

Mixtec: SA's agitation and suspension expert

MechChem Africa visits Mixtec SA at its Meadowdale premises and talks to the company's sales and projects manager, Rudi Swanepoel, about the global success of the company's innovative EDICT agitation systems.

Mixtec founders, Timothy Clamp and William Baguley, have been in the agitator business for several decades, initially with UK-based Kestner Industries, the original home of Mixertech-UK, which is now a wholly owned subsidiary of the South African entity. "Mixtec SA became a standalone OEM for mixers and agitators back in 1984 and we have since grown into a global organisation with six fabrication facilities around the world: in South Africa, the UK, the US, Australia, Malaysia and Chile. In addition, we have four specialised agents: in France, New Zealand, Mauritius and Kazakhstan," Swanepoel tells MechChem Africa.

"Every Mixtec office has its own research and development department as well as design, engineering and commissioning personnel who are trained to apply modern fluid mixing technologies such as computational fluid dynamics (CFD) to any application and installation. We can also quickly tap into a wealth of design experience and expertise,

expanding our overall knowledge base and enabling us to confidently satisfy our customer's needs, no matter where they are located," he continues.

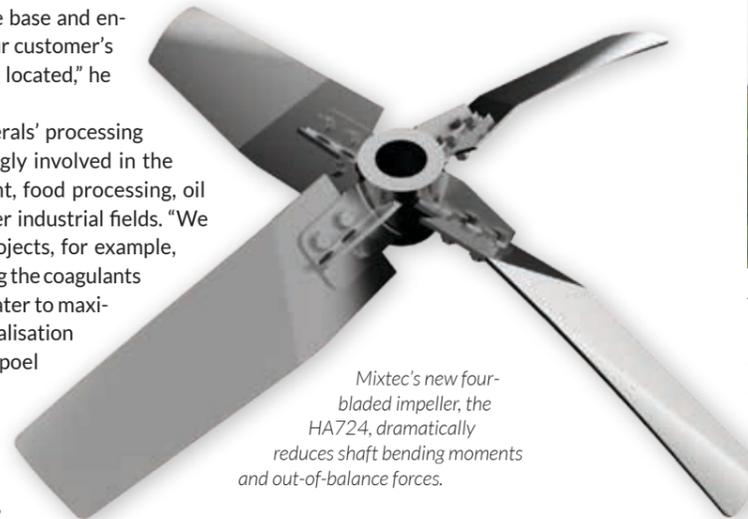
Predominantly servicing minerals' processing applications, Mixtec is increasingly involved in the water and wastewater treatment, food processing, oil and gas, pulp and paper and other industrial fields. "We have now done several AMD projects, for example, developing the mixers for agitating the coagulants and reactants in mine affected water to maximise contact and optimise neutralisation and binding efficiencies," Swanepoel explains.

At the heart of the company's success are its innovative impeller and blade technologies, all of which are designed in-house, in their R&D departments. "Our designs are subjected to CFD analysis and laboratory testing to ensure that specific requirements have been met. But nothing we manufacture is standard," Swanepoel notes. "Each solution is highly optimised to best suit the agitation or suspension requirement. We have developed some unique designs, that offer much better energy and mixing efficiencies than standard options on the market," he says.

Describing Mixtec's EDICT innovation, he says that most top entry mixers in the mining industry use a dual down pumping system, which has two impellers on the same shaft that both pump down into the bottom of the tank. "These mixers pump material towards the tank floor, which forces the flow outwards towards the sides of the tank and then up the side walls.

"From extensive CFD analysis, however, we have found that the dual down system results in flow velocity loss above the upper impeller, which causes faster

resettling and less efficient mixing in the top section of the tank. In minerals processing applications, the key requirement is to keep solids in even suspension across the whole tank volume to maximise contact between the liquid and solid phases," he explains.



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"Our latest EDICT system consists of a high-efficiency down pumping impeller together with an upper impeller that pumps up. This adds velocity to the solids initially suspended by the lower impeller by drawing them into the low-pressure area between the impellers and boosting their upward motion into to the upper portion of the tank. The solids then travel across the slurry surface to the overflow or back down toward the flow generated by the lower impeller to repeat the cycle," he tells MechChem Africa.

Because of the better distribution of suspended solids, the EDICT system requires less power to produce the necessary flow rates, even when the impeller is required to be in very close proximity to the tank bottom. "Less power means smaller motors and gearboxes can be installed, which not only cost less, but they are also more energy efficient. In addition, the shaft, bearings, couplings and mechanical components are under less stress, so these systems tend to be more reliable and robust," Swanepoel informs MechChem Africa.

Further supporting Mixtec's agitation optimisation efforts are its latest generation



An HA736 shaft manufactured in Mixtec's Meadowdale facilities in Gauteng.

high-efficiency hydrofoils. "These impellers reduce operating costs and result in smaller more cost effective drives for solids in suspension applications.

"We have also introduced a four-bladed impeller, the HA724, which dramatically reduces shaft bending moments and out-of-balance forces. When used with the EDICT system, this impeller reduces the pumping capacity needed to achieve the same duty – typically to 85% of that previously required – resulting in further power savings.

"Most importantly, though, because of the opposing flows, there is greater interaction between solids and reagent gases, which improves mineral recovery rates, directly increasing profits," he adds.

The original Mixtec EDICT system was developed back in 2005 in Mixtec's R&D facility in South Africa. "To date, it has been successfully installed in hundreds of mining applications worldwide and it remains a superior choice for agitation within the minerals processing field," Swanepoel says.

Typical applications include general solids suspension processes where homogeneity of solids, reagents and water is critical, such as neutralisation, filter feed and anoxic/anaerobic leaching processes. Mixtec's EDICT solutions have been applied in copper, gold, platinum, and phosphate concentrators and leach plants, with the carbon in leach (CIL) process heading the list.

"For processing gold using carbon in leach (CIL) processes, for example, if the impeller tip speed is too fast, the carbon breaks down, which lowers the adsorption efficiency of the gold onto the activated carbon. This directly affects recovery efficiency," Swanepoel explains.

"We strive to understand our customers' applications in detail in order to provide the best optimised solution possible. We know about the limitation and are able to customise our designs, not only to overcome problematic issues, but also to implement solutions that optimise recovery rates," he notes.

Swanepoel suggests that retrofitting existing mixers with modern custom designs can often be immediately cost effective for mine operators, because the net recovery rates improve instantly.

"We are also experiencing success on tailings circuits in overcoming reliability problems. We were recently asked to look at a system where the mixer couplings were shearing off. Using our impeller designs, we were able to reduce the stresses and improve reliability, which resulted in a very quick payback period.

"Our heavy duty 4000 Series agitators can often have impeller diameters of 8.0 m with shafts over 21 m long – and with two in-tank couplings, we can achieve a run out tolerance of only 3.0 mm, well below the industry-accepted average of 1.0 mm/m. We welcome the challenge of manufacturing systems such as these," he says.

Swanepoel cites a phosphate project in Morocco: "We supplied this plant with pipeline slurry tank agitators that were manufactured in South Africa and exported to Morocco. These were 250 kW units that weighed 38 428 kg, were 20.5 m long with a shaft diameter of 508 mm and impeller diameters of 6.8, 7.5 and 4.0 m, respectively," he reveals.

Also included in Mixtec's range are 250 Series direct drive systems for open or closed tanks; 1000 Series gearbox-driven top entry open tank units; the 2000 Series closed tank units; the large industrial gearbox-driven 4000 Series; the 5000/5050 and 5500/5600 side entry and V-belt side entry units; and static inline mixing units.

"We have spent over 35 years continually improving the agitation systems required by industry so that it can continually improve its process efficiency, profitability and competitiveness – and the results are well proven," Swanepoel concludes. □



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Rudi Swanepoel, sales and projects manager; Jonathan Clamp, director; and Timothy Clamp, founder.