

CHROMIUM

By Ian Robinson

The market for ferrochrome, the major application of chromite ore, suffered disproportionately relative to the decline in the Western world stainless steel production during the year. In a presentation at the Metal Bulletin Southern African Ferro-Alloys Conference in February 2002, Belgium-based analyst Andrew Jones estimated Western stainless steel production in 2001 at 17.69 Mt, a decline of 2.5% compared with production in 2000.

In contrast, in response to the decline in the world demand, ferrochrome producers have (according to Mr Jones' estimates) reduced production by a total annualised tonnage of nearly 1.5 Mt - equivalent to 30% of world production of high carbon (HC) ferrochrome/charge chrome in 2000, estimated at 4.834 Mt by the International Chromium Development Association (ICDA). However, not even these extensive cutbacks were sufficient to halt the persistent decline in prices throughout the year and the Metal Bulletin quotation for lumpy charge chrome in Europe fell from the range US\$0.43-0.45/lb at the beginning of the year to end the year in the range US\$0.29-0.32/lb.

Production Cutbacks

As the world's largest producing country, South Africa accounted for the largest share of the annualised reduction in world production. Both South Africa's major ferrochrome producers - BHP Billiton's Samancor Chrome and Xstrata - made extensive cutbacks during 2001. Samancor Chrome reduced its production of both ore and alloy by 15% and 14% to 3.16 Mt and 908,000 t during the financial year ended June 30, 2001. At the end of the financial year eight ferrochrome furnaces, representing some 30% of total production capacity, had been shut. In November, Samancor closed its entire Palmiet plant with an annual production capacity of 120,000 t.

Xstrata, which produced 1.9 Mt of saleable chromite ore and 1.14 Mt of ferrochrome during the financial year ended December 31, 2000, announced the closure of four more furnaces at its Rustenburg plant in May 2001 (in addition to the two which had been closed in October 2000) as well as the closure of two furnaces at its Wonderkop smelter. These furnace closures reduced Xstrata's annual capacity by 280,000 t at Rustenburg and 170,000 t at Wonderkop.

In October 2001, Xstrata signed an agreement with Anglo Platinum to lease two of the closed furnaces at the Rustenburg smelter for the smelting of converter slag. Only one Xstrata furnace will be used in the arrangement but a second furnace will have to be kept offline because of the configuration.

There were also substantial cutbacks in production in Kazakhstan and in India. In Kazakhstan, Kazchrome cut back production by 25% (equivalent to 130,000 t/y) from the beginning of 2001. According to new estimates by Mr Jones, closures in India totalled 175,000 t of annualised capacity, with Facor accounting for the largest share following the closure of two plants with a combined capacity of 110,000 t/y.

In Zimbabwe, Anglo American's Zimbabwe Alloys (Zimalloys) continued its project to convert capacity for the production of low carbon (LC) ferrochrome to HC ferrochrome at its Gweru smelter. In March, Zimalloys announced the closure of its LC production due to poor markets and growing debts.

In early 2002, Elkem stated in its annual report that it had set aside about US\$31 million to account for the closure of its Rana smelter in Norway. Production was irregular in 2001 and the 175,000 t/y smelter is finding it increasingly difficult to compete with South African ferrochrome producers.

Japanese ferrochrome producers continued to close production capacity as they become increasingly unable to compete with the prices of imported alloy. NKK Materials, the ferro-alloys subsidiary of the Japanese integrated steel producer, shut a furnace down in March as a result of the decline in HC ferrochrome prices and weakening demand. This represented a closure of annual capacity equivalent to 32,000 t. Japanese production had fallen from nearly 270,000 t in 1991 to 122,900 t in 2000, and is likely to suffer a further drastic contraction as there are indications that Showa Denko, the largest producer (with an annual production capacity of 80,000 t) is planning to close in 2003.

New Projects in South Africa

Despite the downturn in the world market in 2001, South African ferrochrome producers believe that, over the longer term, demand for ferrochrome will increase in line with the anticipated growth in stainless steel.

Production.

Work proceeded on four major new projects during 2001, which were designed not only to provide new, or replacement capacity but also to lower operating costs and reduce environmental pollution. The new projects included three brownfield projects - the Xstrata/Samancor joint venture at Xstrata's Wonderkop smelter, the new furnace and pelletising/sintering plant at Assmang's Machadodorp smelter, the new pelletising/sintering plant at Samancor's Tubatse smelter - and SA Chrome & Alloys' greenfield project to build a new smelter at Boshoeck near Rustenburg on the western limb of the Bushveld Complex.

The Wonderkop project is a joint venture between Xstrata and Samancor Chrome based on a synergy between the two partners, producing benefits which neither would have been able to achieve on its own. The existing Xstrata Wonderkop smelter complex provided the infrastructure for rapid and cost-effective expansion in productivity capacity, and Samancor's chrome ore deposits adjacent to

Xstrata's Kroondal mine provide access to large quantities of high-grade ore.

The two new furnaces (Nos. 5 and 6) were commissioned in late June and mid-August and the joint venture will have a total annual production capacity of 180,000 t, including production from the recovery plant. The project is a production, but not a marketing joint venture, and alloy from the project will be marketed separately by the two partners.

The completion of the two joint venture furnaces made Wonderkop the largest single-site ferrochrome facility in the world as it now comprises a total of six 45 MVA furnaces with a total rated capacity of 520,000 t/y.

Assmang's new facilities at its Machadodorp smelter which was commissioned at the end of the year comprise a closed 54 MVA furnace and pre-heater as well as a 350,000 t/y pelletising and sintering plant. This expansion will permit an increase in the smelter's annual ferrochrome production capacity from 150,000 t to 320,000 t.

The initial breakthrough which enabled Assmang to embark on the transformation from being a small high-cost producer to become a world-class producer was the acquisition of the Dwarsrivier property from Gold Fields of South Africa in September 1998. This new mine, situated about 140 km north of the smelter, provides the new project with the security of long-term ore supplies at competitive prices from a captive source.

Samancor is focusing on optimising operations at its major smelters - Ferrometals, Middelburg Ferrochrome and Tubatse. A 520,000 t/y pelletising and sintering plant is under construction at Tubatse. This project is being implemented as a result of Samancor's drive to optimise the ore mix which it supplies to its furnaces without the necessity to plan its mining operations in order to produce ore in a fixed stringent ratio of lump to fines. This permits greater flexibility of mining operations and results in lower production costs.

The use of pellets from the new pelletising/sintering plant will also improve furnace efficiency and increase alloy production from the furnace by 50,000 t/y. The project is scheduled to be commissioned in 2002.

SA Chrome and Alloys will become the first new entrant into the ferrochrome industry in South Africa since August 1999 when ASA Metals commenced production. SA Chrome's greenfield project at Boshhoek, approximately 30km northwest of Rustenburg, will comprise two closed furnaces equipped with pre-heaters and a 520,000 t/y pelletising/sintering plant. The project, which is scheduled to come on stream in mid-2002, will have a production capacity of 240,000 t/y but the pelletising/sintering plant will provide surplus pellet capacity to feed a possible third furnace in the future.

The project will smelt a mix of upgraded UG2 (Upper Group 2) tailings from Impala Platinum's nearby mine and LG6 (Lower Group 6) ore from its Horizon mine which is under development. An exploration programme is also underway on the Royal Bafokeng reserves which could provide long-term supplies with a life of about 100 years.

The choice of the Outokumpu pelletising and sintering route for their new projects by Assmang, Samancor and SA Chrome, demonstrates that this technology has become the preferred route to ferrochrome production in South Africa. Because South African ore contains a high proportion of fines, it is necessary to develop processing routes which can treat fines effectively. The Outokumpu route permits the use of large quantities of fines, lowers power consumption and prevents the emission of toxic fumes into the environment.

Developments outside South Africa

In the prevailing climate of world oversupply and weak demand, there was little stimulus to develop new projects to mine ore or build ferrochrome capacity outside South Africa. However, new projects were planned or under

development in two countries with substantial ore reserves - Finland and India. In Finland, development of the new Kemi underground mine proceeded and the mining method was being tested and fine-tuned in three trial stopes. AvestaPolarit Chrome's Kemi mine is the largest chromite mine in Europe having commenced production in 1968, creating the basis for a fully-integrated ferrochrome to stainless steel chain in the Kemi-Tornio area in northern Finland. At the end of 1998, a decision was taken to switch from an open-pit operation to an underground mine as a result of the increasing strip ratio in the open pit.

Stainless steel production at Tornio is planned to double from its current level of 635,000 t/y by 2004 and the underground mine, with a nominal capacity of 2.7 Mt/y of ore will provide sufficient ore feed to enable the smelter to expand ferrochrome production to meet the increase in requirements. The development of the mine will take about five years and production is expected to start from underground at the end of 2003.

In India, Jindal Steel & Power was reported to be proceeding with a 100,000 t/y ferro-alloys plant with two 24 MVA furnaces. One of the two furnaces was intended to produce ferrochrome and the other was planned for silicomanganese. The furnaces were scheduled to come on stream in early 2002. The Jindal group has captive ore mines and will supply most of its planned ferrochrome production to sister company, stainless steel producer Jindal Strips.

International Trends

The only two countries which appear to have the capacity to sustain a long-term expansion in production and exports of ferrochrome are South Africa and Kazakhstan and the dominance of these two countries will continue to increase as countries without their own ore resources close down their production capacity. Countries such as India, Brazil and Finland which have their own ore reserves but are unable to compete in terms of production

costs with South Africa and Kazakhstan will focus on domestic production to supply in their own countries.

South African producer Herculite Ferrochrome's marketing Director Paddy Probert predicts that, as world demand for ferrochrome expands in response to the continuing growth, averaging about 5% a year, in world stainless-steel production, South Africa will supply most of the increased demand (in addition to closures). As a result, South Africa's share of

world production will expand from about 50% in 2000 to closer to 80% by 2010.

India's Tata Iron & Steel (TISCO) continued its search for a location offshore for a ferrochrome plant which offered lower power rates than are available in India. After considering locations in Queensland, Australia and Mozambique, a TISCO executive said at the end of the year that the company would build its 120,000 t/y project at a coastal location in South Africa.