

Weir Minerals: a world-class local manufacturer



Weir Minerals Africa's Hloni Ledwaba (right) and Danillo van Eck.

“We at Weir Minerals start every meeting with our number one priority, safety, and we are very proud of that,” begins operations director, Hloni Ledwaba. “Our safety performance has seen significant improvements through the years and last year we had only one lost time injury (LTI): a contractor working at a logistics contractor warehouse – we had no LTIs at our sites last year,” he adds.

“We are sitting at a medical treatment injury frequency rate (MTIFR) of 0.12 and this arises from the one LTI and one other recordable injury, which each contributed 0.06 to give us this excellent MTIFR total,” he explains.

Weir Minerals Africa has three manufacturing sites in South Africa: Alrode, Isando and its relatively newly acquired Heavy Bay Foundry (HBF) in Port Elizabeth.

The Alrode site, which is also Weir Minerals Africa's regional distribution centre, performs pump and screen assembly; houses the Linatex rubber facility; manufactures rubber pump and mill linings and mouldings using

MechChem Africa visits the Isando manufacturing facilities of Weir Minerals Africa and talks to Hloni Ledwaba, operations director, and Danillo van Eck, general manager for operations, about the transformational approaches being adopted to align local operations with world-class operational efficiency standards.

its vulcanising presses; and manufactures made-to-order hose sections and bends. “No safety incidents were recorded at Alrode, this in spite of having recorded its best-ever production output,” Ledwaba reveals.

He says that Weir Minerals grew ahead of a shrinking market during 2018-2019. “We have been particular aggressive with respect to our installed equipment base, expanding into integrated solutions where we already have a foothold. We are no longer simply product focused. Instead, we offer long-term customised debottlenecking services to help customers improve their overall efficiency and performance,” he tells MechChem Africa.

This market success, however, puts increasing pressure on manufacturing performance. “We operate a pull system throughout the operation, so when order input increases, all of our manufacturing sites have to step-up to make sure they execute those orders,” he says.

“After safety, our key statistic on-time delivery performance, which is currently sitting at 93%, while our stock availability is at around 94%. We run an ABC Classification system to identify stocking levels for the equipment and components we manufacture. A-classified products are our top runners and, from a manufacturing perspective, we make sure these are in stock at every branch, with

low stocking levels directly driving our manufacturing response,” says Van Eck.

“For several years now, we have been upgrading our manufacturing facilities to manufacture on-demand, with falling stock levels driving day-to-day manufacturing decisions,” he explains.

“This is not restricted to our region, either. As well as South Africa, we are directly responsible for Weir Minerals' portfolio in the Middle East and Africa (ME&A), with an approximate 50/50 split between South Africa and the rest of the region. Increasingly, though, we are also exporting product manufacturing in our South African factories to Weir Minerals facilities outside of the ME&A region; into Canada, Brazil, Australia and North America, for example. This global business has doubled and we have some steep improvement targets in place to ensure the export trend continues,” continues Ledwaba.

“We have won the confidence of our fellow Weir Minerals' facilities around the world in terms of quality and costs, which completely dispels the low-quality myth of African manufacturing,” he says.

Weir Minerals' South African manufacturing facilities are all required to deliver world-class quality. In addition, each facility has been re-organised and re-equipped to cater for lean manufacturing principles so that they can compete with facilities across the globe with respect to quality, overall operational efficiency and costs.

“Production needs to respond to the heartbeat of our customers. Manufacturing and assembly rates need to perfectly match customers' demand and delivery expectations. These need to be perfectly balanced,” adds Van Eck.

Weir Minerals is therefore using new Industry 4.0 levelling tools to best plan production schedules. “Digital data on every order and its delivery date is displayed live on open screens to inform everyone on the manufacturing floor exactly what is required from them and how this affects everybody else.

“As manufacturing progresses, a green, orange and red coding system is used to track progress and alert everyone from the MD down to emerging problems,” Van Eck informs MechChem Africa.

Digital boards in working areas display this information and highlight the standards re-



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quired and current performance expectations of each employee involved in production. The outputs required per workstation are made available so that everyone knows, immediately, what is expected of them, what is being delivered and, where problems arise, quick decisions can be made to overcome them.

“This is part and parcel of our company culture and an integral part of our global Weir production system,” Ledwaba says.

Foundry innovations

The production of products such as Weir Minerals' Warman® pumps starts in its foundries, where the quality of castings such as volutes and impellers are essential in achieving efficient pumping performance.

“We have three foundry lines in Isando and three at Weir Minerals' Port Elizabeth (PE) Heavy Bay Foundry. Anything bigger than 1.0 t gets cast in PE, while everything smaller is handled in Isando. But for single-line accountability purposes, Danillo looks after both the PE and the Isando facilities, supported through best-practice sharing by our other Weir foundries across the world,” says Ledwaba.

“We have been systematically digitising both of these facilities. Isando is mostly complete, while PE is still a work in progress,” says Van Eck.

Weir Minerals' Isando manufacturing facility consists of three value streams: foundry processes, machining processes and rubber moulding. “Isando has only one customer, the Alrode assembly plant, while our Heavy Bay Foundry makes use of Isando's machine shop or third party shops, so it has two customers,

Alrode and Isando,” he continues.

Some sizeable investments have been made to secure the company's growth targets and these are continuing as all manufacturing operations are upgraded to match global benchmarks.

“Our carousel investment in the Isando foundry is of most significance. This is where we make sand moulds, mostly for parts of up to 150 kg. The carousel line at Isando changes mould making into a production-line process. We use it for preparing single or multi-cavity moulds to meet high-volume and high-variability needs. The line is set up for quick changeovers and to give the flexibility to produce volume while meeting short delivery times,” says Ledwaba.

The line enables about 200 parts per day to be cast from up to 18 t/day of molten metal.

“We have also implemented tighter control of the process. The moisture content and temperature of the sand we use to make these moulds, for example, is particularly sensitive to ambient conditions. We now take ambient conditions into account so that variability is taken out of the sand we use, so that when the molten steel is poured, the mould experiences identical characteristics every time,” Ledwaba notes.

For heavier parts in the size range of between 150 to 350 kg, which also present high variability and rapid changeover challenges, the Isando foundry has a fast-loop line, which is a similar concept to the carousel with less automation. “It is still Industry 4.0 ready so it gives good repeatability from a part quality point of view,” he assures.

The third section of the Isando foundry is a

floor moulding area, where large moulds have to be put together on the floor for pouring from ladles transported by overhead cranes. “This section is for components of between 350 kg and 1.0 t,” says Ledwaba.

All castings larger than 1.0 t are manufactured in Port Elizabeth at the company's heavy bay facility, which can accommodate individual castings of up to 17 t. “We have three floor moulding lines in PE and we are now investing in a fourth to meet the needs of our export market,” adds Van Eck.

While the new heavy bay will not be fully automated, Weir Minerals is incorporating some of its fast loop experience. “This is mostly to accommodate and overcome cooling-time constraints and we hope that after implementing this R30-million investment, we will have one of the best floor moulding facilities for heavy castings in the Weir Group,” he says.

Other notable investments being implemented to further improve manufacturing efficiency include:

- Small 1 500 kg furnaces for the Isando facility for increased flexibility to make wear and wet-end components from exotic materials such as duplex stainless steel.
- A new horizontal boring and milling machine for Isando. With a 1.6x1.8 m table, this multi-purpose machining centre comes complete with all of the Industry 4.0 communications capability, in-situ process measurement and initial probing. “The raw castings are put in and finished machined components come out, complete with their own measurement certificates,” Van Eck reveals.
- Two New Mazak Integrex 5 axis machines, which enable reduced setup and run times. The machines can drill angled holes, turn and mill simultaneously, enabling all operations to be performed on a single machine. The machines are equipped with a pallet changer, allowing for quick changeover. “The horizontal boring machine is another example of a forward looking investment to align production with the pull through demands from generated orders. It will be used mostly for our pump frames and bases. “The two bearing landings need to perfectly aligned so these housings must be made very accurately to guarantee that alignment. The Mazak Integrex machines raise our machining capacity to better match increased capacity from the carousel, better balancing the production stream and enabling us to better meet our targets. “That is why we can justify the investment, because we are certain that it will enable us to exceed our customer expectation on quality and on-time delivery, ultimately improving our offering to customers,” Ledwaba concludes. □



The carousel line at Isando uses a production-line process to prepare single or multi-cavity moulds to meet high-volume and high-variability needs.