



Maximum value minerals processing

MechChem Africa talks to Cedric Walstra, Glencore Technology's Africa business development manager, who paints a broad picture of the high-recovery, high-efficiency processing equipment on offer from the technology side of Glencore's business.

"I joined Xstrata Technology about ten years ago, while Glencore was a shareholder, but Glencore took us over about four years ago and the name was changed to Glencore Technology," begins Walstra, adding that Glencore Technology develops, markets and supports niche technologies for the global mining and minerals processing and metals' extraction industries, "and not only for the mines owned by the Glencore Group."

"Glencore Technology is a standalone company that partners with several technology suppliers to develop cutting edge equipment. My involvement has been mostly with IsaMill™ fine grinding technology and Jameson flotation cells, but I am currently responsible for promoting the whole range to mining companies in southern African," he tells *MechChem Africa*.

IsaMill™ grinding technology

Based on technology developed from the Netzsch mill and adding a patented product separator, different media and lining materials, Glencore Technology's IsaMill™ is a highly energy efficient, high intensity, large-scale grinding machine.

Glencore's IsaMill reduces the energy

cost of grinding circuits. Intense grinding is achieved using inert ceramic grinding media that leads to improved metallurgical performance compared with conventional steel media.

"Anglo Platinum has some 26 IsaMills currently in operation. These are horizontal fine grinding mills with cantilevered shaft and eight grinding discs. Each mill is filled to 70 to 80% of capacity with ceramic grinding beads. As the shaft rotates, the discs and beads cause attrition grinding," Walstra explains.

"Kidney shaped holes in the discs allow the progressively milled material to pass down the mill, with most milling taking place in the feed end. A patented rotating product separator on the discharge end is used to pump coarse material back to the feed end and a feed pump pushes slurry forward under 150 to 180 kPa of pressure," he adds.

Without having to use screens or cyclones for external classification, the system allows only fine ground material down to 5.0 to 10 µm to discharge. "Our systems are typically used for tertiary (or quaternary) grinding and flotation concentrate regrinding with typical input feed sizes of up to 300 µm, also known as mainstream inert grinding (MIG) and ultrafine grinding (UFG), respectively," he says.



"The IsaMill is the most energy efficient, highest intensity large scale grinding machine on the market. It has a small footprint, and installation and maintenance access are simple," Walstra notes.

Albion process technology

Associated with IsaMills, Glencore's Albion Process™ is a combination of ultrafine grinding and oxidative leaching at atmospheric pressure. Feed materials to the Albion Process are, generally, base or precious metal concentrates. The sulphides in the feed are oxidised and liberated, allowing the wanted metals to be recovered by conventional means.

"The process uses our HyperSparg™ technology where we introduce the gas required for the leaching process at supersonic speed. This creates very fine bubbles in the slurry, improving energy transfer efficiencies and increasing leaching speeds," says Walstra. "Via gas injection, we achieve fine control of the chemistries of leached concentrates, extracting exactly what is required and leaving the rest for later processing," he adds.

There are four Albion Process plants currently in operation. Two plants treat zinc sulphide concentrates in Spain and Germany, a plant in the Dominican Republic is treating a refractory gold/silver concentrate, while the fourth plant is treating refractory gold in Armenia.

Jameson flotation cells

Based on an invention by Graham Jameson, the Jameson flotation cell replaces a train of traditional mechanical cells with slurry of decreasing concentration gravitating

from one to the other. "But we tend not to compete head-to-head with mechanical flotation cells because there are some niche applications for our Jameson floatation cells," says Walstra.

"The first is for scalping duty. A Jameson cell at the head of a train of mechanical cells can be used to pull off high-grade material that is at final grade concentration. This takes the load off the rest of the flotation bank, allowing for finer tuning and higher overall efficiencies to be achieved," Walstra explains.

The other application is the cleaning of the final concentrate. "What we are finding is that we can replace existing cleaning circuits with two Jameson cells and a single row of mechanical cells. This gives a significantly smaller footprint and lower power consumption, while still achieving the best possible concentrate grades," he assures.

The Jameson flotation cell introduces slurry via an orifice or slurry lens, which creates a jet that sucks in atmospheric air. Consistently fine bubbles are generated and mixed into the medium without requiring mechanical agitators or spargers. "Intense mixing of the slurry and bubbles causes the particles of interest to attach to individual bubbles and froth to the surface for immediate removal as concentrate."

"The system offers the highest possible throughput in a very small footprint, with froth washing maximising the concentrate grade in a single flotation stage. The system is easy to control, fast to respond and offers steady and reliable performance irrespective of changes in feed flow," Walstra tells *MechChem*, adding that there are also no



Above: A Jameson flotation cell in operation at Lumwana in Zambia. The system offers the highest possible throughput in a very small footprint, with froth washing maximising the concentrate grade in a single flotation stage. **Left:** IsaKidd Technology, shown here in use at the Kamoto Copper Company (KCC) in the DRC, is the global benchmark in copper electrowinning accounting for over 11 mtpa of copper production from over 100 licensees.

moving parts, keeping installation and maintenance costs to a minimum and equipment availability very high.

"Cell designs are flexible, making them ideal for new projects and excellent for low cost plant expansions. Over 300 Jameson Cells have been installed, treating a range of materials including coal, base and precious metals, potash, bitumen, graphite, and for recovering organics in solvent extraction processes," he adds.

IsaKidd technology

"IsaKidd Technology is the benchmark in copper electrowinning technology, providing world-class plants following the integration of the ISA and KIDD Processes in 2006," Walstra says.

The combined technologies account for over 11 mtpa of copper production from over 100 licensees worldwide, including Glencore's own operations. "We provide clients with a comprehensive range of technology, process support and equipment including: Isa 2000 cathodes, BR and HP cathodes, duplex (LDX) cathodes, electro-handling equipment, robotic stripping machines and tankhouse cranes.

"We partnered with a Japanese company called Mesco for the supply of cathode stripping machines: These remove electroplated materials from the cathodes. The plates are left in the electrolytic cells for a predetermined time and then taken out and flexed to detach the deposit – hence the advantage of using thinner and stronger LDX stainless steel materials. Once washed, the plates can be reused in the electrowinning cell – and the

whole process can be automated," he informs *MechChem Africa*.

IsaSmelt technology

Another of Glencore Technology's innovations is IsaSmelt™, which is a high-intensity, low-cost submerged lance smelting process that is simple to operate and can be used for a range of applications including copper and lead smelting.

One of the key strengths of the technology is the growing IsaSmelt family itself. Glencore Technology produces the BBOC™ – Bottom Blown Oxygen Cupel – a technology that injects oxygen directly into the reaction zone of the cupel, improving process performance and oxygen utilisation. The technology is well suited to most refining duties where base metals are selectively oxidised and eliminated from precious metal products, such as slimes bullions, PGM-bearing feeds, high purity silver refining and retorted Parkes crusts. BBOC™ technology is now installed in over a dozen sites worldwide.

"Glencore Technology solutions are available to any mining site that sees the benefit and, while we do service Glencore Group mining operations, we are an independently run company that services the whole mining industry," Walstra assures.

"Many of these technologies were developed at Mount Isa, an operating mine in Australia, which makes them highly practical and effective. So a key strength is that our people have all worked with the technologies on mining sites. They are 'hands-on' guys with a broad knowledge of mining with Glencore Technologies," Walstra concludes. □



Glencore Technology's highly energy efficient IsaMills™ are now meeting the grinding requirements at Anglo Platinum's Waterval Retrofit plant.