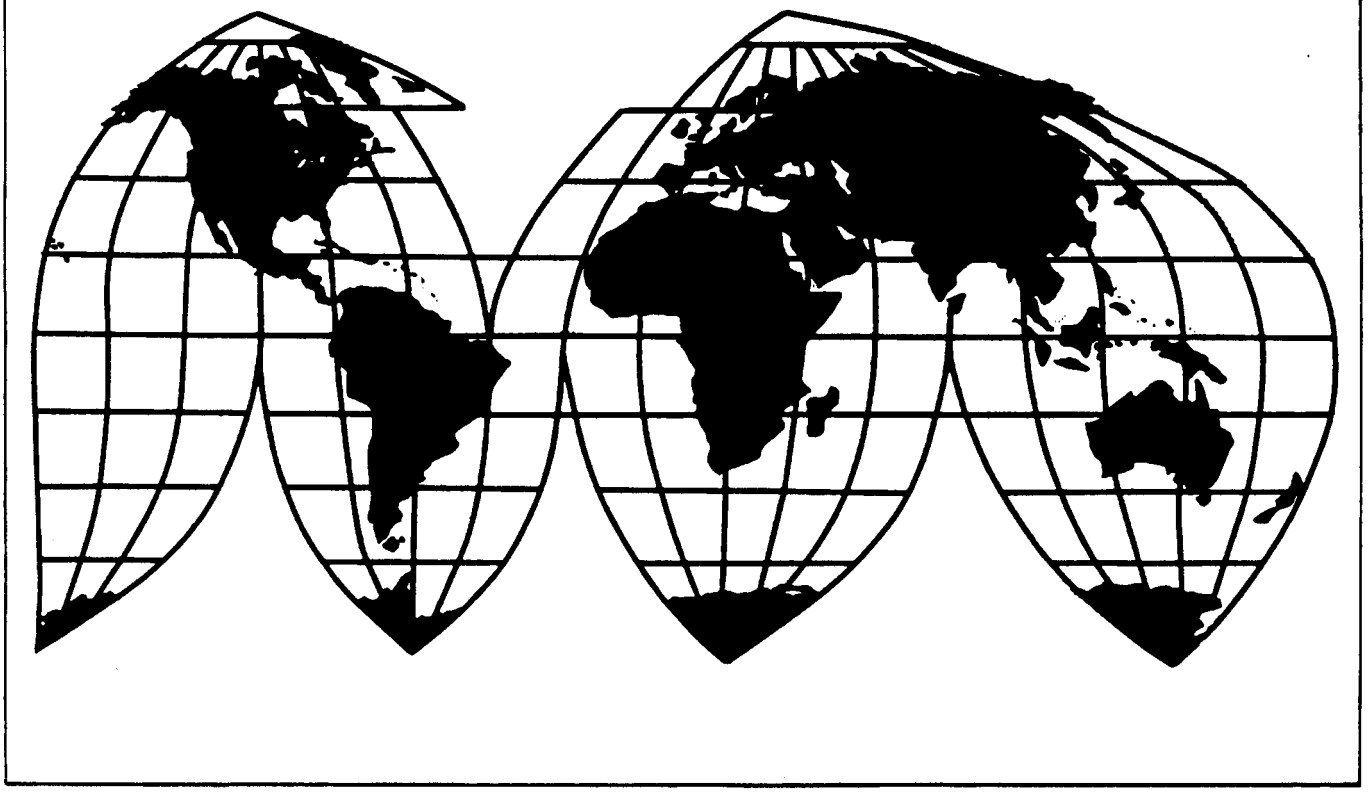
Certain Abrasive Products Made Using a Process for Powder Preforms, and Products Containing Same

Investigation No. 337-TA-449

Publication 3530 **August 2002**

U.S. International Trade Commission



Washington, DC 20436

U.S. International Trade Commission

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Certain Abrasive Products Made Using a Process for Powder Preforms, and Products Containing Same

Investigation No. 337-TA-449

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August 2002

PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, DC 20436

In the Matter of

CERTAIN ABRASIVE PRODUCTS MADE USING A PROCESS FOR POWDER PREFORMS, AND PRODUCTS CONTAINING SAME

Inv. No. 337-TA-449

COMMISSION OPINION ON REMEDY, THE PUBLIC INTEREST, AND BONDING

INTRODUCTION

On February 8, 2002, the presiding administrative judge ("ALJ") issued his final initial determination ("ID") in the above-captioned investigation finding a violation of section 337 of the Tariff Act of 1930 (19 U.S.C. § 1337) by respondent Kinik Company ("Kinik") in the importation and sale of certain abrasive products. On March 29, 2002, the Commission determined not to review the ID, thereby adopting it.

The Commission must now decide the appropriate remedy for the violation, whether the statutory public interest factors preclude such remedy, and the amount of the bond during the Presidential review period.[1] In making those determinations, the Commission has taken into account the ALJ's recommended determination on permanent relief and bonding, as well as the written submissions received from the parties and interested members of the public.[2]

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[1] *See* 19 C.F.R. § 210.50(a) and 19 U.S.C. § 1337(d) and (j)(3).

[2] *See* 19 C.F.R. §§ 210.50(a)(2) and 210.50(a)(4). *See also* 19 U.S.C. § 1337(b)(2) and S. Rep. No. 1298, 93d Cong. 2d Sess. at 195 (1974).

DISCUSSION

I. Background

A. Procedural History

The Commission instituted this investigation on February 5, 2001, based upon a complaint filed on January 5, 2001, by Minnesota Mining & Manufacturing Co. ("3M") of St. Paul, Minnesota and Ultimate Abrasive Systems, LLC ("UAS") of Atlanta, Georgia.[3] Their complaint named Kinik Company ("Kinik") of Taipei, Taiwan and Kinik Corporation ("Kinik Corp.") of Anaheim, California as respondents.

Complainants alleged that respondents had violated section 337 by importing into the United States, selling for importation, and selling within the United States after importation certain abrasive products that are made using a process for making powder preforms that is covered by claims 1, 4, 5, and 8 of U.S. Letters Patent 5,620,489 ("the '489 patent") owned by UAS and exclusively licensed to 3M. The complaint further alleged that an industry in the United States exists as required by subsection (a)(2) of section 337.

Complainants moved to terminate the investigation with respect to the domestic respondent, Kinik Corp., after they concluded that Kinik Corp was not manufacturing or importing products that infringed the '489 patent. The ALJ granted this motion on June 19, 2001, in an ID (Order No. 15), and the Commission determined not to review that ID. On August 8, 2001, the ALJ issued an ID (Order No. 19) that the economic prong of the domestic industry requirement was satisfied with respect to the claims at issue of the '489 patent, and the Commission determined not to review that ID.

An evidentiary hearing was held on October 10-17, 27, and 30, 2001. On February 8, 2002,

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[3] *Notice of Investigation*, 66 Fed. Reg. 9720 (Feb. 9, 2001).

the ALJ issued his final ID, in which he determined that Kinik's DiaGrid® abrasive products are made by a process that infringes claims 1, 4, 5, and 8 of the '489 patent, and that the '489 patent is valid and enforceable. Based upon these findings, he found a violation of section 337.

The ALJ recommended issuance of a limited exclusion order barring importation of all Kinik abrasive products made by a process that infringes the '489 patent, which includes products produced using Kinik's DiaGrid® process. He also recommended issuance of a cease and desist order to Kinik, and a bond during the Presidential review period in the amount of five percent of the entered value of the infringing Kinik products.

On February 21, 2002, Kinik petitioned for review of the ALJ's final ID. Kinik also appealed Order No. 40, issued by the ALJ on October 12, 2001. That order precluded Kinik from asserting 35 U.S.C. § 271(g) as a non-infringement defense.[4] On February 28, 2002, 3M and the Commission investigative attorney ("IA") filed oppositions to Kinik's petition for review and its appeal of Order No. 40. On March 29, 2002, the Commission affirmed Order No. 40 and determined to adopt the ID in its entirety.[5]

B. The Products

The products at issue in this investigation are industrial abrasive products and, more specifically, abrasive products that are made using a particular process which embeds abrasive particles (*e.g.*, industrial diamonds) in a matrix so that they are held securely. The abrasive material made through this process is placed on pads and beads and used in grinding, polishing, and cutting

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[4] The provision of the patent law that Kinik sought to rely upon states that a product which is made by a patented process will no longer be considered to be infringing if it is "materially changed by subsequent processes." 35 U.S.C. § 271(g)(1).

[5] 67 *Fed. Reg.* 16116 (April 4, 2002).

applications. Diamonds, because of their hardness, are often used for grinding, polishing, or cutting hard materials such as silicon, concrete, glass, and stone. Abrasive products that use small diamonds are sometimes called "superabrasives."

The imports at issue in this investigation are Kinik's DiaGrid® products. These are superabrasive products and include wire saw beads, profile wheels, turbo diamond discs, and chemical mechanical planarization ("CMP") pad conditioners.[6] Kinik competes with 3M in the U.S. market for CMP pad conditioners.[7]

CMP pad conditioners are used to condition urethane pads used in the manufacture of semiconductors. During manufacture, semiconductor wafers go through the polishing process known as CMP where excess stocks on a wafer material are removed so as to make the surface flat.[8] Pad conditioning is very important in the manufacture of semiconductor wafers.[9] CMP pad conditioners are used to scrub urethane pads which are in turn used to polish silicon wafers during semiconductor fabrication.[10]

II. Remedy, the Public Interest, and Bonding

When the Commission finds a violation of section 337, as it has here, it must consider the issues of remedy, the public interest, and bonding. 19 U.S.C. §§ 1337 (d), (f), and (j)(3) (1999).

A. Remedy

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[6] Joint Proposed Findings of Fact (JPFF) 16 (Feb. 1, 2002).

[7] JPFF 436.

[8] JPFF 61.

[9] JPFF 60, 64.

[10] JPFF 62

1. Limited Exclusion Order

The ALJ recommended issuance of a limited exclusion order barring importation of all Kinik abrasive products made by a process that infringes claims 1, 4, 5, or 8 of the '489 patent, including those abrasive products made by Kinik's DiaGrid® process. RD at 167. He indicated that the exclusion order should bar imports of DiaGrid® CMP pad conditioners, DiaGrid® wire saw beads, DiaGrid® profile wheels, and DiaGrid® turbo diamond discs. RD at 167. The ALJ also stated that the order should cover only imports for consumption.

The parties agree that if an exclusion order issues, it should be a limited exclusion order, but disagree with respect to the inclusion of certain certification provisions in the limited exclusion order. Kinik and the IA argue that a certification provision should be included that allows for certification that imports do not infringe the '489 patent.[11] The parties also disagree concerning whether a certification provision should be included in the limited exclusion order that would permit imports to be certified as not for consumption in the United States.

The Commission has included certification provisions in exclusion orders where the patent(s) that form the basis of the order cover processes for manufacturing goods and Customs is unable readily to determine how goods sought to be imported were made.[12] The process by which Kinik's abrasive products are made is not readily apparent by inspection. Therefore, a certification provision is appropriate.

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[11] Such a certification provision would permit an importer to certify, after having made an appropriate inquiry, that the products sought to be imported were not made by a process that infringes the patent claims in issue.

[12] *Certain Acid Washed Denim Garments and Accessories,* Inv. No. 337-TA-324, Commission Op. at 23 (Aug. 14, 1992).

3M asserts that a certification provision with respect to infringement could be abused, and seeks an order excluding all of Kinik's DiaGrid® products, without the possibility of certification. However, there is no evidence that Kinik has operated in bad faith, and we have therefore included a certification provision in the limited exclusion order which will permit importers of Kinik's products to certify that the products do not infringe the '489 patent.

However, we also agree with the IA that because certain of Kinik's DiGrid products have already been found to be made by the infringing process, it is reasonable to exclude those products from the certification procedure. This should not impose a burden on Customs as these products are clearly identified with the DiaGrid® mark. These products are DiaGrid® CMP pad conditioners, DiaGrid® wire saw beads, DiaGrid® profile wheels, and DiaGrid® turbo diamond discs.

Kinik also seeks a certification provision that would permit it to certify that imports are not for consumption in the United States. It would then be able to import these products without the use of bonded warehouses or similar procedures. However, Kinik has not identified any rationale for permitting it to circumvent the standard methods for importing for re-export: foreign trade zones and bonded warehouses. Moreover, adopting such a certification procedure for imports for purposes other than consumption could be subject to abuse as it would provide importers with an easy method of circumventing the limited exclusion order. Accordingly, we have not included Kinik's proposed certification provision relating to U.S. consumption in the limited exclusion order.

2. Cease and Desist Order

Section 337(f) permits the Commission to issue, in lieu of or in addition to an exclusion order, a cease and desist order directing persons found to have violated section 337 "to cease and desist from engaging in the unfair methods or acts involved." 19 U.S.C. § 1337(f) (1999). Cease and desist orders

are warranted with respect to domestic respondents that maintain "commercially significant" U.S. inventories of the infringing product.[13]

The ALJ recommended that a cease and desist order be issued against Kinik, based on the fact that Kinik's U.S. distributor, Rodel, Inc., maintains a commercially significant inventory of Kinik's DiaGrid® CMP pad conditioners. RD at 167. 3M and the IA supported this recommendation, while Kinik contended a cease and desist order is not appropriate. Another point of disagreement among the parties was whether the cease and desist order should be directed to Rodel, Inc., which firm is not a respondent in this investigation.

As noted, the Commission generally issues a cease and desist order when there is a commercially significant amount of infringing, imported product in the United States that could be sold so as to undercut the remedy provided by an exclusion order.[14] As Rodel maintains a commercially significant inventory of infringing product in the United States, we find that issuance of a cease and desist order is appropriate in this investigation.[15]

The parties disagree concerning whether Rodel, as a nonrespondent, should be issued a cease

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[13] *See, e.g., Certain Crystalline Cefadroxil Monohydrate,* Inv. No. 337-TA-293, USITC Pub. 2391 at 37-42 (June 1991).

[14] *Flash Memory* at 25; *Certain Condensers, Parts Thereof, and Products Containing Same, Including Air Conditioners for Automobiles*, Inv. No. 337-TA-334, USITC Pub. 3063 (Aug. 27, 1997) Comm. Op. at 27; *Certain Crystalline Cefadroxil Monohydrate*, Inv. No. 337-TA-293, Comm. Op. on Remedy, the Public Interest and Bonding at 37-42, USITC Pub. 2391 (June 1991).

[15] It is undisputed that there is a U.S. inventory of *** worth of infringing DiaGrid® CMP pad conditioners. JPFF 437. This supply would enable Kinik, through its agent Rodel, to continue to supply U.S. customers for an extended period given that this inventory represents *** Rodel's sales for 2001. FF 139; FF 479. It also represents *** percent of 3M's expected sales of its competing product for 2001. *See* JPFF 323. Thus, the U.S. inventory is clearly "commercially significant" relative to 3M, and issuance of a cease and desist order is therefore appropriate.

and desist order. The Commission generally only directs cease and desist orders to respondents in investigations, and we need not depart from that practice in this investigation. This is because a cease and desist order directed to Kinik will also enjoin Kinik's sales through Rodel.[16] The order applies to Kinik and its agents (*i.e.*, Rodel) and enjoins them from importing, selling, advertising, distributing, marketing, consigning, transferring (except for exportation), offering for sale in the United States and soliciting U.S. agents or distributors for the infringing products. Therefore, our cease and desist order, while expressly directed to Kinik, covers Kinik's U.S. agent, Rodel.

B. The Public Interest

Under sections 337(d) and (f), the Commission must provide a remedy if it has found a violation of section 337 unless, after considering the effect of its remedy on (1) the public health and welfare, (2) competitive conditions in the U.S. economy, (3) the U.S. production of articles that are like or directly competitive with those which are the subject of the investigation, and (4) U.S. consumers, it determines that a remedy should not be issued. 19 U.S.C. §§ 1337(e) and (f) (1999).[17]

We do not find that the public health and welfare are implicated by the sale in the United States

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[16] Rodel acts as the agent of Kinik and sells DiaGrid® CMP pad conditioners on consignment for Kinik. FF 147. It is undisputed that Rodel acts as Kinik's U.S. agent and sells infringing CMP pad conditioners to which Kinik retains title. *See* FF 147.

[17] There have been only three section 337 investigations in which consideration of the public interest factors has prevented issuance of a remedy. In *Certain Automatic Crankpin Grinders*, Inv. No. 337-TA-60, USITC Pub. 1022 (1979), relief was denied because of an overriding national policy in maintaining and increasing the supply of fuel efficient automobiles and the domestic industry was unable to supply domestic demand. In *Certain Inclined Field Acceleration Tubes*, Inv. No. 37-TA-67, USITC Pub. 1119 (1980), the Commission denied relief because of the overriding public interest in continuing basic atomic research with the imported acceleration tubes, which were deemed to be of higher quality than the domestic industry's product. In *Certain Fluidized Supporting Apparatus*, Inv. No. 337-TA-182/188, USITC Pub. 1667 (1984), relief was denied because the domestic producer could not supply demand for hospital beds for burn patients within a reasonable time, and there were no therapeutically comparable substitutes available.

of Kinik's infringing products, and there is scant evidence that the U.S. demand for superabrasives could not be supplied by 3M or other manufacturers of noninfringing products.

Kinik and one of its customers, WaferTech (a U.S. consumer of infringing CMP pad conditioners), argue that six months are needed to qualify[18] new CMP pad conditioners for use in the manufacture of semiconductors. They urge the Commission to delay any remedial orders' effective date until January 9, 2003. However, WaferTech does not indicate the size of its operations or explain in any detail how its manufacturing process will be impacted by its inability to purchase Kinik's products. Nor does WaferTech explain how it is that it "only recently [was] made aware of this patent dispute" inasmuch as the Commission's notice of investigation was published in the *Federal Register* over 14 months ago. Kinik apparently chose not to inform its customer that it might no longer be able to supply it with CMP pad conditioners. Given the limited information and argument concerning the interests of U.S. consumers, we do not believe that this factor, or any other public interest factor, weighs in favor of delaying or altering the remedies that are otherwise appropriate in this investigation.

C. **Bonding**

Section 337(j) provides for the entry of infringing articles and sales of such articles from U.S. inventory upon the payment of a bond during the 60-day Presidential review period. The bond is to be set at a level sufficient to "protect complainant from any injury" during the Presidential review period.[19]

The ALJ recommended that the bond be set at a reasonable royalty rate, specifically at five

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[18] Qualification is a process of extensive testing of a product by a user of a product designed to ensure that a particular product meets the user's specifications.

[19] 19 U.S.C. §1337(j). *See also* 19 C.F.R. § 210.50(a)(3) (1998).

percent of the entered value of the products in question. The ALJ found that U.S. prices for Kinik's products are equal to or above the prices for 3M's products. RD at 167. He noted that 3M pays a royalty rate *** of products made using the patented process. RD at 168. He found that a bond of five percent would offset any injury during the Presidential Review period. Kinik and the IA agreed with this recommendation. While 3M has argued for a 100 percent bond, 3M has not offered any evidence that a higher bond is necessary.[20] Therefore, we adopt the ALJ's recommendation that bond during the period of Presidential review be set at five percent of entered value, as well as his findings in support of his recommendation.

D. The Parties' Motions for Leave to File Additional Submissions

On April 24, 2002, 3M filed a motion for leave to respond to the arguments of WaferTech and Rodel. On April 29, 2002, Kinik filed a motion for leave to file a response to 3M's reply submission. In its motion, 3M argued that it was not afforded an opportunity to respond to the non-party submissions as they were filed with the Commission at a time that precluded a response. In its motion, Kinik argued that 3M had raised new arguments in its reply submission to which Kinik needed to respond. While 3M's point with regard to timing is well taken, the nonparty submissions of WaferTech and Rodel do not raise issues that 3M needs to be afforded an opportunity to respond to. We also find that 3M's arguments in its reply submission raising the possibility of inaccurate certifications simply responded to Kinik's contention that a certification provision is appropriate in this investigation and did not raise new issues. We have therefore denied both of the motions for leave to file an additional

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[20] 3M asserted that a wide variety of prices for Kinik's infringing products justifies a 100 percent bond. However, 3M has not established that Kinik's products have a wide variety of prices or that the Commission typically sets a 100 percent bond when prices for the infringing imports are equal to or above the prices for complainants' products.

submission.

ABRASIVE PRODUCTS MADE USING A PROCESS FOR MAKING POWDER PREFORMS, AND PRODUCTS CONTAINING SAME **337-TA-449**

PUBLIC CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached **COMMISSION OPINION ON REMEDY, THE PUBLIC INTEREST, AND BONDING (PUBLIC VERSION)** was served upon all parties via first class mail and air mail where necessary on
July 26, 2002.

Marilyn R. Abbott, Secretary
U.S. International Trade Commission
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PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, DC 20436

In the Matter of	
CERTAIN ABRASIVE PRODUCTS MADE USING A PROCESS FOR POWDER PREFORMS, AND PRODUCTS CONTAINING SAME	Inv. No. 337-TA-449

COMMISSION OPINION AFFIRMING ALJ ORDER NO. 40.

While we have affirmed Order No. 40 issued by the presiding administrative law judge (ALJ), we wish to make clear the reasons we are affirming the Order. We agree with the ALJ's conclusion that the defense to infringement contained in 35 U.S.C. § 271(g) does not apply to investigations conducted pursuant to section 337 of the Tariff Act of 1930. Moreover, we also believe that the ALJ acted within his discretion in not permitting respondent Kinik Company to assert the section 271(g) defense because it was raised too late by Kinik in the investigation.

ALJ Order No. 40

In Order No. 40, issued on October 12, 2001, the ALJ barred Kinik from raising a defense to infringement under 35 U.S.C. § 271(g).[1] If the defense had been permitted, Kinik would have attempted

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[1] Section 271(g) provides in relevant part as follows:

> Whoever without authority imports into the United States or sells or uses within the United States a product which is made by a process patented in the United States shall be liable as an infringer, if the importation, sale, or use of the product occurs during the term of such process patent . . . . A product which is made by a patented process will, for purposes of this title, not be considered to be so made after - -
>
> (1) it is materially changed by subsequent processes; or
>
> (2) it becomes a trivial and nonessential component of another product.

to demonstrate that further heating in its DiaGrid process constitutes a "subsequent process[]" that "materially change[s]" its products, and consequently Kinik does not infringe the claims in issue in the '489 patent.

On September 27, 2001, complainant 3M Corporation ("3M") filed a motion *in limine* seeking to bar the assertion of the section 271(g) defense in this investigation on the ground that the defense is not applicable in section 337 investigations. On October 4, 2001, the ALJ granted complainant's motion in Order No. 33 and found that section 271(g) is not applicable in section 337 investigations.

On October 12, 2001, the ALJ issued Order No. 40 in which he reconsidered Order No. 33 in light of Kinik's opposition to complainant's September 27, 2001, motion.[2] The ALJ again found that the section 271(g) defense could not be asserted in this investigation based upon the authority of two earlier section 337 investigations where it was held that another defense created by the Process Patent Amendments Act could not be raised in section 337 investigations.[3] He further found that Kinik only raised the section 271(g) defense on September 6, 2001, which was more than two weeks after the end of discovery. He indicated that 3M would not have time to prepare a response to Kinik's section 271(g) defense if Kinik were allowed to raise the defense at that time. Order No. 40 at 3.

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35 U.S.C. §271(g).

[2] In Order No. 33, the ALJ relied upon *Amgen, Inc. v. U.S.I.T.C.*, 902 F.2d 1532 (Fed. Cir. 1990) and *Certain Recombinantly Produced Human Growth Hormones*, Inv. No. 337-TA-358, as support for his holding that the section 271(g) defense was not available in this investigation. The ALJ's decision to reconsider Order No. 33 was based on his realization that the cited cases did not support his holding that the defense is unavailable as a matter of law. *See* Order No. 40 at 2.

[3] *See* Order No. 40 (October 12, 2001) at 2 (citing *Certain Plastic Encapsulated Integrated Circuits*, Inv. No. 1337-TA-315, Initial Determination at 108-110 (October 15, 1991); *Certain Methods of Making Carbonated Candy Products,* Inv. No. 337 Order No. 19, Initial Determination Rejecting as a Matter of Law Respondents' Affirmative Defenses Involving Patent Process Legislation at 6 (September 1, 1989)). In these earlier investigations, the defense at issue was the "grandfather clause," a defense which, like the "materially changed" defense, was created by the Process Patent Amendments Act of 1988. Pub. L. No. 100-418, 102 Stat. 1563. The defense was held not to be applicable because of section 9006(c) of the Amendments, which indicated that "[t]he amendments made by [the Process Patent Amendments Act of 1988] shall not deprive a patent owner of any remedies available under ... section 337 of the Tariff Act of 1930, or under any other provision of law." Section 9006(c) of Pub. L. 100-418.

The Section 271(g) Defense to Infringement of U.S. Patents

The Process Patent Amendments Act of 1988 (the "Act"), Pub. L. No. 100-418, 102 Stat. 1563, was passed as part of the Omnibus Trade and Competitiveness Act of 1988, Pub. L. No. 100-418, 102 Stat. 1107. Section 9003 of the Act gave patent owners a new process patent infringement cause of action against importers in the U.S. district courts and is codified as 35 U.S.C. §271(g). It also contained a new "materially changed" defense to infringement. However, the language of the Act in section 9006 also makes clear that section 9003 was not intended to abrogate a remedy available under section 337.

Section 9006(c) of the Act, in our view, disposes of the issue of the defense's application to section 337:

> RETENTION OF OTHER REMEDIES - The amendments made by this subtitle shall not deprive a patent owner of any remedies available . . . under *section 337 of the Tariff Act of 1930*, or under any other provision of law (emphasis added).

The plain meaning of the statute leaves no doubt that the Act was not intended to prevent a patent holder from obtaining a remedy pursuant to section 337.

In addition, section 9003 also explicitly restricts its application to Title 35. Section 271(g) expressly states that the exceptions to infringement contained in sections 271(g)(1) and (2) were "for the purposes of *this title* [*i.e.*, Title 35]." 35 U.S.C. § 271(g) (emphasis added). The plain meaning of this statement is that section 271(g)(1) and (2) exceptions are not to be applied to section 337, which is found in Title 19, not Title 35.

At the time of the passage of the Act, the remedy available at the Commission to patent holders for halting imports infringing a process patent was under old 19 U.S.C. § 1337a. That section did not provide any exception for materially changed products. The proscription against process patent infringement under 19 U.S.C. § 1337a was specifically retained by Congress. Congress, without change, folded 19 U.S.C. § 1337a into section 337 in the very same legislation that contained the process patent

provisions enacting §271(g). Pub. L. No. 100-418, 102 Stat. 1211 at 1212. Given that the new section 271(g) and the incorporation of 19 U.S.C. § 1337a into section 337 were part of the same legislation, it is clear that Congress specifically declined to create new exceptions to infringement in section 337 investigations.

Furthermore, the legislative history of the Act states that it was not Congress' "intention for these provisions to limit in any way the ability of process patent owners to obtain relief from the U.S. International Trade Commission." S. Rep. 83, 100th Cong., 1st Sess. 61 (1987).

Therefore, we find that the ALJ's determination that the section 271(g) defense is not applicable to this investigation is correct as a matter of law.

Furthermore, the ALJ's finding that the section 271(g) defense was asserted too late was not an abuse of discretion. The record reflects that although the investigation was instituted in January 2001, Kinik made no mention of the defense until September 6, 2001, when it filed a response to 3M's motion for summary determination of infringement. The ALJ acknowledged Kinik's assertion of the defense at that time, and noted that September 6, 2001 was "more than a week after the extended discovery cutoff" and approximately one month before trial. ALJ's Order No. 40 at 3. Thus, 3M had no opportunity to obtain discovery concerning the section 271(g) defense.

Kinik asserted in its appeal of Order No. 40 that the parties were on notice of the substance of the defense, if not its legal basis. However, Kinik consistently argued throughout this investigation that it brazed and did not sinter, *not* that it sintered and then materially changed its products through subsequent processing.[4] None of the discovery materials, upon which Kinik relies in its appeal of Order No. 40, indicates that it was arguing that its products were materially changed through subsequent processing during Kinik's DiaGrid process. *See* Kinik's Appeal of Order No. 40 at 11-18. Therefore, 3M had no

[4] *See* Kinik's Appeal of Order No. 40 at 9-11.

reason to seek discovery concerning subsequent processing in Kinik's process.

Given the fact that 3M had obtained no discovery concerning the section 271(g) defense, it was not an abuse of discretion for the ALJ to grant 3M's motion *in limine* and not permit Kinik to present the defense at trial.

ABRASIVE PRODUCTS MADE USING A PROCESS FOR MAKING POWDER PREFORMS, AND PRODUCTS CONTAINING SAME

337-TA-449

PUBLIC CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached **OPINION OF THE COMMISSION AFFIRMING ALJ ORDER NO. 40 (PUBLIC VERSION)** served upon all parties via first class mail and air mail where necessary on **July 26, 2002.**

Marilyn R. Abbott

Marilyn R. Abbott, Secretary
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UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, DC 20436

In the Matter of **CERTAIN ABRASIVE PRODUCTS MADE USING A PROCESS FOR POWDER PREFORMS, AND PRODUCTS CONTAINING SAME**	**Inv. No. 337-TA-449**

NOTICE OF ISSUANCE OF LIMITED EXCLUSION ORDER AND CEASE AND DESIST ORDER

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has issued a limited exclusion order and a cease and desist order in the above-captioned investigation.

FOR FURTHER INFORMATION CONTACT: Michael K. Haldenstein, Esq., Office of the General Counsel, U.S. International Trade Commission, telephone 202-205-3041. Copies of the limited exclusion order, the cease and desist order, the public version of the Commission's opinion, and all other nonconfidential documents filed in connection with this investigation are or will be available for inspection during official business hours (8:45 a.m. to 5:15 p.m.) in the Office of the Secretary, U.S. International Trade Commission, 500 E Street S.W., Washington, D.C. 20436, telephone 202-205-2000.

General information concerning the Commission may also be obtained by accessing its Internet server (*http://www.usitc.gov).* Hearing-impaired persons are advised that information on the matter can be obtained by contacting the Commission's TDD terminal on 202-205-1810. The public record for this investigation may be viewed on the Commission's electronic docket (EDIS-ON-LINE) at *http://dockets.usitc.gov/eol/public.*

SUPPLEMENTARY INFORMATION: The Commission instituted this investigation on February 5, 2001, based upon a complaint filed on January 5, 2001, by Minnesota Mining & Manufacturing Co. ("3M") of St. Paul, Minnesota and Ultimate Abrasive Systems, LLC ("UAS") of Atlanta, Georgia. 66 *Fed. Reg.* 9720 (Feb. 9, 2001). Their complaint named Kinik Company ("Kinik") of Taipei, Taiwan and Kinik Corporation ("Kinik Corp.") of Anaheim, California as respondents.

Complainants alleged that respondents had violated section 337 of the Tariff Act of 1930 by importing into the United States, selling for importation, and selling within the United States after importation certain abrasive products that are made using a process for making powder preforms that is covered by claims 1, 4, 5, and 8 of U.S. Letters Patent 5,620,489 ("the '489 patent"), owned by UAS and exclusively licensed to 3M. The complaint further alleged that an industry in the United States exists as required by subsection (a)(2) of section 337.

Complainants moved to terminate the investigation with respect to Kinik Corp. after they concluded that Kinik Corp was not manufacturing or importing products that infringed the '489 patent. The ALJ granted this motion on June 19, 2001, in an initial determination ("ID") (Order No. 15) and the Commission determined not to review that ID. On August 8, 2001, the ALJ issued an ID (Order No. 19) that the economic prong of the domestic industry requirement was satisfied with respect to the claims at issue of the '489 patent, and the Commission determined not to review that ID.

An evidentiary hearing was held on October 10-17, 27, and 30, 2001. On February 8, 2002, the ALJ issued his final ID, in which he determined that respondent Kinik's accused DiaGrid abrasive products infringed claims 1, 4, 5, and 8 of the '489 patent and that the '489 patent was valid and enforceable. Based upon these findings, he found a violation of section 337.

The ALJ recommended issuance of a limited exclusion order barring importation of all Kinik abrasive products that infringe the '489 patent, which includes products produced using Kinik's DiaGrid process. He also recommended issuance of a cease and desist order against Kinik, and a bond during the Presidential review period in the amount of five percent of the entered value of the infringing Kinik products.

On February 21, 2002, Kinik petitioned for review of the ALJ's final ID. Kinik also appealed Order No. 40, issued by the ALJ on October 12, 2001. That order precluded Kinik from asserting 35 U.S.C. 271(g) as a non-infringement defense. On February 28, 2002, 3M and the Commission investigative attorney ("IA") filed oppositions to Kinik's petition for review and its appeal of Order No. 40.

On March 29, 2002, the Commission determined to affirm Order No. 40 and not to review the ALJ's final ID, and issued a notice to that effect. 67 *Fed. Reg.* 16116 (Apr. 4, 2002). The Commission also issued an opinion explaining its reasons for affirming Order No. 40.

Having determined that a violation of section 337 has occurred in this investigation, the Commission sought comments on and considered the issues of the appropriate form of relief, whether the public interest precludes issuance of such relief, and the bond during the 60-day Presidential review period.

The Commission determined that the appropriate remedy consists of a limited exclusion order prohibiting the importation of the infringing abrasive products manufactured abroad by Kinik Company of Taipei, Taiwan, and a cease and desist order directed to Kinik prohibiting that company from selling or engaging in various other commercial activities relating to such products within the United States. The Commission further determined that the statutory public interest factors do not preclude the issuance of such relief. Finally, the Commission determined that during the Presidential review period importation and sales within the United States should be permitted pursuant to a bond requirement in the amount of five percent of the entered value of the infringing abrasive products.

This action is taken under the authority of section 337 of the Tariff Act of 1930 (19 U.S.C. § 1337) and section 210.50 of the Commission's Rules of Practice and Procedure (19 C.F.R. § 210.50).

By order of the Commission.

Marilyn R. Abbott
Secretary

Issued: May 9, 2002

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of **CERTAIN ABRASIVE PRODUCTS MADE USING A PROCESS FOR MAKING POWDER PREFORMS, AND PRODUCTS CONTAINING SAME**	**Inv. No. 337-TA-449**

LIMITED EXCLUSION ORDER

The Commission has determined that there is a violation of section 337 of the Tariff Act of 1930 (19 U.S.C. § 1337) in the unlawful importation, sale for importation, and sale by respondent Kinik Company ("Kinik") of certain abrasive products manufactured abroad using a process that infringes claims 1, 4, 5, and 8 of U.S. Letters Patent 5,620,489 ("the '489 patent").

Having reviewed the record in this investigation, including the written submissions of the parties, the Commission has made its determination on the issues of remedy, the public interest, and bonding. The Commission has determined that the appropriate form of relief is a limited exclusion order prohibiting the entry for consumption of abrasive articles manufactured by or on behalf of Kinik using a process that infringes the asserted claims of the '489 patent. The Commission has also determined to issue a cease and desist order directed to Kinik.

The Commission has also determined that the public interest factors enumerated in 19 U.S.C. § 1337 (d) and (f) do not preclude issuance of the limited exclusion order or the cease and desist order, and that the bond during the Presidential review period shall be in the amount of five percent of the entered value of the products in question.

Accordingly, the Commission hereby **ORDERS** that:

1. Abrasive products manufactured using a process that infringes one or more of claims 1, 4, 5, and 8 of U.S. Letters Patent 5,620,489 that are manufactured abroad or imported by or on behalf of Kinik Company of Taipei, Taiwan, or any of its affiliated companies, parents, subsidiaries, contractors, or other related business entities, or their successors or assigns, are excluded from entry for consumption into the United States, entry for consumption from a foreign-trade zone, or withdrawal from a warehouse for consumption, for the remaining term of the patent, *i.e.*, until April 8, 2014, except under license of the patent owner or as provided by law.

2. Abrasive products described in paragraph 1 of this Order are entitled to entry for consumption into the United States, entry for consumption from a foreign-trade zone, or withdrawal from a warehouse for consumption, under bond in the amount of five (5) percent of entered value pursuant to subsection (j) of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337(j), from the day after this Order is received by the President until such time as the President

notifies the Commission that he approves or disapproves this action but, in any event, not later than sixty (60) days after the date of receipt of this action.

3. Pursuant to procedures to be specified by the U.S. Customs Service, as the Customs Service deems necessary, persons seeking to import abrasive products described in paragraph 1 of this Order, other than those described below, may certify that they are familiar with the terms of this Order, that they have made appropriate inquiry, and thereupon state that, to the best of their knowledge and belief, the products being imported are not excluded from entry under paragraph 1 of this Order. Such certification shall not be permissible with respect to respondent Kinik's DiaGrid® CMP pad conditioners, DiaGrid® wire saw beads, DiaGrid® profile wheels, and DiaGrid® turbo diamond discs. At its discretion, the Customs Service may require persons who have provided the certification described in this paragraph to furnish such records or analyses as are necessary to substantiate the certification.

4. In accordance with 19 U.S.C. § 1337(l), the provisions of this Order shall not apply to abrasive products that are imported by and for the use of the United States, imported for, and to be used for, the United States with the authorization or consent of the Government.

5. Complainants' Motion for Leave to Respond to Submissions of Rodel, Inc. and WaferTech Concerning Remedy, the Public Interest, and Bonding (Motion Docket No. 449-038C), and Respondent Kinik Company's Motion for

Leave to File Sur Reply to Complainants' Reply Submission (Motion Docket No. 449-039C) are denied.

6. The Commission may modify this Order in accordance with the procedures described in rule 210.76 of the Commission's Rules of Practice and Procedure, 19 C.F.R. § 210.76.

7. The Secretary shall serve copies of this Order upon each party of record in this investigation, upon Rodel, Inc, headquartered at 3804 East Watkins Street, Phoenix, Arizona 85034, and upon the Department of Health and Human Services, the Department of Justice, the Federal Trade Commission, and the U.S. Customs Service.

8. Notice of this Order shall be published in the *Federal Register*.

By Order of the Commission.

Marilyn R. Abbott
Secretary

Issued: May 9, 2002

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of	
CERTAIN ABRASIVE PRODUCTS MADE USING A PROCESS FOR MAKING POWDER PREFORMS, AND PRODUCTS CONTAINING SAME	Investigation No. 337-TA-449

ORDER TO CEASE AND DESIST

IT IS HEREBY ORDERED THAT Kinik Company, 10 Yenping South Road, 100 Taipei City, Taiwan (hereinafter "Kinik"), cease and desist from conducting any of the following activities in the United States: importing, selling, advertising, distributing, marketing, consigning, transferring (except for exportation), offering for sale in the United States and soliciting U.S. agents or distributors for certain abrasive products in violation of section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337.

I.

Definitions

As used in this Order:

(A) "Commission" shall mean the United States International Trade Commission.

(B) "UAS" shall mean Ultimate Abrasive Systems, LLC, 2900 Lookout Place, Atlanta, Georgia.

(C) "3M" shall mean Minnesota Mining and Manufacturing Company, 3M Center, St. Paul, Minnesota.

(D) "Complainants" shall mean 3M and UAS.

(E) "Respondent" and "Kinik" shall mean Kinik Company, 10 Yenping South Road, 100 Taipei City, Taiwan.

(F) "Person" shall mean an individual, or any nongovernmental partnership, firm, association, corporation, or other legal or business entity other than the Respondent or its majority owned or controlled subsidiaries, their successors, or assigns.

(G) "United States" shall mean the fifty States, the District of Columbia, and Puerto Rico.

(H) The terms "import" and "importation" refer to importation for entry for consumption, entry for consumption from a foreign-trade zone, and withdrawal from warehouse for consumption under the Customs laws of the United States.

(I) The term "covered product" shall mean abrasive products that are manufactured abroad by Kinik using a process that infringes one or more of claims 1, 4, 5, and 8 of U.S. Letters Patent 5,620,489.

II.

Applicability

The provisions of this Cease and Desist Order shall apply to Respondent and to any of its principals, stockholders, officers, directors, employees, agents, licensees, contractors, distributors, controlled (whether by stock ownership or otherwise) and majority owned business entities, successors, and assigns, and to each of them, insofar as they are engaging in conduct prohibited by Section III, *infra*, for, with, or otherwise on behalf of Respondent.

III.

Conduct Prohibited

The following conduct of Respondent in the United States is prohibited by the Order. For the remaining term of U.S. Letters Patent 5,620,489, Respondent shall not:

(A) import or sell for importation into the United States covered product except under license of the patent owner;

(B) market, distribute, offer for sale, sell, consign, or otherwise transfer (except for exportation) in the United States imported covered product except under license of the patent owner;

(C) advertise covered product for sale in the United States except under license of the patent owner;

(D) solicit U.S. agents or distributors for covered product except under license of the patent owner; or

(E) aid or abet other entities in the importation, sale for importation, sale after importation, transfer, or distribution of covered product in the United States except under license of the patent owner.

IV.

Conduct Permitted

Notwithstanding any other provision of this Order, specific conduct otherwise prohibited by the terms of this Order shall be permitted if, in a written instrument, the owner of U.S. Letters Patent 5,620,489 licenses or authorizes such specific conduct, or such specific conduct is related to the importation or sale of covered product by or for the United States.

V.

Reporting

For purposes of this reporting requirement, the reporting periods shall commence on January 1 of each year and shall end on the subsequent December 31. However, the first report required under this section shall cover the period from the date of issuance of this Order through December 31, 2002. This reporting requirement shall continue in force until such time as Respondent will have truthfully reported, in two consecutive timely filed reports, that it has no inventory of covered product in the United States.

Within thirty (30) days of the last day of the reporting period, Respondent shall report to the Commission the quantity in units and the value in dollars of covered product that Respondent has imported or sold in the United States after importation during the reporting period and the quantity in units and value in dollars of reported covered product that remain in inventory in the United States at the end of the reporting period.

Any failure to make the required report or the filing of any false or inaccurate report shall constitute a violation of this Order, and the submission of a false or inaccurate report may be referred to the U.S. Department of Justice as a possible criminal violation of 18 U.S.C. § 1001.

VI.

Record Keeping and Inspection

(A) For the purpose of securing compliance with this Order, Respondent shall retain any and all records relating to the sale, offer for sale, marketing, or distribution in the United States of covered product, made and received in the usual and ordinary course of business, whether in detail or in summary form, for a period of two (2) years from the close of the fiscal year to which

they pertain.

(B) For the purposes of determining or securing compliance with this Order and for no other purpose, and subject to any privilege recognized by the federal courts of the United States, duly authorized representatives of the Commission, upon reasonable written notice by the Commission or its staff, shall be permitted access and the right to inspect and copy in Respondent's principal offices during office hours, and in the presence of counsel or other representatives if Respondent so chooses, all books, ledgers, accounts, correspondence, memoranda, and other records and documents, both in detail and in summary form as are required to be retained by subparagraph VI(A) of this Order.

VII.

Service of Cease and Desist Order

Respondent is ordered and directed to:

(A) Serve, within fifteen (15) days after the effective date of this Order, a copy of this Order upon each of its respective officers, directors, managing agents, agents, and employees who have any responsibility for the marketing, distribution, or sale of imported covered product in the United States;

(B) Serve, within fifteen (15) days after the succession of any persons referred to in subparagraph VII (A) of this Order, a copy of the Order upon each successor; and

(C) Maintain such records as will show the name, title, and address of each person upon whom the Order has been served, as described in subparagraphs VII(A) and VII(B) of this Order, together with the date on which service was made.

The obligations set forth in subparagraphs VII(B) and VII(C) shall remain in effect until, April 8, 2014, the date of expiration of U.S. Letters Patent 5,620,489.

VIII.

Confidentiality

Any request for confidential treatment of information obtained by the Commission pursuant to Sections V and VI of the Order should be in accordance with section 201.6 of the Commission Rules of Practice and Procedure. 19 C.F.R. § 201.6. For all reports for which confidential treatment is sought, Respondent must provide a public version of such report with confidential information redacted.

IX.

Enforcement

Violation of this Order may result in any of the actions specified in section 210.75 of the Commission's Rules of Practice and Procedure, 19 C.F.R. § 210.75, including an action for civil penalties in accordance with section 337(f) of the Tariff Act of 1930, 19 U.S.C. § 1337(f), and any other action as the Commission may deem appropriate. In determining whether Respondent is in violation of this Order, the Commission may infer facts adverse to Respondent if Respondent fails to provide adequate or timely information.

X.

Modification

The Commission may amend this Order on its own motion or in accordance with the procedure described in section 210.76 of the Commission's Rules of Practice and Procedure, 19 C.F.R. § 210.76.

XI.

Bonding

The conduct prohibited by Section III of this Order may be continued during the sixty (60) day period in which this Order is under review by the President pursuant to section 337(j) of the Tariff Act of 1930, 19 U.S.C. § 1337(j), subject to Respondent posting a bond of five (5) percent of entered value of the products in question. This bond provision does not apply to conduct that is otherwise permitted by Section IV of this Order. Covered product imported on or after the date of issuance of this order is subject to the entry bond as set forth in the limited exclusion order issued by the Commission, and is not subject to this bond provision.

The bond is to be posted in accordance with the procedures established by the Commission for the posting of bonds by complainants in connection with the issuance of temporary exclusion orders. *See* 19 C.F.R. § 210.68. The bond and any accompanying documentation is to be provided to and approved by the Commission prior to the commencement of conduct which is otherwise prohibited by Section III of this Order.

The bond is to be forfeited in the event that the President approves, or does not disapprove within the Presidential review period, this Order, unless the U.S. Court of Appeals for the Federal Circuit, in a final judgment, reverses any Commission final determination and order as to Respondent on appeal, or unless Respondent exports the products subject to this bond or destroys them and provides certification to that effect satisfactory to the Commission.

The bond is to be released in the event the President disapproves this Order and no subsequent order is issued by the Commission and approved, or not disapproved, by the President, upon service on Respondent of an order issued by the Commission based upon

ABRASIVE PRODUCTS MADE USING A PROCESS FOR MAKING POWDER PREFORMS, AND PRODUCTS CONTAINING SAME

337-TA-449

PUBLIC CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached **Notice of Issuance of Limited Exclusion Order and Cease and Desist Order** was served upon all parties via first class mail and air mail where necessary on **May 10, 2002.**

Marilyn R. Abbott, Secretary
U.S. International Trade Commission
500 E Street, SW - Room 112
Washington, DC 20436

ON BEHALF OF MINNESOTA MINING AND MANUFACTURING COMPANY AND ULTIMATE ABRASIVE SYSTEMS, LLC:

Ralph A. Mittelberger, Esq.
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1666 K Street, NW - Suite 300
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ON BEHALF OF KINIK CO.:

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Morgan, Lewis and Bockius, LLP
1701 Market Street
Philadelphia, PA 19103-2921

Anthony C. Roth, Esq.
Morgan, Lewis and Bockius, LLP
1111 Pennsylvania Avenue, NW
Washington, DC 20004

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, DC 20436

In the Matter of

CERTAIN ABRASIVE PRODUCTS MADE USING A PROCESS FOR POWDER PREFORMS, AND PRODUCTS CONTAINING SAME

Inv. No. 337-TA-449

NOTICE OF COMMISSION DECISION TO AFFIRM ALJ ORDER NO. 40 AND NOT TO REVIEW A FINAL INITIAL DETERMINATION FINDING A VIOLATION OF SECTION 337; SCHEDULE FOR FILING WRITTEN SUBMISSIONS ON REMEDY, THE PUBLIC INTEREST, AND BONDING

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has determined not to review the final initial determination (ID) issued by the presiding administrative law judge (ALJ) on February 8, 2002, finding a violation of section 337 of the Tariff Act of 1930, 19 U.S.C. § 1337, in the above-captioned investigation, and determined to affirm ALJ Order No. 40 issued by the ALJ on October 12, 2001.

FOR FURTHER INFORMATION CONTACT: Michael K. Haldenstein, Esq., Office of the General Counsel, U.S. International Trade Commission, telephone 202-205-3041. General information concerning the Commission may also be obtained by accessing its Internet server (*http://www.usitc.gov*). Hearing-impaired persons are advised that information on the matter can be obtained by contacting the Commission's TDD terminal on 202-205-1810.

Copies of the public version of ALJ Order No. 40, the Commission's opinion affirming that Order, the ID, and all other nonconfidential documents filed in connection with this investigation are or will be available for inspection during official business hours (8:45 a.m. to 5:15 p.m.) in the Office of the Secretary, U.S. International Trade Commission, 500 E Street S.W., Washington, D.C. 20436, telephone 202-205-2000.

SUPPLEMENTARY INFORMATION: The Commission instituted this investigation on February 5, 2001, based upon a complaint filed on January 5, 2001, by Minnesota Mining & Manufacturing Co. ("3M") of St. Paul, Minnesota and Ultimate Abrasive Systems, LLC ("UAS") of Atlanta, Georgia. 66 *Fed. Reg.* 9720 (Feb. 9, 2001). Their complaint named Kinik Company ("Kinik") of Taipei, Taiwan and Kinik Corporation ("Kinik Corp.") of Anaheim, California as respondents.

Complainants alleged that respondents had violated section 337 by importing into the United States, selling for importation, and selling within the United States after importation certain abrasive products that are made using a process for making powder preforms that is covered by claims 1, 4, 5, and 8 of U.S. Letters Patent 5,620,489 ("the '489 patent"), owned by UAS and exclusively licensed to 3M. The complaint further alleged that an industry in the United States exists as required by subsection (a)(2) of section 337.

Complainants moved to terminate the investigation with respect to Kinik Corp. after they concluded that Kinik Corp was not manufacturing or importing products that infringed the '489 patent. The ALJ granted this motion on June 19, 2001, in an ID (Order No. 15) and the Commission determined not to review that ID. On August 8, 2001, the ALJ issued an ID (Order No. 19) that the economic prong of the domestic industry requirement was satisfied with respect to the claims at issue of the '489 patent, and the Commission determined not to review that ID.

An evidentiary hearing was held on October 10-17, 27, and 30, 2001. On February 8, 2002, the ALJ issued his final ID, in which he determined that Kinik's accused DiaGrid abrasive products infringed claims 1, 4, 5, and 8 of the '489 patent and that the '489 patent was valid and enforceable. Based upon these findings, he found a violation of section 337.

The ALJ recommended issuance of a limited exclusion order barring importation of all Kinik abrasive products that infringe the '489 patent, which includes products produced using Kinik's DiaGrid process. He also recommended issuance of a cease and desist order, and a bond during the Presidential review period in the amount of 5 percent of the entered value of the infringing Kinik products.

On February 21, 2002, Kinik petitioned for review of the ALJ's final ID. Kinik also appealed Order No. 40, issued by the ALJ on October 12, 2001. That Order precluded Kinik from asserting 35 U.S.C. 271(g) as a non-infringement defense. On February 28, 2002, 3M and the Commission investigative attorney (IA) filed oppositions to Kinik's petition for review and its appeal of Order No. 40.

Having reviewed the record in this investigation, including the parties' written submissions, the Commission has determined to affirm Order No. 40 and not to review the ID in its entirety. The Commission will issue an opinion explaining its reasons for affirming Order No. 40.

In connection with final disposition of this investigation, the Commission may issue (1) an order that could result in the exclusion of the subject articles from entry into the United States, and/or (2) cease and desist orders that could result in Kinik being required to cease and desist from engaging in unfair acts in the importation and sale of such articles. Accordingly, the Commission is interested in receiving written submissions that address the form of remedy, if any, that should be ordered. If a party seeks exclusion of an article from entry into the United States for purposes other than entry for consumption, the party should so indicate and provide information establishing that activities involving other types of entry either are adversely affecting it or are likely to do so. For background information, see the Commission Opinion, Certain Devices for Connecting Computers via Telephone Lines, Inv. No. 337-TA-360, USITC Publication 2843 (Dec. 1994).

If the Commission contemplates some form of remedy, it must consider the effects of that remedy upon the public interest. The factors the Commission will consider include the effect that an exclusion order and/or cease and desist orders would have on (1) the public health and welfare, (2) competitive conditions in the U.S. economy, (3) U.S. production of articles that are like or directly competitive with those that are subject to investigation, and (4) U.S. consumers. The Commission is therefore interested in receiving written submissions that address the aforementioned public interest

factors in the context of this investigation.

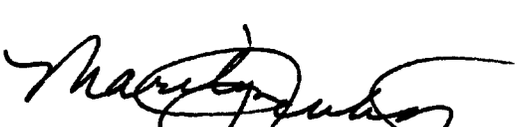
If the Commission orders some form of remedy, the President has 60 days to approve or disapprove the Commission's action. During this period, the subject articles would be entitled to enter the United States under a bond, in an amount to be determined by the Commission and prescribed by the Secretary of the Treasury. The Commission is therefore interested in receiving submissions concerning the amount of the bond that should be imposed.

WRITTEN SUBMISSIONS: The parties to the investigation, interested government agencies, and any other interested parties are encouraged to file written submissions on remedy, the public interest, and bonding. Such submissions should address the February 8, 2002 recommended determination by the ALJ on remedy and bonding. Complainant and the IA are also requested to submit proposed remedial orders for the Commission's consideration. The written submissions and proposed remedial orders must be filed no later than the close of business on April 11, 2002. Reply submissions must be filed no later than the close of business on April 18, 2002. No further submissions will be permitted unless otherwise ordered by the Commission.

Persons filing written submissions must file with the Office of the Secretary the original and 14 true copies thereof on or before the deadlines stated above. Any person desiring to submit a document (or portion thereof) to the Commission in confidence must request confidential treatment unless the information has already been granted such treatment during the proceedings. All such requests should be directed to the Secretary of the Commission and must include a full statement of the reasons why the Commission should grant such treatment. See 19 C.F.R. § 201.6. Documents for which confidential treatment is granted by the Commission will be treated accordingly. All nonconfidential written submissions will be available for public inspection at the Office of the Secretary.

This action is taken under the authority of section 337 of the Tariff Act of 1930, 19 U.S.C. § 1337, and sections 210.42, 210.43, 210.45, 210.46, and 210.50 of the Commission's Rules of Practice and Procedure, 19 C.F.R. §§ 210.42, 210.43, 210.45, 210.46, and 210.50.

By order of the Commission.



Marilyn R. Abbott
Secretary

Issued: March 29, 2002

ABRASIVE PRODUCTS MADE USING A PROCESS FOR MAKING POWDER PREFORMS, AND PRODUCTS CONTAINING SAME

337-TA-449

PUBLIC CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached NOTICE OF COMMISSION DECISION TO AFFIRM ALJ ORDER NO. 40 AND NOT TO REVIEW A FINAL INITIAL DETERMINATION FINDING A VIOLATION OF SECTION 337; SCHEDULE FOR FILING WRITTEN SUBMISSIONS ON REMEDY, THE PUBLIC INTEREST AND BONDING, was served upon all parties via first class mail and air mail where necessary on March 29, 2002.

Marilyn R. Abbott, Secretary
U.S. International Trade Commission
500 E Street, SW - Room 112
Washington, DC 20436

ON BEHALF OF MINNESOTA MINING AND MANUFACTURING COMPANY AND ULTIMATE ABRASIVE SYSTEMS, LLC:

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PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION

Washington, D.C.

In the Matter of **CERTAIN ABRASIVE PRODUCTS MADE USING A PROCESS FOR MAKING POWDER PREFORMS, AND PRODUCTS CONTAINING SAME**

Inv. No. 337-TA-449

INITIAL DETERMINATION CONCERNING VIOLATION OF SECTION 337 AND RECOMMENDED DETERMINATION ON ISSUES CONCERNING PERMANENT RELIEF

(February 8, 2002)

Appearances

Ralph A. Mittelberger, Esq., Harold H. Fox, Esq., Joseph V. Colaianni, Jr., Esq., Andrew Kopsidas, Esq., on behalf of Complainant, Minnesota Manufacturing & Mining Company and Ultimate Abrasive Systems, L.L.C.

Anthony C. Roth, Esq., Allison L. Parlin, Esq., Jennifer M. Lee, Esq., Nathan W. McCutcheon, Esq., on behalf of Respondent, Kinik Co.:

Karen J. Norton, Esq., and T. Spence Chubb, Esq., Office of Unfair Import Investigations, U.S. International Trade Commission, Washington, D.C., on behalf of the Commission Investigative Staff

Delbert R. Terrill, Jr., Administrative Law Judge

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STATEMENT OF THE CASE

On January 5, 2001, Complainants Minnesota Mining and Manufacturing Company and Ultimate Abrasive Systems L.L.C. (collectively "3M") filed a Section 337 complaint with the Commission. The Complaint, as supplemented on January 18, 2001, alleged violations of Section 337 in the importation into the United States, the sale for importation, and the sale within the United States after importation of certain abrasive products made using a process for making powder preforms, and products containing same, on the part of Respondent Kinik Company ("Kinik")[1] by reason of infringement of claim 1[2] of United States Letters Patent 5,620,489 ("the '489 patent"). The Complaint further alleged that there exists an industry in the United States with respect to the patent at issue.

On February 6, 2001, the Commission instituted this investigation by the publication of a Notice of Investigation in the Federal Register. 66 Fed. Reg. 9720-21 (February 9, 2001).

The hearing regarding this investigation was held on October 10-17, 25, and 30, 2001 and closing argument was made on November 28, 2001. During the course of the hearing, fifteen witnesses testified and 218 exhibits received.

Background

Parties

3M is a Delaware corporation with its principal place of business located in St. Paul, Minnesota. 3M is engaged in the business of designing and manufacturing industrial products such as coated and uncoated abrasives, adhesives, and pressure sensitive tapes; transportation, graphics, and safety products; health care products; consumer and office products; home improvement products, including surface preparation and wood-finishing materials; specialty products such as protective materials for furniture, fabrics, and paper; and high performance fluids used in the manufacture of computer chips.

Complainant Ultimate Abrasive Systems, L.L.C. ("UAS") is a limited liability corporation existing under the laws of Georgia with its principal place of business located

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[1]As instituted, this investigation named two Respondents, Kinik Company and Kinik Corporation, a California company with no corporate relationship to Kinik Company. When 3M ascertained through discovery that Kinik Corporation was not involved in the acts at issue in this investigation, 3M moved to terminate Kinik Corporation. The undersigned granted the motion by an Initial Determination in Order No. 15, issued on June 19, 2001. By notice issued on July 9, 2001, the Commission determined not to review that Initial Determination; as a result, the Initial Determination became a determination of the Commission pursuant to 19 C.F.R. § 210.42(h)(3).

[2]3M amended the Complaint and Notice of Investigation, granted by an Initial Determination in Order No. 16 issued on June 19, 2001, to include infringement of claims 4, 5, and 8 of the '489 patent. By notice issued on July 10, 2001, the Commission determined not to review that Initial Determination; as a result, the Initial Determination became a determination of the Commission pursuant to 19 C.F.R. § 210.42(h)(3).

in Atlanta, Georgia. UAS is engaged in the business of developing and exploiting intellectual property rights relating to powder metal and other technologies.

Respondent Kinik is a Taiwanese corporation with an address at 10 Yenping South Road, Chung Cheng District, Taipei City, Taiwan, Republic of China. Kinik is engaged in the business of manufacturing abrasive articles, including bonded abrasive products, coated abrasive products, superabrasive products, polycrystalline diamond tools, grinding wheels and segments and dressers. The products at issue are the abrasive products Kinik manufactures using its DiaGrid® manufacturing process.

Products at Issue

Abrasive Products in General

Abrasive products can abrade or wear off the surface of other materials and are used, for example, as cutting, drilling, and grinding tools. They are manufactured using superabrasive or abrasive particles. Superabrasive particles are abrasive particles with a high degree of hardness, such as diamonds, cubic boron nitride, and tungsten carbide. Due to their hardness, diamonds are often used for grinding, polishing or cutting hard materials such as silicon, concrete, glass and stone. These abrasive particles are secured or embedded onto a substrate in such a way that the particles are sufficiently firmly attached that they can withstand the forces exerted on them when the abrasive product is used without becoming detached. Sometimes it is desirable for the abrasive particles to have a precise and repeatable pattern of placement and depth in the metallic matrix, and for the matrix itself to be corrosion resistant. Generally, abrasive particles are secured onto a substrate by overlaying the substrate with a thin metallic layer that bonds both to the substrate and to the hard particles. Metal bonds can be created in several ways, including by sintering and brazing, two metallurgical processes relevant to this investigation.

The prior art methods for making abrasive articles involved forming a hard, stiff and brittle preform, known as a "green compact," by subjecting a combination of powdered sinterable matrix material and abrasive particles to pressure, and then sintering the green compact. The prior art also included using non-compacted powder mixtures in a mold, or powders sprayed onto a substrate previously sprayed with an adhesive. "Green compacts" are held together by mechanical interactions between particles resulting from subjecting the particles to pressure and forcing them to interlock with each other. Sometimes, a small amount of wax or oil is added to the particles before they are compacted as a processing aid. Problems associated with "green compacts" include: a lack of flexibility during the manufacturing process; stiffness and/or brittleness that results in breakage; uneven powder distribution [often resulting from the molding of non-compacted powders]; a difficulty in dispersing abrasive particles throughout the green compact preform; the difficulty and inefficiency in forming a green compact by pressing abrasive particles into its surface; and, environmental hazards and loss of powdered material upon flexion of sprayed preforms.

The '489 patent teaches a method of making abrasive articles in which soft, easily deformable and flexible ("SEDF") preforms are created, and on or within which abrasive particles, such as diamonds, may be randomly or systematically distributed. The advantages

of using a SEDF preform in the manufacturing of abrasive articles include: easier production of corrugated shapes and profiled shapes with less pressure; easier and more uniform distribution of the metal powders within a mold; and, improved worker safety due to the minimization of airborne powder particles.

Accused Products of Respondent Kinik

The accused products are DiaGrid® products, including CMP Pad Conditioners, wire saw beads and profile wheels. Only these three DiaGrid® abrasive products are commercially available in the United States. Kinik's DiaGrid® profile wheels have been offered for sale, but not yet sold, in the United States. Kinik also has certain DiaGrid® products that are being developed, but are not yet commercially available in the United States, including [ ] While samples of the [ ] have been provided to 3M, there have been no sales of the [ ] in the United States. All Kinik DiaGrid® products are manufactured in Taiwan and imported and distributed in the States directly by Kinik or by Rodel, Inc. of Phoenix, Arizona.

Patent at Issue

The only patent asserted by 3M against the forgoing Kinik DiaGrid® products is the '489 patent.

'489 Patent

The '489 patent, entitled "Method for Making Powder Preform and Abrasive Articles Made Therefrom," was issued by the United States Patents & Trademark Office ("PTO") on April 15, 1997, as a continuation of an application filed on April 8, 1994. The named inventor, Naum N. Tselesin, assigned the patent to Ultimate Abrasive Systems, Inc., which then assigned the patent to a successor company, UAS. On December 22, 1993, before the '489 patent was issued, UAS entered into an agreement with 3M pursuant to which UAS gave 3M certain rights with respect to its portfolio of patents and invention disclosures. The invention disclosures to which 3M obtained rights included the disclosure that resulted in the '489 patent and as a result, 3M obtained the rights to practice and enforce the '489 patent. In connection with this agreement, 3M also retained UAS' principal, Dr. Tselesin, as a consultant. The '489 patent contains an independent claim, claim 1, to an improved process for making abrasive articles and 61 claims that depend from Claim 1, including claims 4, 5, and 8 . 3M asserts claims 1, 4, 5 and 8 against Kinik.

JOINT NARRATIVE STATEMENT OF ISSUES

On September 12, 2001, 3M, Kinik, and Staff submitted a Joint Narrative Statement of Issues to be heard and decided. Included in that Statement were:

> Issue I: Importation: Whether Kinik imports into the United States, sells for importation, or sells within the United States after importation DiaGrid® abrasive articles made in Taiwan?

Issue II: Level of Ordinary Skill in the Art: What is the level of ordinary skill in the art relevant to the '489 patent?

Issue III: Claim Construction for the '489 patent:

Issue III.A: What is the proper construction of claim 1 of the '489 patent?

Issue III.B: What is the proper construction of claim 4 of the '489 patent?

Issue III.C: What is the proper construction of claim 5 of the '489 patent?

Issue III.D: What is the proper construction of claim 8 of the '489 patent?

Issue IV: Infringement

Issue IV.A: Whether each limitation of claim 1 of the '489 patent is met by Kinik's DiaGrid® process, either literally or by a substantial equivalent?

Issue IV.B: Whether each limitation of claim 4 of the '489 patent is met by Kinik's DiaGrid® process, either literally or by a substantial equivalent?

Issue IV.C: Whether each limitation of claim 5 of the '489 patent is met by Kinik's DiaGrid® process, either literally or by a substantial equivalent?

Issue IV.D: Whether each limitation of claim 8 of the '489 patent is met by Kinik's DiaGrid® process, either literally or by a substantial equivalent?

Issue V: Invalidity:

Issue V.A: Whether the asserted claims of the '489 patent are indefinite in violation of 35 U.S.C. § 112 ¶ 2?

Issue V.B: Whether the asserted claims of the '489 patent are invalid as obvious under 35 U.S.C. § 103 in view of the prior art?

Issue VI: Domestic Industry:

Issue VI.A: Economic prong: Whether an industry relating to articles made by a process covered by one or more claims of the '489 patent exists in the United States?

Issue VI.B: Technical Prong: Whether 3M practices one or more claims of the '489 patent?

STIPULATED FACTS

3M, Kinik, and Staff agree to the following stipulated facts:

A. THE PARTIES

JPFF 1. Minnesota Mining and Manufacturing Company ("3M") is a Delaware corporation having its principal place of business at 3M Center, St. Paul, Minnesota 55144. Amended Complaint ¶ 2.1

JPFF 2. Ultimate Abrasives Systems, LLC ("UAS") is a limited liability corporation existing under the laws of Georgia and having its principal place of business at 2900 Lookout Place, Atlanta, Georgia 30305. Amended Complaint ¶ 2.3.

JPFF 3. UAS is the assignee and owner of U.S. Patent No. 5,620,489 ("the '489 patent"), and has granted 3M an exclusive license to the '489 patent. Amended Complaint ¶ 1.3; Visser, Tr. 505:6-22; CX-41C.

JPFF 4. 3M paid [ ] for an exclusive license to the '489 patent and other patents and know-how. Hrg. Tr. at 505:17-22.

JPFF 5. 3M manufactures and sells superabrasive products including cam shoes, bonded wheels, and chemical-mechanical planarization ("CMP") pad conditioning disks. Visser, Tr. 507:7-19; 509:13-19; 511:2-10; CX-53; CPX-26.

JPFF 6. 3M manufactures its cam shoes, bonded wheels and CMP pad conditioners at Building 19, Cottage Grove, Minnesota. Visser, Tr. 511:16-20.

JPFF 7. 3M sells sintered abrasive products including wheel dressers, cam shoes, and pad conditioners. Hrg. Tr. at 507:7-19.

JPFF 8. 3M is a world leader in the design and manufacture of industrial products including coated and uncoated abrasives, adhesives, and pressure sensitive tapes; transportation, graphics, and safety products; health care products; consumer and office products such as Scotchâ Tape and Post-itâ Notes; home improvement products including surface preparation and wood-finishing materials; specialty products such as protective materials for furniture, fabrics, and paper; and high performance fluids used in the manufacture of computer chips. *See* Complaint.

JPFF 9. UAS is a corporation having a principal place of business in Atlanta, Georgia. CX-41.

JPFF 10. UAS is the owner of the patent at issue. Order No. 24 (September 18, 2001); Order No. 25 (September 20, 2001).

JPFF 11. 3M is the exclusive licensee of the patent at issue and is engaged in the design, development, manufacture and marketing of abrasive products including pad conditioners. CX-41, Order No. 19 (August 8, 2001).

JPFF 12. Dr. Tselesin is the principal of UAS. *See* CX-41.

JPFF 13. Kinik Company ("Kinik") is a Taiwanese corporation with its principal place of business at 10 Yenping South Road, Chung Cheng District, Taipei City, Taiwan, Republic of China. Response of Kinik Company to the Amended Complaint, 3.1.; Sung Tr. At 579; CX-391

JPFF 14. Kinik is the largest manufacturer of abrasive articles in Taiwan and one of the largest manufacturers of abrasive articles in Asia. Sung Tr. 579; CX-57C; CX-60C; RX-27.

JPFF 15. Kinik offers over 100,000 different items including bonded abrasive products, coated abrasive products, superabrasive products, polycrystalline diamond tools, grinding wheels and segments and dressers. Sung Tr. at 579; CX-391.

JPFF 16. Kinik's superabrasive products include DiaGrid® pad conditioners, DiaGrid® beads, DiaGrid® wire saws and wire saw beads, DiaGrid® profile wheels, and DiaGrid® dressers. CX-391; CX-60; RX-27; RX-50; RFA 1, 2, 3, 4, 5.

JPFF 17. Kinik's DiaGrid® products are imported into the United States and distributed in the United States directly by Kinik or by Rodel, Inc. of Phoenix, Arizona. CX-358; CX-379.

JPFF 18. Kinik maintains an inventory of products at Rodel's Phoenix, Arizona facility. CX-373 C; CX-375 C.

JPFF 19. The Kinik-Rodel relationship is spelled out in a License Agreement, CX-380 C, a Market Channel and Supply Agreement, CX-381 C, and a Joint Development Agreement, CX-382 C.

JPFF 20. Kinik has a place of business at No. 64 Chung Shan Road, Ying Ge Town, Taipei County, Taiwan, Republic of China. Response of Kinik Company to the Amended Complaint, ¶ 3.1; CX-57C; CX-60C.

JPFF 21. Kinik offers a complete line of bonded abrasive products, including vitrified, resinoid, rubber and magnesia oxychloride etc., coated abrasive products, polycrystalline diamond tools and superabrasive products, including diamond and cubic boron nitride wheels, and CMP pad conditioners, for use in the construction, mechanical and electronic industries. CX-391C; CX-304C.

JPFF 22. Kinik maintains a manufacturing facility in Taipei where it manufactures its DiaGrid® products, including DiaGrid® pad conditioners. Order No. 24 (September 18, 2001).

JPFF 23. On January 5, 2001, 3M and UAS (together, "Complainants") filed a Complaint with the United States International Trade Commission ("Commission") pursuant to Section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337, requesting that the Commission commence an investigation into and remedy the alleged unlawful importation into the United States, the sale for importation, or the sale within the United States after importation of abrasive articles, including but not limited to CMP pad conditioners that are allegedly made or produced under, or by means of, a process that infringes claim 1 of the '489 patent. Complaint, ¶¶ 1.1, 1.5, 6.1; Notice of Investigation at 1.

JPFF 24. A supplement to the Complaint was filed on January 18, 2001. Notice of Investigation at 1.

JPFF 25. The Complaint, as supplemented, alleges violations of section 337 in the importation into the United States, the sale for importation, and the sale within the United States after importation of certain abrasive products made using a process for making powder preforms, and products containing same, by reason of infringement of claim 1 of the '489 patent. Notice of Investigation at 1.

JPFF 26. The Complaint further alleges that an industry in the United States exists as required by subsection (a)(2) of section 337. Notice of Investigation at 1.

JPFF 27. On February 5, 2001, the Commission ordered that "pursuant to subsection (b) of section 337 of the Tariff Act of 1930, as amended, an Investigation be instituted to determine whether there is a violation of subsection (a)(1)(B) of section 337 in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain abrasive products made using a process for making powder preforms, and products containing same, by reason of infringement of claim 1 of U.S. Letters Patent 5,620,489 and whether an industry in the United States exists as required by subsection (a)(2) of section 337." Notice of Investigation at 2.

JPFF 28. A Notice of Investigation issued on February 6, 2001 naming Kinik Company and Kinik Corporation as Respondents. Notice of Investigation at 2.

JPFF 29. On June 8, 2001, Complainants moved to terminate this Investigation as to Respondent Kinik Corporation pursuant to Rule 210.21(a), 19 C.F.R. § 210.21(a).

JPFF 30. On June 19, 2001, the presiding administrative law judge, Honorable Delbert R. Terrill, Jr., issued an Initial Determination granting Complainants' motion for partial termination of this Investigation and terminating the Investigation as to Kinik Corporation. Order No. 15 at 2.

JPFF 31. The Commission determined not to review Judge Terrill's initial determination terminating the Investigation as to Respondent Kinik Corporation based on withdrawal of the allegations in the Complaint relating to Kinik Corporation. Notice of Commission Decision Not to Review Initial Determination Terminating the Investigation as To Respondent Kinik Corporation at 1.

JPFF 32. On June 8, 2001, Complainants moved for leave to amend the Complaint and Notice of Investigation to include allegations that Kinik infringes dependent claims 4, 5, and 8 of the '489 patent.

JPFF 33. On June 19, 2001, the presiding administrative law judge, Honorable Delbert R. Terrill, Jr., issued an Initial Determination granting Complainants' motion for leave to amend the Complaint and Notice of Investigation to include allegations that Kinik infringes dependent claims 4, 5, and 8 of the '489 patent. Order No. 16.

JPFF 34. The Commission determined not to review Judge Terrill's initial determination granting Complainants' motion for leave to amend the Complaint and Notice of Investigation to include allegations that Kinik infringes dependent claims 4, 5, and 8 of the '489 patent. Notice of Commission Decision Not to Review Initial Determination Amending the Complaint and Notice of Investigation.

JPFF 35. The Complaint, as amended, alleges violations of section 337 in the importation into the United States, the sale for importation, and the sale within the United States after importation of certain abrasive products made using a process for making powder preforms, and products containing same, by reason of infringement of claims 1, 4, 5 and 8 of the '489 patent. Notice of Investigation at 1. Amended Complaint, ¶¶ 1.1, 1.5, 6.1.

JPFF 36. Complainants allege that the process Kinik uses to manufacture its DiaGrid products infringes claims 1, 4, 5, and 8 of the '489 patent. Order No. 23 (September 12, 2001).

JPFF 37. The Complaint, as amended, alleges that there exists a domestic industry with respect to the '489 patent. Amended Complaint 8.1-8.4.

JPFF 38. U.S. Patent No. 5,620,489 ("the '489 patent") is entitled "Method for Making Powder Preform and Abrasive Articles Made Therefrom." Order No. 24 (September 18, 2001); Order No. 25 (September 20, 2001).

JPFF 39. The '489 patent issued on April 15, 1997 as a continuation of an application filed on April 8, 1994. CX-1, RX-1.

JPFF 40. The named inventor, Naum Tselesin, assigned the application to UAS. CX-1; RX-1; Order No. 24 (September 18, 2001); Order No. 25 (September 20, 2001).

JPFF 41. UAS and 3M entered into an exclusive license agreement for, inter alia, the '489 patent on December 22, 1993. CX-41.

JPFF 42. Only claims 1, 4, 5 and 8 of the '489 patent are asserted in this case. Amended Complaint; Joint Narrative Statement of Issues ("JNSI") at 3-15.

JPFF 43. Claim 1 is the only independent claim of the '489 patent. CX-1, 16:37-45; Williamson, Tr. 1270:13-21.

JPFF 44. All of the remaining claims of the '489 patent depend from claim 1, either directly or indirectly, including asserted claims 4, 5, and 8, and therefore incorporate all the limitations of claim 1. CX-1, col. 16, ll. 52-57, 62-63. Order No. 23 (September 12, 2001).

JPFF 45. Claim 4 of the '489 patent states:

> The method of claim 1, wherein the plurality of abrasive particles are included in the preform by placing the particles on at least one side of the preform and urging the particles into said preform.

CX-1, 16: 52-55.

JPFF 46. Claim 5 of the '489 patent states:

> The method of claim 4, wherein the abrasive particles are urged into the preform before the preform is sintered.

CX-1, 16:56-57.

JPFF 47. Claim 8 of the '489 patent states:

> The method of claim 1, wherein the abrasive particles are included in the preform in a non-random pattern.

CX-1, 16: 62-63.

JPFF 48. As issued, the '489 patent contained an independent claim to an improved process for making abrasive articles (claim 1) and 61 dependent claims relating to this process and abrasive articles made by it. CX-1; CX-2.

JPFF 49. Dr. Naum Tselesin is the inventor of the '489 patent. CX-1.

JPFF 50. In December 1993, 3M and UAS entered into a license agreement, CX-41C, which was executed by Naum Tselesin, the inventor of the '489 patent, on behalf of UAS.

JPFF 51. On December 22, 1993, UAS entered into an Agreement with 3M. CX-41.

JPFF 52. Pursuant to their Agreement, as amended, UAS gave 3M rights with respect to its portfolio of patents and invention disclosures. CX-41.

JPFF 53. The invention disclosures to which 3M obtained rights included the disclosure

that resulted in the '489 patent. CX-1; CX-41.

JPFF 54. The rights that 3M obtained included the rights to practice and enforce the '489 patent. CX-41.

JPFF 55. 3M paid UAS [

] in exchange for rights to UAS's portfolio of patents and invention disclosures. CX-41.

JPFF 56. In connection with their Agreement, 3M and Dr. Tselesin also entered into [ ] CX-41.

JPFF 57. The '489 patent relates to a method of making abrasive articles and more specifically to the use of soft, flexible and easily deformable powdered pieces as preforms for the manufacture of abrasive articles. CX-1, col. 1, ll. 12-15, col. 2, ll. 56-65.

JPFF 58. Abrasive articles are items that can abrade or wear off the surface of other materials and are used for example as cutting, drilling and grinding tools. Strong Tr. 81-82; CX-1, col. 1, ll. 43-46; SX-1 at 46, 105; SX-2 at 5, 77; SX-3 at 4; SX-6 at 1; Strong Tr. 81-82.

JPFF 59. A pad conditioner is an abrasive article used to scrub a porous urethane pad that in turn is used to polish a silicon wafer during the manufacture of integrated circuits. Visser Tr. 507-08; Strong Tr. 141-42.

JPFF 60. Pad conditioning is one of the most important aspects of the CMP process. CX-358.

JPFF 61. During their manufacture, semiconductor wafers go through a polishing process known as chemical mechanical planarization ("CMP") where excess stocks on a wafer material are removed so as to make the surface flat. RX-31; CX-47.

JPFF 62. The semiconductor wafers are polished by porous urethane pads which are roughly thirty inches in diameter. Visser, Tr. 508:4-7; RX-282C.

JPFF 63. These porous urethane polishing pads use a polishing substance known as slurry that contains both chemicals and suspended abrasives. RX-31; Visser, Tr. 508:10-12; RX-282C.

JPFF 64. CMP pad conditioners are a very critical part of the process of manufacturing silicon semiconductor wafers because they determine the surface condition of the pad that determines how the wafer is polished. Visser, Tr. 508:12-15; CX-47; RX-282C.

JPFF 65. CMP pad conditioners are used to condition the polishing pads in situ. Visser, Tr. 508:7-10.

JPFF 68. CMP pad conditioners are designed to achieve an optimized dressing or polishing rate in accordance with a customer's specifications. RX-31; Visser, Tr. 508:15-16.

JPFF 69. Each diamond dresser pad conditioner can contain thousands of abrasive particles, frequently diamonds, known as "diamond grits." Visser, Tr. 508:3; RX-31.

JPFF 70. In order to maintain the highest quality of CMP performance, several factors are critical with regard to the diamond grits: diamond retention, diamond separation, diamond leveling, and diamond exposure. RX-31; CX-47; CX-53.

JPFF 71. Diamond grits must be firmly anchored to the pad so they will not fall out when they are dragged over the pad. Sung, Tr. 616:12-617:5; RX-31; RX-282C.

JPFF 74. In the polishing process, the CMP pad conditioner is exposed to the polishing acid slurry which can damage the pad conditioning diamond disk. CX-47.

JPFF 75. Kinik was founded in 1953. CX-326C.

JPFF 76. Dr. James Chien-Min Sung ("Dr. Sung") joined Kinik in 1996 as its Vice-President. Sung, Tr. 575:19-22; 1041:11-12.

JPFF 77. The DiaGrid® process involves [ ] Sung, Tr. 594:18-25; RX-4C; CX-330C (K000138).

JPFF 78. The braze powder currently used in the DiaGrid® process is [ ] braze powder, with a size of [ ] Sung, Tr. 1062:2-6; 1062:21-1063:1; German, Tr. 1449:1-2.

JPFF 79. A size of [ ] means that the particles are no greater in diameter than approximately [ ] German, Tr. 377:1-9; Shiue, Tr. 666:3-8, 666:14-22.

JPFF 80. In the past, the braze powder used in the DiaGrid® process was [ ] Sung, Tr. 593:14-20.

JPFF 81. [ ] are both classified as [ ] alloys by the American Welding Society. Shiue, Tr. 647:22-648:14; RX-45C (K000384A).

JPFF 82. [ ] Sung, Tr. 595:11-596:12; CPX-2A.

JPFF 83. [ ] is used by Kinik to make pad conditioners using the

DiaGrid® process. Sung, Tr. 588:3-19.

JPFF 84. A [ ] is used by Kinik to make DiaGrid® profile wheels and DiaGrid® wire saw beads using the DiaGrid® process. Sung, Tr. 588:3-589:1.

JPFF 85. [ ] Hwang, Tr. 779:15-18, 780:9-11; CPX-2A.

JPFF 86. [ ] Hwang, Tr. 779:19-780:8.

JPFF 87. [ ] RX-37C, RX-41C, RX-217C (K001732), RDX-1C, CPX-2A.

JPFF 88. From his work at Kinik, Dr. Sung is familiar with the evolution of the use of the term DiaGrid® and its abbreviation, "DG." Sung, Tr. 1069:9-20.

JPFF 89. All DiaGrid® products are manufactured in Taiwan. CX-57C; CX-60C.

JPFF 90. Kinik and Rodel, Inc. ("Rodel") entered into a Market Channel and Supply Agreement in July 2000. CX-428, CX-381C.

JPFF 91. Rodel has operations throughout the United States, Asia and Europe with its global business headquarters in Phoenix and its manufacturing and research headquarters in Newark, Delaware. CX-304C.

JPFF 92. The Market Channel and Supply Agreement has not been modified since it was executed on July 1, 2000 and is still in effect. CX-428, CX-381C.

JPFF 93. Kinik and Rodel have also entered into a Joint Development Agreement for the co-development of conditioning disc products for use in the CMP field. CX-382C.

JPFF 94. The Joint Development Agreement has not been modified since it was executed on January 31, 2001 and is still in effect. CX-428C.

JPFF 95. Kinik and Rodel have entered into a License Agreement for the licensing by Rodel of Kinik's intellectual property in connection with the manufacture and sale of conditioning products. CX-380C; CX-428.

JPFF 96. The License Agreement has not been modified since it was executed on January 31, 2001 and is still in effect. CX-428C.

JPFF 97. With respect to sales of Kinik's DiaGrid® CMP pad conditioners made in Taiwan, Rodel is Kinik's market channel supplier in the United States. CX-428; CX-381C.

JPFF 98. With the exception of the DiaGrid® CMP pad conditioners, Rodel does not sell or offer for sale any other DiaGrid® products made by Kinik in Taiwan. CX-428.

JPFF 99. Kinik sells its DiaGrid® wire saw beads directly to end-users in the United States. Sung, Tr. 1072:21-22.

JPFF 100. On September 12, 2000, Rodel issued a press release, CX-304C, announcing that it had signed an agreement with Kinik to co-develop CMP pad conditioners and to serve as Kinik's global market channel for its pad conditioners. CX-428C; CX-304C.

JPFF 101. Prior to the issuance of this press release, Rodel had not written any marketing brochures or materials or given any presentations to potential customers regarding the DiaGrid® pad conditioners. CX-428.

JPFF 102. In connection with its promotion, marketing and sales of DiaGrid® CMP pad conditioners, Rodel has written promotional materials including brochures and presentations based on information provided by Kinik. Sung, Tr. 1083:18-1084:9; 1165:3-1167:24; 1175:11-1176:13; CX-428C; RX-261C; RX-262C; RX-264C; CX-358C; CX-379C.

JPFF 103. Dr. A. Brent Strong was qualified as an expert to testify regarding the formation of a soft, easily deformable and flexible preform and the inclusion of abrasive particles. Dr. Strong was accepted as a person of ordinary skill in the art with respect to sintering. Strong Tr. 73-74; CX-127.

JPFF 104. Professor Strong was not qualified at the hearing as an expert on sintering. Strong, Tr. 59:13-16; 73:23-74:4; 74:22-25.

JPFF 105. Professor Strong admitted that the '489 patent relates to the conversion of composite material into an abrasive article. Strong, Tr. 77:7-8.

JPFF 106. Professor Strong admitted that a person of ordinary skill in the art would have experience in the making of composite parts into various abrasive articles and other composite parts into other types of articles besides those which might be used for abrasives. Strong, Tr. 150: 17-151:6.

JPFF 107. Professor Strong considered that his experience in composites, including researching, teaching, writing several books in the area and serving as head of the international society for composites, was relevant to his understanding of the claims of the '489 patent. Strong, Tr. 76:24-77:9.

JPFF 108. Dr. Randall German was qualified as an expert in mechanical engineering and materials engineering. German Tr. 259; CX-121.

JPFF 109. Complainants' expert witness, Professor Randall M. German, was qualified at the hearing as an expert on sintering. German, Tr. 259:3-16.

JPFF 110. Professor German has not taken any classes in brazing and has not taught any classes in brazing. German, Tr. 438:23-25; 1474:17-22.

JPFF 111. Professor German has not written any books on brazing. German, Tr. 439:1-3.

JPFF 112. Professor German admitted that the relevant art is the art of powder metallurgy, ceramics, cemented carbides and some composite fields. German, Tr. 267:7-9.

JPFF 113. Professor German admitted that one of ordinary skill in the art would have experience in powder metallurgy, ceramics, cemented carbides and some composite fields, including the making of abrasive articles. German, Tr. 266:22-267:11.

JPFF 114. Dr. Ren-Kae Shuie was qualified as an expert in metallurgy and materials science, including sintering and brazing. Shuie Tr. 634, 638-39; RX-271.

JPFF 115. Kinik's expert witness, Dr. Ren-Kae Shiue, earned his bachelor of science in mechanical engineering from the National Taiwan University in 1986, his master of science in materials engineering from the National Taiwan University in 1988 and a Ph.D. in materials science and engineering from the Massachusetts Institute of Technology in June 1996, where he studied under Dr. Eager. Shiue, Tr. 636:1-25; RX-271.

JPFF 116. Dr. Shiue was qualified as an expert at the hearing. Shiue, Tr. 628:21-25.

JPFF 117. Dr. J. Brian Williamson was qualified as an expert. Williamson Tr. 1235, 1236; CX-118.

JPFF 118. Dr. Eagar is the Thomas Lord Professor of Materials Engineering and Engineering Systems at the Massachusetts Institute of Technology ("MIT"). RX-293.

JPFF 119. Dr. Eagar was graduated from MIT in 1972 with a bachelor of science degree in metallurgy and materials science and in 1975 with a doctorate degree in metallurgy. RX-293.

JPFF 120. Dr. Eagar was qualified as an expert at the hearing. Eagar, Tr. 1719:1-11.

JPFF 121. Kinik's Vice-President, Dr. Sung, earned an associate degree in metallurgy from Taipei Institute of Technology in 1966 and a bachelor's degree in geology from the National Taiwan University in 1972. Sung, Tr. 1039:4-12.

JPFF 122. Dr. Sung earned a Ph.D. in geochemistry from the MIT in 1976. Sung, Tr. 1039:4-12.

JPFF 123. In addition to his responsibilities as Vice-President of Kinik, Dr. Sung currently teaches superhard materials and diamond synthesis at the Taipei University of Technology. Sung, Tr. 1041:20-1042:1.

JPFF 124. Complainant 3M's employee, Mr. Robert G. Visser, earned a bachelor of science degree in ceramic engineering from Iowa State University. During his coursework he studied

sintering. Visser, Tr. 545:18-546:15.

JPFF 125. Mr. Visser joined 3M in 1974, where he worked for several years in the research group of the abrasives division, eventually supervising and managing the group. Visser, Tr. 504:11-14.

JPFF 126. In 1993, Mr. Visser was promoted to the position of manager in the Superabrasives and Microfinishing Systems Division ("SMSD"). Visser, Tr. 504:14-16; 897:3-5.

JPFF 127. As a manager in the SMSD, Mr. Visser was responsible for developing a line of superabrasive products. Visser, Tr. 504:15-18.

JPFF 129. Robert Visser is 3M's technical director in charge of sintered abrasive product development. Hrg. Tr. at 504:11-505:2.

JPFF 130. As technical director Mr. Visser oversees product development efforts for 3M's sintered abrasive technology. Visser, Tr. 504:23-505:2.

JPFF 131. Robert Visser is at least ordinarily skilled in the relevant art. Hrg. Tr. at 504:6-22; 545:18-546:15.

JPFF 132. Robert Visser is knowledgeable regarding 3M's acquisition of certain rights to the '489 patent and its related technology. Hrg. Tr. at 505:14-22.

JPFF 138. Complainant 3M's employee, Dr. Vincent J. Laraia, received his bachelor's degree in engineering, with an emphasis in materials and metallurgical engineering, from the Stevens Institute of Technology. Laraia, Tr. 896:4-11.

JPFF 139. Dr. Laraia later received masters and doctorate degrees from Carnegie-Mellon in materials and metallurgical engineering. Laraia, Tr. 896:12-23.

JPFF 140. Since 1997, Dr. Laraia has been employed in SMSD at 3M. Laraia, Tr. 896:24-897:7.

JPFF 141. From May 1997 until May 2000, Dr. Laraia held the position of product development specialist. Laraia, Tr. 898:1-14.

JPFF 142. From May 2000 until May 2001, he held the position of advanced product development specialist. Laraia, Tr. 898:1-8.

JPFF 143. Throughout his employment at 3M, Dr. Laraia's responsibilities have included the development and commercialization of superabrasive products incorporating sintered abrasive technology. Laraia, Tr. 897:8-13.

JPFF 158. Kinik imports into the United States, sells for importation or sells within the

United States after importation certain DiaGrid® abrasive products made in Taiwan using the DiaGrid® process. JNSI at 2.

JPFF 159. Kinik's DiaGrid® CMP pad conditioners have been imported into the United States, sold for importation in the United States, or sold in the United States after importation. Sung, Tr. 1140:9-11; CX-428.

JPFF 160. Kinik's DiaGrid® wire saw beads have been imported into the United States, sold for importation in the United States, or sold in the United States after importation. Sung, Tr. 583:20-584:1; 1141:9-11.

JPFF 161. One of ordinary skill in the art relevant to the '489 patent has at least one year of experience in the relevant industry, and may have a bachelor's degree in a related science field. Order No. 23 (September 12, 2001).

JPFF 162. The claims at issue are method claims. Strong, Tr. 166:12-15, 168:16-20.

JPFF 163. Claim 1 is the only independent claim of the '489 patent, and it states:

> In a method for making an abrasive article wherein a plurality of abrasive particles and a quantity of powdered sinterable matrix material are combined together and sintered to form the article, the improvement comprising
>
> forming a soft, easily deformable and flexible preform from a mixture of said quantity of powdered sinterable matrix material and a liquid binder composition,
>
> including a plurality of abrasive particles at least partially in said preform and
>
> then sintering said preform to form said abrasive article.

CX-1 ('489 patent) at col. 16, ll. 36-45.

JPFF 164. The first portion of claim 1 ("In a method for making an abrasive article wherein a plurality of abrasive particles and a quantity of powdered sinterable matrix material are combined together and sintered to form the article") is the preamble. CX-1.

JPFF 165. The preamble of claim 1 states: "In a method for making an abrasive article wherein a plurality of abrasive particles and a quantity of powdered sinterable matrix material are combined together and sintered to form the article." CX-1, 16:37-40.

JPFF 166. Green compacts are held together by mechanical interactions between particles. Strong Tr. at 80:15, 153:12-18; CX-1, col. 1:29-2:29.

JPFF 167. The mechanical interactions that hold green compacts together result from subjecting powdered sinterable matrix material to pressure and forcing the particles to interlock with each other. Strong Tr. at 80:3-15; CX-1, col. 2:11-19.

JPFF 168. There have been difficulties when green compacts were used to form abrasive articles. Strong Tr. at 82-83.

JPFF 169. A green compact is a fragile material. Strong Tr. at 82-83.

JPFF 170. If diamonds were mixed with the powdered sinterable material before forming the green compact, there are issues in molding that complicates the uniformity of distribution of the diamond particles throughout that green compact. Strong Tr. at 83:18-20.

JPFF 171. Green compacts are difficult to shape. Strong Tr. at 83:12.

JPFF 172. A person of ordinary skill in the art would understand that an "abrasive article" is an article that can wear off the surface of something else. Strong Tr. at 81:21.

JPFF 173. A person of ordinary skill in the art would understand that an abrasive particle can be any one of a number of very hard particles including diamonds and cubic boron nitride particles. Strong Tr. at 81-82.

JPFF 174. Abrasive particles are very hard. Strong at 82:7-9; SX-1; SX-2.

JPFF 175. A person of ordinary skill in the art would understand that, in the context of the '489 patent, a powdered sinterable matrix material is a powder that can be sintered. Strong Tr. at 87:21-22.

JPFF 176. In the Preparation of Preform section of the Detailed Description, the word "flexibility" appears only once, in describing that the binder composition should be selected to "provide integrity and flexibility to the final preform." CX-1, 4:60-63.

JPFF 177. Green compacts were known in the prior art. Strong, Tr. 79:25-80:12.

JPFF 178. Prior art green compacts could include abrasive particles. Strong, Tr. 83:3-9.

JPFF 179. Prior art green compacts may have some binder. Strong, Tr. 153:5-8, 193:9-14; 1678:7-10.

JPFF 180. All asserted claims, claims 1, 4, 5, and 8, of the '489 patent require "forming a soft, easily deformable and flexible preform." CX-1, col. 16, ll. 36-45, 52-57, 62-63. Order No. 23 (September 12, 2001).

JPFF 181. Each word in the "forming" step of claim 1 ("forming a soft, easily deformable and flexible preform from a mixture of said quantity of powdered sinterable matrix material and a liquid binder composition") has a commonly understood meaning for persons of ordinary skill in the relevant art. Strong Tr. at 83:24-95:11.

JPFF 182. Some terms in the "forming" step, such as "preform," and "liquid binder composition," have technical meanings that are well understood by persons of ordinary skill in the art. Strong Tr. at 83:24-95:11.

JPFF 183. Other terms in claim 1, such as "soft," "easily deformable," and "flexible," mean the same thing to persons of ordinary skill in the art as to other persons familiar with the English language. Strong Tr. at 83:24-95:11.

JPFF 184. A person of ordinary skill in the art would understand a "powdered sinterable matrix material" to be a powder that can be heated and sintered. Strong Tr. at 84; CX-1, col. 13:28-16:28.

JPFF 185. A person of ordinary skill in the art would understand a "liquid binder composition" to be a liquid glue and to include common ordinary, glue like materials. Strong Tr. at 85:3-18.

JPFF 186. A person of ordinary skill in the art would understand that a binder is a material that holds other things together. Strong Tr. at 152:24-53:4.

JPFF 187. The '489 patent's specification states that "[t]he binder composition may be organic or inorganic, but should be selected to carry the particles of the powder, keep the powder suspended, and provide integrity and flexibility to the final preform," and suggests other desirable attributes. CX-1, col. 4:61-63.

JPFF 188. The '489 patent's specification states that those skilled in the art will understand that many materials will be acceptable as binder compositions, and identifies specific products as examples of suitable liquid binders. CX-1, col. 5:14-26.

JPFF 189. Nothing in the '489 patent suggests that "liquid binder composition" is being used in some way different from "liquid glue." Strong Tr. at 85.

JPFF 190. A person of ordinary skill in the art would understand that a "preform" is a composition that can be shaped and hold its shape, at least temporarily, in anticipation of subsequent processing. Strong Tr. at 86:5-9; *see also* SX-6.

JPFF 191. The '489 patent confirms the definition of "preform" through its figures and its discussion of the uses of the preform and the way in which diamonds are put into it. Strong Tr. at 86:17-22.

JPFF 192. The specification of the '489 patent describes preforms in detail, illustrates them in the figures, and describes how they are prepared and used. *See* CX-1, cols. 4:45-7:42, 10:63-13:46.

JPFF 193. Nothing in the patent suggests that any other definition of "preform" was intended. Strong Tr. at 87:1-7.

JPFF 194. "Soft" does not have a technical meaning for persons of ordinary skill in the art. Strong Tr. at 88:11-13.

JPFF 195. "Soft" means that a person can press something into it." Strong Tr. at 90:10.

JPFF 196. "Deformable" means capable of having its shape changed, and "easily deformable" means capable of having its shape changed by the application of a relatively small amount of force. Williamson Tr. at 1319:22, 1320:22-25.

JPFF 197. The specification of the '489 patent repeatedly mentions cutting the preform with a paper cutter or scissors into a desirable shape. CX-1.

JPFF 198. Nothing in the '489 patent's prosecution history suggests that any other meaning of "easily deformable" was intended. Strong Tr. at 91; Preston Tr. at 1020.

JPFF 199. A person of ordinary skill in the relevant art would understand that, taken together, "soft, easily deformable and flexible" preforms made during the first step of claim 1 of the '489 patent are in contrast to the "hard, stiff and brittle" green compacts in the prior art. Strong Tr. at 84.

JPFF 200. "Soft" means "yielding to physical pressure," "permitting someone or something to sink in," "of a consistency that may be shaped or molded," "capable of being spread," and "lacking relatively or comparatively in hardness." SX-1 at 1120; *accord*, SX-2 at 1249; Preston Tr. 1020.

JPFF 201. "Deform" means "to alter the shape of by stress" usually accompanied by a change in dimension. SX-1 at 334; *accord,* SX-2 at 349; SX-6 at 91; Strong Tr. 91; Preston Tr. 1020; Williamson Tr. 1319, 1320.

JPFF 202. "Flexible" refers to the capability of being flexed where "flex" means "to bend especially repeatedly." SX-1 at 472; *accord,* SX-2 at 504; SX-3 at 772; SX-6 at 129; Strong Tr. 94; Preston Tr. 1020; Williamson Tr. 1261-1262.

JPFF 203. A "preform" is simply "the initial fabrication of a shape." SX-6 at 249; Strong Tr. 86, 1645-46.

JPFF 204. The '489 patent specification contrasts the use of a soft, easily deformable and flexible preform into which abrasive particles are pressed with the hard and brittle green

compacts previously used in the making of abrasive articles. CX-1, col. 1, ll. 11-16, col. 1, ll. 29-37, col. 2, ll. 11-20, col. 2, ll. 56-65. Strong Tr. 190; Preston Tr. 1017-18.

JPFF 205. The advantages of a soft, easily deformable and flexible preform include a more uniform distribution of the metal powders within a mold (CX-1, col. 7, ln. 65 - col. 8, ln. 5), and facilitating the formation of corrugated shapes (CX-1, col. 8, ll. 7-11) and profiled shapes requiring less pressure (CX-1, col. 11, ll. 41-50).

JPFF 206. Unlike the prior art green compact, a soft, easily deformable and flexible preform can be fitted to almost any variety of complex forms. Strong Tr. 126, 129-30.

JPFF 207. Sinterable matrix material may be metal powder or other materials but at a minimum, powdered metals are sinterable matrix material. Strong Tr. 82; German Tr. 272.

JPFF 208. A liquid binder composition is a glue such as the multitude of compounds provided as exemplars in the patent specification. Strong Tr. 85

JPFF 209. The '489 specification provides multiple examples of binder-powder mixtures. *See, e.g.,* CX-1, col. 4, ll. 46-52, col. 5, ll. 27-38, col. 13, ll. 28-33, col. 13, ll. 59-64, col. 14, ll. 14-19, col. 14, ll. 48-53, col. 15, ll. 18-24, col. 15, ll. 47-52.

JPFF 210. Claim 10 of the '489 patent includes, *inter alia*, the limitation:

> said soft, easily deformable and flexible preform is formed from a slurry or paste of said mixture of powdered sinterable matrix material and liquid binder composition, . . . with the volume of the liquid binder composition in the mixture being greater than the volume of the powdered sinterable matrix material

CX-1, col. 17, ll. 1-8.

JPFF 211. A "plurality" is two or more. Strong Tr. at 73.

JPFF 212. Step "b" of claim 1 of the '489 patent requires that the method include: including a plurality of abrasive particles at least partially in said preform. CX-1, 16:43-44.

JPFF 213. "Plurality" means two or more items. A plurality of abrasive particles means two or more abrasive particles. Strong Tr. 72-73.

JPFF 214. The phrase "including a plurality of abrasive particles at least partially in said preform" has no special meaning to one of ordinary skill in the art and it is not specially defined in the specification. CX-1.

JPFF 215. The phrase "including a plurality of abrasive particles at least partially in said preform" means that two or more abrasive particles are placed in the preform with some portion of the abrasive particles below the surface of the preform. Strong Tr. 72.

JPFF 216. The '489 patent specification and drawings show numerous examples with abrasive particles both within the preform (*e.g.*, CX-1, Fig. 1, Fig. 6, Fig. 7, Fig. 10, Fig. 11, Fig. 18, Fig. 20, Fig. 21, Fig. 24, Fig. 25, Fig. 27; col. 3, ll. 39-42, col. 5, ll. 44-47, col. 6, ll. 44-49, col. 10, ll. 65-66) and implanted on one surface of the preform (*e.g.*, CX-1, Fig. 2, Fig. 3, Fig. 4, Fig. 10, Fig. 11; col. 3, ll. 46-47, col. 5, ll. 58-61, col. 6, ll. 33-36, col. 6, ll. 44-49).

JPFF 217. A person of ordinary skill in the art would understand that the preform made during the "forming" and the "diamond placing" steps is being sintered. CX-1; Strong Tr. at 1622.

JPFF 218. A person of ordinary skill in the art would understand that, at first, there are relatively few bonds among the particles and individual particles can still be seen in solid state sintering, but if the powder is kept at this temperature, the bonds between them begin to get big enough so that they overlap. German Tr. at 277.

JPFF 219. A person of ordinary skill in the art would understand that the interparticle bonds that form during sintering are called "necks." German Tr. at 280.

JPFF 220. A person of ordinary skill in the art would understand that the particles and the consolidated mass that they form remain completely solid during solid state sintering. German Tr. at 278; Laraia Tr. at 914; Palmgren Tr. at 930.

JPFF 221. A person of ordinary skill in the art would understand that if only one alloy powder is present during liquid phase sintering, the liquid can come from the partial melting of the powder particles. German Tr. at 278.

JPFF 222. A person of ordinary skill in the art would understand that if two alloys or elemental metals are present during liquid phase sintering, the liquid can form if one alloy or metal melts. German Tr. at 278, 282-85.

JPFF 223. A person of ordinary skill in the art would understand that, during liquid phase sintering, solid particles bond and grow, and the liquid metal facilitates this sintering. German Tr. at 284.

JPFF 224. A person of ordinary skill in the art would understand that if heating continues above the liquidus temperature of the original alloy, there can be complete melting of the original alloy. German Tr. at 286.

JPFF 225. Professor German testified that the *Metals Handbook* definition of sintering "sounds reasonable" and admitted that he had agreed with the definition during his deposition in the case. German Tr. 385:10-17.

JPFF 226. Liquid phase sintering requires the presence of solid particles. Strong, Tr. 247:2-

8.

JPFF 227. Vincent Laraia agrees that sintering involves "the consolidation of powdered material at high temperature" and that brazing involves the melting of the filler material to join two surfaces. Laraia, Tr. 900:3-5, 900:14-23.

JPFF 229. If you heat a single prealloyed powder above its solidus temperature, some of the prealloyed metal powder particles will melt and a liquid will form. German, Tr. 277:23-278:6; 282:8-16.

JPFF 230. It is not possible to heat to the liquidus without passing through the range of temperatures below the liquidus. Shiue, Tr. 645:6-9.

JPFF 231. With sufficient necking, a solid mass may be created from powder particles. Strong, Tr. 134:15-20; Shiue, Tr. 712:13-713: l.

JPFF 232. The mere presence of a solid in a liquid is not sufficient to constitute sintering. German, Tr. 366:3-16.

JPFF 233. Liquid cannot be sintered. Strong, Tr. 1713:12-14; Preston, Tr. 1011:14-20; Tselesin, Tr., 1213:18-20.

JPFF 234. Necks do not exist in a completely liquid material. German, Tr. 354:22-355:11.

JPFF 235. Professor Strong agreed that once you practice all three of the steps (forming a preform, including abrasive particles and then sintering), then you form an abrasive article. Strong Tr. at 72:13-16.

JPFF 236. A person of ordinary skill in the art would understand that the claim language "then sintering said preform to form said abrasive article" requires that the preform with abrasive particles be sintered after forming the soft, easily deformable and flexible preform which contains the abrasive particles. Strong, Tr. 145:11-15; 1646-47; 1707; Order No. 23.

JPFF 237. In forming his opinions concerning how one of ordinary skill would understand the "and sintering said preform to form said abrasive article," Professor German did not review the depositions of 3M's employees or talk with them regarding the issue. German, Tr. 437:22-438:4.

JPFF 238. Dr. Laraia also understands that it is not possible to get to the liquidus temperature without going through the other temperatures below the liquidus temperature. Laraia, Tr. 901:13-15.

JPFF 239. Diamond retention, corrosion resistance, price and patent position or product composition (e.g. manufacture by sintering, brazing or electroplating) are factors considered by 3M in analyzing competitive pad conditioning products. Thornton, Tr. 974:20-975:15; 976:7-13; 986:4-7; RX-61C; RX-81C; RX-87C; RX-93C; RX-282C.

JPFF 240. "Sintering" is not specially defined in the '489 patent but rather has a common meaning to one of ordinary skill in the art. CX-1; Strong Tr. 220-21; German Tr. 266; Tselesin Tr. 1211-12.

JPFF 242. All asserted claims, claims 1, 4, 5, and 8, of the '489 patent require "sintering said preform to form said abrasive article." Order No. 23 (September 12, 2001).

JPFF 243. Claim 4 depends upon claim 1 and incorporates all of the limitations of claim 1. CX-1, 16:52-55; Williamson, Tr. 1270:13-21.

JPFF 244. Claim 4 of the '489 patent recites:
The method of claim 1, wherein the plurality of abrasive particles are included in the preform by placing the particles on at least one side of the preform and urging the particles into said preform. CX-1, col. 16, ll. 52-55.

JPFF 245. The '489 specification provides several examples and drawings displaying abrasive particles included in the preform. CX-1, Figs. 2-5, Figs. 12-17, col. 13, ll. 43-45, col. 14, ll. 54-55, col. 15, ll. 1-4, col. 15, ln. 66-col. 16, ln. 2.

JPFF 246. Claim 5 depends upon claim 4 and incorporates all of the limitations of claim 4. CX-1, 16:56-57.

JPFF 247. Claim 5 of the '489 patent recites:

> The method of claim 4, wherein the abrasive particles are urged into the preform before the preform is sintered.
>
> CX-1, col. 16, ll. 56-57.

JPFF 248. Claim 5 is dependent on claims 1 and 4. CX-1, col. 16, ll. 56-57.

JPFF 249. Claim 8 depends upon claim 1 and incorporates all of the limitations of claim 1. CX-1, 16:62-63; Williamson, Tr. 1270:13-21. [RPFF 457, CX-1, col. 16, ll. 62-63.

JPFF 250. Claim 8 of the '489 patent recites:

> The method of claim 1, wherein the abrasive particles are included in the preform in a non-random pattern.

CX-1, col. 16, ll. 62-63.

JPFF 251. "Random" means "occurring without definite aim, reason, or pattern." *Random House College Dictionary* 1109 (Revised ed., 1980).

JPFF 252. Complainants' counsel and experts inspected Kinik's Ying-Kuo Plant at No. 64 Chung Shan Road in Taiwan facility on May 23, 2001.

JPFF 253. [ ] is a liquid binder. Strong Tr. at 111:14-19; CPX 14; Response to Request for Admission No. 16.

JPFF 254. A pull sheet is a preform. Sung Tr. at 599:25 – 600:2; Response to Request for Admission No. 26.

JPFF 255. The DiaGrid® process includes [ ] CPX-2A; Strong Tr. at 120:11 – 121:11; Sung Tr. at 598:3-5.

JPFF 256. The surface [ ] may be flat, a simple curve, or a complex combination of curves. Strong Tr. at 123:7 – 124:1; Sung Tr. at 598:6-23.

JPFF 257. If a DiaGrid® pad conditioner is being made, [ ] Strong Tr. at 123:15-19; Sung Tr. at 598:6-12.

JPFF 258. DiaGrid® profile wheels have complex curved shapes and include several different curved surfaces [ ] Strong Tr. at 124:20 – 126:25; Sung Tr. at 598:13-23.

JPFF 259. As part of the DiaGrid® process, diamond particles are included at least partially [ ] in Kinik's preform by applying force to the diamonds and urging them into the preform. Sung Tr. at 600:3 – 602:14; *see also,* Response to Request for Admission No. 27, Response to Complainants' Statement of Undisputed Material Facts Nos. 17, 24-26.

JPFF 260. Kinik does not dispute that a plurality of diamond particles are included at least partially in the Kinik preform during the DiaGrid® process. Roth Tr. at 1716:3-10.

JPFF 261. Kinik includes a plurality of diamond particles at least partially in the Kinik preform during the DiaGrid® process. Sung Tr. at 600:3 – 602:14; *see also,* Response to Request for Admission No. 27, Response to Complainants' Statement of Undisputed Material Facts Nos. 17, 24-26.

JPFF 262. Kinik heats its DiaGrid® products to temperatures [ ] and then cools them. Hwang, Tr. 838:17-25.

JPFF 263. [ ] the temperature within the furnace is [ ] before cooling. German Tr. at 318:22 – 319:3; Sung Tr. at 609:24 – 610:3.

JPFF 264. Kinik's counsel observed Professor German's experiment. German Tr. at 1392:6-11, 1392:23 – 1393:9.

JPFF 265. At the end of [ ] Professor German cooled the sample and examined it using a scanning electron microscope ("SEM"). German Tr. at 1393:25 – 1394:4.

JPFF 269. Chemical compounds may form after the formation of liquid in the DiaGrid® process. Strong, Tr. 1692:22-1693:3.

JPFF 270. [ ] is the main constituent of [ ] comprising over [ ] of the total by weight. RX-35C.

JPFF 271. Professor Strong admitted that a person of ordinary skill could determine whether an abrasive article had been formed by taking the cooled item and seeing whether it would scratch glass. Strong Tr. 1637: 24-1638:3

JPFF 276. The documents contained in RX-297, RX-298, RX-299 and RX-300 were prepared on October 29, 2001, pursuant to a request by Administrative Law Judge Terrill that chemical analyses of the surface of the Kinik pad conditioner be taken. Tr. 1603:17-25; Eagar, Tr. 1718:15-17; 1726:19-1727:5; 1761:4-13.

JPFF 277. Dr. Strong was not qualified as an expert in brazing.

JPFF 283. Complainants' expert Professor Strong agreed that if it were possible to instantaneously heat the Kinik preform to [ ] the '489 patent would not be infringed. Strong, Tr. 1653:3-8.

JPFF 284. Dr. Strong testified that if sintering does not occur, then the '489 patent would not be infringed. Strong Tr. at 1653:6-8.

JPFF 285. The reported solidus temperature (i.e. the temperature at which an alloy first starts to melt when heated) of the sinterable matrix material [ ] used in the DiaGrid process is [ ] RX-45 at K000378; CX-86; Sung Tr. 594.

JPFF 286. The reported liquidus temperature of the sinterable matrix material [ ] used in the DiaGrid process is [ ] RX-45 at K000378; CX-86; Sung Tr. 594.

JPFF 287. Kinik [ ] to form a preform. CPX-2AC; RX-24C at K001714; Strong Tr. 112-14, 1620; Sung Tr. 596-97.

JPFF 288. Kinik places abrasive particles at least partially in the preform. Tr. 1716.

JPFF 289. In the DiaGrid® process, diamond particles [ ] Sung Tr. at 600:3 – 601:3.

JPFF 290. In the DiaGrid® process, [ ] Response to Complainants' Statement of Undisputed Material Fact No. 24.

JPFF 291. In the DiaGrid® process, a plurality of diamonds ("abrasive particles") are attached to the preform. Strong Tr. 140, 143-44, 1621-22; Sung Tr. 599.

JPFF 292. Kinik places abrasive particles [ ] CX-2AC; Strong Tr. 140, 143-44; German Tr. 431.

JPFF 293. Kinik [ ] Strong Tr. 131-32, 144; Sung Tr. 600-01, 1091; Hwang Tr. 781, 837.

JPFF 294. In the DiaGrid® process, [ ] Sung Tr. at 599:18 – 601:3.

JPFF 295. Kinik admits that [ ] Response to Complainants' Statement of Undisputed Material Fact No. 26.

JPFF 296. The diamonds in Kinik's DiaGrid products remain in a non-random pattern after manufacturing. RX-27; RX-29-31, CDX-94C.

JPFF 297. The phrase "soft, easily deformable and flexible preform" or "SEDF preform" is not a known term of the art. Strong, Tr. 165:13-22; Williamson, Tr. 1264:18-1265:3; Preston, Tr. 1017:14-18.

JPFF 298. Prior to the invention of the '489 patent, there were known tests that could be used to measure hardness or softness. Strong, Tr. 1681:23-1682:1; Williamson, Tr. 1258:15-20; 1261:3-10.

JPFF 299. Prior to the invention of the '489 patent, there were known tests that could be used to measure flexibility. Strong, Tr. 1684:7-14; Williamson, Tr. 1262:20-1263:11.

JPFF 300. The American Society for Testing and Materials has published standards for measuring flexibility and hardness. Strong, Tr. 1685:12-15; Williamson, Tr. 1262:20-1263:11.

JPFF 301. There are no known tests or quantitative standards available in the art for assessing whether a preform is "soft, easily deformable and flexible." Order No. 23 (September 12, 2001).

JPFF 302. Green compacts were known to be made of metal powders and/or metal fibers. '489 patent, RX-1, 1:20-24.

JPFF 303. Prior art green compacts made of metal powders sometimes included binder. Strong, Tr. 1678:7-10; '489 patent, RX-1, 1:39-43. JPFF 304. Sintering and brazing were both well-known processes for manufacturing abrasive articles prior to the invention of the '489 patent. Strong, Tr. 1664:5-9. JPFF 305. A person of ordinary skill in the art relevant to the '489 patent would be familiar with both sintering and brazing. Williamson, Tr. 1276:8-13; Tselesin '165 patent, RX-119, 3:52-56; deKok '457 patent, RX-117, 2:65-3:4. JPFF 306.Brazing alloys were known to be used to attach abrasive particles to substrates prior to the invention of the '489 patent. Tselesin, Tr. 1196:16-1197:41; 1197:18-22, 1201:18-25.

JPFF 307. Tungsten carbide particles were known to be hard, abrasive particles prior to the invention of the '489 patent. Strong, Tr. 1668:16-21, 1673:17-22; Tselesin, Tr. 1200:2-18, 1202:16-1203:16; '489 patent, RX-1, 1:64-2:1; Steigelman '214 patent, RX-147, 2:49-52.

JPFF 308. Tungsten carbide particles were used in wear-resistant products prior to the invention of the '489 patent. Tselesin, Tr. 1200:2-18.

JPFF 309. The deKok '457 patent, issued on May 15, 1990, is prior art to the '489 patent. RX-117.

JPFF 310. The Tselesin '165 patent, issued on September 17, 1991, is prior art to the '489 patent. RX-119.

JPFF 311. The Davies EP patent, published on December 7, 1988, is prior art to the '489 patent. CX-30.

JPFF 312. The Lowder '673 patent, issued on July 15, 1975, is prior art to the '489 patent. RX-142.

JPFF 313. The Administrative Law Judge found in Order No. 19 that Complainants' activities in the United States satisfy the economic prong of the domestic industry requirement, and the Commission has decided not to review this issue. Notice of Commission Decision Not To Review An Initial Determination Granting Partial Summary Determination That The Economic Prong Of The Domestic Industry Requirement Is Satisfied at 2 (August 28, 2001).

JPFF 314. Robert Visser is knowledgeable regarding 3M's process for manufacturing sintered abrasive products. Hrg. Tr. at 505:3-5; 512:14-24; 514:3-16. JPFF 315. Robert Visser is knowledgeable regarding the '489 patent, including its claims, disclosure, and prosecution history. Hrg. Tr. at 505:6-13.

JPFF 316. Robert Visser is knowledgeable regarding 3M's acquisition of certain rights to the '489 patent and its related technology. Hrg. Tr. at 505:14-22.

JPFF 317. All of 3M's sintered abrasive products are made using the same general process. Hrg. Tr. at 510:17-24.

JPFF 318. All of 3M's sintered abrasive products use a process by which diamonds are inserted into a preform. Hrg. Tr. at 510:17-24.

JPFF 319. All of 3M's sintered abrasive products are made by sintering. Hrg. Tr. at 510:17-24.

JPFF 320. Those ordinarily skilled in the art of superabrasives at 3M understand sintering to include solid state sintering and liquid phase sintering. Hrg. Tr. at 546:20-547:9.

JPFF 321. 3M has also developed a number of sintered abrasive products that are currently in the experimental stage including [ ] These products are also made with the same basic process as 3M's commercial sintered abrasives. Hrg. Tr. at 510:25-511:15.

JPFF 322. 3M's sintered abrasive products are manufactured at 3M's Cottage Grove, Minnesota facility. Hrg. Tr. at 511:16-20.

JPFF 323. 3M expects to sell [ ] sintered abrasive pad conditioners this year. Hrg. Tr. at 512:11-13.

JPFF 324. Worldwide, superabrasives amount to approximately [ ] per year market. Hrg. Tr. at 540:23-541:10.

JPFF 325. Worldwide, CMP pad conditioners amount to approximately [ ] per year market. Hrg. Tr. at 542:11-19.

JPFF 326. In the United States, CMP pad conditioners amount to approximately a [ ] per year market. Hrg. Tr. at 542:11-23.

JPFF 327. 3M practices claim 1 of the '489 patent. Hrg. Tr. at 141:9-142:4; 150:6-9.

JPFF 328. The 3M process practices the "forming" step of claim 1. Hrg. Tr. at 141:9-142:4; 150:6-9; 516:2-518:13; 528:7-530:8; 535:21-536:1; CPX-1A.

JPFF 329. 3M forms a soft, easily deformable, and flexible preform consisting of metal powder and a liquid binder. CPX-1AC; Visser Tr. 515-16, 525, 527; Preston Tr. 1020; Strong Tr. 1618.

JPFF 330. As part of its process for making pad conditioners, 3M mixes [ ] Hrg. Tr. at 524:4-528:6; CX-160 at 3M014732-734; CPX-1A. CPX-1AC; Visser Tr. 515-16, 526; Shiue Tr. 718; Strong Tr. 1705.

JPFF 331. [ ] Hrg. Tr. at 526:13-527:16.

JPFF 332. [ ] are sinterable powders that form the matrix for supporting and retaining the diamonds in 3M's pad conditioners. Hrg. Tr. at 526:13-527:13.

JPFF 333. [ ] is a low-melting alloy that melts at [ ] Visser Tr. 526; Shiue Tr. 718.

JPFF 334. [ ] is a high-melting alloy that melts at about [ ] Visser Tr. 526; Shiue Tr. 718.

JPFF 335. As part of its process, 3M mixes a [ ] Hrg. Tr. at 516:2-14; 524:4-528:6; CX-160 at 3M014732-734; CX-171; CPX-1A.

JPFF 336. As part of its process, 3M mixes [ ] to form a liquid slurry. Hrg. Tr. at 247:22-249:15; 516:2-14; 524:4-528:6; CX-160 at 3M014732-734; CX-162; CX-171; CDX-58; CPX-1A.

JPFF 337. 3M's process employs [ ] to make a preform. Hrg. Tr. at 247:22-249:15.

JPFF 338. 3M employs [ ] Hrg. Tr. at 515:25-517:16; CX-160 at 3M014732-734; CX-176.

JPFF 339. As part of its process, 3M pours the mixture of metal powder and liquid binder [ ] Hrg. Tr. at 516:2-22; 526:13-529:14; 535:21-536:1; CX-160 at 3M014732-737; CX-162; CX-176; CDX-58; CPX-1A.

JPFF 340. 3M's preform is capable of being formed around a variety of curvatures. Hrg. Tr. at 517:19-21.

JPFF 341. 3M uses the terms "metal tape" and "preform" interchangeably. Hrg. Tr. at 517:2-3.

JPFF 342. In its process, 3M's "metal tape" is a preform. Hrg. Tr. at 516:23-517:7.

JPFF 343. As part of its process, 3M cuts the preform [ ] Hrg. Tr. at 529:4-530:8; CX-175.

JPFF 344. The 3M process practices the "including" step of claim 1. Hrg. Tr. at 141:9-142:4; 150:6-9; 518:18-521:18; 529:18-530:8; 536:2-5; CPX-1A; CPX-27. JPFF 345. The 3M process includes [ ] Hrg. Tr. at 518:18-521:18; 529:18-530:8; 536:2-5; CX-160 at 3M014741-743; CX-162; CDX-58; CPX-1A; CPX-27.

JPFF 346. 3M partially embeds diamonds into its preform[ ] Strong Tr.144; Visser Tr. 530-531; Shiue Tr. 673-674.

JPFF 347. 3M uses [ ] in a regular array of rows and columns on one surface of the preform. CPX-1AC; Visser Tr. 507-08, 518-20, 535-36; Strong Tr. 141-45.

JPFF 348. As part of its process, 3M includes diamonds in the preform. Hrg. Tr. at 518:18-521:18; 536:2-5.

JPFF 349. As part of its process, 3M includes diamonds at least partially in the preform. Hrg. Tr. at 518:18-521:18; 536:2-5.

JPFF 350. After patterning the diamond particles, [ ] Hrg. Tr. at 521:19-523:12; 529:21-530:17; CX-162; CDX-58; CPX-1A; CPX-25A; CPX-27; CPX-28.

JPFF 351. [ ] Hrg. Tr. at 521:19-523:12; 529:21-530:17; CPX-1A.

JPFF 352. In 3M's process, [ ] minimize the volume of the stack and urge the diamonds into the preform. Hrg. Tr. at 530:10-531:7; CPX-1A.

JPFF 353. Customers have indicated that 3M's sintered abrasives have the best diamond retention in the industry. Hrg. Tr. at 527:9-13.

JPFF 354. As part of its process, 3M sinters its preform. Hrg. Tr. at 264:9-265:12; 523:13-524:3; 530:10-535:5; 536:6-9; CX-170; CPX-1A.

JPFF 355. The heating step involves increasing the temperature of the SEDF preform, [

] Hrg. Tr. at 530:23-535:3; CX-160 at 3M014754-756.

JPFF 356. In 3M's process, [

] Hrg. Tr. at 526:18-24.

JPFF 357. As part of its process, 3M [ ] sinters its preform. Hrg. Tr. at 351:2-9.

JPFF 358. In its process, 3M employs[ ] sintering. Hrg. Tr. at 695:3-17.

JPFF 359. In its process, 3M consolidates the metal powder [ ] Hrg. Tr. at 534:16-24.

JPFF 360. The 3M process includes [

] CPX-1AC; CX-160 at 3M 014755; Visser Tr. 531-32; Shiue Tr. 718.

JPFF 361. 3M practices [ ] in making its pad conditioners. Strong Tr.142; German Tr. 265, 351, 1461; Visser Tr. 534; Shiue Tr. 674, 695, 719; Sung Tr. 1107.

JPFF 362. The peak temperature in the 3M heating process is [ ] Visser Tr. 526; Shiue Tr. 718.

JPFF 363. At the peak temperature, [

] See Visser Tr. 526; Shiue Tr. 718.

JPFF 364. As part of its process, 3M performs other steps including cleaning the abrasive article. CX-160 at 3M014757-777.

JPFF 365. As part of its process, 3M performs other steps including finishing the abrasive article. CX-160 at 3M014757-777.

JPFF 366. The result of 3M's process is an abrasive article. Hrg. Tr. 534:25-535:3; CPX-26.

JPFF 367. As part of its process, 3M places diamonds on one side of the preform and urges the diamonds into the preform. Hrg. Tr. at 535:14-20; 536:10-14.

JPFF 368. 3M practices claim 4 of the '489 patent. Hrg. Tr. at 143:21-144:7; 150:6-9.

JPFF 369. 3M's process includes adding diamonds to the preform by placing the diamonds on one side of the preform [ ] Hrg. Tr. at 521:19-523:12; 529:21-530:8; 536:10-14; CPX-1A.

JPFF 370. As part of its process, 3M places [ ] urging the diamonds into the preform. Hrg. Tr. at 530:10-531:7; 535:14-20; 536:10-14; CPX-1A.

JPFF 371. 3M practices claim 5 of the '489 patent. Hrg. Tr. at 144:14-24; 150:6-9.

JPFF 372. 3M's process includes urging the diamonds into the preform prior to sintering the preform. Hrg. Tr. at 536:16-19; *see also* 521:19-524:3; 536:2-9.

JPFF 373. As part of 3M's process, the diamonds are urged into the preform [ ] Hrg. Tr. at 536:16-19; *see also* 521:19-524:3; 536:2-9.

JPFF 374. 3M practices claim 8 of the '489 patent. Hrg. Tr. at 150:6-9.

JPFF 375. As part of its process, 3M includes diamonds in the preform in a regular array. Hrg. Tr. at 518:18-521:18; 536:2-5; 536:20-22.

JPFF 376. In 3M's process, the diamonds are placed in the preform in a uniform (*i.e.*, non-random) pattern [ ] Hrg. Tr. at 518:18-520:19; 536:20-22.

JPFF 377. 3M competes directly with Kinik in the market for CMP pad conditioners. Hrg. Tr. at 542:7-15.

JPFF 378. DiaGrid® wire saw beads are sold directly to customers in the United States by Kinik. Hrg. Tr. at 1072:19-22; 1141:9-13.

JPFF 379. DiaGrid® CMP pad conditioners are currently being offered for sale in the United States. Hrg. Tr. at 1140:9-11.

JPFF 380. DiaGrid® CMP pad conditioners are currently being marketed in the United States. Hrg. Tr. at 1140:12-13.

JPFF 381. DiaGrid® wire saw beads are currently being offered for sale in the United States. Hrg. Tr. at 1141:9-11.

JPFF 382. DiaGrid® wire saw beads are currently being marketed in the United States. Hrg. Tr. at 1141:12-13.

JPFF 383. DiaGrid® profile wheels are currently being marketed in the United States. Hrg. Tr. at 1073:1-4; 1041:2-8; 1141:2-8.

JPFF 384. DiaGrid® [ ] are currently being marketed in the United States. Hrg. Tr. at 1141:14-24.

JPFF 385. DiaGrid® [ ] are currently being researched at Kinik. Hrg. Tr. at 1142:13-16.

JPFF 386. Rodel imports DiaGrid® pad conditioners into the United States. Hrg. Tr. at 1140:22-23.

JPFF 387. The DiaGrid® process may be used to make a wide variety of abrasive products. Hrg. Tr. at 584:13-586:10; 587:15-589:17.

JPFF 388. Kinik intends to sell DiaGrid® [ ] in the United States if they prove to be successful. Hrg. Tr. at 586:19-587:10.

JPFF 389. Kinik intends to sell DiaGrid® [ ] in the United States if they prove to be successful. Hrg. Tr. at 586:19-587:10.

JPFF 390. Kinik intends to sell DiaGrid® [ ] in the United States if they prove to be successful. Hrg. Tr. at 586:19-587:10.

JPFF 391. Kinik is just starting to offer [ ] for sale in United States. Hrg. Tr. at 1141:14-22.

JPFF 392. Karen Johnson was Rodel's Vice President of Strategic Alliances and her responsibilities included overseeing the introduction of Kinik's DiaGrid® CMP pad conditioners. CX-428 at 50:10-51:3.

JPFF 393. Rodel maintains an inventory of Kinik DiaGrid® CMP pad conditioners in Rodel's PDC warehouse in Delaware. Hrg. Tr. at 1140:22-23; CX-428 at 45:4-15.

JPFF 394. Rodel has sent customers in the United States DiaGrid® pad conditioners from Rodel's PDC inventory warehouse in Delaware. CX-428 at 67:15-19.

JPFF 395. Rodel has sent customers in Europe DiaGrid® pad conditioners from Rodel's PDC inventory warehouse in Delaware. CX-428 at 72:20-73:14; 77:6-78:9; 82:7-14.

JPFF 396. Rodel's global business headquarters is in Phoenix, Arizona. Complaint ¶ 7.3, Exhibit 14.

JPFF 397. Rodel has sales and technical service centers in North America, Japan, Europe, Malaysia, Korea and Taiwan. Complaint ¶ 7.3, Exhibit 14.

JPFF 398. In accordance with its obligations under the Market Channel and Supply Agreement, Rodel engages in marketing and advertising activities to offer DiaGrid® products for sale.

JPFF 399. Rodel and Kinik have an alliance. CX-304C; CX-367C; CX-428C, 50:15-16.

JPFF 400. Rodel and Kinik are business partners. CX-304C; CX-367C; CX-428C, 50:23-24.

JPFF 401. [ ] CX-428C, 46:19-47:12; CX-367C.

JPFF 402. Kinik has sent DiaGrid® pad conditioners to customers in the United States. CX-428 at 68:19-69:3.

JPFF 403. Kinik has sent DiaGrid® pad conditioners to Rodel in the United States to be shipped to customers in Europe. CX-428 at 69:2-6.

JPFF 404. Rodel has quoted customers (or potential customers) a price of [ ] per disk for DiaGrid CMP pad conditioners. CX-428 at 105:6-8; CX-372.

JPFF 405. Rodel has quoted customers (or potential customers) a price of [ ] per disk for DiaGrid CMP pad conditioners. CX-428 at 105:18-24; CX-372.

JPFF 406. Kinik provides Rodel with DiaGrid® information to be used in Rodel's marketing of DiaGrid pad conditioners. Hrg. Tr. at 1175:11-1176:13.

JPFF 407. Kinik has sold its DiaGrid® wire saw beads directly to end-users in the United States. Sung, Tr. 1081:7-9.

JPFF 408. While Kinik has offered its DiaGrid® profile wheels for sale, Kinik has not sold any DiaGrid® profile wheels in the United States. Sung, Tr. 1073:1-4; 1141:2-8.

JPFF 409. Kinik has had less than [ ] in sales of DiaGrid® non-pad conditioning products in the United States. Sung, Tr. 1081:10-13.

JPFF 410. Rodel, Inc. is Kinik's market channel supplier in the United States of Kinik's DiaGrid® CMP pad conditioners made in Taiwan. CX-428, 32:15-25; 141:4-8; CX-381C.

JPFF 411. Rodel has contact with its customers and determines its customers' needs. CX-428C, 64:12-19, 65:23-66:2.

JPFF 412. Rodel determines whether a customer presentation is necessary. CX-428C, 66:7-9.

JPFF 413. Rodel prepares presentation and marketing materials for use with its customers. CX-428C, 19:4-12, 20:8-16, 21:22-24, 22:8-11; CX-358; CX-379C; CX-381C at ¶3(a); RX-29; RX-262; RX-264.

JPFF 414. Rodel decides whether it should give a presentation to its customer about the DiaGrid® pad conditioners. CX-428C, 66:6-9.

JPFF 415. Rodel decides whether it will provide a DiaGrid® pad conditioner to its customer. CX-428C, 49:1 l-13.

JPFF 416. Dr. Sung was only able to estimate that Rodel has "a few hundred" DiaGrid® pad conditioners in inventory. Sung, Tr. 625:5-15.

JPFF 417. Rodel's employee, Karen Johnson, is Vice President of semiconductor pad and conditioning materials and, as such, is responsible for overseeing the promotion, marketing, and sale of DiaGrid® CMP pad conditioners. CX-428, 6:23-24; 31:9-22; 32:6-7; 32:15-17.

JPFF 418. Ms. Johnson estimated that as of the end of August 2001, Rodel had [ ] DiaGrid® pad conditioners in inventory in the United States. CX-428C, 45:24-46:2.

JPFF 419. As Kinik's market channel supplier, Rodel is responsible for promoting, marketing and selling the DiaGrid® CMP pad conditioners. CX-381C; CX-428, 32:15-22.

JPFF 420. Ms. Johnson was deposed on August 31, 2001 in this Investigation as Rodel's designated corporate representative and portions of Ms. Johnson's deposition testimony have been admitted as CX-428C.

JPFF 421. Rodel has a warehouse in Delaware where it stores any inventory of the DiaGrid® pad conditioners. CX-428C, 44:12, 45:2-15; CX-367C, CX-373C, CX-375C.

JPFF 422. Rodel has a system of tracking and determining how many DiaGrid® pad conditioners it has in inventory. CX-428C, 46:3-7; 119:2-22.

JPFF 423. To the extent Rodel maintains an inventory of DiaGrid® pad conditioners at its warehouse in Delaware, such inventory may be used by Rodel for the purpose of fulfilling sample requests or orders to its customers. CX-428C, 65:6-67:19; 70:7-71:10; 76:15-77:12; 82:7-14.

JPFF 424. Kinik agreed to supply Rodel with sufficient DiaGrid® pad conditioners to enable Rodel to fill its customers' orders. CX-381C at ¶4.

JPFF 425. Rodel has provided samples of DiaGrid® pad conditioners from its inventory in the United States to customers in the United States and Europe. CX-428C, 65:6-67:19; 70:7-71: 10; 73:1-78:9; 80:10-83:6.

JPFF 426. Rodel has sold DiaGrid® pad conditioners from its inventory in the United States to customers in the United States and Europe. CX-428C, 65:6-67:19; 70:7-71:10; 73:1-78:9; 80:10-83:6.

JPFF 427. If Rodel does not have inventory in the United States to fulfill its customers sample requests or orders, Rodel may contact Kinik and ask Kinik to provide DiaGrid® pad conditioners directly to Rodel's customers. CX-428C, 66:3-67:3; 67:15-70:4; 70:17-72:25.

JPFF 428. Under the terms of the Market Channel and Supply Agreement, Rodel is required to try to meet certain sales targets and is obligated to pay Kinik [ ] of the net sales price on sales of DiaGrid® pad conditioners and [ ] on inventory samples of DiaGrid® pad conditioners provided to customers. See CX-381C at ¶¶ 5-6; CX-375C; CX-428C, 114:25-115:9.

JPFF 429. Rodel's marketing and advertising activities include dissemination of DiaGrid® pad conditioner product information in brochures and on Rodel's website. See Complaint at ¶ 7.3; Complaint Ex. 14; RX-29; RX-262C; RX-264C.

JPFF 430. Rodel and Complainant 3M have a strategic alliance. Complaint Exhibit 14.

JPFF 431. When they filed this action in January 2001, Complainants did not name Rodel as a Respondent in this investigation. *See* Complaint.

JPFF 432. When they supplemented their Complaint in January 2001, Complainants did not name Rodel as a Respondent in this Investigation. *See* Complaint.

JPFF 433. When they amended their Complaint in June 2001 to add more allegations of infringement against Kinik, Complainants did not name Rodel as a Respondent. *See* Amended Complaint.

JPFF 434. Rodel has not entered an appearance in this Investigation.

JPFF 435. Kinik has sent DiaGrid® pad conditioners directly from Taiwan to customers outside the United States. CX-428C, 82:1-4.

JPFF 436. 3M's pad conditioner and Kinik's DiaGrid® pad conditioner compete for U.S. sales in the same market. CPX-26 (3M); CPX-24 (Kinik); Visser Tr. 542; Sung Tr. 619-21, 625, 1140; Thornton Tr. 969-70, 975, 998.

JPFF 437. As of July 26, 2001, [ ] DiaGrid pad conditioners were inventoried by third-party Rodel in the United States with an estimated value of U.S. [ ] CX-373.

JPFF 438. Pursuant to the 3M-UAS License Agreement, 3M agreed to pay UAS [

] CX-41C at ¶ 5.1(a).

JPFF 439. The royalty rate [ ] CX-41.

JPFF 440. 3M has never paid UAS [ ] Visser, Tr. 556:7-9.

JPFF 441. Pursuant to the License Agreement between Rodel and Kinik, Rodel agreed to pay Kinik a mutually-agreed upon royalty that is expected to be in the range of [ ] of the net sales

price. CX-380C at 2.2.

JPFF 442. Kinik's accused pad conditioners cost the same as or more than 3M's domestically produced pad conditioners. CX-83 (Kinik price list); CX-307, CX-308 (3M).

RELEVANT STATUTES, REGULATIONS, AND PRECEDENT

Section 337 in General

Section 337 of the Tariff Act of 1930, as amended, declares unlawful the importation into the United States, the sale for importation, or the sale within the United States after importation by the owner, importer, or consignee, of articles that infringe a valid and enforceable United States patent if an industry in the United States relating to the articles protected by the patent exists or is in the process of being established. 19 U.S.C. §§ 1337(a)(1)(B)(i) and (a)(2). Section 337 further provides that the Commission shall investigate any alleged violation of this statute. 19 U.S.C. § 1337(b)(1).

If the Commission determines as a result of such investigation that there is a violation, it shall direct that the articles concerned, imported by any person violating the provisions of this section, be excluded from entry into the United States. 19 U.S.C. § 1337(d)(1). In addition to, or in lieu of taking such action, the Commission may issue an order directing such person to cease and desist from engaging in the unfair methods or acts involved. 19 U.S.C. § 1337(f)(1). In determining whether to issue an exclusion order or cease and desist order, the Commission must consider the effect of such actions upon the public health and welfare, competitive conditions in the United States economy, the production of like or directly competitive articles in the United States, and United States consumers. 19 U.S.C. §§ 1337(d)(1) and (f)(1).

Jurisdiction

The Complaint alleges that Kinik has violated Subsection 337(a)(1)(A) and (B) in the importation and sale of products that infringe 3M'S patents. 3M and Kinik agree that Kinik has engaged in the importation into the United States of the accused products, and the sale in the United States after importation of those products. Accordingly, the Commission has subject matter jurisdiction in this investigation. See Amgen, Inc. v. U.S. Int'l. Trade Comm., 902 F.2d 1532, 1536 (Fed. Cir. 1990). Further, Kinik has responded to the complaint and has participated in the investigation, thereby submitting to the personal jurisdiction of the Commission. See Certain Miniature Hacksaws, Initial Determination (unreviewed by Commission in relevant part) at 4 (October 15, 1986).

Patent Infringement

In General

Analyzing whether a patent is infringed "entails two steps. The first step is determining the meaning and scope of the patent claims asserted to be infringed. The second step is comparing the properly construed claims to the device or process accused of infringing." Dow Chemical Co. v. United States, 226 F.3d 1334, 1338 (Fed. Cir. 2000), citing Markman v. Westview Instruments, Inc., 52 F.3d 967, 976 (Fed. Cir. 1995) (en banc), aff'd, 517 U.S. 370 (1996). The first step is a question of law, whereas the second step is a factual determination. Id. To prevail, the patentee must establish by a preponderance of the evidence that the accused device infringes one or more claims of the patent either literally or under the doctrine of equivalents. Bayer AG v. Elan Pharmaceutical Research Corp., 212

F.3d 1241, 1247 (Fed. Cir. 2000) ("Bayer").

Claim Construction

"Courts must construe disputed claim terms, as a matter of law, based on the claims, the specification, and the prosecution history." Valmet Paper Machinery, Inc. v. Beloit Corp., 105 F.3d 1409, 1413 (Fed. Cir.), amended on rehearing, 112 F.3d 1169 (Fed. Cir.), cert. denied, 522 U.S. 1028 (1997). Extrinsic evidence of the meaning of certain terms may also be used to aid the court's understanding of the patent. O.I. Corp. v. Tekmar Company, Inc., 115 F.3d 1576, 1581 (Fed. Cir. 1997); Markman, 52 F.3d at 979. "Extrinsic evidence consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises." Id. at 980. However, "[i]If the intrinsic evidence resolves any ambiguity in a disputed claim, extrinsic evidence cannot be used to contradict the established meaning of the claim language." DeMarini Sports, Inc. v. Worth, Inc., 239 F.3d 1314, 1322-23 (Fed. Cir. 2001). "What is disapproved of is an attempt to use extrinsic evidence to arrive at a claim construction that is clearly at odds with the claim construction mandated by the claims themselves, the written description, and the prosecution history, in other words, with the written record of the patent." Markman, 52 F.3d at 979.

"In construing claims, the analytical focus must begin and remain centered on the language of the claims themselves, for it is that language that the patentee chose to use to 'particularly point[ ] out and distinctly claim[ ] the subject matter which the patentee regards as his invention.' 35 U.S.C. § 112, ¶ 2." Interactive Gift Express, Inc. v. Compuserve Inc., 256 F.3d 1323, 1331 (Fed. Cir. 2000). "Absent an express intent to impart a novel meaning, terms in a claim are to be given their ordinary and accustomed meaning." Wenger Mfg., Inc. v. Coating Machinery Systems, Inc., 239 F.3d 1225, 1232 (Fed. Cir. 2001) (citing Renishaw PLC v. Marposs Sociatea' Per Azioni, 158 F.3d 1243, 1249 (Fed. Cir. 1998)). Moreover, it is appropriate to "give a technical term its ordinary meaning, that meaning it would be given by persons skilled in the art, unless 'it is apparent from the patent and the prosecution history that the inventor used the term with a different meaning.'" Phillips Petroleum Co. v. Huntsman Polymers Corp., 157 F.3d 866, 871 (Fed. Cir. 1998).

In interpreting particular limitations within each claim, "adding limitations to claims not required by the claim terms themselves, or unambiguously required by the specification or prosecution history, is impermissible." Dayco Products, Inc. v. Total Containment, Inc., 258 F.3d 1317, 1327 (Fed. Cir. 2001), citing Laitram Corp. v. NEC Corp., 163 F.3d 1342, 1347 (Fed. Cir.1998) ("a court may not import limitations from the written description into the claims"). Further, a patent is not limited to its preferred embodiments in the face of evidence of broader coverage by the claims. Caromed Corp. v. Sophomore Danek Group, Inc., 253 F.3d 1371, 1382-83 (Fed. Cir. 2001); Electro Med. Systems S.A. v. Cooper Life Sciences, 34 F.3d 1048, 1054 (Fed. Cir.1994) ("[Particular embodiments appearing in a specification will not be read into the claims when the claim language is broader than such embodiments.").

Claims amenable to more than one construction should, when it is reasonably possible to do so, be construed to preserve their validity. Karsts Mfg. Corp. v. Cleveland Golf Co., 242 F.3d 1376, 1384 (Fed. Cir. 2001). However, a claim cannot be construed contrary to its plain language. See Rhine v. Casio, Inc., 183 F.3d 1342, 1345 (Fed. Cir.1999). Claims

cannot be judicially rewritten in order to fulfill the axiom of preserving their validity; "if the only claim construction that is consistent with the claim's language and the written description renders the claim invalid, then the axiom does not apply and the claim is simply invalid." Id.

Literal Infringement

Literal infringement is a question of fact. Tegal Corp. v. Tokyo Electron America, Inc., 257 F.3d 1331, 1350 (Fed. Cir. 2001). Literal infringement requires the patentee to prove that the accused device contains each limitation of the asserted claim(s). Each element of a claim is considered material and essential, and in order to show literal infringement, every element must be found to be present in the accused device. London v. Carson Pirie Scott & Co., 946 F.2d 1534, 1538 (Fed. Cir. 1991). If any claim limitation is absent from the accused device, there is no literal infringement of that claim as a matter of law. Bayer, supra.

Invalidity

In General

A patent is presumed valid. 35 U.S.C. § 282; Richardson-Vicks Inc. v. The Upjohn Co., 122 F.3d 1476, 1480 (Fed. Cir. 1997) ("Richardson-Vicks Inc."). The party challenging a patent's validity has the burden of overcoming this presumption by clear and convincing evidence. Richardson-Vicks Inc., supra; Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044 (Fed. Cir.), cert. denied, 488 U.S. 825 (1988).

Since the claims of a patent measure the invention at issue, the claims must be interpreted and given the same meaning for purposes of both validity and infringement analyses. As with an infringement analysis, an analysis of invalidity involves two steps: the claim scope is first determined, and then the properly construed claim is compared with the prior art to determine whether the claimed invention is anticipated and/or rendered obvious. Amazon.com, Inc. v. Barnesandnoble.com, Inc., 239 F.3d 1343, 1351 (Fed. Cir. 2001).

A determination that an independent claim is invalid does not automatically mean that a dependent claim that depends from it is also invalid. See 35 U.S.C. § 282 ("Each claim of a patent shall be presumed valid independently of the validity of other claims; dependent or multiple dependent claims shall be presumed valid even though dependent upon an invalid claim"); see Continental Can Co., USA v. Monsanto Co., 948 F.2d 1264, 1266 (Fed. Cir. 1991) (each claim carries an independent presumption of validity and stands or falls independent of the other claims). However, if the validity of a dependent claim is not argued separately from the independent claim from which it depends, its validity will stand or fall with the independent claim. Richardson-Vicks Inc., 122 F.3d at 1480.

Indefinite Claims -- 35 U.S.C. § 112, ¶ 2

Section 112, paragraph 2 of the Patent Act requires that a specification conclude with one or more claims particularly pointing out and distinctly claiming subject matter which the applicant regards as his invention. Exxon Research & Eng'g Co. v. United States, 265 F.3d

1371, 1375 (Fed. Cir. 2001) (quoting 35 U.S.C. § 112, ¶ 2). To satisfy this requirement, lower courts, including the Federal Circuit, "generally require that the 'claims read in the light of the specifications, reasonably apprise those skilled in the art . . . of . . . the scope of the invention' and emphasize that 'each case must be determined in large measure by its own facts.'" Donald S. Chisum, Chisum on Patents § 8.03[3], at 8-27 (2001) (footnotes omitted) (quoting Hybritech Inc. v. Monoclonal Antibodies, Inc., 802 F.2d 1367, 1385 (Fed. Cir. 1986), cert. denied, 480 U.S. 947 (1987), and Chicago Pneumatic Tool Co. v. Hughes Tool Co., 97 F2d 945, 948 (10th Cir.), cert. denied, 305 U.S. 643, reh'g denied, 305 U.S. 673 (1938)). Thus, the standard to determine definiteness of a claim under section 112, ¶ 2 is whether one skilled in the art would understand the bounds of the claim when read in light of the specification. In the Matter of Certain Gel-Filled Wrist Rests and Products Containing Same, USITC Inv. No. 337-TA-456, Order No. 9 (Jan.2, 2002). In applying that standard, one should determine whether the claim language (in view of the specification) reasonably apprises those skilled in the art of the claimed invention, and thus whether the claim language is "reasonably precise," given the nature of the claimed invention and its subject technology. Id.

Obviousness -- 35 U.S.C. § 103(a)

Under 35 U.S.C. § 103(a), a patent is valid unless "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. § 103(a). The ultimate question of obviousness is a question of law, but "it is well understood that there are factual issues underlying the ultimate obviousness decision." Richardson-Vicks Inc., 122 F.3d at 1479; Wang Laboratories, Inc. v. Toshiba Corp., 993 F.2d 858, 863 (Fed. Cir. 1993).

Once claims have been properly construed, "[t]he second step in an obviousness inquiry is to determine whether the claimed invention would have been obvious as a legal matter, based on underlying factual inquiries including: (1) the scope and content of the prior art, (2) the level of ordinary skill in the art, (3) the differences between the claimed invention and the prior art ; and (4) secondary considerations of non-obviousness" (also known as "objective evidence"). Smiths Industries Medical Systems, Inc. v. Vital Signs, Inc., 183 F.3d 1347, 1354 (Fed. Cir. 1999) (citing Graham v. John Deere Co., 383 U.S. 1, 17 (1966)).

In order to prove obviousness, the patent challenger must demonstrate, by clear and convincing evidence, that "there is a reason, suggestion, or motivation in the prior art that would lead one of ordinary skill in the art to combine the references, and that would also suggest a reasonable likelihood of success." Smiths Industries, 183 F.3d at 1356; also see United States Surgical Corporation v. Ethicon, Inc., 103 F.3d 1554, 1564 (Fed. Cir. 1997), cert. denied, 522 U.S. 950 (1997); Certain Integrated Circuit Telecommunication Chips and Products Containing Same, Including Dialing Apparatus, Inv. No. 337-TA-337, Commission Opinion at 18 (August 3, 1993). When an obviousness determination relies on the combination of two or more references, "[t]he suggestion to combine may be found in explicit or implicit teachings within the references themselves, from the ordinary knowledge of those skilled in the art, or from the nature of the problem to be solved . . . the question is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination." WMS Gaming, Inc. v. International Game

Technology, 184 F.3d 1339, 1355 (Fed. Cir. 1999).

"Secondary considerations,"also referred to as "objective evidence of non-obviousness," such as "commercial success, long felt but unsolved needs, failure of others, etc." may be used to understand the origin of the subject matter at issue, and may be relevant as indicia of obviousness or non-obviousness. Graham v. John Deere Co., supra, 383 U.S. at 17-18. Secondary considerations may also include copying by others, prior art teaching away, and professional acclaim. See Perkin-Elmer Corp. v. Computervision Corp., 732 F.2d 888, 894 (Fed. Cir.), cert. denied, 469 U.S. 857 (1984); Avia Group Int'l, Inc. v. L.A. Gear California, 853 F.2d 1557, 1564 (Fed. Cir. 1988) (copying by others); In re Hedges, 783 F.2d 1038, 1041 (Fed. Cir. 1986) (prior art teaching away; invention contrary to accepted wisdom); Kloster Speedsteel AB v. Crucible Inc., 793 F.2d 1565 (Fed. Cir. 1986), cert. denied, 479 U.S. 1034 (1987) (wide acceptance and recognition of the invention).

Evidence of "objective indicia of non-obviousness," also known as "secondary considerations," must be considered in evaluating the obviousness of a claimed invention, but the existence of such evidence does not control the obviousness determination. A court must consider all of the evidence under the Graham factors before reaching a decision on obviousness. Richardson-Vicks Inc., 122 F.3d at 1483-84. In order to accord objective evidence substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention, and a prima facie case is generally made out "when the patentee shows both that there is commercial success, and that the thing (product or method) that is commercially successful is the invention disclosed and claimed in the patent." In re GPAC Inc., 57 F.3d 1573, 1580 (Fed. Cir. 1995); Demaco Corp. v. F. Von Langsdorff Licensing Ltd., 851 F.2d 1387, 1392 (Fed. Cir.), cert. denied, 488 U.S. 956 (1988) ("Demaco"); Certain Crystalline Cefadroxil Monohydrate, 15 U.S.P.Q.2d 1263, 1270 (USITC. 1990). Once the patentee has made a prima facie case of nexus, the burden shifts to the challenger to show that the commercial success was caused by "extraneous factors other than the patented invention, such as advertising, superior workmanship, etc." Id. at 1393.

Domestic Industry

In General

In a patent-based complaint, a violation of Section 337 can be found "only if an industry in the United States, relating to the articles protected by the patent . . . concerned, exists or is in the process of being established." 19 U.S.C. § 1337(a)(2). This "domestic industry requirement" has an "economic" prong and a "technical" prong.

Economic Prong of Domestic Industry Requirement

Section 337(a)(3) sets forth the following economic criteria for determining the existence of a domestic industry in investigations based on patent infringement:

> an industry in the United States shall be considered to exist if there is in the United States, with respect to the articles

protected by the . . . patent . . . concerned --

(A) significant investment in plant and equipment;

(B) significant employment of labor or capital; or

(C) substantial investment in its exploitation, including engineering, research and development, or licensing.

19 U.S.C. § 1337(a)(3). The existence of a domestic industry is measured at the time the complaint is filed. Bally/Midway Mfg. Co. v. U.S. Int'l Trade Comm., 714 F.2d 1117, 1122 (Fed. Cir. 1983).

Technical Prong of Domestic Industry Requirement

In addition to meeting the economic criteria of the domestic industry requirement, a complainant in a patent-based Section 337 investigation must also demonstrate that it is practicing or exploiting the patents at issue. See 19 U.S.C. § 1337(a)(2) and (3); also see Certain Microsphere Adhesives, Process for Making Same, and Products Containing Same, Including Self-Stick Repositionable Notes, Inv. No. 337-TA-366, Commission Opinion at 8 (December 15, 1995) aff'd sub nom. Minnesota Mining & Manufacturing Co. v. U.S. Intel. Trade Comm., 91 F.3d 171 (Fed. Cir. 1996) (Table); Certain Plastic Encapsulated Integrated Circuits, Components Thereof, and Products Containing Same, Inv. No. 337-TA-315, Commission Opinion at 16 (March 24, 1992). In order to find the existence of a domestic industry exploiting a patent at issue, it is sufficient to show that the domestic industry practices any claim of that patent, not necessarily an asserted claim of that patent. Microsphere Adhesives, Commission Opinion at 7-16. Fulfillment of this so-called "technical prong" of the domestic industry requirement is not determined by a rigid formula, but rather by the articles of commerce and the realities of the marketplace. Certain Diltiazem Hydrochloride and Diltiazem Preparations, Inv. No. 337-TA-349, Initial Determination at 138 (Feb. 1, 1995) (unreviewed in relevant part); Certain Double-Sided Floppy Disk Drives and Components Thereof, Inv. No. 337-TA-215, 227 U.S.P.Q. 982, 989 (Commission Opinion 1985).

The test for claim coverage for the purposes of the technical prong of the domestic industry requirement is the same as that for infringement. Certain Doxorubicin and Preparations Containing Same, Inv. No. 337-TA-300, Initial Determination at 109 (May 21, 1990), aff'd, Views of the Commission at 22 (October 31, 1990). "First, the claims of the patent are construed. Second, the complainant's article or process is examined to determine whether it falls within the scope of the claims." Id. As with infringement, the first step of claim construction is a question of law, whereas the second step of comparing the article to the claims is a factual determination. Markman, 52 F.3d at 976. To prevail, the patentee must establish by a preponderance of the evidence that the domestic product practices one or more claims of the patent either literally or under the doctrine of equivalents. See Bayer, supra, 212 F.3d at 1247.

Recommended Determination on Remedy

Pursuant to Commission Rules 210.36(a) and 210.42(a)(1)(ii), the Administrative Law Judge is to consider evidence and argument on the issues of remedy and bonding, and issue a recommended determination thereon.

General or Limited Exclusion Order

Section 337(d)(2) authorizes the Commission to issue a general exclusion order only if it determines that --

> (A) a general exclusion from entry of articles is necessary to prevent circumvention of an exclusion order limited to products of named persons; or
>
> (B) there is a pattern of violation of this section and it is difficult to identify the source of infringing products.

19 U.S.C. § 1337(d)(2); 19 C.F.R. § 210.50(c). This statutory standard codifies longstanding criteria for issuing a general exclusion order that the Commission articulated in Certain Airless Paint Spray Pumps and Components Thereof, Inv. No. 337-TA-90, Commission Opinion at 18, 216 U.S.P.Q. 465 (1981); See S. Rep. No. 412, 103d Cong., 2d Sess. 120 (1994); H.R. Rep. No. 826, 103d Cong., 2d Sess., pt. 1, at 141 (1994) (legislative history of Uruguay Round Agreements Act of 1994). The purpose behind applying these factors is to balance the "complainant's interest in obtaining complete relief against the public interest in avoiding the disruption of legitimate trade that such relief may cause." Certain Crystalline Cefadroxil Monohydrate, Inv. No. 337-TA-293, Commission Opinion, 15 U.S.P.Q.2d 1263, 1273 (1990).

Scope of Exclusion From Entry

The Commission's authority under Section 337 to issue orders excluding unfair imports from entry into the United States extends to all forms of Customs "entry," not only to entry for consumption in the United States. Certain Devices for Connecting Computers Via Telephone Lines, Inv. No. 337-TA-360, USITC Pub. 2843, Commission Opinion at 9 (December 1994). This authority, however, is generally applied by the Commission "in measured fashion," and the Commission issues "only such relief as is adequate to redress the harm caused by the prohibited imports." Id. In this regard, the type of entry that adversely affects Complainants in most cases is entry for consumption, and an exclusion order covering other types of entry, such as entry for transshipment in bond through the United States, normally is not issued absent a showing by the Complainants of a need for such an order. Id. at 9-10.

Cease and Desist Order

Cease and desist orders are warranted primarily when the respondent maintains a

commercially significant inventory of the accused products in the United States. See Certain Crystalline Cefadroxil Monohydrate, 15 U.S.P.Q.2d 1263, 1277-79 (U.S.I.T.C. 1990).

Recommended Determination on Bond During Presidential Review Period

If the Commission enters an exclusion order or cease and desist order, parties may continue to import and sell their products during the pendency of the Presidential review under a bond in an amount determined by the Commission to be "sufficient to protect the Complainants from any injury." 19 U.S.C. § 1337(e); 19 C.F.R. § 210.50(a)(3).

The Commission frequently sets the bond by attempting to eliminate the difference in sales prices between the patented domestic product and the infringing product. See, e.g., Microsphere Adhesives, supra, Commission Opinion at 24. However, in the absence of reliable price information, the Commission has used other methods to determine an appropriate bond. For example, where a price comparison is unworkable, the Commission has determined that a bond of 100 percent is appropriate. See, e.g., Certain Variable Speed Wind Turbines and Components Thereof, Inv. No. 337-TA-376, Commission Opinion at 27-28 and 40 (September 23, 1996). In other instances where a direct comparison between a patentee's product and the accused product was not possible, the Commission has set the bond at a reasonable royalty rate. See, e.g., Certain Digital Satellite System (DSS) Receivers and Components Thereof, Inv. No. 337-TA-392, (unreviewed) ID and RD at 245 (October 20, 1997).

PROCEDURAL HISTORY/RULINGS

On February 9, 2001, the undersigned's predecessor, Administrative Law Judge Debra Morriss ("Morriss"), issued Order No. 1 (a Protective Order) and an Order establishing ground rules and a target date of March 22, 2002 (Order No. 2). Following a preliminary conference on March 5, 2001, Morriss issued Order No. 4 setting the procedural schedule. Upon being appointed to adjudicate this investigation on May 31, 2001, the undersigned issued Order No. 12 amending the target date, the hearing date and certain other dates in the procedural schedule. As a result, the target date was changed by 5 days from March 22 to March 27, 2002, and the hearing was moved from September 17-24 to September 20-27, 2001.

On June 8, 2001, pursuant to Commission Rule 210.21(a)(1), 19 C.F.R. §210.21(a)(1), 3M moved to terminate the above docketed investigation regarding Kinik Corporation. On June 13, 2001, Kinik and Kinik Corporation filed but did not oppose 3M's motion. However, rather than agree to 3M's request that the parties "pay their own costs," Kinik asked that the undersigned reserve such cost allocations until the conclusion of the investigation. In its response on June 15, 2001, Staff supported termination of the investigation as to Kinik Corporation. Given that no party had provided "extraordinary circumstances" that would advise against terminating the investigation (taking no position on which party should bear what costs), in Order No. 15, the undersigned on June 19, 2001, granted the motion for partial termination. By notice issued on July 9, 2001, the Commission determined not to review that Initial Determination; as a result, the Initial Determination became a determination of the Commission pursuant to 19 C.F.R. § 210.42(h)(3).

Also on June 8, 2001, pursuant to Commission Rule 210.14, 19 C.F.R. §210.14, 3M moved to amend its complaint and notice of investigation asking that it include infringement of claims 4, 5, and 8 of the '489 patent. 3M contended that it had only recently learned of the alleged infringement of the additional claims, that the addition of these claims presented no additional burden on Kinik, that the added claims depended on claim 1, that the added were method claims like claim 1 involving the same inventor, patent, products and art, and that judicial economy dictated litigation of all relevant claims in one proceeding. Finally, 3M argued that it had been precluded from making the amendments earlier because: (1) Kinik refused to provide meaningful document discovery; i.e. Kinik's responses to 3M's February 9, 2001 discovery requests were not fully responded to until after judicial intervention resulting in production as late as May 23, 2001; (2) such production included documents requiring translation from Chinese, and; (3) as recently as May 23, 2001, 3M had inspected Kinik's production facilities in Taiwan. Finally, 3M argued that the absence of an actual inspection of the accused manufacturing facility deprived them of the knowledge necessary to add these claims at an earlier date. On June 18, 2001, Kinik opposed the motion. Kinik argued that the amendment would prejudice the public and parties' interests, that 3M monitored markets for competing products and as a result was well aware of Kinik's products as early as September 2000 and yet 3M never tried to obtain or test Kinik's products before filing the complaint herein. Kinik also noted that in February 2001, it had offered to allow 3M to inspect Kinik's process, but 3M refused. Finally, Kinik argued that 3M refusedl to provide meaningful claim construction and infringement analyses in response to discovery requests including the results of their site visit as late as three weeks thereafter. Staff filed its response on June 15, 2001, supporting the motion. Noting Kinik's argument that adding dependent claims 4, 5, and 8 of the '489 patent could only be sought by 3M at this juncture if they believed claim 1 to be invalid, the undersigned concluded in Order No. 16, issued on June 19, 2001, that the dependent claims could hardly prejudice Kinik given that such amendment provided additional venues for Kinik to explore and that it had until July 13, 2001, ample time, to prepare and file expert reports. By notice issued on July 10, 2001, the Commission determined not to review that Initial Determination.

On July 27, 2001, pursuant to Commission Rule 210.18, 19 C.F.R. §210.18, 3M moved, for a summary determination that it had provided sufficient proof of the "economic" prong of the domestic industry requirement regarding their '489 patent. 3M contended that there no longer remained any genuine issue of material fact as to the "economic" prong and Kinik agreed. Accordingly, on August 8, 2001, the undersigned issued an Initial Determination granting 3M's motion for a partial summary determination of its satisfaction of the economic prong of Section 337's domestic industry requirement. By notice issued on August 28, 2001, the Commission determined not to review that Initial Determination.

In the interim, on August 7, 2001, due to conflicting steel hearings that required the use of all Commission hearing rooms at the end of September 2001, the undersigned issued Order No. 18 extending the target date to April 22, 2002 and revising the hearing date to October 10, 2001 through October 17, 2001.

On August 23, 2001, pursuant to Rule 10.18, 3M moved for a summary determination that Kinik infringed Claims 1, 4, 5 and 8 of U.S. Patent No. 5,620,489 ("the '489 patent"). Kinik and Staff opposed the motion on September 6, 2001. 3M argued that because the terms in Claim 1 should be given their ordinary meaning and because there was no material

dispute of fact as to Kinik's process, 3M was entitled to summary determination that Kinik literally infringed claims 1, 4, 5, and 8 of the '489 patent. 3M further argued that the claim term "sintering" should be construed as "a thermal treatment for bonding particles into a coherent, predominantly solid structure via mass transport events that often occur on the atomic scale." 3M further asserted that Kinik's DiaGrid® process, as shown by "admissions" of Kinik's own witnesses, included "sintering" because metal particles are being "glued together" when Kinik's process [ ] and that regardless of subsequent additional steps in Kinik's manufacturing process, Kinik's process had performed the last step required for literal infringement of claim 1. 3M also contended that Kinik's DiaGrid® process practiced claims 4, 5, and 8 of the '489 patent. In opposition to the motion for summary determination, Kinik argued that because 3M failed to properly construe the claims at issue and failed to show the absence of genuine issues of material fact as to whether Claim 1 literally reads on Kinik's process, 3M's motion should be denied. Kinik contested 3M's construction of several claim elements as well as 3M's assertion that Kinik's DiaGrid® process performed all the steps in claim 1 of the '489 patent. For example, Kinik asserted that persons having ordinary skill in the art did not agree that Kinik's process "sinters" as construed in the '489 patent. Kinik argued that the alleged "sintering" in Kinik's process did not form abrasive articles or secure the abrasive particles, as recited in claim 1. In addition, Kinik asserted that Section 271(g) of the Patent Act precluded a finding of infringement because the "sintering" allegedly practiced by Kinik was materially changed by a subsequent process. Finally, Kinik argued that claims 4, 5 and 8 are not practiced by Kinik because no evidence existed to show that Kinik's process involved placing diamonds inside the preform. Staff argued that because expert testimony as to the meaning of certain portions of Claim 1 would be helpful to determine claim scope, and because 3M failed to show that there are no genuine issues of material fact, its motion ought to be denied. Finally, Staff argued that because all reasonable inferences are to be drawn in favor of Kinik, and the record contained facts that might lead the Commission to accept Kinik's position, summary determination was not appropriate. Moreover, Staff asserted that 3M and Kinik offered conflicting evidence with regard to whether Kinik's process was "'sintering' said preform to form said abrasive article," as recited in claim 1 of the 489 patent. Given Commission Rule 210.18, that summary determination "... shall be rendered if pleadings and any depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no genuine issue as to any material fact and that the moving party is entitled to a summary determination as a matter of law," citing 19 C.F.R. § 210.18(b) and relevant case law, the undersigned denied the motion for summary determination in that, 3M had failed to meet the threshold requirements for granting summary determination for at least two reasons.[3] The first of these regarded the proper claim construction of the term "sintering." Noting that the first step of claim construction is a question of law, Markman, 52 F.3d at 976, that three sources must be considered: the claims, the specification and the prosecution history, Vitronics, 90 F.3d at 1582, and that claims are to be interpreted from the perspective of one skilled in the relevant art, Digital Biometrics, Inc. v. Identix, Inc., 149 F.3d 1335, 1344 (Fed. Cir. 1998); Interactive Gift, 231 F.3d at 866 ("[...], as seen in the various depositions and reports, the undersigned concluded that a question remained unresolved as to whether one having reasonable skill in the art would view the term "sintering" used in the '489 patent, as being limited to the particular bonding

[3]The undersigned noted that other genuine issues of material fact may also have existed to preclude a summary determination, but that such need not be resolved.

together of metal particles, the construction urged by 3M, or whether it would be viewed also as a process which necessarily results in the desired end product. The undersigned further noted that the latter view, which was generally asserted by Kinik, was one that 3M presently requested the undersigned dismiss without benefit of expert testimony. The undersigned concluded that it was probable, however, given these conflicting views, that extrinsic testimonial evidence would be helpful in interpreting Claim 1 in addition to the intrinsic evidence. Given that "[w]hen 'intrinsic evidence is insufficient to enable the court to determine the meaning of the asserted claims,' resort may be had to extrinsic evidence." Advanced Cardiovascular Systems, Inc. v. Scimed Life Systems, Inc., __ F.3d __, 2001 WL 877575 at *13 (2001), and when insufficient extrinsic evidence exists to construe the claims in the context of a motion for summary determination, the undersigned concluded that disposition of the claim construction issue by summary determination was inappropriate. See id. (Summary judgment of noninfringement vacated and remanded where intrinsic evidence not sufficiently clear to construe claims; district court instructed to hear extrinsic evidence); also see Innovad Inc. v. Microsoft Corp., __ F.3d __, 2001 WL 877583 at *7 (2001) ("Summary judgment, therefore, should ordinarily be vacated or reversed if based on a claim construction that this court determines includes error.").[4] The undersigned further noted that 3M also failed to meet its burden as to the factual dispute as to whether Kinik's process includes "'sintering' said preform to form said abrasive article" as recited in claim 1. Given that the second step of comparing the article to the claims is a factual determination, Markman, at 976, and that Kinik offered evidence to show that the "sintering" in Kinik's process, as defined by 3M, failed to form abrasive articles, which Kinik argues is a limitation in claim 1, See e.g., Williamson Dep. Tr. at 170:8-178:7; 278:5-20 and having viewed the evidence in the light most favorable to Kinik, the undersigned concluded that a genuine issue of material fact remained to be heard at trial. Accordingly, on September 12, 2001, the undersigned denied 3M's motion for summary determination that Kinik's accused process infringes Claims 1, 4, 5 and 8 of the '489 patent.

On August 27, 2001, Kinik moved for a summary determination dismissing 3M's amended Complaint and this investigation. On September 6, 2001, 3M and Staff opposed Kinik's motion and on September 10, 2001, Kinik moved to reply. In Order No. 23, issued also on September 12, 2001, the undersigned denied Kinik's motion for a summary determination. In its motion, Kinik argued that 3M's asserted claims of the '489 patent were invalid and not infringed by Kinik. Given that even accepting 3M's expert's definition of "sintering," Kinik argued that it did not infringe the asserted claims because its accused process did not practice "sintering" as required by claim 1 of the '489 patent. Furthermore, Kinik claimed that even if "sintering" did occur in the accused process, such "sintering" did not "form" an abrasive article as required by the '489 patent claims or "secure" the abrasive particles in the DiaGrid® products. Specifically, Kinik argued that one of ordinary skill in the art would not consider the chromium boride compounds formed during Kinik's process to "sinter" because Kinik's process uses a brazing material that is heated to a temperature above its liquidus. Kinik also argued that the alleged "sintering" in the DiaGrid process does not "form" or "secure" the abrasive article because any "sintering" that does occur is

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[4]"[C]onsultation of extrinsic evidence is particularly appropriate to ensure that [a judge's] understanding of the technical aspects of the patent is not entirely at variance with the understanding of one skilled in the art." Pitney Bowes, Inc. v. Hewlett-Packard Co., 182 F.3d 1298, 1309 (Fed. Cir. 1999).

transient and that Kinik's process "secure[s]" the abrasive particles in the DiaGrid products by a mechanism other than "sintering." 3M argued that a summary determination on the "sintering" issue is inappropriate because genuine issues exist about Kinik's process [ ] 3M contended that the '489 patent is not limited to "sintering" for a specified minimum period of time. 3M further contended that claim 1 recites that "sintering" is a necessary step to "form" an abrasive particle, but "sintering" is not the sole step in the process, and does not have to be the final step. Staff agreed with 3M that a summary determination was inappropriate at this juncture. Staff also argued that Kinik had failed to show that its proposed claim construction is the only reasonable interpretation of the claims at issue. Staff noted that the interpretation of the term "sintering" to one of ordinary skill in the art remains a highly disputed issue because, for example, Kinik claims that "sintering" refers to a manufacturing process while 3M urged that "sintering" refers to the bonding together of adjacent particles in a powder mass. Another basis precluding a summary determination, Staff contended, is that 3M and Kinik appear to agree that, at some level, the infringement, if any, of the asserted claims occurs unobserved inside Kinik's furnace during the heating cycle. Given that a hearing would produce conflicting evidence regarding events occurring within the furnace, including whether any "sintering" that may in fact take place to "form" an "abrasive article," as recited in claim 1 of the '489 patent, Staff reasoned the summary determination was ill advised. The undersigned concluded that Kinik was not entitled to a summary determination for the same reasons that 3M had been denied summary determination in Order No. 22 in that Kinik had failed to meet the threshold requirements for granting summary determination for at least two reasons.[5] The first of these regarded the proper claim construction of the term "sintering." As recited earlier, the first step of claim construction is a question of law. Markman, 52 F.3d at 976. The undersigned concluded that from the various depositions and reports, that the question remained unresolved as to whether one having reasonable skill in the art would view the term "sintering" used in the '489 patent, was a process which necessarily results in the desired end product, the construction urged by Kinik, or whether it would be viewed also as being limited to the particular bonding together of metal particles. See e.g., German Dep. Tr. at 78:2-11; German Expert Report at 5; William Dep. Tr., 59:4-12; 64:7-66:7; 84:1-11; 179:9-176:12. The undersigned noted that the latter view, which is generally asserted by 3M, is one that Kinik presently requests the undersigned dismiss without benefit of expert testimony. The undersigned concluded that it is probable, however -- in view of these conflicting views, that extrinsic testimonial evidence would be helpful in interpreting Claim 1 in addition to the intrinsic evidence. The undersigned also noted that the second reason Kinik failed to meet its burden was the factual dispute as to whether Kinik's process includes "'sintering' said preform to form said abrasive article" as recited in claim 1 of the '489 patent. The second step of comparing the article to the claims is a factual determination. Markman, 52 F.3d at 976. Kinik offered evidence to show that the "sintering" in Kinik's process, as defined by 3M, failed to "form" abrasive articles, which Kinik argues is a limitation in claim 1. See e.g., Williamson Dep. Tr. 170:8-178:7; 278:5-20. 3M claimed that "sintering" continues through Kinik's entire heating cycle, such that Kink's final product has been "sintered," and the resulting abrasive product firmly affixing diamonds that were not previously attached to the substrate, which "must have been achieved by sintering." Opposition to Respondent's Motion for Summary Determination, p. 18. Viewing the

[5]The undersigned notes that other genuine issues of material fact may also exist to preclude a summary determination, but need not be resolved at this juncture.

evidence in the light most favorable to 3M, there remained a genuine issue of material fact. Accordingly, Kinik's motion for a summary determination that the asserted claims of the '489 patent are invalid and not infringed by Kinik was denied.

On September 7, 2001, 3M moved for a summary determination that 3M had satisfied the technical prong of the domestic industry requirement. On September 19, 2001, Kinik and Staff filed responses in opposition to 3M's motion. On September 20, 2001, in Order No. 25, the undersigned denied 3M's motion for summary determination that it had satisfied the technical prong of the domestic industry requirement. Citing the relevant precedent regarding Commission Rule 210.18 summary determinations, the undersigned noted that a complainant in a patent-based Section 337 investigation, when proving the existence of a domestic industry, must demonstrate that it is practicing or exploiting the patents at issue in addition to meeting the economic criteria for that requirement. See 19 U.S.C. § 1337(a)(2) and (3); also see Certain Microsphere Adhesives, Process for Making Same, and Products Containing Same, Including Self-Stick Repositionable Notes, Inv. No. 337-TA-366, Commission Opinion at 8 (December 15, 1995) ("Microsphere Adhesives"), aff'd sub nom. Minnesota Mining & Manufacturing Co. v. U.S. Int'l. Trade Comm., 91 F.3d 171 (Fed. Cir. 1996) (Table); Certain Plastic Encapsulated Integrated Circuits, Components Thereof, and Products Containing Same, Inv. No. 337-TA-315, Commission Opinion at 16 (March 24, 1992). Further, the undersigned noted that fulfillment of this so-called "technical prong" of the domestic industry requirement is not determined by a rigid formula, but rather by the articles of commerce and the realities of the marketplace citing Certain Diltiazem Hydrochloride and Diltiazem Preparations, Inv. No. 337-TA-349, Initial Determination at 138 (Feb. 1, 1995) (unreviewed in relevant part); Certain Double-Sided Floppy Disk Drives and Components Thereof, Inv. No. 337-TA-215, 227 U.S.P.Q. 982, 989 (Commission Opinion 1985). The undersigned also concluded that the test for claim coverage for the purposes of the technical prong of the domestic industry requirement is the same as that for infringement. Certain Doxorubicin and Preparations Containing Same, Inv. No. 337-TA-300, Initial Determination at 109 (May 21, 1990), aff'd, Views of the Commission at 22 (October 31, 1990). As a result, "First, the claims of the patent are construed. Second, the complainant's article or process is examined to determine whether it falls within the scope of the claims." Id. As with infringement, the undersigned noted that the first step of claim construction is a question of law, whereas the second step of comparing the article to the claims is a factual determination citing. Markman, 52 F.3d at 976. To prevail, the undersigned further concluded that a patentee must establish by a preponderance of the evidence that the domestic product practices one or more claims of the patent either literally or under the doctrine of equivalents. Bayer AG v. Elan Pharmaceutical Research Corp., 212 F.3d 1241, 1247 (Fed. Cir. 2000) ("Bayer"). 3M argued that no genuine issues of material fact existed about the process that 3M uses to manufacture its sintered abrasive products and that the process practices at least one of claims 1, 4, 5 and 8 of the '489 patent. Further, 3M argued Staff provided a proposed claim construction and statement of material facts to support their argument that the 3M process is covered by the asserted claims of the '489 patent. Kinik argued that 3M was not entitled to a summary determination because 3M failed to proffer a complete and proper claim construction, had not offered any evidence to show that 3M's process of making pad conditioners met all of the limitations of each claim step of any claim of the '489 patent, and that granting a summary determination would require that either several disputed material facts improperly be resolved without hearing or be construed in favor of the moving party. Finally, Kinik argued that genuine issues of material

fact existed as to whether 3M practices any of the asserted claim of the '489 patent. For example, regarding the issue of "sintering," Kinik contended that 3M summarily stated that "[s]intering of the SEDF preform occurs during heating within the sinter press" without citing to any evidence, and that which was cited [deposition testimony] did not support their statement. Given that Kinik also disputed the process by which 3M manufactures its pad conditioners, and whether that process is covered by one or more claims of the '489 patent as properly construed, Kinik argued that such are factual disputes which are material to determining whether 3M practices one of the asserted claims of the '489 patent. Staff argued that because the current record is insufficient to determine the proper claim construction for infringement purposes, the record is also insufficient to determine the proper claim construction for the "technical prong" for the domestic industry requirement. Staff noted that 3M's instant motion for summary determination of the "technical prong" of the domestic industry requirement added nothing to the claim construction analysis provided in 3M's motion for a summary determination of infringement, which had been earlier denied. Just as 3M's motion for a summary determination of infringement was denied on the basis that extrinsic testimonial evidence would be helpful in interpreting Claim 1 in addition to the intrinsic evidence, the undersigned also concluded that expert and technical testimony was necessary to understand the underlying technology and the context of the invention. Given that 3M and Kinik offered different constructions for the claim term "sintering," the undersigned also found that given these conflicting views, extrinsic testimonial evidence would be helpful in interpreting this term as well as other claim terms and that, accordingly, summary determination was not appropriate.

On October 2, 2001, the undersigned issued Order Nos. 30, 31 and 32. Order No. 30 denied Kinik's motion in limine to preclude 3M's experts from offering any testimony at the October 3rd hearing on claim construction issues. Order No. 31 denied Kinik's motion in limine to limit 3M to their admitted claim construction of the phrase "then sintering said preform to form said abrasive article" in an interrogatory response. Order No. 32 denied Kinik's motion in limine to bar 3M from offering inventor testimony, evidence and argument regarding the inventor's subjective intent in using certain claim language and the meaning or proper construction of the disputed claim terms of the '489 patent. On September 26, 2001, Kinik had moved to preclude 3M from offering any testimony at the October 3, 2001, claim construction hearing. On October 1, 2001, 3M and Staff responded to the motion. Specifically, Kinik argued that 3M's expert Dr. A. Brent Strong should be precluded from offering any testimony or evidence on any claim construction issue because he admittedly performed an improper claim construction analysis, including considering the accused process in his analysis. Kinik also requested that 3M's expert's, Dr. Randall German, testimony be excluded because he did not construe any of the asserted claims of the patent at issue in his expert report and had not offered to provide expert testimony regarding claim construction. Alternatively, Kinik requested that Strong be precluded from offering claim construction testimony about any disputed claim terms that were not addressed in his expert reports and that German be permitted to provide testimony only regarding the technical meaning of the term "sintering" independent of its meaning or use in the patent at issue. Kinik argued that German had not construed the meaning of any words as they are used in the asserted claims of the patent at issue and to the extent that he was asked to do so by 3M, his expert reports did not disclose his methodology, analysis or conclusions. Kinik further contended that German was offered to provide testimony only regarding the academic meaning of "sintering" divorced from any particular context. With regard to Strong, Kinik

argued that although Strong had been disclosed as a claim construction witness, there was nothing in his expert report about the meaning of the claim term "then sintering said preform to form said abrasive article." With respect to the other claim steps, Kinik argued that German's testimony should also be excluded because he admitted that he was unable to set aside his knowledge of the 3M and Kinik processes of manufacturing abrasive articles when he interpreted the meaning of the first element of claim 1 of the '489 patent. In their opposition to Kinik's motion in limine, 3M argued that the subjects and opinions about which German and Strong would testify were fully disclosed in their expert reports. Staff contended that German's and Strong's testimony ought to be allowed because such might be relevant and helpful to familiarize the undersigned with the field. With regard to Kinik's argument that Strong was not able to set aside his knowledge of Kinik's process when analyzing claim terms, Staff contended that Kinik's view was conclusory because Kinik's argument was based on Strong's statements concerning the information sources at his disposal when writing his expert report. Upon review of the circumstances surrounding the motion in limine, the undersigned found that Kinik had notice of the subjects and opinions about which German and Strong would testify, and accordingly, denied Kinik's motion.

Also on September 26, 2001, Kinik had moved to limit 3M to their admitted claim construction of the phrase "then sintering said preform to form said abrasive article." On October 1, 2001, 3M and Staff responded. Kinik noted that in a response to one of Kinik's interrogatories, 3M stated that the proposed construction for the term "and then sintering said preform to form said abrasive article" was "[h]eating the soft, deformable and flexible preform including the abrasive particles to a temperature high enough to secure the abrasive particles in the matrix material." However, after 3M amended the Complainant to add claims 4, 5, and 8 of the patent at issue, 3M also supplemented their responses and reaffirmed their previously disclosed construction of claim 1. Kinik contended that 3M's actions were an admission that the term "to form said abrasive article" in claim 1 requires that sintering be the mechanism that secures the abrasive particles in the matrix material. Further, Kinik contended that it was only after the close of discovery that 3M for the first time suggested that they intended to try to abandon their admissions in interrogatory responses. Kinik argued that given 3M's binding admission that claim 1 requires that "sintering" to secure the abrasive particles in the matrix material, 3M should not be permitted to proffer a different claim construction after the close of discovery. Kinik further argued that even if 3M's admission was not binding, 3M should not be permitted to change their construction to avoid Kinik's defenses because allowing a reversal of 3M's stated position on the eve of trial severely prejudiced Kinik. In response, 3M argued that Kinik had misinterpreted its interrogatory response by imposing a "mechanism" requirement into claim 1, a requirement that 3M contended had no basis in the patent or prosecution history. 3M also argued that Kinik presented "a faulty and highly suspect" legal basis for its argument that 3M should be absolutely bound to their interrogatory response. Noting that Kinik's legal support was inapplicable because the limitations or admissions imposed in the cited cases were supported by the intrinsic evidence, 3M argued that Kinik's motion ought to be rejected. In its response, Staff noted that an unsupplemented discovery response is not per se a binding admission on a party, but a party is under a duty to timely amend a response to include information obtained thereafter. Staff also argued that allowing 3M to change the claim construction propounded in their response at this late date would severely prejudice the other parties to this investigation and therefore noted that it supported Kinik's motion to the extent that Kinik sought to preclude 3M from presenting wholly new claim construction theories at the

hearing. However, Staff contended that 3M should be able to explain through testimony and argument their position regarding the meaning of the claim term at issue and their interrogatory response. Finally, Staff contended that although Kinik argued that 3M should be limited to the construction that agrees with Kinik's construction, Kinik never articulated its proposed construction until its expert rebuttal report. Thus, while Staff supported Kinik's motion to preclude any new claim construction theories, Staff opposed any attempt to impose de facto Kinik's construction into 3M's interpretation of the claim terms. The undersigned concluded that limiting 3M to the proposed claim construction in their interrogatory responses would be limiting evidence on a question of law, i.e. claim construction. Further, the undersigned noted that while answers to interrogatories may be used as admissions, when introduced into evidence, they are not binding, and the answering party may introduce additional evidence on the subject. See 7 Moore's Federal Practice § 33.160 (2001). Additionally, the undersigned concluded that denying Kinik's motion was not prejudicial to Kinik because Kinik had been on notice of the claim construction currently propounded by 3M noting that the interpretation in 3M's Prehearing Brief was not different than the one presented in 3M's Motion for Summary Determination of Infringement and only arguably different than that presented in 3M's interrogatory responses. Further, the undersigned noted that 3M's experts supported the same position in their depositions and accordingly denied Kinik's motion to limit 3M to the the claim construction provided in their interrogatory response.

On September 26, 2001, Kinik also moved to bar 3M from offering inventor testimony, evidence and argument regarding the inventor's subjective intent in using certain claim language and the meaning or proper construction of the disputed claim terms of the patent at issue. On October 1, 2001, 3M and Staff responded to the motion. Kinik sought to preclude 3M from offering evidence of the patent inventor's interpretation of his subjective intent in using the disputed claim language at the October 3rd hearing or at subsequent proceedings. Kinik requested an order limiting the scope of the patent inventor's testimony to explaining his claimed invention and its development. Kinik further argued that just as inventor testimony should not be considered in the claim construction context, it is equally inappropriate in determining whether the claim language is indefinite. 3M and Staff noted that the Federal Circuit allowed the admission of inventor testimony for claim construction purposes citing Advanced Cardiovascular Systems, Inc. v. Scimed Life Systems, Inc., 261 F.3d 1329 (Fed. Cir. 2001); Voice Technologies Group, Inc. v. VMC Systems, Inc. 164 F.3d 605 (Fed. Cir. 1999). Accordingly, the undersigned denied Kinik's motion.

Finally, on September 26, 2001, Kinik had moved to preclude 3M from presenting any evidence or argument of non-obviousness, including commercial success and long-felt need. On October 9, 2001, 3M and Staff filed oppositions to Kinik's motion. Kinik argued that 3M should be barred from presenting evidence of non-obviousness because 3M failed to disclose any of their contentions or evidence on this issue during discovery. Kinik also argued that 3M's experts should be barred from presenting opinions about non-obviousness because they did not offer an opinion on this issue in their written expert reports or in their depositions. Further, Kinik contended that 3M suggested for the first time that it intended to offer non-obviousness evidence by suggesting that a fact witness, Robert G. Visser, will testify "about the market for 3M's sintered abrasive products" and that it intended to have Strong opine on non-obviousness. Although Kinik admitted that Strong testified during his deposition that he intended to express an opinion relating to the validity of the claims of the patent at issue,

Kinik argued that such was insufficient to defeat its motion because Strong's deposition testimony was to the effect that he would express an opinion on validity because he's "done that in [his] report." Kinik also noted that Strong's opinion on validity as expressed in his report dealt only with the invalidity under § 112 and did not address invalidity for obviousness under § 103. Staff noted that 3M's interrogatory responses and the deposition testimony of 3M's employees adequately put Kinik on notice that secondary consideration of non-obviousness was at issue in this investigation. Agreeing with Staff on the forgoing, the undersigned also found that Strong's rebuttal report specifically addressed Kinik's expert's arguments relating to obviousness by arguing that the employed reasoning contained several flaws. Accordingly, the undersigned denied Kinik's motion to preclude evidence of non-obviousness.

On October 4, 2001, given the short time remaining to trial from the date of filing of the motion, the undersigned issued Order Nos. 33, 34, and 35 without opposing input in order to assist parties in their trial preparation. Order No. 33 granted 3M's motion in limine to bar Kinik from asserting the affirmative defense under 35 U.S.C. § 271(g) that Kinik's process does not infringe because Kinik's continuous heating cycle comprises a "subsequent process" that "materially change[s]" its products. Order No. 34 denied 3M's motion in limine to bar Kinik from asserting invalidity defenses under 35 U.S.C. §§ 102 and 112. Order No. 35 denied 3M's motion in limine to prevent testimony of Kinik's expert relating to opinions expressed in his expert report.

On September 27, 2001, 3M had moved to bar Kinik from asserting the affirmative defense under 35 U.S.C. §271(g) that Kinik's process does not infringe because the final few degrees of Kinik's continuous heating cycle comprises a "subsequent process" that "materially change[s]" its products under § 271(g)(1). 3M argued that controlling authority exists to preclude the advancement of such a theory in this forum, i.e., under Section 337. Section 337(a)(1)(B)(ii) covers, without further qualification thereof, not only those articles that "infringe[,]"§337(a)(1)(B)(i), as defined under Section 271 of the Patent Statute, but also those articles "made[...] by a process covered by the claims of a[...] United States patent." 3M noted that the Court of Appeals for the Federal Circuit and this Commission when faced by situations where a party asserted §271(g) as a defense in the context of a 337 violation, refused to allow such asserted defenses. Amgen, Inc. v. U.S.I.T.C., 902 F.2d 1532 (Fed. Cir. 1990); Certain Recombinantly Produced Human Growth Hormones, Inv. No. 337-TA-358. Accordingly, in Order No. 33, the undersigned granted 3M's motion to strike Kinik's proposed defense.

Also on September 27, 2001, 3M had moved to bar Kinik from asserting the defense of invalidity under 35 U.S.C. §§102 and 112 by virtue of particular theories that had not yet been asserted. 3M asserted that while Kinik had thus far asserted invalidity under §112, ¶2 only with regard to the term "soft, easily deformable and flexible," Kinik had not developed any other theories under this section or §102. 3M argued that consideration of evidence going to these yet undeveloped and virtually untouched theories would greatly prejudice 3M and distort the record in this investigation. The undersigned disagreed noting that Kinik had not averred to any such new theories to date, that such a ruling was premature and accordingly, in Order No.34, denied 3M's motion to strike a Kinik proposed defense that had yet to be asserted.

Finally, on September 27, 2001, 3M had moved to prevent testimony of Kinik's expert, Dr. Ren-Kae Shiue, relating to opinions expressed in his expert report. 3M asserted that Shiue should not be allowed to provide testimony regarding the opinions expressed in his expert report because Kinik failed to provide a draft of the report during discovery. Noting that such might vitiate Shiue's usefulness as a witness, and as such would greatly prejudice Kinik and given that 3M failed to move to compel Kinik's production of Shiue's draft report, the undersigned accordingly, in Order No. 35, denied 3M's motion to preclude testimony by Shiue.

On the opening hearing date, October 10, 2001, the undersigned issued Order Nos. 36, 37, 38 and 39, in order to give parties rulings on the motions prior to the taking of evidence at the hearing. On September 26, 2001, Kinik had moved to limit evidence and argument in this matter to DiaGrid products that are commercially available and are imported into the United States, sold for importation into the United States, or sold in the United States after importation. Kinik, thereby, sought to preclude 3M from claiming that any other Kinik products are encompassed by this investigation. On October 9, 2001, 3M and Staff opposed the motion. Kinik argued that 3M should not be allowed to introduce evidence and make argument about DiaGrid prototype products because the prototype products had not yet entered the stream of commerce in the United States, thereby depriving the Commission of jurisdiction over them. Kinik contended that the Commission did not have jurisdiction over a claimed threat of infringement by devices to be produced in the future and had yet to enter the United States. 3M responded that some of Kinik's prototype DiaGrid products were currently being marketed in the United States which Kinik did not dispute. Staff responded to Kinik's motion by noting that the Commission has jurisdiction to determine whether or not articles have been imported into the United States and must assume jurisdiction in order to be able to reach the merits of that issue. The undersigned concluded that in such circumstances, the scope of this investigation included Kinik's prototype products because such might enter the stream of commerce in the United States during the course of the investigation. See In the Matter of Certain Safety Eyewear and Components Thereof, USITC Inv. No. 337-TA-433, Order No. 15 (August 11, 2001) (permitting discovery on products under development that fall within the scope of the investigation where the new products are likely to be made or imported into the United States prior to the close of the evidentiary record). Thus, to the extent that the importation or sale for importation of certain products is disputed, 3M was permitted to present such evidence and Kinik's motion was denied.

On September 26, 2001, Kinik had moved to preclude 3M from presenting any evidence or argument regarding foreign sales of Kinik's DiaGrid products to customers outside the United States. On October 9, 2001, 3M and Staff filed in opposition and support of the motion, respectively. Kinik argued that because the Commission's jurisdiction and the scope of this investigation concerned only products that enter the stream of commerce in the United States, documents and information relating to Kinik's sales of DiaGrid products to customers outside the United States that do not enter the stream of commerce in the United States were irrelevant to this investigation. Kinik also noted that 3M's trial exhibits included documents regarding these types of sales. Given that the Commission's jurisdiction under § 337 is limited to products that enter the stream of commerce in the United States and as Staff noted, evidence of foreign sales of DiaGrid products to customers outside the United States where such products never enter the United States are irrelevant to this investigation, the undersigned granted Kinik's motion to exclude such evidence and directed that 3M

withdraw from its trial exhibits any documents which concerned such sales.

Also on September 26, 2001, Kinik had moved to preclude 3M from presenting any evidence or argument that any of the asserted claims of the '489 patent are infringed under the doctrine of equivalents. On October 9, 2001, 3M and Staff filed in opposition to and support of this motion, respectively. Kinik contended that 3M's responses to Interrogatory No. 3 made it clear that 3M accused Kinik only of literally infringing the '489 patent. Kink also asserted that 3M's experts' reports also alleged only literal infringement. According to Kinik, the first time 3M suggested that they might attempt to prove infringement under the doctrine of equivalents was a month prior to trial (September 7, 2001), during a telephone conference when 3M's counsel refused to limit the statement of the issues in terms of "literal infringement." Therefore, the Joint Narrative Statement of the Issues stated "Whether each limitation of claims 1, 4, 5 or 8 of the '489 patent is met by Kinik's DiaGrid process, either literally or by a substantial equivalent." Kinik also noted that 3M's Prehearing Brief alleged infringement "literally or by a substantial equivalent," but did not present a doctrine of equivalents analysis in the infringement section. Kinik claimed that it would be unduly prejudiced if 3M was permitted to offer "substantial equivalent" evidence because Kinik took no discovery related to the doctrine of equivalents. Staff agreed that 3M had not set forth a theory based on the doctrine of equivalents, even in their pre-hearing brief, and that to allow 3M to present such a theory for the first time at trial would severely prejudice the other parties to this investigation. Accordingly, the undersigned granted Kinik's motion.

On October 9, 2001, Kinik requested and on October 12, 2001, the undersigned granted Kinik's motion to reconsider Order No. 33. In Order No. 33, the undersigned had granted a 3M motion to strike Kinik's proposed § 271(g) defense. The undersigned granted reconsideration noting that Order No. 33 had incorrectly held that § 271(g)(1) did not apply as a matter of law. Nevertheless, upon reconsideration, the undersigned found that Kinik still could not raise a § 271(g)(1) defense because Kinik had not raised such a defense until approximately a week after the extended discovery cutoff and approximately one month prior to trial. To allow Kinik to assert this defense at such a late date would deprive 3M of timely notice and little time to prepare its response.

ISSUE SPECIFIC POSITION OF PARTICIPANTS, DISCUSSION, ANALYSIS AND FINDINGS

Issue I: Importation: Whether Kinik imports into the United States, sells for importation, or sells within the United States after importation DiaGrid® abrasive articles made in Taiwan?

COMPLAINANT'S Position

3M agrees with Kinik's statement about its importation, sale for importation, or sale or offer for sale after importation of products made using the DiaGrid® process. 3M maintains that Kinik's activities in this regard give the Commission jurisdiction over products made using the DiaGrid® process. 3M also argues that because the relief available under section 337 is prospective, 3M's remedy should be broad enough to cover all products made by the DiaGrid® process including but not limited to all products that have been or are commercially available, sold, or offered for sale in the United States and products that Kinik

is currently developing. 3MPHB[6] at 9; 3MPHRB[7] at 5.

RESPONDENT'S Position

Kinik contends that the issue of importation is not disputed and the parties have stipulated that Kinik imports into the United States, sells for importation or sells within the United States after importation certain DiaGrid® abrasive products made in Taiwan using the DiaGrid® process. However, Kinik claims that not all DiaGrid® products are commercially available and not all DiaGrid® products have been imported into the United States.

According to Kinik, Kinik's DiaGrid® products that are commercially available in the United States are only the DiaGrid® CMP pad conditioners, profile wheels, and wire saw beads. Of these products, Kinik claims that only the DiaGrid® wire saw beads and CMP pad conditioners have been sold in the United States. While Kinik's DiaGrid® profile wheels have been offered for sale, according to Kinik, none have been sold in the United States.

Kinik admits that it is currently developing a number of products using the DiaGrid® process, but that those products have not yet been sold in the United States. Further, Kinik's DiaGrid® [ ] are not yet commercially available, and while samples of the DiaGrid® [ ] have been given to 3M, which expressed an interest in selling them, there have been no sales in the United States of the DiaGrid® [ ] Thus, Kinik maintains that only Kinik's DiaGrid® CMP pad conditioners and DiaGrid® wire saw beads have been imported into the United States, sold for importation in the United States, or sold in the United States after importation. KPHB[8] at 15-16; KPHRB[9] at 7.

COMMISSION INVESTIGATIVE STAFF'S Position

Staff has not stated a position on importation. However, Staff contends that the products at issue are Kinik's DiaGrid® pad conditioner, wire saw beads, profile wheels, and [ ] Staff contends that Kinik offers for sale in the United States DiaGrid® [ ] SPHB[10] at 5-6.

Discussion, Analysis, and Conclusion

Both 3M and Kinik maintain that this issue is not disputed. Accordingly, the undersigned finds that Kinik imports into the United States, sells for importation or sells

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[6]3MPHB refers to 3M's Post-Hearing Brief.

[7]3MPHRB refers to 3M's Post-Hearing Reply Brief.

[8]KPHB refers to Kinik's Post-Hearing Brief.

[9]KPHRB refers to Kinik's Post-hearing Reply Brief. On November 19, 2001, Kinik moved [449-36] for leave, hereby granted, to file out of time Kinik's reply to 3M's Post-Hearing Brief.

[10]SPHB refers to Staff's Post-Hearing Brief.

within the United States after importation certain DiaGrid® abrasive products made in Taiwan using the DiaGrid® process.

Kinik admits that it imports into the United States, sells for importation or sells within the United States after importation certain DiaGrid® abrasive products, but not all DiaGrid products. However, Kinik contends that only DiaGrid® CMP pad conditioners and wire saw beads have been imported into the United States, sold for importation in the United States, or sold in the United States after importation. KPHB at 16. Kinik implies that DiaGrid® profile wheels are not "imported" because although they have been offered for sale, none have been sold in the United States. Id. However, this Commission has recognized that § 337(a)(1)(B), codification of the importation requirement, does not address a purpose for imported products, and thus, includes importation by a respondent without regard to purpose. Certain Integrated Circuits, Processes for Making Same, and Products Containing Same, USITC Inv. No. 337-TA-450, Unreviewed Initial Determination (Order No. 15) (Nov. 2001). Thus, the Commission has given broad interpretation to "importation" under § 337. Id. (citations omitted). Accordingly, it is irrelevant that Kinik has not sold DiaGrid® profile wheels in the United States. That Kinik DiaGrid® profile wheels have, in fact, been imported is sufficient to satisfy the importation standard. See Id. (finding that chipsets imported into the United States by respondents for marketing or promotional activities satisfy the importation standard of § 337). Likewise, Kinik does not state that it imports DiaGrid® [ ] into the United States, but admits that it provided samples to 3M in the United States. The undersigned finds that Kinik imported DiaGrid® [ ] into the United States, by providing samples to 3M, thereby satisfying the importation standard. Id.

Issue II: Level of Ordinary Skill in the Art: What is the level of ordinary skill in the art relevant to the '489 patent?

COMPLAINANT'S Position

3M contends that the art relevant to this investigation is the art of making abrasive articles. 3M further maintains that a person of ordinary skill in this art has at least a bachelor's degree in materials or related engineering or in a materials science, and one or more years of experience or training with respect to abrasive articles.

3M argues that the relevant art is not broad enough also to include the entire field of "powder metallurgy" or "making solid objects out of powdered metal," as Kinik suggests. 3M, however, does agree with Kinik about the level of knowledge of a person of ordinary skill in the relevant art -- making abrasive articles[11]. 3MPHB at 9-10; 3MPHRB at 6.

[11]The undersigned notes that in 3M's post-hearing brief, 3M contends that the a person of ordinary skill in the relevant art has "one [or] more years of experience or training with respect to abrasive articles." However, in its post-hearing reply brief, 3M states that it agree[s] with Kinik about the level of knowledge of a person of ordinary skill in the relevant art" and Kinik states in its post-hearing brief that a person of ordinary skill in the relevant art has "two or more years of experience in a related manufacturing industry."

RESPONDENT'S Position

Kinik maintains that the art relevant to this investigation is the art of powder metallurgy or composites for making solid objects out of such powdered metal, particularly sheet-like metal objects, which includes abrasive articles. Kinik contends that a person of ordinary skill in the art relevant to this investigation has a bachelor's degree in engineering or material sciences (including metallurgy) and two or more years of experience in a manufacturing industry related to the manufacture of products from metal powders or composites.

Kinik contends that 3M's attempt to narrow the relevant art to "making abrasive articles" is overly restrictive and not supported by the weight of the evidence. KPHB at 16-17; KPHRB at 7-8.

COMMISSION INVESTIGATIVE STAFF'S Position

As Staff notes, the undersigned held that one of ordinary skill in the art relevant to the '489 patent has at least one year of experience in the relevant industry, and may have a bachelor's degree in a related science field. Order No. 23 Findings of Uncontroverted Material Fact No. 15 (September 12, 2001). Staff contends that the field of industrial experience would include "'the making of composite parts into various abrasive articles and other composite parts into other types of articles besides those which might be used for abrasives.'" Staff further maintains that a related science field includes engineering or material science, industrial engineering, and mechanical engineering.

Staff agrees with 3M that the relevant art is that of making abrasive articles. SPHRB[12] at 2.

Discussion, Analysis, and Conclusion

The undersigned concludes that the art relevant to this investigation is the art of making abrasive articles. Further, as stated in Order No. 23, a person of ordinary skill in this art has at least a bachelor's degree in a related science field and one or more years of experience in the relevant industry. A related science field, as Kinik notes, is engineering or material sciences (including metallurgy). The relevant manufacturing industry is related to the manufacture of products from metal powders or composites.

Issue III: Claim Construction for the '489 patent

Issue III.A: What is the proper construction of claim 1 of the '489 patent?

Claim 1 of the '489 patent is a method claim written in "Jepson" format "meaning that the claim first describes the scope of the prior art then claims an improvement over the prior art." Dow Chemical v. Sumitomo Chemical Co. Ltd., 257 F.3d 1364, 1368 (Fed. Cir. 2001); Sjolund v. Musland, 847 F.2d 1573, 1576-77 (Fed. Cir. 1988) (stating that the preamble of

[12]SPHRB refers to Staff's Post-Hearing Reply Brief.

a Jepson claim is impliedly admitted to be prior art); 37 C.F.R. § 1.75(a). Hence, the preamble of claim 1 describes the prior art process of forming an abrasive article through the steps of combining abrasive particles and a sinterable matrix material and then sintering. Strong Tr. at 71-72, 80. Claim 1 reads as follows, with the particular terms in dispute underscored for emphasis at points where they appear in the claim for the first time:

> In a method for making an abrasive article wherein a plurality of abrasive particles and a quantity of powdered sinterable matrix material are combined together and sintered to form the article, the improvement comprising
>
> forming a soft, easily deformable and flexible preform from a mixture of said quantity of powdered sinterable matrix material and a liquid binder composition,
>
> including a plurality of abrasive particles at least partially in said preform and
>
> then sintering said preform to form said abrasive article.

The positions of the parties on each disputed term, and the disposition in each instance, is set forth below.

"comprising"

COMPLAINANT'S Position

3M argues that the phrase "comprising" is a transition phrase that makes claim 1 "open," the infringement of which occurs whenever all the recited steps are practiced, regardless of whether the infringer performs additional steps before, during, or after the recited steps. 3M further contends that the term "the improvement comprising" indicates that the elements that follow the phrase in the body of the claim constitute an improvement over the process recited in the preamble and define the invention of claim 1. 3M contends, therefore, "comprising" means that the claim covers any process that includes each of the recited steps regardless of whether other steps are also performed before or after the recited clams. Thus, 3M maintains that any infringing process must perform every step recited in claim 1, but the performance of additional steps does negate infringement. According to 3M, by ignoring the presence of the term "comprising," Kinik eliminates a portion of the claimed invention of the '489 patent and attempts to convert claim 1 into a "closed" claim in order to avoid a finding of infringement by performing additional steps. 3M notes that a process claim can use the term "consisting of" as the transitional phase giving the claim a "closed" form, meaning the claim is infringed if only the recited steps are practiced and no more. 3MPHB at 16; 3MPHRB 6-9.

RESPONDENT'S Position

Kinik does not dispute that the transitional term "comprising" is open-ended and generally does not exclude additional, unrecited elements or method steps. Kinik, however,

argues that there are numerous specific restrictions on the general rule regarding the effect of the word "comprising" in a claim. For example, claims Kinik, "'comprising' is not a weasel word with which to abrogate claim limitations or to restore excluded subject matter." Kinik contends that where an accused process does not merely perform an additional step, but performs a step explicitly in contrast to that covered by the scope of the claim, use of the term "comprising" cannot restore subject matter otherwise excluded from the claim. By analogy, Kinik contends that an additional structure in an accused product may not be disregarded where that structure is inconsistent with the patent's claim. KPHRB at 8-10.

COMMISSION INVESTIGATIVE STAFF'S Position

Staff contends the use of the transitional phrase "comprising" at the end of the preamble indicates that the steps described in the claim are part of a larger process and do not exclude additional preliminary or subsequent steps. SPHB at 10, 18-19.

Discussion, Analysis, and Conclusion

The term "comprising" is a term of art used in patent claim language to mean that the named elements are essential, but other elements may be added and still form a construct within the scope of the claim. Genentech, Inc. v. Chiron Corp., 112 F.3d 495, 501 (Fed. Cir. 1997). A claim using the term "comprising"does not exclude the presence in the accused apparatus or method of factors in addition to those explicitly recited. Vivid Tech., Inc. v. Am. Sci. & Eng'g, Inc., 200 F.3d 795, 811 (Fec. Cir. 1999). See also Phillips Petroleum Co. v. Huntsman Polymers Corp., 157 F.3d 866, 874 (Fed. Cir. 1998) (stating that the use of "which comprises" in a process claim generally means that the claim requires the recited limitations, but that additional process steps may be present); Carl Zeiss Stiftung v. Renishaw PLC, 945 F.2d 1173, 1178 (Fed. Cir. 1991) (stating that a patent claim using the term "comprising" is an "open" claim that is infringed when every claim requirement is satisfied, regardless of whether additional elements or features are also present). Kinik does not dispute 3M's and Staff's construction of this term. Accordingly, as case law clearly states, this term is construed to mean that claim 1 requires the recited limitations or steps, but that additional steps may be present. Thus, an infringer cannot escape a finding of infringement by performing additional steps than those recited in claim 1. However, as correctly noted by Kinik, use of open-ended transition does not free the claim from its own limitation by restoring subject matter otherwise excluded from the claim. See Kustom Signals, Inc. v. Applied Concepts, Inc., 264 F.3d 1326, 1332 (Fed. Cir. 2001); Spectrum Int'l, Inc. v. Sterilite Corp., 164 F.3d 1372, 1380 (Fed. Cir. 1998).

"forming a soft, easily deformable and flexible (SEDF)"

COMPLAINANT'S Position

According to 3M, each term in the "forming" step has a commonly understood meaning for persons of ordinary skill in the relevant art and those meanings should be used in construing this step. 3M further contends that nothing in the '489 patent, the specification, or the prosecution history suggests that the inventor intended these words, by themselves or in combination, to have any other meaning than the customary or ordinary meaning that a person of ordinary skill in the art would give them. 3M argues that persons of ordinary skill

in the art do not give the non-technical terms in the "forming" step – "soft," "easily deformable," and "flexible" – meanings that differ from the meanings attributed to those terms by other persons familiar with the English language. 3M mainly relies on the dictionary definition for these three terms and hearing testimony to construe their meaning. Thus, 3M alleges that "soft" is commonly understood to mean "easily cut, worked, or molded" or "yielding to pressure or weight;" "easily deformable" is commonly understood to mean "subject to having its shape altered 'by stress;'" and "flexible" is commonly understood to mean "it is 'capable of being bent or flexed.'" 3MPHB at 18-22;.

RESPONDENT'S Position

Kinik sets forth a claim construction for this phrase despite arguing, discussed in Section V.A, that even when properly construed the terms are indefinite. Kink agrees that the phrase SEDF does not have a special meaning to one of ordinary skill in the art. Nor does Kinik dispute that the terms "soft," "easily," "deform" and "flexible" have commonly-understood ordinary meanings. Thus, according to Kinik, the ordinary meaning of the phrase SEDF is a preform that: (1) yields or gives way to physical pressure, having a surface that does not firmly resists the touch; (2) is readily misshaped or distorted; and (3) is capable of being turned, bowed or twisted without breaking. Kinik further agrees that nothing in the specification or the file history is inconsistent with the plain and ordinary meaning of these individual terms. Kinik contends that formation of an SEDF perform is required, not just the existence of an SEDF preform. KPHB at 27-28, 36-38.

COMMISSION INVESTIGATIVE STAFF'S Position

Staff also agrees that the terms "soft," "deformable" and "flexible" are not technical terms, and thus, should be given their ordinary and customary definitions. Staff, consistent with 3M, mainly relies on the dictionary meaning and hearing testimony in construing this term. Staff further agrees that there is no indication in either the specification or prosecution history that the terms were intended to have any other meaning. Thus, according to Staff, a SEDF preform is "one that is soft enough to cut with a scissors or knife and to press abrasive particles into, deformable enough to form the desired shape of the abrasive article, and flexible enough to both assume complex shapes and withstand mechanical processing without breaking." Staff disputes Kinik's interpretation of the term "flexible" as capable of being twisted without breaking. Staff argues that the ability to twist is not required by the term "flexible" and should not be incorporated into the claim. SPHB at 10-12; SPHRB at 11.

Discussion, Analysis and Conclusion

For claim interpretation, the administrative law judge must first look to the ordinary meaning of claim language. See Vitronics Corp. v. Conceptronic Inc., 90 F.3d 1576, 1578 (Fed. Cir. 1996). Neither 3M, Kinik, nor Staff offer any intrinsic or extrinsic evidence to impart a special meaning to the claim term SEDF. Accordingly, "[a]bsent an express intent to impart a novel meaning, terms in a claim are to be given their ordinary and accustomed meaning. "Wenger Mfg., Inc. v. Coating Machinery Systems, Inc., 239 F.3d 1225, 1232 (Fed. Cir. 2001); see Hoechst Celanese Corp. v. BP Chem. Ltd., 78 F.3d 1575, 1578 (Fed. Cir. 1996) (stating that when acting as "his own lexicographer," a patentee may give terms an unusual meaning so long as the specification or prosecution history clearly conveys the

atypical definition); Multiform Dessicants, Inc. v. Medzam, Ltd., 133 F.3d 1473, 1477 (Fed. Cir. 1998) (stating that claim language should be construed according to its usual meaning to one of ordinary skill in the art when such construction is consistent with the specification). In Interactive Gift Express, 256 F.3d 1323, 1332 n. 1 (Fed. Cir. 2000), the Federal Circuit stated:

> Dictionaries, which are a form of extrinsic evidence, hold a special place and may sometimes be considered along with the intrinsic evidence. Cybor, 138 F.3d at 1459, 46 U.S.P.Q.2d at 1177; Vitronics, 90 F.3d at 1584 n. 6, 39 U.S.P.Q.2d at 1578 n. 3 (stating that, although technically extrinsic evidence, the court is free to consult dictionaries at any time to help determine the meaning of claim terms, "so long as the dictionary definition does not contradict any definition found in or ascertained by a reading of the patent documents").

A dictionary definition of the term "soft" is "yielding to physical pressure" or "of a consistency that may be shaped or molded." See Webster's New Collegiate Dictionary 1325 (1979) (No. 10a and 10c(1)). Professor Strong testified that "soft" means "just what the dictionary would say it means" and "[t]here's no particular technical meaning to that word." Strong Tr. at 88: 11-13. He further stated that a person skilled in the art would understand that the preform in claim 1 would have a "softness to it, an ability to press into it and have it give under that pressure." Strong Tr. at 89:10-11. Strong also noted that the '489 patent contains pictures that "show the particles being pressed into the surface [of the preform] which clearly could not happen with the old technology." Id. at 12-14. Strong further testified that in his opinion, the '489 patent uses the term "soft" in contrast to the term "hard," used to describe the "green compact" in the prior art. Strong Tr. at 90: 22-24. Kinik's expert, Dr. Brian P. Williamson, defined "soft" consistently with the dictionary definition. He testified that his "personal meaning" of something "soft" is "something which I can easily deform. If I press it, it will yield, but how hard I have to press it, how much it yields, my assessment of that might vary from day to day." Williamson Tr. at 1381. A review of the '489 patent specification supports this construction of the term soft. See CX-1 (col. 7:41-42) (stating that the preform "can then be cut easily with scissors, paper cutter, die cutting or – the like"); (cols. 7:66 - 8:3) (stating that "the softness of the preform makes redistribution of material quite easy"and "variations in thickness and stress can be made uniform simply through the usual pressure on the preform"). Accordingly, the ordinary dictionary definition of "soft" is accepted and the term is construed to mean "yielding to physical pressure."

According to the dictionary definition something is "easily deformable" if its shape can be altered by stress. See Webster's New Collegiate Dictionary (No. 3). Strong testified that a person of ordinary skill in the art would understand the term "easily deformable" to have the dictionary meaning, namely "to alter its shape by stress." Strong Tr. at 91:18-19. He further clarified that "easily deformable" means that "you can press into it and it somewhat holds the shape that it had." Strong Tr. at 90:10-12. Williamson testified that "[I]f somebody said to me I have something which is easily deformable, I would assume they meant that its shape could be changed by the application of a relatively small amount of force." Williamson Tr. at 1320: 22-25. A review of the '489 patent and its prosecution history does not indicate that a meaning other than the ordinary dictionary was intended for

the term "easily deformable." The '489 specification supports the above definition by contrasting an "easily deformable" preform with a "brittle" prior art green compact. CX-1 (cols. 1:18 - 2:35 (contrasting SEDF preforms to the prior art, which is "hard, stiff and brittle"). Also, the figures in the '489 patent show the shape of the preform changing as other materials are pressed into it. Id. Figs. 11, 16, 17; see also id (col. 11: 41-50) (discussing how the preform can be easily shaped). Accordingly, the ordinary dictionary definition of "easily deformable" is accepted and the term is construed to mean that a "easily deformable" preform can have its shape easily altered by stress.

A dictionary definition of "flexible" is "yielding to influence." Webster's New Collegiate Dictionary (No. 2). Strong testified that a person of ordinary skill in the art would accept the standard meaning of the term "flexible," specifically that "[i]t can be bent." Strong Tr. at 94. Williamson provided a similar definition for the term, "'flexible' means it can be bent without breaking." Williamson Tr. at 1321:20-21. A review of the '489 patent and its prosecution history does not indicate that a meaning other than the ordinary dictionary was intended for the term "flexible." For example, the '489 patent's figures show the functional characteristics of flexibility in Fig. 9, where the preform is bent by 90°, and the patent describes a "flexible" preform as one that "can be bent more than 90°." CX-1(col. 2: 2-3). Furthermore, the flexibility of the '489 patent's preform is identified as an improvement over the "stiff"prior art green compacts. Id. (cols. 1:18- 2:19). As Staff contends, the ordinary meaning of "flexible" does not require the ability to twist. Accordingly, the ordinary dictionary definition of "flexible" is accepted and the term is construed to mean that a "flexible" preform yields to influence, including the ability to be bent more than 90°.

The undersigned agrees with Strong's characterization of the phrase "soft, easily deformable, and flexible." Although there is overlap between the meanings of the three terms, each term "bring a different flavor to the nature of the preform." Strong Tr. at 129. Furthermore, the SEDF preform of the '489 patent is in contrast to the preform in the previous technology, which "defined it as hard and brittle." Strong Tr. at 84:15-19.

"mixture"

COMPLAINANT'S Position

3M argues that the "mixture" should be construed to mean subjecting a combination of powdered sinterable matrix material and a liquid binder composition to whatever mixing and further processing is necessary to make a preform that is SEDF. 3M contends that the '489 patent specification lists several powder-binder mixing proportions solely by way of example. According to 3M, these exemplary mixing proportions are not recited in or required by any of the asserted claims, and as such, they can not be read into the claims. 3MPHB at 22; 3MPHRB at 7-8.

RESPONDENT'S Position

Kinik agrees that the terms "forming" and "mixture" have straightforward and plain meanings. However, Kinik argues that one of ordinary skill in the art would understand that the invention includes only those mixtures where the volume of the binder substantially exceeds the volume of the powder because the specification is limited to the formation of

such a mixture. Kinik contends that the specification discloses no embodiment or example in which the mixture is anything different than one in which the volume of the binder substantially exceeds the volume of the matrix material. In support of its argument, Kinik relies on selected passages in the specification[13] and prosecution history relating to volume percentages. Kinik further maintains that the prosecution history supports its construction because in response to objections by the Examiner in the First Office Action, 3M amended the specification and claims by stating that the volume of the binder composition substantially exceeds the volume of the matrix material. Lastly, Kinik claims that extrinsic evidence, including testimony from 3M's own expert, confirms this construction and that case law compels such a construction because the Federal Circuit has recently read claims to include limitations from the specification in similar situations. Therefore, Kinik maintains that the "forming" step[14] requires a combination of powdered matrix material and liquid binder where the volume of the binder substantially exceeds the volume of the powder which is used to form a preform that yields or gives way to physical pressure, is readily misshaped or distorted, and is capable of being turned, bowed or twisted without breaking. KPHB at 29-33, 35-36; KPHRB at 10-16.

COMMISSION INVESTIGATIVE STAFF'S Position

According to Staff, the term "mixture" requires that a powdered sinterable matrix material and a liquid binder composition are combined. Staff maintains that the plain language of the claim does not require any specific proportions of sinterable matrix material and liquid binder composition except to the extent that the combination must be capable of forming a SEDF. The claim does not mandate a specific proportion. Staff contends that the examples relied on by Kinik in support of its construction do not evidence a clear intention to redefine the term "mixture" as limited to particular proportions. Lastly, Staff notes that unlike claim 1, claim 10 of the '489 patent expressly includes the limitation that "the volume of the liquid binder composition in the mixture [is] greater than the volume of the powdered sinterable matrix material." SPHB 10-15; SPHRB at 3-10.

Discussion, Analysis, and Conclusion

Claim construction requires an examination of the claim language, the written description, and, if relevant, the prosecution history. See Vitronics Corp., 90 F.3d at 1582. The appropriate starting point, however, is always with the language of the asserted claim itself. See id.; Bell Communications Research, Inc. v. Vitalink Communications Corp., 55 F.3d 615, 620 (Fed. Cir.1995). Claim terms should be given their ordinary and accustomed

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[13]Specifically, Kinik points out that the Abstract, Summary of the Invention, Drawings, and Detailed Description of the Embodiments each contain descriptions where the binder content is higher than or substantially exceeds the matrix material in terms of volume.

[14]The undersigned notes that Kinik's reference to the "forming" step is to the entire phrase "forming a soft, easily deformable and flexible preform from a mixture of said quantity of powdered sinterable matrix material and a liquid binder composition" whereas 3M's reference to the "forming" step is to a portion of the same phrase, the portion reading "forming a soft, easily deformable and flexible."

meaning as understood by one of ordinary skill in the art. See Dow Chemical, 257 F.3d at 1372. The claim language, specifically the term "mixture," only requires combining or mixing the powder matrix material and the liquid binder to form a SEDF. The claim does not require an absolute or a particular relative proportion of powder and binder, either in terms of volume or weight.

Kinik argues that when the claim is read in light of the specification, the term "mixture" is limited to mixtures where the volume of the binder exceeds the volume of powder. The Federal Circuit has consistently stated that "[w]hile ... claims are to be interpreted in light of the specification and with a view to ascertaining the invention, it does not follow that limitations from the specification may be read into the claims." Sjaelland v. Musland, 847 F.2d 1573, 1581 (Fed. Cir.1988); see Texas Instruments, Inc. v. United States Intel Trade Comm'n, 805 F.2d 1558, 1563 (Fed. Cir.1986) ("This court has cautioned against limiting the claimed invention to preferred embodiments or specific examples in the specification."). The role of the specification in construing claim terms has been described by the Federal Circuit as follows:

> In looking to the specification to construe claim terms, care must be taken to avoid reading "limitations appearing in the specification . . . into [the] claims." [Citation omitted]. "We recognize that there is sometimes a fine line between reading a claim in light of the specification, and reading a limitation into the claim from the specification." [Citation omitted]. In locating this "fine line" it is useful to remember that we look "to the specification to ascertain the meaning of the claim term as it is used by the inventor in the context of the entirety of his invention," and not merely to limit a claim term.

Interactive Gift Express, supra, 256 F.3d 1323, 1331-32 (Fed. Cir. 2001) (emphasis added).

Kinik notes that the Federal Circuit has limited claim terms based on embodiments in the specification. See Wang Labs., Inc. v. America Online, Inc., 197 F.3d 1377, 1383 (Fed. Cir. 1999) (imposing a limitation on a claim term from the only embodiment described in the patent specification); O.I. Corp. v. Tekmar Co., 115 F.3d 1576 (Fed. Cir. 1997); Toro Co. v. White Consolidated Industries, Inc., 199 F.3d 1295 (Fed. Cir. 1999); Cultor Corp. v. A.E. Staley Mfg. Co., 224 F.3d 1328, 1331 (Fed. Cir. 2000) ("Whether a claim must, in any particular case, be limited to the specific embodiment presented in the specification, depends in each case on the specificity of the description of the invention and on the prosecution history. These sources are evaluated as they would be understood by persons in the field of the invention"); Bell Atlantic Network Services, Inc. v. Covad Communications Group, Inc., 262 F.3d 1258, 1268 (Fed. Cir. 2001) (stating that the intrinsic evidence must "clearly set forth" or "clearly redefine" a claim term so as to put one reasonably skilled in the art on notice that the patentee intended to so redefine the claim term). The Federal Circuit in Netword, LLC v. Centraal Corp., 242 F.3d 1347, 1352 (Fed. Cir. 2001), recently rejected a patentee's argument that the trial court had impermissibly imported limitations from the specification into the claim at issue concerning certain "caching" and "pulling" server functions. The Court held as follows:

> Netword's argument that the district court improperly limited the scope of claim 1 by importing the caching and pulling functions from the specification misperceives the role of "claim construction" in infringement analysis. The role is neither to limit nor to broaden the claims, but to define, as a matter of law, the invention that has been patented. The claims are always construed in light of the specification, of which they are a part. [Citation omitted]. The role of the specification includes presenting a description of the technologic subject matter of the invention, while the role of claims is to point out with particularity the subject matter that is patented. See 35 U.S.C. § 112 ¶¶ 1, 2. The claims are directed to the invention that is described in the specification; they do not have meaning removed from the context from which they arose. Thus the claims are construed to state the legal scope of each patented invention, on examination of the language of the claims, the description in the specification, and the prosecution history. See Renishaw PLC v. Marposs Societa' per Azioni, 158 F.3d 1243, 1250, 48 U.S.P.Q.2d 1117, 1122 (Fed. Cir.1998) ("[T]he interpretation to be given a term can only be determined and confirmed with a full understanding of what the inventors actually invented and intended to envelop with the claim."). Although the specification need not present every embodiment or permutation of the invention and the claims are not limited to the preferred embodiment of the invention, [citation omitted], neither do the claims enlarge what is patented beyond what the inventor has described as the invention. "Claim construction" is the judicial statement of what is and is not covered by the technical terms and other words of the claims.

Netword, LLC v. Centraal Corp., 242 F.3d 1347, 1352 (Fed. Cir. 2001) (emphasis added). A review of these cases confirms the general rule that claim terms usually should be given their ordinary meaning to one of ordinary skill in the art and embodiments in the specification should not be used to limit a claim term. The authority cited by Kinik presents facts where the inventor clearly and unambiguously redefined the claim term at issue and consistently used the claim term throughout the specification and prosecution history in the redefined manner or the narrower interpretation was necessary to preserve the validity of the claim itself. Thus, based on the specification, one of ordinary skill in the art would in those circumstances understand the invention to have the imputed limitation. See Cultor Corp., 224 F.3d at 1331. The facts presented in those cases are distinguishable from the ones here. The '489 patent does not singularly describe the invention as having a particular volume of binder. See Enercon GmbH v. United States Int'l Trade Comm'n., 151 F.3d 1376 (Fed. Cir. 1998)[15]. As Staff notes, the '489 specification provides various examples of binder-powder

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[15]Enercon was an appeal from the ITC and involved a method claim. Id. at 1378. Before the ITC, the dispute centered upon the limitation the claim of the patent which claimed the step of "'rotating (continued...)

mixtures by volume and by weight. Moreover, the '489 patent provides a variety of exemplary binder and sinterable matrix material. Thus, one of ordinary skill in the art would understand that many materials could be combined to form a SEDF and the volume proportion would depend on the particular materials.

The undersigned concludes that the intrinsic evidence does not support Kinik's claim construction. See Interactive Gifts, 256 F.3d at 1331 (explaining "intrinsic evidence" and its importance in claim construction). In this case, the term "mixture" has a clear and well-defined meaning. The claim language only requires mixing the powdered sinterable matrix material and the liquid binder composition to form a SEDF preform. The term "mixture" is not so amorphous that one of ordinary skill in the art can only reconcile the claim language with the inventor's disclosure by recourse to the specification. See E.I. du Pont de Nemours, 849 F.2d at 1433 (stating that the specification can supply understanding of unclear terms, but should never trump the clear meaning of the claim terms). Rather than looking to the specification to shed light on the meaning of a claim term as it is used by the inventor in the claim language in the context of the entirety of his invention, Kinik instead attempts to limit the phrase "mixture" to a specific proportion of binder and metal powder based on certain embodiments in the specification.

Although Kinik points to certain parts of the specification that describe the binder content as being higher than the matrix material in terms of volume, the language does not expressly limit the term "mixture" to a certain proportion. See Renishaw PLC, 158 F.3d at 1249 (stating that a patentee can redefine a claim term but must do so "with reasonable clarity, deliberateness, and precision before it can effect the claim"). The specification and

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[15](...continued)
the reference waveform by a selected power factor angle to yield a template waveform.'" Id. at 1384. The dispute on appeal was over the construction of the word "rotating." Id. The ITC concluded that the ordinary meaning of the term "rotating" in the context of the patent was only a phase shift of the reference waveform. Id. The parties agreed that the process of "rotating" a waveform results in a phase shift of the waveform when plotted against time. Id. On appeal, Enercon, held by the ITC to be infringing the patent at issue, argued that "rotating" referred not to the generic process of phase shifting a waveform, but to a specific process used to perform the rotation referred to as a "rotational transformation." Id. Relying primarily upon the specification, Enercon argued that because the only method disclosed in the specification for performing a rotation was a rotational transformation which was described as part of the preferred embodiment, "rotating" had to be limited to that method. Id.

The Federal Circuit found no reason to depart from the well established rule that claim terms are not limited by the specification and should be interpreted so as to give the terms their ordinary meaning, absent some clear special definition. Id. The Court held that there was no evidence to indicate that the term "rotate" was intended to refer to the specialized method known as a "rotational transformation" and gave the term its ordinary meaning. Id. The Court based its decision on a finding that only in the preferred embodiment is the "rotational transformation" procedure described as a method to rotate the waveform, the specification clearly used the terms "rotate" and "shift" interchangeably, and the parties agreed that the phrase "rotating the reference waveform" means a shift in phase of the desired waveform. Id.

the embodiments simply provide examples but do not limit the common meaning of the term to one of ordinary skill in the art. For example, Kinik relies on the second sentence of the following paragraph found in the Detailed Description portion of the specification:

> In the binder-powder mixture, the binder composition is usually 3-20% by weight of the mixture, but the ratio can be extended. By volume, the percentage of the powder within the binder-powder mixture is *usually* from 1 to 5% but it can be extended to a range of 0.3 to 10%. One successful preform has been formed from a binder-powder mixture of slurry containing from 5.0 to 8.5% by weight of a binder composition consisting of rubber cement and thinner.

CX-1 (col. 5: 27-35) (emphasis added). Kinik, however, ignores the express use of the word "usually" and the context of the passage, which provides guidance in terms of volume and weight percentages that the inventor found useful. See Dow Chemical, 257 F.3d at 1377-78 (the Federal Circuit noted with "great significance that the district court's construction would exclude many of the preferred embodiments experiments" because it is unlikely that an inventor would design the invention in a way that excluded the preferred embodiment or that a person of ordinary skill in the field would read the specification in such a way). The inventor's use of both "volume" and "weight" percentages shows there was no intent to limit the claim to a certain volume percentage. If the inventor had intended to limit the term "mixture" by volume, he would not have also given guidance in terms of weight[16]. Kinik, thus, attempts to limit its construction, more binder than powder in terms of volume, to even less than the specification's teachings. Also, the cited language keeps the overall weight of the binder composition fixed at 5.0% to 8.5% of the total mixture, but the volume of that binder composition may vary.

Kinik also relies on the following passage from the Summary of the Invention:

> To form an SEDF preform, a slurry or paste is formed of the powdered composition and the binder composition. The concentration of powdered composition and abrasive particles (if included) in the slurry or paste is low, and the volume of the binder composition is high. In fact, the volume of the binder

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[16]Under Kinik's construction argument, the term "mixture" could also be limited to proportions in which the binder is from 3% to 20% by weight of the mixture. 3M contends that Kinik does not propose this particular construction because Kinik's binder-powder recipe falls in this range. Kinik's DiaGrid® process uses [ ] by volume of powder metal and [ ] by volume of glue. Williamson Tr. at 1286; Roth Tr. at 1922. 3M contends it is customary in the relevant art to use weights, and not volume, to formulate preforms. 3M points out that the manufacturing specifications of both Kinik and 3M specify the amounts of powder and binder in terms of weights, and both of them measure their ingredients by weights. Further, the volume of powder depends on facts such as particle size distribution and the amount of compression to which the powder has been subjected, but weight is independent of these factors. Thus, limiting the term "mixture" in terms of volume does not reconcile with the understanding of one skilled in the relevant art.

> composition or binder phase in the mixture substantially exceeds the volume of the powdered composition and the abrasive particles.

CX-1 (col. 3: 7-15). This passage describes a successful method for making an SEDF but it does not expressly redefine the term "mixture" as limited to a proportion where the volume of the binder is higher than the volume of powder. The other portions of the specification that Kinik relies upon to argue that the term "mixture" is so limited are similarly faulty because they are taken out of context of the entire invention in contravention of the Federal Circuit's admonition[17]. Although the specification may aid the court in interpreting the meaning of disputed claim language, particular embodiments and examples appearing in the specification will not generally be read into the claims. Constant v. Advanced Micro-Devices, Inc., 848 F.2d 1560, 1571 (Fed. Cir.1988) (internal citation omitted); see Laitram Corp. v. Cambridge Wire Cloth Co., 863 F.2d 855, 865 (Fed. Cir.1988) ("References to a preferred embodiment, such as those often present in a specification, are not claim limitations.").

Kinik points to a passage from the Background of the Invention and argues that the prosecution history supports its construction because the patentee "specifically distinguished soft and flexible preforms from the prior art from green compacts, and particularly roll compacted products, even in the presence of some binder." See CX-1 (col. 2: 11-20) (stating "When a roll compacted product includes a binder, the binder is in a much smaller quantity than in a flexible preform."). As Staff notes, the cited passage was in the original specification at page 3, ll. 18-23, and the patentee did not modify the passage during prosecution of the '489 patent. See CX-2. Additionally, the '489 patent distinguishes soft and flexible preforms from roll compacted products. As such, the '489 patent teaches that certain prior art soft and flexible preforms, even those with a high content of binder, are flimsy and roll compacted products, where the binder is present but in a much smaller quantity, are much less flexible than the soft and flexible preforms because the product is held together by mechanical interlocking of particles. CX-1.(cols. 1: 38-43, 2:11-20). Consequently, contrary to Kinik's assertion, the distinction between soft and flexible preforms and green compacts is not based on a relative binder and powder volume proportion in the claimed invention.

The language used in claim 1 should be interpreted "in the context of the entirety of [the] invention" as it would have been understood by a person of ordinary skill in the art who was familiar with the making of abrasive articles. See Interactive Gifts Express, 256 F.3d at 1331-32. The specification states that prior art soft and flexible preforms comprise binders "up to 95% in volume and up to 20% by weight." CX-1 (col. 1: 5-6). This language clearly

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[17]Kinik notes that the Summary of the Invention states "an SEDF" is formed from the slurry or paste of the powdered and binder composition where the volume of the binder composition or binder phase in the mixture substantially exceeds the volume of the powdered composition and the abrasive particles. Id. (col. 3: 7-15). However, this description provides an example of only *one* SEDF preform, not *all* SEDF preforms, and claim 10 covers portions of this particular embodiment. Furthermore, Kinik's reliance on the Abstract is misplaced because, as 3M notes, the abstract is intended to give the reader only a brief overview of the invention.

sets no lower limits in terms of volume or weight. Further, as Staff correctly contends, the exact proportions of binder and powder used in the specific examples of the '489 patent are not stated either in terms of volume or weight. Id. (cols. 13: l: 36 - 16:15). Nevertheless, Kinik points out that each embodiment set forth in the '489 patent specification is described as having the binder content higher than or substantially exceeding the matrix material and argues that there is no disclosure or suggestion of any other type of mixture. KPHB at 20, 30, 36. However, the specification need not present every embodiment or permutation of the invention. See Netword, LLC, 242 F.3d at 1352; SRI Int'l, Inc. v. Matsushita Elec. Corp., 775 F.2d 1107, 1121 n. 14 (Fed. Cir. 1985) (in banc) (stating that because "a specification describes only one embodiment does not require that each claim be limited to that one embodiment").

The specification describes a method, consistent with the understanding of a person of ordinary skill in the relevant art, and describes many embodiments without limiting the term mixture to a relative proportion, either in terms of weight or volume. Thus, the construction proposed by 3M is not invalid because it is so broad as not to be described in the patent's specification, as Kinik argues. See The Gentry Gallery, Inc. v. The Berkline Corp., 134 F.3d 1473, 1475-79 (Fed. Cir. 1998) (declaring claims invalid because they did not describe the invention set out in the specification and explaining that to fulfill the written description requirement, the patent specification must clearly allow persons of ordinary skill in the art to recognize the inventor invented what is claimed). Here, a broad invention is supported by the specification. Although the specification exemplifies certain volume and weight binder-powder mixtures, it does not state that other mixtures are excluded from the claimed invention. The Detailed Description section begins by stating that the embodiments of the invention are presented by way of illustration. CX-1 (col. 4: 37-39); see also (col. 16: 29-31). The Preparation of Preform section further states that the powder and binder are mixed "in the required proportions," referring to the proportions required for the embodiments discussed. Id. (col. 4: 46-48). This section further states that "depending on the particular proportions chosen," the binder-powder mixture may be formed in the form of a slurry or a paste. Id. (col. 4: 49). A review of the specification reveals that the import is that the mixture, no matter what powder and binder materials[18] are used or what proportions are used, results in the formation of a SEDF preform. See id. (col. 4: 39-40) (stating that the invention has two major parts, one of which is preparation of SDF preforms); (col. 4: 60-63) (stating that the binder composition should be selected to provide integrity and flexibility to the final preform); (col. 3: 3-7) (stating that the binder compositions will be selected to provide the desired integrity of the final SEDF preform, while maintaining its flexibility and process-ability).

Finally, Kinik's proposed construction of claim 1 would violate the doctrine of claim differentiation by rendering claim 10 superfluous. While the doctrine of claim differentiation is not a hard and fast rule of construction, it does create a presumption that each claim in a patent has a different scope.

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[18]See id. (col. 3: 2-3) (stating that "[a]ny number of sinterable matrix materials or powdered compositions may be used" to form an SEDF); (col. 4: 59-60) (stating that "[t]here is a variety of materials that can be used as the binder composition for the preform").

> There is presumed to be a difference in meaning and scope when different words or phrases are used in separate claims. To the extent that the absence of such difference in meaning and scope would make a claim superfluous, the doctrine of claim differentiation states the presumption that the difference between claims is significant.

Tandon Corp. v. United States Intel Trade Comm'n, 831 F.2d 1017, 1023 (Fed. Cir.1987). Claim 10 incorporates claim 1 by reference and further defines the "mixture" element with the following additional limitation: "with the volume of the liquid binder composition in the mixture being greater than the volume of the sinterable matrix material." To interpret the term "mixture" in claim 1 to mean a proportion wherein the binder material is present in a higher volume than the metal powder, as Kinik suggests, would render claim 10 completely superfluous and redundant of claim 1. Kinik has not shown any reason sufficient to rebut the presumption that claim 1 should not be so limited in order to preserve the distinction between claims 1 and 10. Consequently, the undersigned declines to adopt Kinik's proposed claim construction to limit the term "mixture" to a proportion where the volume of the binder is higher than the powder. Because the meaning of "mixture" is apparent from a review of the intrinsic evidence alone it is unnecessary to examine the extrinsic evidence. See Dow Chemical, 257 F.3d at 1378.

In contrast to Kinik's restrictive interpretation, the term "mixture" means that certain quantities of powder and binder, depending upon the precise powder and binder compositions chosen, are combined or mixed so as to result in a mixture capable of being shaped into a SEDF preform. Tselesin Tr. at 1223-24.

"sintering said preform"

COMPLAINANT'S Position

3M argues that a person of ordinary skill in the art would understand "sintering" to be a process by which loose particles of powder are bonded together using heat, thermal consolidation of powder, resulting in the individual particles joining to form a solid mass. 3M further contends that sintering does not depend solely on the "melting point of the main constituent" of the original powder because alloys do not have a single melting point but, rather, have solidus and liquidus temperatures. The solidus temperature is the temperature at which a metal alloy first starts to melt when it is heated. Laraia Tr. at 915. The liquidus temperature is the temperature where the original alloy melts upon heating. Id. at 915-18. 3MPHB at 23-26.

According to 3M, sintering a preform begins at room temperature with a mixture of loose powdered alloyed metal particles, dispersed in a binder material. As the temperature increases, the binder material evaporates but little or nothing happens to the metal particles. Before reaching the solidus temperature, the metal particles remain completely solid. However, they are no longer loose and the individual particles begin to bond. 3M maintains that this is solid state sintering. If the powder is kept at this temperature, the bonds, often called "necks," between them begin to get big enough so that they overlap. If the process is

permitted to continue at this temperature, the individual particles completely disappear. Since this activity is happening below the solidus temperature, the particles and the consolidated mass that they form remain completely solid. The necks that form between the particles of the powder during sintering bind the individual particles together and transform them into a contiguous mass. Id.

"Liquid phase sintering" occurs if the temperature is increased above the solidus temperature but below the liquidus temperature. In this range, metal particles begin to melt. The molten metal can generate from several sources. If only one alloy powder is present, the molten metal results from the partial melting of the powder particles of that alloy powder. Alternatively, if two alloy powders are present, the molten metal may form from either or both of the two alloys. Regardless of their source, solids and liquids are both present between the solidus and the liquidus temperatures of the original alloy. In this range, sintering continues. The solid particles bond and grow, and the liquid metal facilitates this sintering. Densification occurs during this process, and pores disappear. Id. at 26.

If heating continues above the liquidus temperature of the original alloy, there can be complete melting of the original alloy. At this point, the liquid metal will form a puddle and sintering will cease unless new compounds have formed that have higher melting temperatures than the original alloys. 3M maintains that sintering can take place between original powder grains and/or between particles that come into existence as a result of chemical reactions involving these original particles. Id. at 27.

Furthermore, 3M argues that the claim language does not require sintering the substrate or the final abrasive article. Rather, 3M contends, the claim language only requires sintering the preform and the sintering must occur at some point in the process of making the abrasive article, but does not exclude additional steps, even other heating steps, including brazing. 3M maintains that sintering the preform can be, but does not have to be, the final step in the process patented by claim 1. 3M further argues no "sintered" abrasive product need be formed. In support, 3M relies on the express claim language, other parts of the '489 patent, including dependent claims and the specification, that teach post-sintering steps that occur before formation of the usable abrasive article. 3M also notes that legal principles disallow imposing limitations on a claim that are not affirmatively stated in the claim. Thus, 3M contends that claim 1 does not require the abrasive article to be formed by sintering. Lastly, 3M disputes that the sintered together powder particles that form the abrasive article must also retain the diamonds. Id. at 29-33; 3MPHRB at 9-14.

RESPONDENT'S Position

Kinik agrees that the word sintering is not defined in the '489 patent and no special meaning is suggested by the manner in which "sintering" is used in the patent. Therefore, Kinik agrees that the term should be given its ordinary meaning as understood by those skilled in the art. Kinik argues that this claim element means heating the preform to a

temperature below[19] (and not above) the melting point of the main constituent, so that the matrix material particles bond to one another through the growth of necks and the abrasive particles are retained by the sintered-together particles of matrix material. Kinik maintains that persons of ordinary skill would understand that it is the powder in "said preform" that is sintered together. Kinik further agrees that sintering only occurs between solid particles that touch one another; sintering does not occur between liquids or between liquids and solids. Sintering is evidenced by the growth of metallurgical necks at contact areas between solid particles. Kinik contends that with sufficient neck growth, sintering creates a solid mass from the powder particles. KPHB at 38-39.

Kinik argues that one of ordinary skill understands that, if the main constituent is heated to above its melting point and becomes a liquid, the process is not called sintering because any metallurgical necks that form between solid particles on the way up to the melting point are destroyed when the melting point is reached and the powder particles turn into liquid. According to Kinik, one of ordinary skill would understand the '489 patent to be distinguishing between a process that does not melt the main constituent of the powder, sintering, and a process that does melt the main constituent of the powder, brazing. Kinik contends that although transient necks growth occurs in the process of melting metal powders, persons of ordinary skill call the process brazing, not sintering. Thus, according to Kinik, sintering does not cover brazing. Id. at 40-45; KPHRB at 16-21.

In support, Kinik claims that the patent's prosecution history makes it clear that "sintering" as used in claim 1 does not cover other methods for securing materials by heating, such as brazing, that involve a peak temperature at or above the melting point of the main constituent. KPHB at 41.

COMMISSION INVESTIGATIVE STAFF'S Position

Staff agrees that "sintering" is not specially defined in the '489 patent and has a common meaning to one of ordinary skill in the art. Generally speaking, according to Staff, "sintering" refers to forming a coherent bonded mass by heating metal powders without melting, a process in which particles bond together through a heat treatment to form a solid, rigid mass. Thus, Staff maintains that the claim language requires heating the SEDF to a temperature below the melting point of the preform so as to bond adjacent particles of the preform into a solid rigid mass. Staff disputes Kinik's contention that "sintering"in claim 1 teaches a process which (upon cooling) results in a final abrasive article. SPHB at 17-18; SPHRB at 11-14.

Staff contends that this phrase requires that the sintering step be undertaken after forming the SEDF preform containing the abrasive particles. Staff maintains that nothing in claim 1 language requires that "sintering said preform to form said abrasive article" must be the final step in manufacturing an abrasive article or commercial product. Staff contends that there may be more to making an abrasive article than solely heating it to produce a hard form having abrasive qualities. "Sintering to form" is only a step within a broader method

[19]Kinik specifically states that the heating process must peak below the melting point of the main constituent of the powder.

of "making" an abrasive article. Staff notes that examples in the specification contemplate steps after sintering to make the final abrasive product. SPHB at 18-19.

Discussion, Analysis, and Conclusion

In construing this phrase of claim 1, "[f]irst we look to the claim language." Interactive Gift Express, supra, 256 F.3d at 1331. A plain reading of claim 1 reveals that the phrase "sintering said preform" is preceded by the temporal language "then." Kinik contends that claim 1 explicitly requires that the first two elements, mixing the preform and including the abrasive particles, must occur before the sintering element. 3M argues that claim 1 covers processes in which abrasive particles are "included" after sintering. In support, 3M asserts that an abrasive article requires abrasive particles and claims 5 and 6 limit claim 1 by requiring the abrasive particles be "urged" into the preform before or during sintering. Thus, to give claim 1 meaning under the doctrine of claim differentiation, contends 3M, claim 1 must be construed to cover processes in which abrasive particles are included after sintering. Kinik contends that claims 5 and 6 limit claim 1 by specifying that the abrasive particles must be "urged" into the preform before or during sintering whereas claim 1 requires only that a plurality of abrasive particles be included at least partially in the preform and does not specify any particular method for accomplishing the inclusion. Under claim 1, for example, contends Kinik, the abrasive particles could be "included" by mixing them with the powder and liquid binder before the preform is formed.

The express language of claim 1 supports Kinik's construction because the claim language uses the term "then sintering" after stating that the improvement is comprised of "forming [an SEDF] from a mixture, including a plurality of abrasive particles." Claim 1 expressly teaches that "sintering" is performed after forming an SEDF from a mixture that includes abrasive particles. In addition, 3M admits that a person of ordinary skill in the art would understand that the "preform made during the 'forming' and the 'diamond placing' steps" is the preform that is sintered. 3MPHB at 23. The extrinsic evidence supports this construction. Strong testified that claim 1 has three steps: the first is to form a preform that has the characteristics of being soft, easily deformable, and flexible; the second is including abrasive particles into the preform, and; the third is "then sinter." Strong Tr. at 72. He further testified that when one has "done the sintering [] preceded by the inclusion and preceded by the forming, then all of those together form said abrasive article." Strong Tr. at 145. Therefore, "then sintering" is construed to mean that what follows "then" must be completed in addition to and after the preceding steps, the "forming" and "including" steps. It also follows that, as discussed more fully below, Kinik's constructions of claims 5 and 6 as limiting claim 1 by the method in which the particles are included in the preform is appropriate.

The express language of claim 1 also requires sintering "said preform." The parties agree that a person of ordinary skill in the art would understand that the preform referred to is the preform described earlier in the claim language, the SEDF preform with the abrasive articles included. Strong Tr. at 1622 (stating that what is actually sintered is "[t]he preform with the diamonds embedded or on it"). Kinik further argues that one of ordinary skill would understand that it is the powder in "said preform" that is sintered together. Although 3M agrees that sintering of the original powder in the preform satisfies this claim limitation, 3M

also argues that sintering can take place between the original powder grains and/or between particles that came into existence as a result of chemical reactions caused by heating these original powders. The undersigned concludes that it is unnecessary to decide whether sintering compounds other than the original powder in the preform satisfies this claim requirement. It is sufficient at this juncture to construe the claim language at issue to mean that what must be sintered is the preform referred to in the previous claim language and that sintering the powder in the preform satisfies this limitation.

Therefore, what is "sintering?" In examining the claim language, "[i]t is appropriate to give a technical term its ordinary meaning, that meaning it would be given by persons skilled in the art, unless 'it is apparent from the patent and the prosecution history that the inventor used the term with a different meaning.'" Phillips Petroleum Co. v. Huntsman Polymers Corp. 157 F.3d at 871. The parties agree that the term "sintering said preform" is not specifically defined in the '489 patent and should be construed to have the plain and ordinary meaning as understood by one skilled in the relevant art. Strong Tr. at 220-22; German Tr. at 266; Tselesin Tr. at 1211-12; KPHB at 39. The phrase in claim 1 consisting of the words "sintering said preform" contains two technical terms -- "sintering" and "preform" -- that are not defined in the claim itself[20]. Because the intrinsic evidence does not shed light on the meaning of the term "sintering," the resort to extrinsic evidence is necessary. Interactive Gift _, 256 F.3d at 1323, 1331 (stating that if meaning of claim limitations is apparent from totality of the intrinsic evidence, then claim has been construed, but if claim limitation is still not clear, court may look to extrinsic evidence to help resolve the lack of clarity); Markman, supra, 52 F.3d at 979 (stating that extrinsic evidence of the meaning of certain terms may be used to aid the court's understanding of the patent).

The definition of "sintering" in the Metals Handbook, submitted by Kinik, is "[t]he bonding of adjacent particles in a powder mass or compact by heating to a temperature below the melting point of the main constituent." RX-226 ("sintering"). Other dictionaries define "sintering" as "[f]orming a coherent bonded mass by heating metal powders, without melting," SX-3, "[t]he bonding of powder compacts by the application of heat to enable one or more of several mechanisms of atom movement into the particle contact interfaces to occur," SX-6, "the process whereby compressed metal powder is heating in a controlled-atmosphere furnace to a temperature below its melting point, but sufficiently high to allow bonding (fusion) of the individual particles," SX-7 ("sintering"). 3M's witnesses defined "sintering" as a "consolidation process that's done with heat, and in that process, it's consolidation because the particles join or bond together to form a solid, rigid mass,"or as "a thermal treatment by powders" causing "the particles to bond together, so they go from a loose state to a consolidated or solid state." Strong Tr. at 134, 22; German Tr. at 261. Although Strong stated that he found the Metal Handbook's definition of "sintering" to be restrictive, Strong Tr. at 223, [21] Kinik's witness, Shiue, stated that his understanding of "sintering" was consistent with the definition in the Metals Handbook.

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[20]The parties do not dispute the meaning of the term "preform."

[21] Strong thought the Metal Handbook's definition of "sintering" was too restrictive, and mentioned that the latest edition's definition allows for the presence of melt material. Strong Tr. 222.

As Staff notes, the Metals Handbook distinguishes between "sintering" used as a verb, defined above, and "sintering" used as a noun[22]. The plain language of claim 1 shows that the '489 patent uses the term "sintering" as a verb. Thus, although a "sintering" cycle may include a cooling phase, the meaning of the verb "sintering" does not require a cooling phase. Shiue agreed that the definitions of "sintering" did not mention cooling but insisted that cooling was "obvious" and a "necessary" step in the definition of "sintering." Shiue.Tr. at 704-07. However, Shiue defined "sintering" as "an entire process, complete process." Shiue Tr.at 706. Shuie's extrinsic evidence is inconsistent with the claim construction mandated by the claims themselves. Although extrinsic evidence may assist in construing a claim term, it is inappropriate to use extrinsic evidence to arrive at a claim construction that is clearly at odds with the claim construction mandated by the claims themselves, the written description, and the prosecution history [in other words, with the written record of the patent]. Markman, supra, 52 F.3d at 979. The '489 patent teaches a method for making an abrasive article and, as stated above, the express language of claim 1 uses "sintering" as a verb, not as a noun. Had Claim 1 used "sintering" as a noun such would contemplate the sintering process. Additionally, when questioned by the undersigned about an heating process, Shiue agreed that cooling was a part of the heating process, but that a cool-down phase was not necessary to the act (verb) of heating. Shiue Tr. at 711-12. Thus, the undersigned concludes that "sintering" as used in claim 1 does not require a cooling phase.

Although the parties agree that sintering is the thermal consolidation of powder, they disagree on the critical temperature point that satisfies this limitation. Kinik argues that if the main constituent is heated to above its melting point, the process is no longer called sintering because any metallurgical necks that formed between solid particles on the way to the melting point are destroyed when the melting point is reached and the powder particles turn to liquid. 3M argues that sintering does not depend solely on the melting point of the main constituent of the original powder because alloys do not have a single melting point but, rather, have solidus and liquid temperatures. Thus, argues 3M, Kinik's construction of "sintering" excludes liquid phase sintering of the original powder below its liquidus[23]. Although Kinik seems to recognize "liquid phase sintering" as satisfying the "sintering" limitation, Kinik specifically notes that the Dictionary of Ceramic Science and Engineering defines "liquid phase sintering" as only involving a "small volume of liquid around the powder particles." SX-6 ("liquid phase sintering"). As German explained, when a powder metal alloy is sintered, solid state sintering occurs below the solidus and "liquid phase sintering" occurs between the solidus and the liquidus. German Tr. at 282-84. German testified that solids and liquids are both present between the solidus and liquidus temperature of the original alloy. Id. German further testified that in this temperature range, sintering continues because the solid particles bond and grow, and the liquid metal facilitates this sintering. German Tr. at 284. Kinik contends that sintering only occurs between solid particles that touch one another, that sintering does not occur between liquids or between

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[22]Staff contends that Kinik defines "sintering" to require a complete industrial manufacturing process requiring cooling and resulting in a final commercial product.

[23]3M also argues that Kinik's construction excludes liquid phase sintering of new compounds with higher melting points than the original powder that occurs above the liquidus temperature of the original alloy. As discussed, this argument need not be addressed.

liquids and solids, and that sintering is evidenced by the growth of metallurgical necks at contact areas between solid particles. Thus, Kinik's construction of "sintering," to this extent, is not inconsistent with liquid phase sintering. Accordingly, in the case of a single metal alloy, sintering is construed to occur below the liquidus of the metal alloy.

In a similar vein, Kinik argues that transient neck growth which occurs in the process of melting metal powders is known by person of ordinary skill in the art as brazing, not sintering[24]. In support of its argument, Kinik cites testimony from Vincent J. Laraia, a person of ordinary skill in the art and a metallurgist at 3M. According to Kinik, Laraia testified that "he and his colleagues at 3M do not call a process that melts the filler metal 'sintering,' even if some necking occurs on the way up to the melting point." KPHB at 40-41. However, Kinik's representation of Laraia's testimony is somewhat misleading. Laraia testified that if an alloy were heated such that it completely melted, he would consider what happens on the way up to the point where everything is liquid as a sintering process. Laraia Tr. at 917. Therefore, according to Laraia, in a brazing process some sintering could occur during the heating cycle. Laraia Tr. at 918. Laraia confirmed that above the liquidus, where filler melts, he would consider that to be a joining process. Laraia Tr. at 918. Also in support of its argument, Kinik contends that the prosecution history shows that as originally filed, claim 1 recited "heating the preform," but the patent claim was changed during prosecution to require one specific heating process, "sintering[25]." Thus, contends Kinik, not all heating processes for securing materials are covered by the issued claim of the '489 patent, but that only sintering processes are covered. Kinik's assertion that "sintering" within the meaning of claim 1 is not satisfied by transient neck growth as powders are heated to temperatures above their melting point is consistent with 3M's definition of sintering. Transient neck growth by definition would be difficult, if not impossible, to show because of its transient nature. German, 3M's witness, testified that attributes of sintering include: (1) necking, which involves physical contact between particles; (2) the presence of solid particles; (3) atomic transport; (4) maintaining shape; (5) reduced surface area or reduced pores; and (6) strengthening. RX-274. Staff notes that whether metal particles bond together or sinter depends upon several variables including temperature, time at temperature, and concentration of metal particles. See German Tr. at 275, 279-82, 353, 358, 386, 389 398-400, 1465; Strong Tr. at 85-86, 153, 155-56, 1646-47, 1708. A heating process that does not present these attributes would not be considered "sintering." For example, the presence of transient neck growth, without the other attributes of "sintering," in a process of heating a metal alloy past its liquidus temperature would not satisfy the "sintering" limitation. Therefore, "sintering"

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[24]Kinik contends that brazing is the joining of two materials that do not melt by a filler material that melts at 450°C or higher. Kinik's characterization of brazing as "the opposite of sintering," KPHRB at 19, because brazing requires melting and heating to temperatures above the liquidus of the braze alloy and sintering requires that temperatures stay below the liquidus of the braze alloy is inaccurate. The undersigned finds that sintering and brazing represent a continuum when heating a metal alloy where sintering occurs below the liquidus and brazing occurs above the liquidus.

[25]Staff notes that there is no direct lineage from the original claim that was cancelled to the claim that issued as claim 1 of the '489 patent.

is construed to include more than transient[26] neck growth. Accordingly, a heating process which results in transient neck growth is not sintering particularly when the heating process results from a continuum of increasing temperature. See CX-2 (original patent application used "heating the preform" language but was subsequently changed to "sintering").

Lastly, Kinik contends that the purpose of the metal powder is to retain the diamonds through a sintering process. In support, Kinik cites portions of the '489 specification that interchangeably refers to the metal powder as "powdered sinterable matrix materia," "retaining powder," and "powdered sinterable composition." CX-1 (col.16:37-40), Strong Tr. at 219 (stating that powdered matrix material is also termed a retaining matrix). Kinik, thus, argues that the "sintering" claim language means the abrasive particles are retained by the sintered-together particles of matrix material. Kinik maintains that as a consequence, in a brazing process any metallurgical necks formed during heating to the melting point are destroyed by the melting and cannot hold the abrasive particles in place[27]. Staff agrees that abrasive particles must be retained by the matrix to be capable of abrasion, but contends that there is no requirement for the abrasive particles to be retained against all possible displacement forces. Staff further maintains that claim 1 requires the formation of an abrasive article, not necessarily a commercial product and that some abrasive articles may require additional processing steps to become commercially viable products. 3M disputes that the sintered-together powder particles that form the abrasive article must also retain the diamonds. 3M does not agree that the specification requires or even suggests that sintering has to be the mechanism that holds diamonds in the final abrasive article. In support, 3M notes that the dependent claims and the specification contradict Kinik's construction because they recite post-sintering steps leading to the formation of an abrasive article.

Although sintering may not have to be the final step in the patented method, discussed more thoroughly infra., that alone does not dispute Kinik's proposed construction. As stated above "sintering" must be performed after the SEDF has been formed, from sinterable matrix material, and the abrasive particles have been included in the preform before or during sintering. Furthermore, the specification teaches that the sinterable powder material should be chosen based on its retention capabilities. CX-1 (col. 2:66 - 3:1) (stating that "[i]n making the SEDF preforms, the powdered sinterable compositions will be chosen based on criteria related to the holding necessary for the abrasive particles to be included.") Although the specification indicates that the sintered-together matrix material must retain the abrasive particles, the specification does not indicate by what mechanism the particles must be retained. The patented method requires a sintered SEDF preform including abrasive particles at the end of the sintering step. However, this claim limitation must be read in light of the entire '489 patent. As also discussed more fully infra., claim 1 is an open claim that allows additional steps, but at least the three steps of forming, including, and sintering must be performed. With that backdrop, the undersigned concludes that the intrinsic evidence indicates that the sintered-together powder metal material must retain the diamonds at the

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[26]Transient is defined as passing especially quickly into and out of existence. Webster's New Collegiate Dictionary, 1231 (1979) (adjectival definition of "transient").

[27]Kinik's argument presumes that "sintering" must be the process by which the abrasive article is formed. This particular argument is discussed in the following section.

end of the sintering step. The extrinsic evidence supports this construction. Dr. Naum Tselesin testified that the "[t]he purpose of the powder is to retain the abrasive particles in this solidified powder." Tselesin Tr. 1209. He further testified that his invention utilizes soft and easily deformable preforms "to put abrasive particles in and then sinter." Id.

Accordingly, the claim phrase "sintering said preform" is construed to mean that the sintered-together matrix material must retain the abrasive particles at the end of the sintering step.

"to form said abrasive articles"

COMPLAINANT'S Position

3M argues that the final phrase in claim 1, "to form said abrasive article," expresses the cumulative result of the three process steps discussed above ("forming," "diamond placing," and "sintering said abrasive"). 3M contends that the claim's use of the term "comprising" at the beginning of the claim means that infringement of claim 1 requires performing the three recited steps and the creation of an abrasive article. 3M maintains that there is infringement whenever the three recited steps are performed in a process that results in an abrasive article, regardless of whether other steps are also performed and regardless of whether these additional steps are performed before or after the sintering step. 3MPHB at 29-33.

3M also argues that sintering the preform and forming the abrasive article are separate and distinct requirements in claim 1. 3M maintains that a person of ordinary skill in the art would not combine these two claim terms to require sintering to be the final step in the process and the creation of a "sintered abrasive article." Rather than requiring sintering to be the final step, 3M contends that claim 1 requires sintering the preform during the process of making the abrasive article. According to 3M, in the method of claim 1, sintering alone does not form an abrasive article. Thus, contends 3M, claim 1 does not require the abrasive article to be formed by sintering. 3MPHRB at 12-14.

RESPONDENT'S Position

Kinik argues that the plain language of the claim requires that sintering be the process by which the abrasive article is formed. Thus, contends Kinik, one of ordinary skill in the art would understand that it is the preform, not the diamonds or the substrate, that must be sintered and that an abrasive article must exist at the end of the sintering step, but not necessarily the final product. Kinik adds that mere academic or transient or theoretical sintering is not sufficient. Kinik maintains that the sintered-together powder particles that form the abrasive article must also retain the diamonds[28]. Kinik claims that only after the abrasive particles have been retained in the metal powder does one have an abrasive article. KPHB at 42-45; KPHRB at 24-26.

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[28]In a brazing process, asserts Kinik, it is the coating of the diamonds with the metal (called wetting) and the re-solidification of the melted metal around the diamonds that holds the diamonds in place to form the abrasive article in brazing process.

Kinik adds that for a process to result in a product formed by sintering, there needs to be original powder grains present in the final product, although they may have necked with other particles. Kinik claims that it is not sufficient that there be a few solid particles here and there (which may or may not have sintered). For sintering to form the article the necked particles must give the structure its shape and retain the diamonds in the structure. KPHB at 44-45.

Kinik disputes that "and then sintering" and "to form said abrasive article" are separate steps[29]. Kinik claims that the third step of the claimed process, a combination of the above two terms, is forming an abrasive article by sintering the preform. Thus, contends Kinik, one of ordinary skill would understanding that claim 1 requires that an abrasive article exist at the end of the sintering step and the article must be one in which the preform is sintered. However, Kinik does not suggest that the entire final product is required to be sintered. Rather, claim 1 requires that the preform be sintered and that an abrasive article, but not necessarily the final product, be formed by that sintering. Thus, sintering need not be the final step in the manufacturing of an abrasive article, but it is the final step in claim 1 in the patented process, and an abrasive article must exist at the end of the sintering step. Further, claim 1 requires that the first two elements of mixing the preform and including the abrasive articles must occur before the sintering element. In sum, Kinik argues that combining the above two claim terms – "then sintering said preform to form said abrasive article" – means heating the preform to a temperature below (and not above) the melting point of the main constituent, so that the matrix material particles bond to one another through the growth of necks and the abrasive particles are retained by the sintered-together particles of matrix material[30]. KPHRB at 24-26

COMMISSION INVESTIGATIVE STAFF'S Position

Staff contends that this phrase refers to the cumulative intended result of practicing each and every step of the claim up to the final step of the claim, but not beyond. Staff asserts that simply forming a SEDF preforming containing abrasive articles does not give rise to an abrasive article. Staff maintains that only after sintering into a solid rigid mass does the SEDF preform containing abrasive particles assume the characteristics necessary for abrasion. Staff further states that abrasive particles must be retained by the matrix to be capable of abrasion, but there is no requirement for the abrasive particles to be retained against all possible displacement forces. SPHB at 18; SPHRB at 14. Staff defines an abrasive article as "an item or 'thing' used for 'abrading, smoothing or polishing.'" SPHB

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[29]Kinik contends that 3M's argument that there are four elements stated in claim 1, the terms "and then sintering and "to form said abrasive article" being the third and fourth elements respectively, is a new claim construction put forth for the first time in 3M's post hearing brief and should, therefore, be stricken. The undersigned finds that 3M does not put forth a new claim construction because 3M has consistently maintained that the third step in claim 1 is "the 'sintering' step." JNSI at 5. Furthermore, 3M does not argue that "to form said abrasive article" is a step, but rather that it "expresses the cumulative result of all three process steps discussed above ('forming,' 'diamond placing,' and 'sintering said abrasive')." 3MPHB at 29.

[30]Kinik specifically asserts that sintering must be the mechanism by which the abrasive particles are retained in the abrasive article.

at 18 (citing SX-1).

Discussion, Analysis, and Conclusion

At the outset, 3M contends that the third step in claim 1 is "sintering said preform" while Kinik maintains that it is "sintering said preform to form said abrasive article." Under Kinik's construction, the third step of the claim process is forming an abrasive article by sintering the preform. Kinik also makes other similar statements such as "sintering the preform must be what forms the abrasive article," "[c]laim 1 mandates that an abrasive article be formed by sintering the preform," and "while other things may happen subsequently, claim 1 requires that an abrasive article exist at the end of the sintering step and the article must be one in which the preform is sintered." KPHRB at 24. Kinik further contends that an abrasive article, but not necessarily the final product, must be formed by the sintering. 3M and Staff agree that the phrase "to form said abrasive article" expresses the cumulative result of the three process steps discussed above, "forming," "including," and "sintering said preform." Thus, contends 3M, infringement occurs whenever the three recited steps are performed in a process that results in an abrasive article, regardless of whether other steps are also performed and regardless of whether these additional steps are performed before or after the sintering step[31]. Staff specifically asserts that "'sintering said preform to form said abrasive article' refers to the cumulative result of practicing each and every step of the claim up to the final step of the claim, but not beyond." SPHRB at 14

This claim language must be construed in light of the claim's use of the term "comprising" at the beginning of the claim. Also, Claim 1 is a method claim that teaches a method for making an abrasive article not a claim on a specific product. Limiting claim 1 to require the formation of an abrasive article after the sintering step would be legally impermissible because it would impose a limitation not affirmatively stated in the claim or supported by the specification. See Networld, supra, 242 F.3d at 1342. As discussed above, claim 1 is not limited to the recited steps, but covers the recited steps, and an infringer cannot avoid infringing by performing additional steps regardless of when they are performed. Thus, claim 1 covers processes that practice the recited steps and any additional steps that may be performed after the sintering step. It follows then that "sintering" can be but does not have to be the final step in the patented method. In fact, the specification teaches post-sintering steps that are performed to make a final abrasive article. CX-1 (cols. 13:55-58; 14:10-13, 40-43; 15:14-17, 43-16; 16:12-15). Similarly, other claims recite post sintering steps that are performed before formation of a final abrasive article. CX-1, claims 27-29, 32-34, 37-39, 42-44. Thus, to "form said abrasive article" reflects the culmination of a process that includes, but is not necessarily limited to, the steps actually recited in claim 1.

Kinik concedes that claim 1 does not require a final abrasive article after the performance of the recited steps, but contends that the claim requires an abrasive article after the sintering step. As discussed above, what is sintered is the SEDF containing the abrasive

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[31]3M also makes the statement that "infringement of claim 1 requires performing the three recited steps and the creation of an abrasive article." CPHB at 29. The undersigned finds that this comment differs because it does not indicate a causal relationship between the three steps and the creation of an abrasive article.

particles. Thus, it logically follows that after the sintering step, the article contains the abrasive particles. As staff notes, "sintering transforms [an SEDF] containing abrasive particles into a solid rigid mass having the characteristics necessary for abrasion." SPHRB at 14. However, the article may be but is not required to be an abrasive article because an abrasive article by definition is usable or capable of abrading[32]. As cited above, the specification and dependent claims teach steps that are performed after the sintering step to form an article that is usable for abrasion, i.e. an abrasive article. All the post-sintering steps taught assume the existence of an article containing abrasive particles but Kinik has not shown that they contemplate the existence of an abrasive article.

In addition, as 3M notes, sintering alone does not create an abrasive article. The patented method teaches a process comprised of three recited steps that results in the eventual formation of an abrasive article. Kinik argues that "for a process to result in a product formed by sintering, there needs to be original powder grains present in the final product, although they may have necked with other particles." KPHB at 39. However, Kinik's argument fails because the patented method can include additional steps performed after the three recited steps, such as other heating methods, that may change the state of the original powder particles. Thus, a process whereby the performance of the three recited steps are followed by other heating steps, such as brazing, which results in an abrasive article, such constitutes infringement of claim 1.

A person of ordinary skill in the art would understand that claim 1 requires the performance of the three recited steps as part of a process resulting in the formation of an abrasive article. See Strong Tr. at 72.

Issue III.B: What is the proper construction of claim 4 of the '489 patent?

Claim 4 reads as follows:

> The method of claim 1, wherein the plurality of abrasive particles are included in the preform by placing the particles on at least one side of said preform and urging the particles into said preform.

COMPLAINANT'S Position

3M contends that Claim 4 depends on claim 1, and thus, includes all of the limitations of claim 1, and requires that the diamonds or other abrasive particles are included in the preform by placing them on one or more sides of the preform, and then pushing, them into the preform. Like claim 1, claim 4 requires that the diamonds to be "at least partially" in the preform; it does not require complete encapsulation (*i.e.,* entirely below the outer surface of

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[32]3M defines an abrasive article as "an article that can wear off the surface of something else." Strong Tr. at 81. Staff defines an "abrasive article" as item or thing used for "'abrading, smoothing or polishing.'" See SX-1 at 6; SX-2 at 5,77; Strong Tr. 81-82. Kinik does not posit a meaning for the term "abrasive article."

the preform and surrounded by the preform). In support of its argument, 3M relies on the specification. 3MPHB at 33-34.

RESPONDENT'S Position

Kinik argues that claim 4 requires that the abrasive particles be placed on at least one side of the preform and urged into the preform. According to Kinik, the word "urge" has a commonly understood meaning, and the application of its ordinary meaning of to force in or to press in, is not disputed. Thus, contends Kinik, based on its plain meaning and as confirmed by the specification, claim 4 adds the further limitation that the abrasive particles must be included in the preform by placing them on at least one side of the preform and forcing or pressing them at least partially into the preform. KPHB at 46.

COMMISSION INVESTIGATIVE STAFF'S Position

Staff, relying primarily on the specification, contends that claim 4 requires that the abrasive particles be placed on at least one side of the SEDF preform followed by pressing or forcing the abrasive particles into the surface of the preform to some extent. Staff agrees with 3M that the abrasive particle do not have to be wholly or within the preform or completely surrounded by it. SPHB at 19-20.

Discussion, Analysis, and Conclusion

The parties agree that claim 4 depends on claim 1 and requires that the abrasive particles be included in the preform by placing them on one or more sides of the preform, and then pushing, them at least partially into the preform.

Issue III.C: What is the proper construction of claim 5 of the '489 patent?

Claim 5 reads as follows:

> The method of claim 4, wherein the abrasive particles are urged into the preform before the preform is sintered.

COMPLAINANT'S Position

3M contends that Claim 5 is a dependent claim that depends from claim 4 and, indirectly, from claim 1. Hence, it includes all the limitations of claims 1 and 4, and requires including the diamonds in the preform before the sintering step. 3MPHB at 34.

RESPONDENT'S Position

Kinik agrees that dependent claim 5 depends on claim 4, and hence depends indirectly on claim 1. Kinik argues that the plain and ordinary meaning of this claim limitation requires that the abrasive particles be urged, forced or pressed, into the preform before the preform is sintered. KPHB at 45-46.

COMMISSION INVESTIGATIVE STAFF'S Position

Staff agrees that claim 5 is dependent on claim 4 and claim 1. According to Staff, claim 5 is not materially different in scope from claim 4. SPHB at 20-21.

Discussion, Analysis, and Conclusion

The parties agree that claim 5 includes all the limitations of claim 4, and indirectly claim 1, and requires including the diamonds in the SEDF preform before the sintering step.

Issue III.D: What is the proper construction of claim 8 of the '489 patent?

Claim 8 reads as follows:

> The method of claim 1, wherein the abrasive particles are included in the preform in a non-random pattern.

COMPLAINANT'S Position

3M contends that claim 8 also depends from claim 1. As such, it includes all of the limitations of claim 1 and requires that the abrasive particles be included in the preform in a non-random pattern. In support, 3M contends that the specification and the figures of the '489 patent reveal some illustrative methods for effecting a non-random pattern of abrasive particles. 3M maintains that claim 8 is not limited to a specific non-random pattern of abrasive particles or method of creating the pattern. 3MPHB at 34.

RESPONDENT'S Position

Kinik agrees that dependent claim 8 depends directly on claim 1. Kinik contends that claim 8 adds the further limitation that the abrasive particles are included in the preform in a non-random manner. According to Kinik, the ordinary meaning of the word "random" is "lacking or seeming to lack a regular plan, purpose or pattern." Thus, the ordinary meaning of the term "non-random" would follow as "having a regular plan, purpose or pattern." Kinik maintains that this limitation requires the abrasive particles to be included at least partially in the preform in a regular pattern. KPHB at 46.

COMMISSION INVESTIGATIVE STAFF'S Position

Staff agrees that claim 8 is dependent on claim 1. Staff contends that the ordinary meaning of the phrase "non-random pattern" should apply, and thus, claim 8 requires that the abrasive particles must be placed in a pattern. Staff adds that one of ordinary skill in the art would appreciate that the intent or purpose of providing a non-random pattern of abrasive particles was in part to address the disadvantages of non-uniform or clumped abrasive particles known in the art at the time of filing the '489 patent and would understand the claim limitation accordingly. Staff reemphasizes that the claim 8 does not require that the abrasive particles be completely surrounded and covered by the preform matrix. SPHB at 21-22.

Discussion, Analysis, and Conclusion

The parties agree that claim 8 includes all the limitations of claim 1 and requires that the abrasive particles be included at least partially in the SEDF preform in a non-random manner so as to have no regular plan, purpose or pattern.

Issue IV: Infringement

Issue IV.A: Whether each limitation of claim 1 of the '489 patent is met by Kinik's DiaGrid process either literally or by a substantial equivalent?

COMPLAINANT'S Position

3M maintains that Kinik's DiaGrid® process includes the three steps required for infringement of claim 1, and results in the formation of an abrasive article. 3M notes that an analysis into whether Kinik infringes claims 1, 4, 5, and/or 8 must be performed by comparing Kinik's DiaGrid® process with the asserted claims themselves, and not by comparing Kinik's process with 3M's process or by comparing Kinik and 3M abrasive articles. 3M relates that Kinik forms a preform by combining sinterable metal powder[33] and a liquid glue binder[34]. 3M maintains that Kinik's preform is soft, easily deformable and flexible[35]. 3M contends that Kinik practices the second step of claim 1 by arranging abrasive particles (diamonds) in a uniform pattern and forcing the diamonds partially into one side of the preform. 3M notes that Kinik's counsel has stated that Kinik does not deny meeting this limitation. 3M asserts that Kinik sinters its preform as required by the third step of claim 1. MPHB at 35-36, 38, 40-44.

3M argues that Kinik sinters its preform throughout the entire last portion of the DiaGrid® process heating cycle. According to Kinik, sintering begins below the solidus temperature of the metal powder through the formation of metallurgical necks between particles of the metal powder and the necking continues as the temperature increases to the solidus temperature. 3M contends that thus sintering occurs [ ] of the DiaGrid® heating cycle. 3M claims that during this [ ] the metal powder, from which Kinik formed its preform, necks, consolidates, and as the grain boundaries begin to disappear, individual metal particles are being converted into a "free-standing" mass. 3M disputes Kinik's argument that the sintering that takes place is only "transient." According to 3M, the phenomenon that occurs at [ ] includes necking, consolidation, grain growth, and decreasing porosity.3M maintains that at the end of [

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[33] The parties do not dispute that the metal powder Kinik initially used in its DiaGrid® process was [ ] which was subsequently substituted by [ ] Both metal powders have the identical composition. Sung Tr. at 593-94.

[34]The liquid binder used by Kinik is [ ] Sung Tr. at 594-95.

[35]3M restates its claim construction argument that claim 1 does not specify, by weight, volume, or any other quantitative recipe, the amount of binder and powder that must be used to infringe.

] Kinik has formed an abrasive article, and therefore, practices the third step of claim 1. 3M notes that as a matter of patent law, nothing that happens above [ ] can "undo" or "cure" the infringement that has already occurred. KPHB at 46-50; KPHRB at 26-29.

3M contends that Kinik's continued heating only prolongs the sintering. 3M claims that in the [ ] temperature range, the preform material continues to sinter in a solid state. 3M notes that the solidus temperature, the temperature at which an alloy first starts to melt when heated, for [ ] is [ ] 3M further claims that in the [ ] temperature range, where the preform material is partially melted, sintering of remaining solid particles continues and is facilitated by the liquid metal that is present. 3M notes that the liquidus temperature of the metal alloy Kinik uses in its DiaGrid® process is [ ] According to 3M, sintering also continues in the [ ] temperature range. 3M asserts that even though [ ] is slightly above the liquidus temperature of [ ] complete melting does not immediately occur. 3M relates that there are several explanations for the continued sintering of remaining particles above [ ] despite the liquid temperature of [ ] 3M contends that particles of new compounds with very high melting points come into existence at temperatures below [ ] and remain solid at [ ] According to 3M, as liquids begin to appear: (1) components of the original metal powder diffuse out of the original particles and, since these components are melting point depressants such as boron and silicon, some particles remain unmelted; and (2) chemical reactions between components of the original metal powder, the diamonds and the substrate form new solid compounds (i.e., chromium boride, chromium carbide, and a nickel-rich solid phase) that each have very high melting points. These compounds, according to 3M, remain solid at [ ] and bond together via necking in the presence of a liquid phase. 3M, therefore maintains, that liquid phase sintering occurs above [ ] and continues to and throughout the [ ] 3M adds that although many obvious "necks" that were present at [ ] disappear above [ ] grain growth, disappearance of necks, and overall densification are all consistent with liquid phase sintering. 3MPHB at 51-56; 3MPHRB at 29-34.

3M asserts that continued sintering at [ ] and the absence of complete melting at that temperature are proven both by inspection of finished Kinik DiaGrid® products and by detailed chemical and metallurgical analyses of the DiaGrid® process. Specifically, 3M contends that lack of complete melting is evidenced by spherical particles on the surface of Kinik DiaGrid® commercial products.

3M also notes that Kinik's intent not to sinter during the DiaGrid® process is irrelevant, that Kinik's brazing argument is a "red herring," that the recommended brazing temperature for the metal alloy used by the DiaGrid® process is [ ] and that Kinik only heats to [ ] 3M further argues that "wetting" is not exclusive to brazing and can occur when any liquid is present, and that the lattice formed by the liquid phase sintered structure at [ ] retains the diamonds in place. 3MPHRB at 35-38.

Lastly, 3M argues that the DiaGrid® process also infringes claims 4, 5, and 8 because during the DiaGrid® process, diamonds are arranged in a uniform pattern using a template and are urged partially into a surface of Kinik's SEDF preform before Kinik begins sintering. 3MPHB at 57-58; 3MPHRB at 38-39.

RESPONDENT'S Position

Kinik maintains that based on any reasonable construction of the asserted claims, Kinik does not infringe any of the asserted claims as properly construed. Kinik contends that it does not infringe the first step of claim 1 because Kinik does not form a preform in which the liquid binder is greater in volume than the metal powder. Kinik also claims that it does not practice this step because Kinik's preform, its "pull sheet," is not a SEDF preform. In support, Kinik asserts that its pull sheet cracks as a result of diamonds being pressed into it, mixture pieces of the pull sheet stick to the rollers initially, and the pieces often did crack or break when bent over themselves 180°. KPHB at 48-49; KPHRB at 27-28.

Kinik further maintains that the Kinik DiaGrid® process does not involve sintering within the meaning of claim 1 of the '489 patent, sintering does not form the DiaGrid® products, and sintering does not retain the diamonds in the DiaGrid® products. Kinik disputes as irrelevant 3M's evidence that [ ] when heated to [ ] and then cooled, exhibits neck growth formation between its metal powder particles. Kinik contends that the heating cycle 3M used to produce such evidence was materially different than the DiaGrid® process. Kinik notes that it is undisputed that the vacuum brazing step of the Kinik DiaGrid® process does not peak at [ ] Rather than cooling after reaching [ ] asserts Kinik, the vacuum brazing furnaces are set to continue to increase the temperature another [ ] up to [ ] By changing the DiaGrid® process as 3M did, Kinik contends that 3M ignores the most critical portion of the DiaGrid® process for purposes of determining whether sintering is occurring within the meaning of claim 1, which is that sintering requires that the main constituent of the metal powders not be heated to a point above its melting point. Kinik notes that the actual DiaGrid® process heats the [ ] at which point the material is [ ] above its liquidus. Kinik adds that the diamonds in the DiaGrid® products heated to [ ] are not retained by sintering and just sit atop the pull sheet. KPHB at 49-50.

Kinik contends that persons of ordinary skill in the art do not consider "transient" neck growth in a brazing powder when heated to its melting point to be sintering. Kinik notes that it is it is not possible to heat powders to their melting point without passing through the range of temperatures below the melting point where such neck growth does occur. According to Kinik, it is the product produced by the entire process, not arbitrarily selective points in the process, that determines whether sintering or brazing has occurred[36]. Kinik also contends that transient neck growth at [ ] is not sintering within the meaning of claim 1 because those necks do not form the DiaGrid® products and secure the diamonds. Whatever neck growth exists at [ ] asserts Kinik, ceases to exist when the temperature exceeds[ ]Kinik maintains that because the necks ceased to exist before the DiaGrid® vacuum brazing furnace heating cycle is completed, 3M's evidence of neck growth at [ ] also fails to satisfy the other requirements of the third step of claim 1, specifically that transient necks "form" the DiaGrid® abrasive articles or that the temporary necks retain the diamonds in the DiaGrid® products. According to Kinik, the diamonds in the DiaGrid®

[36]Kinik argues that if the entire process results in melting of the main component to join two materials, it is brazing. If the entire process peaks at a temperature below the melting point of the main powder constituent and forms the requisite neck bonds, it is sintering.

products are retained by the liquid braze material that wets their sides and pulls them down into the molten braze. Kinik contends that a person of ordinary skill in the art would not understand an abrasive article to have been formed until a product had been cooled because the abrasive article cannot be used to abrade another surface when it is at [ ] or higher within a vacuum furnace. KPHB at 51-52; KPHRB at 31.

Kinik argues that 3M failed to prove that any original powder materials remain solid throughout the entire Kinik DiaGrid® heating cycle. Kinik notes that the liquidus temperature of its alloy is [ ] Therefore, asserts Kinik,by heating to a temperature between [ ] the powder could be melted and diamond abrasive brazed products produced. Kinik contends that by experimentation, it discovered that commercial production quality brazed diamond abrasive products could be achieved with a peak temperature of [ ] and therefore, the furnace in the DiaGrid® process is set to heat the products and their brazing powder to [ ] Kinik claims that it uses this heating profile to ensure that the metal powder fully melts during the DiaGrid® process. Kinik contends that the mere presence of solids in a liquid is not sintering as one of ordinary skill would understand the term as used in claim 1. Kinik adds that to confirm brazing, after the DiaGrid® process is complete, Kinik inspects the DiaGrid® products and discards any that did not completely melt during the heating process. Kinik maintains that a manufacturer's recommending brazing temperature for its metal alloy is irrelevant because: (1) regardless of the "recommended" brazing temperature, the prealloyed powder would be all liquid at any temperature above [ ] (2) the recommended brazing temperature of [ ] is for applications other than diamond abrasive tools, and; (3) the recommended brazing temperature range begins at [ ] just [ ] above the temperature used by Kinik. KPHB at 52-55; KPHRB 34-39.

According to Kinik, the metal powder used in the DiaGrid® process melts completely by the end of [ ] Kinik argues that as shown by ternary phase diagrams, the chromium boride phase is soluble in liquid nickel and, if it formed below [ ] it would not remain solid through the peak temperature of [ ] Kinik further contends that the solid angular pieces of chromium boride present in the final DiaGrid® products form only upon cooling to [ ] and are not solid throughout the DiaGrid® heating cycle. Furthermore, Kinik argues that the spherical shaped structures observed on the surface of Kinik's pad conditioners are not remnants of original alloy powder, established by testing which showed that the silicon composition of the spherical structures was significantly different than that of the original powder alloy. Kinik claims that these spherical structures are cellular dendritics which form through solidification during cooling from peak temperature. Kinik also argues that the reaction between the carbon (primarily from the diamonds) and chromium to form chromium carbides do not involve solid powder particles because these reactions occur only after the powder particles melt between [ ] and liquid chromium chemically reacts with diamonds in the wetting process. As such, asserts Kinik, no solid powder particles are involved in these reactions. According to Kinik, that the product of the reaction remains solid is irrelevant to whether sintering of the powder particles occurred. KPHB at 56-58.

Kinik also argues that DiaGrid® products failed to exhibit any characteristics typical of sintering because they are virtually pore free. According to Kinik, pores exist in brazed

and sintered products, and thus, the mere existence of pores does not determine whether a product is brazed or sintered. Moreover, contends Kinik, the structures identified as pores by German were, in fact, not the result of sintering, but rather were the result of solidification shrinkage as the eutectic phase solidified, exposing the cellular dendritic structures. Kinik also contends that its pull sheet does not shrink, at least not after the heating cycle is completed, but rather flows outward during heating because it is molten. KPHB at 59; KPHRB at 34-39.

Kinik asserts that while their products do not have the traits characteristic of sintering, they do have the traits characteristic of brazing. As stated, Kinik argues that [ ] causes complete melting. Kinik explains that the reason diamond positioning does not change due to gravity on wire saw beads is because of surface tension forces which pull the diamonds towards the bead overwhelmingly counteract the downward force of gravity. Moreover, Kinik argues that the diamonds which initially rest atop the alloy powder are substantially covered by the alloy. This undisputed fact, Kinik reasons, can only be explained by the absence of a sintered lattice, and the presence of fully molten metal. Kinik also asserts that there are no necks in the finished DiaGrid® products. KPHB at 60-64.

Lastly, in accordance with its claim construction argument, Kinik argues that the DiaGrid® process does not meet the requirement that resulting products are "formed" by sintering or that diamonds are retained by sintering. Kinik contends that once the amount of molten liquid by volume reaches approximately 30%, sintering stops and begins to reverse as necking and other indications of sintering begin to melt away. As part of its argument, Kinik also mentions that despite its inability to actively assert 35 U.S.C. § 271(g)(1) as an affirmative defense, this portion of the Patent Statute is most accurately seen as an element which 3M must prove in bearing its burden to show infringement. Thus, Kinik asserts that 3M must show by a preponderance of evidence that Kinik's process, though it may otherwise infringe under § 271(g), is not "substantially changed by a subsequent process." Kinik concludes that 3M has failed to meet this burden. Accordingly, Kinik argues, the DiaGrid® process does not perform the "sintering" step. Kinik adds that it does not infringe claims 4, 5 and 8 for all of the reasons set forth in connection with claim 1. KPHB 64-66; KPHRB at 38-39

COMMISSION INVESTIGATIVE STAFF'S Position

Staff contends that Kinik's DiaGrid® process practices each and every element of claim 1 of the '489 patent, as properly construed. Staff notes that the actual steps of the DiaGrid® process are not disputed. Staff contends that Kinik meets the first limitation of claim 1 by making a SEDF preform consisting of metal powder and a liquid binder. Staff contends that throughout processing, the preform remains substantially intact. With regard to the second limitation of claim 1, which requires the inclusion of the diamonds, Staff notes that Kinik does not dispute the fact that it practices this step. SPHB at 24-28.

Staff maintains that Kinik meets the third and final limitation of claim 1 by sintering the SEDF preform resulting in the diamond-containing preform becoming a single coherent mass capable of abrasion. Staff contends that after Kinik completes the heating step to [ ] the preform is a hard and solid mass capable of scratching glass. Thus, according to Staff, at this stage in the DiaGrid® process, Kinik has sintered the preform and has

performed all of the other steps. Staff, in agreement with 3M, contends that Kinik's subsequent raising of the temperature to above the melting point of the sinterable matrix material and subsequent alleged brazing of the diamonds to the substrate does not negate the performance of the required steps of claim 1[37]. Staff contends that if only a portion of the entire DiaGrid® process meets each and every limitation of claim 1 of the '489 patent, Kinik cannot escape liability by adding steps to its process. Id.

Discussion, Analysis, and Conclusion[38]

Analyzing whether a patent is infringed "entails two steps. The first step is determining the meaning and scope of the patent claims asserted to be infringed. The second step is comparing the properly construed claims to the device or process accused of infringing." Markman, 52 F.3d at 976. The first step is a question of law, whereas the second step is a factual determination. Id. To prevail, the patentee must establish by a preponderance of the evidence that the accused device infringes one or more claims of the patent either literally or under the doctrine of equivalents. Bayer, 212 F.3d at 1247. However, the patentee need not show that the infringer intended to infringe. Warner-Jenkinson Co. v. Hilton Davis Chem. Co., 117 S.Ct 1040, 1052 (1997). Furthermore, the accused device or process must be compared to the properly construed claim not to any commercial embodiment of the claim. Glaxo Inc. v. TorPharm, Inc., 153 F.3d 166, 1373 (Fed. Cir. 1998).

As Staff notes, the steps of the DiaGrid® process are not disputed. 3M has established by a preponderance of the evidence that Kinik's DiaGrid® practices all three limitations of claim 1. With regard to the first limitation of claim 1, forming an SEDF from a mixture of said quantity of powdered sinterable matrix material and a liquid binder composition, it is undisputed that Kinik's DiaGrid® process begins by mixing or combining [ ] Kinik's Prehearing Brief at 16; CPX-2A; Sung Tr. at 593-95. Both [ ] and [ ] are powdered sinterable matrix material. Strong Tr. at 97-98; Responses to Requests for Admission Nos. 13-14; CX-85; CX-86; CX-88; CX-343. As stated in the claim construction analysis of the term "mixture," contrary to Kinik's assertion, the first limitation does not require any specific proportion of powder metal and binder glue by volume or weight.

After mixing [ ] the undersigned finds that Kinik forms a SEDF preform. Kinik has stated that the mixture of powder metal and liquid binder is hand-kneaded using a plastic sheet to form a [ ] substance. Kinik's Prehearing Brief at 16; Sung Tr. at 595-96. The [ ]substance is [ ] to form a "pull sheet" [ ] Kinik Prehearing Brief at 16.; Sung Tr. at 596. Kinik agrees that the "pull sheet" is a preform. Sung Tr. at 599-600; Strong Tr. at 121; Response to Request for Admission No. 26. Dr. James Chien-Min Sung testified that

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[37]Staff notes that although the reported liquidus temperature of [ ] is [ ] when the sinterable matrix material interacts with a steel substrate or diamonds, changes in the melting point may occur.

[38]The undersigned notes that 3M was precluded from presenting any evidence or argument that any of the asserted claims are infringed under the doctrine of equivalents. Order No. 39 (October 10, 2001).

the purpose of [ ] is to make the preform into "thin sheet[s] with control thickness." Sung Tr. at 596. Kinik's operators periodically [ ] Strong Tr. at 114. The [ ] sheets and they become increasingly thinner, wider and longer. Strong Tr. at 114, 116. [ ] CPX-2A; Sung Tr. at 597-98; Strong Tr. at 114. The sheets have to be supported on a rigid flat surface [ ] to prevent drooping from the force of gravity as can be seen from what happens to the portions of the preform that extend beyond the surface of the rigid supporting material, particularly as the preform becomes thinner. Sung Tr. at 596-97; Strong Tr. at 116-17; CPX-2A.

Once the preform has reached its desired thickness, Kinik operators [ ] Strong Tr. at 114, 117-18, 120; Sung Tr. At 597; Kinik Prehearing Brief at 16; CPX-2A. The next relevant step in the DiaGrid® process is that [ ][39]. Strong Tr. at 120-21; Sung Tr. at 598; CPX-2A. Then the diamonds are urged into the preform by applying a relatively small amount of force to the diamonds. Sung Tr. 600; Kinik Prehearing Brief at 16. As 3M notes, [ ] of the preform is done by hand, indicating that the preform is SEDF. CPX-2A; Sung Tr. at 594-98; Strong Tr. at 114-19.

Therefore, the undersigned finds that Kinik's DiaGrid® preforms conform to the ordinary meanings given to the terms soft, easily deformable and flexible. That the preform has a [ ] consistency and is [ ] demonstrates that the preform is soft, i.e. yields to physical pressure. That the preform does not generally break or crack despite being repeatedly bent over itself [ ] droops if not supported by a rigid surface, is flattened [ ] and may be [ ] without breaking demonstrates that the preform is easily deformable and flexible, i.e. its shape is easily altered by stress and it yields to influence, including the ability to be bent over on itself. In addition, the undersigned's observation of a several month old physical sample of the DiaGrid® preform confirmed that the preform is soft, easily deformable, and flexible as those terms are ordinarily construed. CPX-16. Lastly, Kinik's witness, Williamson, agreed that in comparison to a prior art hard, stiff and brittle green compact, Kinik's preform is SEDF. Williamson Tr. at 1311-16, 1318-21. Strong agreed that the prior art green compacts were not SEDF. Strong Tr. at 147-48.

Kinik disputes 3M's claim that its preform is SEDF by relying on evidence allegedly showing the cracking of the preform that resulted from diamonds being pressed into it. RX-276; Sung Tr. at 600. Kinik's witness, Hwang, testified that pushing the diamond into the preform resulted in cracks in the preform. Hwang Tr. at 781, 837-39. Sung testified that there are cracks at every location there is a diamond. Sung Tr. at 1079. Kinik argues that the cracking of the Kinik preform contradicts 3M's allegation that deformability and flexibility

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[39]The undersigned notes that DiaGrid® substrates have different shapes, e.g. flat or curved, and the the preform is made to conform to the shape of the substrate [ ] Sung Tr. at 598-99.

of Kinik's preform are shown by the lack of cracking or breaking. Kinik also refutes 3M's claim that its preform does not break or crack despite being repeatedly bent over itself [ ] Kinik alleges that the videotape of the DiaGrid® process shows that the[ ] and the pieces often times did crack or break when bent 180°.

Kinik's evidence is not persuasive because the picture Kinik presented of the cracks in the preform is a scanning electron microscope ("SEM") photograph of a Kinik preform into which diamonds have been included after it has been heated to [ ] Hwang Tr. at 835-36. Although Hwang testified that the cracks were also there before heating, a comparison photograph of the pre-heated preform was not offered. Hwang Tr. at 836. Also, Hwang's testimony was not completely persuasive because he testified that he "assume[d]" the cracks occurred when the diamonds were pushed into the preform, but there was no documentation in the record to support him. Hwang Tr. at 837, 839, 858-59. Furthermore, although pieces of the preform did stick to the rollers, this evidence is minimal in the face of the overwhelming evidence establishing the SEDF characteristics of Kinik's preform. Accordingly, Kinik's DiaGrid® process practices the first limitation of claim 1.

With regard to the second limitation of claim 1, placement of the diamonds partially in the preform, Kinik does not dispute that the DiaGrid® process practices this step. Roth Tr. at 1716. As recited in a joint proposal pursuant to Order No. 11, issued May 14, 2001, "respondents agreed that they will not interpose a defense based on what occurs in the DiaGrid® abrasive placement step which is not disclosed to complainants." Furthermore, 3M provided evidence that Kinik meets this requirement. Sung testified that diamond particles are included at least partially, [ ] in Kinik's preform by [ ] Sung Tr. at 600-02. Strong's examination of a pad condition prior to and after the placement step in the DiaGrid® process confirmed that the diamonds were urged into the preform. Strong Tr. at 140.

The third step of claim 1 is "sintering said preform to form said abrasive article." After the preform [ ] and diamond particles have been included in the preform (the "assembly"), the assembly is then placed in a furnace [ ] and then cooled. KPHB at 17. Once the assemblies have completed the [ ] cycle, they are loaded into a vacuum furnace where they undergo a prescribed, programmed heating cycle[40]. Id.; Sung Tr. at 603. This heating cycle includes [ ][41] [ ] German Tr. At 303,305; CX-95[42]. The temperature inside the vacuum furnace is then increased [ ] Kinik's Prehearing Brief at 17; Sung Tr. at 606; German Tr.

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[40]The vacuum furnace is a large furnace and has at least one thermocouple to measure the temperature inside the furnace. Sung Tr. at 611-12, 1121-22.

[41]The undersigned notes that Kinik's Prehearing Brief at 17 states that the [ ] However, this discrepancy is not relevant to this infringement analysis.

[42]This exhibit of the DiaGrid® heating cycle prescribes time versus temperature and time versus pressure plots, with the temperature indicated with the orange line and pressure by the pink line. German Tr. at 298.

at 308-309; CX-95; Williamson Tr. at 1293-94. The temperature is then increased to [[43]] Sung Tr. at 609-10; German Tr. at 318-19; CX-95.

The undersigned finds that Kinik's DiaGrid® process practices the third limitation of claim 1 at the [ ] in the heating cycle. Sung, Kinik's vice president who developed and supervises the DiaGrid® process, agreed that there is some evidence that sintering occurs at [ ] Sung Tr. at 606-08. Specifically, he testified that [ ] the metal powder from which Kinik formed its preform necks and consolidates, and that the grain boundaries begin to disappear. Sung. Tr. at 606-08. He further testified that the individual metal particles stick together and become a "free-standing" mass. Sung Tr. at 607-08. Thus, the phenomenon that occurs at [ ] includes necking, consolidation, and grain growth. Sung Tr. at 606-09, 1177. However, Sung testified that at this point in the heating cycle, the sintering cannot bond the diamond particles, that there's no strength to the sintering, and the "preform become[s] a porous chunk with a lot of interconnect porosity inside." Sung Tr. at 609. Kinik's witness, Shiue, agreed that [ ] some bonding, consolidation, necking and contact between the metal particles occurs and a solid mass is formed, although there is some loose powder. Shiue Tr. at 686-87,705-06, 708-09, 712-13. Kinik's expert, Dr. Thomas Eagar, also agreed that the sintering process is occurring at [ ] and a "very brittle, metal sponge" is formed, although he also testified that "you don't end up with a sintered product." Eagar Tr. at 1794-95.

Most importantly, 3M's expert, German duplicated Kinik's heating cycle up through [ ] in a vacuum furnace. Kinik's counsel observed German's experiment. German Tr. at 1392-93. To assure precise duplication of the Kinik process, German used preform samples supplied by Kinik, and placed them on an actual Kinik substrate. German Tr. at 1391-96. At the end of [ ] German cooled the sample, cut a cross section, and examined it using a scanning electron microscope ("SEM"). German Tr. at 1393-94. The SEM examination revealed that significant bonding between adjacent metal particles (i.e., "necking") occurred [ ] German Tr. at 1394-1395. These metallurgical necks are also evident in an SEM photograph of a cross section of the sample that German heated to [ ] in accordance with Kinik's heating cycle. CX-393. These necks are also evident in another SEM made by German of another sample that he heated to [ ] using the DiaGrid® heating cycle. CDX-64C. Strong agreed that these SEMs evidenced solid state sintering. When shown CX-393, Professor Strong stated:

> This SEM, to me, is one that I would use in teaching my students what solid state sintering is about, and clearly, they would understand from this, as I would, that this is solid state sintering.

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[43]The undersigned notes that Kinik's Prehearing Brief at 17 states that the temperature is increased to [ ]

Strong Tr. at 1623-24; see also 1637("It's a sintered metal powder."). German explained the solid state sintering in CDX-64 as follows:

> We see sinter necks, bonds, growing between the particles, these are the prealloyed, [ ] or [ ] powder particles. The bonds are about a third of the size of the particles. It's a very well-developed sintered structure.

German Tr. at 312.

Further, the sintering that takes place at [ ] is between the solid particles of the powder metal because [ ] is below the solidus of the [ ] Shuie Tr. at 706.

Kinik does not deny that German precisely followed the DiaGrid® heating cycle up to [ ] However, Kinik disputes the relevancy of 3M's evidence that if the powder metal Kinik uses in its DiaGrid® process is heated to [ ] and then cooled, necks grow between metal powder particles. KPHB at 50. Kinik contends that the heating cycle 3M used to manufacture neck growth information is materially different than that used in the DiaGrid® process. Id. Kinik notes that the DiaGrid® heating cycle does not peak at [ ] and rather than cooling after reaching [ ] the furnace increases the temperature another [ ] to [ ] above the liquidus of [ ][44]. Id. As discussed in the claim construction analysis of the terms "comprising" and "sintering said preform," sintering does not have to be the last step in the accused process to be an infringing process[45]. The appropriate infringement analysis does not compare the entire DiaGrid® process to claim 1. See Dow Chemical, 257 F.3d at 1380-81[46]. That a portion of the DiaGrid® process meets each and every limitation of claim 1 is sufficient for infringement. Furthermore, contrary to Kinik's assertion that [ ] is unimportant or irrelevant, Hwang testified that since assuming his new position six-months ago, he has been trying to eliminate this step but has not yet succeeded. Hwang Tr. at 850, 856; Strong Tr. at 1652.

The undersigned does not find persuasive the testimony that the function of [ ] is merely to achieve thermal equilibrium. Sung Tr. at 1176-77; Hwang Tr. at 850, 856-67; Shiue Tr. at 688-89; Williamson Tr. at 1324. There are a variety of temperatures at which Kinik could have achieved thermal equilibrium, yet Kinik continues to use [ ] Sung Tr. At 1177. Kinik intentionally uses [ ] because it increases the yield of the DiaGrid® product. Williamson Tr. at 1324; Shiue Tr. at 688;

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[44]The undersigned notes that [ ] is the established liquidus for [ ] but Eagar testified that when the sinterable matrix material interacts with a stainless steel substrate or diamonds, changes in the melting point may occur. Eagar Tr. at 1794.

[45]Kinik does not provide any legal support for its argument that 3M bears the burden of proving by a preponderance of evidence that the product imported into the United States was not "materially changed by subsequent processes" occurring after the patented process aside from citing 35 U.S.C. § 271(g), which the undersigned found Kinik was precluded from asserting in Order Nos. 33 and 40.

[46]In Dow Chemical, the district court compared defendant's entire two-stage chemical process to the lcaim at issue and found non-infringement. Id. The Federal Circuit reversed, holding that defendant's process infringed, even though only the second stage of the process met the limitation of the claim. Id.

Roth Tr. at 1939. If the better yield is merely due to thermal equilibrium as alleged by Kinik, Roth Tr. at 1939, then it is logical that the yield would increase at any temperature at which thermal equilibrium could be achieved.

Kinik also argues that persons of ordinary skill in the art do not consider transient neck growth when a brazing powder is heated to its melting point to be sintering. KPHB at 51. However, the DiaGrid® process is programmed to hold its furnace at [ ] and extensive solid state sintering occurs during this period as evidenced by the testimony cited above. As a result, Kinik gets an optimal yield on its production of abrasive articles. As 3M notes, the DiaGrid® process does not involve a situation in which the furnace temperature merely passes through [ ] so rapidly that sintering does not have time to occur and have no effect. Solid state sintering occurs throughout the solid state of [ ] Strong Tr. at 1652. Shiue testified that necking occurred at [ ] during the DiaGrid® process [ ] and throughout the temperature increase to [ ] Shiue Tr. at 705-06. Sung testified that solid sintering occurs in the temperature range between [ ] and liquid phase sintering occurs in the temperature range between [ ] although brazing may also occur in that temperature range. Sung Tr. at 1127-28. Kinik asserts that at some temperature point between [ ] sintering ceases because of the presence of a significant amount of liquid. However, Kinik does not dispute that some sintering is occurring. KPHRB at 39. Therefore, the undersigned finds that the sintering that takes place in the DiaGrid® process is not "transient," particularly during [ ] which increases Kinik's yield.

Kinik further argues that the DiaGrid® process does not practice claim 1 because sintering does not form the DiaGrid® products and sintering does not retain the diamonds. KPHB at 51-52. Kinik alleges that whatever neck growth exists at [ ] are melted when the temperature exceeds the liquidus. Id. at 52. Thus, contends Kinik, because the necks cease to exist minutes after they grow, it is illogical to say that the necks "form" the abrasive articles or that they retain the diamonds in the final products. Kinik understates how long necks actually exist given that Kinik's own witness acknowledged that the necks began occurring during [ ] which lasted longer than just a few minutes. And necking continued to occur and evolve throughout [ ] and time span required for Kinik's furnace to reach [ ][47]. While necks may evolve during the heating cycle they do not necessarily cease to exist minutes after they grow. Regardless, as discussed in the claim construction analysis of the claim phrase "sintering said preform," claim 1 does not require the formation of an abrasive article at the end of the sintering step. Rather, claim 1 requires the performance of the three recited steps as part of a process resulting in the formation of an abrasive article. Furthermore, sintering does not have to secure the diamonds in the final abrasive articles.

Claim 1 only requires a sintered SEDF containing abrasive particles at the end of the sintering step. The DiaGrid® process satisfies this requirement because 3M's evidence established more than a sintered SEDF containing abrasive particles. Strong and German both examined the solidified mass, CPX-17, created during [ ]

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[47] The record is, however, devoid of evidence as to qualitative impact of these evolving necks that formed early in the heating cycle.

during the DiaGrid process. They both agreed that it is an abrasive article as a person of ordinary skill in the art would understand that term. German Tr. at 1397-98; Strong Tr. at 1637-38, 1651-52,1708.. Strong also tested this article using a standard glass scratching test to determine whether it was an abrasive article. Strong Tr. at 1637-38. He explained that he "used it to scratch glass, and it was successful in doing so," and that he performed such a test because "that's what a person of ordinary skill in the art would do." Id.

That Kinik did not intend to create a sintering process is irrelevant to a finding of infringement. Warner-Jenkinson Co, 117 S.Ct at 1052. Kinik argues that 3M failed to prove that any powder materials remain solid throughout the entire DiaGrid® heating cycle. However, this is not a limitation of claim 1. Kinik's argument that the DiaGrid® products do not have the attributes of sintering but do have the attributes of brazing likewise fails. That Kinik's DiaGrid® process may also begin to braze the sintered SEDF at some temperature point in the heating cycle does not alter the fact that infringement has already occurred. See Dow Chemical, 257 F.3d at 1380-81. Accordingly, the undersigned finds that Kinik's DiaGrid® process infringes claim 1 of the '489 patent.

3M also argues that Kinik's DiaGrid® process sinters above the liquidus point of [ ] in the temperature range of [ ] Kinik disagrees and claims to braze in that temperature range. The undersigned declines to determine whether sintering continues in this temperature range because infringement occurs below the liquidus and additional steps in the DiaGrid® process do not change Kinik's liability. See Dow Chemical, 257 F.3d at 1380-81.

Issue IV.B: Whether each limitation of claim 4 of the '489 patent is met by Kinik's DiaGrid® process either literally or by a substantial equivalent?

COMPLAINANT'S Position

3M argues that Kinik's DiaGrid® process infringes claim 4. In support, 3M cites Sung's testimony that diamond particles are forced approximately [ ] into one side of the preform. 3M also notes that Kinik admits that "the diamonds are placed on one side of the pull sheet and force is applied to push them partially in the pull sheet but that they are partially protruding from the top of the pull sheet." 3MPHB at 57.

RESPONDENT'S Position

Kinik claims that it does not infringe claim 4 for all of the reasons set forth in connection with claim 1.

COMMISSION INVESTIGATIVE STAFF'S Position

Staff maintains that Kinik's DiaGrid® process practices the added limitation of claim 4 because a plurality of diamonds are attached to the preform by applying pressure to the diamonds so that about [ ] of the diamond surface enters the top portion of the preform.

Discussion, Analysis, and Conclusion

The undersigned finds that Kinik's DiaGrid® process infringes claim 4 by virtue of infringing claim 1. Furthermore, Sung testified that diamond particles are forced approximately [ ] into one side of the preform. Sung Tr. at 600-01.

Issue IV.C: Whether each limitation of claim 5 of the '489 patent is met by Kinik's DiaGrid® process either literally or by a substantial equivalent?

COMPLAINANT'S Position

3M argues that Kinik's DiaGrid® process infringes claim 5. In support, 3M cites Sung's testimony that diamond particles are forced approximately [ ] into the preform before it is sintered. Sung Tr. at 600-01, 603-04. 3M also notes that Kinik admits that Kinik admits that diamonds are pushed into the pull sheet prior to the assembly being placed in the vacuum furnace. 3MPHB at 57.

RESPONDENT'S Position

Kinik claims that it does not infringe claim 5 for all of the reasons set forth in connection with claim 1.

COMMISSION INVESTIGATIVE STAFF'S Position

Staff contends that there is no material difference between the infringement analysis for claims 4 and 5 of the '489 patent.

Discussion, Analysis, and Conclusion

The undersigned finds that Kinik's DiaGrid® process infringes claim 5 by virtue of infringing claim 1. Furthermore, Sung testified that diamond particles are forced approximately [ ] into the preform before it is sintered. Sung Tr. at 600-01, 603-04.

Issue IV.D: Whether each limitation of claim 8 of the '489 patent is met by Kinik's DiaGrid® process either literally or by a substantial equivalent?

COMPLAINANT'S Position

3M argues that Kinik's DiaGrid® process infringes claim 8. In support, 3M cites Sung's testimony that diamond particles are arranged in a uniform patten [ ] and then pressed into the preform. 3M also notes that Kinik admits that diamonds are regularly placed in the pull sheet. 3MPHB at 57.

RESPONDENT'S Position

Kinik claims that it does not infringe claim 8 for all of the reasons set forth in connection with claim 1.

COMMISSION INVESTIGATIVE STAFF'S Position

Staff maintains that Kinik's DiaGrid® process practices the added limitation of claim 8 because Kinik places its diamonds into the SEDF preform in a non-random pattern.

Discussion, Analysis, and Conclusion

The undersigned finds that Kinik's DiaGrid® process infringes claim 8 by virtue of infringing claim 1. Furthermore, Sung testified that diamond particles are placed in a regular patten in the preform. Sung Tr. at 600.

Issue V: Invalidity

Issue V.A: Whether the asserted claims of the '489 patent are indefinite in violation of 35 U.S.C. section 112 paragraph 2?

COMPLAINANT'S Position

3M maintains that Kinik's argument that the terms "soft," "easily deformable," and "flexible" are indefinite under 35 U.S.C. § 112 ¶ 2 fails for both factual and legal reasons. 3M first asserts that those terms have been used in thousands of issued patents, and thus, their use in claim 1 of the '489 patent is nothing out of the ordinary[48]. In fact, contends 3M, at no time during prosecution of the '489 patent did the PTO Examiner indicate that she considered those terms indefinite. Second, 3M notes that all of the witnesses questioned, including Kinik's expert, Williamson, defined these terms in the same way, as they are defined in Webster's Dictionary. 3MPHRB at 39-40.

3M asserts that during the prosecution of the '489 patent application, the Examiner reviewed the specification, figures, and claims thoroughly and the claims went through several revisions in response to various rejections based on 35 U.S.C. § 112 deficiencies. Even in this context, claims 3M, the Examiner never questioned the definiteness of the terms "soft," "easily deformable" and "flexible" or suggested that quantification was needed to distinguish the invention of the '489 patent from the prior art. CX-2. Id. at 40.

3M also argues that compliance with 35 U.S.C. § 112 ¶ 2 is a question of law, which does not require mathematical precision. Thus, according to 3M, quantification of "soft," "easily deformable," and "flexible" in the '489 patent is not required and although they are qualitative terms, there is nothing wrong with using them in a patent claim. Furthermore, contends 3M, quantification of these terms would be difficult and would unfairly limit the scope of the invention. 3M argues that because the '489 patent contemplates a wide variety of powders and liquid binders for a wide variety of abrasive articles, reciting specific softness, deformability, or flexibility quotas would produce nothing more than an arbitrarily and unduly limited claim. Id. at 42-43.

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[48]3M notes that since 1995 the PTO has issued: 6,517 patents in which the term "soft" is used in a claim; 6,365 patents having "deformable" in a claim and 54 patents using "easily deformable" in a claim; 37,275 patents using the term "flexible" in a claim, and; in a substantial number of these patents, these terms were not quantified.

Lastly, 3M contends that the '489 patent specification distinguishes the prior art based on the difference between the "SEDF"[49] preform taught in the patent and the "hard, stiff and brittle" green compacts previously used to make abrasives and well-known in the art. 3M claims that the specification also describes precisely what need be done to form a "SEDF" preform. Id. at 43-44.

RESPONDENT'S Position

Kinik claims that a determination of whether an inventor has complied with the definiteness requirement is generally a question of law based on the court's duty as the construer of patent claims and focuses on whether those skilled in the art would understand the scope of the claim when the claim is read in light of the specification. Kinik argues that the phrase "SEDF" preform is indefinite in violation of § 112 ¶ 2 because the ordinary meaning of the phrase is ambiguous and would not permit one of ordinary skill in the art to understand the precise scope of the claim when read in light of the specification[50]. According to Kinik, the term "SEDF" is not a recognized term in the relevant art, and although it appears in a number of places throughout the patent, it is not defined anywhere in the patent or the prosecution history. Kinik contends that to give the phrase meaning, the patentee could have acted as his own lexicographer and specifically defined the phrase "SEDF" or its individual components – the words "soft," "easily deformable" and "flexible" – to give meaning to the phrase "SEDF," but he did not do so. KPHB at 68, 70.

Kinik asserts that nothing in the '489 patent or its file history provides any explanation of what quantifiable characteristics a material must have for it to be a "SEDF" preform. Kinik suggests that this problem could have been solved if the patentee identified tests that could be used to measure hardness or softness or flexibility and Kinik notes that such tests were known prior to the invention of the '489 patent, but the '489 patent and its file history do not identify any tests or quantitative standards. Id. at 70-71.

Kinik argues that because the words "soft," "easily deformable" and "flexible" do not have special meanings to person of ordinary skill in the art, those seeking to avoid infringing the '489 patent must resort to the ordinary meanings of those words. However, the problem with doing so, contends Kinik, is that the ordinary meanings of these words each result in a subjective interpretation. Kinik maintains that the terms "soft," "easily deformable" and "flexible" are qualitative terms without any established point of reference. Kinik contends that the fact that the words used in the phrase have ordinary meanings or that one of ordinary skill in the art could define the meaning of those words does not make a claim phrase comprised of those words definite under § 112 ¶ 2. Id. at 71-72.

Kinik claims that the critical issue in assessing whether the asserted claims of the '489 patent are invalid for indefiniteness is whether the patent discloses how much physical pressure, stress or flexion is necessary to satisfy the "SEDF" preform requirement. Kinik argues that based on a plain meaning claim construction of the phrase, a person of ordinary

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[49]3M explains in its Post-Hearing Brief that the term "soft, easily deformable and flexible" is simply the sum of its parts. 3MPHB at 21-22.

[50]Kinik contends that because the phrase "SEDF" is incorporated directly or indirectly into all of the other asserted claims the phrase renders each of the asserted claims invalid under § 112 ¶ 2.

skill in the art still would not be able to know definitively what the phrase includes or excludes because, according to Kinik, the '489 patent and its file history provide no definitive guidance. Kinik contends that it is not sufficient that one of ordinary skill in the art relevant to the '489 patent might know that something meets the limitation (*e.g.*, a preferred embodiment) without also knowing what would not satisfy the limitation. Kinik contends that although the specification describes the advantages of the SEDF preform, these descriptions do not clarify the meaning of "soft" within what is a subjective determination, even within a specific application such as the manufacture of an abrasive article. Id.

Kinik further contends that based on the specification, how "soft" a preform is appears to correlate somewhat to the use of the binder and a review of the specification shows that this mixture formed by the binder and powder is typically cured, but no details regarding the curing step are given. Thus, maintains Kinik, one of ordinary skill in the art, even if he could quantify the "softness" or other characteristics of the binder-powder mixture, would not be able to assess the characteristics of the "cured mixture." Kinik contends that the only guidance the specification could provide with respect to the meaning of "soft," "easily deformable" and "flexible" as applied to a preform is that the binder content in the preform is what is important, but the usage of these terms in the specification otherwise does not shed any light on the plain meaning of the terms. Id. at 73-74.

Kinik notes that aside from using the term "flexible" or "flexibility" to describe both the invention and the prior art, the term is used in the specification only two times. Kinik contends that the only guidance the specification provides in these instances is that flexibility is desired in the final SEDF preform, and that a binder composition should be selected to provide integrity and flexibility to the final preform. Again, maintains Kinik, these usages in the specification do not clarify what "flexible" means in the context of the patent specification. Kinik similarly contends that while the term "deformable" or "deformability" is used a total of five times in the entire patent (outside of the claim term at issue), there is no discussion of "easy" deformability nor any other clarifications of how much force is applied in order to "deform" the preform. Id. at 74.

Kinik maintains that although 3M has alleged that the patent's "SEDF" preform can simply be contrasted with green compacts, which are "hard, brittle and stiff," this is an oversimplification. Kinik contends that 3M fails to recognize that green compacts can be made using some amount of binder when they make their sweeping statement. Kinik contends that 3M has admitted that green compacts can be made with some amount of binder and because the presence of binder tends to give a preform more "flexibility," it is logical that these green compacts have some degree of flexibility. However, maintains Kinik, the patent specification has not distinguished what amount of softness, deformability or flexibility the "SEDF" preforms of the claims have as compared to the green compacts made with some binder. Id. at 74-75.

Lastly, Kinik contends that the prosecution history does not provide any additional insight into what is meant by a "SEDF"preform. In sum, Kinik maintains that because the plain meaning of the claim phrase taken in conjunction with the specification and prosecution history would not permit one of skill in the art to discern where the line is between what is a "SEDF" preform and what is not, the claim is indefinite in violation of § 112, ¶ 2. Id.

COMMISSION INVESTIGATIVE STAFF'S Position

Staff argues that the purpose of the definiteness requirement is to alert practitioners in the relevant art to the scope of the claimed invention and to give fair warning as to what constitutes infringement. Staff contends that a patentee is not required to set forth every minute detail relating to the production of its products under the patent in order to satisfy the definiteness requirement. Staff maintains that one of ordinary skill in the art, making a good faith attempt to understand claim 1, would be able to identify what the claim covered. In support, Staff notes that the specification acknowledges that soft and flexible preforms were known at the time of the invention and identifies relevant qualities of such preforms, e.g, their ability to be cut by a scissors and bent more than 90°. Moreover, contends Staff, the use of a "SEDF" preform into which abrasive particles are pressed is contrasted with the prior art "hard and brittle" green compacts. Thus, states Staff, the '489 patent teaches one of ordinary skill in the art what the invention involves: a "SEDF" preform is one that is soft enough to cut with a scissors or knife and to press abrasive particles into, deformable enough to form the desired shape of the abrasive article, and flexible enough to both assume complex shapes and withstand mechanical processing without breaking – and it is not a hard and brittle green compact. SPHB at 30-31.

Staff claims that Kinik's argument that quantification is required to save claim 1 of the '489 patent from indefiniteness has no support in logic or law. Staff maintains that because there are no known tests or quantitative standards for a preform in the relevant art, Kinik's insistence that the '489 patent provide them is not reasonable. Id. at 31-32.

Noting that Kinik's expert had no difficulty in concluding that "SEDF" preforms according to the claims of the '489 patent were disclosed in earlier publications, Staff disputes Kinik's argument that one of ordinary skill in the art could not know what preforms fall into the category of "SEDF,"Staff also notes that no witness had any difficulty in distinguishing between a "SEDF" preform of the '489 invention and a green compact of the prior art. Staff contends that although Kinik argues that green compacts could be made with some amount of binder, both the intrinsic and extrinsic evidence indicate that the presence of a processing aid does not affect the mechanism by which the compact is held together, and therefore, even the green compact with some binder or processing aid will be hard and brittle. SPHRB at 19-20.

Staff disputes Kinik's assertion that "the critical issue in assessing whether the asserted claims of the '489 patent are invalid for indefiniteness is whether the patent discloses how much physical pressure, stress or flexion is necessary to satisfy the 'soft, easily deformable and flexible preform' requirement." Staff further contends that Kinik misstates the test for indefiniteness and argues that the test for definiteness under §112 is whether one of ordinary skill in the art would understand the bounds of the claim when read in light of the specification. Id. at 20.

Lastly, Staff claims that Kinik's reliance on Williamson's assertion that persons of ordinary skill may differ in their interpretation of "soft, easily deformable and flexible," making the term indefinite is misplaced because the Federal Circuit has dismissed such an argument. In sum, Staff maintains that the '489 patent, including the language of claim 1

when read in conjunction with the specification and drawings, and in light of the level of ordinary skill in the art (a person with at least one year of experience in the relevant industry and a Bachelor's degree in a related science filed) is adequately definite with respect to the claim term "SEDF" preform. Staff concludes that when the appropriate test for indefiniteness is applied, the substantial weight of the evidence, both intrinsic and extrinsic, supports the definiteness and validity of the '489 patent claims, and thus, Kinik has not shown by clear and convincing evidence that the asserted claims of the '489 patent are indefinite in violation of 35 U.S.C. §112. Id. at 21.

Discussion, Analysis, and Conclusion

Kinik recognizes that all patents are presumed valid by law, 35 U.S.C. § 282 (1984), and a party asserting invalidity bears the burden of showing invalidity by clear and convincing evidence. See Checkpoint Sys., Inc. v United States Int'l Trade Comm'n, 54 F.3d 756, 761 (Fed. Cir. 1995); Texas Instruments, Inc. v. United States Int'l Trade Comm'n, 988 F.2d 1165, 1177 (Fed. Cir. 1993). Nevertheless, Kinik argues that claim 1 and its dependent claims[51] are invalid in violation of 35 U.S.C. § 112 ¶ 2, which requires that a patent specification conclude "with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention."[52]

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[51]Each claim of a patent, whether independent or dependent, "carries an independent presumption of validity, 35 U.S.C. § 282, and stands or falls independent of the other claims." Continental Can Co. v. Monsanto Co., 948 F.2d 1264, 1266-67 (Fed. Cir.1991). Kinik argues that because the claim phrase "SEDF" in independent claim 1 is indefinite, the claims that depend from it, which add nothing to remedy the indefiniteness of the independent claim, are also indefinite. Indeed, the undersigned does not find anything in the text of dependent claims 4, 5, and 8 that addresses the specific indefiniteness issues raised by Kinik. 3M has not argued that the indefiniteness analysis for claims 4, 5 and 8 should differ from that of claim 1 for the purposes of the indefiniteness argument. Thus, although each patent claim carries an independent presumption of validity, with respect to the arguments raised by Kinik in this instance, there is nothing in dependent claims 4, 5 and 8 to require an indefiniteness analysis that differs from that applied to independent claim 1.

[52]Kinik notes that this section is referred to as the definiteness requirement. See General Elec. Co. v. Wabash Appliance Corp., 304 U.S. 364, 369 (1938). The definiteness requirement is contained in the second paragraph of section 112 of the Patent Act. As stated by the Federal Circuit in its Shatterproof Glass opinion, the second paragraph of section 112 does not stand in isolation. Rather, it is integrated into the overall requirements for a patent specification. The first and second paragraphs of section 112, referred to by the Federal Circuit, are as follows:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.
>
> The specification shall conclude with one or more claims *particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.*

(continued...)

Kinik's arguments focus on the claim phrase "SEDF" and the arguments with regard to the separate terms that comprise the phrase "SEDF" – "soft," "easily deformable" and flexible" are based on the same reasoning. Kinik argues that the definiteness inquiry focuses on whether those skilled in the art would understand the scope of the claim when the claim is read in light of the specification. KPHB at 68 (citing Union Pacific Res. Co. v. Chesapeake Energy Corp., 236 F.3d 684, 692 (Fed. Cir. 2001). Thus, according to Kinik, "the claims must have a clear and definite meaning when construed in light of the complete patent document," and that "the test for definiteness is whether one skilled in the art would understand the bounds of the claim when read in light of the specification." See Miles Laboratories, Inc. v. Shandon, Inc., 997 F.2d 870, 874-75 (Fed. Cir. 1993), cert. denied, 510 U.S. 1100 (1994)). Kinik relies on Sheller-Globe Corp. V. Milsco Mfg. Co., 206 U.S.P.Q. 42, 53-54 (E.D. Wis. 1979), aff'd in part, rev'd in part on other grounds, 636 F.2d 177 (7th Cir. 1980) for the proposition that claims must provide one of ordinary skill in the art with standard values and method of achieving desired result[53]. Kinik also notes that the Federal Circuit has recognized that indefiniteness should be considered from the perspective of a potential competitor, and that the evidence must be sufficiently precise to permit a potential competitor to determine whether he is infringing. See Morton Int'l, Inc. v. Cardinal Chem. Co., 5 F.3d 1464, 1470 (Fed. Cir. 1993). Kinik relates several Federal Circuit opinions deeming one or more claims indefinite in violation of § 112 ¶ 2. Aside from these general statements, Kinik does not set forth a standard of definiteness that must be applied to patent claims.

3M maintains that the appropriate test for definiteness is whether a claim "reasonably apprise[s] those skilled in the art" as to its scope and is "as precise as the subject matter permits." See Hybritech, Inc. v. Monoclonal Antibodies, Inc., 802 F.2d 1367 (Fed. Cir. 1986), cert. denied, 480 U.S. 947 (1987). 3M also contends that claims are not per se indefinite when expressed in qualitative terms without numerical limits. See Modine Mfg. Co. v. United States International Trade Commission, 75 F.3d 1545, 1557 (Fed. Cir. 1996) (holding that "relatively small" is not indefinite).

Staff, consistent with 3M's argument for the correct standard of definiteness, contends that the test for definiteness is whether one of ordinary skill in the art would understand the bounds of the claim when read in light of the specification. See Exxon Research and Engineering Co. v. U.S., 265 F.3d 1371, 1375 (Fed. Cir. 2001). Relying on the same decision as 3M, Staff maintains that the definiteness requirement is met if the claims read in light of the specification reasonably apprise those of ordinary skill in the art of the claimed invention. See Hybritech Inc., 802 F.2d at 1385. Staff also cites Shatterproof Glass Corp. v. Libbey-Owens Ford Co., 758 F.2d 613, 624 (Fed. Cir. 1985) (stating that the test for

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[52](...continued)
35 U.S.C. § 112, ¶¶ 1, 2 (emphasis added).

[53]Staff notes that the Sheller-Globe decision was not reviewed or affirmed by the 7th Circuit on appeal and the Federal Circuit has never cited the decision. Staff also disputes that the decision stands for the proposition put forth by Kinik. Staff contends that the decision states that "[t]he claims are indefinite because they describe the desired result but they do not teach a method of achieving it," thereby confusing indefiniteness and enablement. Sheller-Globe, 206 U.S.P.Q. at 54.

definiteness is one of reasonableness). Staff notes that patents are written by and for persons experienced in the field of the invention. See Vivid Tech, Inc. v. Am. Sci. & Eng'g, Inc., 200 F.3d 795, 804 (Fed. Cir. 1999). Staff agrees with 3M that in an indefiniteness analysis, "mathematical precision is not required – only a reasonable degree of particularity and definiteness." Exxon, 265 F.2d at 1381.

The parties agree that those skilled in the art must understand the bounds of the claim when read in light of the specification. Furthermore, a review of relevant case law reveals that it is un-controverted that patent claims must reasonably apprise those skilled in the art of the scope of the claimed invention. See In the Matter of Certain Gel-Filled Wrist Rests and Products Containing Same, USITC Inv. No. 337-TA-456, Order No. 9 at 11 (Jan. 2, 2002) (citations omitted). Although Kinik cites language stating that "claims must have a clear and definite meaning when construed in the light of the complete patent document," Miles Laboratories, 997 F.2d at 874, the Federal Circuit in that decision also stated that "[i]f the claims read in light of the specification reasonably apprise those skilled in the art of the scope of the invention, § 112 demands no more." Id. 3M seems to argue that claim language must meet a higher standard than "reasonably apprise" by being as "precise as the subject matter of the invention permits."[54] As discussed more fully in Gel-Filled Wrist Rests, at 11-17, formulation of recent case law does not contain the requirement that the claims be drafted as precisely as possible, given the subject technology. The standard adopted under this formulation is that the claims "reasonably apprise" those skilled in the art of the scope of the invention, the standard directly put forth by 3M and Staff and indirectly by Kinik. This standards leaves open the possibility that while a patentee might fail to employ the most precise language possible in a patent, the claim may nonetheless adequately, fairly, and "reasonably" inform those skilled in the art of the scope of the claimed invention. Id. at 11-12. Thus, an analysis of the validity of a patent claim need not center on minutiae of the subject art and language to determine whether by some possible manner a claim falls short of the precision possible, and therefore, is invalid. Id. at 12. "Rather, an analysis under the second paragraph of section 112 may follow a pattern more closely resembling other analyses conducted in a patent case by presuming that a claim is valid, and by determining whether that claim, in light of the specification, reasonably puts those skilled in the art on notice of the claimed invention." Id. at 12.

> Consequently, . . . the standard to determine definiteness of a claim under section 112, paragraph 2 is whether one skilled in the art would understand the bounds of the claim when read in light of the specification. In applying that standard, one should determine whether the claim language (in view of the specification) reasonably apprises those skilled in the art of the claimed invention, and thus whether the claim language is "reasonably precise," given the nature of the claimed invention and its subject technology.

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[54]The undersigned notes that the Federal Circuit decision relied upon by Kinik also contains similar language, "[t]he degree of precision necessary for adequate claims is a function of the nature of the subject matter." Miles Laboratories, Inc., 997 F.2d at 874 (citing Hybritech, 802 F.2d at 1385).

Gel-Filled Wrist Rests, at 11-17

The undersigned concludes that Kinik has failed to show by clear and convincing evidence that claim fails reasonably to apprise those skilled in the art of the claimed invention. See Gel-Filled Wrist Rests, at 18. As 3M notes, at the hearing for this investigation, both parties' expert witnesses testified as to the meaning of the terms "soft," "easily deformable" and flexible," and each witness provided essentially the same meanings for the terms. For example, 3M's witness, Strong, testified that "soft" means "you can press into." Strong Tr. at 90. Williamson, Kinik's witness, testified that something "soft" is "[s]omething which I can easily deform. If I press it, it will yield, but how hard I have to press it, how much it yields, my assessment of that might vary from day to day." Williamson Tr. at 1320. Although Williamson testified that his assessment of how hard he had to press a "soft" thing and how much it must yield to be "soft" may vary from day to day, as discussed above, patent claims do not have to be exactly precise[55]. That both parties' witnesses would provide similar definitions of the terms comprising "SEDF" evidences that claim 1 "reasonably apprises" those skilled in the art of the claimed invention.

Furthermore, contrary to Kinik's assertion that these terms are mere qualitative terms without any established point of reference, the '489 patent gives these terms, and thus the phrase "SEDF," a "reasonably precise" meaning because the patent distinguishes "SEDF" preforms taught in the patent from "hard, stiff and brittle" green compacts from the prior art based on their differences[56]. Kinik's argument that this comparison is an oversimplification because green compacts containing some amount of binder have some degree of flexibility and the patent specification does not distinguish what amount of softness, deformability, or flexibility the "SEDF" preforms have as compared to the green compacts with some binder is faulty. That some green compacts containing binder may have some degree of flexibility is irrelevant as the '489 patent specifically distinguishes "SEDF" preforms from "hard, stiff and brittle" green compacts, whether they are made with or without binder. As 3M explains, further quantification, i.e. specifying exactly how much more softness, deformability, or flexibility "SEDF" preforms exhibit than green compacts, is not legally required and would unfairly limit the scope of the invention. The invention contemplates a wide variety of powders and liquid binders for a wide variety of abrasive articles. Thus, requiring the patent to specify specific softness, deformability or flexibility quotas would unduly limit the claim. Even if Kinik could show that there exists a determinable set of powders and liquid binders that can be used to form "SEDF" preforms, and thus, a determinable quota for softness, deformability and flexibility, the law does not require such preciseness. Exxon, 265 F.3d at 1375.

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[55]With regard to the term "easily deformable," Strong testified that the term means "you can press into it and it somewhat holds the shape that it had, because 'deform' means to change its shape." Strong Tr. at 90. Williamson similarly testified that "easily deformable" means that "its shape could be changed by the application of a relatively small amount of force." Williamson Tr. at 320. With regard to the term "flexible," Strong testified that the term means "that you can bend it repeatedly and not have it break." Strong Tr. at 94. Williamson similarly testified that "flexible" means that "it can be bent without breaking." Williamson Tr. at 1321.

[56]The undersigned notes that the distinguishing characteristics of a "SEDF" preform are discussed in the claim construction section of this Initial Determination.

In addition, Kinik's argument that the claims are indefinite because the '489 patent does not identify the quantifiable characteristics a material must have to be a "SEDF" preform as opposed to a material that is not a "SEDF" preform[57] fails because such quantification or mathematical precision is not required under the law. See Exxon, 265 F.2d at 1381 (stating that mathematical precision is not required, only a reasonable degree of particularity and definiteness); Modine Mfg. Co., 75 F.3d at 1557 (stating mathematical precision should not be imposed for its own sake because patentee has right to claim invention in terms understood by persons of ordinary skill in art). Likewise, the patent need not specify how much physical pressure, stress or flexion is necessary to satisfy the "SEDF" preform requirement. Again, such precision is unnecessary and, in this instance, would have unduly limited the invention. Id. Lastly, Kinik's argument that the patentee could have acted as his own lexicographer and specifically defined the phrase "SEDF" or the individual components of the phrase but failed to do so relates to a claim construction analysis rather than a definiteness requirement analysis. In addition, Kinik's argument that the specification teaches that the mixture formed by the binder and powder is typically cured but no details regarding the curing step are given is more aptly an enablement challenge, not an issue here.

Accordingly, when the appropriate test for indefiniteness is applied, the undersigned concludes that the claim phrase "SEDF" is not indefinite.

Issue V.B: Whether the asserted claims of the '489 patent are invalid as obvious under 35 U.S.C. section 103 in view of the prior art?

COMPLAINANT'S Position

3M maintains that Kinik's obviousness arguments reflect impermissible 20/20 hindsight. 3M argues that although Williamson asserts that many prior art patents render the '489 patent obvious, neither he nor Kinik could find a single patent, journal article, or document from any source that even arguably discloses all of the steps recited in claim 1 of the '489 patent. According to 3M, Kinik has "stitch[ed] together far-flung pieces of prior art using the '489 patent as a blueprint," which is not "clear and convincing" evidence that the invention was obvious at the time it was conceived, particularly considering many of the references relied upon by Kinik had been considered by the Examiner before she granted the '489 patent. 3MPHRB at 44-49.

3M notes that to prove a claim invalid for obviousness, Kinik must show by clear and convincing evidence that the differences between the claimed invention as a whole and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art. 3M contends that this inquiry requires the Judge to make factual determinations about the scope and content of the prior art, the level of ordinary skill in the art, the differences between the claimed invention and the prior art; and objective secondary considerations of nonobviousness. 3M emphasizes that in deciding whether a patent claim is obvious, a court must take special care to avoid using hindsight. 3M also notes that the prior art itself must provide some suggestion, motivation,

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[57]Kinik states that the patentee could have identified tests that could be used to measure hardness, softness or flexibility. KPHB at 70.

or teaching for combining known components. 3M contends that the suggestion, motivation, or teaching to combine cannot come from the '489 patent itself, as that would constitute impermissibly using the inventor's teaching as a blueprint to render the invention obvious. Id. at 45-47.

3M asserts that it would not have been obvious to combine the references relied on by Williamson at the time of the invention of the '489 patent. According to 3M, none of the references cited by Williamson contains a teaching, motivation, or suggestion to be combined with other references cited by Williamson. 3M contends that Williamson could only theorize that it was "inherent [knowledge] in the art" that various references could be combined to produce that which is taught by the '489 patent. 3M argues that if it was so well known in the art to combine SEDF performs with abrasive particles and sintering, Williamson would have been successful in finding at least one patent, publication, or document describing the process or he should have been able to show that the process was used in the industry or that products made by it were known in the industry. 3M also notes that it would not have paid $1.6 million for the right to practice the claimed invention if it only recited what was inherently known in the industry. Id. at 48-54.

3M further contends that Kinik's theory of inherent obviousness is wrong because an invention cannot be considered obvious solely because it is a combination of elements that were individually known, unless there is a showing that the combination was also known at the time of the invention. According to 3M, Kinik has not shown any "clear and particular" support for combining its various references. 3M maintains that Williamson failed to provide details about how various references could be combined, or what would result from combining those references. According to 3M, he did little more than to list the references and summarily state that any of them could be combined to render the '489 patent obvious. As explained by Strong, asserts 3M, some of the combinations that Williamson proposed are physically incapable of being combined and for the rest, there is no suggestion that one skilled in the art would have known to combine them at the time the '489 invention was conceived. Id.

3M argues that a complete reading of the references or combination of references Kinik relies upon to support its contention that claims 1, 4, 5 and 8 of the '489 patent are invalid as being obvious demonstrates that none of the proposed references or combinations would render claims 1, 4, 5 and 8 obvious without the benefit of hindsight. 3M contends that for at least the reasons discussed with respect to claim 1 and the lack of additional motivation to combine, claims 4, 5 and 8 are not invalid over the references or combinations thereof relied upon by Kinik. Id. at 54.

3M also argues that secondary considerations further demonstrate the '489 patent's validity. 3M notes that the Federal Circuit has repeatedly held that objective evidence of non-obviousness, or "secondary considerations" as they are sometimes known, must be taken into account always and not just when the decision maker is in doubt. 3M further relates that "secondary considerations" include commercial success, long-felt but unresolved need, and

licensing[58]. While secondary considerations cannot control the obviousness determination, states 3M, it is legal error to ignore such objective indications of non-obviousness when they are present. Id. at 54-55.

In support of its "secondary considerations" argument, 3M notes that 3M recognized the value of the '489 patent. 3M further relates that prior to licensing the technology of the '489 patent, 3M had attempted to produce superabrasive products but was severely limited by the deficiencies of prior art green compacts. According to 3M, these deficiencies resulted in problems such as poor performance, limited life, and diamond clumping. 3M states that when Naum Tselesin, inventor of the '489 patent and related technology, approached 3M, it recognized the value of the '489 patent technology and the potential that the patent represented to revolutionize the superabrasives industry. Consequently, states 3M, it paid [ ] to obtain the right to practice the '489 patent and related know-how and this decision has proven to be well-founded. According to 3M, it was not the only superabrasives manufacturer experiencing frustration with prior art methods. 3M notes that Sung testified that he tried for a long time to find a preform that was more rigid than a slurry to hold diamonds in place, but soft enough to permit diamonds to be attached to the preform. 3M claims that soon thereafter Kinik began using a soft, easily deformable, and flexible preform identical in characteristics and almost identical in composition to the 3M preform —that taught by Naum Tselesin in the '489 patent. 3M argues that no one had been able to solve the problems presented by the prior art, notwithstanding a clear motivation to do so, until the '489 patent's process solved these problems. Id. at 56-57.

RESPONDENT'S Position

Kinik does not dispute the relevant legal standards put forth by 3M. Kinik maintains that the asserted claims of the '489 patent are invalid under § 103 because the differences between the subject matter as a whole and the prior art are such that the subject matter as a whole would have been obvious to one of ordinary skill in the art. Kinik adds that although a patent carries a presumption of validity that a challenger must overcome with clear and convincing evidence, the "clear and convincing" standard applies only to the facts underlying the obviousness determination, not the ultimate legal conclusion. Moreover, contends Kinik, where as here, the most pertinent art was not before or directly considered by the patent examiner, this presumption is more easily overcome. KPHB at 76-77.

According to Kinik, the scope of the prior art includes that reasonably pertinent to the particular problem with which the inventor was involved, and therefore, encompasses not only the field of the inventor's endeavor but also any analogous art, including those that a person of ordinary skill would reasonably have consulted and applied in seeking a solution to the problem that the inventor was attempting to solve. Kinik contends that the technology underlying a method for making abrasive articles from powdered metals relates to the

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[58]As 3M explains, the term "secondary considerations" is not meant to connote that such evidence is secondary in importance, but rather refers to the fact that such evidence typically arises from events that occur after issuance of the patent. It is therefore secondary in time, not in importance. Truswal Sys. Corp. v. Hydro-Air Eng'g., Inc., 813 F.2d 1207, 1212 (Fed. Cir. 1987); see also, Arkie Lures, Inc. v. Gene Larew Tackle, Inc., 119 F.3d 953, 957-58 (Fed. Cir. 1997).

practice of making composites or structures out of metal powders. Thus, contends Kinik, the art of abrasive articles is contained in the field of powder metallurgy, or composites manufacturing. Kinik also claims that the manufacture of abrasive articles is essentially the same art as the manufacture of wear-resistant articles. According to Kinik, persons manufacturing abrasive articles would also be manufacturing hard-facing or wear-resistant articles, as is evidenced by the plethora of patents describing articles that are used for both purposes. Kinik maintains that the art of the manufacture of wear-resistant articles is relevant to a determination of obviousness of the claims of the '489 patent. Id. at 78-79.

Kinik contends that several specific types of prior art were recognized as pre-existing in the '489 patent specification, in the Background of the Invention section, including sintered green compacts, preformed structures of metal powders and/or metal fibers, SEDF preforms, soft and flexible preforms made specifically of brazing filler metal, and combining metal powders and a liquid binder composition to form soft and flexible preforms that are sinterable. In addition, according to Kinik, sintering and brazing were both well-known processes for manufacturing abrasive articles prior to the invention of the '489 patent. Kinik further notes that brazing alloys were known to be used to attach abrasive particles to substrates prior to the invention of the '489 patent. Kinik argues that because 3M has asserted that the claims of the '489 patent are broad enough to cover methods that employ brazing, certain prior art relating to brazing becomes particularly relevant. In addition, Kinik contends that one of ordinary skill in the art also would have been familiar with the practice of combining metal powders and a liquid binder composition to form SEDF preforms that are sinterable and would have consulted this prior art when attempting to develop a flexible preform suitable for the manufacture of an abrasive article. Id. at 79-85.

Kinik contends that there is no dispute that the combination of abrasive particles and sinterable matrix materials, and then sintering the combination to form an abrasive article was known in the art prior to the claimed invention. Kinik also contends that it is not disputed that soft and flexible preforms that had a high binder content were known in the art of manufacturing wear-resistant articles. Id.

Kinik argues that even though the Applicant expressly recognized the existence and relevance of art utilizing soft and flexible preforms of brazing alloy material, the Applicant did not provide the Examiner with any such known references. Instead, contends Kinik, the Applicant provided the Examiner primarily with art that related only to the manufacture of abrasive articles. Id.

Kinik notes that Applicant's invention is directed to the particular combination of elements that admittedly were known in the art: (a) use of soft and flexible preforms; (b) including abrasive particles; and (c) sintering to form said abrasive article, and that in two separate places in the specification Applicant states that to the best of his knowledge there was no art relating to the use of soft and flexible preforms in articles that had abrasive particles. Kinik argues that in direct contradiction to Applicant's statements, at least two references that were not before the Examiner disclose the use of abrasive particles in flexible preforms made of a mixture of liquid binder and metal powder. Kinik also argues that this Applicant's statements are contradicted by the fact that soft and flexible preforms made of brazing filler metal that contained tungsten carbide abrasive particles, known to be hard, abrasive particles, were known in the art prior to the invention of the '489 patent. According

to Kinik, the prior art confirms that one of ordinary skill in the art knew to include abrasive particles, specifically, tungsten carbide particles, in flexible preforms. Id.

Kinik maintains that several combinations of references exist that invalidate the '449 patent due to obviousness, including: (1) U.S. Patent No. 4,228,214 ("the Steigelman patent") alone; (2) the Steigelman patent combined with U.S. Patent No. 4,925,457 ("the deKok patent") or U.S. Patent No. 5,049,165 ("the Tselesin '165 patent"); (3) the Steigelman patent combined with U.S. Patent No. 4,678,717 ("the Nickola patent") or U.S. Patent No. 3,653,884 ("the Davies '884 patent"), and (4) the deKok patent combined with the Nickola patent. Id. at 85-90.

Kinik maintains that claim 4, 5, and 8 are obvious in light of the prior art because the limitations taught in those claims were well known within the art. Thus, contends Kinik, prior art in combination with the combinations of the prior art that invalidate claim 1 would also render claim 4, 5, and 8 of the '489 patent invalid for obviousness. Id. at 90-91.

COMMISSION INVESTIGATIVE STAFF'S Position

Staff generally agrees with the legal standards for non-obviousness put forth by 3M and Kinik. Staff notes that in order to prove obviousness, the patent challenger must demonstrate, by clear and convincing evidence, that there is a reason, suggestion, or motivation in the prior art that would lead of ordinary skill in the art to combine the references, and that would also suggest a reasonable likelihood of success. Staff also point out that while the references need not expressly teach that the disclosures contained therein should be combined with another, the showing of combinability must be clear and particular. With regard to "secondary considerations," Staff contends that a court must consider all of the the evidence supporting the secondary considerations before reaching a decision on obviousness. SPHB at 33-35.

Staff maintains that Kinik has not identified a single piece of evidence showing a motivation to combine any of the references and relies instead on the conclusory testimony of its expert witness[59]. Staff contends that the sheer volume of prior art references Kink has asserted against the '489 patent, none of which is argued to be anticipatory, suggests instead that the '489 patent was nonobvious at the time of the invention. Id at 36.

Staff contends that Kinik's statements with regard to the scope and content of the prior art rely exclusively on the testimony of Williamson, who testified that the same people that make abrasive articles also make wear-resistant or hard facing articles. Staff notes that despite Kinik's assertion that multiple witnesses of "at least ordinary skill in the art" testified at the hearing, Kinik did not attempt to substantiate Williamson's views by eliciting testimony from any such witnesses. Nevertheless, contends Staff, even assuming arguendo that Kinik's asserted "scope and content of the prior art" is correct, the differences between

[59]According to Staff, it is still not clear, even after the hearing, which are the primary combinations of prior art references upon which Kinik is relying to invalidate the '489 patent. The undersigned agrees that although Kinik referred to other allegedly invalidating prior art references, Kinik specifically discussed only four combinations of references.

the claims and the prior art are such that the prior art does not render the subject matter obvious to one of ordinary skill in the art at the time of the invention. SPHRB at 21-22.

Staff disputes Kinik's arguments that the prior art, in any combination put forth by Kinik, renders obvious the asserted claims of the '489 patent or that there was motivation in the art to make the particular combination of elements. Id. at 23-28.

Discussion, Analysis, and Conclusion

Under 35 U.S.C. § 103(a), a patent is valid unless "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." The ultimate question of obviousness is a question of law, but "it is well understood that there are factual issues underlying the ultimate obviousness decision." Richardson-Vicks Inc., 122 F.3d at 1479; Wang Laboratories, Inc. v. Toshiba Corp., 993 F.2d 858, 863 (Fed. Cir. 1993).

Once claims have been properly construed, "[t]he second step in an obviousness inquiry is to determine whether the claimed invention would have been obvious as a legal matter, based on underlying factual inquiries including: (1) the scope and content of the prior art, (2) the level of ordinary skill in the art, (3) the differences between the claimed invention and the prior art ; and (4) secondary considerations of non-obviousness." Smiths Industries Medical Systems, Inc. v. Vital Signs, Inc., 183 F.3d 1347, 1354 (Fed. Cir. 1999) (citing Graham v. John Deere Co., 383 U.S. 1, 17 (1966)).

In order to prove obviousness, the patent challenger must demonstrate, by clear and convincing evidence, that "there is a reason, suggestion, or motivation in the prior art that would lead one of ordinary skill in the art to combine the references, and that would also suggest a reasonable likelihood of success." Smiths Industries, 183 F.3d at 1356; also see United States Surgical Corporation v. Ethicon, Inc., 103 F.3d 1554, 1564 (Fed. Cir. 1997), cert. denied, 522 U.S. 950 (1997); Certain Integrated Circuit Telecommunication Chips and Products Containing Same, Including Dialing Apparatus, Inv. No. 337-TA-337, Commission Opinion at 18 (August 3, 1993). When an obviousness determination relies on the combination of two or more references, "[t]he suggestion to combine may be found in explicit or implicit teachings within the references themselves, from the ordinary knowledge of those skilled in the art, or from the nature of the problem to be solved . . . the question is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination." WMS Gaming, Inc. v. International Game Technology, 184 F.3d 1339, 1355 (Fed. Cir. 1999).

"Secondary considerations,"also referred to as "objective evidence of non-obviousness," such as "commercial success, long felt but unsolved needs, failure of others, etc." may be used to understand the origin of the subject matter at issue, and may be relevant as indicia of obviousness or non-obviousness. Graham, 383 U.S. at 17-18. Secondary considerations may also include copying by others, prior art teaching away, and professional acclaim. See Perkin-Elmer Corp. v. Computervision Corp., 732 F.2d 888, 894 (Fed. Cir.), cert. denied, 469 U.S. 857 (1984); Avia Group Intel, Inc. v. L.A. Gear California, 853 F.2d 1557, 1564 (Fed. Cir. 1988) (copying by others); In re Hedges, 783 F.2d 1038, 1041 (Fed.

Cir. 1986) (prior art teaching away; invention contrary to accepted wisdom); Kloster Speedsteel AB v. Crucible Inc., 793 F.2d 1565 (Fed. Cir. 1986), cert. denied, 479 U.S. 1034 (1987) (wide acceptance and recognition of the invention).

Evidence of "secondary considerations" must be considered in evaluating the obviousness of a claimed invention, but the existence of such evidence does not control the obviousness determination. A court must consider all of the evidence under the Graham factors before reaching a decision on obviousness. Richardson-Vicks Inc., 122 F.3d at 1483-84. In order to accord objective evidence substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention, and a prima facie case is generally made out "when the patentee shows both that there is commercial success, and that the thing (product or method) that is commercially successful is the invention disclosed and claimed in the patent." In re GPAC Inc., 57 F.3d 1573, 1580 (Fed. Cir. 1995); Demaco Corp. v. F. Von Langsdorff Licensing Ltd., 851 F.2d 1387, 1392 (Fed. Cir.), cert. denied, 488 U.S. 956 (1988) ("Demaco"); Certain Crystalline Cefadroxil Monohydrate, 15 U.S.P.Q.2d 1263, 1270 (U.S.I.T.C. 1990). Once the patentee has made a prima facie case of nexus, the burden shifts to the challenger to show that the commercial success was caused by "extraneous factors other than the patented invention, such as advertising, superior workmanship, etc." Id. at 1393.

The undersigned concludes that Kinik has failed to show by clear and convincing evidence that the differences between the subject matter of the asserted claims of the '489 patent and the prior art is such that the subject matter as a whole would have obvious at the time the invention was made to one having ordinary skill in the art. As Staff posits, even accepting Kinik's asserted "scope and content of the prior art" is correct, the differences between the prior art and the asserted claims are such that the prior art does not render the subject matter obvious.

Kinik claims that several invalidating combinations of prior art references exist. First, Kinik claims that the Steigelman patent alone invalidates claim 1 of the '489 patent. According to Kinik, the Steigelman patent discloses a flexible bilayered sheet consisting of a layer of brazing alloy particles dispersed in a liquid binder cast over a layer of abrasive particles dispersed within the same binder, and then brazing to form a single composite sheet. However, as Staff notes, Kinik does not offer an explanation as to why it would be obvious to one of ordinary skill in the art to replace brazing with sintering, especially in view of Kinik's efforts to distinguish brazing and sintering during its claim construction arguments for the term "sintering." Although Kinik asserts that 3M proposes that the claims of the '489 patent are broad enough to cover methods that employ brazing making certain prior art relating to brazing processes relevant, the obviousness analysis should focus on the subject matter of the asserted claims and the prior art, not on unclaimed additional steps that may be taken in accused processes. Kinik further argues that the Steigelman patent makes obvious putting the the abrasive particles in the binder/powder layer, as opposed to a separate layer of binder, because the same binder is used for both layers and there is no need to provide separate layers. As Staff point out, however, Kinik's conclusion does not account for the fact that every disclosure and every claim of the Steigelman patent relates solely to a bilayer and it has not been shown that anyone in the art combined these two layers between the issuance of the Steigelman patent and the patent application leading to the '489 patent. That the two layers in Steigelman's bilayered sheet can be formed from the same binder has no bearing

on whether a person of ordinary skill in the art would have been motivated to include abrasive particles in the layer containing a binder and matrix metal or alloy particles. Kinik has not shown that a person of ordinary skill in the art would have anticipated a reasonable likelihood of success from combining the bilayers into a single layer by putting the abrasive particles in the layer containing a binder and matrix metal or alloy particles. Lastly, the undersigned disagrees with Kinik's claim that the Steigelman patent "discloses brazing the preform to form the hardfacing article," which would be considered an abrasive article, and agrees with Staff's characterization that the Steigelman patent teaches producing a "coating that must be supported by a substrate" because the bilayer tape or sheet is brazed onto the substrate. RX-147(3:27-36). Therefore, the undersigned concludes that Kinik fails to show by clear and convincing evidence that the Steigelman patent renders obvious claim 1 of the '489 patent.

Kinik next contends that the deKok patent or the Tselesin '165 patent[60] in combination with the Steigelman patent invalidates claim 1 of the '489 patent. According to Kinik, the deKok patent discloses the use of a flexible preform that has abrasive particles urged into it. Although Kinik admits that the deKok patent does not disclose the use of a liquid binder to make the flexible preform, Kinik contends that one of ordinary skill in the art with the deKok patent would have known that other preforms, including those made with a liquid binder, were available in the art. Kinik again claims that the one of ordinary skill in the art with the Steigelman patent would have known that sintering could also be used to form abrasive articles, and adds that the deKok patent suggests that brazing is as suitable as sintering for forming abrasive articles. The undersigned finds that a review of the cited passage from deKok does not make obvious that brazing is as suitable as sintering. Rather, as Staff notes, the passage relied upon by Kinik teaches that one can attach an already flexible sintered abrasive material to a metal plate by "welding, brazing or other known means." RX-117 (deKok patent) (3:60-4:3). The undersigned agrees with Staff and finds this teaching to be consistent with the knowledge that brazing can be used to join two surfaces and does not make obvious that brazing can be used in lieu of sintering the abrasive particles in the metal matrix. In addition, as discussed above with regard to the Steigelman patent alone, the combination of the deKok patent with the Steigelman patent does not account for the bilayer limitation in the Steigelman patent. Lastly, Kinik fails to show by clear and convincing evidence that there is a suggestion or motivation in the prior art that would lead one of ordinary skill in the art to combine the Steigelman and deKok patents and that would also suggest a reasonable likelihood of success from combining the references. See Heidelberger Druckmaschinen AG v. Hantscho Commercial Prods., Inc., 21 F.3d 1068, 1073 (Fed. Cir. 1994) (stating that "[w]hen the patented invention is made by combining known components to achieve a new system, the prior art must provide a suggestion or motivation to make such a combination"). Kinik argues that one of ordinary skill in the art would have been motivated to combine the Steigelman and deKok patents because they both form articles having abrasive particles in the preform rather than in a separate layer. Although the undersigned finds that the deKok patent teaches a method for making a flexible "abrasive tool," which is arguably similar to an "abrasive article," as defined by the parties in this investigation, the Steigelman patent teaches a method for making articles more akin to

[60]The undersigned notes that Kinik does not discuss or present any facts with regard to the combination of the Steigelman and Tselesin '165 patents.

abrasive "coatings." Id; RX-147 (Steigelman patent). Thus, the undersigned concludes that without the benefit of hindsight the suggestion or motivation to combine these references is not clear and convincing. Therefore, the undersigned concludes that Kinik fails to show by clear and convincing evidence that the combination of the Steigelman and deKok patents renders obvious claim 1 of the '489 patent.

Kinik also argues that the combination of the Steigelman and Nickola patents invalidates claim 1 of the '489 patent. According to Kinik, the Steigelman patent teaches that abrasive particles tend to enhance the hardness and wear resistance of the resulting coating. Thus, Kinik argues, one of ordinary skill in the art would have been motivated to add abrasive particles to existing coating to enhance their hardness or wear resistance to make an abrasiave article. Kinik notes that among the existing coatings in the art without abrasive particles is the Ninckola patent, which discloses the use of a flexible preform to manufacture hardfaced articles. Although Kinik argues that the Nickola patent discloses sintering the preform to form the article, the passage cited by Kinik teaches exposing the coating on a metal substrate "to varying amounts of heat and processing conditions which produce a wide range of coating compositions and surface properties." RX-149(1:7-17). The undersigned finds that this teaching does not make obvious "sintering" the preform to make the abrasive article. The undersigned also agrees with Staff that the Nickola patent does not teach that the coating disclosed is a preform, i.e., the initial fabrication of a shape, as taught by the '489 patent. See Id. (3:18-31). In addition, this combination of references is afflicted with the same Steigelman bilayer limitation and the limitation that abrasive particles must be placed in the base layer of the bilayered sheet as discussed in relation to the above two combination. Lastly, Kinik fails to show by clear and convincing evidence that there is a suggestion or motivation in the prior art that would lead one of ordinary skill in the art to combine the Steigelman and Nickola patents and that suggests a reasonable likelihood of success from combining the references to make a sintered SEDF preform containing abrasive particles. See Heidelberger Druckmaschinen, 21 F.3d at 1073. Both the Steigelman and Nickola patents teach methods for making a coating. RX-147 (1:14-16) ("composite coating"); RX-149 (1:7-10) ("protective coating"). Also, the Steigelman patent teaches the inclusion of abrasive particles with a flexible sheet and not including a plurality of abrasive particles at least partially in a SEDF preform. Thus, as Staff explains, the expected result of combining these two coating patents would be an improved coating not an abrasive article formed by a sintered SEDF preform containing abrasive particles. Therefore, the undersigned concludes that Kinik fails to show by clear and convincing evidence that the combination of the Steigelman and Nickola patents renders obvious claim 1 of the '489 patent.

Kinik's last combination of references that allegedly invalidates claim 1 of the '489 patent combines the deKok and Nickola patents. According to Kinik, the deKok patent discloses the use of a flexible preform with abrasive particles in its surface and sintering to generate an abrasive article. Kinik contends that one of ordinary skill in the art with the deKok patent would have known that other preforms, including those made with a liquid binder such as the Nickola patent were available in the art. However, as Staff explains, the deKok patent refers to a preformed structures of metal powders or metal fibers, whereas the Nickola patent does not teach that the coating referred to in that patent takes on an initial shape, such that it would be considered a preform or preformed structure. Lastly, Kinik fails to show by clear and convincing evidence that there is a suggestion or motivation in the prior

art that would lead one of ordinary skill in the art to combine the deKok and Nickola patents and that suggests a reasonable likelihood of success from combining the references to make a sintered SEDF preform containing abrasive particles. See Heidelberger Druckmaschinen, 21 F.3d at 1073. As 3M explains, the deKok patent, which teaches a method for making an abrasive tool, does not suggest that a flexible carrier including a binder, as taught by Nickola, can be used to prepare an abrasive tool. Thus, without the benefit of hindsight, a person of ordinary skill in the art would not have any motivation to look to Nickola for a preform to use in manufacturing an abrasive tool as taught in deKok. Similarly, the Nickola patent does not contemplate forming an abrasive tool as taught by deKok. Therefore, the undersigned concludes that Kinik fails to show by clear and convincing evidence that the combination of the deKok and Nickola patents renders obvious claim 1 of the '489 patent.

Kinik argues that combining the deKok patent with any of the combination of references discussed above in connection with the analysis of claim invalidates dependent claims 4, 5 and 8 for obviousness. Because of the reasons discussed with respect to claim 1 and the lack of additional motivation to combine, claims 4, 5 and 8 are not invalidated due to obviousness by any of the combination of references asserted by Kinik.

The undersigned concludes that objective evidence of secondary considerations also supports a conclusion that the asserted claims were not obvious in light of the prior art. 3M recognized the value of the '489 patent technology and the potential it represented to revolutionize the superabrasives industry. 3M was not the only susperabrasive manufacturer experiencing frustration with prior art methods. See Sung Tr. at 1047-48. As 3M notes, the state of the art in the superabrasives industry at the time of the invention of the '489 patent was to use hard, stiff, and brittle green compacts, which caused manufacturing process difficulties and often lead to health and environmental concerns. Visser Tr. at 513-14, 544-45. In addition, products manufactured using prior art green compacts were typically inferior, experiencing poor diamond retention and limited lifetime. Id. The '489 patent's process solved these problems. Consequently, 3M paid [ ] to obtain the right to practice the '489 patent and its related know-how. Visser Tr. at 505:18-22; CX-41. According to 3M, this decision has proven to be well-founded because this year alone, 3M expects to sell in excess [ ] worth of pad conditioners manufactured using the patented '489 technology. Visser Tr. at 512:9-13; CX-53.

Accordingly, the undersigned concludes that the the asserted claims of the '489 patent are not invalid as obvious under 35 U.S.C. section 103 in view of the prior art.

Issue VI: Domestic Industry

In a patent-based complaint, a violation of Section 337 can be found "only if an industry in the United States, relating to the articles protected by the patent . . . concerned, exists or is in the process of being established." 19 U.S.C. § 1337(a)(2). This "domestic industry requirement" has an "economic" prong and a "technical" prong.

Issue VI.A: Economic Prong: Whether an industry relating to articles made by a process covered by one or more claims of the '489 patent exists in the United States?

Discussion, Analysis, and Conclusion

Section 337(a)(3) sets forth the following economic criteria for determining the existence of a domestic industry in investigations based on patent infringement:

> an industry in the United States shall be considered to exist if there is in the United States, with respect to the articles protected by the . . . patent . . . concerned --
>
> (A) significant investment in plant and equipment;
>
> (B) significant employment of labor or capital; or
>
> (C) substantial investment in its exploitation, including engineering, research and development, or licensing.

19 U.S.C. § 1337(a)(3). The existence of a domestic industry is measured at the time the complaint is filed. Bally/Midway Mfg. Co. v. U.S. Int'l Trade Comm., 714 F.2d 1117, 1122 (Fed. Cir. 1983).

On August 8, 2001, the undersigned issued an Initial Determination, Order No. 19, granting 3M's motion for a summary determination that 3M had satisfied its burden of proof regarding the "economic" prong of the domestic industry requirement. By notice issued on August 8, 2001, the Commission determined not to review that Initial Determination; as a result, the Initial Determination became a determination of the Commission pursuant to 19 C.F.R. § 210.42(h)(3).

Issue VI.B: Technical Prong: Whether an industry relating to articles made by a process covered by one or more claims of the '489 patent exists in the United States?

Discussion, Analysis, and Conclusion

In addition to meeting the economic criteria of the domestic industry requirement, a complainant in a patent-based Section 337 investigation must also demonstrate that it is practicing or exploiting the patents at issue. See 19 U.S.C. § 1337(a)(2) and (3); also see Certain Microsphere Adhesives, Process for Making Same, and Products Containing Same, Including Self-Stick Repositionable Notes, Inv. No. 337-TA-366, Commission Opinion at 8 (December 15, 1995) ("Microsphere Adhesives"), aff'd sub nom. Minnesota Mining & Manufacturing Co. v. U.S. Intel. Trade Comm., 91 F.3d 171 (Fed. Cir. 1996) (Table); Certain Plastic Encapsulated Integrated Circuits, Components Thereof, and Products Containing

Same, Inv. No. 337-TA-315, Commission Opinion at 16 (March 24, 1992). In order to find the existence of a domestic industry exploiting a patent at issue, it is sufficient to show that the domestic industry practices any claim of that patent, not necessarily an asserted claim of that patent. Microsphere Adhesives, Commission Opinion at 7-16. Fulfillment of this so-called "technical prong" of the domestic industry requirement is not determined by a rigid formula, but rather by the articles of commerce and the realities of the marketplace. Certain Diltiazem Hydrochloride and Diltiazem Preparations, Inv. No. 337-TA-349, Initial Determination at 138 (Feb. 1, 1995) (unreviewed in relevant part); Certain Double-Sided Floppy Disk Drives and Components Thereof, Inv. No. 337-TA-215, 227 U.S.P.Q. 982, 989 (Commission Opinion 1985).

The test for claim coverage for the purposes of the technical prong of the domestic industry requirement is the same as that for infringement. Certain Doxorubicin and Preparations Containing Same, Inv. No. 337-TA-300, Initial Determination at 109 (May 21, 1990), aff'd, Views of the Commission at 22 (October 31, 1990). "First, the claims of the patent are construed. Second, the complainant's article or process is examined to determine whether it falls within the scope of the claims." Id. As with infringement, the first step of claim construction is a question of law, whereas the second step of comparing the article to the claims is a factual determination. Markman, supra, 52 F.3d at 976. To prevail, the patentee must establish by a preponderance of the evidence that the domestic product practices one or more claims of the patent either literally or under the doctrine of equivalents. See Bayer, supra, 212 F.3d at 1247.

During closing arguments in this investigation, counsel for Kinik stated that whether or not a domestic industry has been established by the evidence is not an issue in this investigation and that Kinik does not dispute the existence of a domestic industry. Closing Argument Tr. at 1906: 8-16. Accordingly, the undersigned finds that 3M has satisfied the domestic industry requirement set forth in § 337(a)(2) and (3).

FINDINGS OF FACT

FF 1. The United States Patent and Trademark Office ("PTO") issued U.S. Patent No. 5,620,489 ("the '489 patent) to UAS on April 15, 1997. CX-1; CX-2.

FF 2. UAS engages in the development and exploitation of intellectual property rights relating to powder metal and other technologies. *See* Complaint.

FF 3. All of Kinik's DiaGrid products are manufactured in Taiwan. CX-391; CX-60; RX-27; RX-50; RFA 1, 2, 3, 4, 5.

FF 4. Kinik maintains an inventory of products at Rodel's Phoenix, Arizona facility. CX-373 C; CX-375 C.

FF 5. The Kinik-Rodel relationship is spelled out in a License Agreement, CX-380 C, a Market Channel and Supply Agreement, CX-381 C, and a Joint Development Agreement, CX-382 C.

FF 6. Kinik imports, sells for importation, or sells within the United States after importation, DiaGrid abrasive articles made in Taiwan using the DiaGrid process. *See* Respondent Kinik Company's Prehearing Statement, at 16, Stipulation No. 5.

FF 7. The art relevant to this case is the art of making abrasive articles. Strong Tr. at 151.

FF 8. Adopted in Joint Stipulated Proposed Findings of Fact.

FF 9. The preamble to claim 1 recites a known process for manufacturing abrasive articles: combining abrasive particles and a powdered sinterable matrix material, and then sintering the combination The preamble further states that the steps of combining abrasive particles and matrix material and then sintering are done in order "to form the article." CX-1, 16:40.

FF 10. A person of ordinary skill in the art would understand the prior art process identified in the preamble of claim to be a process that includes making a hard, stiff and brittle structure known as a "green compact" by subjecting a combination of powdered sinterable matrix material and abrasive particles to pressure, and then sintering the green compact in order "to form the article." Strong Tr. at 80:3-15; *see also* CX-1, col. 1:18-29.

FF 11. A small amount of binder, glue, wax or oil is sometimes added to a green compact to serve as a lubricant and help the metal particles being formed into a green compact "slide into position." Strong Tr. at 81:6-9.

FF 12. The binder, glue, wax, or oil that is sometimes added to a green compact before compacting is insufficient to be the holding material, and the mechanical interlocking

of the green compact particles themselves hold the green compact together. Strong Tr. at 80:3-23; CX-1, col. 2:11-19.

FF 13. Green compacts made only of metal powder are hard, stiff, and brittle. CX-1, col. 1:18-29; Strong Tr. at 152.

FF 14. Since the mechanism that holds a green compact together is the mechanical interlocking of the particles, green compacts crumble if pressure or bending disrupts this interlocking. Strong Tr. at 82:23-83:2.

FF 15. Diamonds or other abrasive particles had to be mixed with the powdered sinterable matrix material before the green compact was formed. Strong Tr. at 83:18-20.

FF 16. The green compact's hard, brittle and stiff nature made it difficult to fit the green compact to complex curved surfaces. Strong Tr. at 83:12.

FF 17. If a green compact was to be mounted on a surface that was not flat, it had to be formed with the desired final shape before pressure was applied to make the green compact. Strong Tr. at 82-83.

FF 18. A person of ordinary skill in the art would understand that some brazing powders can be considered powdered sinterable matrix materials. Strong Tr. at 88:3.

FF 19. A person of ordinary skill in the art would understand that "sintering" is a thermal process for consolidating powder. Strong Tr. at 134:17-20; *see also* SX-4; SX-5; SX-6.

FF 20. During sintering, particles join or bond together to form a solid, rigid mass. Strong Tr. at 134:17-20. *See also* SX-4; SX-5; SX-6.

FF 21. The '489 patent specifically names some liquid binder compositions. CX-1, col. 5:15-26.

FF 22. The '489 patent defines "liquid binder material" functionally and by example in ways that are completely consistent with this definition. *See, e.g.,* CX-1 at 5:15-39.

FF 23. Everything in the '489 patent regarding "liquid binder composition." reinforces the definition given by Professor Strong. Strong Tr. at 85. CX-1, col. 5:15-27.

FF 24. A person of ordinary skill in the art would understand "soft" to mean "easily cut, worked, or molded" or "yielding readily to pressure or weight." Webster's II New College Dictionary; *see also* Preston Tr. at 1020:14-15.

FF 25. A person of ordinary skill in the art might look at the patent or a dictionary to define "soft." Strong Tr. at 88-90.

FF 26. Nothing in the '489 patent's specification or prosecution history suggests that a meaning different from the ordinary meaning was intended. Strong Tr. at 88-90; Preston Tr. at 1020.

FF 27. The '489 patent and its prosecution history use the plain meaning of "soft" to describe that characteristic in a preform. CX-1, cols. 7:65-8:5.

FF 28. The '489 patent and its prosecution history define "soft" by contrasting it to the "hard" green compacts in the prior art, just as a person of ordinary skill in the art would understand. Strong Tr. at 90:22-24.

FF 29. "Soft" means that a person can press something into it." Strong Tr. at 90:10.

FF 30. "Easily deformable" has the same meaning for persons of ordinary skill in the relevant art and for others. Strong Tr. at 91.

FF 31. A person of ordinary skill in the art would understand "easily deformable" to have the meaning given by the dictionary, namely, subject to having its shape altered by stress, and if you can do that easily, then it would be easily deformable. Strong Tr. at 91; Webster's II New College Dictionary; Preston Tr. at 1020; SX-1; SX-2.

FF 32. The specification of the '489 patent defines "easily deformable" by contrasting an easily deformable preform with a "brittle" prior art green compact. CX-1, col. 1:18-2:35.

FF 33. The specification of the '489 patent defines "easily deformable" based on the functions that it serves. *See, e.g.,* CX-1 at 11:11-50.

FF 34. To be easily deformable, the shape of the preform made during the "forming" step must be capable of being easily changed as other steps are taken. Strong Tr. at 91-92.

FF 35. Many of the figures in the '489 patent show the shape of the preform changing as other materials are pressed into it. CX-1, Figs. 11, 16, 17; Strong Tr. at 91-92.

FF 36. The specification of the '489 patent refers to screen wires and reticulated metal structures being used to hold the abrasive particles. CX-1, col. 8:37-39.

FF 37. A person of ordinary skill in the art would understand that "flexible" has a commonly understood meaning as "capable of being bent or flexed." Webster's II New College Dictionary; *see also* SX-1; SX-2.

FF 38. A person of ordinary skill in the art would understand "flexible" to mean that something can be bent without breaking. Strong Tr. at 94; Preston Tr. at 1020; Williamson Tr. at 1321:20-21.

FF 39. A key indicator of flexibility of an object is that it can be stretched. Strong Tr. at 94.

FF 40. Nothing in the specification or the prosecution history suggests that "flexible" has any different meaning from its ordinary meaning. Strong Tr. at 94; Preston Tr. at 1020.

FF 41. The '489 patent's figures show the functional characteristic of flexibility in Fig. 9, where the preform is bent by 90°, and the patent describes a flexible preform as one that "can be bent more than 90°". CX-1, col. 2:2.

FF 42. The "flexibility" of the '489 patent's preform is identified as an improvement over "stiff" prior art green compacts. CX-1, cols. 1:18-2:19.

FF 43. The phrase "soft, easily deformable, and flexible" is the sum of its parts. Although there is some overlap between the characteristics that are described, each term contributes something unique to the whole. Strong Tr. at 129.

FF 44. No combination of any two of these characteristics would fully describe all the physical and functional attributes needed from the preform formed during this step. Strong Tr. at 130-131.

FF 45. A person of ordinary skill in the art would understand "sintering" occurs when loose particles of powder metal are bonded together using heat at a temperature below its liquids with the result that the individual particles join to form a solid mass. Strong Tr. at 134, 221; German Tr. at 261; SX-6; Laraia Tr. at 900; Palmgren Tr. at 929; Preston Tr. at 1011.

FF 46. A person of ordinary skill in the art would understand that the solidus temperature is the temperature at which a metal alloy such as a single prealloyed powder first starts to melt when it is heated. German Tr. at 277-78; Laraia Tr. at 915.

FF 47. A persons of ordinary skill in the art would understand that metal particles remain completely solid at temperatures below the solidus temperature. German Tr. at 277.

FF 48. A person of ordinary skill in the art would understand that all particles are no longer loose once sintering begins. German Tr. at 277.

FF 49. A person of ordinary skill in the art would understand that once sintering begins, individual particles begin to bond. German Tr. at 277.

FF 50. A person of ordinary skill in the art would understand that sintering of a single prealloyed powder system below the solidus temperature is solid state sintering. German Tr. at 277.

FF 51. A person of ordinary skill in the art would understand that if solid state sintering is permitted to continue to an infinite time, the individual particles would fully coalesce.

German Tr. at 277.

FF 52. A person of ordinary skill in the art would understand that the necks that form between the particles during sintering bind the individual particles together and transform them into a contiguous mass. German Tr. at 279.

FF 53. A person of ordinary skill in the art would understand that "liquid phase sintering" of a single prealloyed powder system occurs if the temperature is increased above the solidus temperature but below the liquidus temperature. German Tr. at 283-84; Laraia Tr. at 915.

FF 54. A person of ordinary skill in the art would understand that metal particles begin to melt during liquid phase sintering. German Tr. at 284.

FF 55. A person of ordinary skill in the art would understand that solids and liquids are both present between the solidus and the liquidus temperatures of the original alloy of a single prealloyed powder system. German Tr. at 284.

FF 56. A person of ordinary skill in the art would understand that densification occurs during liquid phase sintering, and pores disappear to an extent . German Tr. at 285.

FF 57. The '489 patent's specification teaches processes for making final products that include post-sintering steps. *See, e.g.,* CX-1, cols. 13:55-58; 14:10-13, 40-43; 15:14-17, 43-46; 16:12-15.

FF 58. The '489 patent's specification contemplate mounting a preform on the substrate carrier, and the mounting process could include "heating" to bond the preform to the substrate. Strong Tr. at 230-31.

FF 59. A person of ordinary skill in the art would understand that claim 1 requires the performance of the three steps in claim 1 as part of a process resulting in the formation of an abrasive article. Strong Tr. at 72.

FF 60. A person of ordinary skill in the art would understand that sintering the preform does not have to be final step in the process. Strong Tr. at 72.

FF 61. "Sintering" as used in Claim 1 does not require a cooling phase. Shive Tr. 704-07, 711-12

FF 62. Transent neck growth during a continual heating process is not "sintering." CX-1

FF 63. "Sintering" said preform as used in Claim 1 requires that the sintered - together powder metal material must retain the abrasive particles at the end of the sintering step, but not against all displacement forces. CX-1 (2:66 -31); Tselesin Tr. 1209.

FF 64. Claim 1 requires a "sintered" soft, easily deformable, and flexible preform containing abrasive particles at the end of the "sintering" step. CX-1

FF 65. Professor A. Brent Strong is an expert in the art of composites and is a person having ordinary skill in the art of sintering. Strong Tr. at 69:12-24.

FF 66. U.S. Patent No. 5,620,489 entitled "Method For Making Powder Preform And Abrasive Articles Made Therefrom" issued on April 15, 1997 and has been assigned to Complainant Ultimate Abrasive Systems, L.L.C. ("UAL"). CX-1.

FF 67. Respondent Kinik Company ("Kinik") maintains a manufacturing facility at No. 64 Chung Shan Road in Taiwan. CX-391; CX-60; RX-27; RX-50; RFA 1, 2, 3, 4, 5 where it manufactures its DiaGrid products, including DiaGrid pad conditioners.

FF 68. Kinik's DiaGrid pad conditioners are all manufactured using the same DiaGrid process while the same basic process is used to make all DiaGrid® pad conditioners, different dimensional components and different finishing steps are used based on differing customer requirements. Sung Tr. at 1138:7-12, 1139:6-11.

FF 69. As they are used in the DiaGrid process, [ ]and [ ] are interchangeable. Sung Tr. at 593:17 – 594:17.

FF 70. [ ] and [ ] are both powdered sinterable metal powders. Strong Tr. at 97:22 – 98:10; Responses to Requests for Admission Nos. 13-14; CX-85; CX-86; CX-88; CX-343.

FF 71. The DiaGrid process includes [ ] Sung Tr. at 593:17 – 594:11, 594:18 – 595:6.

FF 72. The [ ] liquid binder is [ ] Strong Tr. at 112:5 – 113:3; Sung Tr. at 595:7-12

FF 73. [ ] Sung Tr. at 596:6-12; Response to Request for Admission No. 17.

FF 74. [ ] Strong Tr. at 114:9-16; Sung Tr. at 596:13-16; CPX-2A.

FF 75. [ ] which Kinik refers to

refers to as a "pull sheet." Sung Tr. at 596:5.

FF 76. During the preparation of the preform, the pull sheets of preform are [ ] CPX-2A.

FF 77. During preparation of the preform, Kinik's operators [ ] Strong Tr. at 114:17-22.

FF 78. [ ] CPX-2A; Strong Tr. at 114:25 – 115:3.

FF 79. [ ] the pull sheets of preform become thinner, wider and longer. Strong Tr. at 114:25 – 115:7.

FF 80. The pull sheets of preform [ ] and do not break when [ ] for the most part. CPX-2A.

FF 81. Almost every time a pull sheet of preform [ ] it is bent over on itself, [ ] CPX-2A

FF 82. Even when bent over on itself, the pull sheets of preform do not break for the most part. CPX-2A; Strong Tr. at 114:9-22; Sung Tr. at 597:8 – 598:2.

FF 83. The pull sheets of preform have to be supported on a rigid flat surface [ ] or they will "droop" under the force of gravity. CPX-2A; Strong Tr. at 116:23 – 117:12; Sung Tr. at 596:22 – 597:20.

FF 84. The pull sheets of preform also "droop" under the force of gravity when the thickness of the sheets are being measured using a micrometer and the sheets are not completely supported. CPX-2A; Strong Tr. at 117:2-12.

FF 85. When the desired thickness and appropriate degree of mixing are achieved, operators [ ] CPX-2A; Strong Tr. at 117:23 – 118:5, 120:11 – 121:5.

FF 86. During preparation of the preform in the DiaGrid process, [ ] CPX-2A.

FF 87. The manipulation of the sheets of preform during the DiaGrid process indicates that the preform is soft, easily deformable and flexible. CPX-2A; Strong Tr. at 114:17 – 119:5.

FF 88. After [ ] in the DiaGrid process, the preform is soft, easily deformable and flexible. CPX-2A; Strong Tr. at 118:22 – 119:5.

FF 89. Compared to a prior art hard, stiff and brittle green compact, Kinik's preform after mixing and rolling is soft, easily deformable, and flexible. Williamson Tr. at 1311:14 – 1316:10, 1321:22-25.

FF 90. As part of the DiaGrid process, Kinik forms a soft, easily deformable and flexible preform from a mixture of sinterable matrix material and a liquid binder composition [ ] CPX-2A; Strong Tr. at 118:22 – 119:5.

FF 91. When DiaGrid wire saw beads are being made, the preform conforms to the outside of a metal bead [ ] Strong Tr. at 127:25 – 128:9; Sung Tr. at 598:24 – 599:8.

FF 92. The preform is made to conform to the shape of the substrate by [ ] Sung Tr. at 598:22-23

FF 93. The assembly of the substrate with the pull sheet and the diamonds is placed into a dewaxing furnace and heated to approximately [ ] to volatilize the majority of the glue, is then cooled, and the assemblies are placed in a vacuum furnace where they undergo a prescribed heating cycle. RX-37C; RX-41C; RX-42C; RX-217C; RDX-1C; CPX-2A; *see also* RPFF 136-140.

FF 94. Kinik uses the same heating cycle to manufacture all of its various DiaGrid products. Sung Tr. at 1139:6-19.

FF 95. One of the vacuum furnaces used by the DiaGrid® process is large enough for an adult to walk into and has at least one thermocouple to measure the temperature inside the furnace. Sung Tr. at 611:18 – 612:11, 1121:22 – 1122:10.

FF 96. A sample of a production run showing the DiaGrid® vacuum furnace heating cycle admitted as CX-95, prescribes time versus temperature and time versus pressure plots, with the temperature being indicated by the orange line and pressure by the pink line. German Tr. at 298:23 – 301:17.

FF 97. During part of the DiaGrid heating cycle, the abrasive particle-laden preform attached to a substrate is placed in the vacuum furnace and the furnace is heated to [ ] German Tr. at 305:11-25.

FF 98. During this time period [ ] the glue vaporizes. German Tr. at 303:6-17, 305:11 – 306:6; Sung Tr. at 604:2-11.

FF 99. Kinik then increases the furnace temperature to [ ] German Tr. at 308:24 – 309:2; Sung Tr. at 606:5-7.

FF 100. During [ ] particles of the metal powder from which Kinik formed its preform consolidate and form "necks" there between, and the grain boundaries between the particles begin to disappear. Sung. Tr. at 606:8 – 608:2.

FF 101. During [ ] the individual metal particles of the matrix material have been converted into a "free-standing" mass. Sung Tr. at 607:9 – 608:8.

FF 102. The phenomenon that occurs at [ ] during the DiaGrid process includes necking, consolidation, and grain growth. Sung Tr. at 606:8 – 609:23.

FF 103. Professor German precisely duplicated Kinik's heating cycle up through [ ] in a vacuum furnace. German Tr. at 1391:13 – 1393:9.

FF 104. To assure precise duplication of the Kinik process, Professor German used preform samples supplied by Kinik, and placed them on an actual Kinik substrate. German Tr. at 1391:16-22, 1395:19 – 1396:6.

FF 105. The SEM examination revealed that extensive bonding between adjacent metal particles (*i.e.*, "necking") occurred at the end of [ ] German Tr. at 1394:5 – 1395:2.

FF 106. CX 393 and CDX-64 C both demonstrate solid state sintering. Strong Tr. at 1623:23 – 1624:1; German Tr. at 312:21-25.

FF 107. If the DiaGrid process is undertaken up to [ ] and then cooled, the resulting product is an article sufficient to abrade glass. German Tr. at 1397:17 – 1398:5; Strong Tr. at 1637:18 – 1638:3, 1708:10-13.

FF 108. The solidus temperature (*i.e.*, the temperature at which an alloy first starts to melt when heated) of [ ] is [ ] Sung Tr. at 594:12-13.

FF 109. The liquidus temperature of [ ] is [ ] Sung Tr. at 594:14-17.

FF 110. As Kinik heats its abrasive particle-laden preform and substrate from [ ] during the DiaGrid process, the metal particles remain solid, and solid state sintering continues. Sung Tr. at 1127:11-18; Eagar Tr. at 1796:16-17.

FF 111. During the DiaGrid process, as the temperature increases above the solidus temperature of the powdered alloy (*i.e.*, above [ ] the reported solidus temperature of [ ] partial melting of the metal powder begins to occur and the presence of a liquid phase begins to exist. German Tr. at 277:23 – 278:7; Eagar Tr. at 1796:18 – 1797:5.

FF 112. At temperatures above the solidus temperature of the matrix material in the DiaGrid process, the solid particles continue to sinter and the presence of molten metal facilitates this sintering. German Tr. at 290:5 – 291:1.

FF 113. At temperatures above the solidus temperature of the matrix material in the DiaGrid process, metallurgical necks continue to form between the metal particles of the matrix material. German Tr. at 290:5 – 291:1; Response to Request for Admission No. 34.

FF 114. At temperatures above the solidus temperature of the matrix material in the DiaGrid process, liquid phase sintering occurs. German Tr. at 290:20 – 291:1.

FF 115. Kinik's wire saw beads (CPX-22) are [ ] as they are made using the DiaGrid process. Shiue Tr. at 748:23 – 749:2.

FF 116. Sintering of Kinik's preform begins below the solidus temperature of the matrix material through the formation of metallurgical necks between particles of the metal powder and the necking continues as the temperature increases to the solidus temperature. German Tr. at 309:8-11, 311:18 – 313:19; Sung Tr. at 606:8 – 608:2; Shiue Tr. at 705:7 – 706:12; Sung Tr. at 1127:11-18; Williamson Tr. at 1294:2 – 1296:1, 1394:5 – 1395:2; Eagar Tr. at 1793:24 – 1794:15, 1796:16-17.

FF 117. Between the solidus and liquidus temperature of the matrix material, liquid begins to form and liquid phase sintering begins in the DiaGrid process. German Tr. at 290:5 – 291:1.

FF 118. Kinik sinters its preform at [ ] during the DiaGrid process. Strong Tr. at 1623:23 – 1624:1; German Tr. at 312:21-25; Sung Tr. at 606:8 – 608:2; Eagar Tr. at 1793:24 – 1794:15; Shiue Tr. at 705:7 – 706:12.

FF 119. Kinik sinters its preform from [ ] during the DiaGrid process. Sung Tr. at 1127:11-18; Eagar Tr. at 1796:16-17.

FF 120. Kinik sinters its preform from [ ] during the DiaGrid process. German Tr. at 290:5 – 291:1.

FF 121. Kinik sinters its preform to form an abrasive article during the DiaGrid process. German Tr. at 1397:17 – 1398:5; Strong Tr. at 1637:18 – 1638:3, 1708:10-13.

FF 122. In the DiaGrid process, diamond particles are forced approximately [ ] into the preform before the preform is sintered in the vacuum furnace. Sung Tr. at 600:3 – 601:3, 603:24 – 604:17.

FF 123. Kinik admits that "the diamonds are placed on one side of the pull sheet and force is applied to push them partially in the pull sheet but that they are partially protruding

from the top of the pull sheet, and this step occurs prior to assembly being placed in the vacuum furnace." Response to Complainants' Statement of Undisputed Material Fact No. 25.

FF 124. The technology of the '489 patent has provided 3M with better technology than was previously known. Hrg. Tr. at 537:9-539:15.

FF 125. The 3M process practices the "forming" step of claim 1. Hrg. Tr. at 141:9-142:4; 150:6-9; 516:2-518:13; 528:7-530:8; 535:21-536:1; CPX-1A.

FF 126. As part of its process, 3M mixes[ ] Hrg. Tr. at 524:4-528:6; CX-160 at 3M014732-734; CPX-1A.

FF 127. 3M's liquid binder composition is [ ] Hrg. Tr. at 516:11-14.

FF 128. As part of its process, 3M forms an preform that soft, easily deformable, and flexible. Hrg. Tr. at 516:2-518:13; 528:7-530:8; 535:21-536:1; CPX-25A.

FF 129. 3M's preform can be manipulated into many shapes and must be transported on a rigid carrier so that it does not droop onto the floor. Hrg. Tr. at 516:20-518:13; 529:4-530:8; CPX-1A; CPX-25A.

FF 130. During 3M's heating cycle, the preform [ ] Hrg. Tr. at 351:2-9; 534:16-24; 695:3-17.

FF 131. As part of its process, 3M performs other steps including forming the abrasive article. CX-160 at 3M014757-777.

FF 132. The [ ] (CPX-27). Hrg. Tr. at 521:19-523:12; 529:21-530:17; CPX-1A.

FF 133. As part of its process, 3M urges diamonds into preform [ ] Hrg. Tr. at 536:15-19.

FF 134. 3M is licensed under the '489 patent. Hrg. Tr. at 505:14-22; 513:20-22.

FF 135. 3M has also developed a number of sintered abrasive products that are currently in the experimental stage [ ] These products are also made with the same basic process as 3M's commercial sintered abrasives. Hrg. Tr. at 510:25-511:15.

FF 136. Kinik manufactures its DiaGrid pad conditioners, wire saw beads, profile wheels, and turbo grinders using the same DiaGrid process. Hrg. Tr. at 1139:6-19.

FF 137. Kinik's DiaGrid pad conditioners are sold in the United States through Kinik's distributor, Rodel Inc. Hrg. Tr. at 619:7-12; 621:10-12; 1072:19-21; 1140:9-18; CX-359; CX-381; CX-428 at 32:18-22; RX-262.

FF 138. Kinik manufactures at least 34 different versions (customer specifications) of its DiaGrid CMP pad conditioners. CX-428 at 32:15-39:15, 48:11-49:13; CX-367.

FF 139. Kinik has sold approroximately [ ] worth of DiaGrid products (excluding DiaGrid pad conditioners) in the United States. Hrg. Tr. at 1081:10-13.

FF 140. "DG" is an abbreviation for "DiaGrid". Hrg. Tr. at 1069:9-15; 1070:11-12.

FF 141. Kinik's DiaGrid products are manufactured using the same basic DiaGrid process but sometimes with different dimensional components and different finishing steps based on differing customer requirements. Respondent's Response To Complainants' Statement of Undisputed Material Facts (filed Sep. 17, 2001) at p. 2-3.

FF 142. DiaGrid products are all manufactured using the same metal powder. Hrg. Tr. at 587:15-589:17.

FF 143. DiaGrid products are all manufactured using the same liquid binder. Hrg. Tr. at 587:15-589:17.

FF 144. DiaGrid products are all manufactured using the approximately same heating curve. Hrg. Tr. at 587:15-589:17.

FF 145. Rodel is the sole market channel supplier of DiaGrid pad conditioners in United States. Hrg. Tr. at 619:7-22.

FF 146. Karen Johnson was Rodel's Vice President of Strategic Alliances and her responsibilities included overseeing the introduction of Kinik's DiaGrid CMP pad conditioners. CX-428 at 50:10-51:3.

FF 147. Kinik sends Rodel DiaGrid pad conditioners on a consignment basis. Sung Tr. 619-20, 625

FF 148. The Complaint identified Kinik Company and Kinik Corporation as proposed respondents. Complaint at ¶¶ 3.1-3.4.

FF 149. Both 3M and Kinik manufacture superabrasive products, including CMP pad conditioners, using superabrasive or abrasive particles, such as diamonds. Visser, Tr. 518:18-519:8; Sung, Tr. 600:3-9; CX-53; CX-391.

FF 150. Superabrasive particles are abrasive particles with a very high degree of hardness and may be diamonds, cubic boron nitride, or tungsten carbide. Visser, Tr. 518:18-519:8; Sung, Tr. 600:3-9; Tselesin, Tr. 1200:6-18; 1202:20-23; Strong, Tr. 1668:16-18; CX-1, col. 16, l. 16.

FF 151. CMP pad conditioners are superabrasive articles that are used in the manufacture of silicon semiconductor wafers. Visser, Tr. 508:2-5.

FF 152. These chips have a significant value and, as a result, the standards to manufacture the semiconductor chips are very demanding. Visser, Tr. 508:20-25.

FF 153. In WCMP processes, most of the conventional slurry is an acid environment. CX-47.

FF 154. During the polishing process, the pad top forms a mush of slurry, the thickness of which affects the usable quantity of slurry and the polishing rate of the pad. RX-31; CX-47.

FF 155. The CMP process is very much dependent on the surface conditions of the polishing pad. RX-31; CX-47.

FF 156. In order to maintain the polishing efficiency, a pad conditioner, or diamond dresser, is typically employed to scrape off the accumulated agglomerates on the pad surfaces. RX-31; CX-47; RX-282C.

FF 157. The polishing pad is consumed by the dressing action of the pad conditioner at a rate, known as the "dressing rate." RX-31.

FF 158. This is a critical CMP parameter as it determines not only the wafer removal rate, but also pad life, as well as wafer quality, such as defect count and thickness uniformity. RX-31; RX-282C.

FF 159. Thus, in making CMP pad conditioners, or any abrasive articles for grinding, cutting or polishing, it is necessary to devise a means of placing abrasive particles on the pad conditioner in a uniform pattern and to secure the abrasive particles to a substrate in such a way that the particles are sufficiently firmly attached that they can withstand the forces exerted on them when the product is used and to do so using processes that do not degrade the superabrasive materials. RX-31; CX-47; CX-53; Amended Complaint at ¶ 4.1; Response of Kinik Company to the Amended Complaint, ¶ 4.1.

FF 160. There are three well-known methods used by CMP pad conditioner manufacturers to create metallic bonds to secure the abrasive particles: electroplating, sintering and conventional brazing. RX-27; RX-29; RX-31; RX-81; RX-93; RX-261; RX-

264; RX-282; RX-284; CX-47; CX-358.

FF 161. Many of the problems commonly encountered in CMP can be attributed to the shortcomings of conventional pad conditioners, including polish rate stability, polish rate uniformity, polish pad lifetime, defectivity and pad conditioner lifetime. CX-358.

FF 162. Diamond wire saws were introduced in 1970 initially for splitting rocks in a quarry. CX-49.

FF 163. The use of diamond wire saws has since expanded and now includes splitting rocks in a quarry, slicing stones in factories, as well as construction applications, such as remodeling buildings, repairing bridges, and even installing underwater cables. CX-49.

FF 164. In contrast to conventional tools like gang saws and circular diamond saws, diamond wire saws can cut slabs much larger than circular saws and can slice stone much faster than gang saws. CX-49.

FF 165. In addition, unlike conventional tools, diamond wire saws are unique in that they can trace a curved profile through stone. CX-49.

FF 166. While electroplated diamond beads can cut faster initially, they wear out quickly. CX-49.

FF 167. Profile wheels are used in the stone cutting industry. RX-50; CX-391.

FF 168. Unlike wire saw beads that are used for cutting, profile wheels are used for shaping and edge-profiling of stone, including granite and marble. CX-391; RX-50.

FF 169. For profile wheels, like wire saw beads and CMP pad conditioners, diamond height, diamond placement and diamond retention play significant roles in the performance and longevity of the abrasive product. CX-391; RX-50.

FF 170. For more than half a century, Kinik's major business has been manufacturing grinding wheels, diamond blades, and drilling tools for stonework for domestic use and export. Response of Kinik Company to the Amended Complaint, ¶ 3.1; CX-326.

FF 171. Kinik first began offering sintered products in 1965, when it introduced its first vitrified bond grinding wheel. Sung, Tr. 582:14-17; CX-326.

FF 172. Dr. Sung wanted to solve the diamond tool manufacturing problem, namely how to firmly retain diamonds in the tool. Sung, Tr. 1039:23-25

FF 173. Before joining Kinik, Dr. Sung had demonstrated that brazing was a viable technology to hold diamonds in an abrasive tool very firmly. Sung, Tr. 1042:21-23; 1048:17-24.

FF 174. Before joining Kinik, Dr. Sung reviewed U.S. Patent No. 3,894,673 ("the Lowder '673 patent"), RX-142. Sung, Tr. 1049:7-1050:5; RX-142.

FF 175. When Dr. Sung joined Kinik in 1996, Kinik used a sintering process to form its diamond tools. Sung, Tr. 1047:3-6, 1071:15-19.

FF 176. After arriving at Kinik in November 1996, Dr. Sung did further work to develop his idea for a new process of manufacturing abrasive articles using a brazing process. Sung Tr., 1050:20-24.

FF 177. After arriving at Kinik, Dr. Sung developed a soft, easily deformable, flexible pull sheet preform to anchor the diamonds; Kinik already had in place a technology for making a pull sheet that Kinik had been using for almost thirty years. Sung, Tr. 1050:22-1051:8.

FF 178. After arriving at Kinik, Dr. Sung also used technology to braze diamonds to form an abrasive article. Sung, Tr. 1050:22-24.

FF 179. After trial and error, Dr. Sung developed a process that eventually matured into the process currently used by Kinik to manufacture its DiaGrid® abrasive articles (the "DiaGrid® Process"). Sung, Tr. 576:12-13; 589:18-590:4; 1047:7-1051:13; 1057:13-1059:17; .

FF 180. Dr. Sung testified that at the time he was developing the DiaGrid® process, he was not aware of Dr. Tselesin or the '489 patent. Sung, Tr. 1069:1-8.

FF 181. The process shown during the plant inspection on May 23, 2001 is the same process that Kinik uses to make commercial DiaGrid® products. Hwang, Tr. 779:1-7.

FF 182. RDX-1C is a graphical representation of Kinik's DiaGrid® process prepared by Kinik's counsel. Shiue, Tr. 647:18-648:19.

FF 183. RDX-2C is a graphical representation of Kinik's DiaGrid® heating curve prepared by Kinik's counsel. Shiue, Tr. 648:20-649:14.

FF 184. Kinik's DiaGrid® process is identical for the manufacture of the various products, except for dimensional differences, and relevant excerpts of that process have been videotaped at CPX-2A. Sung. Tr. 583: 20-585:1.

FF 185. RX-51 is a product description from [ ] describing [ ] Sung, Tr. 1059:18-23.

FF 186. RX-45 is a brochure of [ ] describing [ ] Sung, Tr. 1059:24-1060:5.

FF 187. RX-35C is a certificate of composition describing [ ] received from the manufacturer of the product. Sung, Tr. 1062:14-23.

FF 188. The composition of [

] RX-45C.

FF 189. The composition of one batch of [ ] is [

] RX-35C.

FF 190. The five prealloyed elements of [ ] and [ ] are relatively uniformly distributed. Eagar, Tr. 1722:10-18.

FF 191. Chromium boride is not present in the original [ ] or [ ] powders. German, Tr. 1509:16-21.

FF 192. Chromium boride does not have the same composition as the original [ ] and [ ] powder. German, Tr. 1509:16-21.

FF 193. Chromium carbide is not present in the original [ ] or [ ] powders. RX-35C; RX-45C

FF 194. Chromium carbide does not have the same composition as the original [ ] and [ ] powder. RX-35C; RX-45C

FF 195. [ ] braze powder has a solidus of [ ] and a liquidus of [ ] Sung, Tr. 594:12-17; CX-62C; German, Tr. 377:10-19; 480:13-22; German, Tr. 294: 17-18, 294:25 - 295:1.

FF 196. [ ] braze powder has a solidus of [ ] and a liquidus of [ ] Sung, Tr. 594:12-17; 1060:25-1061:3; RX-45C (K000384A); CX-62C; German, Tr. 377:10-19; 480:13-22.

FF 197. Professor German does not dispute that [ ] braze powder has a solidus of [ ] and a liquidus of [ ] German, Tr. 377:10-19; 480:13-22.

FF 198. Product literature from the manufacturer of [ ] suggests a brazing temperature between [ ] for listed applications. RX-45C; German, Tr. 378:17-379:3.

FF 199. The suggested brazing temperature for [ ] for listed applications. German, Tr. 485:5-7; RX-45; Sung, Tr. 1060:25-1061:23.

FF 200. [ ] recognizes that its published "suggested brazing temperature" is only a guidance. The [ ] brochure specifically states, in reference to the suggested brazing temperature, that "[t]he exact brazing temperature for any specific joint depends on the joint and base metal properties desired." The brochure goes on to say "[c]onsequently it may sometimes be necessary to determine the ideal brazing temperature by experiment." RX-45.

FF 201. Professor German does not dispute that [ ] braze powder has a solidus of [ ] and a liquidus of [ ] German, Tr. 377:10-19; 480:13-22.

FF 202. Professor German did not do any testing to determine the solidus or liquidus temperatures of [ ] or [ ] German, Tr. 380:2-4; 393:18-22.

FF 203. In a single prealloyed powder system, the solidus temperature is the temperature below which the single prealloyed powder is solid. German, Tr. 19:1-4; 279:17-21; Shiue, Tr. 640:23-641:9

FF 204. In a single prealloyed powder system, the liquidus temperature is the temperature above which the single prealloyed powder is a liquid. German, Tr. 398:6-9.

FF 205. [ ] Sung, Tr. 596:13-16.

FF 206. [ ] Sung, Tr. 596:22-597-24.

FF 207. [ ] Sung, Tr. 598:3-5, CPX-2A.

FF 208. Diamonds are partially pushed into the pull sheet. Sung, Tr. 599:11-24.

FF 209. RX-217C contains the specification or standard operating procedure for the dewaxing cycle. Hwang, Tr. 871:21-872:4; RX-217C (K001732).

FF 210. Kinik uses [ ] in the DiaGrid® process, referenced Y15 and Y18. RX-217C (K001732); RX-37C; RX-41C.

FF 211. RX-37C and RX-41C are production run records from the [ ] for the Kinik DiaGrid® products. Hwang, Tr. 794:7-11.

FF 212. The assemblies are heated in a vacuum furnace where they undergo a prescribed heating cycle that takes a number of hours. RX-217C (K001733-K001737), RX-42C, CPX-2A.

FF 213. The vacuum furnace heating cycle includes [ ] Sung, Tr. 603:1-3; 604:2-17; 849:7-17; 849:23-850:10; RX-217C; RX-42C.

FF 214. [ ] German, Tr. 262:25-263:4; Sung, Tr. 604:19-22; 606:5-7; Williamson, Tr. 1294:22; RX-217C; RX-42C.

FF 215. [ ] German, Tr. 263:10-17; Sung, Tr. 609:20-610:3; RX-217C; RX-42C.

FF 216. Diamonds are sensitive to manufacturing temperatures and are adversely affected by high temperatures. Sung, Tr. 1061:12-1062:1.

FF 217. After [ ] the vacuum furnace is cooled and the DiaGrid® products are removed from the furnace. Sung, Tr. 610:4-9.

FF 218. CX-95 is the vacuum heating curve for the Kinik DiaGrid® process. CX-95; German Tr. 296-309.

FF 219. Kinik uses four vacuum furnaces in the DiaGrid® process, referenced Y1, Y19, Y32 and Y33. RX-217C (K001733); RX-42C; Hwang, Tr. 851:21-22.

FF 220. RX-42C is a set of production run records from the vacuum furnace heating cycle for the Kinik DiaGrid® products. Hwang, Tr. 795:13-17.

FF 221. After the vacuum furnace heating step, all DiaGrid® products are inspected under a microscope. Hwang, Tr. 797:22-24; 844:5-11.

FF 222. Kinik classifies approximately [ ] of the DiaGrid® products are found to be defective, some of which have resulted from underheating. Hwang, Tr. 797:25-798:5, 79:1-4, 799:15-21, 801:1-4, 801:9-17.

FF 223. Specifications at RX-24, RX-25, RX-26 constitute some but not all of the specifications for the DiaGrid® product line. Hwang, Tr. 776:19-21.

FF 224. Dr. Sung coined the term "DiaGrid" and he testified that it is a registered trade name. Sung, Tr. 1069:18-20.

FF 225. DiaGrid® is sometimes abbreviated as "DG." Sung, Tr. 1069:9-11.

FF 226. The abbreviation DG is used for the products made by the accused DiaGrid® process at issue in this investigation. Sung, Tr. 1070:9-1071:7; RX-283C.

FF 227. Kinik's abrasive products that are commercially available in the United States and that are manufactured using the DiaGrid® process are DiaGrid® profile wheels, DiaGrid® wire saw beads, DiaGrid® CMP pad conditioners, and DiaGrid® turbo disks. RX-283C; CX-326; Sung, Tr. 583:22-584:16; 1070:1-1072:18; CPX-21; CPX-22; CPX-24.

FF 228. Of the DiaGrid® products that are commercially available in the United States, at least the DiaGrid® CMP pad conditioner and DiaGrid® wire saw beads have been sold in the United States. Sung, Tr. 1072:19-22.

FF 229. Kinik also has certain DiaGrid® products that are being, or have been, developed and are not yet commercially available in the United States, including [ ] Sung, Tr. 584:13-16; 586:1-587:10; 1141:25-1142:3.

FF 230. Samples of the DiaGrid® turbo diamond disc have been given to 3M, which has expressed an interest in selling them. Sung, Tr. 584:15-25; 586:19-22; 1072:21-25; 1141:14-19.

FF 231. Kinik's [ ] and and [ ] are still being developed and have not been sold in the United States. Sung, Tr. 586:23-587:10; 1141:25-1142:3.

FF 232. The only DiaGrid® product manufactured by Kinik that competes with Complainants' abrasive products in the United States is the DiaGrid® CMP pad conditioner. Visser, Tr. 555:3-11.

FF 233. DiaGrid® pad conditioners are available in a wide range of sizes and shapes to accommodate all major polishing platforms. CX-358C; CX-428C, 35:16-18; 36:9-37:5; CX-367C; CX-391.

FF 234. Kinik's DiaGrid® wire saw beads have an array of diamonds set in a specific pattern. CX-49.

FF 235. CX-49 is an article by Dr. Sung from Finer Points, published by the Industrial Diamond Association of America, Inc. Sung, Tr. 1043:1-7; CX-49.

FF 236. Rodel is the global leader in polishing technology for semiconductors, silicon wafers and storage media substrates and has been a key supplier to the semiconductor industry since 1969. CX-304C.

FF 237. The reinforced nature of the chemical bond achieved by the Kinik DiaGrid® brazing process and the uniform, patterned placement of diamonds on its products are two key features of Kinik's DiaGrid® products that are highlighted in DiaGrid® marketing materials. RX-27; RX-29; RX-31; RX-50; RX-261; RX-262; RX-264; CX-47; CX-49.

FF 238. Kinik's DiaGrid® marketing materials specifically refer to DiaGrid®'s reinforced chemical bonding as the solution to the weak diamond retention problem found in competitive products made by conventional methods. RX-27; RX-29; RX-31; RX-50; RX-261; RX-262; RX-264; CX-47; CX-49.

FF 239. CX-391 is a copy of Kinik's website. Hwang, Tr. 877:10-17; CX-391.

FF 240. CX-391 describes Kinik's DiaGrid® profile wheel as adopting "the innovative chemical bonding technique which brazed each diamond crystal to the substrate individually, with the greatest diamond exposure and precise controlled diamond spacing." CX-391.

FF 241. CX-391 (Kinik's website) claims that DiaGrid® profile wheel "is triple the life of electroplating and double the speed of sintering." CX-391.

FF 242. CX-391 also describes the critical features that distinguish Kinik's DiaGrid® CMP pad conditioners from other pad conditioners: diamond grits from an array that optimizes the polishing rate; diamonds are chemically bonded by a reinforced braze so they won't fall out; brazed metal is protected by a diamond shield so it can polish in situ in acid slurry; diamond shield prevents metal from dissolving so wafer contamination is avoided; diamond possess euhedral crystal shape that does not damage pad; and overall cost of operation is decreased by more than 10% while throughput increases by more than 10%. CX-391.

FF 243. In RX-31, Kinik discusses the effective and efficient design of dressers in light of the needs of the industry and reveals that Kinik has come up with a "revolutionary diamond dresser" that incorporates all important design features and, in particular, involves "firmly brazed" diamonds that are held by "the strong chemical bond" in the DiaGrid® process. RX-31.

FF 244. RX-50, titled "Kinik Diamond Tools & Abrasive Wheels for Stone Industry Brochure, Catalog No. 920E – Jan. 2000," states that "Brazing ensures high diamond exposure for aggressive cutting. Diamond will never be pulled out, so the life is guaranteed." RX-50.

FF 245. RX-50 also states that "DiaGrid® beads (patent pending) are not mechanically

electroplated, nor physically sintered ... they are chemically brazed! As such, no diamond will fall out." RX-50.

FF 246. The Rodel-Kinik DiaGrid® CMP pad conditioner marketing materials claim that there are significant distinctions between DiaGrid® products and those made by conventional methods. RX-29; RX-261; RX-262; RX-264.

FF 247. For example, RX-29, titled "Rodel DiaGrid® Pad Conditioners – The Ideal Solution for CMP," notes that "[d]iamonds are typically affixed to a pad conditioner's surface using electroplating, brazing or sintering" and that, unlike products made by conventional methods, "the Rodel DiaGrid® pad conditioners use a unique, highly robust braze chemistry which provides an intimate bond of the diamonds to the metal matrix. Our exclusive braze chemistry, combined with the features of our diamond grid placement system and our unique overcoat, renders diamond loss virtually non-existent, resulting in less wafer scratching and other damage." RX-29.

FF 248. In connection with meetings between 3M and Kinik, samples of Kinik's DiaGrid® turbo diamond discs have been imported into the United States because 3M has expressed interest in selling them. Sung, Tr. 1072:23-25.

FF 249. The art relevant to the '489 patent includes the art of making abrasive articles. Strong Tr. 151:3-6

FF 250. A person of ordinary skill in the art relevant to the '489 patent has a bachelor's degree, in engineering, material science or metallurgy, and two or more years of experience in industry. Williamson, Tr. 1238:14-19; Strong, Tr. 77:17-21; German, Tr. 266:23-267:6.

FF 251. In the academic portion of the qualifications of one of ordinary skill in the art, only a few minutes to an hour of treatment would be given to sintering. German, Tr. 266:26-267:1; 269:16-19; 366:17-20.

FF 252. Kinik's expert witness, Dr. John Brian Peter Williamson, received his Ph.D. in Physics and Chemistry of Surfaces from Cambridge University in 1955. CX-118; Williamson, Tr. 1235:16-1236:5.

FF 253. In addition, Dr. Williamson has lectured frequently in industry on the subjects of brazing and sintering. Williamson, Tr. 1236:6-8.

FF 254. Kinik's expert witness, Dr. Thomas W. Eagar, is an expert on brazing, sintering and materials evaluation. Eagar, Tr. 1719:1-11.

FF 255. Dr. Eagar has authored papers relating to metallurgical processes. RX-293.

FF 256. As part of his studies to obtain his degrees, Dr. Shiue received training on sintering and the testing of metals to determine what processes were used to make them. Shiue, Tr. 636:1-25.

FF 257. Dr. Shiue completed his doctoral dissertation at Norton Company, a competitor of

3M. Shiue, Tr. 637:5-12.

FF 258. Dr. Shiue is currently an Associate Professor at the National Taiwan University in the Department of Materials Science and Engineering where he teaches sintering as part of his materials science courses. Shiue, Tr. 637:1-4; RX-271.

FF 259. Dr. Shiue has lectured to the Taiwan Welding Society on the subject of the manufacture of abrasive tools, and that includes the difference between diamonds using the process of brazing and sintering. Shiue, Tr. 638:6-9.

FF 260. Complainants' expert witness, Professor A. Brent Strong, is a person of ordinary skill regarding sintering and was permitted to testify concerning his understanding of the phrase "and then sintering to form said abrasive article." Strong, Tr. 73:23-74:4; 74:22-25.

FF 261. Professor German is not an expert on brazing. German, Tr. 439:4-5; 1475:1-2.

FF 262. Professor Germans' books Sintering Theory and Practice and Liquid Phase Sintering do not mention brazing. German, Tr. 403:24-404:10.

FF 263. After obtaining his Ph.D. from MIT, Dr. Sung was employed by Norton Company, a competitor of 3M. Sung, Tr. 1039:13-1040:13.

FF 264. After leaving Norton Company, Dr. Sung worked for Taiwanese governmental institute, the Industrial Technology Research Institute, where he was involved in diamond abrasive tools. Sung, Tr. 1040:20–1041:10.

FF 265. From his education and his employment, Dr. Sung has an understanding of sintering and brazing. Sung, Tr. 617:19-618:4; 1043:25-1044:18.

FF 266. From his education and his employment, Dr. Sung has an understanding of the manufacture of abrasive articles. Sung, Tr. 1043-1044:18.

FF 267. Dr. Sung has written a number of articles concerning the manufacture of abrasive articles. Sung Tr., 1042:2-13, CX-47, CX-49, and RX-31.

FF 268. Dr. Sung is a person having at least ordinary skill in the art. Sung Tr., 1039:4-1041:10.

FF 269. From his education and his employment, Dr. Laraia is familiar with the meaning of the words "liquidus", "solidus", "sintering" and "brazing." Laraia, Tr. 898:15-899:5, 899:21-900:2.

FF 270. Dr. Laraia is a person having at least ordinary skill in the art. Laraia, Tr. at 896:6-900:2.

FF 271. Claim 1 of the '489 patent is directed to a method for forming an abrasive article. CX-1.

FF 272. Claim 1 of the '489 patent requires that the method include: forming a soft, easily deformable and flexible preform from a mixture of said quantity of powdered sinterable matrix material and a liquid binder composition. CX-1, 16: 40-43.

FF 273. Formation of the SEDF preform is required, not just the existence of an SEDF preform. Strong, Tr. 168:21-169:2.

FF 274. SEDF is not a known term of art in the technical sense; it is known by the ordinary and commonly understood interpretation of the words. Strong, Tr. 165:13-22; Williamson, Tr. 1264:18-1265:3.

FF 275. A preform is a material that has been shaped and holds that shape at least temporarily, and one of ordinary skill in the art would understand a preform to have this meaning. Strong, Tr. 86:3-13.

FF 276. In the Preparation of Preform section of the Detailed Description, the claim term of "soft, easily deformable and flexible preform" is comprised of the words "soft" and "flexible." CX-1, 4:44-7:42.

FF 277. Soft and flexible preforms were known in the prior art. Strong, Tr. 152:1-9; 165:23-166:1.

FF 278. Prior art soft and flexible preforms were soft, easily deformable and flexible. Strong, Tr. 152:5-9; 196:6-11.

FF 279. An SEDF preform is a type of soft and flexible preform. Strong, Tr. 165:9-12.

FF 280. The Abstract of the '489 patent states that the preform has a "high binder content," and that "[t]he binder . . . is present in greater quantity than the retaining powder." CX-1, abstract:2-4.

FF 281. The Summary of Invention section of the '489 patent states that to form an SEDF preform, "the concentration of powdered composition and abrasive particles (if included) in the slurry or paste, is low, and the volume of binder composition is high. In fact, the volume of the binder composition or binder phase in the mixture substantially exceeds the volume of the powdered composition and the abrasive particles." CX-1, 3: 9-15; Williamson, Tr. 1239:21-1240:6.

FF 282. The Preparation of Preform section of the Detailed Description of the Embodiments of the '489 patent begins by stating that "[t]he preform is prepared by mixing a binder composition with a sinterable powdered composition or matrix retaining material in the required proportions." CX-1, 4:45-47; Strong, Tr. 170:18-23; Williamson, Tr. 1240:7-12.

FF 283. The Preparation of Preform section of the Detailed Description of the Embodiments of the '489 patent describes the following as one exemplary way to form a soft, easily deformable, and flexible preform: "By volume, the percentage of the powder within the binder-powder mixture is usually from 1 to 5%, but it can be extended to a range of 0.3 to 10%." CX-1,5:29-31; Williamson, Tr. 1240:13-24.

FF 284. The '489 patent describes the following as one exemplary way to form a soft, easily deformable, and flexible preform: If the percentage of the powder by volume is between 1 and 5%, by volume the percentage of the binder in the

powder-binder mixture is 95 to 99%. Williamson, Tr. 1240:17-19.

FF 285. The '489 patent describes the following as one exemplary way to form a soft, easily deformable, and flexible preform: If the percentage of the powder by volume can be extended to a range of 0.3 to 10%, by volume the percentage of the binder in the powder-binder mixture may be in a range between 90% and 99.7%. Williamson, Tr. 1240:19-23.

FF 286. The Preparation of the Preform section of the Detailed Description of the Embodiments describes the following as one exemplary way to form a soft, easily deformable, and flexible preform: In the binder-powder mixture, the particles of the sinterable retaining powder are "dispersed" or "distributed" in the liquid binder composition. CX-1, 5:35-38, 5:44-46; Williamson, Tr. 1241:7-16.

FF 287. The Preparation of Preform section of the Detailed Description of the Embodiments of the '489 patent describes the following as one exemplary way to form a soft, easily deformable, and flexible preform: "[t]he sinterable retaining powder is dispersed in the liquid binder composition and held thereby" and the powder is "distributed in the binder composition." CX-1, 5:35-36, 5:44-46; Williamson, Tr. 1241:7-16.

FF 288. The Preparation of Preform section of the Detailed Description of the Embodiments of the '489 patent describes the following as one exemplary way to form a soft, easily deformable, and flexible preform: "The abrasive particles in the substrates are not surrounded by closely packed particles of a retaining powder as in the traditional green compacts. Rather, the abrasive particles are suspended predominantly by the binder composition, and in contact with a very few particles of the sinterable retaining powder. This is illustrated in FIGS. 1-4 of the drawings." CX-1, 6:16-21.

FF 289. The Background of the Invention section of the '489 patent states "[w]hen a roll compacted product includes a binder, the binder is in a much smaller quantity than in a flexible preform. The roll compacted product is held together, not by the binder, but by the mechanical interlocking of particles, which makes the roll compacted product much less flexible than the soft and flexible preforms." CX-1, 2:11-20.

FF 290. Claim 1 of the originally-filed application for the '489 patent contained the limitation "the volume of said binder is greater than the volume of said quantity of retaining powder." CX-2.

FF 291. The patent examiner objected to the specification and rejected claim 1-18 of the originally-filed application under 35 U.S.C. § 112, first paragraph, in an office action dated July 31, 1995. CX-2.

FF 292. The application that led to the '489 patent was amended on June 3, 1996 in response to a July 31, 1995 office action. CX-2.

FF 293. The following words appear in the June 3, 1996 amendment: "[f]urther, it is the

mixture of the powdered sinterable matrix material and the liquid binder composition used to form the SEDF preform where the volume of the binder composition substantially exceeds the volume of the matrix material and in which the weight of the binder composition is usually from 3 to 20% by weight of the mixture." CX-2 (Amendment dated June 3, 1996 at 20); Williamson, Tr. 1243:16-1244:6.

FF 294. The following words appear in the August 29, 1996 amendment: "[f]urther, it is the mixture of the powdered sinterable matrix material and the liquid binder composition used to form the SEDF preform where the volume of the binder composition substantially exceeds the volume of the matrix material and in which the weight of the binder composition is usually from 3 to 20% by weight of the mixture." CX-2

FF 295. The prosecution history describes the following in connection with one exemplary way to form a soft, easily deformable, and flexible preform: the volume of binder in the mixture of powdered sinterable matrix material and the liquid binder composition used to form the SEDF preform substantially exceeds the volume of powder. Williamson, Tr. 1243:1-1244:23; CX-2.

FF 296. Kinik does not dispute the second step of claim 1, "which is the placement of the diamond partially in the preform." Roth Tr. at 1716:7-10.

FF 297. Claim 1 of the '489 patent includes the following limitation: "including a plurality of abrasive particles at least partially in said preform." CX-1, 16:43-44.

FF 298. The "including" step of Claim 1 is interpreted by one of ordinary skill in the art, based upon its plain meaning, to mean including more than one abrasive particle in the preform so that the abrasive particles are at least partially below the surface of the preform. Strong Tr. 131:14-132:11.

FF 299. Claim 1 of the '489 patent contains the following language: "and then sintering said preform to form said abrasive article." CX-1, 16:45.

FF 300. Claim 1 requires that the preform be sintered. CX-1

FF 301. No explicit definition is given in the '489 patent for the term "sintering." CX-1

FF 302. One of ordinary skill in the art seeking to understand the word sintering would look for a definition of that term in a technical dictionary, a technical encyclopedia or reference books. German, Tr. 362:1-363:3.

FF 303. The following is one of the definitions of sintering offered in technical treatises: Sintering is the bonding of adjacent particles in a powder mass or compact by heating to a temperature below the melting point of the main constituent. Shiue, Tr. 642:16-643:6; German, Tr. 385:10-17; RX-226; SX-1; SX-3; SX-7.

FF 304. The Metals Handbook is a reference for those of ordinary skill in the art. German, Tr. 371:12-16.

FF 305. German testified that he did not know of any metal powders that are not

sinterable. German, Tr. 272:5-6.

FF 306. Sintering and neck growth requires contact between powder particles. German, Tr. 275:3-4; 386:7-9.

FF 307. Sintering requires the presence of solid particles. Tselesin, Tr. 1213:18-20; RX-226; SX-1; SX-3; SX-5; SX-7.

FF 308. Sintering requires the bonding together of solid powder metal particles. German, Tr. 276:11-14, 280:21-23.

FF 309. A person of ordinary skill in the art would understand that sintering requires the consolidation of solid powder metal particles and neck-growth is evidence of consolidation and bonding.. German, Tr. 385:22-24; RX-274.

FF 310. As heat is applied to a metal powder, the particles of the metal powder will consolidate. German, Tr. 354:18-21.

FF 311. As heat is applied to a metal powder, the particles of the metal powder will bond togetehr into a solid mass. Shiue, Tr. 712:13-713:1.

FF 312. If a metal powder is completely melted, no metallurgical necks will be present. German, Tr. 354:22-24.

FF 313. The mere presence of a solid in a liquid is not sufficient to constitute sintering. German, Tr. 366:3-8.

FF 314. For liquid phase sintering to occur in a single prealloyed powder system, a solid material must be present. German, Tr. 388:20-25.

FF 315. Even in liquid phase sintering, there may be 2-10% porosity in sintered products. German, Tr. 422:10-16.

FF 316. Liquid cannot be sintered. Strong, Tr. 1713:12-14; Preston, Tr. 1011:14-20.

FF 317. Necks between solid particles do not exist in a completely liquid material. German, Tr. 354:9-11.

FF 318. Dr. Eager testified that according to Professor Germans' books, when the amount of liquid reaches 31% at temperatures between the solidus and liquidus, the liquid starts to break up the sintered structure. Eagar, Tr. 1798:1-8.

FF 319. RX-274 is a listing of some of the attributes of sintering Professor German testified about. German, Tr. 364:13-366:2; Tr. 1387:19-1388:6.

FF 320. RX-275 is a listing of some evidence of sintering Professor German testified about. German, Tr. 371:23-374:25; Tr. 1387:19-1388:6.

FF 321. Some attributes of sintering are necking, solid particles, atom transport, maintenance of shape, reduced surface area and strengthening. German, Tr. 364:13-365:25; RX-274.

FF 322. Sintering does not occur in the absence of the attributes of sintering. German, Tr.

366:9-16; 451:14-19.

FF 323. As originally filed, claim 1 of the application that became the '489 patent recited "heating the preform." CX-2 (Original application filed April 8, 1994 at 38-40).

FF 324. Col. 3, lines 27-28 of the '489 patent state "Final processing of the SEDF preform of the present invention includes sintering or other heat treating." CX-1.

FF 325. The inventor admitted that he intended "sintering" to have its customary meaning. Tselesin, Tr. 1212:5-10.

FF 326. While there are differences between sintering and brazing, the two are not mutuall exclusive. Strong, Tr. at 1642:9-10; Williamson, Tr. 1290:15-1291:4.

FF 327. German testified that brazing is a process by which a metal has been made into a liquid for the purpose of joining two solids together. German, Tr. 394:17-20.

FF 328. The following offers a definition of brazing: Brazing is bonding process where two materials are bonded using a filler, with the liquidus of the filler being above 450°C and below the solidus of the base metal. The brazing temperature is the temperature to which the base material is heated to enable the filler metal to melt and wet the base material to form a brazed joint. Shiue, Tr. 639:3-640:20; RX-225; RX-227; SX-1; SX-3; SX-7; SX-8.

FF 329. razing requires complete melting of a braze alloy.. Shiue, Tr. 646:8-13; German, Tr. 398:14-17.

FF 330. In general, a melted metal powder will densify and consolidate. German, Tr. 495:13-18.

FF 331. "Wetting" of diamonds can occur during liquid phase sintering. German Tr. at 1459:6-8.

FF 332. Dr. Shiue testified that he would be called an idiot by colleagues if he called a process that takes the temperature above the melting point sintering instead of brazing. Shiue, Tr. 687:17-689:24.

FF 333. "Heating" encompasses sintering. Tselesin Tr. 1216:21-23.

FF 334. Mr. Visser testified that he understands that solid state sintering involves the growth of necks between solid particles through the process of diffusion without the presence of a liquid. Visser, Tr. 547:3-12.

FF 335. Mr. Visser testified that he understands that liquid phase sintering also has solid particles connected by the growth of necks between them in the presence of a liquid. Visser, Tr. 547:13-20.

FF 336. Mr. Visser testified that he understands that supersolidus sintering also has solid particles, with a liquid phase, in which there is a growth of necks between the solid particles. Visser, Tr. 547:21-25.

FF 337. Dr. Laraia testified that sintering can occur in the presence of a liquid phase.

Laraia Tr. at 914:25 – 915:8. 404.

FF 338. Dr. Laraia testified that solid state sintering would occur below the solidus temperature of a powdered alloy. Laraia Tr. at 915:16-25.

FF 339. Dr. Laraia testified that liquid phase sintering is a consolidation process for powders where heat is applied and there are solid particles in the presence of a liquid. Laraia, Tr. at 914:25-915:8.

FF 340. Dr. Laraia testified that liquid phase sintering will occur between the solidus and liquidus temperatures of a powder alloy by atoms moving around on the surfaces or through the bulk of the powders in the presence of a liquid. Laraia, Tr. 916:1-14.

FF 341. Dr. Laraia testified that sintering requires the presence of solid material. Laraia, Tr. 918:17-19.

FF 342. Dr. Laraia testified that brazing is the joining of materials with the use of a filler material at a temperature above approximately 400°C in such a way that the two surfaces to be joined do not dissolve in the melt substantially. Laraia, Tr. at 900:14-19.

FF 343. Dr. Laraia testified that in a brazing process, two materials are joined with a filler that melts. Laraia, Tr. 900:20-23; 904:4-6.

FF 344. Dr. Laraia testified that in taking a single prealloyed metal powder, heating the furnace and the material to a temperature above the liquidus of the braze alloy filler material, the temperature of the furnace and materials will go through a range where the braze alloy does not melt. Laraia, Tr. 901:6-12.

FF 345. Dr. Laraia noted that 3M has a product [ ] and, when the joining material is melted, 3M calls that process brazing. Laraia, Tr. 907:6-16.

FF 346. In fact, "sintering" and "brazing" have been the subjects of frequent discussions between members of the SMSD group, including Dr. Laraia, Mr. Visser and Dr. Tselesin. Thornton, Tr. 961:24-962:7; 966:24-967:7; 967:19-968:1.

FF 347. 3M markets its CMP pad conditioners as sintered abrasive products. Thornton Tr. at 959:12-15.

FF 348. 3M describes its CMP pad conditioners as having a sintered bond. Thornton Tr. at 959:16-19.

FF 349. Kinik markets its CMP pad conditioners as "brazed" abrasive products. CX-47; CX-49; RX-27; RX-31; RX-50; RX-261C; RX-262; RX-264C.

FF 350. One of the criteria for choosing a powder composition is its ability to retain abrasive particles. Strong Tr. at 220:1-5.

FF 351. An article is not used while it is still inside a vacuum furnace. Strong, Tr. 232:13-17.

FF 352. The additional limitation contained in claim 4 is interpreted by one of ordinary skill in the art, based upon its plain meaning, to mean that the abrasive particles are included in the preform by pressing or pushing the particles into said preform. Strong, Tr. 143:23-144:17.

FF 353. The additional limitation contained in claim 5 is interpreted by one of ordinary skill in the art, based upon its plain meaning, to mean that the abrasive particles are pressed or pushed into the preform prior to the sintering step. Strong, Tr. 144:18-24.

FF 354. The additional limitation contained in claim 8 is interpreted by one of ordinary skill in the art, based upon its plain meaning, to mean that the abrasive particles are included in the preform in a pattern. Strong, Tr. 144:25-145:2.

FF 355. Complainants' expert Professor Strong has not read all of the Kinik process specifications. Strong, Tr. 214:4-10.

FF 356. Kinik's expert, Dr. Williamson, has studied Kinik's process specifications, reviewed the video of Kinik's DiaGrid® process, CPX-2A, and is familiar with the Kinik process for making its DiaGrid® pad conditioners, DiaGrid® wire saw beads and DiaGrid® profile wheels. Williamson, Tr. 1266:5-15.

FF 357. Dr. Williamson testified that Kinik uses approximately [ ] by volume of braze powder and [ ] by volume of glue. Williamson, Tr. 1286:3-9.

FF 358. Table 1 of RX-4C describes the weight and volume percentages of the constituents used in Kinik's DiaGrid® process. Shiue, Tr. 689:25-691:5; RX-4C.

FF 359. RX-276 depicts a preform that has been heated to [ ] and cooled to room temperature before diamonds are included. Huang Tr. at 835:20 – 836:1.

FF 360. The temperature reached in the DiaGrid® process is above the liquidus of the sinterable matrix material [ ] Shiue, Tr. 651:10-14; Sung, Tr. 594:12-17; 1060:25-1061:3; Williamson, Tr. 1286:10-23.

FF 361. In RX-27, at K000003, the drawing in the upper left-hand corner was made by Dr. Sung and shows the slope of the brazed alloy in the Kinik products made by the DiaGrid® process. Sung testified that the slope created by wetting when the braze alloy is melted is important to ensuring that the diamonds do not fall out of the finished product. Sung, Tr. 1067:20-1068:7; Williamson, Tr. 1267:5-1268:14.

FF 362. Figure 1(a) in RX-3C is an SEM photograph of [ ] powder. Shiue, Tr. 658:18-22; RX-3C.

FF 363. Figure 1(b) in RX-3C is an SEM photograph of [ ] Shiue, Tr., 658:18-22; RX-3C.

FF 364. Figures 6(a) and 6(b) in RX-3C are SEM photographs of the Kinik pull sheet.

Shiue, Tr. 659:7-22; RX-3C.

FF 365. Figures 8 and 9 in RX-3C are SEM photographs of the DiaGrid® wire saw bead and pad conditioner, respectively. Shiue, Tr. 660:23-661:12; RX-3C.

FF 366. Mr. Hwang oversaw the preparation of two samples for Dr. Shiue. Hwang, Tr. 801:18-802:3; 804:6-9.

FF 367. Mr. Hwang took the samples from the production line for Ebara pellet pad conditioning disks. Hwang, Tr. 802:1-803:9.

FF 368. The process for preparing the samples was the same as the process 3M's lawyers witnessed on May 23, 2001. Hwang, Tr. 802:22-803:9.

FF 369. Mr. Hwang heated the samples pursuant to the request of Dr. Shiue to [ ] and [ ] Hwang, Tr. 803:15-804:805:5.

FF 370. When Mr. Hwang heated the sample to [ ] he attempted to mirror the standard DiaGrid® heating curve that peaks at [ ] Hwang, Tr. 872:23-873:12.

FF 371. The third sample given to Dr. Shiue had been heated to [ ] and was taken from the batch that 3M's lawyers inspected on May 23, 2001. Hwang, Tr. 804:17-805:5.

FF 372. Dr. Shiue obtained three samples from Kinik. Shiue, Tr. 651:22-652:6; Hwang, Tr. 847:4-848:2.

FF 373. Figures 3(a) and 3(b) of RX-4C show a cross-section of Test Sample D after heating to [ ] and cooled to room temperature. RX-4C.

FF 374. The designated areas A and B on Figure 3(b) of RX-4C show the areas where the EDS chemical analyses were performed. RX-4C.

FF 375. When Kinik applies the diamonds to its pull sheet in the DiaGrid® process, [Sung, Tr. 1090:18-1091:24; RX-47.

FF 376. Because [ ] is used, the diamond will be oriented such that the flat surface of the diamond will be pointing upward. Sung, Tr. 1090:18-1091:24; RX-47.

FF 377. RDX-52 depicts the Kinik pad conditioner (with the PVDD coating) and 3M pad conditioner cross-sections at 100x magnification. Tr. 1376:22-1377:4.

FF 378. RDX-65 depicts top views of Kinik and 3M pad conditioners at 100x magnification. Eagar Tr. at 1367:9 – 1368:6. RDX-65 is distorted.

FF 379. RDX-67 depicts cross-sections of 3M and Kinik pad conditioners at 100x, 500x, and 1000x magnification. RDX-67 is distorted.

FF 380. RDX-67A is RDX-67 with Professor German's markings identifying alleged

necks and pores. German, Tr. 1430:20-1431:14.

FF 381. Figure 10 of RX-3C is a cross-section of a Kinik DiaGrid® wire saw bead. Shiue, Tr. 663:23-664:1.

FF 382. Figure 12 of RX-3C is a cross-section of a Kinik DiaGrid® pad conditioner. Shiue, Tr. 666:23-667:1.

FF 383. Professor German stated that the existence of necks was important evidence of sintering. German, Tr. 462:3-25; RX-275.

FF 384. Dr. German testified that the necks present at [ ] will not be present at [ ] but that sintering occurs at [ ] German Tr. at 437:15-21.

FF 385. Persons skilled in the art would call necking that occurs during a heating process sintering. Laraia Tr. at 918:25 – 919:6

FF 386. At least some of the sintering bonds that form in the vacuum heating step of the DiaGrid® process will be destroyed when the powder melts. Sung, Tr. 1127:16-19.

FF 387. Dr. German testified that he did not look up the viscosity of the powder because it is not tabulated in handbooks, but he did look up the viscosity of liquid and nickel tape alloys. German Tr. at 428:16-20.

FF 388. Dr. German testified that the level of shrinkage observed in the DiaGrid products was not an artifact of liquid solidifying. German Tr. at 450:25-451:2.

FF 389. Dr. German testified that in sintering, the matrix material holds its relative shape instead of distorting or flowing. German Tr. at 1470:24 – 1471:3.

FF 390. Dr. German testified that in the field of brazing, he was not familiar with the term surface shrinkage porosity. German, Tr. 1468:25-1469:10.

FF 391. Dr. German testified that the sintered bonds between the spherical structures formed during the heating of the alloy and remained solid at the peak temperature of [ ] German, Tr. 1518:6-7.

FF 392. Dr. German opined that sintering occurs during the DiaGrid process because solids are present and sinter together beginning below the solidus temperature of the alloy and continuing up to the peak temperature of [ ]. German, Tr. 1527:11-19.

FF 393. The phase II material is the tree-like dendritic structures in various SEMS. Eagar, Tr. 1756:19-21; RX-301.

FF 394. The phase called "III" at the hearing is chromium boride. Eagar, Tr. 1735:14-23; RX-301.

FF 395. The phase III material are the angular chromium borides in various SEMS. Eagar, Tr. 1729:12-24; 1735:14-15; RX-301.

FF 396. Dr. German testified that the alloy Kinik uses never completely melts during the DiaGrid process and that the solid material sinters. German, Tr. 1491:11-13; 1491:18-1492:3; 1492:14-18.

FF 397. The composition of the spherical cellular dendritic structures is not the same as the original powder particles because boron and silicon have diffused out of the original powder particles during heating. Eagar, Tr. 1761:22-24.

FF 398. RX-297 is a series of SEM images and chemical analyses of the AMS4777 braze alloy powder. Eagar, Tr. 1721:4-1726:10.

FF 399. RX-298, RX-299 and RX-300 are each SEM images and chemical analyses of three respective surface areas on the Kinik DiaGrid® pad conditioner that Professor German had originally tested. Eagar, Tr. 1726:19-1734:16, 1758:20-1759:25.

FF 400. The spherical structures in RX-298, RX-299 and RX-300 have chemical compositions different from the original braze alloy as depicted in RX-297 because boron and silicon have diffused out of the original powder particles during heating. Eagar, Tr. 1733:2-1734:16, 1739:15-20, 1758:20-1759:25.

FF 401. RX-49C is an analysis report by a competitor of Kinik, [ ] concerning Kinik's DiaGrid® pad conditioners. Sung, Tr. 1091:25-1092:19; RX-49C.

FF 402. Complainants' expert Professor Strong could not opine that Kinik's product was not brazed. Strong, Tr. 135:6-8; 141:6-8.

FF 403. Complainants' expert Professor Strong doesn't know what a person of ordinary skill in the art would understand by brazing. Strong, Tr. 225:15-20.

FF 404. The phrase "soft, easily deformable and flexible preform" or "SEDF preform" is defined in the '489 patent by contrasting them to the hard, stiff and brittle green compacts in the prior art, by descriptions of the functions that each characteristic performs, and by preferred embodiments and examples that illustrate some of the ways in which these characteristic could be achieved. CX-1, cols. 1:18-2:35, 7:65-8:5; Strong Tr. at 84, 88-94, 129-131.

FF 405. The individual words of the phrase "SEDF preform" -- "soft", "easily deformable", and "flexible" – have commonly understood meanings. CX-1, SX-1, SX-2.

FF 406. The word "soft" does not have a meaning different from that which persons not of ordinary skill in the art (i.e., laypersons) would have. Williamson, Tr. 1258:3-1259:4.

FF 407. The word "deformable" does not have a meaning different from that which persons not of ordinary skill in the art (i.e., laypersons) would have. Williamson, Tr. 1263:12-14.

FF 408. The word "flexible" does not have a meaning different from that which persons

not of ordinary skill in the art (i.e., laypersons) would have. Williamson, Tr. 1261:20-22.

FF 409. The meaning of the terms "easily deformable" and "soft" overlap but have slightly different meanings. Strong Tr. 129-31.

FF 410. The specification of the '489 patent provides guidance about the characteristics of "soft," "easily deformable" and "flexible" by contrasting them to the hard, stiff and brittle green compacts in the prior art, by descriptions of the functions that each characteristic performs, and by preferred embodiments and examples that illustrate some of the ways in which these characteristic could be achieved. CX-1 These terms also have commonly understood meanings for persons of ordinary skill in the art. Strong Tr. at 88-94.

FF 411. Apart from this reference to the word "soft," there are only four other references to the word "soft" in the entire patent specification – indeed, there is only one reference to the word "soft" alone, and three references to the word "softness." CX-1, 2:8, 7:66, 8:8, 8:17.

FF 412. The word "soft" appears alone only once, in the Background section, describing the "soft and flexible preforms" of the prior art, stating "[I]t is the binder that makes such preforms *soft* and flexible." CX-1, 2:7-8 (emphasis added).

FF 413. Aside from its use in the claim term "SEDF," neither the word"soft" or even "softness" appears a single time in the detailed description of the embodiments within the portion "Preparation of Preform." CX-1, 4:35-7:41.

FF 414. The term "softness" appears only three times in the entire specification, in connection with describing the use of a sintering fixture, depicted in Figures 10 and 10A. CX-1, 7:65-8:19.

FF 415. Here, the specification describes the SEDF preform as follows: "that the softness of the preform makes redistribution of material easy," that "because of the softness and deform ability of the SEDF preform, abrasive articles with a corrugated shape can be mass produced" and that the "softness and deform ability of the SEDF preform make sintering in stock acceptable for mass production technology." CX-1, 7:65-67, 8:7-10, 8:17-19.

FF 416. As evidenced by a review of the specification, this mixture formed by the binder and powder is typically cured. However, no details regarding the curing step are given. CX-1, 3:15-19, 4:63-5:1, 5:41-44, 6:1-7, 6:37-40, 6:57-58, 7:23-25.

FF 417. Like "soft," "flexible" or "flexibility" are used to describe both the invention and the prior art. Outside of the claim term at issue and in describing the prior art preforms, "flexible" and "flexibility" appear in the specification only two times. CX-1, 3:7, 4:63.

FF 418. The terms "deformable" or "deformability" appear five times in the entire patent (outside of the claim term at issue). CX-1, 4:18, 8:8, 8:17, 11:50, 12:1.

FF 419. The '489 patent specification make clear that green compacts are hard, stiff and brittle whether they contain no binder or a small amount of binder, and expert testimony confirms this. CX-1, col. 2:11-19.

FF 420. Green compacts may contain a small amount of binder as a processing aid. CX-1; col. 2:13-19.

FF 421. The '489 patent specification describes all green compacts as hard, stiff and brittle and does not distinguish between those having no binder and those having a small amount of binder. Indeed, the specification states the the same mechanical interlocking holds all green compacts together and, thus, they all have the same characteristicss. CX-1, col. 1:26-27; 2:11-19.

FF 422. The durometer is well-known in the art for measuring the hardness of a surface. Strong, Tr. 1684:20-23; Williamson, Tr. 1258:17-20; 1261:3-10.

FF 423. The '489 patent identifies bending and cutting tests for measuring softness and flexibility. CX-1, col. 2:2-3. It also makes clear that "softness" and "hardness" were to be determined in comparison to prior art green compact preforms. CX-1, col. 1:26-27.

FF 424. The '489 patent makes clear that "deformability" is to be determined in comparison to prior art green compact preforms. CX-1, col. 1:26-27.

FF 425. The '489 patent teaches a method for making powder preforms and abrasive articles therefrom. CX-1.-1.

FF 426. According to the license agreement between 3M and UAL, 3M obtained an exclusive license for [ ] CX-41C at ¶¶ 1.2, 2.3.

FF 427. The Brown '011 patent discloses the manufacture of a turbine blade tip with wear-resistant coating. Williamson, Tr. 1272:18-1273:14; Brown '011 patent, RX-128, 1:5-12.

FF 428. The Oliver '869 patent discloses a bonded abrasive grit structure. Williamson, Tr. 1273:15-1274:3; Oliver '869, RX-152, 2:7-29.

FF 429. The Tselesin '165 patent discloses a composite material that holds abrasive particles. Williamson, Tr. 1274:25-1275:11; Tselesin '165 patent, RX-119, 2:1-21.

FF 430. The Tselesin '165 patent discloses abrasive articles and wear-resistant articles. Tselesin '165 patent, RX-119, 2:1-21.

FF 431. Tthe Davies EP patent discloses a method for making abrasive particle-containing bodies that may be used as wear and abrasion resistant surfaces or as saw segments. Williamson, Tr. 1275:22-1276:6; Davies EP patent, CX-30 1:30-38.

FF 432. Several types of prior art were recognized as pre-existing in the '489 patent's Background of the Invention, including sintered green compacts and soft and

flexible preforms made of brazing filler metal. CX-1, 1:17-28; 1:38-42; 1:60-67; 2:4-35.

FF 433. Preforms made of metal powders and metal fibers were known in the art. Tselesin '165 patent, RX-117, 3:47-51; deKok '457 patent, RX-119, 2:32-38.

FF 434. in the art of abrasive articles, sintered green compacts were known prior to the invention of the '489 patent. Strong, Tr. 1676:7-10; '489 patent, RX-1, 1:20-28.

FF 435. Soft and flexible preforms were known in other arts but not the art relevant to the invention of the '489 patent. CX-1, col. 1:60-2:35; Strong, Tr. 1667:18-22; Tselesin, Tr. 1196:2-4.

FF 436. The earlier known soft and flexible preforms comprised a high content of various binders. '489 patent, CX-1, 2:4-5.

FF 437. Soft and flexible preforms made of brazing filler metal that contained tungsten carbide abrasive particles were known in other arts prior to the invention of the '489 patent but not the relevant art. CX-1, col. 1:60-2:23.

FF 438. The Steigelman '214 patent discloses the use of tungsten carbide as abrasive particles. Steigelman '214 patent, RX-147, 2:49-51; Strong, Tr. 1673:20-22.

FF 439. The Lowder '673 patent discloses the manufacture of a diamond abrasive tool by mixing a braze alloy and a liquid binder and then brazing. Lowder '673 patent, RX-142, 4:55-5:9.

FF 440. One difference between Lowder '673 and the '489 patent is that Lowder '673 does not disclose a preform. Strong Tr. at 1666:13-20.

FF 441. The '489 patent recognized problems with using brazing filler metals to form abrasive articles. Tselesin, Tr. 1197:23-1199:4.

FF 442. One recognized problem with using brazing filler preforms was that it took time to dewax them. '489 patent, CX-1,2:27-35; Tselesin, Tr. 1198:13-16.

FF 443. The Steigelman '214 patent, issued on October 14, 1980, is prior art to the '489 patent. RX-147.

FF 444. The Steigelman '214 is not cited in the prosecution history of the '489 patent. CX-1, CX-2.

FF 445. that Steigelman '214 discloses a bi-layered tape that includes abrasive particles in liquid binder and metal powder in liquid binder, in distinctly and necessarily separate layers. RX-147.

FF 446. Steigelman '214 discloses a bi-layered tape comprising a layer of metal powder dispersed in a liquid binder cast over a layer of abrasive particles dispersed in the same binder. RX-147.

FF 447. The Steigelman '214 patent discloses a flexible bi-layered sheet. Williamson, Tr.

1278:19-22; 1279:8-9.

FF 448. Steigelman '214 discloses a flexible bi-layered tape in which the lower layer (*i.e.*, the first layer applied) may consist of tungsten carbide in a binder. Steigelman '214 patent, RX-147, 2:49-52.

FF 449. Steigelman '214 discloses melting the upper layer of the bilayered tape to induce infiltration thereby producing a composite hard-facing coating to enhance the wear-resistance of the substrate. RX-147.

FF 450. Steigelman '214 discloses that fine particle-size tungsten carbide powder of less than 15 microns in size and preferably less than 2 microns in size tends to enhance the hardness and wear-resistance of resulting coatings. RX-147 at 2:56-62.

FF 451. Dr. Tselesin is a named co-inventor on the deKok '457 patent. deKok '457 patent, RX-117.

FF 452. The deKok '457 patent discloses a method of making abrasive articles by combining abrasive particles and preformed structures of metal powders and then sintering the combination. deKok '457 patent, RX-117, 2:29-44.

FF 453. The deKok '457 discloses a flexible carrier made of metal powders or metal fibers. RX-117, 1:61-68. The deKok '457 patent was considered by the patent examiner and not believed by the patent examiner to render any claim of the '489 patent anticipated or obvious (alone or in combination with many other references considered by the patent examiner). CX-1; CX

FF 454. The deKok '457 patent recognizes that it is known to use preformed structures of metal powders or fibers, or mixtures of metal powders and fibers. RX-117 at 2:33-35.

FF 455. The deKok '457 patent discloses the inclusion of patterned abrasive particles by urging them into the carrier. RX-117 at 2:38-42. 742.

FF 456. the deKok '457 patent teaches that after the abrasive particles are urged into the carrier, the carrier can be sintered. RX-117 at 2:42-44.

FF 457. The Oliver '869 patent, issued on April 17, 1990, is prior art to the '489 patent. RX-152.

FF 458. The Oliver '869 is not cited in the prosecution history of the '489 patent. CX-1, CX-2.

FF 459. The Oliver '869 patent discloses a bonded abrasive grit structure that is brazeable to a tool surface by infiltration of a brazing material therethrough. Oliver '869 patent abstract, RX-152.

FF 460. The Oliver '869 patent discloses the use of metal powders including diamond setting powders. The Oliver '869 patent, RX-152, 2:43-47.

FF 461. The Oliver '869 patent discloses the use of abrasive particles and a metal powder. RX-152.

FF 462. The Nickola '717 patent, issued on July 7, 1987, is prior art to the '489 patent. RX-149.

FF 463. The Nickola '717 is not cited in the prosecution history of the '489 patent. CX-1, CX-2.

FF 464. The Nickola '717 patent discloses coatings applied to metal strips to improve resistance to oxidation, corrosion, or similar stresses, or to improve appearance, paintability or weldability. Nickola '717 patent, RX-149, 1:18-24.

FF 465. the Nickola '717 patent discloses that the mixture of liquid binder and metal powder forms a flexible coating which exhibits a degree of flexibility required for handling and processing. Nickola '717 patent, RX-149, 3:51-64.

FF 466. The Davies '884 patent, issued on April 4, 1972, is prior art to the '489 patent. RX-139.

FF 467. The Davies '884 patent is not cited in the prosecution history of the '489 patent. CX-1, CX-2.

FF 468. The Lowder '673 is not cited in the prosecution history of the '489 patent. CX-1; CX-2; Strong, Tr. 1667:2-8; Tselesin, Tr. 1207:6-11.

FF 469. Claim 1 of the '489 patent is not obvious in view of Steigelman '214. Strong Tr. at 1606:16-1609:7; *see also* Williamson Tr. at 1292:24-1293:8; 1304:6-15.

FF 470. The bi-layered tape taught in Steigelman '214 is purposefully and necessarily *bi-layered.* In fact, each and every claim of Steigelman '214 requires that the tape be *bi-layered.* Strong Tr. at 1606:16-1609:7; Williamson Tr. at 1292:24-1293:8; 1304:6-15. Moreover, there are other elements of claim 1 and of the '489 patent that are not taught or suggested by Steigelman '214. Strong Tr. at 1606:16-1609:7.

FF 471. Claim 1 of the '489 patent is not obvious in view of Steigelman '214, deKok '457, or the combination of Steigelman '214 and deKok '457 because neither reference suggests that the two references could be combined. Strong Tr. at 1606:16-1609:7; Williamson Tr. at 1292:24-1293:8; 1304:6-15; CX-1; CX-2.

FF 472. Claim 1 of the '489 patent is not obvious in view Steigelman '214, Nickola '717, or the combination of Steigelman '214 and Nickola '717 because neither Steigelman '214 nor Nickola '717 states or suggests that the two references could be combined. Strong Tr. at 1606:16-1609:7; Williamson Tr. at 1292:24-1293:8; 1304:6-15; CX-1; RX-147, RX-149.

FF 473. Claim 1 of the '489 patent is not obvious in view Steigelman '214, Davies '884, or the combination of Steigelman '214 and Davies '884 because neither

Steigelman '214 nor Davies '884 states or suggests that the two references could be combined. Strong Tr. at 1606:16-1609:7; *see also* Williamson Tr. at 1292:24-1293:8; 1304:6-15; CX-1; RX-147, RX-139.

FF 474. Neither the deKok '457 nor the Nickola '717 patent teach all of the elements of claim 1 of the '489 patent. RX-117; RX-149.

FF 475. Claim 1 of the '489 patent is not obvious in view deKok '457, Nickola '717, or the combination of deKok '457 and Nickola '717 because neither deKok '457 nor Nickola '717 states or suggests that the two references could be combined. CX-1; CX-2; RX-117, RX-149.

FF 476. The volume of binder used in the 3M process is approximately [ ] of the binder-powder mixture in terms of volume. Visser, Tr. 549:8-15.

FF 477. The volume of powder used in the 3M process is approximately [ ] of the binder-powder mixture in terms of volume. Visser, Tr. 549:16-550:5.

FF 478. Rodel currently has [ ] DiaGrid® pad conditioners stored at its warehouse in Delaware. CX-428C, 45:24-46:2; Sung, Tr. 625:12-15.

FF 479. As of June 30, 2001, Rodel had sold less than [ ] of DiaGrid® CMP pad conditioners in the United States. CX-375C.

FF 480. Kinik's DiaGrid® pad conditioners are of good products. Thornton, Tr. 976:1-13.

FF 481. Kinik's DiaGrid® pad conditioners are generally more expensive than 3M's pad conditioners. Thornton, Tr. 984:15-17; 984:23-985:7; 985:25-986:1; Visser, Tr. 509:20-510:8; 543:6-15; CX-83C; CX-307C; CX-308C.

FF 482. Theoretically, at approximately 30% liquid, the particle-to-particle bonds in sintered structures begin to break up. Eagar, Tr. 1798:1-8.

FF 483. The remnants of powder particles identified by Professor German change as a result of heating to [ ] because the particles lose boron and silicon during the heating cycle. German, Tr. 1834:1-2.

FF 484. Professor Strong testified that the '489 patent describes the conversion of a composite material into an abrasive article. Strong Tr. at 77:7-8.

FF 485. Professor Strong testified that a person of ordinary skill in the art would have some experience in the making of composite parts into various abrasive articles and other composite parts into other types of articles besides those which might be used for abrasives. Strong Tr. at 150:17 – 151:2.

FF 486. Dr. German testified that the relevant art is powder metallurgy, ceramics, cemented carbides, and some composite fields, including the making of abrasive articles. German Tr. at 267:8-11.

FF 487. The Abstract of the '489 patent includes the following language: "[a] method for making abrasive articles us[ing] a soft, easily deformable and flexible preform having a high binder content. The binder gives the preform its integrity and is present in greater quantity than the retaining powder." CX-1 at Abstract, lines 1-4.

FF 488. Kinik does not dispute that it practices the step of "including a plurality of abrasive particles at least partially in said preform" in claim 1 of the '489 patent. Strong Tr. at 1716:3-10; Roth Tr. at 1878-79.

FF 489. Dr. Shiue testified that his understanding of sintering is consistent with the definition of sintering in the *Metals Handbook.* Shiue Tr. at 643:3-6.

FF 490. The definition of sintering in SX-1 includes the following language: "to cause to become a coherent mass by heating without melting." SX-1.

FF 491. Dr. Laraia testified that during heating of an alloy that completely melts, "I would consider what happens on the way up to the point where melting has occurred as a sintering process ... Sintering can occur as the metal – as the entire material is melted." Laraia Tr. at 917:15-20.

FF 492. Sintering and neck growth requires contact between powder particles. German, Tr. 386:4-9.

FF 493. Sintering requires the presence of solid materials. Tselesin, Tr. 1213:18-20; Preston, Tr. 1011:21-23; SX-1; SX-3; SX-5; SX-7.

FF 494. While sintering may be evidenced by neck growth, sintering requires the bonding of solid material into a solid mass. German Tr. at 477:2-19.

FF 495. The definition of liquid phase sintering in SX-6 contains the following language: "sintering process which . . . maintains a small volume of liquid around the powder particles." SX-6 at 189.

FF 496. Liquid phase sintering requires the presence of solid material. Strong, Tr. 1713:12-14.

FF 497. Professor Strong testified that an abrasive article is formed when all three of the steps recited in claim 1 of the '489 patent are performed. Strong Tr. at 145:12-15.

FF 498. The '489 patent's disclosure of post-sintering steps such as cleaning and cutting of the sintered assembly into pieces and mounting the pieces onto a carrier are to create the final product. CX-1, 13:55-58, 14:10-13, 14:40-43, 15:14-17, 15:43-46, 16:12-15.

FF 499. The Summary of the Invention section of the '489 patent includes the following language: "[f]inal processing of the SEDF preform of the present invention includes sintering or other heat treating. The result is a high quality abrasive material, with or without a porous layer therein, which can be used for numerous cutting or abrasive tools and the like." CX-1, 3:27-31.

FF 500. Kinik provided samples of its pull sheet to counsel for Complainants who then provided it to Professor German. German, Tr. 1395:16-23; CPX-17C.

FF 501. Professor German heated one quarter sample of Kinik's pull sheet mounted on a stainless steel substrate from CPX-17C to [ ] in accordance with the DiaGrid heating cycle, and then cooled and removed it from the furnace. German, Tr. 1395:20-1396:6

FF 502. Based on his heating of the pull sheet to [ ] and then cooling and removing it from the furnace and Dr. Strong's glass abrasion test using the article, Professor German opined that an abrasive article had been formed. German, Tr. 462:15-17, 1397:17-1398:5

FF 503. Professor Strong based his opinion that an abrasive article has been formed on the sample that was heated to [ ] and then cooled and removed from the furnace by Dr. German as well as his observation and the outcome of a glass abrasion test. German Tr. at 1397:17-22; Strong Tr. at 1637:18 – 1638:3, 1708:10-13.

FF 504. An abrasive article exists when an article capable of abrading comes into existence.. German, Tr. 550:21-23, 1642:24-25; Shiue, Tr. 704:5-9, 706:19-707:2, 762:21-763:9.

FF 505. Dr. German testified that a person of ordinary skill in the art would characterize an abrasive article as hard, and that it could be used to abrade a material. German Tr. at 1397:17-22.

FF 506. Dr. German testified that liquid phase sintering occurs in the DiaGrid products during the DiaGrid heating cycle above [ ] German Tr. at 295:12 – 296:10, 477:2 – 479:7, 1404:1-19, 1431:15 – 1433:1, 1455:6 – 1456:25.

FF 507. Professor Strong testified that an abrasive article was formed [ ] during the DiaGrid process. Strong Tr. at 1709:11-23.

FF 508. A solid state sintered structure is formed at [ ] and that the resultant article was successfully used to abrade glass. CX-393; German Tr. at 309:8-11, 311:18 – 313:19; Sung Tr. at 606:8 – 608:2; Shiue Tr. at 705:7 – 706:12; Williamson Tr. at 1294:2 – 1296:1; German Tr. at 1394:5 – 1395:2; Eager Tr. at 1793:24 – 1794:15; CPX-17C; German Tr. at 1397:17 – 1398:5; Strong Tr. at 1637:18 – 1638:3, 1708:10-13.

FF 509. Professor German testified that dendritic structures form from liquids that had solidified. German, Tr. at 1492:2-21, 1576:13-18.

FF 510. Dr. German measured the thickness of the preform material on the Kinik DiaGrid wire saw bead by using calipers. German Tr. at 295:12 – 296:10, 477:2 – 479:7, 1404:1-19, 1431:15 – 1433:1, 1455:6 – 1456:25.

FF 511. Surface tension forces are inherent in all liquids even if loose and sintered solids are present. Strong, Tr. 1678:23-1679:10; Eagar, Tr. 1779:18-20; Sung, Tr. 1075:15-18.

FF 512. Professor Strong testified that, generally, it is possible that surface tension forces can be greater than the force of gravity. Strong Tr. at 1679:3-14.

FF 513. Professor German's calculations on surface tension and gravitational forces were not disclosed. German, Tr. 349:14-350:5.

FF 514. Dr. German testified that his calculations of surface tension forces were based on a different geometry than what is shown in RX-290. German Tr. at 1584:9-12.

FF 515. CX-381 includes the following language: "an appropriate warehousing facilit[y] as necessary in Rodel's reasonable judgment to service the immediate requirements of its [Rodel's] customers" for the DiaGrid® pad conditioners. CX-381C at t 3(c).

FF 516. 3M has been aware of the fact that Rodel distributes DiaGrid pad conditioners since approximately August 2000.. Complaint at 7.1 and Exhibit 15.

FF 517. The initial Complaint filed by Complainants in January 2001 asserts the following: Rodel "is the United States distributor of Kinik products including the DiaGrid® CMP pad conditioner." Complaint at 7.1.

FF 518. Rodel has never been named as a Respondent in the present investigation. Complaint and Amended Complaint.

FF 519. 3M and UAL entered into a License Agreement effective December 22, 1993. CX- 41C; see also CFF 305.

FF 520. The "Background" section of the '489 patent contains a discussion of several prior art methods for making abrasive articles using some type of preform and other prior art using known soft and flexible preforms which had not, however, been used for making abrasive articles. CX-1, col. 1, ln. 18- col. 2, ln. 52.

FF 521. The prior art methods for making abrasive articles involved using a preform of compacted powder mixtures termed "green compacts" (CX-1, col. 1, ll. 18-28), non-compacted powder mixtures in a mold (CX-1, col. 1, ll. 29-37), or powders sprayed onto a substrate previously sprayed with an adhesive (CX-1, col. 1, ln. 60- col. 2, ln. 10).

FF 522. Soft and flexible preforms containing up to 95% binder by weight were known and used for attaching parts together and for repair of worn parts in other industries but not for the manufacture of articles with abrasive particles on or within the preform. CX-1, col. 2, ll. 4-26.

FF 523. Kinik either imports the accused products into the United States, or has them imported into the United States. Stipulation 5, Kinik Prehearing Statement at 16.

FF 524. The preamble of claim 1 describes the prior art process of forming an abrasive article through the steps of combining abrasive particles and a sinterable matrix material and sintering "to form the article". Strong Tr. 71-72, 80.

FF 525. The terms "soft," "deformable," "flexible," and "preform" are not technical terms. Strong Tr. 90, 91, 165; Preston Tr. 1017; Williamson Tr. 1258.

FF 526. The ability to be cut by a scissors and the ability to be bent were identified in the '489 specification as qualities of a soft, easily deformable and flexible preform. CX-1, col. 7, ll. 37-42; col. 13, ll. 35-37; col. 13, ll. 65-67; col. 14, ll. 20-23; col. 14, ll. 55-58; col. 15, ll. 25-27; and col. 15, ll. 53-55.

FF 527. A green compact of the prior art was held together by the mechanical interaction of the particles and was not soft, easily deformable or flexible.

FF 528. A soft, easily deformable and flexible preform is one that is soft enough to cut with a scissors or knife and to press abrasive particles into, deformable enough to form the desired shape of the abrasive article, and flexible enough to both assume complex shapes and withstand mechanical processing without breaking. CX-1.

FF 529. The phrase "a mixture of said powdered sinterable matrix material and a liquid binder composition" has no special meaning in the art and is not specially defined in the specification. CX-1.

FF 530. "Mixture" requires that powdered sinterable matrix material and a liquid binder composition are combined. CX-1.

FF 531. The phrase "then sintering said preform" requires that the sintering step be performed after forming the soft, easily deformable and flexible preform containing the abrasive particles. Strong Tr. 145.

FF 532. "Sintering" in claim 1 requires heating the soft, easily deformable and flexible preform to a temperature below the melting point of the preform so as to bond adjacent particles of the preform into a solid rigid mass. SX-3 at 1835; *accord,* SX-6 at 292; SX-1 at 1101; RX-226; Strong Tr. 134, 221-23; German Tr. 261, 385; Shiue Tr. 642-43.

FF 533. The phrase "to form said abrasive article" means the cumulative intended result of all the preceding steps but need not need be the final step in the manufacture of an abrasive article or a commercial product. Strong Tr. 1646-47, 1707.

FF 534. The '489 patent specification contains examples where post-sintering steps are performed to create the final abrasive product. *See* CX-1, col. 13, ll. 55-58, col. 14, ll. 10-13, col. 14, ll. 40-43, col. 15, ll. 14-17, col. 15, ll. 43-46, col. 16, ll. 12-15.

FF 535. The phrase "the plurality of abrasive particles are included in the preform by placing the particles on at least one side of the preform and urging the particles into said preform" means that the abrasive particles should be placed on at least one side of the soft, easily deformable and flexible preform followed by pressing or forcing the abrasive particles into the surface of the preform to some extent. The soft, easily deformable and flexible preform of claim 1 itself may or may not contain abrasive particles. Strong Tr. 143-44.

FF 536. Complainants have alleged that the process Kinik uses to manufacture its DiaGrid products infringes claims 1, 4, 5, and 8 of the '489 patent.

FF 537. Kinik makes a soft, easily deformable, and flexible preform consisting of metal powder and a liquid binder. Strong Tr. 118-19, 123, 126, 130-31, 140, 242, 250; Sung Tr. 595.

FF 538. The DiaGrid process begins with mixing a single powdered sinterable matrix material [ ] and a liquid binder composition [ ] CPX-2AC; Strong Tr. 97-98, 111-12, 241; Shiue Tr. 647-48. Sung Tr. 594:18-25, 1062:2-6, 1062:21-1063:1;

FF 539. The Kinik single prealloyed powder used in the process is either [ ]

or [ ] (Kinik substituted the former for the latter). Both [ ] and [ ] contain [ ] They are substitutes for each other. German Tr. 375-76; Sung Tr. 593-94.

FF 540. [ ] CPX-2AC; RX-24C at K001713-14; Strong Tr. 240, 1620; Sung Tr. 596.

FF 541. Kinik's preform is soft, easily deformable and flexible. CPX-2AC; Strong Tr. 112-14, 117, 241-42, 1611 (soft, easily cut, flexible); Sung Tr. 597 and Williamson Tr. 1315, 1322-24 (flexible); Strong Tr. 116, 242 and Williamson Tr. 1323, 1324 (deformable).

FF 542. Kinik's DiaGrid process includes a multistage heating process with [ ] CX-95; German Tr. 262-63, 308-09, 318-19; Sung Tr. 604, 606, 609-10; Shiue Tr. 648-49, 677; Hwang Tr. 851; Williamson Tr. 1293-94.

FF 543. After heating step at [ ] Kinik's preform is no longer soft, easily deformable, or flexible, but is instead a hard and solid mass capable of scratching glass. CPX-17; German Tr. 313-14, 1397-98, 1400; Sung Tr. 608-09; Shiue Tr. 708, 712-13; Eager Tr. 1794-95; Strong Tr. 1637; 1707-08.

FF 544. During [ ] particles of the sinterable matrix material in Kinik's preform coalesce and bond together into a single coherent mass. CPX-17; Sung Tr. 606-09; Shiue Tr. 706, 708-09, 712-13; Strong Tr. 1622-24; Eager Tr. 1795; German Tr. 313-14.

FF 555. The Kinik product after [ ] exhibits extensive sinter bonding between the particles, also referred to as "necking." CDX-64C; CX-393; RX-4C at p. 9; Strong Tr. 1624, German Tr. 312-13, 1394, 1467-68, 1503; Sung Tr. 608, 1177; Shiue Tr. 686-687, 705-06, 708 , 712; Eager Tr. 1795.

FF 556. Sintering of the Kinik preform occurs at [ ] Shiue Tr. 706; Sung Tr. 607,; Williamson Tr. 1270, 1294-95; Eager Tr. 1794, 1796.

FF 557. Kinik places its diamonds into the soft, easily deformable and flexible preform in a non-random pattern. Strong Tr. 132; Sung Tr. 599, 1047-48; Shiue Tr. 647-48.

FF 558. After heating at [ ] 3M's preform has been sintered and has become an article capable of abrasion. Visser Tr. 534-35.

APPENDIX

RECOMMENDED DETERMINATION ON REMEDY AND BONDING

Limited Exclusion Order

A limited exclusion order barring importation of all Kinik abrasive products manufactured using a process that infringes claims 1, 4, 5 and 8 of the '489 patent, including the DiaGrid® process.

Scope of Exclusion from Entry

The exclusion order should be directed to entry for consumption only.

Infringing Products

The exclusion order should be directed against the following Kinik abrasive products:

Kinik abrasive products that infringe claims 1, 4, 5 or 8 of the '489 patent, including without limitation the following products:

- DiaGrid® CMP pad conditioners;
- DiaGrid® wire saw beads;
- DiaGrid® profile wheels; and
- DiaGrid® turbo diamond discs.

Cease and Desist Order

Kinik maintains a significant inventory of infringing DiaGrid® CMP pad conditioners in the United States. Rodel, Kinik's United States marketing agent, as of July 26, 2001, maintained [ ] pad conditioners, with an estimated value of [ ] in its inventory. Therefore, a cease and desist order against Kinik, and any of its affiliated companies, parents, subsidiaries, contractors, and other related business entities, and its successors or assigns, is appropriate. This cease and desist order prohibits Kinik and its agents and contractors from importing, renaming, selling, advertising, distributing, marketing, transferring, of offering for sale Kinik's accused products in the United States, and from otherwise renaming, selling advertising, distributing, marketing, transferring, or offering for sale Kinik's accused products outside the United States for sale in the United States.

Bonding During Presidential Review Period

The evidence demonstrates that Kinik's accused products cost the same as or more than 3M's for the most part. The relative prices of the accused and domestic products are

readily available, and were made known during the trial. It would therefore appear that a reasonable royalty rate would be the most appropriate form of bond during the Presidential review period. See Certain Integrated Circuit Telecommunication Chips and Products Containing Same, Inv. No. 337-TA-337, Commission Opinion at 41 (1993).

In this instance, 3M and UAS have entered into a license agreement for the '489 patent that set a royalty rate of 5 %. CX-41. In view of the objective of the bond "to protect the complainant from any injury" during the 60-day Presidential review period as set forth in Section 337(j)(3) (emphasis added), it is therefore appropriate to take the 5 % royalty rate negotiated between 3M and UAS as the maximum amount that would protect 3M from the full range of possible injuries. Accordingly, a bond in the amount of 5 % of the entered value of any infringing Kinik DiaGrid® abrasive product is recommended.

Within seven days of the date of this document, each party shall submit to the office of the Administrative Law Judge a statement as to whether or not it seeks to have any portion of this document deleted from the public version. The parties' submissions may be made by facsimile and/or hard copy by the aforementioned date.

Any party seeking to have any portion of this document deleted from the public version thereof must submit to this office a copy of this document with red brackets indicating any portion asserted to contain confidential business information. The parties' submissions concerning the pub lic version of this document need not be filed with the Commission Secretary.

Delbert R. Terrill, Jr.
Administrative Law Judge

Washington, D.C.

CERTAIN ABRASIVE PRODUCTS MADE USING A PROCESS FOR MAKING POWDER PREFORMS, AND PRODUCTS CONTAINING SAME

INV. NO. 337-TA-449

CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached ORDER was served upon, Karin J. Norton, Esq., Commission Investigative Attorney, and the following parties via first class mail and air mail where necessary on March 27, 2002.

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U.S. International Trade Commission
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CERTAIN ABRASIVE PRODUCTS MADE USING A PROCESS FOR MAKING POWDER PREFORMS, AND PRODUCTS CONTAINING SAME

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