

ERIEZ



TRUNNION MAGNET SYSTEM

SAG/BALL MILL MAGNETIC SEPARATOR



ERIEZ
GLOBAL LEADER IN SEPARATION TECHNOLOGIES

About Eriez

Established in 1942, Eriez stands as a pioneering force in separation technologies, embodying a truly global presence. With operations around the world, Eriez designs, manufactures and supports magnetic separation, flotation, metal detection, X-ray inspection, material handling and related technologies for demanding processing applications.

Our knowledgeable sales engineers work closely with customers to understand their unique challenges and deliver dependable, high-performance equipment, systems and solutions. Whether an application calls for standard equipment or a custom-engineered solution, Eriez draws on more than 80 years of experience to improve productivity, efficiency and product purity.

For mineral processing operations, this experience includes technologies engineered to improve grinding circuit performance and protect downstream equipment.

Trunnion Magnet System

Continuous Removal of Grinding Ball Fragments

Eriez has pioneered magnetic separation techniques to improve grinding circuit efficiency in mineral processing plants. The Trunnion Magnet System bolts directly to the ball mill discharge flange to provide continuous magnetic collection and removal of grinding ball fragments. A permanent magnetic circuit captures the ferrous material and discharges it to a collection hopper.

Proven Performance

Customers have reported the following benefits after removing grinding ball fragments:

- Pump and hydrocyclone life extended by 250%
- Nominal 5% increase in mill throughput
- Nominal 8% reduction in mill power consumption
- Nominal 10% reduction in mill work index through more efficient grinding



Features

- Permanent magnetic circuit designed to provide maximum performance
- Continuous, automatic operation with no operator intervention required
- No energy consumption
- Low maintenance
- Rugged construction for long service life

Benefits

- Removes chips and scats before they recirculate through the grinding circuit
- Helps reduce wear on downstream sumps, pumps, hydrocyclones, and interconnecting piping
- Frees mill volume for additional feed and fresh grinding media
- Independent sources report extended pump and hydrocyclone life, increased mill throughput, and reduced mill power consumption

Principles of Operation

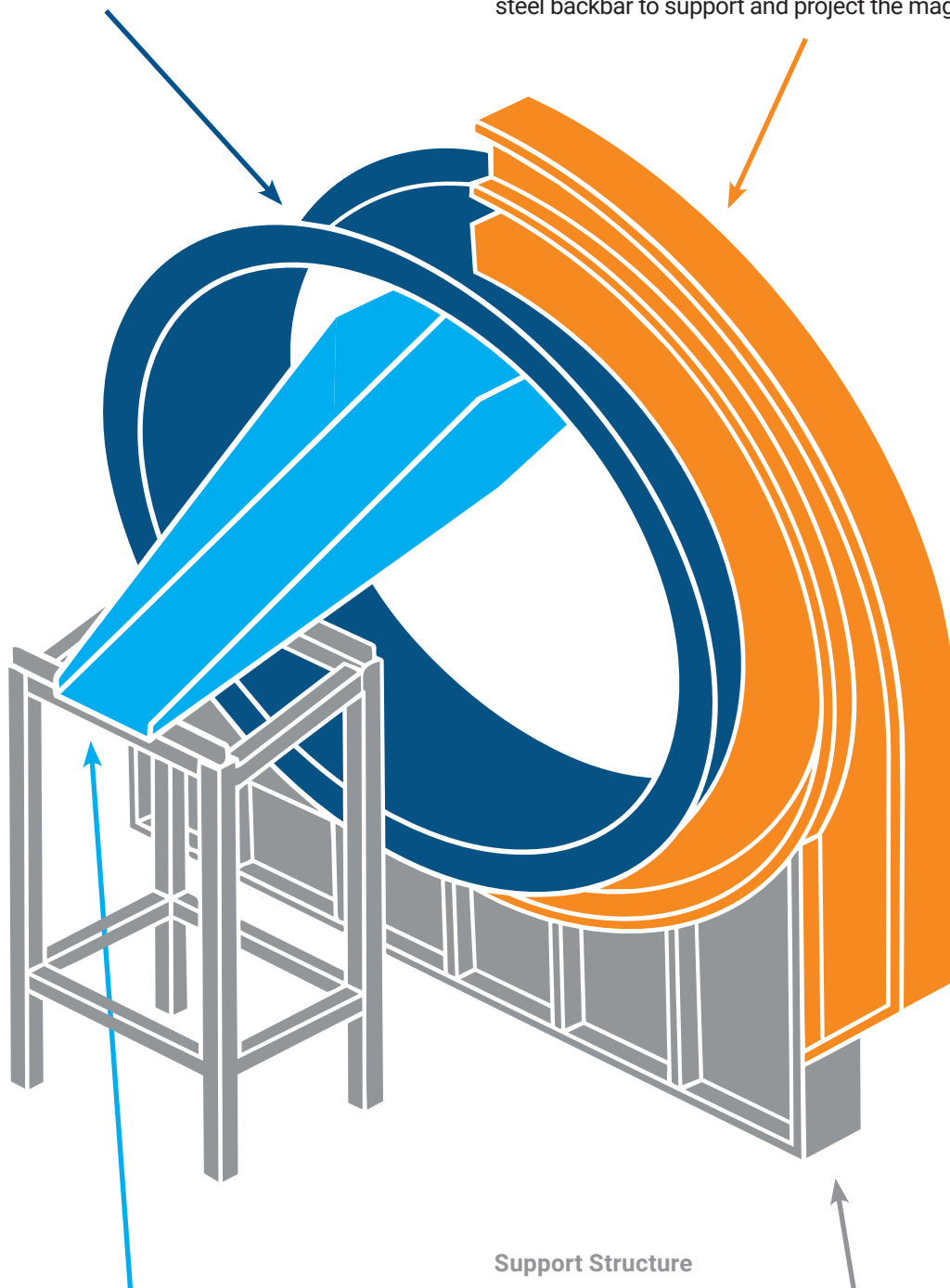
Primary Components

Stainless Steel Barrel

A short stainless steel extension that bolts directly to the ball mill discharge flange and transports mill discharge material through the magnetic arc. An abrasion-resistant wear liner helps protect the trommel from the demanding mill discharge stream.

Magnet Arc

A 200-degree “C”-shaped arc of permanent magnets is positioned around the stainless steel barrel to capture ferrous grinding ball fragments from the mill discharge. The magnets are enclosed in stainless steel canisters and incorporate a steel backbar to support and project the magnetic field.

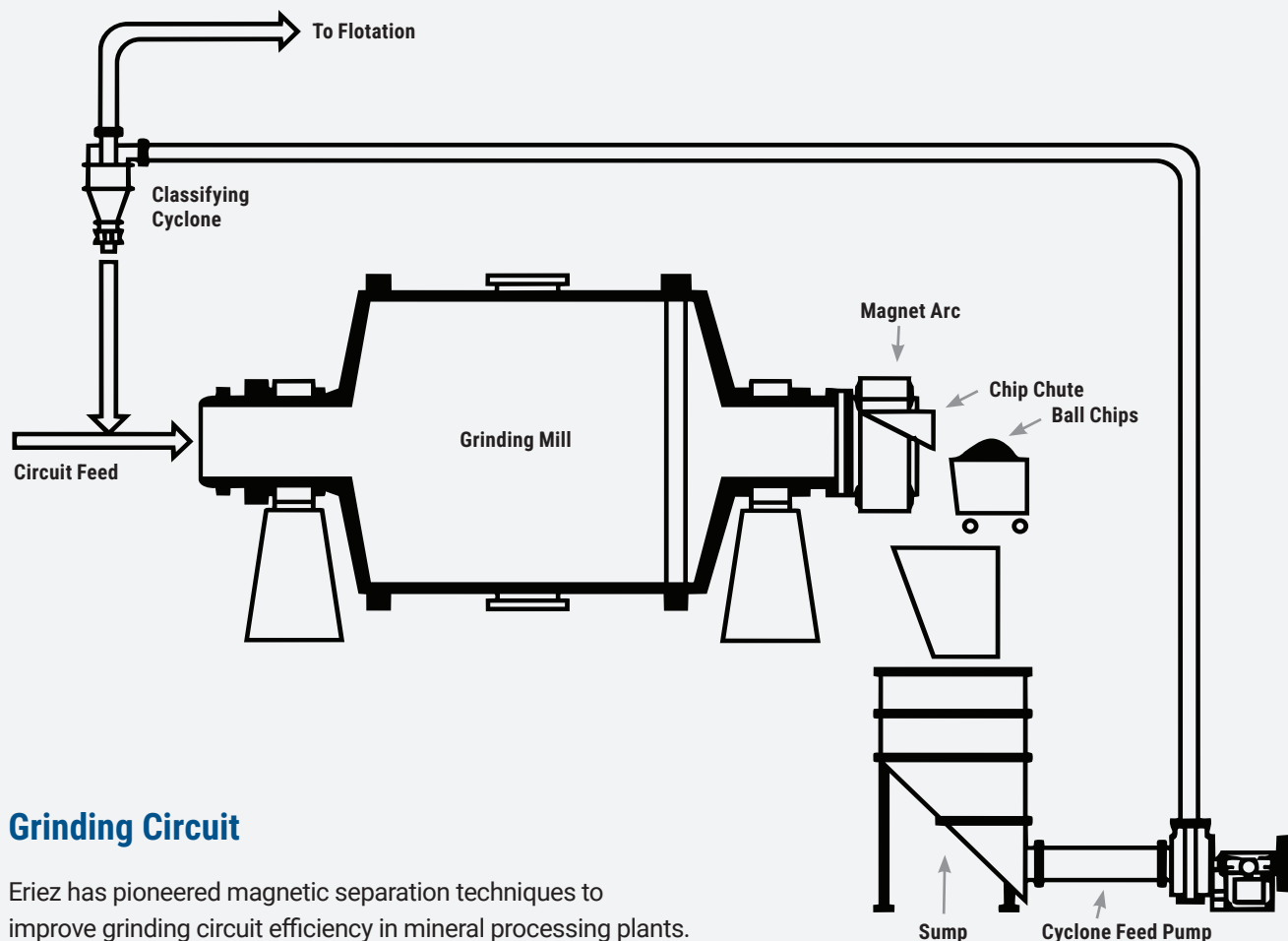


Discharge Hopper

Positioned just inside the stainless steel barrel, the discharge hopper collects grinding ball fragments as they rotate beyond the end of the magnetic arc and release from the magnetic field.

Support Structure

A rugged steel support structure positions the magnetic arc around the stainless steel barrel, maintaining the proper clearance between the magnet and barrel.



Grinding Circuit

Eriez has pioneered magnetic separation techniques to improve grinding circuit efficiency in mineral processing plants.

Engineered for Strong Magnetic Capture

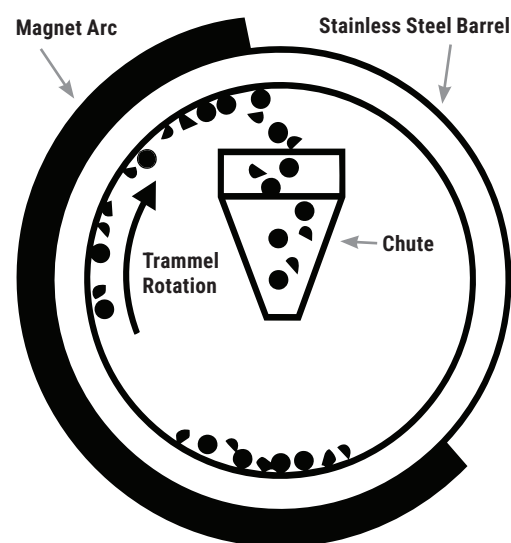
High-energy rare earth and barium ferrite magnets form a hybrid magnetic circuit designed to collect ferrous material, including whole grinding balls, against the hydraulic drag force of the mill discharge slurry. The magnetic arc can be extended along the barrel to increase retention time and exposure to the magnetic field. Magnetically induced lifters can also assist in the collection of ball chips.

Reduce the Burden of Recirculating Ball Fragments

Milling is critical in mineral processing because it liberates valuable minerals from gangue ore. Ball mills are widely used for this purpose; however, ball breakage and wear generate chips and scats that create a dead load within the mill. These fragments can recirculate until they are finely milled enough to move to the next stage of the process.

Recirculating Load Issues

- Steel is harder to mill than the ore, and ball chips must be milled finer to report to cyclone overflow
- Milling ball chips consumes additional energy. In one Trunnion Magnet installation, an 11% energy reduction was indicated after two weeks of operation
- Recirculating fragments consume mill capacity that could otherwise be used for productive grinding
- Milling ball chips can lead to higher consumption of good grinding balls



Protect the Entire Circuit

Remove Grinding Media Early

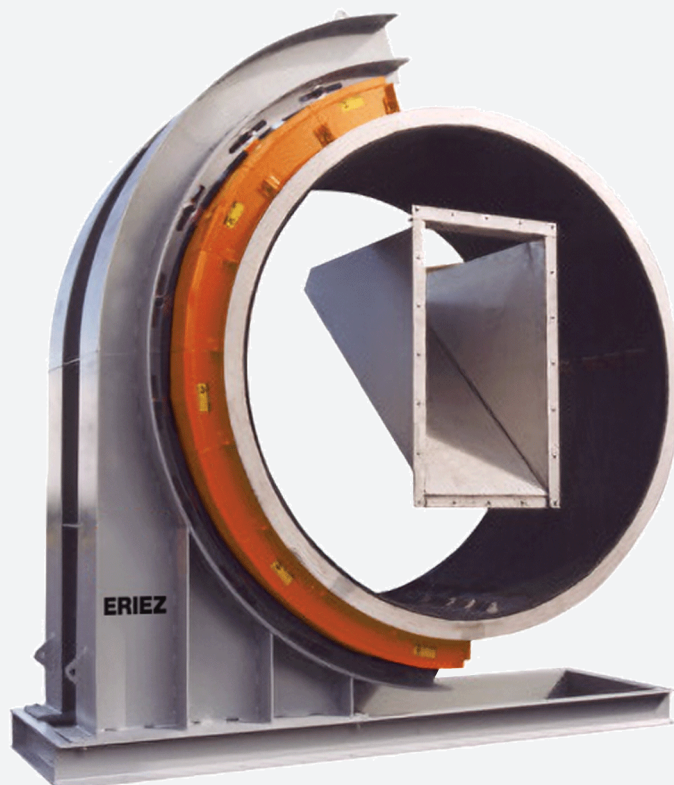
Worn and broken grinding media can create problems that extend beyond inefficient grinding. If ball fragments continue through the process, they can accelerate wear on pumps, sumps, piping and hydrocyclones. Grinding balls that reach the crushing circuit can also damage crushers, resulting in unplanned downtime and lost production.

The Trunnion Magnet System removes an estimated 80% or more of worn or broken grinding media from the mill discharge, helping protect critical equipment while reducing unnecessary recirculating load.

Increase Productive Capacity

Grinding ball fragments occupying space in the mill represent capacity that cannot be used for ore or fresh grinding media. Removing this dead weight restores valuable mill volume for productive grinding while reducing the burden of repeatedly milling metallic fragments.

With hundreds of installations worldwide, Eriez Trunnion Magnet Systems provide a proven approach to controlling worn grinding media at the mill discharge.



Trunnion Variations

Configured for the Application

Several configurations of the Trunnion Magnet System are available to accommodate different mill arrangements, throughputs and installation requirements.

- Stainless steel barrel and magnetic arc dimensions can be varied to retrofit an existing SAG/ball mill and available discharge space
- The magnetic arc can be designed to provide maximum strength for high slurry throughputs and grinding balls up to 100 mm (4") in diameter
- The Trunnion Magnet can be configured for reversing or bidirectional SAG/ball mills
- The magnetic arc can be extended to increase retention time and exposure of the mill discharge stream to the magnetic field
- Magnetically induced lifters can be incorporated to assist with ball chip collection

Eriez can evaluate mill configuration, available space, slurry conditions and grinding media size to determine the appropriate Trunnion Magnet arrangement for an application.



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