

# SUMMARY & OUTLOOK

## PLATINUM

**Demand for platinum reached 6.7 million oz in 2005, an annual rise of 160,000 oz. Purchases by the autocatalyst sector again grew strongly, and use of the metal in the glass industry and electrical applications also increased. However, jewellery demand for platinum fell for the third year in a row, a direct result of the rising price. Supplies of platinum expanded at a similar rate to demand, and so the market remained in deficit.**

Purchases of platinum for use in **autocatalysts** surged by 330,000 oz (9 per cent) to a new high of 3.82 million oz in 2005. Most of the growth occurred in Europe as a result of tightening limits on diesel emissions, strong demand for catalysed soot filters (CSF), and further growth in diesel car sales. Rising production of light vehicles in China and elsewhere in Asia also boosted demand for platinum.

In contrast, purchases of platinum for **jewellery** manufacture dropped by 200,000 oz to 1.96 million oz, the weakest level of demand in a decade. A further sharp drop in purchases of metal by the Chinese jewellery trade accounted for much of the decline but demand in Japan and North America also contracted. In all regions,

purchases of platinum for jewellery were adversely affected by the strength of the metal's price. The high cost of maintaining inventories of platinum jewellery prompted wholesalers and retailers to cut stock levels and led

to an increase in the volume of older pieces being recycled to manufacturers.

**Industrial** demand for platinum climbed by 9 per cent to 1.675 million oz last year, an all time high. In the electrical sector there was further growth in the use of platinum in hard disks, whilst the ongoing expansion of LCD glass manufacturing capacity in Asia propelled glass demand for platinum to a record level. Consumption of platinum in the manufacture of catalysts for the chemicals and petroleum refining industries also increased.

Net demand for physical **investment** products in platinum slipped lower in 2005. Sales of bullion and proof coins were relatively stable but Japanese investors were net sellers of large bars, reflecting the move in the price through the key level of ¥3,000 per gram around the middle of the year and its rapid rally towards ¥4,000 per gram during December.

**Supplies** of platinum expanded by 140,000 oz to 6.63 million oz in 2005, with greater output from South Africa, Russia and Zimbabwe. South African production increased by 2 per cent to 5.11 million oz, less than anticipated as efforts to expand output were hampered by a number of operational problems. Russian production of platinum was boosted by the release of metal from Norilsk Nickel's process pipeline, whilst output in Zimbabwe edged higher.

The **price** of platinum was relatively stable during the first half of 2005, trading between \$860 and \$880 for much of that period. In contrast, the second half of the year was marked by an increase in volatility and a strong rally, as a substantial influx of fund money propelled platinum to \$1,012 in December – the highest price for almost 25 years.

- **Demand** for platinum grew by 2 per cent to 6.7 million oz in 2005. Use of the metal in autocatalysts continued to rise but purchases of platinum for jewellery weakened.
- **Autocatalyst** demand for platinum climbed by 330,000 oz to set a new record of 3.82 million oz. Most of this growth was generated by the light duty diesel sector in Europe.
- Purchases of platinum for the manufacture of **jewellery** dropped by 9 per cent to 1.96 million oz in response to higher metal prices. Chinese jewellery demand fell to its lowest level for seven years.
- Demand for platinum in **industrial** applications reached 1.675 million oz, driven by the construction of new LCD glass furnaces in Asia and greater consumption of the metal in hard disks.
- **Supplies** of platinum also increased by 2 per cent in 2005, rising to 6.63 million oz. South African output expanded by less than planned while supplies from North America and Russia fell.
- The platinum **price** ranged between \$860 and \$880 for most of the first half of 2005, with end user demand and fund buying providing support. During the second half, a surge of speculative investment propelled the price to a peak fixing of \$1,012.

Platinum Supply and Demand '000 oz			2004	2005
<b>Supply</b>				
South Africa		5,010	5,110	
Russia		845	890	
North America		385	360	
Others		250	270	
<b>Total Supply</b>		<b>6,490</b>	<b>6,630</b>	
<b>Demand</b>				
Autocatalyst:	gross	3,490	3,820	
	recovery	(690)	(770)	
Jewellery		2,160	1,960	
Industrial		1,535	1,675	
Investment		45	15	
<b>Total Demand</b>		<b>6,540</b>	<b>6,700</b>	
<b>Movements in Stock</b>		<b>(50)</b>	<b>(70)</b>	



*Retail sales of platinum jewellery remained relatively firm in luxury sectors of the market in 2005, despite the strength of the metal's price.*



In this respect, platinum tracked the behaviour of gold and many base metals, as fund investment in commodities as a whole accelerated. At its peak in December, the combined net speculative position in platinum on the NYMEX and TOCOM futures exchanges exceeded 1 million oz, up from 200,000 oz six months earlier.

### Supply

Platinum supplies from **South Africa** totalled 5.11 million oz in 2005, up by 100,000 oz compared with the previous year. Output of refined metal from Anglo Platinum was unchanged at just over 2.45 million oz, falling short of the company's intended output of 2.6 to 2.7 million oz. This was primarily due to an explosion at the group's Polokwane smelter in September that resulted in 120,000 oz of platinum accumulating in unprocessed stocks of concentrate.

Refined platinum production from Impala's main lease area on the western Bushveld rose by 6 per cent to almost 1.16 million oz last year thanks to increased mill throughput and a significant improvement in concentrator recoveries. The developing Marula Platinum mine on the eastern Bushveld, however, contributed only 31,000 oz of platinum in concentrate as the operation began making a transition from mechanised to conventional mining.

Lonmin produced 963,000 oz of platinum in 2005, a record for the group. Output from the company's

western Bushveld mines increased as greater production from underground operations led to an improvement in head grades. Lonmin also gained a small volume of pgm output from the Messina mine on the eastern limb of the Bushveld complex, which it acquired in June 2005.

Northam's platinum production climbed to 225,000 oz, up 18 per cent on the previous year when the mine lost six weeks' output due to a fire. In addition, new technology at the company's UG2 concentrator



contributed to an improvement in recoveries.

Aquarius Platinum's Kroondal and Marikana mines are both now operated under Pool & Share Agreements with Anglo Platinum. Platinum output attributable to Aquarius from the two operations in 2005 totalled just over 200,000 oz. The concentrator at the company's newest mine at Everest South was commissioned during December.

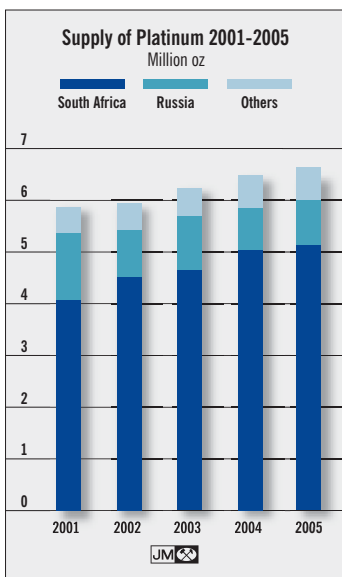
Platinum output from the Modikwa joint venture between Anglo Platinum and African Rainbow Minerals increased by 13 per cent to 129,000 oz, whilst the concentrator at the Crocodile River operations of Barplats was refurbished during the year.

**Russian** sales of platinum increased by 5 per cent to 890,000 oz in 2005. Norilsk Nickel was able to release details of its pgm output for the first time – the company produced 751,000 oz of platinum during the year, with output in the second half boosted by a reduction in pipeline stocks of pgm. Production from the alluvial mines in the Far East of Russia was relatively stable, whilst there was no evidence of sales by either the Ministry of Finance or the Central Bank.

Supplies of platinum from **North America** declined by almost 7 per cent to 360,000 oz in 2005. Sales of refined platinum by Stillwater Mining increased, despite a slight decline in average grades at its mining operations in Montana, but this was offset by lower output at Inco, Falconbridge and North American Palladium.

Production of platinum in **Zimbabwe** grew to 153,000 oz, up by 10,000 oz on the previous year as a result of increased output at both the Mimosa and Ngezi mines.

*Purchases of platinum for the manufacture of hard disks expanded substantially last year, thanks to strong sales of personal computers and consumer electronics such as digital music players.*



Demand

Demand for platinum in **autocatalysts** increased by 9 per cent in 2005 to 3.82 million oz. The diesel light vehicle sector in Europe continued to be the main driver of growth in platinum demand, with purchases by auto makers in the region climbing by 280,000 oz to reach 1.96 million oz.

Sales of diesels continued to rise, accounting for almost half of all new light vehicles registered in Western Europe, although the rate of growth slowed compared to the previous year. At the same time, the advent of Euro IV emissions limits plus the introduction of catalysed soot filters (*catalysed diesel particulate filters*) led to a significant rise in average platinum loadings. Public concern about particulate emissions, notably in Germany, resulted in an increasing number of vehicle models being manufactured with a CSF as standard equipment, despite most being able to meet the requirements of Euro IV without one.

The use of platinum on autocatalysts in Japan also increased in 2005 but purchases fell by 3 per cent to 595,000 oz as a result of year-to-year changes in auto manufacturers' inventories of the metal. The greater use of platinum was partly a consequence of higher light vehicle output and a small rise in average loading levels, with an increasing proportion of light vehicles meeting the strict Japanese Ultra Low Emissions Vehicle standards. The use of platinum was also boosted by new emissions regulations that necessitate the fitment of after-treatment to most new heavy duty diesel vehicles.

In North America, autocatalyst demand for platinum increased slightly to 820,000 oz, despite the fact that light vehicle production in the region weakened. This was a consequence of a slow but steady rise in the retrofitting of after-treatment systems to heavy duty diesel vehicles, plus changes in market share between domestic and foreign vehicle brands.

Demand for platinum from the autocatalyst sector in China jumped from 75,000 oz in 2004 to 110,000 oz in 2005 – a result of higher light vehicle production (up 14 per cent) and the ongoing tightening of vehicle emissions limits. Autocatalyst demand for platinum in the Rest of the World region also increased, rising by 5 per cent to 335,000 oz, driven by stronger light vehicle production in much of Asia and South America. There

was, however, a notable acceleration of switching from platinum-based catalysts to palladium after-treatment systems by certain vehicle manufacturers.

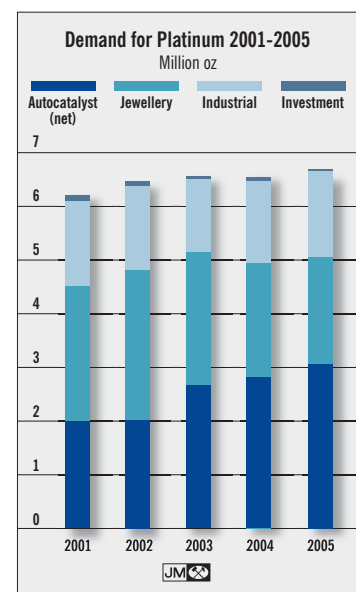
In 2005, **jewellery** demand for platinum slipped below 2 million oz for the first time since the mid-1990s, falling by 9 per cent to 1.96 million oz. Purchases of metal by Chinese manufacturers fell substantially for the third year in a row, and demand in Japan and North America also declined.

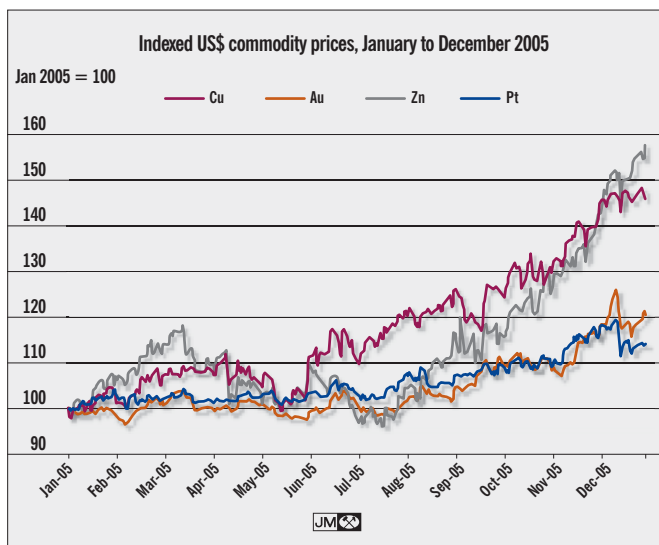
Chinese jewellery demand for platinum dropped by 13 per cent to 875,000 oz in 2005, a greater decrease than we had previously forecast. The rapid rally in the platinum price from \$930 to over \$1,000 during November and early December resulted in a sharp fall in purchasing by the Chinese jewellery trade, which made worse what had already been a relatively weak year for demand.

The rise in the price throughout the second half of 2005 led to reductions in inventories of platinum jewellery and increased recycling, as wholesalers and retailers cut their holdings in the face of escalating financing costs. With retailers tending to place smaller and less frequent orders for platinum, manufacturers switched a greater proportion of their output to more profitable white gold and palladium jewellery.

At the retail end of the Chinese market, platinum jewellery sales trended down in second and third tier cities. This was partly due to higher prices, but was also a consequence of there being less platinum on display and consumers having a greater choice of white gold and palladium products. Furthermore, 2005 was widely considered to be an inauspicious year to get married and sales of bridal jewellery dropped throughout China compared with the previous year.

Purchases of platinum by Japanese jewellery manufacturers also fell significantly in 2005, dropping by 50,000 oz to 510,000 oz. The rise in the platinum price led to an increase in the volume of metal being recycled by





The 14 per cent increase in the price of platinum in US\$ over the course of 2005 was rather modest compared with some other commodity markets, notably copper and zinc (shown above) and crude oil.

manufacturers and wholesalers as they cut back on their product inventories. It also resulted in an upturn in the amount of old jewellery being sold back to the trade by consumers. At the same time, sales of wedding rings slipped as the marriage rate trended downwards, and white gold gained market share at lower price points.

Demand for platinum from the North American jewellery sector weakened by 5 per cent to 275,000 oz in 2005. Although platinum jewellery continued to sell well at the luxury end of the market, sales of both fashion and bridal products were hit by increased competition from white gold. As elsewhere, the high price of platinum also led to an increase in scrap returns and recycling of outdated platinum jewellery. European jewellery demand for platinum, however, remained stable at 195,000 oz, with the UK bridal market remaining relatively firm.

In contrast to the jewellery sector, purchases of platinum for **industrial** applications climbed to a new high of 1.675 million oz in 2005, up by 140,000 oz on the previous year.

Platinum purchases by the glass industry surged to 355,000 oz in 2005, an annual increase of 22 per cent. Demand was driven by substantial investment in Asia in new facilities for the production of glass for liquid crystal displays (LCD) and other flat panel displays.

Booming sales of computers and other consumer electronics also had a positive effect on consumption of platinum in the electrical sector, as these fed back to strong demand for hard disks. Combined with firm

demand for platinum wire thermocouples and further development of fuel cells for portable applications, this resulted in electrical demand for platinum climbing by 20 per cent to 360,000 oz.

Consumption of platinum in the chemicals sector grew by 3 per cent to 335,000 oz in 2005. Demand for platinum-based catalysts for the production of silicones increased, thanks to the addition of new manufacturing capacity in Asia. However, the growth was partly offset by slightly lower consumption of the metal in other chemical catalyst applications and thrifting of platinum used in gauze for the nitric acid industry. Purchases of platinum by the petroleum refining industry increased moderately, rising to 155,000 oz on the back of the construction of new reforming and isomerisation capacity.

Total demand for platinum in other applications was stable in 2005 at 470,000 oz. *The major components of this demand are examined in detail in the special feature that begins on page 28.*

## Outlook

Supplies of platinum and demand for the metal are both forecast to grow more strongly in 2006 than last year. Consequently, we expect the market to remain in moderate deficit. There are, however, significant uncertainties on both sides.

On the supply side, growth in output in 2006 will again depend on whether South African pgm mining expansions proceed according to plan, with substantially higher production expected from several operations and the first metal due from the Two Rivers and Everest South projects. In addition, Anglo Platinum should benefit from the release of metal that was caught up in its process pipeline as a result of the explosion at its Polokwane smelter last September.

The political situation in Zimbabwe, however, is still not conducive to any significant expansion of pgm mining, with considerable disquiet over the government's stated intention to obtain a majority shareholding in existing operations.

On the demand side, the autocatalyst market remains robust: purchases of platinum are almost certain to exceed 4 million oz in 2006, quite possibly by a significant margin.

Further good growth will be seen in Europe from the

light duty diesel sector. Average loadings per vehicle are forecast to continue to rise, driven by two factors: by October 2006 all new cars will have to meet Euro IV emissions limits (until now, only new models have had to meet Euro IV), and the proportion of diesel vehicles fitted with CSF will increase. At the same time, growth in diesel car sales should pick up this year after slowing in 2005. Although palladium will begin to make in-roads into the diesel after-treatment sector, this is unlikely to have a notable impact on demand for platinum in 2006.

North American demand for platinum in autocatalysts is also forecast to increase this year, despite further substitution of platinum by palladium in gasoline catalyst systems. The spur to increased demand for platinum will come instead from the heavy duty diesel sector, as a majority of new models manufactured this year will need to be fitted with either an oxidation catalyst or a CSF (or both) in order to meet new emissions regulations that come into effect in 2007.

Autocatalyst demand for platinum in China and the Rest of the World region is also projected to continue growing on the back of higher vehicle production and tightening emission limits. In South Korea, greater output of diesel cars (with higher average loading levels) for export to Europe will contribute to growth in autocatalyst demand for platinum.

The Japanese autocatalyst sector will be an exception in 2006, as platinum demand is expected to soften as a result of greater use of palladium-based catalysts on new light vehicle models. Demand will still be relatively strong, however, due to the fitment of after-treatment systems as original equipment to new heavy duty diesel vehicles.

In contrast to the autocatalyst sector, the outlook for platinum demand in jewellery is mixed. On the positive side, sales of platinum jewellery to affluent consumers in all major regions have remained relatively robust in the face of much higher metal prices. In addition, this year is expected to see a substantial increase in the number of weddings conducted in China, as 2006 is considered to be a much more favourable year to get married than 2005.

In addition, Chinese retailers held back from replenishing stock as much as possible in late 2005 and early 2006 as the platinum price was rising steeply.



The result was that, following the New Year holiday in early February 2006, inventory levels were generally very low. Consequently, a substantial upturn in demand for platinum was seen from Chinese jewellery manufacturers in mid-February and March.

However, should the platinum price continue to strengthen during the year we would expect to see additional stock reductions and recycling throughout the global jewellery trade. Platinum could also lose further sales to white gold and to palladium.

Demand for platinum in industrial applications is projected to expand again this year. Another increase in consumption of the metal in hard disks is expected to outweigh a slight softening in demand from the glass industry.

The fundamentals of the platinum market, therefore, remain positive and any shortfall in the projected increase in supplies this year will lead to a tightening in availability of metal and higher lease rates. However, speculative activity across the metals markets is likely to exert a greater influence on the price of platinum in the short term than the supply-demand balance. With no end in sight to the current commodities bull market, and with the dollar widely expected to weaken this year, the price has further upside potential. We therefore forecast platinum could reach \$1,250 within the next six months. Conversely, in the event of significant fund long liquidation, good end user demand is likely to limit the downside to \$1,025.

*Emissions regulations in the USA will soon require the fitment of after-treatment as standard equipment on the majority of new heavy duty truck models, resulting in a significant boost to autocatalyst demand for platinum in 2006.*

## PALLADIUM

**Demand for palladium climbed above 7 million oz for the first time in five years in 2005, increasing by 480,000 oz to 7.04 million oz. This was primarily due to a marked increase in purchases by the Chinese jewellery sector, although autocatalyst demand edged higher and there was growth in some electronic and chemical applications. Supplies of palladium slipped lower but, at 8.39 million oz, remained well in excess of demand. The palladium market, therefore, was in a state of surplus for the fifth year in succession.**

Purchases of palladium for **autocatalysts** increased by less than 1 per cent to 3.81 million oz in 2005. Substantially higher demand was seen in Asia, with auto makers in Japan, China and South Korea all increasing their use of the metal. These gains, however, were largely offset by lower demand in Europe and North America.

Demand for palladium from auto makers in Europe fell below 1 million oz for the first time since 1996 as production of gasoline light vehicles continued to decline. North American demand also slipped lower as a further reduction in average metal loadings countered the positive effects of switching from platinum to palladium in catalysts.

Jewellery demand for palladium, on the other hand, surged by 500,000 oz to 1.43 million oz, becoming the second largest application for the metal. The growth was almost entirely due to the rapid expansion of purchases by Chinese jewellery manufacturers, as orders for palladium products from wholesalers and retailers swelled.

Purchases of palladium for **electronic** applications improved to 965,000 oz from 920,000 oz the year before. The growth was mainly due to greater use of the metal in plating; demand from multi-layer ceramic capacitor manufacturers slipped lower.

The mature market for palladium in **dental** alloys was relatively stable, demand softening slightly to 845,000 oz, whereas purchases of palladium for use in **other applications** rose by 3 per cent to 620,000 oz. Demand for the metal in chemical industry catalysts was moderately higher at 320,000 oz, and sales of palladium bars and coins to private investors in North America also grew.

At 8.39 million oz, **supplies** of palladium exceeded demand by 1.35 million oz. As in 2004, mine production was supplemented by a substantial volume of Russian metal sold from stocks. This included more than 1 million oz of palladium shipped from Russian state inventories, plus 439,000 oz of metal sold by Stillwater Mining Co. from the stock it received from Norilsk Nickel in 2003.

The **price** of palladium was capped at or just above \$200 throughout the first nine months of 2005. Fund interest was strong during the first quarter, with speculative buying on NYMEX pushing the price from close to \$180 to just over \$200 in early March. However, substantial spot sales of metal prevented it from moving any higher and when funds subsequently reduced their long positions the price declined to a low of \$172 in July.

- **Demand** for palladium increased by 7 per cent to 7.04 million oz in 2005; the growth was almost entirely due to substantially higher use of the metal in jewellery.
- Purchases of palladium for the manufacture of **jewellery** jumped by 54 per cent to 1.43 million oz, driven by rapid development of the market in China.
- **Autocatalyst** demand for palladium increased marginally to 3.81 million oz. Although auto makers made greater use of palladium catalyst systems, average loadings in gasoline vehicles continued to decline.
- **Electronics** demand for palladium improved to 965,000 oz, an increase of 5 per cent, largely due to growth in use of the metal in plating applications.
- **Supplies** of palladium fell by 2 per cent to 8.39 million oz; growth in South African output did not offset lower production in North America and a drop in sales of Russian metal.
- The palladium market continued in surplus in 2005 and the easy availability of metal kept the **price** suppressed for much of the year. Speculative sentiment remained positive, however, and strong fund buying in the fourth quarter pushed the price to almost \$300.

Palladium Supply and Demand '000 oz			
		2004	2005
<b>Supply</b>			
South Africa		2,480	2,590
Russia		4,800	4,620
North America		1,035	905
Others		265	275
<b>Total Supply</b>		<b>8,580</b>	<b>8,390</b>
<b>Demand</b>			
Autocatalyst:	gross	3,790	3,810
	recovery	(530)	(630)
Dental		850	845
Electronics		920	965
Jewellery		930	1,430
Other		600	620
<b>Total Demand</b>		<b>6,560</b>	<b>7,040</b>
<b>Movements in Stock</b>		<b>2,020</b>	<b>1,350</b>

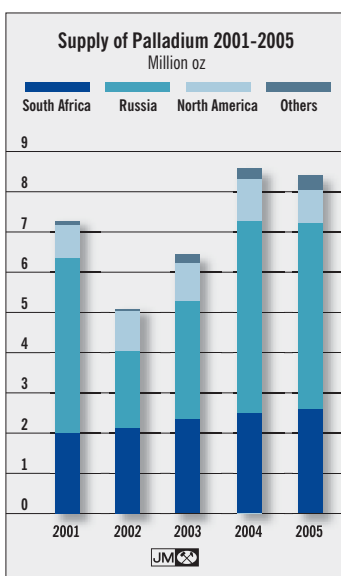


Renewed speculative buying emerged from September onwards, and with other metals markets rallying strongly, the palladium price broke out of its previous range and surged to a peak of \$297 in December. The lack of support from the fundamentals, however, meant that when funds started taking profits ahead of the year-end the price fell sharply, finishing 2005 at \$253.

### Supply

Russian supplies of palladium totalled an estimated 4.62 million oz in 2005. Norilsk Nickel produced just over 3.13 million oz of palladium during the year from its nickel-copper operations on the Taimyr and Kola peninsulas. The company was able to release details of its output for the first time following the relaxation of secrecy laws covering the Russian pgm industry. All of Norilsk's palladium output is understood to have been sold during the year, the majority under contract to end users.

The remaining Russian metal was supplied to the market from two sources: the Russian State Treasury (Gokhran) and Stillwater Mining Co. In recent years Gokhran has not received an annual pgm export quota until late in the year, leading to substantial exports of palladium in late 2004 and early 2005, and again in December 2005 and early 2006. We estimate that over 1 million oz of Russian state metal was sold into the market last year.



Our 2005 Russian supply figure for palladium also includes 439,000 oz of metal sold by Stillwater Mining. This came from the inventory of more than 877,000 oz that Stillwater received from Norilsk Nickel when the latter acquired a majority shareholding in the US company in 2003.

South African production of palladium climbed by 4 per cent to 2.59 million oz. Output increased from all of the major pgm mining groups with the exception of Anglo Platinum, where palladium production

was disrupted by the problems at the company's Polokwane smelter.

Supplies of palladium from North America, however, dropped sharply, sliding by 130,000 oz to 905,000 oz. Although output from Stillwater, Inco and Falconbridge was stable, production at North American Palladium fell by 43 per cent due to a combination of a low grade ore zone in the mine, equipment failures at the mill, and lower pgm recoveries.

### Demand

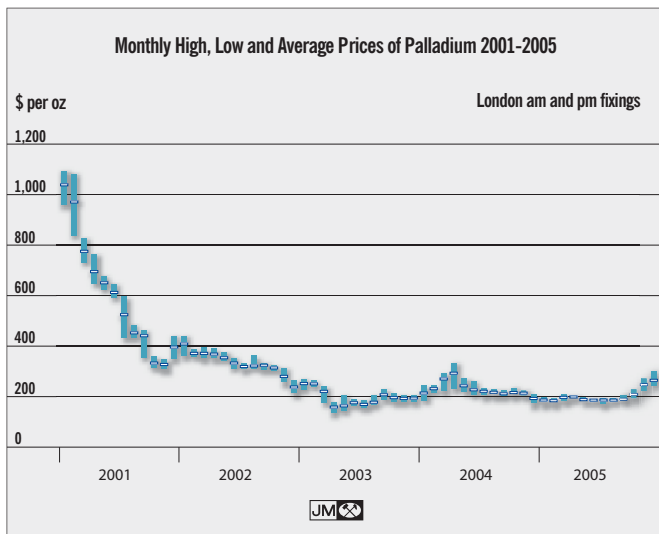
With palladium trading at less than a quarter of the price of platinum throughout most of 2005, auto makers continued to make greater use of the former on gasoline vehicle catalyst systems. This trend, coupled with higher light vehicle output and generally tightening emissions regulations, led to substantially higher demand for palladium from vehicle manufacturers in Asia. Purchases by the Japanese autocatalyst sector increased by 4 per cent to 660,000 oz, Chinese demand jumped by 43 per cent to 150,000 oz, and demand in the Rest of the World region grew by 16 per cent to 580,000 oz.

In North America, however, further progress was made on reducing the amount of palladium required per catalyst and average loading levels continued to fall. At the same time light vehicle output softened and foreign brands gained a greater share of the US market. Purchases of palladium by the North American auto industry consequently drifted down to 1.43 million oz, a fall of 1 per cent on the previous year.

European autocatalyst purchases of palladium dropped more markedly, sliding by 10 per cent to 990,000 oz. Demand was affected by the continuing decline in production and sales of gasoline light vehicles as diesels took further market share, as well as by the ongoing thrifting of palladium loading levels on catalysts. Although the first diesel after-treatment systems containing palladium were launched during the year, production volumes were small and palladium loading levels were relatively low.

The overall result of the changes above was that total demand for palladium in autocatalysts edged up by just 20,000 oz to 3.81 million oz in 2005.

The volume of palladium recovered from scrap autocatalysts continued to climb, rising by 19 per



cent to 630,000 oz. Increased recovery in Europe resulted from a greater number of catalysts entering the recycling chain with higher average palladium loadings. Palladium recovery also continued to rise in North America for the same reasons.

Purchases of palladium for use in **jewellery** surged to 1.43 million oz in 2005, up from 930,000 oz the year before. Chinese purchases of metal jumped by 71 per cent to 1.2 million oz as manufacturers increased production to meet strong orders from wholesalers and retailers. The latter continued to establish inventories of palladium jewellery last year, with more stores adding it to their range of products and others expanding the number of items stocked. The introduction and rapid acceptance of Pd990 jewellery (99 per cent palladium) was a significant factor in the increased demand for metal, as many retailers built up stocks alongside their existing displays of Pd950.

Palladium has proved attractive to the Chinese jewellery trade because of the low cost of financing metal compared with platinum. Traders are willing to fund manufacturers' inventories of work in progress, and wholesalers and retailers can establish and maintain inventories of product at much lower cost than for platinum. The lower density of palladium also helps in this regard, as roughly twice as many products of identical volume can be produced from a given weight of palladium compared with platinum.

For consumers, palladium offers an affordable entry point into the white precious metal jewellery market. Palladium's close association with platinum

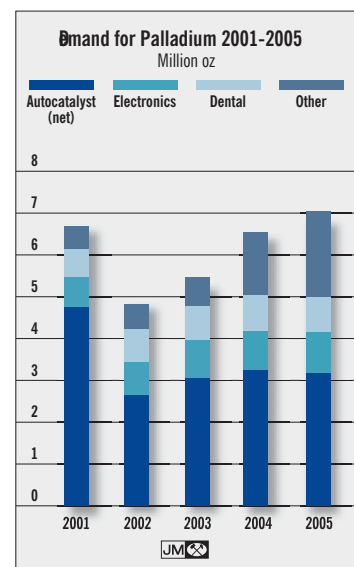
is also a factor in its favour, enabling it to be sold on the basis that it shares many of the same attributes, namely whiteness, rarity, purity and durability. Purity, in particular, gives palladium a significant advantage over white gold jewellery (which contains 75 per cent gold at most) as purity remains an important consideration for consumers in less affluent areas. The argument that palladium jewellery is a good investment is also commonly heard in China – a message that increased in credibility during the fourth quarter of last year when the price was rising.

The level of retail sales of palladium jewellery, however, is harder to determine than the scale of metal demand from manufacturers. Sales of palladium jewellery to consumers undoubtedly increased in 2005 compared with the previous year, but by less than the 71 per cent rise in metal purchases.

Outside China, most of the other demand for palladium in jewellery stems from use of the metal in platinum and white gold alloys. However, trade interest in palladium jewellery in North America increased last year and a few manufacturers began the production of a limited range of products.

Purchases of palladium for use in **electronic** applications advanced to 965,000 oz in 2005. The rise in demand came primarily from the plating sector, with increased use of palladium in place of gold on connectors and growth in use of the metal in applications such as printed circuit boards. Consumption of palladium in multi-layer ceramic capacitors, however, fell as a result of the ongoing thrifing of palladium in conductive pastes and the miniaturisation of capacitors.

Demand for palladium in **dental** alloys was slightly lower in 2005 at 845,000 oz, whilst purchases for industrial and **other applications** was up 20,000 oz at 620,000 oz. Sales of palladium coins and small bars to private investors in North America continued at a high level, with interest in precious metals in general boosted by the rising price of gold.



## Outlook

After having risen strongly for the previous three years, total demand for palladium could flatten out in 2006. There will undoubtedly be stronger demand from the auto industry, with growth expected in all regions except Europe, but the outlook for the jewellery sector is less certain.

North American purchases of palladium for autocatalysts are forecast to grow significantly as the rate of thrifting slows and the growing substitution of platinum in gasoline vehicle catalysts finally has a noticeable impact on metal demand. Asian auto makers are also expected to purchase more palladium in 2006 than last year, again due to a combination of higher light vehicle production, switching from platinum to palladium catalysts for gasoline vehicles, and tightening emissions legislation.

In Europe, however, the continuing slide in gasoline vehicle production in the face of rising diesel sales is projected to result in a further fall in palladium demand. The decline will be countered to some extent by increasing use of palladium, in combination with platinum, in after-treatment systems for diesel vehicles.

In contrast to the autocatalyst sector, purchases of palladium for jewellery manufacture may not grow this year. A key issue for the Chinese jewellery trade and for the wider palladium market is how much of the jewellery that was manufactured in 2005 ended up in the hands of consumers, and how much remained in the display cases and strong-rooms of wholesalers and retailers.

Although retail sales might well strengthen further in 2006, with a greater range of products on display and plans for organised promotion and marketing of the metal, the size of the inventory built up through 2005 could stifle any growth in purchases of metal.

Supplies of palladium are also predicted to be flat or slightly lower in 2006 as Stillwater completed its sales of Russian metal during the first quarter. Without the sales of Russian metal from stocks the palladium market would have recorded a deficit last year. However, we estimate that the remaining palladium inventory in Russia could support sales in excess of 1 million oz per year for at least the next four to five years. More than 580,000 oz of palladium were



imported by Switzerland from Russia in the first two months of 2006 alone, a large proportion of which we believe was State-owned metal.

More pertinently, perhaps, if South African production of platinum expands as planned in 2006, palladium output will also rise substantially. In this event, mine supplies of metal would comfortably cover demand.

None of the above, however, is likely to have a major bearing on the price of the metal in the short term. The climb in the palladium price from less than \$200 at the beginning of the fourth quarter of 2005 to \$370 in April this year was driven by hedge funds, managed futures funds and other investors. Over the last two years, funds have amassed a speculative net long position in the metal equivalent to several million ounces, a significant proportion of which is in the form of physical metal.

In the current commodities bull market, it is quite possible for speculative buying to push the price of palladium even further above the level that would appear justified by the level of demand from end users. However, the collapse in the silver price from a fixing of \$14.31 on the 20th of April 2006 to \$12.185 the next day was a salutary reminder that, for relatively small metal markets lacking strong underlying fundamentals, the downside risks are substantial. We forecast that palladium could trade as high as \$420 over the next six months but, in the event of a major fund sell-off, it could drop as low as \$260.

*The increased penetration of palladium jewellery throughout China, plus the introduction of Pd990 products, led to a strong rise in purchases of metal by Chinese jewellery manufacturers.*