The Boeing Company
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February 7, 2011

Mr. Timothy Mooney
Export Policy Analyst
Office of Exporter Services, Regulatory Policy Division
Bureau of Industry and Security, Department of Commerce
1401 Constitution Avenue, N.W., Room 2705
Washington, D.C. 20230

Subject: **Notice of Inquiry – CCL**
Commerce Control List: Revising Descriptions of Items and Foreign Availability

Dear Mr. Mooney:

Thank you for the opportunity to comment on the proposed rule referenced above. The Boeing Company (hereinafter "Boeing") commends and fully supports the effort by the Bureau of Industry and Security (BIS) to review the Commerce Control List (CCL) so that it better reflects U.S. national security concerns in a much changed global trade and technology environment. Similarly, we appreciate the opportunity to provide information relating to the proposed tiering of the CCL and examples of foreign availability that may impact the level of control imposed by the U.S. government.

Boeing supports a tiered CCL that is based on the level of military or intelligence advantage that items on the list provide to the U.S, as well as on the availability of those items outside a certain group of countries (as defined in 75 FR 76665-76666). Generally speaking, tiering placement that would require licensing of items that are available outside the U.S. would not improve national security, and could instead result in an increased regulatory burden and a competitive disadvantage to U.S. companies due to more rigorous licensing practices in the United States. We believe that moving to a tiered system will strengthen the U.S. export control system and allow for greater predictability and clarity for both industry and government stakeholders.

Attached please find Boeing's specific comments. We focused our efforts on those items that are most relevant to our business and selected ECCNs for comment where either licenses are currently required or where our engineers have encountered issues relating to clarity. While there are other ECCNs that are applicable to Boeing's products and technologies, those selected for comment identify key areas where we believe substantive, meaningful improvements can be realized.

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As requested, we have also provided data on foreign availability for certain products and technologies where we have direct knowledge and experience.

Once again, thank you for offering industry the opportunity to comment and provide input. Boeing looks forward to continued engagement with BIS on export reform initiatives and moving to the implementation phase. Should you have questions or require further information, please feel free to contact me at (703) 465-3505 in our Washington, D.C. office.

Sincerely,

Stephanie A. Reuer
Director, Global Trade Controls
International, Policy & License Administration

Comments

1. Request for Comments on How to Make the CCL More Clear and "Positive"

In order to prioritize and organize our comments, Boeing has selected ECCNs under which our equipment and technologies are controlled and that currently require licenses or where we have experienced issues with the clarity of the control language. While there are other ECCNs that are applicable to Boeing's products and technologies, those selected for comment identify key areas where we believe substantive, meaningful improvements can be realized.

ECCN	**1A002**
Current ECCN Description	1A002 "Composite" structures or laminates, having any of the following (see List of Items Controlled). License Requirements Reason for Control: NS, NP, AT Control(s) Country Chart NS applies to entire entry NS Column 2 NP applies to 1A002.b.1 in the form of tubes with an inside diameter between 75 mm and 400 mm NP Column 1 AT applies to entire entry AT Column 1 License Requirement Notes: See 743.1 of the EAR for reporting requirements for exports under License Exceptions. License Exceptions LVS: $1,500; N/A for NP; N/A for "composite" structures or laminates controlled by 1A002.a, having an organic "matrix" and made from materials controlled by 1C010.c or 1C010.d. GBS: N/A CIV: N/A List of Items Controlled Unit: Kilograms Related Controls: (1) See ECCNs 1E001 ("development" and "production") and 1E201 ("use") for technology for items controlled by this entry. (2) Also see ECCNs 1A202, 1C010, 1C210, 9A010, and 9A110. (3) "Composite" structures specially designed for missile applications (including specially designed subsystems and components) are controlled by ECCN 9A110. (4) "Composite" structures or laminates specially designed or prepared for use in separating uranium isotopes are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110). Related Definitions: N/A Items:

	[entry truncated for ease of review]
Proposed ECCN Changes	***Add a new technical note at the end of the description for ECCN 1A002 as follows:*** ***Note 4: For the purposes of this ECCN, "finished" is defined as either following completion of the final product or readiness for the next level of assembly processing.***
Issue/ Rationale	**Because there are often modifications to parts that are performed at locations other than the site of the part fabrication, "finished" should be defined in such a way that the part can be exported without license even though some production steps will be applied to the part to enable installation following export. The key example for this is spares support for commercial airplanes in which composite spare parts need to be exported to the site of a damaged aircraft. At that repair site some processing will be required including trim/drill, application of protective coatings, etc. The part should be considered to be ready for export as a 9A part as opposed to a semi-finished article controlled by 1A002.**
ECCN	**1B003**
Current ECCN Description	1B003 Tools, dies, molds or fixtures, for "superplastic forming" or "diffusion bonding" titanium, aluminum or their alloys, specially designed for the manufacture of any of the following (see List of Items Controlled). License Requirements Reason for Control: NS, AT Control(s) Country Chart NS applies to entire entry NS Column 2 AT applies to entire entry AT Column 1 License Exceptions LVS: $5000 GBS: N/A CIV: N/A List of Items Controlled Unit: Tools in number; dies, molds, or fixtures in $ value Related Controls: For specially designed production equipment of systems, sub-systems and components controlled by 9A005 to 9A009, 9A011, 9A101, 9A105 to 9A109, 9A111, and 9A116 to 9A120 usable in "missiles", see 9B115. Related Definitions: N/A Items: a. Airframe or aerospace structures; b. "Aircraft" or aerospace engines; or c. Specially designed components for structures specified by 1B003.a or for engines specified by 1B003.b.

Proposed ECCN Changes	***No change in wording proposed.*** ***However, Boeing proposes that these items be moved to a new ECCN falling within Category 2, Materials Processing.***
Issue/ Rationale	**The items currently identified within ECCN 1B003 are not materials, but rather are items used in the processing of materials, and therefore would be more appropriately captured under Category 2.**
ECCN	**1B102**
Current ECCN Description	1B102 Metal powder "production equipment," other than that specified in 1B002, and components as follows (see List of Items Controlled). License Requirements Reason for Control: MT, AT Control(s) — Country Chart MT applies to entire entry — MT Column 1 AT applies to entire entry — AT Column 1 License Exceptions LVS: N/A GBS: N/A CIV: N/A List of Items Controlled Unit: Equipment in number; components in $ value Related Controls: 1.) See also 1B115.b. Related Definitions: N/A Items: a. Metal power "production" equipment usable for the "production," in a controlled environment, of spherical or atomized materials specified in 1C011.a, 1C011.b, 1C111.a.1, 1C111.a.2, or on the U.S. Munitions List.
Proposed ECCN Changes	**Revise wording of 1B102.a as follows:** **1B102 Metal powder "production equipment," other than that specified in 1B002, and components as follows (see List of Items Controlled).** **a. Metal power "production" equipment usable for the "production," in a controlled environment, of spherical, *directly reduced* or atomized materials specified in 1C011.a, 1C011.b, 1C111.a.1, 1C111.a.2, or on the U.S. Munitions List.**
Issue/ Rationale	**New direct reduction powder processes (Armstrong, MER, etc) can directly make unique chemistry powders in a variety of shapes without needing**

	atomization. Adding this wording ensures that all of the equipment that can produce materials with the properties of concern are included in 1B102.a.
ECCN	**1C002**
Current ECCN Description	1C002 Metal alloys, metal alloy powder and alloyed materials, as follows (see List of Items Controlled). License Requirements Reason for Control: NS, NP, AT Control(s) — Country Chart NS applies to entire entry — NS Column 2 NP applies to 1C002.b.3 or b.4 if they exceed the parameters stated in 1C202 — NP Column 1 AT applies to entire entry — AT Column 1 License Exceptions LVS: $3000; N/A for NP GBS: N/A CIV: N/A List of Items Controlled Unit: Kilograms Related Controls: (1) See ECCNs 1E001 ("development" and "production") and 1E201 ("use") for technology for items controlled by this entry. (2) Also see ECCN 1C202. (3) Aluminum alloys and titanium alloys in physical forms and finished products specially designed or prepared for use in separating uranium isotopes are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110). Related Definition: N/A Items: Note: 1C002 does not control metal alloys, metal alloy powder and alloyed materials, for coating substrates. Technical Note 1: The metal alloys in 1C002 are those containing a higher percentage by weight of the stated metal than of any other element. Technical Note 2: 'Stress-rupture life' should be measured in accordance with ASTM standard E-139 or national equivalents. Technical Note 3: 'Low cycle fatigue life' should be measured in accordance with ASTM Standard E-606 'Recommended Practice for Constant-Amplitude Low-Cycle Fatigue Testing' or national equivalents. Testing should be axial with an average stress ratio equal to 1 and a stress-concentration factor (Kt) equal to 1. The average stress is

	defined as maximum stress minus minimum stress divided by maximum stress. **[subcategories a, b, and d removed for ease of review]** c. Metal alloy powder or particulate material, having all of the following: c.1. Made from any of the following composition systems: Technical Note: X in the following equals one or more alloying elements. c.1.a. Nickel alloys (Ni-Al-X, Ni-X-Al) qualified for turbine engine parts or components, i.e. with less than 3 non-metallic particles (introduced during the manufacturing process) larger than 100 æm in 109 alloy particles; c.1.b. Niobium alloys (Nb-Al-X or Nb-X-Al, Nb-Si-X or Nb-X-Si, Nb-Ti-X or Nb-X-Ti); c.1.c. Titanium alloys (Ti-Al-X or Ti-X-Al); c.1.d. Aluminum alloys (Al-Mg-X or Al-X-Mg, Al-Zn-X or Al-X-Zn, Al-Fe-X or Al-X-Fe); or c.1.e. Magnesium alloys (Mg-Al-X or Mg-X-Al); c.2. Made in a controlled environment by any of the following processes: c.2.a. "Vacuum atomization"; c.2.b. "Gas atomization"; c.2.c. "Rotary atomization"; c.2.d. "Splat quenching"; c.2.e. "Melt spinning" and "comminution"; c.2.f. "Melt extraction" and "comminution"; or c.2.g. "Mechanical alloying"; and c.3. Capable of forming materials controlled by 1C002.a or 1C002.b;
Proposed ECCN Changes	**Make the following changes under the ECCN description of ECCN 1C002:** **(a) Change the wording of 1C002.c.2.h to read as follows:** **1C002 Metal alloys, metal alloy powder and alloyed materials, as follows (see List of Items Controlled).** **c. Metal alloy powder or particulate material, having all of the following:** **c.1. Made from any of the following composition systems:** **Technical Note: X in the following equals one or more alloying elements.**

	c.1.a. Nickel alloys (Ni-Al-X, Ni-X-Al) qualified for turbine engine parts or components, i.e. with less than 3 non-metallic particles (introduced during the manufacturing process) larger than 100 æm in 109 alloy particles; **c.1.b. Niobium alloys (Nb-Al-X or Nb-X-Al, Nb-Si-X or Nb-X-Si, Nb-Ti-X or Nb-X-Ti);** **c.1.c. Titanium alloys (Ti-Al-X or Ti-X-Al);** **c.1.d. Aluminum alloys (Al-Mg-X or Al-X-Mg, Al-Zn-X or Al-X-Zn, Al-Fe-X or Al-X-Fe); or** **c.1.e. Magnesium alloys (Mg-Al-X or Mg-X-Al);** **c.2. Made in a controlled environment by any of the following processes:** **c.2.a. "Vacuum atomization";** **c.2.b. "Gas atomization";** **c.2.c. "Rotary atomization";** **c.2.d. "Splat quenching";** **c.2.e. "Melt spinning" and "comminution";** **c.2.f. "Melt extraction" and "comminution"; or** **c.2.g. "Mechanical alloying"; ~~and~~ *or*** ***c.2.h "Direct Reduction" and*** **c.3. Capable of forming materials controlled by 1C002.a or 1C002.b;** **(b) Add definition for "Direction Reduction" to support proposed change in wording to 1C002.c.2 as follows:** ***Direct Reduction - the making of a metal alloy powder by taking mixed oxides, chlorides, etc and reducing them together by chemical, electrochemical, or other methods.***
Issue/ Rationale	**New direct reduction powder processes (Armstrong, MER, etc) can directly make high-purity alloy powders in a variety of shapes without needing the other processes.**
ECCN	**1C008**
Current ECCN Description	1C008 Non-fluorinated polymeric substances as follows (see List of Items Controlled). License Requirements Reason for Control: NS, AT

	Control(s) Country Chart NS applies to entire entry NS Column 2 AT applies to entire entry AT Column 1 License Exceptions LVS: $200 GBS: N/A CIV: N/A List of Items Controlled Unit: Kilograms Related Controls: See also 1A003. Related Definitions: N/A Items: a. Non-fluorinated polymeric substances, as follows: a.1. Bismaleimides; a.2. Aromatic polyamide-imides; a.3. Aromatic polyimides; a.4. Aromatic polyetherimides having a 'glass transition temperature (Tg)' exceeding 513K (240ø C). Note: 1C008.a controls the substances in liquid or solid "fusible" form, including resin, powder, pellet, film, sheet, tape, or ribbon. N.B.: For non-"fusible" aromatic polyimides in film, sheet, tape, or ribbon form, see ECCN 1A003. **[remaining subcategories truncated for ease of review]**
Proposed ECCN Changes	**Add a new note to 1C008.a as follows:** **1C008 Non-fluorinated polymeric substances as follows (see List of Items Controlled).** **a. Non-fluorinated polymeric substances, as follows:** **a.1. Bismaleimides;** **a.2. Aromatic polyamide-imides;** **a.3. Aromatic polyimides;** **a.4. Aromatic polyetherimides having a 'glass transition temperature (Tg)' exceeding 513K (240ø C).** **Note: 1C008.a controls the substances in liquid or solid "fusible" form,**

	including resin, powder, pellet, film, sheet, tape, or ribbon. **N.B.: For non-"fusible" aromatic polyimides in film, sheet, tape, or ribbon form, see ECCN 1A003.** ***Note: For materials consisting of blends including the materials listed in a.1 through a.4 the classification shall be made based on the resin chemistry of highest percentage in the mixture.***
Issue/ Rationale	**New resins can be developed which are hybrids of differing resin chemistries some of which are controlled by 1C008 and some which are not. There is currently no guidance to assist industry in understanding how to classify such mixtures. Additional clarity in this area may enable more self classifications and fewer requests for commodity classification.**
ECCN	**1C010**
Current ECCN Description	1C010 "Fibrous or filamentary materials" as follows (see List of Items Controlled). License Requirements Reason for Control: NS, NP, AT Control(s) Country Chart NS applies to entire entry NS Column 2 NP applies to 1C010.a (aramid "fibrous or filamentary materials", .b (carbon "fibrous and filamentary materials"), and e.1 for "fibrous and filamentary materials" that meet or exceed the control criteria of ECCN 1C210 NP Column 1 AT applies to entire entry AT Column 1 License Requirement Notes: See 743.1 of the EAR for reporting requirements for exports under License Exceptions. License Exceptions LVS: $1500, N/A for NP GBS: N/A CIV: N/A List of Items Controlled Unit: Kilograms Related Controls: (1) See ECCNs 1E001 ("development" and "production") and 1E201 ("use") for technology for items controlled by this entry. (2) Also see ECCNs 1C210 and 1C990. (3) See also 9C110 for material not controlled by 1C010.e, as defined by notes 1 or 2. Related Definitions: 1.) "Specific modulus": Young's modulus in pascals, equivalent to N/m2 divided by specific weight in N/m , measured at a temperature of (296+2) K ((23+2) øC) and a relative humidity of (50+5)%. 2.) "Specific tensile strength": ultimate tensile strength in pascals, equivalent to N/m2 divided by specific weight in N/m , measured at a temperature of (296+2) K ((23+2) øC) and a relative humidity of (50+5)%.

	Items: a. Organic "fibrous or filamentary materials", having all of the following: a.1. "Specific modulus" exceeding 12.7 x 106 m; and a.2. "Specific tensile strength" exceeding 23.5 x 104 m; Note: 1C010.a does not control polyethylene. b. Carbon "fibrous or filamentary materials", having all of the following: b.1. "Specific modulus" exceeding 14.65 x 106 m; and b.2. "Specific tensile strength" exceeding 26.82 x 104 m; Note: 1C010.b does not control: a. "Fibrous or filamentary materials", for the repair of "civil aircraft" structures or laminates, having all of the following: 1. An area not exceeding 1 m2; 2. A length not exceeding 2.5 m; and 3. A width exceeding 15 mm. b. Mechanically chopped, milled or cut carbon "fibrous or filamentary materials" 25.0 mm or less in length. **[remaining subcategories truncated for ease of review]**
Proposed ECCN Changes	**Change wording of 1C010.b as follows:** **1C010 "Fibrous or filamentary materials" as follows (see List of Items Controlled).** **b. Carbon "fibrous or filamentary materials", having all of the following:** **b.1. "Specific modulus" exceeding 14.65 x 106 m; and** **b.2. "Specific tensile strength" exceeding 26.82 x 104 m;** **Note: 1C010.b does not control:** **a. "Fibrous or filamentary materials", for the repair of "civil aircraft" structures or laminates, having all of the following:** **1. An area not exceeding 1 m2;** **2. A length not exceeding 2.5 m; and** **3. A width exceeding 15 mm.** **b. ~~Mechanically chopped, milled or cut c~~Carbon "fibrous or filamentary materials" 25.0 mm or less in length.**
Issue/ Rationale	**Carbon nanotubes are carbon fibrous materials and are, by nature, much shorter than an inch (25.0 mm) in length. Boeing believes that the note to 1C010.b is intended to exclude nanotubes. However, as currently written, the note does not exclude nanotubes since it only addresses those fibers which have been intentionally shortened using mechanical means. Removing the words, "mechanically chopped, milled, or cut" ensures that nanotubes are excluded.**

	If there is intent to control carbon nanotubes, then the specific tensile strength and modulus parameters in 1C010.b are not appropriate because they cannot be quantified for nanotubes due to the extreme small scale of the nanoparticles (carbon nanotubes have theoretically high but unmeasurable specific strength and modulus). In that case, new parameters would need to be identified which are measureable and consistent with the capability of concern. Because the tensile properties of nanotubes, in general, cannot be physically measured, the argument above relates to all nanotube or nanofiber materials including those that have inorganic chemistries.
ECCN	**1C202**
Current ECCN Description	1C202 Alloys, other than those controlled by 1C002.b.3 or 1C002.b.4 as follows (see List of Items Controlled). License Requirements Reason for Control: NP, AT Control(s) Country Chart NP applies to entire entry NP Column 1 AT applies to entire entry AT Column 1 License Exceptions LVS: N/A GBS: N/A CIV: N/A List of Items Controlled Unit: Kilograms Related Controls: 1) See ECCNs 1E001 ("development" and "production") and 1E201 ("use") for technology for items controlled by this entry. (2) Also see ECCN 1C002. (3) Aluminum alloys and titanium alloys, in physical forms and finished products and specially designed or prepared for use in separating uranium isotopes, are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110). Related Definitions: The phrase "capable of" refers to aluminum alloys and titanium alloys either before or after heat treatment. Items: a. Aluminum alloys having both of the following characteristics: a.1. "Capable of" an ultimate tensile strength of 460 MPa or more at 293 K (20 øC); and a.2. In the form of tubes or cylindrical solid forms (including forgings) with an

	outside diameter of more than 75 mm; b. Titanium alloys having both of the following characteristics: b.1. "Capable of" an ultimate tensile strength of 900 MPa or more at 293 K (20 øC); and b.2. In the form of tubes or cylindrical solid forms (including forgings) with an outside diameter of more than 75 mm.
Proposed ECCN Changes	**Make the following changes under the ECCN description of ECCN 1C202:** **(1) Make the following change to the wording for ECCN 1C202.a.2:** **1C202 Alloys, other than those controlled by 1C002.b.3 or 1C002.b.4 as follows (see List of Items Controlled).** **a. Aluminum alloys having both of the following characteristics:** **a.1. "Capable of" an ultimate tensile strength of 460 MPa or more at 293 K (20 øC); and** **a.2. In the form of tubes or cylindrical solid forms (including forgings) with an outside diameter of more than 75mm; or** ***a.3 Rectilinear forms having a length greater than 75mm and having a width greater than 75 mm and having a thickness greater than 75mm.*** **(2) Make the following change to the wording for ECCN 1C202.b.2:** **1C202 Alloys, other than those controlled by 1C002.b.3 or 1C002.b.4 as follows (see List of Items Controlled).** **b. Titanium alloys having both of the following characteristics:** **b.1. "Capable of" an ultimate tensile strength of 900 MPa or more at 293 K (20 øC); and** **b.2. In the form of tubes or cylindrical solid forms (including forgings) with an outside diameter of more than 75 mm; or** ***b.3. Rectilinear forms having a length greater than 75mm and having a width greater than 75 mm and having a thickness greater than 75mm.***
Issue/ Rationale	**(1) Rationale for changing wording of 1C202.a.2: One can machine rectangular products 75mm thick x 75mm wide into tubes of 75mm diameter with a simple lathe.** **(2) Rationale for changing wording of 1C202.b.2 : One can machine rectangular products 75mm thick x 75mm wide into tubes of 75mm**

	diameter with a simple lathe.
ECCN	**1C990**
Current ECCN Description	1C990 Fibrous and filamentary materials, not controlled by 1C010 or 1C210, for use in "composite" structures and with a specific modulus of 3.18 x 106 m or greater and a specific tensile strength of 7.62 x 104 m or greater. License Requirements Reason for Control: AT Control(s) Country Chart AT applies to entire entry AT Column 1 License Exceptions LVS: N/A GBS: N/A CIV: N/A List of Items Controlled Unit: Kilograms Related Controls: N/A Related Definitions: N/A Items: The list of items controlled is contained in the ECCN heading.
Proposed ECCN Changes	**Change description of 1C990 as follows:** **1C990 Fibrous and filamentary materials *and resin impregnated fibrous and filamentary materials* not controlled by 1C010 or 1C210, for use in "composite" structures and *having fibers* with a specific modulus of 3.18 x 106 m or greater and a specific tensile strength of 7.62 x 104 m or greater.**
Issue/ Rationale	**It is the current practice of the Department of Commerce to classify some resin infused items such as prepreg materials (including BMS8-276 wide tape forms) as 1C990. Because there is a separate listing for resin impregnated fibers in 1C010, there is an implication that other listings for fibrous and filamentary materials that do not mention resin infused forms are not intended to cover those materials. The addition of prepregs and resin infused fiber performs to the text of 1C990 would add to consistency and clarity.**
ECCN	**1E001**
Current ECCN Description	1E001 "Technology" according to the General Technology Note for the "development" or "production" of items controlled by 1A001.b, 1A001.c, 1A002, 1A003, 1A004, 1A005, 1A006.b, 1A007, 1A008, 1A101, 1B (except 1B999), or 1C

	(except 1C355, 1C980 to 1C984, 1C988, 1C990, 1C991, 1C995 to 1C999). **[remaining entry truncated for ease of review]**
Proposed ECCN Changes	**Change description of 1E001 as follows:** **1E001 "Technology" according to the General Technology Note for the "development" or "production" of items controlled by 1A001.b, 1A001.c, 1A002, 1A003, 1A004, 1A005, 1A006.b, 1A007, 1A008, 1A101, 1B (except *1B003*, 1B999), or 1C (except 1C355, 1C980 to 1C984, 1C988, 1C990, 1C991, 1C995 to 1C999).**
Issue/ Rationale	**Remove technology for the "development" or "production" of items controlled by 1B003 from ECCN 1E001. Technology related to these items is captured under 2E003. (See related proposals documented in this Table for ECCNs 1B003 and 2E003.)**
ECCN	**2E003**
Current ECCN Description	2E003 Other "technology", as follows (see List of Items Controlled). License Exceptions CIV: N/A TSR: Yes, except 2E003.a, .b, .e and .f List of Items Controlled a. "Technology" for the "development" of interactive graphics as an integrated part in "numerical control" units for preparation or modification of part programs; b. "Technology" for metal-working manufacturing processes, as follows: b.1. "Technology" for the design of tools, dies or fixtures specially designed for any of the following processes: b.1.a. "Superplastic forming"; b.1.b. "Diffusion bonding"; or b.1.c. "Direct-acting hydraulic pressing"; **[remaining subcategories truncated for ease of review]**
Proposed ECCN Changes	**Change description of 2E003 as follows:** **2E003 Other "technology", as follows (see List of Items Controlled) ....** **b. "Technology" for metal-working manufacturing processes, as follows:** **b.1. "Technology" for the ~~design~~ *"development" or "production"* of tools, dies or fixtures specially designed for any of the following processes:**

	b.1.a. "Superplastic forming"; **b.1.b. "Diffusion bonding"; or** **b.1.c. "Direct-acting hydraulic pressing";**
Issue/ Rationale	**Currently, technology related to the design of tools, dies or fixtures specially designed for "superplastic forming" or "diffusion bonding" is captured under two ECCNs: 1E001 and 2E003. Boeing recommends excluding technology related to 1B003 from ECCN 1E001, and changing the words under 2E003.b.1 to ensure that both development and production technology are captured under ECCN 2E003. (See related recommendations documented under ECCNs 1B003 and 1E001 in this table.)**
ECCN	**7E004**
Current ECCN Description	7E004 Other "technology" as follows (see List of Items Controlled). License Requirements Reason for Control: NS, MT, AT Control(s) Country Chart NS applies to entire entry NS Column 1 MT applies to entire entry, except 7E004.a.7. MT Column 1 AT applies to entire entry AT Column 1 License Exceptions CIV: N/A TSR: N/A List of Items Controlled Unit: N/A Related Controls: See also 7E104 and 7E994 Related Definitions: "Primary flight control" means an "aircraft" stability or maneuvering control using force/moment generators, i.e., aerodynamic control surfaces or propulsive thrust vectoring. Items: **[subcategory a removed for ease of review]** b. "Development" "technology", as follows, for "active flight control systems" (including fly-by-wire or fly-by-light): b.1. Configuration design for interconnecting multiple microelectronic processing elements (on-board computers) to achieve "real time processing" for control law implementation; b.2. Control law compensation for sensor location or dynamic airframe loads,

	i.e., compensation for sensor vibration environment or for variation of sensor location from the center of gravity; b.3. Electronic management of data redundancy or systems redundancy for fault detection, fault tolerance, fault isolation or reconfiguration; Note: 7E004.b.3. does not control "technology" for the design of physical redundancy. b.4. Flight controls that permit inflight reconfiguration of force and moment controls for real time autonomous air vehicle control; b.5. Integration of digital flight control, navigation and propulsion control data, into a digital flight management system for "total control of flight"; Note: 7E004.b.5 does not control: 1. "Development" "technology" for integration of digital flight control, navigation and propulsion control data, into a digital flight management system for "flight path optimization"; 2. "Development" "technology" for "aircraft" flight instrument systems integrated solely for VOR, DME, ILS or MLS navigation or approaches. b.6. Full authority digital flight control or multisensor mission management systems, employing "expert systems"; N.B.: For "technology" for "Full Authority Digital Engine Control Systems" ("FADEC Systems"), see ECCN 9E003.h.
Proposed ECCN Changes	**Change description of 7E004.b.2 as follows:** **7E004 Other "technology" as follows (see List of Items Controlled).** **b. "Development" "technology", as follows, for "active flight control systems" (including fly-by-wire or fly-by-light):** **b.1. Configuration design for interconnecting multiple microelectronic processing elements (on-board computers) to achieve "real time processing" for control law implementation;** **b.2. Control law compensation for sensor location or dynamic airframe loads ~~*i.e., compensation for sensor vibration environment or for variation of sensor location from the center of gravity;*~~** **b.3. Electronic management of data redundancy or systems redundancy for fault detection, fault tolerance, fault isolation or reconfiguration;** **Note: 7E004.b.3. does not control "technology" for the design of physical redundancy.** **b.4. Flight controls that permit inflight reconfiguration of force and moment controls for real time autonomous air vehicle control;**

	b.5. Integration of digital flight control, navigation and propulsion control data, into a digital flight management system for "total control of flight"; **Note: 7E004.b.5 does not control:** **1. "Development" "technology" for integration of digital flight control, navigation and propulsion control data, into a digital flight management system for "flight path optimization";** **2. "Development" "technology" for "aircraft" flight instrument systems integrated solely for VOR, DME, ILS or MLS navigation or approaches.** **b.6. Full authority digital flight control or multisensor mission management systems, employing "expert systems";** **N.B.: For "technology" for "Full Authority Digital Engine Control Systems" ("FADEC Systems"), see ECCN 9E003.h.**
Issue/ Rationale	**The wording as currently written is confusing as it appears to be a clarification for the dynamic airframe loads. BIS has previously confirmed to Boeing that the clarification statement refers only to the control law compensation for sensor location.**

2. Request for Comments on the Availability of CCL Items Outside the U.S.

We are providing foreign availability information for those products and technologies for which we have direct knowledge and experience.

ECCN	**1B001 & 1B101**
Item Description	**1B001** Equipment for the production or inspection of "composite" structures or laminates controlled by 1A002 or "fibrous or filamentary materials" controlled by 1C010, as follows (see List of Items Controlled), and specially designed components and accessories therefor. **1B101** Equipment, other than that controlled by 1B001, for the "production" of structural composites, fibers, prepregs or preforms, usable for rockets, missiles, or unmanned aerial vehicles capable of achieving a "range" equal to or greater than 300 km and their subsystems, as follows (see List of Items Controlled); and specially designed components, and accessories therefor.
Foreign Availability	Tooling listed under 1B001 and 1B101 is very similar to tooling utilized for hand layup of the items cited in these ECCNs. Such tooling is covered by ECCNs 1B999.c and 1E998. The characteristics that typically make them subject to ECCNs 1B001.b, 1B001.g, 1B101.a and 1B101.b are features that are used to orient the tools to the layup machines. These features are typically things like additional holes in tools with bushings and "spud" brackets (a pair of welded assemblies with two flanges that attach to the machine and tool respectively, allowing the tool to be attached to the machine and rotated "rotisserie-style"). These are things that any competent tooling shop anywhere could fabricate and install.

Typically, tooling used with these types of machines tend to be quite large in order to gain the benefits of automation – long courses of materials are more efficiently laid-down with machines than by hand. That is about to change with the advent of a new class of Automated Fiber Placement machine based on automotive-type robots. Boeing, ElectroImpact in Mukilteo, WA, Coriolis Composites in Lorient, France, DLR in Stade, Germany, MAG/Cincinnati in Hebron, KY and others are developing these machines. The robotic-based machines will make much smaller tools usable with these technologies. The tools will be indistinguishable from tools used for hand layup and actually may be utilized by either process. (Note that existing large tools can be used by either process as well; hand layup for large tools is not very efficient).

Current sources known by Boeing for these types of tools:

USA – numerous; including

- Coast Composites (Irvine, CA) http://www.coastcomposites.com/
- Janicki Industries (Sedro-Woolley, WA) http://www.janicki.com/

Other countries (supply base generally not as well known; there is a high probability that these tools could be made in many other locations)

Canada

- Weber Manufacturing, LTD (Midland, Ontario) http://www.webermfg.ca/

Great Britain

- Brookhouse (Cheshire) http://www.brookhouse.net/
- Hyde Group (Manchester) http://www.hydegroup.com/index.asp
- JF Faber (Lancashire) http://www.jffaber.co.uk/index/
- Retrac (Wiltshire) http://www.retrac-group.com/

France

- Latecis (formerly BEAT) (Toulouse; also UK and Romania) http://www.latecisuk.com/default.html
- Compose (formerly Cogemoule) (Bellignat) http://www.compose-tools.com/

Spain

- M Torres (Pamplona) http://www.mtorres.es/
- Ingenia (Castelldefels – Barcelona region) http://www.ingenia.aero/quienesSomos.asp

Australia

- Broens (Sydney) http://www.broens.com.au/broens_nf.html
- Marand (Victoria) http://www.marand.com.au/site/index.php?cat=home&sub=home

Italy

- Eligio Re Frachini (Legnano / Milan) http://www.refraschini.it/en/specials/keel.asp
- Moreggia (Turin & Naples) http://www.moreggia.com/
- Rev Aviation (Chivasso / Turin) http://www.rev-aviation.com/

Japan

- Hikari (Seki, Gifu Prefecture)
- Ryoki (Ichinomiya – Aichi prefecture)

China

- Gurit Red Maple (Taikang) http://www.gurit.com/sector_introduction.asp?section=000100010066

	Specific to NDI equipment classified under 1B001.f, there are many international suppliers; examples include, but are not limited to: - Ultrasonic Sciences Limited (UK) www.ultrasonic-sciences.co.uk - Tecscan (Canada) www.tecscan.ca/pGantrySys.html - ScanMaster (Israel) www.evs-sm.com - Tecnatom (Spain) http://www.tecnatom.es/en/home/markets/aircraft-a-space - www.tecnatom.es/english/catalogo/ficha_producto_pag.php?idProducto=310 - MTorres (Spain) http://www.mtorres.es/default.asp?id=22&menu=02&idmenu=2 - General Electric Inspection Technologies (Germany) http://www.ge-mcs.com/en/ultrasound/integrated-systems.html - Toshiba (Japan) http://www.toshiba.co.jp/index.htm - Midas NDT (UK) http://www.midas-ndt.co.uk/midas.html - PScan (Netherlands) http://www.p-scan.com/cms/site.aspx?p=6248 - Olympus (Canada): http://www.olympus-ims.com/en/?apd=1&adid=rdt&acid=engle&gclid=CljagOeK1qYCFQTNKgod1G0AJA
ECCN	**1B003**
Item Description	1B003 Tools, dies, molds or fixtures, for "superplastic forming" or "diffusion bonding" titanium, aluminum or their alloys, specially designed for the manufacture of any of the following (see List of Items Controlled). a. Airframe or aerospace structures; b. "Aircraft" or aerospace engines; or c. Specially designed components for structures specified by 1B003.a or for engines specified by 1B003.b.
Foreign Availability	This category of items is available from a variety of sources, both SPF and SPF/DB. Examples of companies who possess these items include, but are not limited to: • Aeromet (UK) http://www.aeromet.co.uk/ • Aurock (France) http://www.aurock.fr/en/home/ • Aubert-Duval (France) http://www.aubertduval.com/ Additionally, you will find that the aerospace OEMs and subcontractors have internal tool design and fab. Examples include, but are not limited to: • Rolls-Royce (UK) http://www.rolls-royce.com/ • BAE (UK) http://www.baesystems.com/WorldwideLocations/UnitedKingdom/ • Aerospatiale (UK) (part of EADS) http://www.eads.com • Superform (UK) http://www.superform-aluminium.com/ • FormTech (Germany) http://www.formtech.de/en/en-start.htm • ITP (Spain) http://www.itp.es/ • Doncasters (UK) http://www.doncasters.com/index.php?s=0
ECCN	**2E003.b.1.a, b.2.a**
Item Description	2E003 Other "technology", as follows (see List of Items Controlled). b. "Technology" for metal-working manufacturing processes, as follows:

	b.1. "Technology" for the design of tools, dies or fixtures specially designed for any of the following processes: b.1.a. "Superplastic forming"; b.2. Technical data consisting of process methods or parameters as listed below used to control: b.2.a. "Superplastic forming" of aluminum alloys, titanium alloys or "superalloys": b.2.a.1. Surface preparation; b.2.a.2. Strain rate; b.2.a.3. Temperature; b.2.a.4. Pressure
Foreign Availability	The following companies have superplastic forming (SPF) design and build tooling technology: • Aeromet (UK) http://www.aeromet.co.uk/ • Aurock (France) http://www.aurock.fr/en/home/ • Aubert-Duval (France) http://www.aubertduval.com/ • Rolls-Royce (BAE) http://www.rolls-royce.com/ • Aerospatiale (UK) (part of EADS) http://www.eads.com • Superform (UK) http://www.superform-aluminium.com/ • FormTech (Germany) http://www.formtech.de/en/en-start.htm • ITP (Spain) http://www.itp.es/ • Doncasters (UK) http://www.doncasters.com/index.php?s=0 • Cyril Bath (called "ACB")(France) • Rhodes (UK) http://www.grouprhodes.co.uk/006_jrhodes.php • Harbin Institute (China) http://en.hit.edu.cn/research/introduction.htm • BAMTRI Institute (China) http://www.bamtri.com/default.aspx • Chinese aerospace companies possess SPF capability. • Honda (Japan) http://world.honda.com/group/Japan/ • International Science & Technology Center (Russia) http://www.istc.ru/istc/db/inst.nsf/all/CA7FFDB697BCB188C32565D7002141CC?opendocument Tallis Tech in Korea (http://www.tallistech.com/main.html) builds SPF presses, SPF tools, and SPF parts. Process methods for SPF are common knowledge throughout the world. This information can readily be found on the internet.
ECCN	**2E003.b.2.c**
Item Description	2E003 Other "technology", as follows (see List of Items Controlled). b. "Technology" for metal-working manufacturing processes, as follows: b.2. Technical data consisting of process methods or parameters as listed below used to control: b.2.c. "Direct-acting hydraulic pressing" of aluminum alloys or titanium alloys:

	b.2.c.1. Pressure; b.2.c.2. Cycle time;
Foreign Availability	Process methods for hydroforming are common knowledge throughout the world. This information can readily be found on the internet. Companies that have hydroforming capabilities include, but are not limited to: • Sung Kwant (Korea) • Nextop (Korea) http://www.nextop.com/kor/main.html • Harbin Institute (China) http://en.hit.edu.cn/research/introduction.htm • Honda (Japan) http://world.honda.com/group/Japan/
ECCN	**2E003.b.2.d**
Item Description	2E003 Other "technology", as follows (see List of Items Controlled). b. "Technology" for metal-working manufacturing processes, as follows: b.2. Technical data consisting of process methods or parameters as listed below used to control: b.2.d. "Hot isostatic densification" of titanium alloys, aluminum alloys or "superalloys": b.2.d.1. Temperature; b.2.d.2. Pressure; b.2.d.3. Cycle time;
Foreign Availability	Hot Isostatic Pressing (HIP) is the common term for densification. This is being accomplished throughout Europe. The Welding Institute in the U.K. is the hub. Rolls-Royce and the Advanced Manufacturing Research Center AMRC also perform this kind of work in the U.K. References: • Welding Institute, UK http://www.twi.co.uk/ • Rolls Royce, UK http://www.rolls-royce.com/ • Advanced Manufacturing Research Center AMRC, UK http://www.amrc.co.uk/
ECCN	**3A001.e.4**
Item Description	Electronic components and specially designed components therefor, as follows (see List of Items Controlled). e. High energy devices as follows: e.4. Solar cells, cell-interconnect-coverglass (CIC) assemblies, solar panels, and solar arrays, which are "space-qualified," having a minimum average efficiency exceeding 20% at an operating temperature of 301 K (28§C) under simulated 'AM0' illumination with an irradiance of 1,367 Watts per square meter (W/m2); Technical Note: 'AM0', or 'Air Mass Zero', refers to the spectral irradiance of sun light in the earth's outer atmosphere when the distance between the earth and sun is one astronomical unit

	(AU).
Foreign Availability	Aside from AZUR in Germany and Toyota Technical Institute in cooperation with Sharp Electronics in Japan, we are aware of Chinese manufacturers working in cooperation with government institutes that are capable of manufacturing high efficiency triple junction $GaInP_2/GaAs/Ge$ (TJ) space qualified solar cells under the same space industry-established test conditions as those used by US companies for product testing. The best triple junction result that we are aware of to date is 28.3% efficiency, produced on a German Metal Organic Vapor Phase Epitaxy (MOVPE) reactor, supported by the Chinese Academy of Sciences. References: • Azur (Germany) http://www.azurspace.com/ • Toyota Technical Institute (Japan) http://www.ttic.edu/ttij.php • Sharp Electronics http://sharp-world.com/ • Chinese Academy of Sciences http://english.cas.cn/
ECCN	**3C001**
Item Description	Hetero-epitaxial materials consisting of a "substrate" having stacked epitaxially grown multiple layers of any of the following (see List of Items Controlled). a. Silicon (Si); b. Germanium (Ge); c. Silicon Carbide (SiC); or d. "III/V compounds" of gallium or indium.
Foreign Availability	Taiwan has the capability for high quality growth of Epitaxial wafers. In the UK, IQE is producing wafers with which a US concentrator photovoltaic manufacturer used to produce 39% efficient concentrator photovoltaic cells. References: • Arima (Taiwan) -http://www.arimacorp.com/about_aboutarima.htm • VPEC (Taiwan) • IQE (UK) http://www.iqep.com/
ECCN	**7E004.a.5**
Item Description	7E004 Other "technology" as follows: a. "Technology" for the "development" or "production" of any of the following: a.5. Electric actuators (i.e., electromechanical, electrohydrostatic and integrated actuator package) specially designed for "primary flight control
Foreign Availability	Comments regarding the foreign availability of 7E004.a.5 technology follow: "Electromechanical" electric actuator technology is readily available outside the US. Examples of non-US electromechanical electric actuator suppliers include:

	• Goodrich (France) http://www.goodrich.com/Goodrich/Businesses/Actuation-Systems/Products/Primary-Flight-Controls • Safran (France) http://www.safran-na.com/spip.php?rubrique51&lang=en • Liebherr (Germany) http://www.liebherr.us/en-GB/66442.wfw
ECCN	**7E004.b.3**
Item Description	7E004 Other "technology" as follows b. "Development" "technology", as follows, for "active flight control systems" (including fly-by-wire or fly-by-light): b.3. Electronic management of data redundancy or systems redundancy for fault detection, fault tolerance, fault isolation or reconfiguration;
Foreign Availability	Comments regarding the foreign availability of 7E004.b.3 technology follow: The development technology for electronic management of data redundancy or systems redundancy for airplane flight control systems at a general level is readily available outside of the US. Examples of non-US companies who possess this technology include: • Airbus, Europe http://www.airbus.com/ • Embraer, Brazil http://www.embraercommercialjets.com/ • Bombadier, Canada http://www.bombardier.com/
ECCN	**9E003.b.1**
Item Description	9E003 Other "technology" as follows (see List of Items Controlled). b. "Technology" "required" for the "development" or "production" of any of the following: b.1. Wind tunnel aero-models equipped with non-intrusive sensors capable of transmitting data from the sensors to the data acquisition system; or b.2. "Composite" propeller blades or propfans, capable of absorbing more than 2,000 kW at flight speeds exceeding Mach 0.55;
Foreign Availability	Technology classified under ECCN 9E003.b.1 is readily available internationally, and can be accessed by searching on the web. Hundreds of universities and dozens of companies world wide have published information about wind tunnel model technology, including, but not limited to all western European countries, Russian, China, Iran, Japan, Brazil, Canada, Singapore, Australia, India, South Africa, Pakistan, Israel, South Korea, and Saudi Arabia. Information published by Iran can be found accessed at: http://www.iranwatch.org/suspect/records/aerospace-industries-organization-(aio).html. Additionally, North Korea has a developed Aerospace Launch vehicle capability as well, that is likely backed by some level of wind tunnel testing and wind tunnel model work. References: • Aiolos (UK) - Design and construction of Wind Tunnel Facilities http://www.aiolos.com/products/prod_aerospace.asp • BAE Systems (UK) - Design & Manufacture of Wind Tunnel Models, Operations of Wind Tunnel Facilities

	http://www.baesystems.com/ProductsServices/bae_prod_mas_wind_tunnel.html • National Aerospace Laboratory (NLR) (Netherlands) - Wind Tunnels, Models, Insturmenation, Design and Fab NLR (National Aerospace Laboratory) • RUAG Aviation (Germany) - Wind Tunnel Operators, Model design and fabricators http://www.ruag.com/en/Aviation/Innovation/Wind_Tunnel/Wind_Tunnel_Models • Telemetric Elektronik GmbH (Germany) - Telemetry systems suitable for non-intrusive wind tunnel model instrumentation applications http://www.datatel-telemetry.de/en/ • Wttech CZ (Czech Republic) - Aerodynamic Testing, Consulting, rigs, models and facilities. http://www.wttech.cz/en/ • Deharde-Maschinbau (Germany) - Design and fabricate wind tunnel models with non-intrusive sensors http://www.deharde.de/en.html • Aircraft Research Association (UK) – wind tunnel model fabrication http://www.ara.co.uk/services/design-and-manufacture/introduction/ • Onera (France) - Design and fabricate wind tunnel models with non-intrusive sensors http://windtunnel.onera.fr/wind-tunnel-model • National Aerospace Library (Netherlands) - Design and fabricate wind tunnel models with non-intrusive sensors http://www.nlr.nl/smartsite.dws?l=en&id=10254 • Ara (UK) - Design and fabricate wind tunnel models with non-intrusive sensors http://www.ara.co.uk/services/design-and-manufacture/introduction/ There are many links that show wind tunnel testing in Asia; for example: • http://wuxinghongqi.blogspot.com/2009/05/chinas-fourth-generation-fighter-being.html

EXPORT REFORM / USML MATERIALS

PROPOSED CONTROLS – EXPORT REFORM / 21ST CENT

Category XIII (d) controlled as follows:

_____(d) Carbon/carbon billets and preforms not elsewhere controlled by this subchapter (*e.g.*, Category IV) which are reinforced with continuous unidirectional tows, tapes, or woven cloths in three or more dimensional planes (*e.g.*, 3D, 4D) specifically designed, developed, modified, configured or adapted for defense articles.

Proposed:

(Tier 2/USML) – No change to existing USML text

(Tier 2 / *Commerce Control List -1A002) Carbon/carbon billets and preforms for carbon/carbon billets in three or more dimensional planes (e.g., 3D, 4D), with carbon fibers having the following characteristics:* [List militarily critical thresholds such as size, fiber architecture, and fiber specific strength and stiffness].

Rationale:

Commercial applications for carbon-carbon materials include brakes, industrial furnace components, and X-ray targets. The existing USML text is already formatted in a predominantly positive manner and does not require modification.

The EAR-CCL already addresses semi-finished articles having carbon matrices in 1A002. Unless the semi-finished item has uniquely military application, the placement should be on the Commerce listing. In recognition of the potential strategic military application of some carbon-carbon billets, placement onto CCL - Tier Two is recommended. (We are presuming that tier two will have licensing requirements for most countries beyond the regime member states). If the intent of the existing EAR control is to limit availability of carbon-carbon materials for application to nozzles and reentry structures, the control parameters in the EAR could be made more specific to limit the number of commercial items covered. Those control parameters could include characteristics typical of those for the launch and reentry applications such as size, fiber architecture, matrix densification, and reinforcement fiber properties. However, if the highest military criticality of the carbon-carbon billets relates to an application other than missiles, the existing CCL text may be acceptable.

Category XIII (f) controlled as follows:

(f) Structural materials, including carbon/carbon and metal matrix composites, plate, forgings, castings, welding consumables and rolled and extruded shapes that have been specifically designed, developed, configured, modified or adapted for defense articles.

Proposed:

(Tier 2/ ITAR-USML) *Delete the above XIII (f) listing for structural materials*

(Tier 3/ EAR-CCL) Recommendation is to control dual-use structural materials in the Commerce positive listing by type and performance characteristic as is already the case with those dual use materials specified by 1C010, 1C990, 1C210, and 1C008.

Rationale:

Raw structural materials are not inherently defense articles even though the first use of the raw material may be on a defense application. Many high volume applications exist for high performance materials in the commercial aerospace, automotive, marine, and sporting sectors. The current USML control language can be broadly interpreted such that raw materials and related technology developed or modified in support of a defense application are considered to be ITAR-controlled. Such an interpretation discourages raw material suppliers from offering their best materials to defense programs because the resulting classification as an ITAR item could negatively impact the potentially larger and more lucrative commercial markets for that material. Raw materials can be appropriately controlled on the Commerce Control List with military criticality addressed by placement into the appropriate CCL tier. Critical characteristics of structural materials are understood and there is no reason control parameters isolating the key materials cannot be identified and included in the EAR without compromising classified information. Placing ITAR controls downstream of the raw material, e.g. on military structures made from a particular material, would better align export control resources to perceived threats and encourage raw material innovation.