

PALLADIUM

AUTOCATALYST

Demand for palladium for use in autocatalysts is forecast to slip by 1 per cent to 3.69 million oz in 2005. Purchases by the European auto industry appear certain to fall for the fifth year in a row as production of gasoline light vehicles in the region continues to decline. US demand for palladium in autocatalysts is also expected to weaken as a result of ongoing thrifting programmes. Demand in China and the Rest of the World, however, is projected to grow in line with rising light vehicle output.

Europe

European demand for palladium from the autocatalyst sector is forecast to drop by 9 per cent (100,000 oz) to just over 1 million oz in 2005, the lowest level of demand since 1996. The continuing rise in the market share taken by diesel cars in Europe is expected to result in a decline in production of gasoline light vehicles of around 3 per cent this year, equivalent to more than 300,000 units. At the same time, average palladium loading levels in gasoline autocatalysts are still trending downwards and this thrifting will contribute to the fall in demand for the metal. The development of diesel oxidation catalysts that contain a proportion of palladium in place of platinum will not have a material impact on demand for either metal this year.

Japan

Purchases of palladium by the Japanese auto industry are forecast to edge up by 10,000 oz to 645,000 oz in

2005. Light vehicle production is likely to increase by around 2 per cent this year. At the same time, the proportion of vehicles manufactured to stringent Japanese ultra low emissions vehicle (ULEV) standards will rise. Although ULEV limits are not mandatory, the environmental credentials of light vehicles are generally an important consideration for new car buyers in Japan.

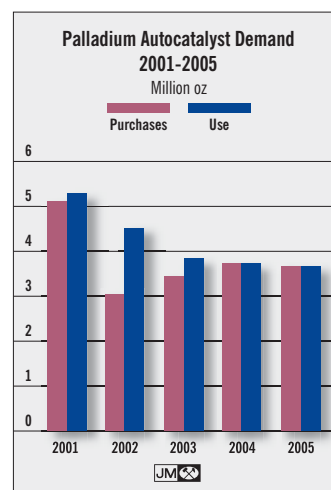
Palladium Demand: Autocatalyst '000 oz		
	2004	2005
Europe	1,105	1,005
Japan	635	645
North America	1,445	1,395
Rest of the World		
China	105	150
Other	430	495
Total	3,720	3,690
Autocatalyst recovery	(535)	(680)

North America

Purchases of palladium by the North American auto industry are forecast to weaken by 3 per cent in 2005 to 1.395 million oz. Thrifting will continue to reduce average catalyst palladium loading levels and, this year at least, will outweigh the positive effects of auto manufacturers switching from platinum to palladium-based systems on gasoline vehicles.

The rate of light vehicle production in North America is also expected to slow moderately compared with 2004. The decrease in output of larger SUVs and pick-up trucks is likely to be greater than the overall decline, as the rapid rise

in the price of gasoline had a noticeable impact on sales during the middle of the year. These heavy, large-engined vehicles generally utilise catalyst systems with relatively high palladium contents.



With no changes to auto industry stocks, purchases of palladium have been representative of use for the last two years.

China

Demand for palladium from the Chinese automotive industry is forecast to jump by 43 per cent to reach 150,000 oz in 2005. The surge in demand will reflect higher light vehicle production, which is on track to record double-digit percentage growth.

Purchases of palladium will also be boosted by a further increase in the proportion of light trucks fitted with catalysts and a rise in average catalyst loading levels, a result of the introduction of more stringent emissions standards.

Rest of the World

Autocatalyst demand for palladium in the Rest of the World is expected to reach 495,000 oz this year, an annual increase of 15 per cent. As with platinum, demand will be driven by a combination of higher light vehicle production in South Korea, India and South East Asia, and tightening emissions limits in a number of countries.

Autocatalyst Recovery

An estimated 680,000 oz of palladium will be recovered from scrapped autocatalysts in 2005, up from 535,000 oz the year before. Recovery in North America is expected to climb by 23 per cent to reach 425,000 oz as greater volumes of palladium-rich catalysts from vehicles dating from the mid-1990s enter the recycling stream.

The average palladium content of scrapped catalysts in Europe is also projected to increase and recovery rates in the region are rising. The volume of palladium recovered in 2005 is consequently forecast to expand by 50 per cent to 165,000 oz.

Dental

A marginal increase in demand for palladium in dental alloys is expected this year, total purchases rising by 10,000 oz to 860,000 oz. European demand is forecast to weaken further but this is likely to be offset by some growth in the Japanese and North American markets.

Japan remains by far the biggest dental market for palladium thanks to the state subsidy of the cost of 'kinpala' alloys, which contain 20 per cent of the metal

Palladium Demand: Dental '000 oz		
	2004	2005
Europe	80	75
Japan	520	525
North America	235	245
Rest of the World	15	15
Total	850	860

by weight. Little change in this mature market is expected in 2005 and palladium demand is forecast to edge up by 1 per cent to 525,000 oz.

In the more price sensitive North American market, the low and stable price of palladium relative to gold this year is likely to result in demand in dental

alloys rising by 4 per cent to 245,000 oz. In Europe, however, palladium retains only a niche position in the dental sector and purchases of metal are forecast to weaken slightly to 75,000 oz.

ELECTRONICS

Purchases of palladium by the global electronics industry are forecast to increase by just over 5 per cent in 2005 to reach 970,000 oz, continuing the steady recovery from the nadir of 670,000 oz

in 2001. Although demand from the multi-layer ceramic capacitor (MLCC) sector will continue to decline, use of the metal in plating applications is expected to show robust growth.

Although MLCC output is expected to grow this year, palladium demand is forecast to fall, continuing the trend of the last five years. The market share of nickel-based MLCC is on course to reach 70 per cent as a result of further substitution of palladium-based capacitors, whilst miniaturisation will also continue to adversely affect metal usage. At the same time, the average palladium content of the conductive pastes used in MLCC production is still declining.

In contrast, demand for palladium from the plating sector is forecast to expand by close to 30 per cent in 2005. Demand will benefit from the overall growth in production and sales of electronic components; from the drive to replace solders containing lead with alternative formulations; and from the widening difference between the price of palladium and gold, which has stimulated increased demand for plating compounds based on the former for the plating of connectors.

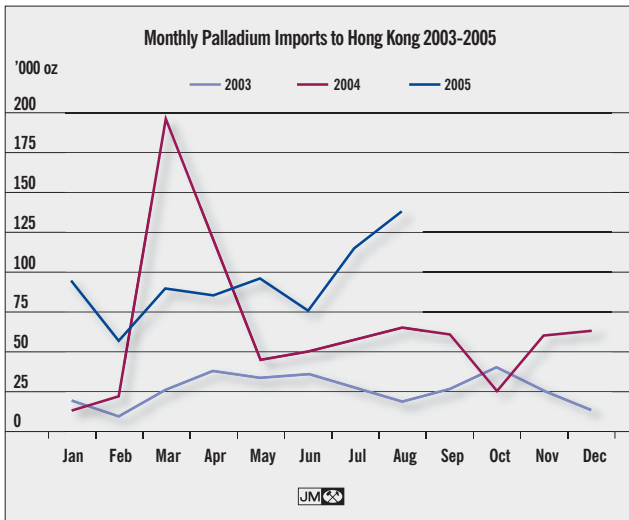
Further growth in demand for palladium this year will come from higher production of resistor chips and related components, driven in part by strong demand for automotive electronics. Use of palladium in hybrid integrated circuits is expected to be stable.

Palladium Demand: Electronics '000 oz		
	2004	2005
Europe	115	115
Japan	235	245
North America	185	190
Rest of the World	385	420
Total	920	970

JEWELLERY

Global demand for palladium in jewellery manufacture is forecast to rocket to 1.43 million oz in 2005, an annual increase of 55 per cent. Virtually all the growth will come from China, where the production of palladium jewellery has expanded remarkably quickly.

Purchases of palladium for jewellery manufacture in China are projected to soar to 1.2 million oz in 2005, up by 71 per cent compared to 2004 (700,000 oz). Most of the leading jewellery manufacturers in Shenzhen are now producing palladium jewellery in addition to platinum, and for several of them palladium accounts



Apart from March and April (which were exceptional months in 2004) palladium imports to Hong Kong in 2005 have been running well ahead of last year.

for the majority of their output. Manufacturers, wholesalers and retailers all benefit from the much lower metal funding costs for palladium compared to platinum, whilst the comparatively low volatility of the palladium price during 2005 to date has reduced the financial risk of holding stock.

In addition, although the manufacturing margins for palladium jewellery have declined to the point at which they are now little different from those on platinum, profit margins per piece of jewellery at the retail end of the market remain considerably more attractive.

This year has seen the number of jewellery stores stocking palladium increase, whilst the availability of a wider range of new designs has encouraged some retailers to expand the proportion of counter space that they have allotted to palladium. Meanwhile, the technical and quality problems experienced with some of the earlier palladium jewellery production appear to have been largely overcome.

The introduction of Pd990 alloys (99 per cent palladium) in place of Pd950 alloys has also proved

successful – high purity is a key selling point and gives palladium a major advantage over white gold.

Retailers are promoting palladium jewellery on the basis that it shares many attributes with platinum: that it is a pure, rare, durable, white fashionable precious metal. The suggestion that palladium jewellery could

appreciate in value in the same way that platinum has is also a frequently used sales message. In essence, palladium offers less affluent consumers high purity white precious metal jewellery at an affordable price.

However, the pattern of retail sales of palladium jewellery is still rather patchy, both on a broad geographical level and from one store to the next. Where palladium is selling well, typically in second and third tier cities, it appears to have taken some market share from traditional yellow gold, white gold and from the lower end of the plain platinum jewellery market. In contrast, in Shanghai and Beijing platinum remains the metal of choice for middle-class consumers and many leading retailers have held back from stocking palladium jewellery.

OTHER

Demand for palladium in other applications is forecast to rise by 2 per cent to 620,000 oz in 2005. The growth will come primarily from greater use of the metal in chemical catalysts. Purchases of physical investment products is also likely to be moderately higher.

Purchases of palladium for use in chemical catalyst applications are forecast to grow by around 3 per cent to reach 320,000 oz in 2005. Demand for palladium catchment gauze from the nitric acid industry is likely to be broadly stable, whereas the construction of new purified terephthalic acid manufacturing capacity in Europe and Asia will give a boost to demand for palladium-based process catalysts. Demand for palladium from other smaller industrial applications, including petroleum cracking catalysts, is not expected to change significantly.

Private investors continue to show a strong appetite for palladium, with total investment demand projected to rise 5 per cent to 220,000 oz this year. Small 1 and 10 oz bars have been selling well in the US market, benefiting from the high level of interest in commodities and precious metals in particular. In the fourth quarter of the year the Royal Canadian Mint launched a series of 1 oz palladium Maple Leaf coins.

	2004	2005
Europe	35	35
Japan	155	160
North America	0	5
Rest of the World	730	1,230
Total	920	1,430

	2004	2005
Europe	25	20
Japan	10	10
North America	235	250
Rest of the World	25	20
Total	295	300