

MANUFACTURED ABRASIVES

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Manufactured abrasives include fused aluminum oxide, silicon carbide, alumina-zirconia oxide, and metallic shot and grit. Data in this report are for fused aluminum oxide, silicon carbide, and alumina-zirconia oxide produced in the United States and Canada; data for metallic shot and grit are for U.S. production only. Except where noted, quantities are reported in metric units.

Fused Aluminum Oxide

Government Programs.—At yearend 1995, the National Defense Stockpile (NDS), contained 183,089 tons of crude fused aluminum oxide valued at \$27 million and 32,548 tons of abrasive-grain fused aluminum oxide valued at \$18 million. However, the NDS goals for crude fused aluminum oxide and abrasive-grain fused aluminum oxide are zero; all of the material is authorized by law for disposal.

The Department of Defense (DOD) planned to sell at least 13,600 tons of stockpiled crude fused aluminum oxide and 5,400 tons of stockpiled abrasive-grain fused aluminum oxide in fiscal year 1996 (October 1, 1995 to September 30, 1996). In accord with this plan, the DOD sold \$267,000 of abrasive-grain fused aluminum oxide (490 tons) and \$2 million of crude fused aluminum oxide (13,600 tons) by yearend 1995.

Production.—Data in this report on the production, sale, and use of fused aluminum oxide are based on a survey of operations in the United States and Canada conducted by the U.S. Geological Survey (USGS). Production and sold or used data were collected from five companies operating 10 plants in the United States and Canada and represented the entire industry. (See table 1.)

Total output of fused aluminum oxide in 1995 was 159,000 tons, about the same as in 1994. Production of regular-grade fused aluminum oxide was 126,000 tons, 5% less than in 1994. However, production of high-purity fused aluminum oxide in 1995 increased 13% to 33,100 tons. (See table 2.)

Consumption and Uses.—Fused aluminum oxide in the form of graded grain has several end uses. The total value of U.S. producer sales of fused aluminum oxide graded grain for all uses reached \$113 million in 1995, a new 11-year high that was 10% greater than that of 1994. The value of 1995 sales for specific applications compared with those of 1994 are as follows: bonded abrasives rose 11%; coated abrasives rose 51%; refractories declined 9%; tumbling media declined 18%; blasting abrasives rose 14%; polishing cake and buffing compounds declined 3%; antislip abrasives declined 13%; polishing abrasives rose 19%; and all other uses increased 11%.

Prices.—The USGS does not collect price data on the

various grades of fused aluminum oxide. However, it does collect data on the value of fused aluminum oxide production. The average value of regular-grade fused aluminum oxide in 1995, as reported by producers, was \$358 per ton. The reported average value of high-purity fused aluminum oxide in 1995 was \$468. However, these values do not necessarily reflect abrasive grain prices of fused aluminum oxide sold to users. Prices in 1995 generally ranged from \$0.25 to \$0.70 per pound for regular-grade grain and \$0.40 to \$0.80 per pound for high-purity grain.

Foreign Trade.—The quantity of exports plus reexports of fused aluminum oxide in 1995 decreased 15% to 11,000 tons. These exports plus reexports were valued at \$28 million, about 5% less than in 1994; the average value per ton increased 10% to \$2,545.

Imports increased 47% in 1995 to 213,000 tons. Most of this material was crude rather than ground or refined. The value of these imports increased 19% to \$83.9 million.

Silicon Carbide

Government Programs.—The NDS, as of December 31, 1995, contained 21,017 tons of silicon carbide valued at \$10.4 million; however, the stockpile goal was zero. Existing legislation authorizes disposal of all of the silicon carbide in the NDS; over 4,000 tons were sold in 1995.

Production.—Data in this report on the production, sale, and use of silicon carbide are based on a survey of domestic and Canadian producers conducted by the USGS. Production and sold or used data were collected from four companies operating four plants in the United States and Canada and represented the entire industry. (See table 1.)

During 1995, total output of silicon carbide increased slightly to 85,900 tons with a value of \$42.2 million. Data on the production of silicon carbide for abrasive, metallurgical, and refractory uses are not published for 1995 in order to protect company proprietary information.

Consumption and Uses.—Silicon carbide in the form of graded grain has several end uses. The total value of U.S. producer sales of silicon carbide graded grain for all uses in 1995 reached \$86 million, 16% greater than 1994 sales. The value of 1995 sales by individual end use compared with those of 1994 are as follows: bonded abrasives increased by 33%; coated abrasives increased 39%; refractories increased 40%; tumbling media decreased 34%; blasting abrasives increased 2%; wiresawing abrasives decreased 3%; polishing cake and buffing compounds decreased 33%; antislip abrasives increased 13%; polishing abrasives increased 17%; metallurgical

abrasives decreased slightly; and all other uses rose 15%.

Prices.—The USGS does not collect price data on the various grades of silicon carbide. However, data are collected on the value of output. The average value of abrasive-grade silicon carbide, as reported by producers, was \$495 per ton in 1995. As a further price indicator, note that about 4,100 tons of silicon carbide in the NDS was sold at a unit price of \$495 per ton in late 1995.

Foreign Trade.—Exports plus reexports of crude silicon carbide in 1995 were 4,240 tons, while exports of refined and ground silicon carbide reached 15,700 tons. The total quantity of exports plus reexports was 25% higher than in 1994. The value of all silicon carbide exported plus reexported increased 18% to \$16.9 million, but the value per ton decreased 6% to \$849.

Imports of crude silicon carbide in 1995 were 164,000 tons; imports of silicon carbide in ground or refined form reached 7,760 tons. The total import quantity was 59% higher than in 1994. The value of all silicon carbide imports rose 29% to \$75.3 million, but the value per ton decreased 17% to \$439.

Alumina-Zirconia Oxide

One firm produced fused alumina-zirconia oxide for abrasive applications in 1995; output was from two plants, one each in the United States and Canada. In order to protect company proprietary information, the USGS does not publish detailed data regarding this production. Export and import data on alumina-zirconia oxide are not available.

Metallic Abrasives

Production.—Data in this report on the domestic production, sale, and use of metallic abrasives are based on a survey of domestic operations conducted by the USGS. Production and sold or used data were collected from 13 companies operating 14 plants in the United States and accounted for virtually all of domestic industry. (See table 3.)

As shown in table 4, steel shot and grit account for most of the metallic abrasives produced domestically. The quantity of steel shot and grit produced in 1995 increased 2% relative to 1994 output; total value increased 9%. The average value per ton was \$436, a 7% increase.

During 1995, four firms, one each in Indiana, Michigan, New York, and Ohio reported production of cut wire shot. The production and value of shot and grit other than steel increased

significantly in 1995.

Consumption.—Relative to 1994, the quantity of steel shot and grit sold or used in 1995 increased 3% and total value increased 7%. The average value per ton sold or used increased 4% to \$451. The quantity and value of other shot and grit sold or used increased significantly. (See table 4.)

Foreign Trade.—U.S. exports and reexports of metallic abrasives totaled 31,100 tons in 1995, about the same as in 1994. The total value of these exports was \$16.2 million, also similar to that of 1994. The average value per ton was \$521.

U.S. imports of metallic abrasives decreased 11% in quantity to 25,600 tons. The value of these imports remained at \$14.5 million, but the value per ton increased 13% to \$566.

Outlook

Future use of manufactured abrasives will be directly related to trends in foundries, machine tool industries, metal fabrication plants, and other industrial operations where they are used for cutting, shaping, and polishing metals. Consequently, the substitution of metals by plastics and other materials could inhibit demand for some abrasives. Automotive manufacturing, a major metals consumer, also will influence demand (albeit indirectly) for manufactured abrasives. Consequently, domestic consumption of manufactured abrasives will reflect both the number and the metal content of automotive vehicles built in the United States.

Less influential demand factors include near-net-shape metal casting and environmental regulations that reduce chemical finishing of metals; the former tends to decrease demand for abrasive finishing of metals, while the latter would increase such demand. Small markets for manufactured abrasives used in specialized applications such as machining advanced ceramics and metal matrix composites show promise of significant growth.

OTHER SOURCES OF INFORMATION

U.S. Geological Survey Publications

Manufactured Abrasives, Mineral Industry Surveys (quarterly).
Manufactured Abrasives, Mineral Commodity Summaries—
1996.

Other Sources

Abrasives, Industry & Trade Summary. U.S. International Trade
Commission, May 1995.

TABLE 1
CRUDE ARTIFICIAL ABRASIVES MANUFACTURERS IN 1995

Company	Location	Product
Dakota Catalyst Products	Williston, ND	Fused aluminum oxide (high purity).
The Exolon-Esk Co.	Hennepin, IL	Silicon carbide and fused aluminum oxide (regular).
Do.	Thorold, Ontario, Canada	Fused aluminum oxide (regular).
Triebacher Schlesismittel Corp.	Niagara Falls, NY	Do.
Do.	Niagara Falls, Ontario, Canada	Fused aluminum oxide (regular) and silicon carbide.
Saint-Gobain/Norton Industrial Ceramics Corp.	Huntsville, AL	Fused aluminum oxide (high-purity) and aluminum-zirconium oxide.
Do.	Worcester, MA	General abrasive processing.
Do.	Chippawa, Ontario, Canada	Fused aluminum oxide (high-purity) and aluminum-zirconium oxide.
Do.	Shawinigan, Quebec, Canada	Silicon carbide.
Superior Graphite Co.	Hopkinsville, KY	Do.
Washington Mills Electro Minerals (Canada) Corp.	Niagara Falls, Ontario, Canada	Fused aluminum oxide (regular).
Washington Mills Electro Minerals (US) Corp.	Niagara Falls, NY	Fused aluminum oxide (high-purity).
Washington Mills Ltd.	Niagara Falls, Ontario, Canada	Fused aluminum oxide (regular).

TABLE 2
END USES OF CRUDE SILICON CARBIDE AND ALUMINUM OXIDE (ABRASIVE GRADE)
IN THE UNITED STATES AND CANADA, AS REPORTED BY PRODUCERS 1/

Use	1994			1995		
	Quantity (metric tons)	Value (thousands)	Yearend (stocks)	Quantity (metric tons)	Value (thousands)	Yearend (stocks)
Silicon carbide:						
Abrasives	43,100	\$22,900	3,340	(2/)	(2/)	(2/)
Metallurgical	41,600	19,500	2,980	(2/)	(2/)	(2/)
Refractories and other	W	W	--	(2/)	(2/)	(2/)
Total	84,700	42,400	6,320	85,900	42,200	9,640
Aluminum oxide:						
Regular: Abrasives and refractories	133,000	47,900	7,300	126,000	45,100	15,600
High purity	29,200	16,300	1,670	33,100	15,500	966
Total	162,000	64,200	8,980	159,000	60,600	16,600

W Withheld to avoid disclosing company proprietary data; included with "Metallurgical."

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Withheld to avoid disclosing company proprietary data; included in "Total."

TABLE 3
U.S. PRODUCERS OF METALLIC ABRASIVES IN 1995

Company	Location	Product (shot and/or grit)
Abrasive Materials, Inc.	Fortville, IN	Cut wire, steel.
Alcotec Wire Co.	Traverse City, MI	Cut wire.
Barnsteel Abrasives	Butler, PA	Iron and steel.
Chesapeake Specialty Products	Baltimore, MD	Steel.
Durasteel Abrasive Co.	Pittsburgh, PA	Do.
Ervin Industries, Inc.	Adrian, MI	Do.
Do.	Butler, PA	Do.
Metaltec Steel Abrasives Co.	Canton, MI	Do.
National Metal Abrasive Co.	Wadsworth, OH	Do.
Peerless Metal Powders & Abrasive	Detroit, MI	Do.
Pellets, Inc.	Tonawanda, NY	Cut wire.
The Platt Brothers, Inc.	Waterbury, CT	Other types.
Premier Shot Co.	Cleveland, OH	Cut wire.
The Wheelabrator Co.	Bedford, VA	Steel.

TABLE 4
ANNUAL PRODUCTION AND SHIPMENTS FOR METALLIC
ABRASIVES IN THE UNITED STATES, BY PRODUCT 1/ 2/

Product	Production		Shipments	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
1994:				
Chilled iron shot and grit	W	W	W	W
Annealed iron shot and grit	W	W	W	W
Steel shot and grit	230,000	93,400	208,000	89,900
Other 3/	4,520	5,550	3,640	4,490 4/
Total	234,000	99,000	212,000	94,400
1995:				
Chilled iron shot and grit	W	W	W	W
Annealed iron shot and grit	W	W	W	W
Steel shot and grit	234,000	102,000	214,000	96,600
Other 3/	11,400	8,550	12,400	41,900
Total	246,000	110,000	227,000	184,000

W Withheld to avoid disclosing company proprietary data; included with "Other."

1/ Excludes secondary (recycle) producers.

2/ Data are rounded to three significant digits; may not add to totals shown.

3/ Includes cut wire, aluminum, stainless steel shot, and items indicated by symbol W.

4/ Fourth quarter data for the quantity and value of other shot and grit was withheld from the 1994 total.