MANGANESE

By Ian Robinson

The boom in world steel production in 2000 enabled manganese ore producers to achieve their first price increase after three successive years of price cuts. The world's largest producer of manganese ore, Billiton's Samancor Manganese, which has mines in both South Africa and Australia, negotiated a 7% increase with Japanese steel mills, taking the new price for South African ore to US$1.94 per metric tonne unit (mtu) of manganese. Other producers claimed to have won increases of about 6.8% from US$1.90 to US$2.03/mtu.

The use of manganese (Mn) as an alloying element in steel production accounts for over 90% of total world manganese consumption and, therefore, the level of steel production is the most important factor which determines demand for manganese alloys and, ultimately, of manganese ore. World crude steel production in the 63 countries covered by the Iron & Steel Institute (IISI) in Brussels rose for the second successive year (by 7.4%) to reach a new peak of 828.5 Mt.

During the second half of 1999, several major producers of manganese alloys had curtailed production in order to reduce excess inventory. These cutbacks plus the strengthening demand in response to the boom in world steel production led to a substantial improvement in alloy prices during the first half of the year. However, prices of silicomanganese started declining in the US as early as the second quarter, as excess supplies of the alloy, attracted by the strong dollar, flowed into the US and the boom in steel production started to stall. Freemarket US prices of silicomanganese quoted in *Metal Bulletin* collapsed from the range US$0.25-0.27/lb at the end of the first quarter to the range US$0.20-0.21/lb at the end of the third quarter.

In Europe, the prices of the two alloys remained more stable and *Metal Bulletin* quoted prices of high carbon (HC) ferromanganese in the range DM860-900/t and silicomanganese in the range DM990-1,020/t throughout the first nine months of the year. However, the price trends of the two alloys diverged during the second half of the year as the quotation for HC ferromanganese, reflecting the greater control over production exerted by a smaller number of producers, strengthened to the range DM960-1,000/t by the end of the year whereas silicomanganese prices declined to the range DM980-1,000/t.

Industry Trends

In a report on the manganese industry, 'The Economics of Manganese', the UK research group Roskill forecast that demand for manganese would increase over the period 2000-2005 at a rate slightly lower than the forecast average annual growth in steel production of 1.8%. However, Roskill warned that there would still be a plentiful supply of manganese ore and the growth in demand would not be sufficient to stimulate the development of any new manganese projects over this period. Any increases in production would be most likely to come from the rehabilitation of the Ukrainian mining industry and an expansion in Chinese production of high-grade ore.

Speaking at Metal Bulletin's 16th International Ferro-Alloys Conference in Paris in November, general manager of the Eramet Group, Jacques Bacardats said that future manganese consumption would depend on the evolution of steelmaking processes as well as the level of steel production. He forecast that gains in yield from processing improvements would reduce unit consumption of manganese in steel production by 2% over the next five years. He also forecast that silicomanganese will

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increase its share of the manganese alloy market at the expense of HC ferromanganese.

The move towards consolidation in the industry continued during the year as Brazilian producer CVRD proceeded with its strategic plan to bring together all its manganese ore and alloy interests within a single company. In 1999, CVRD had taken full control of its Société Europeenne d'Alliages pour la Sidérurgie (Seas) subsidiary in France through raising its stake from 65% to 100% and renaming the company Rio Doce Manganese Europe (RDME) and had also acquired 100% control of Cia Paulista de Ferroligas, Brazil's largest manganese alloys producer. CVRD regards its manganese alloy operations as strategically important for the company's manganese mining operations and CVRD's interest in ferro-alloys has been based on its drive to secure markets for its manganese ore.

Approximately two-thirds of CVRD's 1.8 Mt/y manganese ore is now used as feed for its ferro-alloy operations at Sibra and Paulista in Brazil and RDME in France.

World Ore Production

Global manganese ore production is estimated to have risen to about 19 Mt in 2000 from 18.3 Mt in 1999. The industry comprises six major producing countries - China, South Africa, Gabon, Australia, Ukraine and Brazil of which South Africa, Gabon, Australia and Brazil produce high-grade ore (with a Mn content of over 35%). Four groups dominated world production of high-grade ore - Samancor, Associated Manganese, Eramet and CVRD, and Roskill estimates that together they control 74% of world production.

Samancor Manganese is the world's largest producer of high-grade manganese ore. During the financial year (FY) ended June 30, 2000, Samancor's production of manganese ore in South Africa rose by 15.2% over the previous FY to 2,099,000 t, and production in Australia was 1,501,000 t compared with an annualised figure of 1,554,000 t for the second half of 1999. In the first half of FY 2001 (second half of calendar year 2000), the production of manganese ore in South Africa rose to 1,124,000 t (compared with 1,020,000 t in the first half of 2000) whereas production in Australia fell to 787,000 t (938,000 t).

South Africa's second largest producer, Associated Manganese (Assmang), reduced its sales of manganese ore during FY 2000 to 1,360,000 t (1,475,000 t). However, sales increased by 8% in the first half of the new FY to 600,000 t. Assmang proceeded with the development of the No. 3 shaft at its Nchwaning mine. This shaft was planned with the objectives of making it the lowest-cost underground manganese mine in the world and to produce a higher-grade ore and reduce its production of fines. The first production of ore from the new shaft is expected in October 2003.

Production from Eramet's Moanda mine in Gabon declined from 1,910,000 t in 1999 to 1,740,000 t in 2000 due to technical problems with equipment. However, CVRD raised its production of ore from its Azul mine in Amazon state to well over 1 Mt from 900,000 t in 1999 when mine operations were halted for three months due to excessive stocks.

The strong demand for manganese units during the first half of the year in response to the boom in world steel production also stimulated expansion plans by some smaller producers in the industry.

Australian manganese ore producer Perth-based Consolidated Minerals which restarted the mothballed Woodie Woodie mine in the Pilbara region of Western Australia produced 262,500 t of ore in its first year of operation. The projected output for FY 2001 is 300,000 t, comprising 250,000 t of lump and 50,000 t of fines. A large proportion of the output is sold under long-term contracts which include a 90,000 t/y five-year contract with DCM

Decometal to supply the Nikopol ferro-alloys plant in Ukraine. The ore is recovered from open pits with a maximum depth of 90 m and at an average strip ratio of waste to ore of 4:1.

In Mexico, Minera Autlan, the largest producer of manganese ore in North America, raised production from its Molango mines aiming to achieve an annual production rate of over 800,000 t compared with 750,000 t in 1999.

It was also announced that JSC Chiaturmanganum in Georgia planned to rehabilitate its mining and concentrating operations which had been working at about 10% of capacity over the past seven years. The company aimed to produce 75,000 t of high-grade concentrates in 2000 rising to 210,000 t in 2002.

World Alloy Production

World manganese alloy production is estimated at about 7.5 Mt/y, and China and the CIS states together account for over a third of world production. Roskill estimates that the four major Western groups - Samancor, Assmang, Eramet and CVRD - together account for nearly half of world production capacity. The production of manganese ferroalloys comprises approximately equal tonnages of HC ferromanganese and silicomanganese (about 3.4 Mt/y) and 700,000 t of refined ferromanganese.

As the world's largest producer and exporter of manganese alloys, China's exports are a major factor on world manganese markets - particularly Japan. In 1999, China produced about 1.9 Mt of manganese alloys, of which, exports accounted for 420,800 t. Silicomanganese comprised about 70% of total manganese alloy exports with HC ferromanganese comprising nearly the entire balance. Production and exports continued at a high level during 2000 and Chinese exports to Japan rose to about 180,000 t, representing a substantial increase of nearly 30,000 t over 1999. This rise in Chinese imports prompted the Japanese Ferroalloy Association to monitor Chinese imports with a view to asking the Japanese Government to re-impose anti-dumping duties.

Following production cuts in the first half of FY 2000, Samancor increased manganese alloy production significantly in the second half of the FY. As a result, production levels for the full FY were almost unchanged. The company's South African production was 461,000 t compared with 449,000 t in FY1999 and Australian production was 215,000 t compared with an annualised 240,000 t for the second half of 1999. In the first half of FY 2001, Samancor increased production by 20% over the second half of FY 2000 to reach a total production of 348,000 t (290,000 t), including 217,000 t (196,000 t) in South Africa and 131,000 t (94,000 t) in Australia.

In a reversal of the trend in recent years for manganese alloy production to migrate from the major consuming countries in the northern hemisphere to countries with their own domestic ore production, Nippon Denko of Japan negotiated an agreement with Samancor that it would take over the production of HC ferromanganese which Samancor had been shipping to Japanese customers, of which the largest is Nippon Steel. Nippon Denko will now undertake the production of 40,000-50,000 t/y of HC ferromanganese at its Tokushima plant in Shikoku. In exchange, Samancor will increase its supplies of ore to Nippon Denko and will raise its share of Nippon Denko's total purchases of approximately 250,000 t/y from about 50% to 80%

Despite enjoying the competitive advantages of its own ore supplies and relatively low power costs, high transport costs have reduced the profitability of Samancor's manganese operations in South Africa over the past three years to close to zero. Speaking to the Transport Committee in South Africa's National Assembly in early 2001, finance manager at Samancor's

manganese alloys plant Metalloys, Anton Fourie, complained that the costs of transporting ore by rail from the mines to the plant and alloy from the plant to the ports was crippling the business.

Assmang increased its sales of manganese alloys to 207,000 t (156,000 t) during FY 2000 but sales declined marginally in the first half of FY 2001 to 85,000 t (88,000 t). Assmang aims to optimise its ore feed to its smelter through smelting a higher-grade ore. The ore from its Nchwaning No. 3 shaft will have a higher manganese to iron (Mn:Fe) ratio than the current production from Nchwaning No. 2 and will contain less fines.

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