

# MANGANESE: THE STRONG, SILENT TYPE

**M**ANGANESE IS THE quiet achiever among steel raw materials markets.

Indeed, the element is the fourth most commonly used metal after iron, aluminium and copper.

Manganese end-use is almost entirely as a constituent of alloys, especially in the steel industry, where the principal feedstock is ferromanganese.

Inclusion of manganese into steels increases hardness, toughness, rigidity and wear resistance.

Steel uses comprise more than 90% of manganese demand.

Geographically, China dominates end-user demand with nearly 50% of the global market. China's reliance upon imported ores is set to increase.

Other major consumers include Japan, Europe, the US, the Middle East and India.

Manganese ore prices are negotiated between buyers and sellers – as there is no exchange traded price.

International benchmark prices set the tone for negotiation.

Price premiums are available for products that suit individual customer needs and where impurities are minimal.

Capped iron, silica, phosphorus and alumina contents are key price differentiators, with premiums increasing as higher quality ores become more difficult to source.

Prices into China are now renegotiated on a monthly basis for a specified loading month.

The grade that has been widely referenced as the benchmark grade is medium grade lump ore, with a minimum guaranteed manganese content of 43.5%.

Various forms of manganese are traded.

Ores for the steel industry typically have high manganese to iron ratios above 8:1.

The market is denominated in price per dry metric tonne unit, where one unit relates to 1% manganese per

dry metric tonne (dmtu). Benchmark pricing aside, there is no well defined 'spot market', as there is for other bulk raw material markets such as iron ore.

From peaking at \$US8.40/dmtu in mid-2010, cost-insurance-freight China prices have declined to around \$5.30/dmtu in mid-2011.

The price outlook is positive from 2011 levels in the near to mid-term, with potential for \$7/dmtu prices in 2012-13.

Total mine output globally is about 40 million tonnes of ex-mine manganese product. Manganese suppliers are fairly concentrated – meaning there aren't too many of them.

Not surprisingly, existing producers such as BHP Billiton, Brazil's Vale and Anglo American are looking to incremental expansions at their operations to feed into global demand growth.

Unlike base metals and specialty metals markets, manganese is not recycled, so additional demand equates directly to required supply growth for mine supply.

China, South Africa, Australia, Gabon, Brazil, Ukraine, India and Morocco are the main sources of mine supply.

The principal manganese ores are pyrolusite, braunite and hausmanite.

Most economic manganese deposits are hosted within sedimentary rocks.

Sedimentary manganese deposits of Archaean age occur in Brazil, Guyana, Cote D'Ivoire, Ghana and Burkina Faso.

The upper caps of these deposits are of higher grade as supergene processes have enriched the ore.

Proterozoic age carbonate-associated manganese deposits occur in the Kalahari region of South Africa, in Brazil and in Colombia.

The manganese ores at Grootte Eylandt in Australia are again sedimentary, being pisolitic in nature, akin to certain iron ore deposits.

Mining is mostly via open pit methods. High grades can exceed 45%

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manganese. For example, the Woodie Woodie mine in Western Australia produces lump ore that typically achieves 49.5%.

By comparison, although the Chinese are a major producer, the average Chinese mine grade is only around 30%. OMH Holdings' run-of-mine grade at its Bootu Creek mine in the Northern Territory is around the reserve grade of 22%.

However, OMH sells a beneficiated ex-mine produce at around 36% after on-site sorting.

Parallels to iron ore beneficiation apply. That is, lump ore (greater than six millimetres) and fine product (less than 6mm) are differentiated.

Lump product is generally smelted whereas fine product can be used as feed for chemical or electrolytic processing.

Manganese ores are then smelted to produce ferromanganese, silicomanganese and ferromanganese-silicon.

Ferromanganese production occurs in both blast furnaces and electric arc furnaces.

Slag from ferromanganese production is used as a feedstock to silicomanganese production.

The manganese sector is well placed to benefit from the continued growth of China's steel industry: watch this space.

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