CHROMIUM

By Ian Robinson

Stainless-steel production in the Western world rose for the second successive year to a new record level of 18.8 Mt, an increase of 9.3% over production of 17.2 Mt in 1999. Stainless-steel production is the major driving force which determines the consumption of ferrochrome and, ultimately, of chromite ore. Ferrochrome, the alloy which is added to stainless-steel to render it stainless accounts for about 80% of total chromite consumption. (Stainless-steel has a minimum chromium (Cr) content of 12%.)

However, there is not always a direct relationship between the production of stainless-steel and the consumption of ferrochrome. This is because ferrochrome is not the only source of chromium units available to stainless-steel producers - stainless-steel scrap competes with primary ferrochrome and can substantially reduce demand for the alloy. However, demand for stainless-steel scrap is driven by its nickel rather than its chromium content as nickel is by far the more valuable ingredient and this introduces another factor which influences demand for ferrochrome.

Western world production of stainless-steel during the first half of 2000 rose by 12.4% year-on-year. However, demand suddenly weakened in the second half due to excess production. Stainless-steel stockists which had been stockpiling to reduce their exposure to the escalating nickel prices began to offload stockpiled material when nickel prices started to decline.

Although demand for ferrochrome increased during the first half of the year, the rise in ferrochrome prices did not match the growth in stainless-steel production. Spot prices of charge chrome in Europe rose from an average of US$0.40/lb at the beginning of the year to US$0.43/lb by the middle of the year - an increase of only 7.5%. Production cutbacks by stainless-steel producers and an increase in the consumption of stainless-steel scrap forced prices down in the second half of the year to levels of about US$0.30/lb on the spot market in Europe. Although producers claimed that they had achieved roll-overs of their quarterly prices which remained officially in the range US$0.43-0.45/lb, the effective prices were much lower as producers were believed to be granting discounts on their official prices.

Production

According to preliminary industry estimates, world production of chrome ore and ferrochrome in 2000 was 16 Mt and 4.7 Mt, respectively. Ferrochrome production rose by 400,000 t over 1999 (4.3 Mt) to reach a record level, which was nearly double the annual production recorded in 1990 (2.5 Mt).

Most of the growth occurred in the first half of the year and was followed by cutbacks in the second half when the growth in stainless-steel production lost momentum.

The world's two largest ferrochrome producers, Billiton's Samancor and Xstrata which have their entire production capacity in South Africa, increased production in 2000. As a result of increased furnace availability and productivity improvements, Samancor achieved an 11% increase in ferrochrome production during the financial year ended June 30, 2000 to 1.055 Mt. (947,000 t). During the first half of FY 2001 (second half of calendar year 2000) production increased to 522,000 t (506,000 t) despite the closure of four furnaces in order to bring alloy stock levels in line with market demand. In January 2001, the company effected another major cutback through the closure of four furnaces at its Tubatse works with a combined installed capacity of 180,000 t/y for a projected period of six months. After raising its output of chrome ore by 8% to 3.73 Mt

during FY 2000, Samancor reduced its ore production in the first half of FY 2001 from 1.86 Mt to 1.82 Mt. During the first half of 2000 Xstrata increased its alloy production by 22% to 567,903 t. However, in the second half of the year Xstrata closed two furnaces at its Rustenburg facility with a combined annual capacity of 130,000 t.

The smaller South African ferrochrome producers also cut back production in the second half of the year. Feralloys closed one out of its three furnaces at its Machadodorp plant with an annual production capacity of 45,000 t and Hernic Ferrochrome closed two 37 MVA furnaces for refractory repairs.

Producers in other countries including Kazakhstan, Norway and Japan, also closed ferrochrome capacity during 2000 or early 2001. In Kazakhstan, Kazchrome cut production capacity by 80,000 t/y through the closure of three furnaces, one at its Aktyubinsk plant in September and two at its Aksu plant in October.

Higher exports of ferrochrome from China aggravated the oversupply in the world industry. Metal Bulletin Research (MBR) estimated that Chinese exports grew from about 57,000 t in 1999 to about 120,000 t in 2000. This increase was based on a sharp increase in ore imports, particularly from India, and MBR estimated that China imported about 1.16 Mt of chrome ore during 2000 compared with 820,000 t during 1999.

India also increased its exports of ferrochrome as it increased its production to a level of about 310,000 t in the year 1999-2000 which exceeded domestic demand by around 120,000-130,000 t.

In Zimbabwe, Zimbabwe Alloys, which is controlled by Anglo American, embarked on a programme to convert operations at its Gweru smelter from the production of low-carbon (LC) ferrochrome production to high-carbon (HC) ferrochrome. Until 2000 the Gweru smelter was dedicated entirely to the production of ferrosilicon chrome and LC ferrochrome. However, declining demand and the continuing export of alloy from countries in the former Soviet Union to the West at sub-economic prices forced market prices to their lowest levels in 30 years during late 1999 and early 2000. In March 2000, Zimbabwe Alloys suspended the production of LC ferrochrome.

However, it resumed production in July and commenced a cost cutting campaign and undertook the conversion of its largest furnace to HC ferrochrome production. The continuing poor prices and growing debt forced the company to shut down its LC ferrochrome production again in March 2001 and it suspended production of ferrosilicon chrome (silicochrome) in its A2 furnace as the output is used as an intermediate product for the production of LC ferrochrome. However, it continued to operate its A1 furnace in order to meet orders from European customers. Feasibility studies on the conversion of more furnaces are continuing and are scheduled to be completed by the end of June 2001.

New Projects

Despite the collapse in demand and the closure of substantial production capacity during the second half of 2000, ferrochrome producers, particularly in South Africa proceeded with new projects to expand their production capacity. The continuing growth in ferrochrome production capacity reflects the confidence that stainless-steel production will continue to grow at an average annual rate similar to that over the past 30 years when it averaged 4.5% per year. Because South Africa possesses about three quarters of world chromite reserves and has relatively low power costs its share of world ferrochrome production capacity is expected to continue to expand from a current level of about 59% to as high as 75% by 2010.

However, despite the confidence in a continuation of long-term growth in demand for ferrochrome, the deterioration in the market during the course of the year forced Samancor and Xstrata to postpone their

plans for greenfield projects in favour of a joint venture brownfield project. Samancor postponed its plans to build a greenfield smelter adjacent to its Mooinooi mine on the western belt of the Bushveld Complex and, in order to meet its short to medium term commitments, formed a joint production venture with Xstrata in June at Xstrata's Wonderkop facility near Rustenburg. The joint venture will exploit Samancor's chrome ore reserves which will be mined by Xstrata through its Kroondal mine. The joint venture will comprise two new 45 MVA submerged-arc furnaces, an agglomeration plant and a metal-from-slag recovery plant with a total annual capacity of 180,000 t.

Samancor also focused on brownfield projects to improve its current operations. Construction of the 520,000 t/y pelletising plant at its Tubatse Works continued with commissioning planned for calendar 2002. The use of pellets will improve operating efficiency and provide greater flexibility in the ore input into the furnaces. This, together with organisational restructuring which is taking place, is expected to bring Tubatse's costs into line with the lowest in the industry. Looking further ahead, Samancor established a special project team to capture the full potential of DC plasma-arc technology for the group. During the second half of calendar 2000, Samancor's two DC arc furnaces at the Middelburg and Palmiet works performed consistently at record levels, confirming the potential importance of this technology in the future, particularly for the smelting of low-cost UG2 ore which is produced as tailings from platinum mining operations. DC arc furnaces offer two important advantages over conventional submerged arc furnaces which are used to produce the bulk of the world's ferrochrome production : the capacity to treat fine ore directly in the furnace without any pre-treatment and the flexibility to use cheap reductants.

Associated Manganese Mines of South Africa (Assmang) commenced the development of a captive ore source which would finally enable it to build a competitive ferrochrome facility. Assmang has a 100% interest in Feralloys which operates a ferrochrome smelter at Machadodorp in the province of Mpumalanga. However, historically the plant has not been competitive because its relatively small size prevented it from achieving economies of scale and, without a captive mine, it was forced to buy ore on the open market from mines situated some distance from the plant. In September 1998 Assmang finally acquired its own ore deposit when it purchased the Dwarsrivier property from Gold Fields of South Africa and the mine was officially opened in October 2000. The mine will supply ore to the Machadodorp plant, which is situated some 150 km from the mine, and Assmang is proceeding with an expansion programme to double annual ferrochrome capacity from 150,000 t to 300,000 t through upgrading existing furnaces and installing a large new 54 MVA furnace and a pelletising and sintering plant as well as a pre-heating facility.

In early 2001 new producer SA Chrome and Alloys announced that it had entered into an agreement with Hernic Ferrochrome, South Africa's third largest ferrochrome producer, regarding the purchase of Hernic's entire shareholding. Provided the results of the due diligence investigation are acceptable to both parties this will effectively lead to a merger which would create a company with an annual production capacity of about 500,000 t of ferrochrome. The new company would also have the ore resources to double production over time to reach a level of over 1 Mt/y comparable with that of the two leading South African producers, Samancor and Xstrata.

SA Chrome & Alloys has commenced construction of a plant at Boshoek, about 25 km north-west of Rustenburg. The project will use the Outokumpu process route and the plant will comprise two 54 MVA furnaces and a 520,000 t/y pelletising and sintering plant. The plant complex which is expected to be commissioned during the second quarter of 2002, will have an annual production capacity

of 235,000 t of charge chrome. SA Chrome's feed will comprise a mixture of UG2 tailings from Impala Platinum and LG6 ore from its Horizon mine which is situated 41 km north-west of the smelter site.

Hernic has an annual production capacity of 260,000 t from a facility comprising three furnaces and an Outokumpu pre-treatment route with a pre-heater and a pelletising and sintering plant. Hernic had been planning to build a second 54 MVA furnace and to develop a new underground mine with an annual production capacity of 1 Mt. However, the merger could enable the new amalgamated company to defer the development of the underground mine as SA Chrome would have surplus ore and sintered pellet capacity at its Boshoek plant. Sintered pellets could be transported from Boshoek to Hernic for use as feed for the planned new 54 MVA furnace.

India's largest producer and exporter of chrome ore concentrates and HC ferrochrome, Tata Iron and Steel Co (Tisco), has revealed plans for a major expansion in India and overseas. It plans to expand output of HC ferrochrome from about 100,000 t in 1999-2000 to about l80,000 t in 1999-2000 and to 300,000 t/y in about three years. It also plans to expand production of chrome ore and concentrates and is seeking joint venture partners overseas to build ferrochrome plants based on feed which it would supply from its own mines and processing plants in India. In January 2001 the acting premier and minister of state development Terry Mackenroth of Queensland, Australia announced that Tisco would develop a ferrochrome project at Gladstone with a production capacity of 120,000 t/y based on the consumption of ore from India.