

THE RUSSIAN PGM INDUSTRY



Russia remains the largest producer of palladium and Soviet-era bars like these are a common sight in bank vaults.

The USSR was a command economy. There was no market in precious metals in a Western sense. From the 1920s, precious metals were subject to a State monopoly over their mining, refining, manufacturing and ownership.

Private individuals could only own precious metals in the form of jewellery. The title over all other forms of precious metals remained with the State, which accumulated them in the State treasury (Gokhran), and allocated them to industries as required. After use any residual or recovered metal, after refining, was returned to Gokhran. As a result, pgm use was not as economically efficient as in the West.

The result of this special treatment of precious metals in the USSR was that all information about reserves, production, refining, consumption and exports was a State secret. Not until 2003 was this law changed in Russia and even then historical information was not made available.

USES FOR PGM

Most pgm use reflected the structure of the Soviet economy and the bulk of metal was used for military applications or in industries such

as bulk chemical manufacture. As the military-industrial complex was the major consumer of raw materials in the USSR and any data about this sector was top secret, it is difficult for Western analysts to know exactly what pgm consumption actually was in the Soviet era. Despite the secrecy, it is clear that the major pgm-consuming industries, some of which overlapped into the military area, were:

- electronics applications
- production of nitric acid
- petroleum refining
- glass manufacture

Electronics demand was for both military and consumer products. Very large quantities of contacts and capacitors were produced and large amounts of these were found to be stored unused after the demise of the USSR. Much of this material was subsequently recycled, including some that found its way by "unconventional" routes to the West.

The nitric acid industry in the USSR was probably the largest in the world, with a high proportion of its output going into the production of nitrogenous fertilisers. Most plants were operated at high or medium pressure and there was little attempt to introduce new technologies to reduce pgm losses in operation. Catchment gauzes (which trap platinum displaced from the main gauze) were largely unused in Soviet times and recovery of pgm from downstream pipework ("low-grade recovery") was only introduced by Western companies in the post-Soviet period. The pgm composition of Soviet gauzes

was close to Western offerings (i.e. mainly platinum-rhodium alloys) but tended to contain from 10 to 20 per cent of palladium as a minor alloy component.

The USSR's oil and gas production led to the need for catalytic refining of petroleum to produce useful products. Although the USSR did import reforming catalysts from the West in quite large quantities, it also manufactured its own variants of these catalysts for internal use.

Other significant uses of pgm in Soviet times were in the glass industry; laboratory apparatus, including crucibles for growing crystals, for which iridium was important; and some catalysts for the control of air pollution, for example to reduce NOx emissions from nitric acid plants and to remove poisonous CO in submerged submarines.

SUPPLY OF PGM

Alluvial platinum was first discovered in the Ural mountains in 1824, and this location was the major source of Russia's platinum until the opening of the Norilsk mine in the mid-1930s. Norilsk is a nickel and copper deposit with pgm as important by-products. The production of pgm in the

Norilsk Nickel is the world's largest producer of palladium, which is mined in its main Siberian operations alongside large amounts of nickel and copper.





The nitric acid industry in the Former Soviet Union did decline in global importance. However, demand for pgm gauzes for nitric acid production is growing once again.

USSR was therefore determined by the need for nickel and copper and not by the demand for pgm either for internal consumption or for export to produce foreign (hard) currency. In contrast to the platinum-dominated alluvial deposits, the Norilsk region mines yield substantially larger quantities of palladium than platinum. Newer alluvial platinum deposits in the far East of Russia were only exploited relatively recently, at Kondyor from 1984 and Koryak from 1994.

GOVERNMENT STOCKS AND EXPORTS

All pgm produced in the USSR were deemed to belong to the State. Metal produced but not required for immediate use was stored by the State treasury Gokhran and was potentially available for the generation of hard currency subject to the requirements of the State budget. The Almazjuvelirexport (Almaz) State agency was the only body legally entitled to export pgm, and remains so for good delivery products at the time of writing.

It is generally believed that following the opening of the Talnakh deposits in the 1960s, the State built up substantial reserves of pgm, particularly of palladium,

which may have exceeded 30 million ounces when mine output was at its peak in the late-1980s. Sales to investors outside the USSR and to automotive manufacturers have since depleted these stocks significantly.

FABRICATORS

As in any industry under the Soviet command economy, fabrication of pgm products was concentrated in a few facilities, many of which still dominate the internal market.

The principal pgm fabricating factory was located in the Urals at Sverdlovsk (Ekaterinburg), where nitric acid gauzes, contacts, glass fibre bushings and crucibles were made. At its peak in 1990, this facility manufactured over 60 metric tonnes of pgm products. An estimated 70 per cent of this output was for military purposes. Other specialised pgm products were produced at a number of smaller operations scattered around the Soviet Union.

The transformation of the economy following Perestroika had a two-fold effect: on the one hand, the volumes of pgm fabrication at Ekaterinburg by the late-1990s were reduced to only 10 per cent of their highest levels, so the plant resumed the pgm refining it had originally been built for in 1916, accepting materials from small local operations, deposits in the far East of Russia and occasionally even from Norilsk. On the other hand, new economic policies gave room for competition and created opportunities for new fabricators.

The first one to move towards independent pgm manufacturing was the Supermetal company.

Originally based on the premises of the central research facility for the national fibre glass industry, this now manufactures bushings and other specialist glass equipment. Currently Supermetal is the leading bushings manufacturer in Russia supplying not only the FSU but also customers in China and Western Europe.

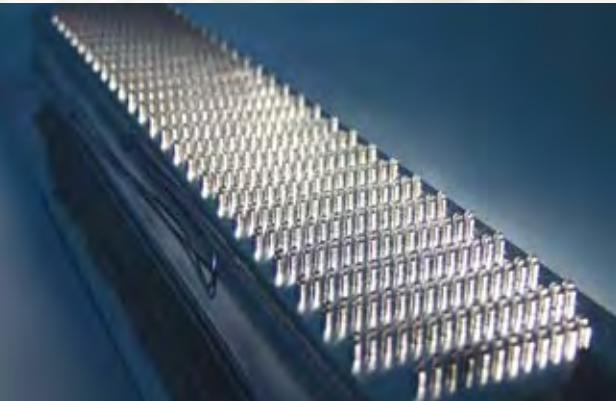
The other major player is Krasnoyarsk Non-Ferrous Metals Plant, which is located in Siberia, in the geographical centre of Russia. Set up originally to refine pgm concentrates from the Norilsk region mines, this operation has recently increased its involvement in gold refining and pgm manufacturing. Currently Krasnoyarsk refines over 95 per cent of Russian pgm and is also the leading producer of pgm compounds and platinum jewellery. It has also developed a knitted catalytic gauze business based on licensed Western technology.

PRESENT DAY DEMAND

Russia's development towards a market economy and the partial liberalisation of the State monopoly on precious metals have led to changes in pgm demand patterns. This process is still gathering momentum. A number of demand

Johnson Matthey is the first western autocatalyst manufacturer to establish a plant in Russia. The facility shown is in Krasnoyarsk and will start operations in the first half of 2008.





Demand for bushings and other glass products in the Former Soviet Union is now expanding once more, having contracted after the restructuring of the old USSR economy.

segments for the platinum group metals in Russia and the other Former Soviet Union (FSU) countries have already emerged as significant, principally industrial uses and autocatalyst production.

In the automotive sector, Russia is increasingly significant. 2.8 million new cars were bought in 2007, 35 per cent more than in 2006. This means that the Russian market is already larger than more established national markets such as the UK and France. More importantly, sales are still growing rapidly – by an expected 30 per cent in 2008 – and Russia is likely to overtake Germany within two years to become the largest car market in Europe.

Emissions limit compliance was finally made mandatory in July 2006 for cars sold in Russia and these rules were tightened in 2008 and are now equivalent to European Euro stage 3 rules. Many cars sold in Russia are fitted with low-loaded autocatalyst technology that has already been applied to the European market. One difference, however, is the choice of active metal. In Europe, both platinum and palladium are used in gasoline catalysts alongside rhodium – although much more palladium is used than platinum. However, in

the Russian market, almost every formulation employs palladium–rhodium technology. With very few diesel cars produced, there is little autocatalyst demand for platinum.

Future developments should see the introduction of Euro 4 rules into Russia in 2010. The major foreign vehicle manufacturers are increasingly investing in local production capacity – the Russian government has signed over 20 incentive agreements with the global automotive industry. Renault also recently announced its purchase of a share of the largest local auto maker (Avtovaz, the owner of the Lada brand).

With emissions limits tightening, more local manufacturing and a growing market for light duty vehicles, pgm demand in this sector will increase.

By comparison, the Russian platinum jewellery manufacturing industry is developing more slowly. With a substantial amount of metal mined in Russia, there is considerable interest in adding value locally and building a domestic market. Russian demand is still small with only 5,000 oz of platinum and 1,000 oz of palladium hallmarked in 2007. However, with Russian disposable income growing, there is potential for further growth in jewellery demand.

In the industrial sector, Russia and the other FSU countries have always consumed a significant amount of pgms, particularly palladium. The electronics and glass industries in Russia are still substantial users of metal. Pgm demand from the chemicals industry is relatively small compared to demand in other regions. However, the

most interesting sectors in terms of industrial pgm demand are petroleum refining and nitric acid manufacturing.

Russia has become a much more important player in the global petroleum industry in recent years, particularly in relation to supplying natural gas. Downstream processing activity remains relatively limited but is expected to grow as the economies in the region expand.

The nitric acid industry in Russia now produces an annual 9 million tonnes or more than 10 per cent of total global output, making it again the largest producer. Most of this Russian production goes to the growing fertiliser industry but its use in the manufacturing of explosives (e.g. for mining) has further boosted demand. Strong production in Russia reflects a growing global trend to concentrate nitric acid plants near sources of cheap natural gas.

Recent Russian economic growth has been at an annual rate of 6 to 8 per cent and the corresponding influx of foreign direct investment (close to US \$50 billion in 2007) has created further opportunities for the development of local fabrication. As the economy continues its rapid expansion, pgm demand looks set to grow still further.

The graph below shows demand for platinum and palladium in Russia in 2006 and 2007.

