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CENTRAL INTELLIGENCE AGENCY

INTELLIGENCE MEMORANDUM NO. 185

17 June 1949

SUBJECT: The Abrasive Industry of Eastern Europe and the USSR.

Abrasives are of critical importance in a state's war potential, and represent one of the most sensitive points at which an industrial economy can be controlled. Artificial abrasives and industrial diamonds, necessary to advanced industrial technics, are among the items in which the Soviet-controlled economies stand in great need. Although both the USSR and Czechoslovakia have sizeable abrasives industries, their combined production is not sufficient for their own requirements, to say nothing of those of the entire Soviet orbit. The USSR's most critical lack is in precision grinding wheels, which Soviet industry cannot yet manufacture, and without which Soviet machine tool production is quantitatively and qualititively handicapped. With all its abundant resources, the USSR is dependent upon imports for such essentials in the abrasives industry as graphite electrodes, silk bolting cloth, natural rubber, and shellac.

Shipments of abrasive raw materials and finished abrasives are helping to alleviate this shortage to some extent. In view of the limited information available on abrasives production and requirements, it is extremely difficult to relate western shipments to the normal requirements of Eastern Europe. It is estimated, however, that actual shipments have not been in excess of current requirements, and that therefore stockpiling of abrasives has not been possible. Western exports of abrasives to Eastern Europe would have been larger had it not been for the initial inability of American and British suppliers after the war to fill the large orders from Eastern Europe, and the more recent refusal of American manufacturers to accept Soviet or Satellite orders.

A detailed report on the abrasives situation in Eastern Europe and the movement of abrasives to that area is attached as Enclosure "A".

Attention is drawn to earlier information on this subject presented in IM-82 and IM-150. Further information will be provided as it becomes available. A comprehensive study of the abrasives situation in the world as a whole is under preparation.

Note: This memorandum has not been coordinated with the Intelligence Organizations of the Departments of State, Army, Navy, and Air.

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An edition which has been modified to protect certain CIA sources has been prepared for more general distribution.

ENCLOSURE A

THE ABRASIVE INDUSTRY OF EASTERN EUROPE AND THE USSR

1. Introduction.

Abrasives are of the greatest importance to any industrial economy. The process of grinding, involving the use of abrasives, enters into every phase of precision production in the metal working and optical industries, as well as being a major standard production method in all types of light and heavy industry.

Abrasives found in the natural state, with the exception of diamonds and the better grades of corundum, are too soft for most industrial uses. This report will therefore be concerned with artificial abrasives with brief mention being given to industrial diamonds.

The artificial abrasive industry is of American origin and began in the latter part of the 19th century when the American scientist, Dr. E. G. Acheson, discovered the electrode method of producing artificial abrasives. Dr. Acheson subsequently founded the Carborundum Company to exploit this process, and that company now has several subsidiaries in Europe. The United Carborundum Company in Czechoslovakia was formed as the result of the purchase by Czech industrialists of Dr. Acheson's patents. The technical know-how for manufacturing artificial abrasives is available or in practice in most of the industrial countries of the world including the USSR. The United States has always been the leading producer, consumer, and exporter of artificial abrasives.

Artificial abrasive products employ the use of either of two basic commodities, aluminum oxide or silicon carbide. Both of these are produced in electric furnaces. The crystals that result from this electrolytic process are crushed and then sifted into grain sizes. It is these grains which go into

the production of coated abrasives, such as sandpaper and garnet cloth, and into the bonded products-- grinding wheels, sticks, and hones.

Approximately 60 percent of the output of crude silicon carbide is used for abrasive grain; the remainder is used for refractories. All except a small fraction of the fused aluminum oxide production goes into abrasive grain.

Approximately 15 percent of abrasive grain is used in the manufacture of coated abrasives; 25 percent is employed as grain in a wide variety of uses such as sandblasting; the bevelling and polishing of glass, granite, marble and stone; lithographing; and in refractories. The remaining 60 percent is used in bonded abrasives - wheels, sticks, and hones.

The production of abrasive crude is dependent upon an adequate supply of raw materials--bauxite in the case of fused aluminum oxide, and silica and high-grade coke for silicon carbide (petroleum coke is required for the better grades of silicon carbide). A large quantity of cheap electric power is required to run the electric furnaces, while a certain degree of ceramic know-how is basic to the whole operation.

Abrasive wheels consist of the abrasive grain (aluminum oxide or silicon carbide), bonded together with some other material such as kaolin feldspar, china clay, natural rubber, or shellac. Vitrified wheels, containing one of the clay products mentioned above, constitute approximately 50 percent of the output of abrasive grinding wheels. The manufacture of grinding wheels requires a higher degree of technical know-how than the production of abrasive grains. Advanced technical knowledge is of particular importance in the manufacture of <u>precision</u> grinding wheels.

The field of coated abrasives is considered to be of less importance than that of bonded abrasives and is therefore omitted from this survey.

2. Abrasive Situation in Eastern Europe and the USSR.

The study of the abrasive industry in eastern Europe and the USSR is hampered by the paucity of prewar and postwar information on requirements, production, and to a lesser extent, on imports. Scattered bits of information must be pieced together and the resultant gaps must be filled by intelligent estimates.

Only the USSR and Czechoslovakia possess a significant abrasive industry. Both countries produce abrasive grain and grinding wheels, although Czechoslovakia produces no silicon carbide. Hungary manufactures enough grinding wheels for its own use but has to import all of its abrasive grain requirements. Poland, Rumania, and Yugoslavia produce no abrasive grain and only small quantities of grinding wheels. They are therefore dependent upon outside sources for the major part of their abrasive requirements. Albania and Bulgaria are so little industrialized that their abrasive requirements are of minor significance.

The following country by country analysis is divided into two parts, the first dealing with abrasive grains and the second with grinding wheels.

3. Specific Abrasives.

a. Abrasive Grains.

(1). USSR.

(a). Requirements and Production.

Soviet requirements for abrasive grains are estimated to be around 30,000 tons annually. Estimates of Soviet production[1/], based upon an

1/ This production estimate does not take into account production in the Soviet Zone of Germany, which in 1943 amounted to 20,000 tons of aluminum oxide and 7,000 tons of silicon carbide. If the Soviet Zone plants were now in full production and their output were at the disposal of the Soviets, the USSR should have no worries about its abrasive grain requirements. Two Soviet Zone abrasive

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analysis of individual plant production, approximate 15,000 tons of fused aluminum oxide and 10,000 tons of silicon carbide yearly. Silicon carbide grain is believed to be in shorter supply than aluminum oxide.

Further expansion of Soviet abrasive grain production to the point where it can supply the entire domestic requirement is favored by:

(1) An adequate supply of electric power.

(2) Adequate manpower;

(3) Sufficient ceramic know-how;

(4) A plentiful supply of silica for the production of silicon carbide.

Limiting factors include (1) a probable shortage of petroleum coke for the production of the better grades of silicon carbide; (2) an inadequate supply of high-grade bauxite (low in both iron and silica content) for the production of white aluminum oxide; (3) the need to import silk bolting cloth for sizing the fine grain; and (4) a shortage of graphite electrodes for electric furnaces.

Of these limiting factors, the most critical bottlenecks are probably petroleum coke and graphite electrodes. Silk bolting cloth is manufactured only in Switzerland but the Soviets are presumably able to import this material from Swiss suppliers.

The USSR might be able to overcome all of these limitations by imports. Should these materials be denied to the Soviets, however, their abrasive industry

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Footnote: (Cont'd)
plants have reportedly been dismantled and shipped to the USSR. If, as also reported, these plants were cannibalized by the Soviets some time before their removal, Soviet technicians may have had some difficulty putting them into operation on Russian soil. The SovZone abrasive picture is at present so clouded by conflicting information that it seems best, for purposes of this study, to exclude it from the computation of total USSR abrasive production.

would be severely hampered, at least until new sources could be developed within the Soviet orbit.

(b). Imports.

During the war the U.S. shipped large quantities of abrasive crude and grain to the USSR under the Lend-Lease program. (See Appendix A). These shipments reached a peak of 5,035 tons for the calendar year 1945. It is quite likely that the Soviet abrasive industry was unable to utilize all of the abrasive grain it received under lend-lease and was therefore able to stockpile a portion of the grain for later use.

U.S. shipments were reduced to a trickle after lend-lease was cut off and amounted to only 48 tons during 1948. This amount would undoubtedly have been much larger had not U.S. manufacturers turned down most of the orders emanating from the Soviet orbit.

So far as is known the only other significant source of Soviet abrasive imports is Norway, which during 1948 shipped 420 tons of silicon carbide to the USSR.

(c). Inquiries.

Few Soviet inquiries (or suspected Soviet inquiries) for abrasive grains have been received by U.S. abrasive manufacturers. The last large-scale Soviet order to circulate in the U.S. was placed in 1946 and called for 3520 tons of abrasive grain, of which 2575 tons were for aluminum oxide and 945 tons for silicon carbide. To the best of our knowledge this order was never filled.

The only recent Soviet inquiry for abrasive grains was an order for 520 tons of green silicon carbide received by several U.S. companies in March 1949.

One U.S. manufacturer received identical orders from five different agents and identified them as being similar in quantity, specifications, and terminology with an inquiry placed by Tecno Import in Moscow. Green silicon carbide is important because of its use in the manufacture of wheels used for grinding tungsten carbide tools. No known production of this material exists within the Soviet orbit probably because it requires the use of petroleum coke in its manufacture. To the best of our knowledge no U.S. firms have quoted on this order. The quantity is not considered to be in excess of current Soviet requirements for silicon carbide.

(2) Czechoslovakia.

(a) Requirements and Production.

Czech requirements of abrasive grains are estimated at 8,000 tons of aluminum oxide and 3,000 tons of silicon carbide annually. United Carborundum is the only producer of abrasive grains in Czechoslovakia and has a reported annual capacity of 8,000 tons of aluminum oxide. Official Czech statistics, however, report that 1948 production of this commodity was only 6,121 tons. United Carborundum has apparently failed to restore its silicon c rbide furnaces since the war, and Dr. Novak, the Company's director, has made persistent efforts to obtain this product in the United States.

(b) Imports.

The Czechs have indicated that they were purchasing 1,000 tons of silicon carbide a year from Norway and that they desired to purchase another 2,000 tons in the United States. In 1948, however, the Czechs purchased only 420 tons of silicon carbide from Norway and 813 tons from the United States. They have apparently had no need to import any of their aluminum oxide require-

ments and have demurred to the offers of U.S. manufacturers to substitute aluminum oxide for Czech silicon carbide orders.

(c) Inquiries.

During the last three years the Czechs have tried repeatedly, and for the most part unsuccessfully, to secure large quantities of silicon carbide from the U.S., but the quantities requested have not been in excess of Czech requirements. The following inquiries have been reported during 1949, on all of which the American companies have refused to quote:

(i) 1,000 tons of silicon carbide for the manufacture of refractories. Inquiry received 11 February 1949 from U.S. agent for Pancosma Ltd., Geneva, Switzerland.

(ii) 6.5 tons of silicon carbide. Inquiry received 11 February 1949 from Siegel Chemical Co., Inc., Brooklyn, N.Y.

(iii) 2,000 tons of silicon carbide. Inquiry received 1 April 1949 from Overseas Marketing Services, London.

In each of the above cases the agents involved stated the inquiries had come from Czechoslovakia.

(3) Hungary.

(a) Production and Requirements.

Hungary has no known production of abrasive grains. Hungarian abrasive grain requirements, largely for her grinding wheel industry, are estimated at 400 tons of aluminum oxide and 150 tons of silicon carbide annually.

(b) Imports.

In 1948 Hungary imported 48 tons of abrasive grains from the United States, none from Norwegian, British, or Italian manufacturers.

(c) Inquiries.

The Central Board of the Hungarian Ceramic Industry has made numerous attempts to procure abrasive grains from U.S., British, and Canadian suppliers. In a few cases these inquiries have been placed directly by the Board. In most instances, however, the orders have been placed with American, British, and Dutch agents. The following is a list of the inquiries which have been received:

	Date of Inquiry	Agent	Material	Amount	Action
A.	By a U.S. Manufacturer of Abrasives:				
1.	10/8/48--	Hungarian Ceramic Ind.	Aluminum Oxide	409 tons	No quote
2.	10/8/48--	B. Rupke, Utrecht	Aluminum Oxide Silicon Carbide	840 tons 150 tons	No quote No quote
3.	11/12/48--	M. Denes, Budapest	Aluminum Oxide	400 tons	No quote
4.	11/17/48--	Block Int. Corp., N.Y.	Aluminum Oxide regular & white	several hundred thousand pounds of each	No quote
5.	12/14/48--	New World Suppliers, N.Y.	Aluminum Oxide	-not stated-	No quote
B.	By a U.S. machine tool and abrasive Co.:				
1.	12/6/48--	Corregidor Ltd., London	Abrasive Grains	440 tons	No quote
2.	12/7/48--	Hungarian Ceramic Ind.	Identical order as above,		No quote
3.	12/1/48--	U.S. export agent	Aluminum Oxide	374 tons	No quote
B-1.	By Same Company's UK subsidiary:				
1.	12/-/48--	Corregidor Ltd., London	Abrasive Grains	100 tons	No quote
C.	U.S. Exporter:				
1.	3/-/49--	Hungarian Govt.	Aluminum Oxide	100 tons	export license applied for

Added together, these inquiries would represent amounts far in excess of Hungary's requirements. The similarity of many of the orders indicates, however, that the same order was probably placed with a number of agents in the hope that at least one of them would materialize.

(4) Poland.

(a) Production and Requirements.

Poland produces no abrasive grains. Requirements for such grains probably range from 200 to 300 tons a year.

(b) Imports.

During 1948 Poland imported 174 tons of silicon carbide from Norway. The U.S., Britain, and Italy exported no abrasive grains to Poland in 1948.

(c) Inquiries.

(1) 100 tons of aluminum oxide. Placed by the Polish American Supply Corporation, New York, with an American manufacturer in December 1948. Latter advised customer to obtain an export license and has heard nothing further regarding the order.

(5) Rumania.

(a) Production and Requirements.

Rumania produces no abrasive grains. Rumanian requirements are estimated at 200 to 300 tons a year.

(b) Imports.

So far as is known, there have been no shipments of abrasive grains from the U.S. and western Europe to Rumania since 1946. The USSR has reportedly shipped some abrasive grain to Rumania from Germany.

(c) Inquiries.

(i) 200 to 300 tons of abrasives, including silicon carbide and aluminum oxide. Received during 1948 by an American exporter. So far as is known, this exporter did not accept the order.

(6) Yugoslavia.

(a) Production and Requirements.

Yugoslavia produces no abrasive grains. Requirements are estimated at 300 to 500 tons annually.

(b) Imports.

During 1948 Yugoslavia imported 109 tons of abrasive grains from Italy, 45 tons from Norway and none from the United States. Imports during 1947 included 110 tons of silicon carbide from Norway and 217 tons of aluminum oxide from the United States.

In addition to the above, three trade treaties signed by Yugoslavia in 1948 called for the shipment of abrasive materials to that country. The treaty with Czechoslovakia signed 24 May called for the shipment of 3,000,000 Korunas worth of abrasives to Yugoslavia. A trade agreement with the SovZone of Germany signed on 15 November 1948, effective until 31 May 1949, provided for shipment of aluminum oxide to Yugoslavia. A trade treaty with Austria signed on 31 August 1948 provides for the shipment to Yugoslavia of abrasive materials to the value of $50,000. (Grinding wheels may be included in the category of "abrasive materials" in some of these treaties). There is no confirmation of actual shipments under any of these agreements. It does not appear that the quantities in the aggregate would go any further than the supplying of Yugoslavia's current requirements.

(c) Inquiries.

(i) 1,500 tons raw abrasives. Inquiry received 21 December 1948 by U.S. exporter from Pav Impex, New York City, a firm with Yugoslav connections. In April 1949 Pav Impex informed the U.S. exporter that the order had been filled in Europe. It is doubtful whether any single European manufacturer could fill such a large order which is certainly in excess of Yugoslav requirements.

(ii) Numerous additional inquiries of Yugoslav origin were received by U.S. firms during 1948. The total quantity exceeded 16,000 tons, two-thirds of it aluminum oxide and the other third silicon carbide. To the best of our knowledge, none of these inquiries was filled. It is believed that the Yugoslav Government hoped by placing these orders to fill its import requirements in their entirety even though only a fraction of the quantities requested were actually shipped. The desire to stockpile may also have been the motive behind these large orders, although even for stockpiling requirements, the quantities requested were excessive.

b. Abrasive Wheels.

(1) USSR.

(a) Production and Requirements.

Current Soviet requirements for grinding wheels are estimated at 18,000 tons per year. It is believed that Soviet requirements have increased materially since the war due to the tremendous increase in the Soviet inventory of machine tools.

Production, based on an individual plant analysis, is believed to approximate 14,000 tons annually. It is believed that the Soviets have sufficient technical competence to produce their own requirements of general-purpose wheels, but that they fall short in their ability to manufacture precision grinding wheels. For these the Soviets appear to be dependent upon the West for the bulk of their requirements. It is significant that toward the end of the war the Soviets unsuccessfully solicited technical assistance contracts for their grinding wheel industry from US manufacturers. The fabrication of rubber-bonded wheels seems to have particularly baffled Russian technicians.

The Soviets are entirely dependent upon outside sources for certain bonding materials such as natural rubber and shellac. (Synthetic rubber has proved unsatisfactory for use in grinding wheels, according to American manufacturers). Vitrified wheels, however, generally comprise 50 percent of the abrasive wheels produced, and the Soviets have an adequate supply of Kaolin, feldspar, and other raw materials used in the manufacture of wheels of vitrified bond.

(b) Imports.

Soviet imports of grinding wheels from the US in 1948 totalled only 26 tons, while imports from Czechoslovakia are reckoned at 350 tons. US exports to the Soviet under Lend-Lease totalled 4,014 tons in 1943, 3,793 tons in 1944, and 5,408 tons in 1945. It is believed that this was enough to enable the Soviets to stockpile a portion of these wheels. While abrasive grains can be stored indefinitely, the stockpiling of wheels has serious limitations. Some breakage is involved in storage. Rubber and shellac may deteriorate, while vitrified wheels cannot be subjected to freezing.

(c) Inquiries.

Large-scale Soviet inquiries for grinding wheels have appeared in the US in recent months. These inquiries indicate that the Soviets are either critically short of abrasive wheels, rubber-bonded wheels in particular, or are attempting to stockpile them.

1. 50,250 aluminum oxide wheels of 55 different types and sizes, 1300 of bakelite bond and the remainder of rubber bond. The specification of this order, which was received in May 1949 from a Swiss distributor, clearly indicates that the wheels were for use in the manufacture of ball bearing cups and races. An official of the US company which received the order described the quantities as huge and stated that the production of bearings for which such quantities would be required would be of great magnitude. This official firmly believed that the order originated in the Soviet Union. This belief he based on the fact that it was very similar in quantities and nomenclature to an order placed by the

Soviet Purchasing Commission during the war; that it was very similar to a recent order placed by the USSR Trade Delegation in London with a British subsidiary of the American company; and finally that Switzerland would have no requirements for such a large order. The same order was received by other American companies, whose officials also expressed the opinion that the order originated in the Soviet orbit. All of the American producing companies, to the best of our knowledge, refused to quote on the order. The very size of this request indicates a possible attempt to stockpile these wheels.

4,000 12 in. vitrified wheels placed by the USSR Trade Delegation in London with a British firm. The firm quoted, but no order was placed. 9/22/48.

"A large quantity of vitrified wheels" placed by Martin Kjelgaard, Vejle, Denmark, with a British firm. The firm did not quote. Due to Denmark's limited abrasive needs and to Martin Kjelgaard's involvement in another trade deal with an Eastern European customer, this order was believed to be for the USSR or Poland. 10/30/48.

"A large quantity of rubber bonded wheels" placed by the USSR Trade Delegation with a British firm. There was no quotation. 2/24/4

(2) Czechoslovakia.

(a) Production and Requirements.

Czech requirements for grinding wheels are estimated at approximately 9,000 tons a year. United Carborundum Company in Prague is the only significant producer of grinding wheels. No recent production

figures are available, but on the eve of World War II, production averaged 9,600 tons annually. The Czechs appear to be able to satisfy their own requirements for all finished abrasive products except rubber-bonded wheels, which they are reportedly unable to manufacture.

(b) Imports and Exports.

i. Records of the Czech Statistical Office indicate that for the first nine months of 1948 imports of wheels amounted to 18 tons. This compares with imports of 24 tons for the full year 1937.

ii. The same statistics show that 520 tons of grinding wheels were exported during the first nine months of 1948. Exports for the full year 1937 show exports of 600 tons.

iii. Czechoslovakia is reportedly allocating half of its grinding wheel exports to the Soviet Union. The remainder are shipped to other European countries and to South America.

(c) Inquiries.

i. A British grinding wheel manufacturer received the following Czechoslovak orders during the period 1 June 1948 to 1 April 1949:

Inquiry Date	Customer	Material	Action
1 Jun 48	Omnipol Trading & Shipping Co. Ltd., London	Ball Wheels	£884 order entered 13 Dec 48
8 Jul 48	United Carborundum & Electric Works Ltd., Lincoln	Alonite rubber wheels	£435 order entered 28 Jan 49
1 Oct 48	Omnipol Trading & Shipping Co. Ltd.	Rubber bonded ball race wheels	£1600 order entered 24 February 49
14 Oct 48	Industria Ltd., London	Ball wheels and ball race wheels	Accepted £870 order, ball wheels only, entered 16 Mar 49

(The above three firms wanted to place repeat orders for similar wheels but the British firm stated that their commitments would not allow them to accept.)

12 Jan 49	Ceskoslovenska Keramika AS, Prague	100,000 rubber bonded wheels (probably for ball raceways)	Stated unable to quote
12 Jan 49	Ceskoslovenska Keramika AS, Prague	12,300 rubber bonded wheels	Stated unable to quote
4 Mar 49	Industrial Suppliers Ltd., London	1,650 small rubber wheels	Stated unable to quote

The order for 100,000 rubber bonded wheels is believed to be considerably in excess of Czech requirements. If the Czechs really expected to obtain that quantity, it is quite likely that they planned to re-export some of them to the USSR.

ii. 3,000 abrasive stones. The order was received on 6 February 1948 by an American manufacturer from the Automobilove Zavody-Narodni Podnik-Zavod Avia, of Cakovice, Czechoslovakia. The export license for this order was rejected by the Department of Commerce. Subsequently, the Czech firm learned that the stones could be shipped without export license if

each transaction involved less than $100. They therefore placed six orders and submitted six letters of credit to cover the quantity ordered. No information is available on whether the stones were shipped.

iii. Abrasive stones. The order was received by a US company in 1948 from the Pal Company of Czechoslovakia. Their export application was rejected.

iv. 300 to 500 grinding wheels, 70 mm diameter, 2 mm thick, 16 mm arbor hole, to be used for grinding threads in insulating porcelain. The inquiry was received on 4 February 1949 by an American manufacturer from Arnida Products Company, New York City, who advised that the wheels were to be shipped to Czechoslovakia. The US manufacturer refused to quote.

(3) Hungary.

(a) Production and Requirements.

There are several producers of abrasive wheels in Hungary, and they are apparently able to satisfy domestic requirements for grinding wheels.

(b) Imports and Exports.

Hungarian imports of abrasive wheels have been almost negligible. During 1948 the US exported to Hungary abrasive wheels valued at $236, while during the same period the United Kingdom shipped wheels valued at a sum in sterling equivalent to $724.

(c) Inquiries

In contrast to Hungary's diligent efforts to procure

abrasive grains from the US, its inquiries for wheels have been notably lacking, lending support to belief that Hungary is able to supply her domestic grinding wheel requirements.

The following is the only inquiry reported:

$15,000 worth of finished grinding wheels. The inquiry was received by a US manufacturer on 6 December 1948 from Corregidor Ltd., London. The latter stated that the shipment would be made to Hungary. The US manufacturer did not quote on the order.

(3) Poland.

(a) Production and Requirements.

Little data is available on Polish grinding wheel requirements but they probably do not exceed 500 tons a year. Reports of the number of abrasive wheel manufacturers in Poland vary from one to three, and the total number of wheels produced is believed to be insignificant. Poland is therefore dependent upon outside sources for her grinding requirements.

(b) Imports.

During 1948 the US shipped to Poland 17 tons of grinding wheels at $2500. During the first nine months of 1948 the United Kingdom shipped $2888. worth of grinding wheels to Poland.

(c) Inquiries.

i. The following orders for abrasive wheels were placed by Polimex (Polish Import and Export Co.) with a British firm in the period April 1948 to April 1949.

Inquiry Date	Material	Value of Quotation & Order	Order Entered
17 Apr 48	100 green-grit carborundum wheels	£495	13 Nov 48
2 Sep 48	Aloxite rubber wheels	£2087	17 Feb 49
30 Sep 48	Aloxite rubber wheels	£73	[illegible]

Inquiries for the same period were as follows:

Inquiry Date	Material	Value of Quotation	Action
18 Jun 48	Carborundum & aloxite vitrified & resinoid wheels	£629	No order received
28 Jun 48	Aloxite rubber & resinoid wheels	£6481	No order received
1 Jul 48	Carborundum vitrified wheels	£19,584	No order received
11 Aug 48	Aloxite rubber cut-off wheels	£32	No order received
12 Aug 48	General inquiry, diamond wheels		Gave prices, but no orders received
6 Sep 48	Carborundum & aloxite vitrified wheels	£769	No order received
13 Oct 48	Aloxite rubber & resinoid wheels	£105	On 14 Mar 49, advised unable to accept order
15 Nov 48	Diamond wheels		Advised unable to supply
17 Nov 48	Assortment centerless wheels	£262	Advised unable to supply
11 Jan 49	75 - 16 in cut-off wheels		Advised unable to supply

(5) Rumania.

(a) Production and Requirements.

Rumanian requirements for abrasive wheels largely for the wood working industry are believed to be only several hundred tons a year. Rumanian production of abrasive wheels is believed to be negligible.

(b) Imports.

During the first nine months of 1948 Rumania imported from the United Kingdom abrasive wheels valued at £ 5812 sterling. An unconfirmed report states that Rumania has also been importing wheels from Czechoslovakia. During 1947 the wood working industry is reported to have imported 20,000 aluminum oxide wheels from the United Kingdom through a Turkish agent in Istanbul.

(c) Inquiries — There have been no inquiries reported since 1947.

(6) Yugoslavia.

(a) Production and Requirements.

Yugoslav requirements for abrasive wheels are limited chiefly to the woodworking industry. There is only one manufacturer of artificial abrasive wheels in the country, and production is small. In 1937 the few grinding wheels which were produced were of a heavy type. Most of them were made of natural corundum and Naxos emery rather than artificial abrasives. Many of them were also fabricated from sandstone

procured from natural quarries. Such inferior substitutes are of no value in precision uses. It appears that the Yugoslavs are now using more artificial abrasives in their grinding wheel production than they used before the war, and that they must depend upon other countries to meet their requirements for precision grinding wheels.

(b) Imports.

US and British statistics indicate that no grinding wheels were exported to Yugoslavia from either country in 1948. It is believed that Czechoslovakia exported some grinding wheels to Yugoslavia in 1948.

(c) Inquiries.

1. 10,000 grinding wheels "for sharpening planers and other tools used in woodworking and sawmill industry". This inquiry was received by a US manufacturer on 9 May 1949 from the Yugoslav Embassy in Washington. So far as is known, the American manufacturer has not quoted. The order is large but not excessive for Yugoslavia's woodworking industry.

2. Diamond Wheels.

(1) USSR.

(a) Production and Requirements.

Soviet requirements of diamond wheels for precision grinding would presumably be very large. The USSR is reportedly

manufacturing diamond wheels, but there is no available information on the volume of this production. Fabrication of diamond wheels requires the use of industrial diamonds bonded together with high alloy metal. It is doubtful that Soviet technicians possess sufficient technical "know-how" to produce an adequate supply of diamond wheels. In addition the Soviets are dependent upon outside sources for the industrial diamonds which go into the fabrication of these wheels. As important as diamond wheels are for certain types of precision grinding, such as the grinding of tungsten carbide tools, the Soviets can and probably do get along with admittedly inferior abrasive wheels of this kind.

(b) Imports.

There is no information on imports of diamond wheels.

(c) Inquiries.

The Soviets have repeatedly tried to purchase industrial diamonds for diamond wheel manufacture from American sources. So far as is known, however, these efforts have been unsuccessful.

(2) Satellites.

None of the satellite countries manufactures diamond wheels and with the exception of Czechoslovakia, their requirements are considered insignificant.