

# MANUFACTURED ABRASIVES

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Manufactured abrasives include fused aluminum oxide, silicon carbide, alumina-zirconia oxide, and metallic shot and grit. Production data for fused aluminum oxide, silicon carbide, and alumina-zirconia oxide were for the United States and Canada. Data for metallic shot and grit were for the United States only.

## Fused Aluminum Oxide

**Government Programs.**—The National Defense Stockpile (NDS), as of December 31, 1994, contained 218,867 tons of crude fused aluminum oxide and 39,824 tons of abrasive-grain fused aluminum oxide. The NDS goals for abrasive-grain fused aluminum oxide and crude fused aluminum oxide are zero; all of the material is targeted for disposal. During 1994, the NDS disposed of 27,216 tons of crude fused aluminum oxide and 6,682 tons of abrasive-grade fused aluminum oxide.

**Production.**—The U.S. Bureau of Mines (USBM) determines U.S. and Canadian production of crude fused aluminum oxide and the amount of crude sold or used by producers from the "Crude Artificial Abrasives Survey," a voluntary survey of U.S. and Canadian operations. Production and sold or used data were collected from 6 companies operating 11 plants in the United States and Canada and represented 100% of the industry.

At yearend, five firms were producing fused aluminum oxide at eight plants in the United States and Canada. Production of regular-grade fused aluminum oxide in 1994 was 133,000 tons, essentially unchanged from that of 1993.

Production of high-purity fused aluminum oxide increased 37% to 29,000 tons. Total 1994 production of 162,000 tons was 5% more than that of 1993. (See table 2.)

**Consumption and Uses.**—Fused aluminum oxide in the form of graded grain has a number of different end uses. The total value of sales of fused aluminum oxide-graded grain for all uses increased 13% compared to those of 1993, this was a new 10-year high. The value of sales for use in bonded abrasives increased 15%, coated abrasives increased 68%, refractories increased 7%, tumbling media increased 18%, blasting abrasives increased 5%, polishing cake and buffing compounds decreased 18%, antislip abrasives decreased 50%, polishing abrasives

increased 17%, and all other uses increased 19%.

**Prices.**—The USBM did not collect data on the prices of various grades of fused aluminum oxide. It did collect data on the value of fused aluminum oxide production. The average value of regular-grade fused aluminum oxide, as reported by producers, was approximately \$361 per ton. In 1994, the average value of high-purity fused aluminum was \$557. The average value of all grades of fused aluminum oxide in 1994 was \$396 per ton.

**Foreign Trade.**—The quantity of exports plus reexports of fused aluminum oxide in 1994 increased 16% to about 13,000 tons; the value of exports plus reexports increased about 4% to \$29.5 million. The average value per ton of fused aluminum oxide, exported or reexported, decreased 11% to \$2,316.

Imports decreased about 8% in 1994 to 145,000 tons, and the value of imports decreased about 9% to \$70.3 million.

## Silicon Carbide

**Government Programs.**—The NDS, as of December 31, 1994, contained 28,991 tons of silicon carbide; the goal was zero. During 1994, the Defense National Stockpile Center of the Defense Logistics Agency disposed of 2,517 tons of silicon carbide. Existing legislation authorizes disposal of all of the silicon carbide in the NDS.

**Production.**—The USBM determines U.S. and Canadian production of crude silicon carbide and the amount of crude sold or used by producers from the "Crude Artificial Abrasives Survey," a voluntary survey of U.S. and Canadian operations. Production and sold or used data were collected from four companies operating five plants in the United States and Canada and represented 100% of the industry. (See table 1.)

During 1994, four firms produced silicon carbide at five plants in the United States and Canada. Production of abrasive-grade material increased 13% to about 43,000 tons. Production of metallurgical-grade silicon carbide increased about 13% to 42,000 tons. Total production of silicon carbide increased 13% in 1994 to 85,000 tons. (See table 2.)

**Consumption and Uses.**—Silicon carbide in

the form of graded grain has a number of different end uses. The total value of sales of silicon carbide graded grain for all uses increased 12% in 1994. The total value of sales by individual end use was a mixture of increases and decreases. Sales for use in bonded abrasives were up 17%, coated abrasives were up 20%, refectories increased 24%, tumbling media increased 13%, blasting abrasive decreased 5%, wiresawing abrasive increased slightly, polishing cake and buffing compounds were down 56%, antislip abrasives were up 6%, polishing abrasives were down 17%, metallurgical was up 13%, and all other uses were up 37%.

**Prices.**—The USBM did not collect price data on the various grades of silicon carbide. Data were available on the value of production of the various grades. The average value per ton of abrasive-grade silicon carbide, as reported by producers, was \$531; and metallurgical-grade averaged \$470; and the average value of all grades was \$501.

**Foreign Trade.**—Exports plus reexports of silicon carbide in 1994 were 16,000 tons, essentially unchanged compared with that of 1993. While the total value of silicon carbide exported plus reexported decreased 9% to \$14.4 million, the value per ton decreased 4% to \$900.

Imports of silicon carbide in 1994 decreased 4% in quantity to 110,000 tons, the total value was essentially unchanged at \$58.3 million. The average value per ton increased 20% to \$530.

## Alumina-Zirconia Oxide

One firm produced fused alumina-zirconia oxide in two plants, one each in the United States and Canada. Abrasive applications accounted for all the production. Publishing production data would disclose company proprietary data. Export and import data were not available.

## Metallic Abrasives

**Production.**—The USBM determines U.S. production of metallic abrasives and the amount of metallic abrasives sold or used by producers from the "Metallic Abrasives Survey," a voluntary survey of U.S. operations. Production

and sold or used data were collected from 13 companies operating 14 plants in the United States and represented 100% of the industry. (See table 3.)

The quantity and value of steel shot and grit produced increased about 16% and 22%, respectively. The average value per ton was \$406, a 4% increase compared with that of 1993. Michigan, Pennsylvania, Virginia, and Ohio, in decreasing order of quantity, supplied the production of steel shot and grit. During 1994, four firms, one each Indiana, Michigan, New York, and Ohio reported production of cut wire shot. Production of shot and grit other than steel increased significantly in 1994. (See tables 4.)

**Consumption.**—The quantity of steel shot and grit sold or used increased slightly to 208,000 tons, the total value increased 13% to \$89.9 million, and the average value per ton increased 11% to \$432.

The quantity of other shot and grit sold or used increased. The value was significantly higher.

**Foreign Trade.**—U.S. exports and reexports of metallic shot and grit increased 9% to about 31,900 tons. The total value of exports plus reexports increased 11% to \$16.3 million, and the average value per ton increased slightly to \$511.

U.S. imports of metallic abrasives increased 11% in quantity to 28,900 tons, the value of imports were essentially unchanged at \$14.5 million, and the value per ton decreased 7% to \$502.

The United States was a net importer of metallic abrasives in 1994 for only the second time in the past 10 years.

**Outlook.**—The use of manufactured abrasives is very closely tied to the automotive industry, their largest single consumer. The increase or decrease use of manufactured abrasives will be directly related to the number of automobiles, trucks, tractors, and earthmoving equipment built in the United States.

## **OTHER SOURCES OF INFORMATION**

### **U.S. Bureau of Mines Publications**

Manufactured Abrasive Chapter Mineral

Commodity Summaries, 1995.

Manufactured Abrasives Quarterly MIS.

Abrasive Materials Annual Reports, 1993.

TABLE 1  
CRUDE ARTIFICIAL ABRASIVES MANUFACTURERS IN 1994

Company	Location	Product
Dakota Catalyst Products	Williston, ND	Silicon carbide and 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).
Praxair Surface Technologies, Inc.	Indianapolis, IN	Fused aluminum oxide (regular and high-purity).
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 (regular and 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	1993			1994		
	Quantity (metric tons)	Value (thousands)	Yearend (stocks)	Quantity (metric tons)	Value (thousands)	Yearend (stocks)
<b>SILICON CARBIDE</b>						
Abrasives	38,300	\$20,600	1,450	43,100	\$22,900	3,340
Metallurgical	36,700	19,300	3,090	41,600	19,500	2,980
Refractories and other	W	W	--	W	W	--
Total	74,900	39,900	4,540	84,700	42,400	6,320
<b>ALUMINUM OXIDE</b>						
Regular: Abrasives and refractories	132,000	48,500	14,400	133,000	47,900	7,300
High purity	21,300	13,200	1,260	29,200	16,300	1,670
Total	154,000	61,700	15,600	162,000	64,200	8,980

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

1/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; may not add to totals shown.

TABLE 3  
U.S. PRODUCERS OF METALLIC ABRASIVES IN 1994

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	Brownsville, PA	Annealed 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 shot.
The Wheelabrator Co.	Bedford, VA	Steel.

TABLE 4  
ANNUAL PRODUCTION, SHIPMENTS, AND PLANT CAPACITIES FOR  
METALLIC ABRASIVES IN THE UNITED STATES, BY PRODUCT<sup>1/ 2/</sup>

Product	Production		Shipments		Capacity 3/
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)
1993:					
Chilled iron shot and grit	W	W	W	W	W
Annealed iron shot and grit	W	W	W	W	W
Steel shot and grit	197,547	\$76,832	202,925	\$79,216	247,440
Other 4/	15,389	7,746	15,855	8,672	XX
Total	212,936	84,578	218,780	87,888	XX
1994:					
Chilled iron shot and grit	W	W	W	W	W
Annealed iron shot and grit	W	W	W	W	W
Steel shot and grit	229,834	93,405	208,043	89,869	247,440
Other 4/	4,515	5,554	3,641	4,489 5/	XX
Total	234,349	98,959	211,684	94,358	XX

W Withheld to avoid disclosing company proprietary data; included with "Other." XX Not applicable.

1/ Excludes secondary (recycle) producers.

2/ Previously published and 1994 data are rounded by the U.S. Bureau of Mines to three significant digits; data may not add to totals shown.

3/ Total quantity of the various types of metallic abrasives that a plant could have produced during the year, working three 8-hour shifts per day, 7 days per week, allowing for usual interruptions, and assuming adequate fuel, labor, and transportation.

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

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