

# SUMMARY

## PLATINUM

Net global demand for platinum fell by 5.0 per cent to 6.35 million ounces in 2008. Gross autocatalyst demand was depressed by the slowing world economy and fell heavily to 3.81 million ounces. Industrial demand weakened rapidly towards the end of the year and fell to 1.76 million ounces. Annual physical investment demand rose by 150 per cent to 425,000 oz. Net jewellery demand fell to 1.37 million ounces, a fall of 6.2 per cent, a much smaller decrease than previously expected.

A series of challenges – from electricity supply to safety shutdowns, and from skills shortages to bad weather – depressed South African platinum supplies by 10.7 per cent in 2008 to 4.53 million ounces. With Russian platinum production also falling, total platinum supplies decreased by 9.5 per cent to 5.97 million ounces. **With demand exceeding supply – despite a slowing global economy – the platinum market was in a deficit of 375,000 oz in 2008.**

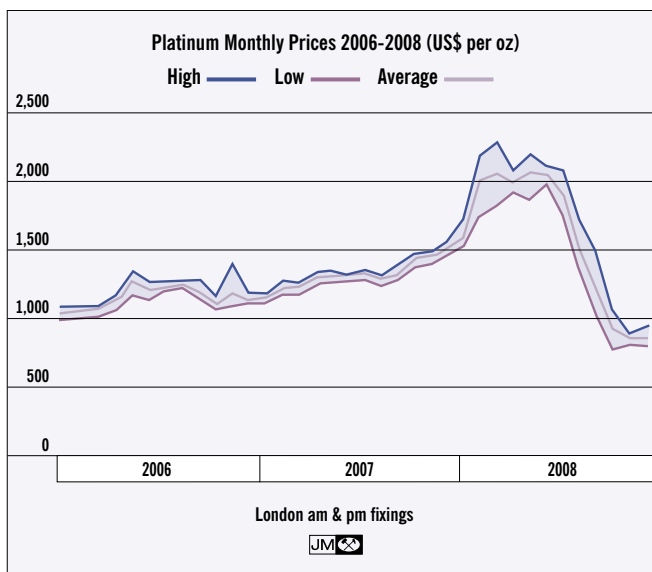
Demand for platinum fluctuated during 2008 in response to the volatile platinum price and the weakening economy. As a result, we have made significant revisions to our previous estimates for demand in the autocatalyst sector – where working stocks of catalysts were run down further than initially forecast – and in the jewellery and investment sectors – where the falling platinum price prompted extremely strong demand in late 2008 in Asia.

The weakness in the automotive industry was widely reported in the media during 2008 but intensified only later in the year. Falling output was seen earliest in North America where annual light duty vehicle production dropped by nearly twenty per cent. The economic slowdown was seen later in Europe where light duty vehicle output fell by only six per cent. There was support for automotive platinum demand from tightening emissions legislation in Europe, which encouraged greater use of platinum-rich diesel particulate filters on passenger cars, and from rising vehicle production in China. Overall, gross autocatalyst platinum demand fell by 8.2 per cent in 2008 to 3.81 million ounces.

The weight of platinum recovered from spent catalytic converters climbed to 1.01 million ounces in 2008. This growth was driven partly by an increase in average metal loadings of the catalysts being collected and partly by the high metal prices in the first half of the year which encouraged the recycling industry to process stocks it had previously hoarded.

Net platinum demand from the jewellery industry fell by 6.2 per cent to 1.37 million ounces in 2008. In the first six months of the year, record prices weakened consumer purchasing in every market and prompted increased recycling of old jewellery in Asia. However, as the price fell, retailers and manufacturers in China in particular took the opportunity to rebuild their stocks of platinum jewellery. Many retailers also reduced store prices, stimulating higher consumer sales. The softening price caused recycling volumes to diminish rapidly in China and in Japan. Net platinum demand was therefore particularly strong in the final quarter of the year and in early 2009. However, demand remained weak in Europe and North America where low consumer confidence limited sales of all precious jewellery.

Industrial demand for platinum fell from 1.85 million ounces to 1.76 million ounces in 2008 and was especially soft in the final quarter of the year. Demand decreased in the chemical sector as production was cut in response to weak consumer demand in late 2008. As a result, while some new plant capacity was installed during the year, platinum demand steadily



*2008 was a year of highs and lows for the platinum price with fundamentals and investor activity both having a profound influence.*

Platinum Supply and Demand '000 oz		
	2007	2008
<b>Supply</b>		
South Africa	5,070	4,530
Russia	915	820
North America	325	325
Others	290	295
<b>Total Supply</b>	<b>6,600</b>	<b>5,970</b>
<b>Demand</b>		
Autocatalyst: gross	4,145	3,805
recovery	(935)	(1,005)
Jewellery	1,455	1,365
Industrial <sup>1</sup>	1,845	1,755
Investment	170	425
<b>Total Demand</b>	<b>6,680</b>	<b>6,345</b>
<b>Movements in Stocks</b>	<b>(80)</b>	<b>(375)</b>

<sup>1</sup> Industrial includes chemical, electrical, glass, petroleum refining and other industrial demand.

weakened and fell to 395,000 oz. In the glass sector, there was good demand for platinum from the construction of factories producing fibre glass and LCD television glass in Asia. However, net platinum demand was reduced to 390,000 oz by the sale back to the market of metal from a number of Chinese cathode ray tube (CRT) glass factories which closed during the year. Net demand in the electronics sector was driven lower, to 225,000 oz, by a decrease in the hard disk industry’s working stocks, despite an increase in the amount of platinum actually coated onto hard disks. Meanwhile, the petroleum refining sector purchased 245,000 oz of platinum, 40,000 oz more than one year earlier. Other applications took 500,000 oz of platinum in 2008.

Annual net physical investment demand rose by 150 per cent to 425,000 oz. Buying through the European Exchange Traded Funds (ETFs) was very strong in early 2008. However, as commodity and equity prices plunged in the second half of the year, investors sold much of this metal. The behaviour of individual Japanese investors was quite different. They sold more metal than they bought in the first few months of 2008 but purchased extremely large quantities of platinum bars in the final quarter in response to the fall in the metal price.

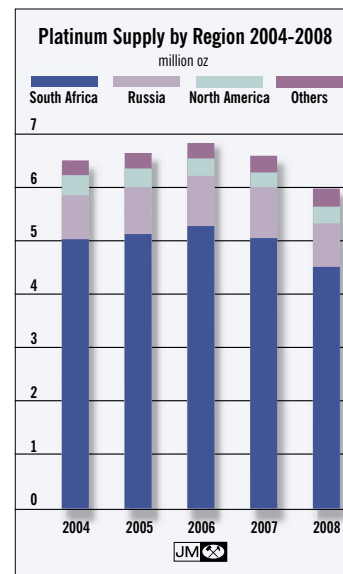
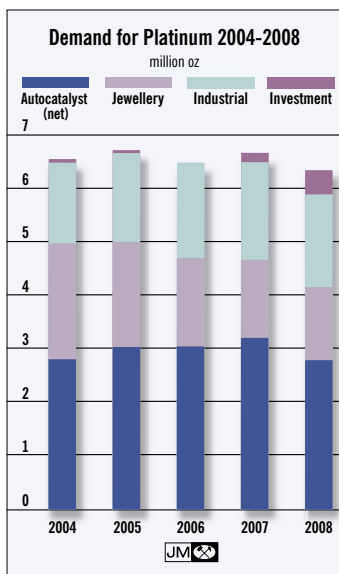
Global platinum supplies dropped from 6.60 million ounces in 2007 to 5.97 million ounces in 2008. Production fell steeply in South Africa and also decreased in Russia. Supplies of platinum from North America were unchanged from 2007. Sales of metal from Zimbabwe and other minor producing nations were almost flat at 295,000 oz as the Zimbabwean producers maintained production levels in a difficult political and economic environment.

South African supplies of platinum were disappointing in 2008, falling 540,000 oz to only 4.53 million ounces. The three largest mining houses – Anglo Platinum, Impala and Lonmin – all recorded lower output than in 2007 with bad weather, safety shutdowns, industrial unrest and skills shortages amongst the numerous causes. An intermittent electricity supply had initially been expected to have a substantial impact across the country but direct losses were limited to roughly 60,000 oz of platinum production. There were, though, improved performances at some of the smaller mines: Modikwa, Northam, Two Rivers and Crocodile River all reported modest increases in production of pgm in concentrate.

Russian platinum supplies also decreased in 2008, primarily due to lower output from Norilsk Nickel where platinum sales fell from 727,000 oz to 632,000 oz. North American platinum supplies were flat at 325,000 oz. There were lower sales from Stillwater and North American Palladium but a rise in platinum production as a by-product from the Canadian nickel mines. Zimbabwean platinum production increased despite a very difficult political and operating environment. Supplies from Zimbabwe and other producing countries rose by 5,000 oz to 295,000 oz.

The volatility in the platinum price during 2008 was without precedent. The first fix of the year was at \$1,530, just a few dollars below the previous record price of \$1,544 recorded in December 2007. Disruption to platinum

supplies from South Africa combined with a weak US Dollar to drive platinum to a record \$2,276 on the 4th of March. The price remained high until the middle of the year when escalating concerns over the global economic situation prompted many funds to liquidate large positions in commodity and equity investments. While fundamentals did play a part in price movements, fund investment activity was more important. The purchasing of metal over recent years had helped drive the price to record levels but much of this metal – in the form of forward purchases, futures positions and physical metal – was sold in the second half of 2008. With several million ounces of long positions having been liquidated, the platinum price crashed to \$756 in October before recovering to end the year at \$899.



## PALLADIUM

Net global palladium demand increased by 15,000 oz to 6.85 million ounces in 2008, despite the worsening economic climate. Falling vehicle production in North America cut demand there by 350,000 oz but gross global autocatalyst demand fell by only 165,000 oz to 4.38 million ounces due to a strong performance in other regions. Demand from the electronics sector rose to 1.33 million ounces. Dental usage of palladium remained steady at 630,000 oz. Palladium offtake for jewellery manufacturing improved, with lower recycling of old stock in China helping drive net global demand higher to 855,000 oz. Demand in the physical investment market strengthened to 400,000 oz.

Global palladium supplies decreased by 14.8 per cent to 7.31 million ounces during 2008. The problems that depressed platinum production in South Africa also hit palladium output, which fell to 2.43 million ounces. In North America, mine production was cut in late 2008 and supplies dropped to 910,000 oz. Sales of palladium from Russian primary production fell by 350,000 oz to 2.70 million ounces. We estimate that sales of palladium from Russian state stocks decreased too, from 1.49 million ounces in 2007 to 960,000 oz in 2008. As a result of these sales, the palladium market was in oversupply, by 460,000 oz, during 2008.

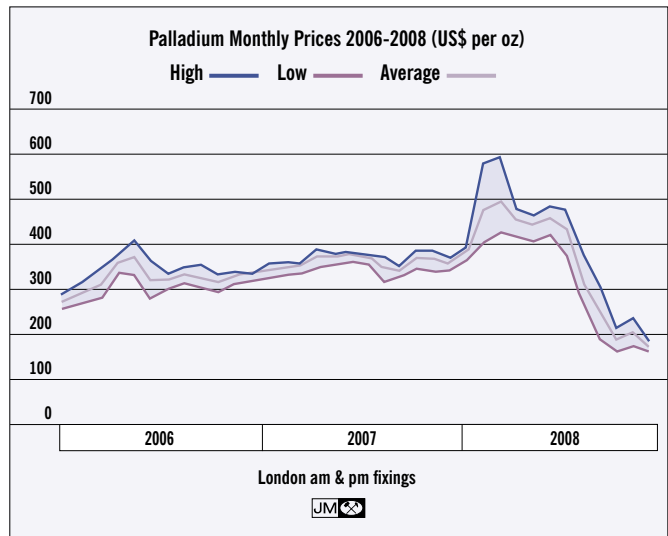
In the autocatalyst sector, gross palladium demand fell by 3.6 per cent in 2008 to 4.38 million ounces. Although North America remains the largest market in terms of palladium consumption, purchases of metal in this region decreased by 350,000 oz – more than twenty per cent – to 1.35 million ounces in 2008. Light duty vehicle production

fell throughout the year as the economy weakened. A lack of consumer confidence and high oil prices hit sales of larger vehicles especially, further depressing palladium demand.

In Europe, light duty vehicle production fell and the amount of palladium used on gasoline vehicles decreased as a direct result. However, increasing use of platinum/palladium catalysts in the diesel sector in place of platinum-only formulations drove total palladium demand 30,000 oz higher in this region to 950,000 oz. Gross autocatalyst demand for palladium climbed in China, Japan and the Rest of the World region too.

The weight of palladium recovered from spent autocatalysts increased to 1.17 million ounces in 2008. The percentage of end-of-life vehicles from which the catalyst is recovered is rising in every region. Average palladium loadings of these spent autocatalysts are also increasing, leading to long-term growth in recovery of palladium from this source. In 2008, recycling volumes were particularly strong as high metal prices encouraged the processing of catalysts which had previously been hoarded. Recovery rates, however, decreased at the end of the year as prices fell, and remained depressed in early 2009.

Net demand for palladium for use in jewellery manufacturing climbed by 19.6 per cent to 855,000 oz in 2008. Net Chinese demand for palladium increased strongly to 650,000 oz. Lower amounts of old Pd950 stock (95 per cent purity alloy) were recycled than had been the case in 2007 and little of this stock now remains. Additionally, a number of manufacturers switched some of their jewellery production into palladium in the first half of 2008 in response to high platinum and gold prices. This switching was reversed later in the year as the platinum price fell, lending some uncertainty to the prospects for jewellery industry demand for palladium in China in 2009. In Europe and North America, palladium



*The palladium price reached a multi-year high of \$588 in March but slumped back to end the year below \$200.*

Palladium Supply and Demand '000 oz		
	2007	2008
<b>Supply</b>		
South Africa	2,765	2,430
Russia		
Primary Production	3,050	2,700
State Sales	1,490	960
North America	990	910
Others	285	310
<b>Total Supply</b>	<b>8,580</b>	<b>7,310</b>
<b>Demand</b>		
Autocatalyst: gross	4,545	4,380
recovery	(1,015)	(1,170)
Jewellery	715	855
Electronics	1,240	1,325
Other <sup>1</sup>	1,350	1,460
<b>Total Demand</b>	<b>6,835</b>	<b>6,850</b>
<b>Movements in Stocks</b>	<b>1,745</b>	<b>460</b>

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<sup>1</sup> Other includes physical investment, dental, chemical and other industrial demand.

continued its steady development into a mainstream jewellery metal and demand rose in both regions.

Industrial demand for palladium climbed by 55,000 oz to 2.39 million ounces. The chemical industry bought a net 350,000 oz of palladium in 2008, a decrease of 25,000 oz from 2007 and less than we had previously forecast. Fewer new chemical plants were constructed in 2008 than in 2007 and demand was trimmed further at the end of the year as low operating rates in this industry translated into reduced requirements for top-up catalyst.

Dental sector demand for palladium was unchanged at 630,000 oz. Net palladium use in Japan was flat at 275,000 oz as lower gross manufacturing demand was balanced by a fall in recycling of scrap dental alloy. In North America, demand rose by 5,000 oz to 270,000 oz.

The electronics industry purchased a net 1.33 million ounces of palladium in 2008, representing the seventh successive year of demand growth in this sector. The increasing complexity of consumer electronics has driven a long-term increase in the number of passive components – such as palladium-containing multi-layer ceramic capacitors – per device. Consumer sales were strong for much of 2008 before weakening in the final months. Palladium demand therefore grew in 2008 but is expected to shrink in 2009.

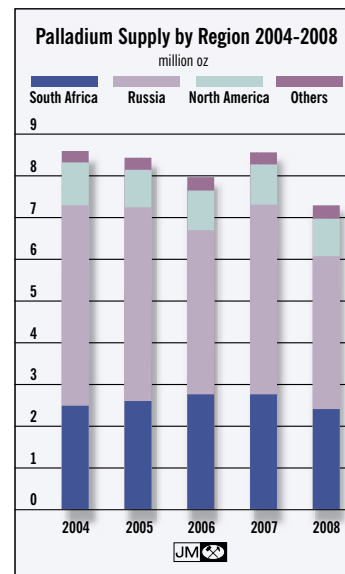
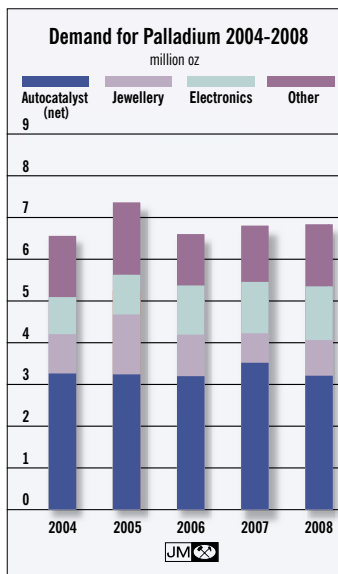
Physical investment demand for palladium increased by 140,000 oz in 2008 to 400,000 oz with European investors buying 370,000 oz of palladium through Exchange Traded Funds (ETFs). Compared to the platinum market, buying and selling of metal were not so closely related to movements in the metal price, suggesting that investors in this metal may be acquiring it for longer-term returns. While platinum ETF demand fell, palladium demand through ETFs climbed by 90,000 oz. Net purchases of coins and large bars rose to 30,000 oz.

Global supplies of palladium fell by 14.8 per cent in 2008 to 7.31 million ounces. Supplies from South Africa decreased by 12.1 per cent to 2.43 million ounces, reflecting the range of problems experienced there. Russian mine production slipped from 3.05 million ounces in 2007 to 2.70 million ounces in 2008 despite stable nickel output. North American supplies of palladium fell by 80,000 oz to 910,000 oz as Stillwater refocused production on its larger mine and North American Palladium placed its Lac des Iles mine on care and maintenance in the final quarter of the year. Supplies of palladium from Zimbabwe and elsewhere grew from 285,000 oz to 310,000 oz.

We believe that sales of Russian state stocks (metal which had not previously been priced) decreased from 1.49 million ounces in 2007 to 960,000 oz in 2008. There were substantial shipments of metal from Russia to Switzerland in December 2007 and in the second half of 2008. However, we do not believe that all of this metal was sold into the market: our current expectation is that the remainder of this metal will instead be sold in the next few years.

The palladium price largely tracked movements in the platinum price for much of 2008. It started the year

at \$370 and followed platinum higher in the first quarter of the year. It reached a peak of \$588, its highest price since 2001, on the 4th of March before the price retreated to \$450 by the middle of the year. In the second half of 2008, industrial purchasing weakened, removing some support from the palladium price. Investors reacted to the panic in the financial markets by selling very large quantities of palladium. The US Dollar strengthened too, reinforcing the downward move in the palladium price. As worries over the credit ratings of some of the auto makers intensified, the price was driven to a low of \$164 in early December. In the final weeks of 2008, US government proposals to provide some support to the car manufacturers helped the price to recover some lost ground to end the year at \$183.50.



## OTHER PGM

## Rhodium

Net rhodium demand fell by 18.4 per cent to 689,000 oz in 2008. A slowdown in demand from the global automotive market was the main cause of this fall as gross demand in the sector decreased by 14.3 per cent to 760,000 oz. Demand from the glass sector also declined despite continued growth in production capacity for LCD glass. Supplies of rhodium, from South Africa and elsewhere, fell to 695,000 oz. Rhodium was therefore, after four successive years of deficits, in a small surplus of 6,000 oz.

Gross automotive industry purchases of rhodium fell by 127,000 oz to 760,000 oz in 2008. The high price of rhodium in recent years has driven extensive development activity by the car manufacturers and catalyst producers on reducing consumption of this metal. The results of this work were apparent in 2008 as auto makers were able to fit new, thrifty, lower-rhodium three-way catalyst formulations on many of their vehicles. The average rhodium content of a gasoline vehicle therefore fell in most regions. In Japan, for instance, where production was almost flat, gross rhodium demand fell by 14,000 oz to 222,000 oz.

However, the poor state of the automotive market also played its part in driving rhodium demand lower. Plunging vehicle production in North America depressed gross demand there by a third to 194,000 oz. In Europe, a less steep fall in output meant that demand fell by only 14.6 per cent to 124,000 oz. Only in China, where vehicle production grew and new emissions legislation came into force in 2008, did rhodium demand increase.

The weight of rhodium recovered from spent catalytic converters climbed by 13,000 oz to 205,000 oz last year. High metal prices in the first half of the year – particularly that of rhodium – encouraged the processing of a backlog of catalysts that had previously built up at collectors. The average rhodium content of a spent catalyst continued to rise, further boosting the weight of rhodium recovered.

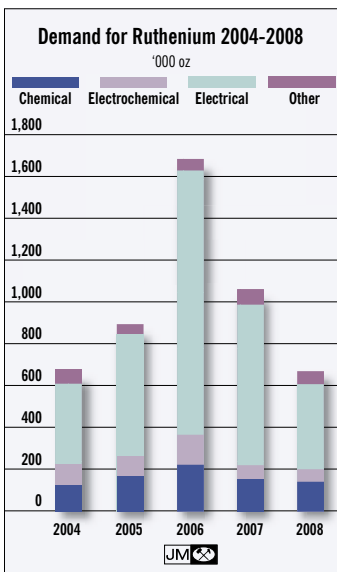
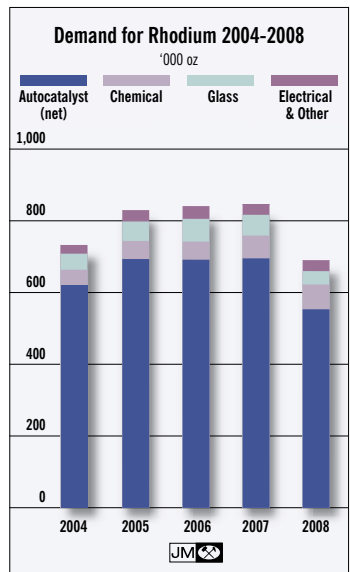
In the glass industry, rhodium demand decreased by over a third to 38,000 oz. Significant amounts of new production capacity for LCD glass were installed in Asia during 2008 to meet rising demand for flat screen televisions. However, the high rhodium price drove many glass producers to thrift rhodium from the alloys they use in their processes – so-called dealloying. Although this decreases the lifetime of a typical coated component, the extra cost of more frequent replacement of these components was outweighed by the lower metal cost.

Glass sector rhodium demand was further hurt by the return of some rhodium to the market in China. Most manufacturing of cathode ray tube (CRT) television glass is now carried out in China and, as demand for these sets has fallen, a number of factories have closed, releasing several thousand ounces of rhodium which we believe has been sold.

Demand from the chemical sector climbed to 68,000 oz as new production capacity for acetic acid was installed in China to meet growing domestic demand.

Supplies of rhodium fell in 2008, to 695,000 oz, from 824,000 oz a year earlier. Numerous production problems in South Africa drove supplies of refined metal sharply lower to 574,000 oz. Russian supplies of rhodium fell by 5,000 oz to 85,000 oz. Combined supplies of rhodium from other producing nations fell to 36,000 oz.

The rhodium price was exceptionally volatile during 2008, even by its own standards. It started the year at \$6,850, strong buying could not be met by weak supplies from South Africa and the price rose rapidly to peak at an all-time record of \$10,100 in June. However, as automotive output around the world worsened in the second half of the year, physical demand for rhodium dwindled. With rumours of metal sales by speculators and car companies emerging, the fall in the rhodium price was even more spectacular than its earlier rise and it ended the year at \$1,250.



### Ruthenium

Net demand for ruthenium fell by 36.8 per cent to 669,000 oz in 2008. This sharp decrease was mainly due to lower net purchases of ruthenium by the electronics industry. Although much of the mining industry does not publish figures for production of the minor platinum group metals, we believe that ruthenium production fell last year. However, production of ruthenium still exceeded demand during 2008.

In the electrical sector, ruthenium remains an important material for the production of hard disks, thick film chip resistors and, to a lesser extent, plasma display panels (PDP). Net demand fell in each of these applications, driving overall electronics industry demand down from the 776,000 oz purchased in 2007 to only 414,000 oz in 2008.

Perpendicular magnetic recording technology (PMR) – which uses ruthenium to increase the data that can be stored on a hard disk – captured further market share during 2008. By the end of the year almost one hundred per cent of all hard disks manufactured used this technology. The weight of metal actually coated onto disks therefore rose. However, refining pipelines continued to shorten last year, allowing sputtering target manufacturers and producers of hard disks to meet an increasing proportion of their metal requirements from recycling material they already owned. As a direct result, net ruthenium demand softened considerably.

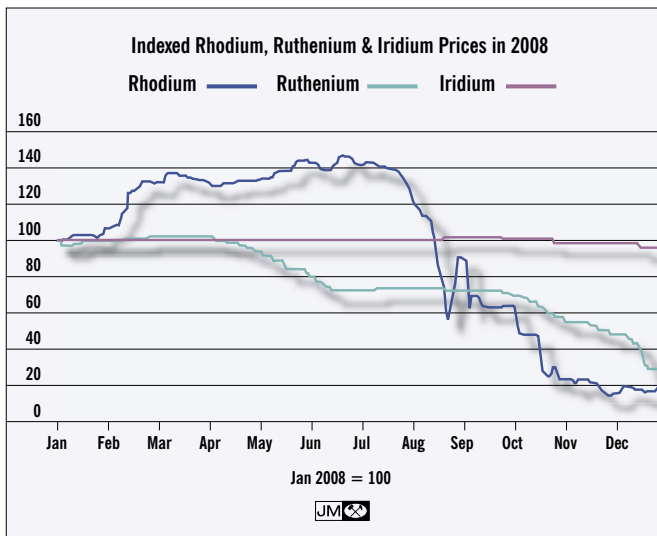
In the chip resistor market, a rise in the number of resistors manufactured was offset by a trend towards miniaturisation of these components. This meant that the average ruthenium content of a chip resistor fell and demand decreased accordingly. Ruthenium pastes are also used in the production of plasma display panels for flat screen televisions. However, the industry has moved to cut costs by reducing the ruthenium content of a typical paste: ruthenium demand has therefore shrunk even as the plasma display panel market has grown.

Electrochemical sector demand for ruthenium remained strong as the chlor-alkali industry continued replacing its mercury-based technology with diaphragm or membrane cells. Demand from the chemical industry fell to 139,000 oz as less ruthenium was required for the installation of new capacity than in 2007.

While ruthenium production declined, the decrease in demand for ruthenium and the rise in metal recovered by the hard disk industry meant that it was in plentiful supply during most of 2008. As a result, the price continued its fall from its February 2007 highs. It started the year at a Johnson Matthey Base Price of \$415 and fell rapidly, particularly in the second half of 2008 as already quiet buying weakened further, ending the year at a very soft \$100.

### Iridium

Demand for iridium fell by 2,000 oz in 2008 to 102,000 oz. Weak demand for iridium crucibles for crystal growing outweighed healthy requirements from most other sectors. Electrochemical sector demand was strong as new membrane cells were installed for the chlor-alkali process. Demand for iridium in spark plugs and aero engine ignitors was flat. As with ruthenium, little information exists on iridium production but we believe that supplies of iridium were readily able to meet this level of demand. The iridium price moved little: it started the year at a Johnson Matthey Base Price of \$450 and softened marginally as industrial purchasing slowed, ending the year at \$435.



*The rhodium price was exceptionally volatile during 2008. The ruthenium price lost considerable ground as purchasing from the electrical sector weakened. Iridium, however, moved little.*

