

# Screening and sizing

*IM* looks at some of the latest technologies and in particular sees massive demand for such equipment from the global iron ore sector

**G**range Resources and its joint venture partner Sojitz Resources and Technology have signed what they describe as "a unique Memorandum of Understanding (MOU) with Metso Minerals (Australia) for the Southdown magnetite project. Considered by the parties to be a first for the mining and minerals processing industry in Australia, this MOU allows Grange and Sojitz to access Metso's comminution, iron ore processing and pelletising design capabilities at the initial design phase of the project.

Grange notes: "Metso is a world leader in this field [comminution] and accessing their expertise in the initial design phase of the project ensures that the processing plant will incorporate the latest technology to produce a high quality iron ore product."

The project comprises a magnetite mine and concentrator at Southdown, Western Australia, a slurry pipeline from Southdown to the Port of Albany with storage and shipping facilities at the port. Concentrates will be shipped to a pellet plant to be constructed at Kemaman on the east coast of peninsular Malaysia. On progression of the project, Metso's services will extend to the timely supply of major process plant equipment, supervision of installation and commissioning and training of operational personnel. Metso will also provide performance guarantees for the entire process route. Metso is currently undertaking test work on samples in Australia, the USA and Europe to determine the optimum processing circuit for the project.

Also in Western Australia's Pilbara, Metso will supply three cone crushers to BHP Billiton Iron Ore for its Newman Hub project. Delivery is

scheduled for September 2008 and the value of the order is approximately €5 million and includes three Nordberg MP800 cone crushers that are supplied with drive motors, bases and air-cooler chillers units. The chiller units are required due to the high temperatures experienced at the site. Installed power per machine is 600 kW. The order also includes commissioning assistance and spare parts.

The Newman Hub project is a new plant being built at an existing site. Primary crushed ore will be crushed by the three cone crushers in a closed circuit to produce 32 Mt/y of iron ore lump (32 mm x 6 mm) and fines (6 mm x 0 mm).

Pilbara iron ore developer Aurox Resources has reached agreement with engineering and manufacturing partners for the construction of its concentrate plant and associated port infrastructure. Aurox has engaged FLSmidth Minerals and Siemens to engineer, manufacture and supervise installation of all major components required to commission its 6 Mt/y Balla Balla magnetite processing plant and related port infrastructure.

Aurox Managing Director Charles Schaus said the lump sum contracts "mitigate the risk of cost blow-outs in the development of the project, and provides further security as we move into the construction phase." FLSmidth and Siemens have worked together on numerous projects including the new crushing circuit recently installed at the Cloud Break operation owned by FMG.

"The Balla Balla processing plant will be constructed to handle additional capacity, reflecting the company's strategy medium term to ramp up production from our initial 6 Mt target,"

*Vale Carajas mine product stockyard*

Schaus said. The plant will incorporate a gyratory crusher and a SAG mill capable of 10 Mt/y throughput in anticipation of the expansion from 6 Mt to 10 Mt/y in 2014. A second ball mill will be installed as part of the proposed expansion.

FLSmidth will supply the complete plant on a firm price basis beginning at the Primary Crusher Station at Balla Balla through to the slurry pipeline flange on site and from the pipeline output at Port Hedland to dewatering and transfer of the concentrate onto the ship loading conveyor. FLSmidth is proceeding with all steps necessary to complete the scope of the proposal, which includes:

- ◆ Detailed engineering - specifications to be agreed and approved by Aurox
- ◆ Equipment supply - crusher, mills, chutework, ducting, process piping, utility piping, etc.
- ◆ Structural steelwork - buildings, transfer houses, galleries, trestles, platforms, stairways, etc.
- ◆ Process automation and instruments
- ◆ Process guarantees, equipment warranties and delivery guarantees

FLSmidth will provide services to coordinate construction management, equipment installation, and plant commissioning. Siemens will engineer, manufacture and install the Balla Balla electrical infrastructure as required for the processing plant, which includes gearless mill drives.

Sinclair Knight Merz (SKM) has applied its extensive iron ore experience gained in the Pilbara to Brazil, having recently completed a Value Engineering Study for the world's largest iron ore producer, Vale (formerly CVRD). The scope of the A\$500,000 study was to optimise

**Extec has been at the forefront, both introducing and customising mobile screening and crushing technology to suit the specific demands of Indian iron ore producers**



the current basic engineering design of screening and crushing facilities of a wet process iron ore beneficiation plant at Vale's Carajas Programa 130 Mt/y mine.

This is an upgrade of Vale's existing Carajas operations from 100 to 130 Mt/y. SKM was engaged to undertake the study on the proposed new secondary and tertiary/quaternary crushing and screening facilities to identify opportunities for reducing capital and operating costs. This involved simplifying the plant by reducing the number of equipment items to decrease total maintenance

effort and improve overall system availability. The study also investigated reducing procurement and construction lead times to fit into the project timeframe.

**Mobile in the iron**

New Sandvik companies Extec and Fintec have considerable experience in iron ore in India. Extec began marketing to the sector at the start of 2004. The industry then was beginning a rapid transition from outdated low capacity static crushing and screening plants to fully mobile high productivity screening and crushing equipment.

A key feature of the inherent flexibility of these operations is the nature of the machinery itself. All Extec equipment is fully hydraulic, crawler mounted, self propelled and fully self contained. Thus the machines can be used in complementary flexible combinations, or as stand-alone units, depending on the specific requirement.

Extec in India has been at the forefront, both introducing and customising mobile screening and crushing technology to suit the specific demands of Indian iron ore producers.

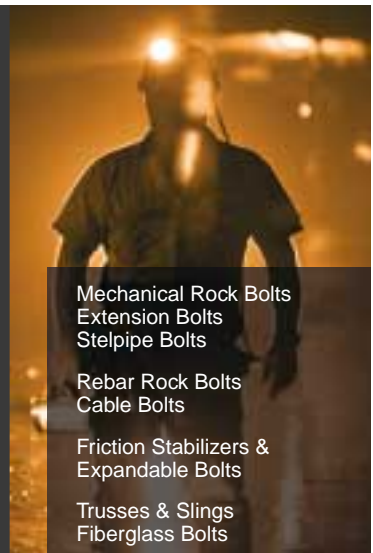
- Amongst the 'firsts' the company claims are:
- ◆ The use of tracked impact crushers in both a primary and secondary crushing application
  - ◆ Configuration of screening and crushing systems in order to produce virtually 100% fines from ROM through a very high reduction ratio closed circuit
  - ◆ Single stage on track closed circuit systems for virtual 100% conversion to fines and calibrated ore from ROM
  - ◆ Two and three stage on track closed circuit mobile plants with jaw-cone-impactor-screen. The system has flexibility to adapt to changes in product profile via a wide range of possible set-ups.
  - ◆ Extec's Double-Screen systems for efficient screening of a diverse range of material characteristics. The configuration and design of the Double-Screen box allows five possible

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TelSmith's new SBX Cone Crusher

product fractions to be produced through its unique, segmented high frequency screen box.

Fintec recently supplied a crushing and screening train to Indian iron ore producer M/s Kalinga Commercial Corp (KCC). Comprising a Fintec 1107 track-mounted jaw crusher, a Fintec 1080 track-mounted cone crusher and a Fintec 570 screen, the equipment is at KCC's mine at Keonjhar in Orissa State. Sandvik Asia based the purchase upon KCC's positive experience with a

Fintec 570 track-mounted mobile screen at another site and with the service and after sales support provided.

A Volvo hydraulic excavator equipped with a 2.4 m<sup>3</sup> bucket feeds the Fintec 1107 jaw crusher with ROM hematite ore. Operating to a closed side setting of 90 mm, the unit processes the 0-500 mm feed material at a rate of around 250 t/h. The 0-150 mm product passes directly to the Fintec 1080 cone crusher. Powered by a fuel efficient Cat C-13 diesel engine, the compact 1080 incorporates a proven, hydraulically driven H3800 cone crusher and an automatic feeder that maintains a choke feed to deliver a predominantly 0-40 mm crusher output.

Metso's original, proven Lokotrack range has now been complemented with a new jaw plant – the Lokotrack LT106. It is built around the completely new Nordberg C106 jaw crusher, which provides up to 10% more crushing efficiency, thanks to its innovative cavity design, longer stroke and optimised rpm used.

The crusher has a feed opening of 1,060 x 700 mm; providing a maximum feed size of 600 mm. The LT106 is powered by the efficient, 224 kW environmentally friendly CAT C9 diesel motor, meeting Tier 3 emission requirements. Moreover, the market leading, user-friendly IC500 process automation system features complete automatic crushing process controls, single-button process start-up and advanced fault diagnostics.

## Gyratories

Sandvik last year launched a complete range of primary gyratory crusher models. Although Sandvik has long in-house experience in the design and manufacture of primary gyratory crushers, the new models are a result of a co-operation with Earthtechnica of Japan, a joint venture of Kawasaki Heavy Industries and Kobe Steel. Sandvik says "the crushers bring a unique combination of leading mechanical designs and control systems to the market. The fundamental designs are well proven in operations globally, with numerous installations made throughout Africa, Asia and Australia in the last decade. All five crusher sizes will also include the Automatic Setting Regulation, ASRiT. This unique Sandvik feature has previously been fitted to more than 20 primary gyratory crushers over the years."

Sandvik says its strategy is to combine two proven and efficient technologies to boost customer productivity. With this offering it also leverages its presence at mine sites and its global logistics capabilities to



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give customers outstanding support also in primary crushing. Christian Ottergren, Vice President of Mining Crushing and Screening for Sandvik, elaborates: "Over the last years our primary focus in mining has been on cone crushers for secondary and tertiary crushing. Although we haven't actively pursued this type of product in recent years, we have always supported the market with spare parts and wear components. It is a logical step to expand our leading position into primary gyratory crushers combining proven mechanical designs with modern technology and automation."

## Cones and jaws

FLSmidth Excel is launching, at CONEXPO-CON/AGG 2008, its new XL900 Raptor™ cone crusher. This is an addition to its line of Raptor cone crushers and features high-performing, cost-effective solutions for medium- to high-tonnage mining operations. Technical advances include a higher pivot point and larger crushing stroke

The dynamics of the XL900 allow more crushing action to take place from the first nip at the feed opening and continue through until the material exits the parallel zone. The innovative design is ideal for operations needing a large cone crusher as a secondary unit with a maximum throughput approaching 1,270 t/h. The XL900 handles feed sizes up to

313 mm up to a 4 to 6 reduction ratio, and has the most active feed opening, thereby providing better product shape and higher yields of saleable product.

It uses a 670 kW motor, but is designed to operate and be mechanically sound at a wide range of eccentric speeds. Eccentric speed can be selected to maximise throughput, size reduction, product shape or product yield. The 1.8-m crushing head uses the same eccentric motion as the other Raptor cones. It is designed with a rigid four-arm lower frame and an integral countershaft mounted inside one of the four arms. This provides a stronger frame design and avoids pitfalls associated with an external countershaft box.

The XL900 can replace cone crushers with a 1.5-m head diameter or larger without major modifications to foundations or feed arrangements. This facilitates increases in product capacity without major plant renovations.

The XL900 joins a growing family of Raptor cone crusher models, including the XL300, XL400, XL600 and XL1100 – the largest cone crusher available on the market today.

Telsmith's new SBX Cone Crusher, the company says, represents an evolution in design from the popular SBS cone crushers. The SBX is engineered with new internal components and crushing chamber profiles that accept larger

feed. With an extra-coarse feed opening, the SBX is ideal for secondary crushing circuits that once required larger crushers.

Its advanced features and benefits include a Dynamic Adjust system that enables remote adjustment under load; a maintenance-free hydraulic Anti-spin system that extends manganese life, a large-stroke chamber clearing system that delivers safe and quick recovery from a shutdown, and heavy-duty components for crushing. The SBX Cone Crusher Series is available in three models -- the 44SBX (224 kW); 52SBX (298 kW); and the 57SBX (373 kW).

## Custom screening

Tabor Machine has developed many different techniques for handling different industries.

"Before we start the sizing process," explains John R. Casey II, Applications Engineer, "we look at many of the characteristics of the material being screened and how the customer wishes to handle this process. There are many different variables that can be added to either, increase efficiency or to increase wear life of the screen and the screen components. As with the ore industry, the abrasive nature of this material warrants the added expense of extra wear protection to ensure a long lasting screen. The attention to the small details allows the end user comfort in knowing that their investment is going to last and perform as efficiently."

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"Tabor has also looked forward with new innovative designs. One is the Tabor Multi-Slope (TMS) screen, which was the first five slope screen in the industry. With the TMS screen we are able to not only increase the capacity over a conventional screen, but we can also keep the efficiency at a high percentage. This allows customers to retrofit their older conventional screens, such as the horizontal or incline screen, to the higher capacity TMS screens. The TMS screen is capable of a screening range from the large size openings through 0.5 mm openings, depending on the application. We now have the TMS screen operating in coal, ore, and aggregate applications around the world."

The Haver screening group demonstrated its expertise in 2007. More than 400 Niagara and Tycan vibrating screens were delivered, produced in Germany, Canada and Brazil. They included four-bearing screens, two-bearing screens with circular motion, linear vibrating screens, fine screening machines and reject screens.

A large number are customised machines designed and built to fulfil specific customer requirements and applications. Two-bearing screens with circular motion were the most popular. Every third machine that left the Haver production halls last year was a circular vibrating two-bearing screen. Every sixth

machine was a linear vibrating screen.

Haver Mineral Processing Technology's product range has been extended with multiple deck screening machines in a co-operation with Dr. Ernst-Heinrich Dressler. In the late 1970s Dreßler conceptualised and designed a multiple deck screening machine that is ideal for classifying various dry materials into fine and very fine particle ranges. Since then more than more than 100 machines have gone into operation in a wide range of applications to the full satisfaction of its customers.

The multiple deck screening machines, known as NIAGARA® M-Class in the Haver product line, are the ideal extension of the existing five screening systems offered by the company. In spite of their minimal space requirements, the multiple deck screening machines, depending on design, offer very large screening surface areas. **IM**

*First new screen from Tabor's new factory being completed last year.*



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