CHROMIUM

By Ian Robinson

In 2003, world stainless steel production continued to rise at an annual rate of over 7% for the second successive year to reach a record level of nearly 22 Mt. This led to a shortage of ferrochrome supplies and South African producers responded by raising production to near capacity and by expanding capacity or announcing plans to expand capacity. Little additional production was forthcoming from countries outside South Africa China and India, traditional sources of extra capacity in a tight market, became net importers of ferrochrome.

South African producers, burdened by rising costs resulting from a stronger rand and higher power and freight charges, were able to demand higher prices. World prices of charge chrome nearly doubled from US$0.32/lb contained chromium at the beginning of the year to US$0.56/lb at the end of the year and escalated still further to reach US$0.68/lb for the second quarter of 2004.

Xstrata

Xstrata, which has overtaken BHP Billiton's Samancor Chrome to become the largest ferrochrome producer in the world, made two decisive moves to consolidate its leadership.

In December Xstrata announced that it would build a new smelter on the site of its existing Vantech vanadium facility near Steelpoort in the province of Mpumalanga. The project, known as Project Lion, will comprise two 63 MVA closed submerged-arc furnaces and a pre-reduction kiln and will use Xstrata's exclusive Premus technology. The 330,000 t/y Lion plant will be Xstrata's fourth ferrochrome smelter and will raise its total annual production capacity to 1.63 Mt. Premus technology is currently being applied at Xstrata's Lydenburg smelter where three furnaces are being supplied with pre-reduced pellets from two kilns. This technology is a refinement of the solid state reduction (SRC) process developed by Japanese ferroalloys producer Showa Denko and was applied at the Lydenburg plant which was commissioned by Consolidated Metallurgical Industries in 1977. This was the first ferrochrome smelter in South Africa to adopt a process which included a pre-smelting stage.

Xstrata claims that the Premus route has two major advantages - lower consumption of power and of coke - over the Outokumpu process route which has been adopted by several South African producers and has become the standard ferrochrome production route in South Africa. The Premus route is being driven by the expectation that power costs in South Africa will rise sharply as the country's power excess is being rapidly reduced and it is also necessary to reduce the consumption of coke beyond what could be achieved in open furnaces. Another advantage of the Premus process is that it

produces a low silicon (Si) alloy. Charge chrome produced by the Premus process contains less than 2% Si.

As a result, Xstrata has embarked on a strategy to expand production by the Premus route in established smelters as well as the Lion project and is placing more emphasis on agglomeration to reduce power consumption.

Xstrata made a second major strategic move to consolidate its position as world leader in the ferrochrome industry when it announced in February 2004 that it would merge its South African ferrochrome and chrome ore assets with SA Chrome. SA Chrome developed a 235,000 t/y ferrochrome project on a greenfields site near Rustenburg in the North West Province, comprising two 54 MVA closed submerged-arc furnaces with charge pre-heating and a 520,000 t/y Outokumpu route pelletising and sintering plant. The plant was commissioned in September 2002.

The Royal Bafokeng Nation (RBN) is SA Chrome's largest shareholder and the deal complies with new mining legislation, which requires foreign companies operating in South Africa to have black empowerment partners. The 'pool-and-share' agreement combines SA Chrome's two furnaces with Xstrata's 16 furnaces and gives SA Chrome an 11% share of the joint venture. It is envisaged that SA Chrome's participation will eventually rise to the required level of 26% through preferential participation in future growth projects.

In addition to its smelter, SA Chrome also operates the Horizon chrome mine, and RBN holds vast ore reserves situated only a few kilometres from the smelter.

Other developments in South Africa

The South African ferrochrome industry entered a new phase of growth as several producers embarked on expansion programmes and a new producer prepared to enter the arena.

In a presentation on 'Ferrochrome - a South African Perspective' at the International Chromium Development Association Conference held in Johannesburg in April 2003, Xstrata's Marketing Manager (Chrome Division) Jeff McLaughlan forecast that world production of ferrochrome with a carbon (C) content of over 6% (which includes charge chrome) would reach 4.4 Mt in 2003, of which South Africa would contribute about 2.8 Mt, representing a 63% share of the world total. McLaughlan estimated South Africa's total design capacity at 3.15 Mt, with Xstrata holding the largest share of 42%, followed by BHP Billiton's Samancor with 33%, Assmang and Hernic with 8% each, SA Chrome with 7% and ASA Metals with 2%.

In the financial year ended June 30, 2003, Samancor sales of chrome ore rose by 15% to 2.8 Mt and ferrochrome production increased by 18% to 990,000 t as furnaces were recommissioned in response to a recovery in market demand. In September 2003 an upgrade of Furnace 4 (F4) at Samancor's Ferrometals smelter at Witbank was completed for Newsam, a

joint venture between Samancor and Poschrome of Korea, to increase the furnace's production capacity from 100,000 t/y of ferrochrome to 125,000 t/y. The upgrade and rebuild of F4 followed a similar upgrade of Furnace 5 at the same site during 2002 and involved the existing 48 MVA furnace being upgraded to a 60 MVA closed submerged-arc furnace.

In the year to end June 2003, Assmang increased sales of ferrochrome from its Machadodorp smelter by almost 30% to 244,000 t (190,000 t). This increase follows an upgrading of the existing plant and the installation of a fourth 54 MVA furnace with an Outokumpu pelletising and sintering line. Technical problems followed the commissioning of the new furnace in August 2001 but Assmang reports that the problems have been largely overcome and in January 2004 the Machadodorp smelter reached its production capacity. At the end of 2003 Assmang was close to making a decision about developing an underground mine to replace the 600,000 t/y production from its Dwarsrivier open-pit operation.

In April 2004, Hernic Ferrochrome announced that it would increase its production of ferrochrome by about 60% to 420,000 t/y by late 2005 and it has a longer-term goal to reach a production level of 1 Mt/y. Hernic is planning to build a fourth furnace similar to its third furnace which was commissioned in mid-1999 — a 54 MVA closed furnace with a pre-heater which will operate on a feed of lump ore and sintered pellets produced by an Outokumpu pelletising and sintering line. Hernic has more than doubled its chrome ore reserves at a property about 8 km from the plant to about 250 Mt, and estimates that the new reserves will be sufficient to sustain an annual production of 1 Mt of ferrochrome for a period of over 50 years.

South Africa's smallest ferrochrome producer, Chinese-owned ASA Metals, more than doubled its production capacity when it commissioned a second furnace at its Dilokong smelter in December. The completion of the 45 MVA furnace raised smelter capacity from 50,000 t/y to 120,000 t/y.

A potential new producer prepared to enter the South African ferrochrome industry. Transvaal Ferrochrome would become South Africa's seventh ferrochrome producer — and the first South African specialist ferrochrome producer to be listed on the Australian Stock Exchange. At the end of the year, the Australian company, created specifically to exploit the Buffelsfontein Chrome Mine (situated adjacent to Samancor's Mooinooi mine in the Marikana area of the North West Province), was still awaiting the finalisation of the financial arrangements before proceeding with the project. A black-empowerment consortium and a strategic partner, Jiquan Iron &-Steel Corp (JISCO) of China will provide part of the equity.

It is planned to build a smelter with two 63 MVA furnaces and an Outokumpu-route pelletising and sintering line. The smelter will have an annual production capacity of 240,000 t, which would make it the largest greenfield ferrochrome smelter to be built in South Africa. The project is scheduled to reach full production during the second half of 2005.

Another potential new ferrochrome producer in South Africa, India's Tata Iron & Steel, launched an environmental impact assessment (EIA) in early 2003 at Richards Bay on South Africa's east coast to assess the ecological impact of building a ferrochrome smelter to produce high-carbon (HC) ferrochrome based on imports of high-grade ore from India.

Other countries

The boom in demand for ferrochrome also stimulated interest in new projects in countries, having no history of ferrochrome production. Plans were formulated in both Canada and Australia to establish ferrochrome projects.

In Australia, Consolidated Minerals Ltd (CML) commissioned a technical feasibility study into a proposed ferrochrome smelter in the Pilbara region of Western Australia. Pyromet of South Africa concluded that it would be feasible to build the smelter in one of three sizes – 50,000 t/y, 70,000 t/y or 110,000 t/y. However, CML decided against building the smelter as the Pyromet study indicated that CML could generate a better return by focusing on the growth of production from its Coobina mine, located 80 km south-east of Newman in the Pilbara region, as well as developing alliances with existing smelters. China is CML's major market for chrome ore but in April it announced that it would sign a three-year contract to supply 35,000 t/y to a smelter in Europe. It also announced that it planned to double its production from a rate of 100,000 t/y to 200,000 t/y during the current financial year. In Canada, Allican Resources was reported to be seeking a partner for a ferrochrome smelter in Quebec and had had discussions with Indian producer Tata Iron & Steel in February. Although the talks broke down, Allican continued to look for potential partners and favourable sites for the project.

Once a large producer with a production of almost 300,000 t/y in the early 1990s, Japan took another decisive step to dismantle its ferrochrome industry and increase its reliance on imports. In January, Nisshin Steel commissioned a new large 160 t furnace at its Shunan stainless steel works to replace two 40 t furnaces. Showa Denko's subsidiary Shunan Denko had operated a 70,000 t/y ferrochrome furnace within the complex and charged the alloy directly into the two smaller furnaces. The ferrochrome furnace was closed as a result of the closure of the two small stainless steel furnaces and the new large furnace is being supplied with ferrochrome imported from the two giant South African producers, Xstrata and Samancor.