

# New ferrochrome smelter for Assmang

**A consortium of Bateman Titaco and Outokumpu Engineering Contractors Oy has supplied a new smelter at Assmang Chrome Division's Machadodorp Works, Mpumalanga, RSA. The plant uses the latest technology in agglomeration, sintering and preheating of the feed ore supplied to the furnace, resulting in improved chromium recovery and a lower consumption of kilowatt hours per tonne of metal produced. Furnace stability and ease of operation during smelting are also enhanced.**

## Assmang Ferrochrome project statistics:

Client:	Assmang Chrome Division.
Location:	Near Machadodorp, Mpumalanga, RSA.
Contract	
■ Turnkey	
■ Project value:	R300M
■ Duration	June 2000 to October 2001
Peak site labour:	750
Total project man hours	1,2M hours
Disabling injuries:	1
DIFR (Disabling injury frequency rate)	0,833 per 10 <sup>6</sup> hours
Steelwork:	3 000 tonne
Electrics:	
■ Cables	114 km
■ Cable racking	9 km
■ Motor drives	260
■ Variable-speed drives	4 MW
Instrumentation:	
■ Instrumentation loops	1 336
■ SCADA tags	24 000
Major subcontractors:	13

This R300M turnkey contract for Assmang Chrome, an Avmin / Assore joint venture, effectively doubles the ferrochrome output at the Machadodorp plant to about 300 000 tonne/yr. The smelter includes a 54 MVA furnace, a preheater and a 350 000 tonne/yr pelletising plant.

The submerged-arc closed furnace is a Bateman Titaco design and features Bateman Titaco electrode holders using Söderberg paste. A significant advantage of this design is that the smelting process does not generate significant amounts of toxic chromium six. With a pretreated charge the furnace can be sealed gas tight. It also reduces environmental pollution as the process gas is cleaned, rendering it suitable for use as a heating fuel.

A feature of the furnace is its freeze lining, which is expected to extend the campaign life of the furnace lining considerably. A Bateman Titaco mudgun and taphole drill unit was also supplied. The mudgun is electrically

operated and eliminates any potential fire hazards in front of the taphole. The drill is pneumatically operated.

The preheater and pelletising plant embody Outokumpu technology and supply the furnace with sintered pellets, significantly increasing chrome recovery and reducing electrical energy consumption.

The fine-ore feed to the plant is milled and filtered to remove excess water, mixed with a binder and passed into a pelletising drum to produce green pellets of between 10 and 15 mm. Under- and oversized pellets are reprocessed.

The green pellets are fed to an energy-efficient steel-belt sintering furnace and are dried, preheated, sintered and cooled to produce sintered pellets with a hard and porous structure and excellent high-temperature strength. The pretreated pellets now contain iron in a readily reducible form and the high specific surface of the finely ground chromite increases the reduction rate in the smelting furnace and avoids non-uniform reduction. The cooled pellets are stored on stockpiles, part of which is used to form a protective under-layer in the sinter machine and the balance sent to the furnace for smelting.

The hot gases from the cooling compartments are recycled to the drying, preheating and sintering compartments and greatly improve the energy efficiency of the sintering system. The decomposition of the volatile hydroxides and carbonates during sintering also reduces the demand for electrical energy during subsequent smelting in the furnace.

Stockpiled sintered pellets, with other raw materials, are conveyed and fed into a preheater above the furnace. Here the pellets are heated to a temperature of 600 °C by combusting the scrubbed gases captured in the furnace. Preheating the pellets reduces the electrical energy consumption of ferrochrome production by about 20 % compared to conventional plants. It also increases the capacity of the furnace, results in a smoother arc-furnace operation and reduces electrode consumption and maintenance downtime.

A building 60 m high had to be constructed to house both the



The Assmang ferrochrome facility about 8 km south west of Machadodorp, Mpumalanga, RSA. The 60 m-high building housing the new smelter may be seen on the right-hand of the picture.

furnace and the preheater. Being essentially a brown-fields project, care had to be taken not to disrupt ongoing production at the works. The contract for the project was awarded in June 2000 and completed in October 2001 with the opening ceremony for the new smelter held on 29 January 2002. The furnace took 14 months to complete and the pelletising plant a further two months.

A very similar project was completed in

1999 by Bateman Titaco and Outokumpu Engineering Contractors Oy for Heric Ferrochrome and has been followed by another, but of double the size, for SA Chrome, due for completion later this year.

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*The Assmang sinter plant.*



*The roof of the furnace with the Bateman Titaco electrode system and the feed chutes.*