

# Australian Mining

No. 1 FOR MINING TECHNOLOGY & EQUIPMENT



Queensland Mining & Engineering Exhibition

www.qme.reedexhibitions.com.au

22-24 July 2008  
Mackay, Queensland

REEDMINING&CONSTRUCTIONEVENTS

VOLUME 100/6 JUNE 2008

Print Post Approved P1255003/00535

## Electronic ear guides drill

CSIRO scientists with the Minerals Down Under National Research Flagship have successfully used an electronic listening post to track and control a drill operating more than 300 m below the Earth's surface.

While there is still a lot of research to be done, CSIRO's successful trial has demonstrated, for the first time in Australia, that the use of 'microseismics' technology has significant potential in delivering cost savings and efficiency improvements in the directional drilling process for exploration and mining applications.

The trial was carried out at a coal field test site in Queensland as part of a program to develop and exploit coal seam gas.

Normally in coal seam drilling for gas, a vertical production well in the subsurface is linked to another borehole that has been drilled through the main seam where the gas is generated and channelled.

The challenge is that when using current methods to try to connect a sub-horizontal borehole to the vertical production borehole, the bit often misses the target. CSIRO's solution was to use seismic monitoring to identify the location of the drill bit from the noise it generated while drilling.

Minerals Down Under Microseismic Team leader Dr Xun Luo said the drill string and bit were navigated sub-horizontally towards the target gas production well situated 1200 m from the test drilling site.



The drill string and bit were navigated sub-horizontally towards the target gas production well situated approximately 1200 m from the test drilling site. Image: CSIRO.

"We used a multiple geophone array to improve the signal to noise ratio, but even so, the seismic data was still rather noisy and contaminated by periodic electrical noise signals," he said.

"However, we applied a sophisticated filtering and cancelling algorithm with the result that we could successfully identify the drill bit location and were able to intercept the target borehole at the first attempt."

A new technology that contributes to reducing the cost and increasing the efficiency of drilling could produce major

benefits for the mining industry. Drilling is a critical component of both the exploration and mining industries. It contributes approximately 20% of exploration costs and 10% of mining costs.

For more information about the CSIRO's research into microseismics technology, call Xun Luo on 07 3327 4551 or email: Xun.Luo@csiro.au.

For more information about the Minerals Down Under National Research Flagship, contact the director Dr Peter Lilly on 08 6436 8613 or email: Peter.Lilly@csiro.au.

## Construction and mining equipment market powers on

THE Australian construction and mining equipment market grew by 1.6% in 2007, according to figures released by the Construction and Mining Equipment Industry Group (CMEIG) and ERG International. This rise follows earlier rises of 10% in 2006 and 8% in 2005. All product markets increased sales volume with the exception of dozers

which declined 12% on 2006 sales. The increase in sales reflected the strength of the Australian economy over the last three years and in particular the amount of construction work and increased demand in the mining market. With the expected slowdown in the growth of the Australian economy from 3.9% in 2007 to around 3.0%

in 2008 the growth in the construction market is expected to moderate during the year ahead. However, the mining market is expected to remain strong throughout the year. The largest volume of sales was recorded in Queensland which had 32% of market sales. NSW recorded 21% of national sales followed by WA and Victoria with 19% each. The

estimated value of the market in 2007 was \$4.2 billion. Hydraulic excavators experienced an increase in sales volume of 20% due to strong sales in the less than 8 tonne capacity market. Overall, sales for the construction and mining equipment markets are forecast to remain at current levels over the next two years.



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# IsaMill ramps up production

Xstrata Technology is on track to have 100 MW of installed IsaMill power operating by the end of 2008, with two more orders for M10,000 IsaMills bound for the lead/zinc operation at Goldcorp's Penasquito project in Mexico.

IsaMill technology is now in its 13th year since the first full scale development went into operation at Xstrata's lead zinc concentrator in Mount Isa in 1995.

It was the first of 14 x M3000 IsaMills to be installed in Xstrata's Mt Isa and McArthur River Mine (MRM) operations.

The initial mill was designed with a 3000 L grinding chamber, powered by a 1.12 MW motor. The duty of the IsaMills at the MRM concentrator was regrinding concentrate to 7 µm.

The development of larger IsaMills, as well as ceramic media, has enabled the mill to treat much coarser feeds than it was originally designed for.

Feed sizes up to a F80 of 150 µm or greater are now standard, and development work is being trialled at the MRM operation on coarser materials.

Operating duties for the technology include tertiary and secondary grinding applications, for ore types including platinum, copper, pyrite, nickel, as well as lead and zinc.

Operators, relying on grid power or running diesel generators, face increased power cost.

IsaMills can provide energy savings of a 1/3 compared to traditional grinding technologies, such as ball mills or tower mills.

This is due to the IsaMill having a horizontal packed bed of grinding media, with up to eight grinding discs rotating through the bed at relatively high speeds.

This creates a high probability of high energy intensity media-particle collisions, result-



15 kg samples are required to be passed through the mill a number of times until the required grind size is achieved.



Maintenance on Anglo Platinum PPL A/B operation using 2 x M10,000 IsaMills. The initial mill was designed with a 3000 L grinding chamber.

ing in attrition grinding, as well as limiting short circuiting, as the multiple disc act as independent grinding chambers.

This also eliminates the need to enclose the grinding circuit with cyclones, reducing operating and capital cost. A patented internal classifier at the end of the mill retains the oversize particles and media and pumps them back into the mill for further grinding, allowing the ground particles to pass out the mill.

The action of the classifier produces a narrow product sizing distribution, with minimal over grinding and under grinding in the mill, which assist in metallurgical response as well as slurry handling and filtration.

The other benefit of IsaMilling is the use of inert grinding media.

While initial IsaMill operations used sands and slags, most

of the current operations now use ceramic media, that has been developed specifically for IsaMill operation by Magotteaux, called Keramax MT1.

Media sources such as sand and slag may make economic sense for use in IsaMills if located near the milling operation. How-

**The development of larger IsaMills has enabled the mill to treat much higher coarser feeds than it was originally designed for.**

ever, the use of ceramics provides media with high SG, consistent hardness and roundness, as well as other properties, which enables increased grinding efficiency, resulting in less installed power compared to similar applications using sand.

The energy impacted by the media is a function of the veloc-

ity, media size and the media SG, so ceramic media is important in coarse grinding applications due to the larger media size (up to 3.5 mm) and higher SG, compared to sand.

Inert grinding is the key to improving the metallurgy of downstream processes after

required to minimise the effects of ferric ions. This is compounded by closed circuit operation in traditional milling operation, where the milled product undergoes cycloning and the underflow is fed back to the mill for further contamination.

However with the use of inert grinding in IsaMills, in open circuit operation, results in no ferric ions being generated, and reagent usage is reduced, as only the new surfaces are dosed with reagent.

*This article was written by Brenton Burford, senior IP coordinator for Xstrata Technology.*

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