

MINERAL HANDLING AND PROCESSING:

A more efficient daily grind

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AN ORE grinding technology that was initially developed for fine grained ores has now been transferred to conventional grinding and regrinding applications, and its developers are finding there is a bigger market here than the one it was originally designed for. Alex Forrest reports

Called IsaMill, the technology was originally developed by Mount Isa Mines in the early 1990s to process the lead-zinc ore at nearby MacArthur River. The ore was required to be ground down to a fine grade to liberate the lead from the zinc and the host rock.

"There was nothing on the market at that stage to economically grind down that far," Xstrata Technology's senior intellectual property coordinator Brenton Burford told *MiningNewsPremium.net*.

"It takes a lot of energy, and when you start to pound it down to that level with iron media, you get all sorts of coatings on the mineral species itself."

Burford said a researcher named Professor Bill Johnson began talks with a German company called Netzsch-Feinmahltechnik, which specialises in the fine grinding of materials for the paint, ink, pharmaceuticals and food industries.

"The guys worked together for a number of years and developed the first IsaMill," he said. "There were a couple of smaller ones but the first one that really turned the economics around was the 3000 litre mill, which was called the M3000.

"The M3000s eventually went into MacArthur River and started up that operation. That was 1995, but the first IsaMill went in at Mount Isa in 1994. There's a deposit at Mount Isa called George Fisher, and these mills were very useful for [processing ore from] that deposit."

While the success enabled entire new orebodies like MacArthur River and George Fisher to be developed, it now seems IsaMill will make an even bigger impact on the mining industry as they are transferred from fine grinding to conventional grinding and regrinding applications.

Several operators have adopted it as the increase in grinding energy efficiency that they have been seeking, and in some operations IsaMills carry out 70% of their conventional grinding and regrinding.

While many of the recent applications have been overseas (South Africa, United States, Mexico, New Zealand, Canada, Laos, Kyrgyzstan), Australian operations have noticed the improved processing efficiency and there are upcoming installations at Oxiana's Prominent Hill, and BHP Billiton's Leinster Nickel operations.

To demonstrate how fast the technology has evolved, Mount Isa's MacArthur River will commission two IsaMills in primary grinding this year, grinding all SAG mill discharge before flotation.

Xstrata Technology general manager Joe Pease said it is fitting that the Australian site which inspired the development of technology for fine grinding should be the first to apply it in primary grinding.

"Five years ago people thought we were crazy when we said that within a decade we could see some plants built without any tumbling mills," he said.

"Yet the MacArthur installation brings us within sight of it. Several of our clients think that the combination of HPGRs [high-pressure grinding rolls] and IsaMills could be the step change in comminution grinding energy they have been looking for."

In September 2007, Xstrata announced the successful commissioning of a 3MW, 10,000-litre IsaMill M10,000 for mainstream coarse grinding duty for Anglo Platinum's operations in South Africa.

This follows the installation of the first M10,000 IsaMill for concentrate regrinding at Anglo Platinum's Western Limb Tailings Retreatment Project in 2003. The new installation is at Anglo's Potgietersrus PPL-C concentrator in Limpopo, South Africa.

Chris Rule, head of concentrator technology with Anglo Platinum, said the IsaMill offers a real alternative to ball or tower milling in secondary and tertiary applications, and enables a "step change" in metallurgical recoveries through better liberation.

"The energy efficiency, flotation improvement from inert grinding, and small installation footprint are all pluses, but the competitive capital and operating costs, in addition to the downstream recovery improvement are the primary project drivers," Rule said.

"IsaMills can be used to design simpler grinding circuits that more specifically meet the liberation needs of each ore's mineralogy," he said. "It is still early days, but so far the results are very promising."

The significance of the PPL-C installation is that it is the first IsaMill to be installed in a coarse, mainstream grinding application as a ball mill alternative.

Rule said the mill, commissioned in December 2006, had achieved its metallurgical design objectives – grinding more efficiently than a ball mill, in a much smaller plant footprint, and with significant processing benefit from the inert grinding media.

Following the success of this first application, Anglo Platinum commissioned a further four 3MW M10,000 IsaMills for mainstream coarse grinding in the last quarter of 2007, two more at Potgietersrus and two at the Waterval UG2 concentrator in Rustenberg.



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