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The MINING Advocate

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Robotic stripper a ripper for CST

Cutting-edge technology has given a copper producer the chance to lift output and reduce maintenance efforts, **writes Jan Green.**

Lady Annie's two new 600kg payload robots have patented end-of-arm tooling for cathode plate handling and stripping which gives them a capacity of 150 cathode plates per hour.

After 14 months in the planning, a $2.3 million robotic cathode stripping machine has been commissioned at the CST Lady Annie mine 126km north-west of Mount Isa.

CST Mining process superintendent Wally Gohdes said it was great to see the ground-breaking technology up and running following its delivery to the mine site last August.

"Since that time, we've been working on the foundations and installations to the point where commissioning could go ahead," he said.

The technology – a joint Mesco, Xstrata Technology and CST project – is the first if its type to be applied in Australia's mining industry.

Mr Gohdes described the new system as a revolutionary advance on the site's previous handling system, in operation since 2005.

"The now obsolete manual handling machine was capable of about 22,000 tonnes per annum output," he said.

"The new robotic copper stripping system can produce in excess of 35,000 tonnes in that period.

"It uses two 600kg payload robots with patented end-of-arm tooling for cathode plate handling and stripping and has a capacity of 150 cathode plates per hour."

Factors behind the upgrade included the need for a "smarter" cathode stripping system requiring less maintenance as well as a desire for increased throughput plus improved safety and enhanced product quality.

"At this point, we'll still produce the same amount of copper annually," Mr Gohdes said.

"However, as demand increases to the stripper's capacity, we'll be able to comfortably meet it.

"It's a massive piece of equipment. Its footprint on the ground is probably 15m square, it sits on 85 cubic metres of concrete and each robot weighs six tonnes. It looks so futuristic, it's almost like having a space shuttle at our back door.

"It's exciting to be leading the way in what is indisputably cutting-edge, mining industry technology and it's equally exciting to be the showcase for the most up-to-date copper stripping process in the country."

A model tool for fine tuning flotation circuits

To optimise coal processing flotation circuits, meet challenges associated with increasing throughput and manage bottlenecks, it's essential all coal handling preparation plant (CHPP) components operate efficiently.

Unfortunately, this is not always a straightforward process because it is difficult to see the inside workings of various pieces of equipment.

However, as CSIRO research scientist Dr Peter Koh explains, computational fluid dynamics (CFD) - a sophisticated numerical modelling tool - can simulate the complex processes that occur within such plant, allowing problems to be identified and solutions developed.

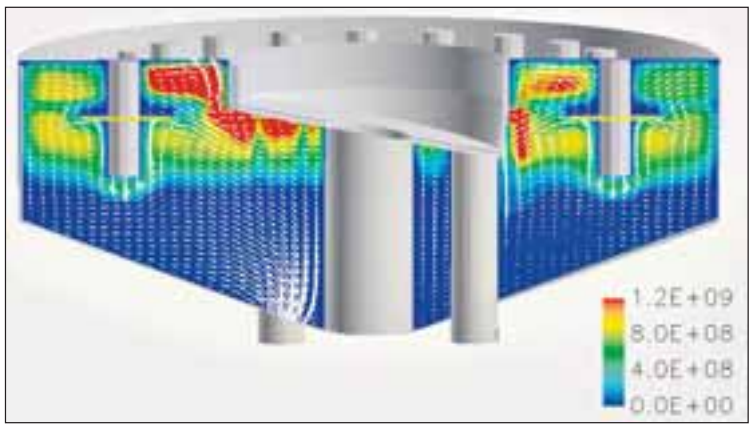
CFD modelling was used to predict the turbulence and shear levels in the Microcel and Jameson cell processes in a recent Australian Coal Association Research Program (ACARP) funded project.

A key aim of the project was to identify the means to enhance the performance of existing equipment through minor engineering modifications.

The CSIRO's CFD flotation cell modelling capability generates outputs which highlight regions where particles are being detached from bubbles by turbulent eddies in the Jameson cell.

Dr Koh said CHPP operators often sought to increase throughput by increasing pulp density.

The viscosity went up with pulp density and there was the possibility of non-Newtonian rheology and yield stress, he said.



Bubble-particle detachment rates predicted by a CFD model for a vertical slice through the Jameson cell with 20 downcomers.

Bubble-particle attachment became more difficult in a viscous pulp, although detachment rates would decrease.

"CFD is also well suited to evaluating new flotation cell designs or identifying how minor engineering modifications to existing cells can be used to enhance performance," Dr Koh said. "In a number of such cases, our CFD modelling capabilities have been applied very successfully."

Dr Koh identified equipment wear due to particle impacts caused by localised high pulp velocities as a major contribution to maintenance costs.

"Significant reductions in wear rates can be achieved if minor changes are made to the flotation cell design to eliminate excess localised pulp velocities," he said.

"Alternatively, pulp velocities can potentially also be reduced by using high pulp densities. If the flotation cell is well designed to overcome the pulp viscosity problem, then decreasing the velocity will definitely reduce the wear rate, maintenance and energy costs."