Glencore Technology
MAGNETITE FOCUS

High intensity, energy efficient magnetite grinding

EHM Magnetite Circuit

M10,000 IsaMill™ installed at EHM

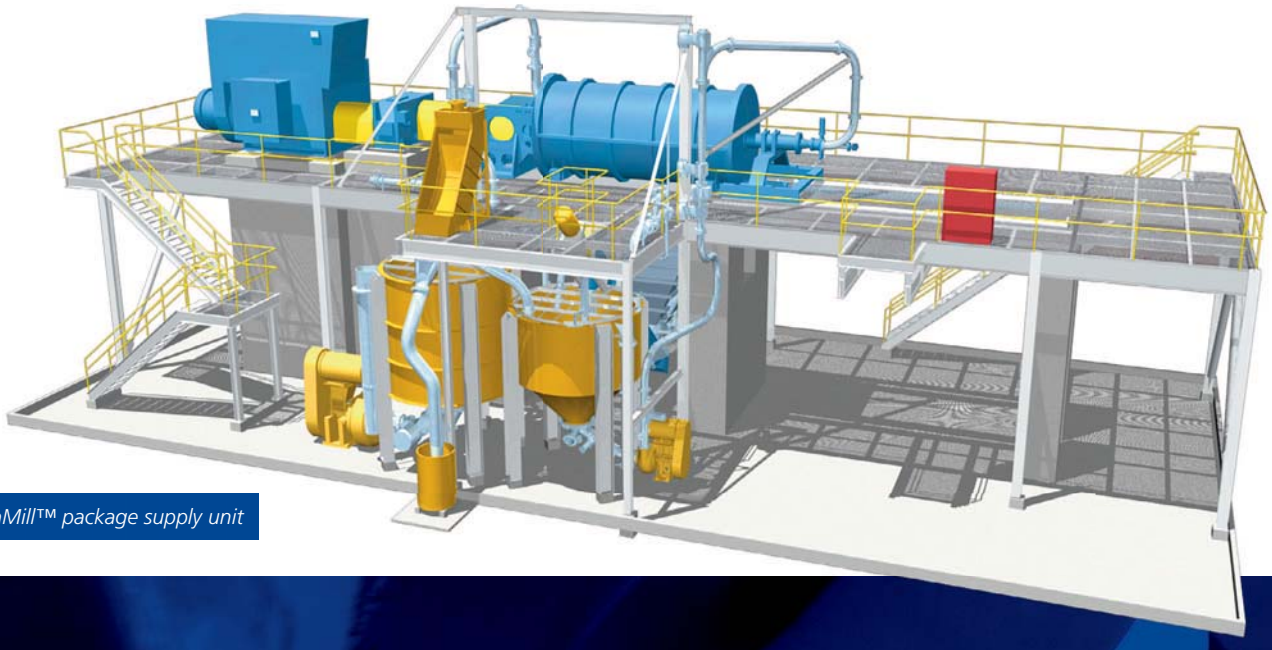
IsaMills™ have been at the forefront of energy efficient grinding since their fi rst full scale operation in the base metals industry in 1994.

The development of the large scale 3MW M10,000 mills, along with ceramic media, have seen IsaMills™ included in many grinding circuits, treating a variety of mineral types. Further development has resulted in the 8 MW M50,000 IsaMill™ now available for very high throughput applications. In July, 2011, the first IsaMill™ to grind magnetite was successfully commissioned at Glencore's Coppers' Ernest Henry Mine.

First Magnetite Operation

The Ernest Henry Mining ('EHM') operation, in North West Queensland, has been an open cut copper operation since its start up in 1995, recovering a copper concentrate from an ore consisting of magnetite, chalcopyrite and carbonates. In 2009, approval was given to convert the operation to an underground mine to extend the mine life, as well as construct a magnetite plant to treat the tailings from the copper concentrator.

The Magnetite Circuit at EHM is designed to treat 6MTpa, and produce 1.2MTpa of magnetite concentrate. A 3MW (4000Hp) M10,000 IsaMill™ operates in the circuit, treating magnetic rougher concentrate sizing between 150 to 200µm, and reduces it down to 40 to 45µm, before it is further cleaned to produce the fi nal grade concentrate. The IsaMill™ was supplied as a package by Glencore Technology, and incorporates mill, feed and discharge sumps and pumps, media handling and dosing system. 5mm ceramic media is used by the mill to achieve the grind size.



IsaMill™ package supply unit

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Stirred Milling Energy Efficiency

Preliminary work using samples from EHM were ground using a lab scale IsaMill™ and vertical mill in 2003[1] (Fig 1). The work showed that below 70µm, the IsaMill™ was signifi cantly more energy effi cient, and more effective at achieving the fi ner sizes (with less slimes produced). At a product size of 40µm the IsaMill™ was 45% more energy effi cient than the vertical mill. In this testwork, the IsaMill™ used 3.5mm media, and the tower mill 12mm balls. In this test a coarser media (ie. 5–6mm) used in the IsaMill™ would have achieved even greater grinding effi ciency for coarser sizes, (although the size of the media does determine the fi neness of the product that can be achieved, and will vary from deposit to deposit).

Recent testwork[2] using IsaMills™ and ball mills in a Levin test using magnetite, also showed the IsaMill™ to grind more effi ciently than a ball mill at sizes less than 100µm (Fig 2). In this case the magnetite sample required grinding down to 34µm to achieve magnetite liberation. At this size the IsaMill™ was 40% more energy effi cient than the ball. In the test the IsaMill™ used 5mm ceramic media to achieve the grind size.

Testwork and Scale Up

The first steps for sizing an IsaMill™ for a project is to obtain a Signature Plot, (power versus sizing) using a lab scale M4 IsaMill™. These tests are conducted by major independent laboratories worldwide.Glencore Technology can then size an IsaMill™ for the application from the testwork – the scale up from the M4 to the full scale mill is a 1 for 1 relationship, with no scaling factors used.

Contacts for IsaMill™ Testwork

G&T Metallurgical Services *Canada*	www.gtmet.com
SGS Lakefield *Canada and Chile*	www.met.sgs.com
JKTech *Australia*	www.jktech.com.au
Ammtec *Australia*	www.ammtec.com.au

M4 IsaMill™ test unit used to obtain signature plot

Figure 1: Signature Plot
IsaMill™ vs Tower Mill

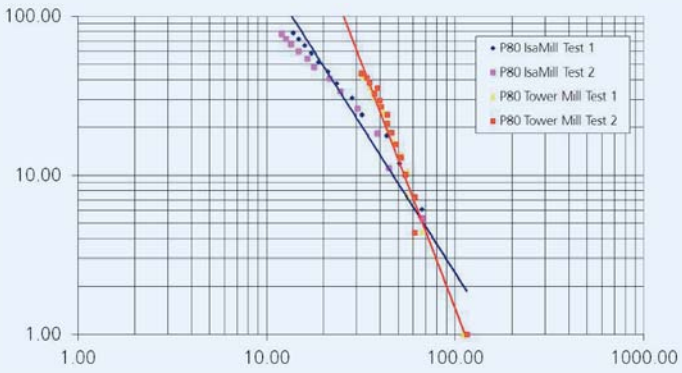
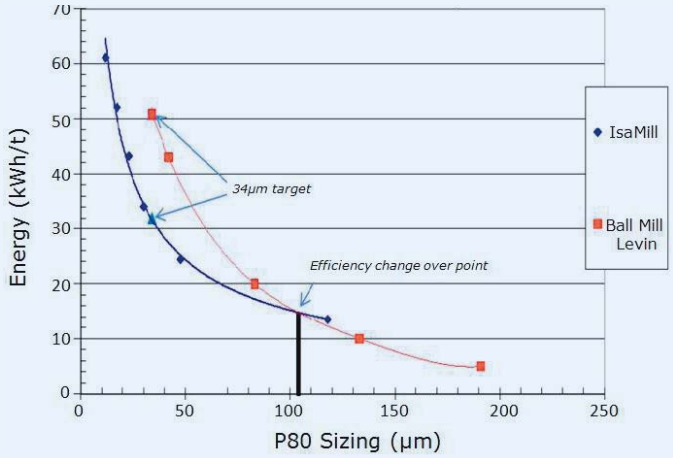


Figure 2: Levin Test – 400 µm Feed
Magnetite IsaMill™ M4 vs Ball Mill



References

1: Comparing Energy Efficiency in Grinding Mills , Burford, & Niva, Metplant 2008

2: Optimising Western Australia Magnetite Circuit Design, David, Larson & Li, Metplant 2011

For more information:
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