**From mining to tailings management: Weir Minerals’ Integrated Solutions**

MechChem Africa talks to JD Singleton, process director for Weir Minerals Africa, about the company’s five core Integrated Solutions offerings for: pit and underground mine dewatering; crushing and screening plants; mill circuits; mineral beneficitation plants; and tailings management.

The Weir Group PLC has been advancing the efficiency of pumps, valves, hydrocyclones, mill lining, crushers, screens and a host of integrated equipment for nearly 150 years. “And our curiosity and determination to find efficient solutions remain as strong as ever!” says JD Singleton of Weir Minerals Africa.

“Increasingly, we provide customers with total solutions that optimise their entire process, removing any bottlenecks and holistically maximising wear life and recovery efficiencies, while minimising downtime and ownership costs,” he says.

From a miners’ perspective, Singleton says the company’s Integrated Solutions offering can be categorised into five key areas: pit and underground mine dewatering; crushing and screening; the mill circuit; mineral beneficitation plants; and the management of tailings. “This general categorisation matches what we experience on customers’ mines, where there are separate plant engineers and section managers, a single manager for the mine, its crushing plant and underground projects, we find that engineered solutions remain as strong as ever!”

**Pit and underground mine dewatering**

Singleton says, is usually an essential first step before mining can begin. “While Weir Minerals has a whole spectrum of dewatering pumps, from clear water to high solids and slurry application across open-pit and underground projects, we find that engineered dewatering systems that include pumps, pipes, valves, controls and access platform or walkway solutions are always more effective than simply installing pumps.”

“Design solutions using our Multiflo® for Warman® DWU pumps, which assist with high lift and high-volume dewatering. All solutions are application specific and designed to deal with multiple requirements: high volumes, heads, densities and accessibility. We may need walkways to get onto a pontoon in a pit, for example, and we are currently dealing with a client on an open cast coal mine that needs to anchor its pontoons against the sidewalks with suspended cables to ensure the system remains secure in line with the fluctuating water levels.”

“We manufacture pontoons that use Warman® DWU high lift pumps that can deal with light slurries (specific gravities or SGs of up to 1.05) for example, into pressures of up to 130 m using a single stage centrifugal impeller. We also have our extensive Multiflo® MF range, for higher head, higher volume applications.”

“When pontoon access is impractical, diesel-powered Multiflo® dewatering systems with processable grinding additions can be mounted onto trailers and situated alongside the pit – and all of these solutions incorporate Isogate® valves and Linatex® hoses, combining best-in-class components to meet the applications’ exact requirements and wear characteristics,” he tells MechChem Africa.

**Crushing and screening**

Crushing and screening is the first processing stage for mineral ores once they have been extracted from the pit or with the surface. “Our integrated crushing and screening solutions are centred around our Trio® and Enduron® brands, which can accommodate ore volumes from 40 to 1 500 tons per hour. Solutions typically include the primary and secondary crushers, the interlinking feeders, the screens and all the conveyors required to move the materials to and from each crushing stage,” Singleton says.

“We have just won an order from an iron ore mine for the supply of primary feeders and crushers, and secondary crushers – including an Enduron® high pressure grinding roll crusher (HPGR) with HPGR product screens, which offers best-in-class wear life.”

“Every sub-system used in this solution is from Weir Minerals and comes with our own process guarantees, so the client is dealing with us as a single product supplier for everything needed to deliver suitably sized ore to the downstream processing circuit,” he adds.

“As well as being the OEM for all the crushing and screening plant equipment, Weir Minerals process engineers such solutions. “We included a washing section to remove clay material from the ore prior to sending it to our own HPGR. This involved using our Warman slurry pumps and Enduron dewatering screens and highlights our ability to bring together our wet and dry circuit expertise to offer highly optimised plant solutions,” Singleton says.

**Holistic mill circuit systems**

The third category of Integrated Solutions is holistic mill circuit systems. “Before a mineral can be refined into its pure form, it has to be finely milled so the valuable mineral can be liberated from its ore. This has long been our bread and butter expertise,” he continues.

“We have been manufacturing mill circuit pumps, mill liners, hydrocyclones, hoses, valves and rubber liners for as long as we can remember and we are very good at it. We understand classification and value circuits, wear aspects of hydrocyclones and feed pumps, the wear inside the mill and the various mineral factors and the sump geometry. We have just won an order for a copper mill that in February 2019, ran into trouble with the lining material in the mill circuit while a single manager is often responsible for the beneficiation and tailings plants or the back end of the circuit.”

**Tailings management**

Weir Minerals’ tailings handling solutions have traditionally used various stages of Warman® AHW and AHP high pressure centrifugal pumps. From a systems perspective, however, the pipework must also be sized and lined correctly to suit the abrasive properties and density of the tailings slurry, and the number of pipe bends on the way to the deposition area, as well as between the different pump stations, must be minimised.

“Following the successful delivery of a comprehensive solution to the discharge the highly abrasive finely ground tailings to the downstream processing circuit, “ he adds.

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**Understanding the mineralogy of the slurry and its effect on the lining material is critical in this regard,” he adds.**

This also applies to Weir Minerals’ Cavex® hydrocyclones. “Our entire range of Cavex hydrocyclones has laminar spiral inlets that minimise turbulence and result in increased efficiency and component life. Instead of using chrome carbide or ceramic liners, we can use replaceable rubber inserts over a mild steel casing, which not only improves the wear life in high silica content material, but customers are able to easily swap out the inserts onsite, minimising maintenance downtime,” he says.

For the Caveo mill thesing equipment, Singleton cites a success on a copper mill that included using one of the company’s proprietary Linatex® rubber liners to replace the commonly used steel slotted discharge chute. “This doubled the chute life, again avoiding having to add a shutdown to replace them. In addition, careful selection of the correct grade of Linatex rubber lining for the trommel screen on the outlet side has improved the overall wear life balance of the whole plant,” he tells MechChem Africa.

Once ore is milled, processing can begin to liberate high-value minerals. “We have a lot of expertise in froth pumping, understanding the froth volume factors, froth generating factors and the sump geometry. We have found that to optimise the flow through the system and maximise froth pumping efficiency, we fine-tune the discharge of the feed to the pump’s wear components and extend the life of the pump. To reduce turbulence, the resident time in the sump is also important. CFD analysis on the outlet side has improved the overall performance of the system.”

Singleton says.

“Understanding froth pumping technology offers significant filtration efficiency and throughput gains.”

For dewatering, a boost driven Warman DWU pump set on a trailer-mounted Multiflow® can be used where access is impractical.