IsaMill™ uses horizontal milling to secure better energy efficiency, product size and availability

GLENCORE TECHNOLOGY

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> IsaMill's horizontal configuration means it's completely different from other mills. IsaMill™ gives me an increased recovery that outweighs the cost. I never have to worry about the mill."
>
> – Amandelbult Operation, Anglo American

IsaMill™ at a glance

- → Real-world success in 144 metalliferous installations across 23 countries since launching in 1994
- → World's only horizontal fine grinding mill, it avoids short-circuits and gives the highest availability
- → Most efficient fine grinding mill in the world
- → Strongest performance guarantee in the world
- → Most consistent product size
- → Delivers better results to downstream flotation and leaching

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IsaMill™ is the most efficient and reliable grinding mill available and with 144 metalliferous installations in 23 countries it has a proven record in the real world

The IsaMill™ reduces the energy, media and capital costs of grinding. It's incredibly efficient and intense. It focuses only on the particles that need grinding.

The IsaMill™ produces greater power intensity than ball or tower mills.

Today's IsaMill™ is also light. A modest volume of concrete and structural steel are used, and the entire unit sits on a one-storey platform. This means it's about a third the height and weight of similar grinding mills available.

It produces the most consistent and 'sharp' particle size distribution in a simple open circuit configuration.

IsaMill™ is the world's only horizontal fine grinding mill. The horizontal slurry flow means low cost ceramic media can be used without the concerns of a vertical mill. It's easy to operate and it maximises availability.

The IsaMill™ gives an accurate and rapid scale up, so it's predictable and reliable.

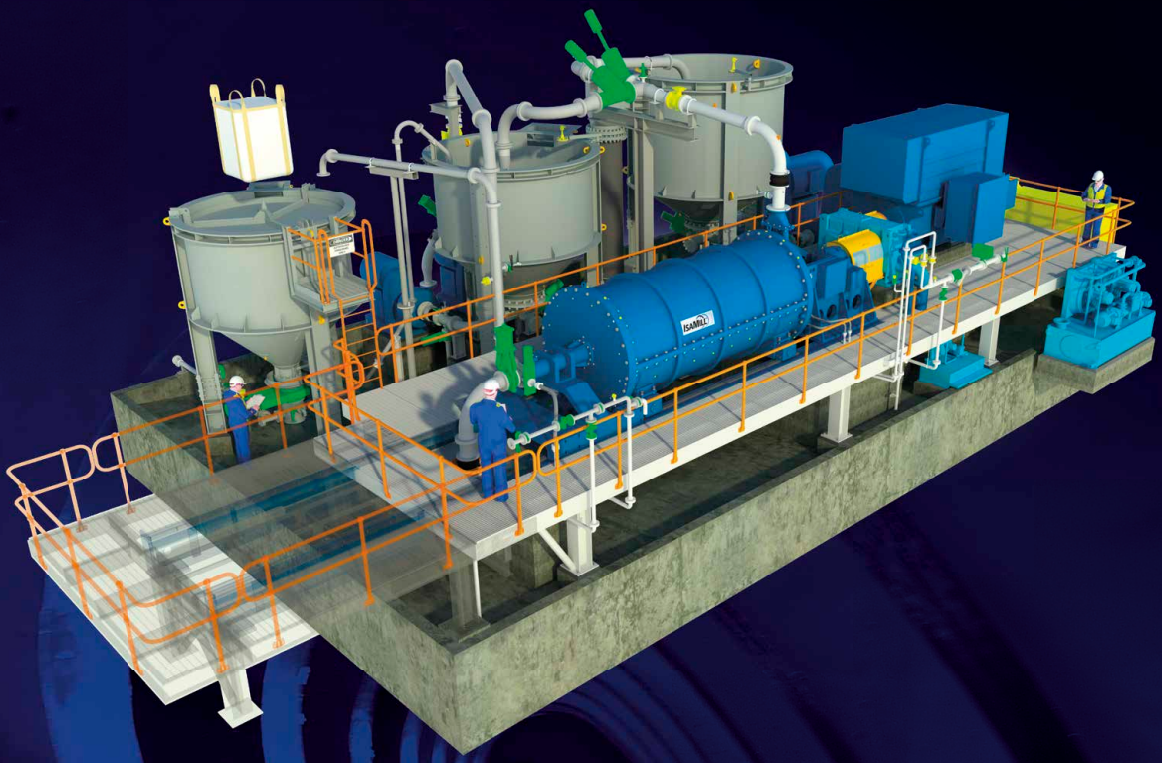
Operating and maintaining the IsaMill™ is safe, simple and reliable. It's quick to install, flexible in operation and easy to maintain.

The IsaMill™ is widely used in base metals (copper, lead, zinc and nickel), PGM, iron ore, industrial applications and gold processing plants and is the best choice for regrinding concentrates, fine or ultrafine grinding and mainstream grinding.

The IsaMill™ is currently available in the following models, named for their net grinding volume:

- M1000 (355–500kW)*
- M3000 (800kW)
- M5000 (1120–1500kW)
- M7500 (2300kW)
- M10000 (3000kW)
- M15000 (3700kW)
- M20000 (5000kW)
- M30000 (6000kW)
- M50000 (8000kW).

* Smaller models are available on request



How IsaMill™ grinds more efficiently and delivers greater value

1. More accurate scale-up

The IsaMill™ is proven in the real world. Lab and pilot results are scaled to commercial size with 100% accuracy. We test rigorously for specific energy, particle size and optimise the media size for accurate scale up so that every plant we install always meets design.

When you buy an IsaMill™, the scope includes process and engineering design, supply and commissioning by experts with real-world experience, for easy installation by a local contractor or EPCM.

2. Easier installation and operation

Because the IsaMill™ delivers high intensity grinding, it only requires a small footprint.

The horizontal configuration results in a low height, unlike vertical grinding mills. Smaller cranes are required to install and maintain the IsaMill™.

The IsaMill™ takes about a tenth the grinding volume of an equivalent ball or tower mill. There are no external screens or cyclones required because the IsaMill™ internally classifies the feed and delivers a consistent product.

3. Finer grinding and better media

Slurry travels in a 'plug' flow pattern through the eight rotating grinding discs within the mill. Media recirculates between the discs, colliding with the particles in the feed, causing breakage.

The media is ceramic and avoids the passivation of particles common with metallic media, improving the product for flotation and leaching.

The IsaMill™ delivers an even blend of attrition and abrasion of particles throughout the mill. At the discharge end, slurry and media reach a patented product separator where media and over-sized particles are retained in the grinding zone, while particles at the correct grind size exit the IsaMill™.

4. Most consistent product

The IsaMill™ gives a sharper product size distribution. Other mills with just one grinding stage require closed circuit cyclones and high recirculating loads and still don't produce product size distributions as tight and steep as the IsaMill™.

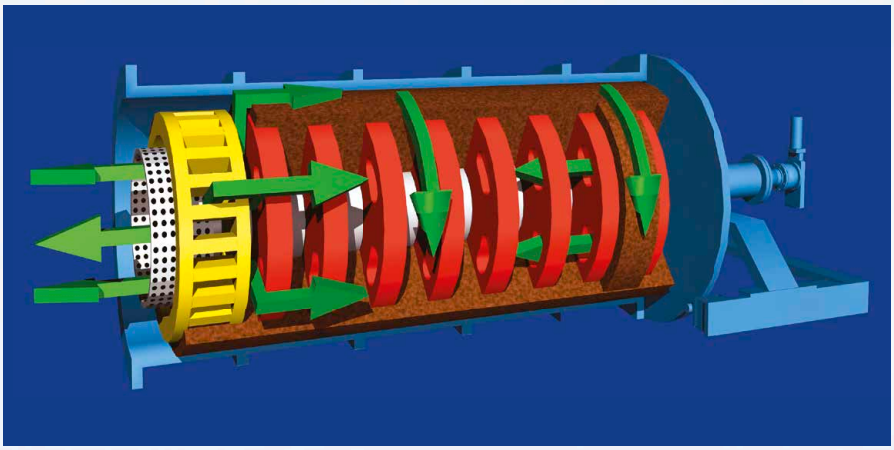
The IsaMill™ also produces clean, fresh mineral surfaces that improve downstream performance from flotation and leaching.

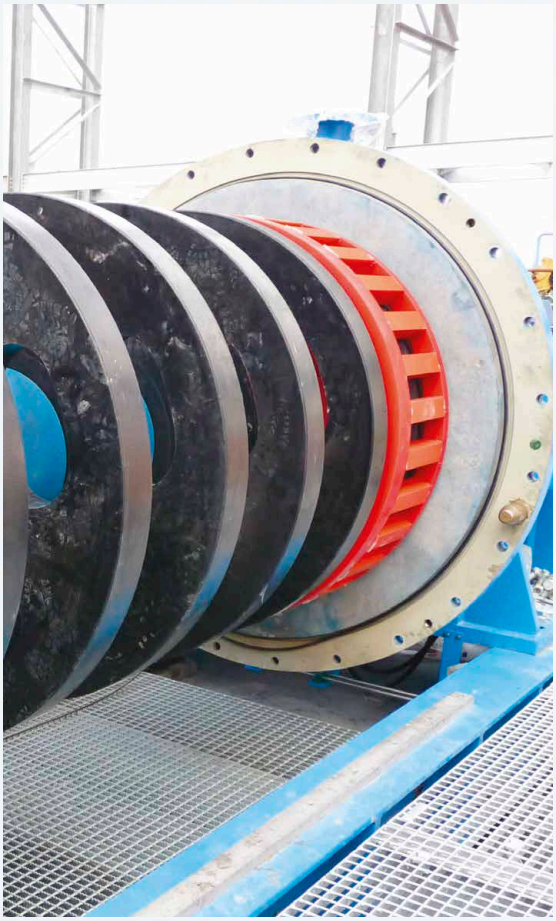
5. Easier operation and maintenance

A Liquid Resistance Starter for the IsaMill™ motor means it can be started under load, so no time is lost in draining the mill.

Maintenance is easy. The entire grinding chamber is quick to access. Slurry is flushed from the IsaMill™ and the media is dumped through a scuttle valve into a hopper below. The IsaMill™ shell is then pushed back along rails using hydraulic rams, giving you quick access to all the wear parts, all in under half an hour.

Even a complete shutdown for inspection and replacement of wear parts including the liner itself takes less than eight hours.





How we help you get more from your IsaMill™

Commitment in a partnership

The IsaMill™ was developed and proven in real world mining applications, so we've built up a suite of services that underpin our Technology Partnership concept.

As a Partner:

- You will have access to training opportunities at real client sites.
- You will always have access to our most experienced technology experts around the world.
- Your team will have opportunities to learn from other users.
- You will have access to a comprehensive spare parts supply.
- You'll have access to maintenance and advisory services.
- You will secure an ongoing technical relationship with us.

A strong performance guarantee

IsaMill™ uses horizontal milling to secure better energy efficiency, product size and availability.

The commitment and agreement is complete:

- Your needs for a given energy draw or a given product distribution will be secured by the performance guarantee.
- We will work with you to ensure your needs for feed variability, operations and maintenance will be built in.
- Training and support will be included.

How others have gained from IsaMill™

George Fisher's regrind circuit boosts recovery and reduces reagents

When the George Fisher project needed fine grinding to a P80 of seven microns in their zinc retreatment circuit, they knew the IsaMill™ would be ideal.

Every one-micron size reduction in the zinc retreatment circuit below a P80 of 10 microns improves the overall plant zinc recovery by 1%, and the IsaMill™ was modelled to achieve this.

Eight 1.1 MW IsaMill™ installations were introduced, two to regrind lead cleaner feed and six to regrind intermediate zinc flotation streams. The existing concentrator was modified to suit the new ore type.

The results were good and better – the recovery improvement was expected due to better liberation, but the operation also saw a significant drop in reagents and circulating loads.

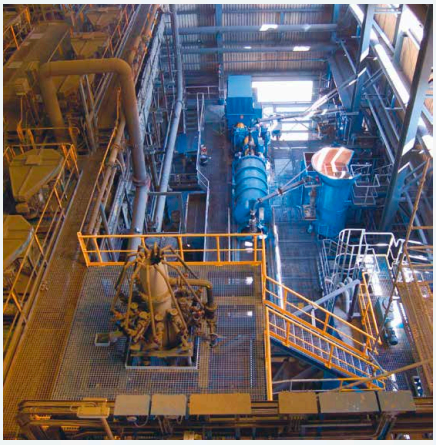
Fine minerals are expected to consume more reagent due to their higher surface area, but improved liberation dropped circulating loads. Clean fresh surfaces from inert attrition increased flotation rates and selectivity, and these significantly reduced the need for collector and depressant.

Prominent Hill uses IsaMill™ to boost downstream performance

OzMinerals' Prominent Hill copper-gold concentrator began commercial production in 2009. They needed liberated fluorine minerals to be rejected in the cleaner flotation circuit to produce a commercial quality copper-gold concentrate.

A 3 MW M10000 IsaMill™ operating with 3.5mm ceramic media was installed to liberate the fluorine bearing gangue minerals from the rougher concentrate.

The IsaMill™ regrind circuit successfully produced a leaner circuit feed P80 of 20–25µm ensuring adequate liberation. What's more, the inert grinding environment in the IsaMill™ prevented contamination of the mineral surfaces and gave OzMinerals the optimum flotation performance from the first day of commissioning.



144 metalliferous installations in 23 Countries

Clients and Projects include:

- Woodlawn (Heron Resources)
- Aktogay (KAZKMYS)
- Gidgi (KCGM)
- Eleonore (GoldCorp)
- Constancia (Hudbay)
- Dugald River (MMG)
- Mortimer (Anglo Platinum)
- Mt Milligan (Thompson Creek Metals)
- Ernest Henry Mining (Evolution Mining)
- Penasquito (Minera Penasquito)

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