

PLATINUM

AUTOCATALYST

The global autocatalyst industry purchased 3.51 million oz of platinum in 2004, an annual increase of 7 per cent. Once again, the greatest contribution to growth in platinum demand came from Europe, driven by another strong year of diesel car sales and tightening diesel emissions regulations. Japanese auto industry purchases of platinum also increased substantially as truck manufacturers prepared for the introduction of strict new heavy duty diesel emissions standards. Elsewhere in Asia, rising light vehicle production contributed to higher platinum demand. In contrast, demand for platinum from the US auto industry fell as programmes to reduce use of the metal in gasoline vehicle autocatalysts progressed.

Europe

European autocatalyst demand for platinum climbed by 14 per cent to a new high of 1.66 million oz in 2004 as sales of diesel-powered cars in Europe surpassed 7 million units for the first time. At the same time, tightening emissions standards for light duty diesel vehicles resulted in higher average platinum loadings in diesel autocatalysts.

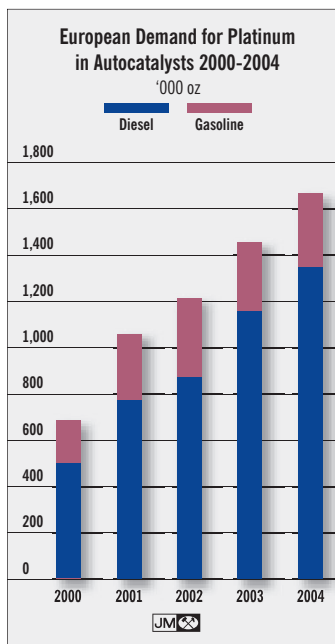
Sales of diesel cars continued to gain market share in Western Europe in 2004, accounting for more than 48 per cent of total new car sales over the year as a whole. This translated into in excess of 800,000 additional diesels sold last year compared with 2003.

Increasing fuel prices helped to underline the appeal of diesels to car buyers in Europe: diesels are on average around 30 per cent more fuel efficient than their gasoline counterparts, and in a majority of

European countries diesel is cheaper than gasoline. In addition, vehicle taxation in the region is increasingly linked to fuel efficiency and carbon dioxide (CO₂) emissions, which again favours diesel engines.

Euro IV emissions standards, which set more stringent emissions limits for both gasoline and diesel light vehicles, came

into effect in January 2005. The introduction of new Euro IV compliant cars during 2004 was a factor in higher autocatalyst platinum demand. In general, auto manufacturers were able to meet lower permissible NOx limits for diesel cars by modifying vehicles' engine calibrations, but meeting the necessary reductions in CO and particulate emissions typically required an increase in oxidation catalyst platinum loadings. On some larger, heavier diesel car models manufacturers introduced platinum-catalysed diesel particulate filters (DPF) in order to meet the Euro IV particulate matter standard. In addition, several European auto manufacturers began offering diesel particulate filters as optional extras.



Japan

Japanese purchases of platinum for autocatalysts jumped by 18 per cent to 590,000 oz in 2004. The rise was largely due to a combination of new demand from the heavy duty diesel sector and an overall increase in inventories of platinum held by vehicle manufacturers.

New national emissions standards for heavy duty diesel vehicles come into force in Japan in October 2005, and necessitate the use of diesel oxidation catalysts on new trucks for the first time. In 2004, the country's truck manufacturers rapidly introduced new models compliant with the 2005 regulations. Many of these are fitted with more than one oxidation catalyst or an oxidation catalyst in combination with a diesel particulate filter. Some of the largest new trucks utilise two oxidation catalysts as well as a DPF.

The introduction of emissions after-treatment systems onto heavy duty diesel vehicles, therefore, was a major component of the substantial increase in Japanese platinum demand last year. The need for truck manufacturers to establish initial working stocks of platinum, as well as the desire by some to hold strategic reserves of the metal, also contributed to the marked rise in purchases of platinum. Some Japanese

Platinum Demand: Autocatalyst
'000 oz

	2003	2004
Europe	1,455	1,660
Japan	500	590
North America	885	800
Rest of the World		
China	65	75
Other	365	385
Total	3,270	3,510



The use of after-treatment systems on heavy duty diesel vehicles made a significant contribution to growth in autocatalyst demand for platinum last year.

car companies are also believed to have increased their inventories of platinum last year.

A further, albeit small, factor in the growth in Japanese autocatalyst demand for platinum in 2004 was a 1 per cent increase in production of cars and light trucks, which was supported by an upturn in domestic car sales.

North America

Purchases of platinum by the North American auto industry dropped to 800,000 oz in 2004, a decline year-on-year of almost 10 per cent from the peak demand of 885,000 oz in 2003. Whilst light vehicle production in the region fell (imports taking an increased share of the market), the main cause of the slide in platinum demand was the ongoing replacement of gasoline autocatalyst systems containing platinum with palladium-based formulations. A significant number of the numerous new car, pick-up truck and sports utility vehicle models that were launched in 2004 make use of autocatalysts having little or no platinum content.

However, the pattern of North American auto industry demand for platinum was complicated by the phasing in of stricter federal Tier 2 vehicle emissions standards in the USA from the beginning of 2004. This had a small yet positive impact on the use of platinum. In addition, the number of heavy duty diesel vehicles in the USA that were retrofitted with diesel oxidation catalysts continued to increase steadily.

China

Growth in light vehicle production and sales in China, coupled with tightening emissions standards, resulted in a 15 per cent increase in autocatalyst demand for platinum to 75,000 oz in 2004. New car sales for the year increased by 13 per cent to 2.4 million; impressive in comparison to the performance of North American, Japanese and European markets but a considerably slower rate of growth than in 2003. Sales would almost certainly have been substantially higher had the Chinese government not introduced curbs on the availability of credit for new car purchases in mid-2004.

Autocatalyst demand for platinum was also boosted as limits on vehicle emissions in China continued to tighten. Euro II equivalent standards were extended



from Beijing and Shanghai nationwide in July 2004; Euro III standards will be introduced in the capital in 2005 and are expected to be applied across the country from 2008 onwards.

Vehicle emissions limits equivalent to Euro II standards were applied across China in 2004, whilst Euro III regulations will be introduced in Beijing (above) in 2005.

Rest of the World

Autocatalyst demand for platinum in the Rest of the World climbed to 385,000 oz in 2004, an increase of just over 5 per cent thanks largely to rising light vehicle production and tightening emissions legislation in Asia. Strong increases in light vehicle output were seen in India, South Korea, Thailand and Malaysia last year.

At the same time, tightening emissions standards in a number of countries were also a factor in higher autocatalyst demand for platinum: a greater proportion of new vehicles in Thailand met Euro III equivalent standards; South Korean automakers began introducing models that met emission limits that subsequently came into force in January 2005; whilst in India an increasing number of light vehicles were produced to Euro III equivalent standards, which will apply in selected major cities from April 2005 onwards.

Autocatalyst Recovery

The volume of platinum recovered from recycled autocatalysts grew by nearly 9 per cent in 2004, reaching an estimated 700,000 oz. The rise was most

notable in Europe, where cars fitted with catalysts made up an increasing proportion of the total number of vehicles scrapped. In several countries (including Austria and Germany) effectively 100 per cent of cars

Platinum Demand: Autocatalyst Recovery '000 oz		
	2003	2004
Europe	(115)	(140)
Japan	(60)	(60)
North America	(420)	(440)
Rest of the World	(50)	(60)
Total	(645)	(700)

now being recycled are equipped with catalysts. European targets covering the disposal and recycling of end of life vehicles (to be enforced from January 2006) also helped to push overall vehicle dismantling and catalyst recycling rates upwards.

The volume of platinum recovered from autocatalysts in North America also increased, but not as rapidly as in Europe. However, with a long-established and competitive catalyst recycling industry, the overall collection rate in North America was significantly higher than in Europe. Greater volumes of catalysts were also recovered from scrapped vehicles in South America and parts of Asia, driven in part by higher metal prices.

JEWELLERY

Purchases of platinum for jewellery manufacture dropped by more than 12 per cent in 2004 to 2.20 million oz, the lowest level of demand since the late 1990s. The decline was largely a result of the strength and volatility of the platinum price, which in turn led to another significant fall in purchases of metal by the Chinese jewellery trade. In Japan and North America retail sales of platinum jewellery were also adversely affected by the rise in the metal price. In Europe, however, purchases of platinum for jewellery manufacture increased due to a combination of growth in the UK market and good sales of Swiss watches.

Europe

Total European jewellery demand for platinum rose by 8 per cent in 2004 to 205,000 oz. The growth was generated by increased sales of platinum jewellery in the UK and by relatively strong shipments of luxury Swiss watches to export markets. In contrast, consumer demand for platinum jewellery in

continental Europe generally remained weak.

In the UK, the total volume of platinum jewellery hallmarked during the year increased by more than 12 per cent to just over 93,000 oz, of which around 70,000 oz was produced domestically. After several years of double-digit increases, however, the rate of growth in the UK is slowing.

Demand for platinum from the Swiss jewellery industry also climbed in 2004, reflecting continuing strong orders for platinum watches from export markets including the USA, Hong Kong, China, Singapore and parts of the Middle East.

In general, Italian companies also reported higher export sales of platinum jewellery last year, albeit compared with a weak 2003. In the domestic market, however, platinum's strong hold on the bridal sector was pressured by the rise in the price, white gold gaining some market share. In addition, the establishment of the Silplats jewellery joint venture diverted some platinum demand from Italy to South Africa (*see Rest of the World section*).

Purchases of platinum by German jewellery manufacturers slipped lower in 2004; although some companies successfully increased export sales, the domestic jewellery market remained weak, and platinum lost further ground as consumers turned to less expensive alternative white metals.

Japan

Japanese jewellery demand for platinum slumped by 12 per cent in 2004 to 590,000 oz, contradicting earlier expectations that the market would stabilise after several years of decline.

The slide in purchases of platinum by Japanese jewellery manufacturers resulted from a combination of factors. Key amongst these was another drop in retail sales of platinum jewellery, due in part to the high price of the metal. Sales of both bridal and fashion rings decreased, whilst in the chain sector the average weight per piece fell. Competition from white gold remained high, sales increasing at the expense of both platinum and yellow gold.

Platinum Demand: Jewellery '000 oz		
	2003	2004
Europe	190	205
Japan	660	590
North America	310	290
Rest of the World		
China	1,250	1,010
Other	100	105
Total	2,510	2,200



High quality, brand-name platinum jewellery continued to sell well in North America last year, despite the higher price of the metal.

The rising price of platinum also gave further momentum to the recycling of old platinum jewellery, both by consumers trading in old pieces and by retailers returning outdated stock to manufacturers in return for new designs. Higher and volatile metal prices also compounded cash flow problems for the wholesale side of the market, and further bankruptcies from within the trade contributed to the volume of platinum jewellery being recycled.

In addition, a small but increasing share of the Japanese market for platinum jewellery was taken by imports last year, as European and US brand name jewellery continued to gain sales at the expense of domestically produced products.

North America

Despite the robustness of the US economy, total sales of precious metal jewellery in North America were generally soft last year. At the same time, the increased price of platinum had a detrimental effect on purchases of the metal by jewellery manufacturers, as well as on certain sectors of the retail market. As a result, demand for platinum from the jewellery industry slipped by more than 6 per cent to 290,000 oz.

Higher metal prices caused some retailers to cut back their overall platinum stock levels, diverting a greater proportion of their display space to white gold.

As the metal price increased it became harder for suppliers of platinum products to meet key price points, particularly at the lower end of the market. As the difference between the retail price of white gold and platinum widened, the task of convincing consumers with a limited budget to opt for the latter became a tougher proposition for sales staff. In contrast, at the upper end of the market sales of platinum jewellery increased due to the promotion of new product ranges.

China

The volume of platinum purchased by Chinese jewellery manufacturers dropped by 19 per cent in 2004 to 1.01 million oz. Whilst still substantial, the contraction in demand of 240,000 oz, compared to our revised estimate for the previous year, was not as great as earlier feedback from the market had suggested it might be. When set against the strength of the platinum price, the market demonstrated considerable resilience in absorbing 1 million oz of metal for the fifth year in succession.

The reasons for the fall in Chinese purchases of platinum for jewellery manufacture were largely related to the behaviour of the platinum price during the first few months of 2004. The rapid rate at which the price of the metal increased in early January and from February to mid-April resulted in an intense squeeze on profit margins throughout the platinum jewellery supply chain. As a consequence, many manufacturers of jewellery cut back production of platinum products and switched output to palladium items, which (at that time) were much more profitable.

The rise in the price of platinum and the resulting increase in metal funding costs also caused an overall reduction in the amount of platinum jewellery stocked across the trade. Greater volumes of unsold older platinum articles were returned by retailers and wholesalers to manufacturers for re-fabricating into new designs.

At the retail end of the market, platinum faced increased competition from white gold and, in some areas, from the introduction of palladium jewellery.

Despite these negative factors, demand for platinum was underpinned by the consumer preference for the metal in the larger, wealthier metropolitan areas,

where promotion and marketing of platinum jewellery has been concentrated. Sales of diamond-set platinum products, which carry higher profit margins than plain jewellery, increased, as did the range of platinum items sold into the nascent bridal market.

By the second half of 2004, margins on platinum jewellery had improved a little as the volatility of the platinum price subsided and retail prices in China moved up, helping to offset higher metal costs.

Rest of the World

Platinum demand for jewellery fabrication in the Rest of the World increased by 5 per cent last year to total 105,000 oz. In India, the developing market for platinum jewellery was given a boost by the government's decision to reduce the import duty on platinum, bringing it in line with the duty on gold. Domestic sales of platinum jewellery continued to rise but at a fairly slow pace. On the other hand, some smaller manufacturers in South East Asia cut back their platinum production in reaction to the high and volatile metal price.

The Silplats jewellery manufacturing joint venture, in which the Italian manufacturer Silmar and Impala Platinum are partners, generated a modest volume of new demand for platinum in South Africa in 2004.

CHEMICAL

Consumption of platinum in chemical catalyst applications grew by around 3 per cent to 330,000 oz in 2004. Although demand for platinum gauze for the production of nitric acid fell, this was offset by growth in sales of platinum-based catalysts to the bulk and speciality chemicals industries in Europe and Asia.

Purchases of platinum for the manufacture of catalyst gauze for nitric acid production slipped lower in 2004. Whilst a number of new plants and expansions to existing capacity were commissioned in Asia during the year, the extra demand for platinum that this generated was outweighed by metal returned for refining from the closure of older plants in both Asia and North America. In addition, an increased volume of platinum was recycled from residues recovered during plant maintenance programmes.

In contrast, demand for platinum-based catalysts for the manufacture of silicones increased strongly, reflecting good demand for silicones compounds worldwide. Manufacturing plants within the industry were generally run at high operating rates and additional capacity was brought on stream in Europe.


In Asia, the construction of new paraxylene manufacturing plants contributed to firm demand for platinum-based catalysts. Demand from the specialty chemicals sector was also good: the expansion of capacity for the production of linear alkyl benzene, for example, contributed to an upturn in platinum catalyst purchases in Japan.


ELECTRICAL

Demand for platinum used in electrical applications expanded by just over 13 per cent in 2004 to reach 295,000 oz. The growth was driven by the hard disk sector, which benefited from a sizeable rise in sales of electronic goods. Purchases of platinum for use in thermocouples and other electrical applications also increased.

Sales of personal computers jumped by approximately 15 per cent in 2004 compared with the previous year, due to a combination of strong consumer buying and an upturn in corporate IT spending. At the same time, sales of consumer electronic goods (such as digital video recorders and camcorders, and MP3 music players) accelerated. As a result, production and shipments of hard disk drives, particularly for mobile applications, climbed strongly throughout 2004. In addition, the trend towards the use of fewer disks per hard drive flattened out last year. These factors fed back into a substantial increase in demand for platinum, a key component of the magnetic alloy used for data storage in hard disks.

Orders for platinum wire thermocouples improved in 2004, reflecting higher production of steel, glass and semiconductors.

Platinum Demand: Chemical '000 oz		
	2003	2004
Europe	105	115
Japan	40	45
North America	95	90
Rest of the World	80	80
Total	320	330
		

Platinum Demand: Electrical '000 oz		
	2003	2004
Europe	35	35
Japan	40	50
North America	85	90
Rest of the World	100	120
Total	260	295
		

World crude steel production increased by almost 9 per cent, with output surging by more than 23 per cent in China and rising by between 2 and 6 per cent in all of the other top ten steel producing nations. This fed back to greater demand for high temperature thermocouples.

The semiconductor manufacturing sector enjoyed a strong first half of 2004, and with significant new capacity under construction, orders for platinum wire thermocouples from the industry were good. From July onwards, however, the rate of growth in production slowed markedly. Investment in new glass manufacturing capacity also contributed to higher thermocouple demand for platinum last year, in particular the construction of numerous new LCD glass furnaces in Asia (*see following section*).

In the fuel cell arena, demand for platinum increased in 2004 but, in absolute terms, consumption remained small. In the automotive sector, research and development continued to target cost reductions and durability improvements for proton exchange membrane (PEM) fuel cells. Several new prototype vehicles were unveiled, whilst work on establishing suitable hydrogen storage infrastructure advanced. In the stationary market, the number of fuel cell systems installed for stationary power supply applications also increased, with rising interest in Japan in the commercial possibilities of residential fuel cells.

consumer electronics containing LCDs.

With strong growth in LCD demand forecast to continue, producers of the high quality glass used in their manufacture made substantial investments in the construction of additional capacity in Asia during 2004. At least 17 new furnaces were announced, commissioned or under construction in Taiwan, South Korea and Japan.

In addition to the investment in LCD glass production, new capacity for the production of conventional television glass and fibreglass also came on stream in China last year. The result of the expansion of Asian glassmaking facilities was an increase in demand for platinum of just over 40 per cent in the Rest of the World region to 205,000 oz. Much of this metal was first imported into Japan, where it was fabricated into equipment, before being re-exported to glass plants elsewhere. Purchases of platinum for use within Japan itself climbed by a more modest 6 per cent to 90,000 oz.

The situation in North America, however, was markedly different: the closure of the last television glass plants remaining in the USA led to the sale of a significant volume of metal back to the market.

Platinum Demand: Glass '000 oz		
	2003	2004
Europe	10	5
Japan	85	90
North America	(30)	(10)
Rest of the World	145	205
Total	210	290



GLASS

After a relatively weak 2003, demand for platinum from the glass industry surged by 38 per cent to 290,000 oz last year. This reflected the rapid construction of new manufacturing capacity in Asia to meet burgeoning demand for high quality glass from the liquid crystal display (LCD) market. In North America, however, the closure of several glass furnaces led to a significant volume of platinum being recovered and re-refined.

Global demand for LCD panels accelerated rapidly during 2004. The growth in the LCD market was powered by a combination of factors: the ongoing replacement of cathode ray tube (CRT) televisions and monitors by flat screen alternatives; the trend towards larger screen sizes; and strong growth in sales of notebook computers, mobile phones and other

PETROLEUM REFINING

Total demand for platinum used in petroleum refining catalysts climbed to 145,000 oz in 2004, an annual rise of 21 per cent. Most of the growth occurred in the Rest of the World region where investment in expanding catalytic reforming and isomerisation capacity was concentrated. Demand in the mature North American, European, and Japanese markets was little changed.

The construction of significant new petroleum reforming and isomerisation capacity in Asia, Africa and the Middle East, plus the commissioning of a large base-oil hydrocracking facility, led to an upturn in demand for

Platinum Demand: Petroleum Refining '000 oz		
	2003	2004
Europe	15	15
Japan	5	5
North America	40	35
Rest of the World	60	90
Total	120	145



platinum catalysts in 2004. Total purchases of metal consequently climbed to 145,000 oz, despite the concurrent cancellation of a number of projects in South America.

Reforming and isomerisation capacity in North America and Europe, however, was largely unchanged and demand for top-up catalyst charges was stable.

OTHER

Small increases in demand for platinum were recorded for most other applications, including oxygen sensors, spark plugs, medical components and turbine blades. However, the use of platinum in stationary emissions control catalysts fell, whilst demand for the metal in dental alloys was flat. Total demand for platinum in other applications, therefore, was stable at 470,000 oz.

The use of dental alloys containing platinum, the largest single component of the 'other' category of demand, was stable in 2004. Despite their relatively high price compared to some alternatives, traditional high gold dental alloys (typically containing up to 15 per cent platinum) remain popular in several European countries and, to a lesser extent, in North America.

The use of platinum in non-catalyst automotive applications increased by around 3 per cent last year. This category comprises high-performance platinum-tipped spark plugs and oxygen sensors, which use platinum electrodes. Fitment of platinum spark plugs as original equipment by auto manufacturers in both Japan and North America grew steadily in 2004 but there was also increased competition from iridium-based alternatives.

Oxygen sensors are essential components of vehicle emissions control systems. Demand is related to vehicle output but can also be influenced by changes to emissions regulations. Increased light vehicle production in Europe and the advent of Tier 2 emissions standards in the USA led to modest increases in platinum demand from this sector in 2004.

The use of platinum in biomedical applications expanded steadily, with demand from both anti-cancer drugs and components for medical equipment continuing on an upward trend.

There was a small increase in the use of platinum to coat aircraft engine turbine blades in 2004. This was

consistent with the long term trend for increased numbers of blades per engine to be coated and the need for increased coating thicknesses as turbines are operated at higher temperatures.

Platinum-based catalysts are used in a wide range of industrial applications to control emissions of volatile organic compounds

(VOC), carbon monoxide and other pollutants in a wide range of industries including power generation, bulk chemicals, coatings and metals processing. After a relatively good year in 2003, demand for platinum from this sector dropped in 2004.

INVESTMENT

Net demand for platinum coins and bars improved to 40,000 oz in 2004. In Japan, although higher prices led to a rise in sales of bars back to dealers in the first quarter, platinum remained attractive as a long-term investment and demand for the year as a whole increased. Sales of platinum bullion coins by the US Mint, however, fell compared with 2003.

The platinum price in yen climbed from around ¥2,800 per gram at the start of 2004 to over ¥3,200 by mid-March due to a combination of the rally in the dollar price of the metal and a weakening of the yen versus the US currency. This led to an upturn in sales of platinum investment bars back to dealers by Japanese investors. However, once the platinum price fell back below ¥3,000 in mid-April, new purchases of large bars began to outweigh further disinvestment. Net Japanese demand for the year, therefore, totalled 15,000 oz.

Demand for the US Mint's platinum American Eagle bullion coins during 2004 slid to 20,100 oz, down from just over 24,000 oz the previous year. The rapid climb in the platinum price affected sales, with investor attention focused more on gold and palladium products. Purchases of platinum proof coins by collectors also fell in 2004, leaving net demand in North America at 20,000 oz.

Platinum Demand: Other '000 oz		
	2003	2004
Europe	185	190
Japan	40	40
North America	215	205
Rest of the World	30	35
Total	470	470



Platinum Demand: Investment '000 oz		
	2003	2004
Coins and small bars		
Europe	0	0
Japan	5	5
North America	25	20
Rest of the World	0	0
	30	25
Large bars in Japan	(15)	15
Total	15	40

