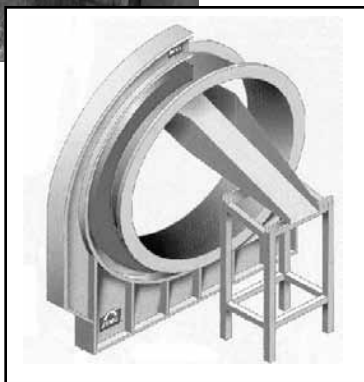




# TRUNNION MAGNET SYSTEM

## BALL MILL MAGNETIC SEPARATOR

*Permanent magnetic separation system for the automatic and continuous removal of grinding ball fragments from the ball mill discharge.*



### FEATURES

- **Permanent magnetic circuit** designed to provide maximum performance
- **No energy consumption**
- **Rugged construction ensures** long service life
- **Minimum maintenance**
- **Continuous “Operator Free” process**

ONLY FROM ERIEZ

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 of the grinding ball fragments. A permanent magnetic circuit collects the grinding ball fragments and discharges them to a collection hopper.

Grinding ball fragments discharging from ball mills cause extreme wear to downstream processing equipment. These ball fragments, circulating in a milling circuit, will cause excessive wear to sumps, pumps, hydrocyclones and interconnecting piping. Grinding ball fragments contribute very little to the grinding process while consuming power.

The Trunnion Magnet separator was developed and improved over the years to remove grinding ball fragments directly from the mill discharge. This separator mounts to the discharge flange of the ball mill. An arc of permanent magnets attracts essentially all ferrous material in the discharge stream and removes it from the process. This magnetic separator has proven effective for removing all size fractions of grinding ball fragments.

The removal of grinding media from the ball mill discharge has resulted in several benefits in the milling circuit. Benefits reported from independent sources are:

- Extended the pump life and the hydrocyclone life of approximately 250 percent.
- An increase in mill throughput of a nominal 5 percent.
- A nominal 8 percent reduction in mill power consumption.
- More efficient grinding resulting in a nominal 10 percent reduction in the mill work index.

### THE TRUNNION MAGNET SYSTEM

The Trunnion Magnet system includes four basic components as shown in Figure 1. The system consists of the blind trommel, magnet sector, support structure and the discharge hopper. The blind trommel is a short extension that bolts directly to the discharge flange of the ball mill. The function of the blind trommel is to transport the mill discharge material through the magnetic field. The blind trommel is fabricated from stainless steel and has an abrasion resistant wear liner. The magnet sector is comprised of permanent magnets and has an approximate 200-degree arc. This magnetic arc is mounted on a steel support pedestal and is positioned around the blind trommel. The permanent magnets are enclosed in stainless steel canisters and

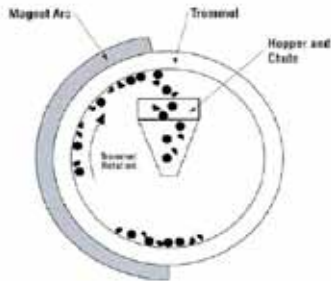


Figure 1

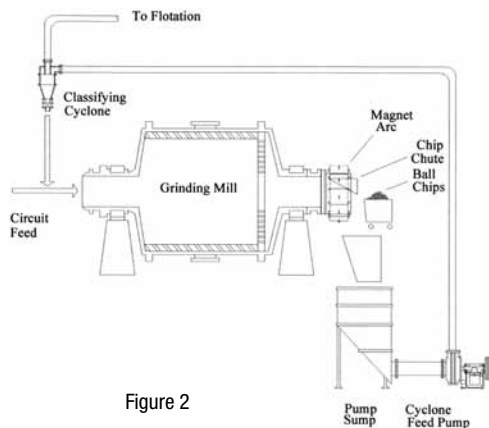


Figure 2

incorporate a steel backbar for support and projection of the magnetic field. The discharge hopper and support structure is positioned just inside the blind trommel to collect the grinding ball fragments. The hopper collects the grinding ball fragments as they rotate past the end of the magnetic sector at the top of the blind trommel.

In the design of the Trunnion Magnet, consideration was given to the magnetic capture of grinding balls/fragments directly opposed by the drag force of the mill discharge slurry. Several techniques are used in the magnet design to compensate for the drag force. First, high-energy rare earth magnets have been used in conjunction with the barium ferrite magnets in a hybrid magnetic circuit to increase the magnetic force. This provides a magnetic force that will collect essentially all ferrous material including whole grinding balls. Second, the magnetic arc can be extended along the length of the magnet barrel to increase the retention time that the mill discharge stream is exposed to the magnetic field. And third, magnetically induced lifters inside the magnet barrel can be used to assist in the collection of ball chips. Figure 2 illustrates the position of the Trunnion Magnet system in the milling circuit.

### TRUNNION VARIATIONS

Several variations and modifications of the Trunnion Magnet system are available for any specific application.

- The size of the blind trommel and magnetic circuit can be varied to retrofit an existing ball mill and available space at the discharge.
- The magnetic circuit is designed to provide maximum strength for high slurry throughputs and up to 4 inch diameter grinding balls.
- The trunnion magnet can be configuration for reversing or bi-directional mills.

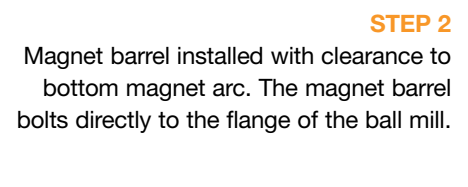


# TRUNNION MAGNET INSTALLATION



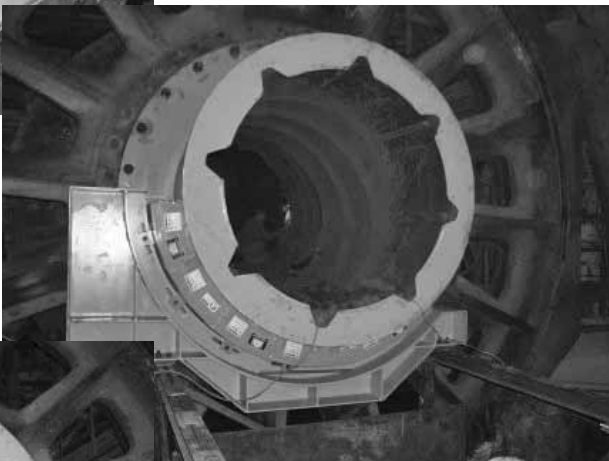
## STEP 1

Trommel screen removed and bottom magnet sector installed. The magnetic blocks are on a support structure that spans two beams.



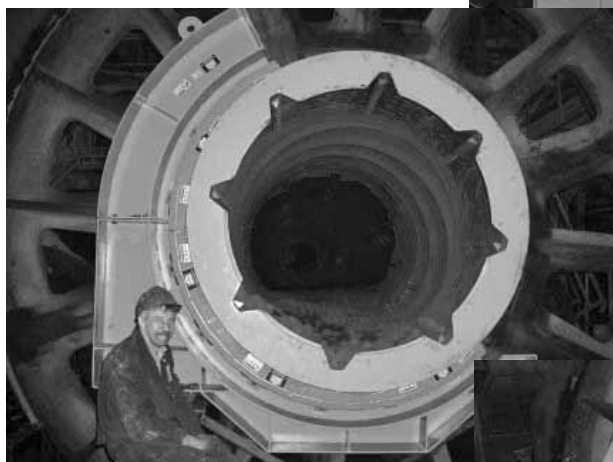
## STEP 2

Magnet barrel installed with clearance to bottom magnet arc. The magnet barrel bolts directly to the flange of the ball mill.



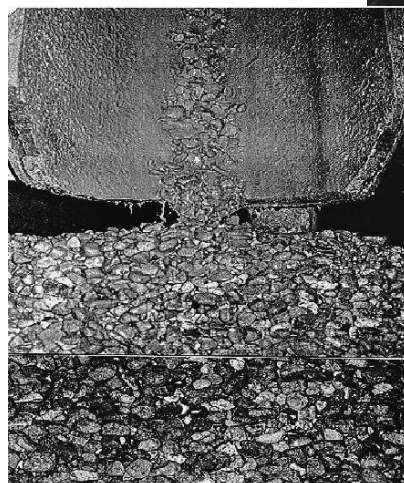
## STEP 3

Top magnet sector installed. Clearance between the magnet and blind trommel is 1 inch.



## STEP 4

Complete Trunnion Magnet System installed with discharge chute and spray bars.



Grinding ball fragments collected by the Trunnion Magnet System.

## **ERIEZ ENGINEERING SERVICES**

Eriez provides Engineering Services to cover a wide range of functions, assistance, and support. Specific engineering features related to the Trunnion Magnet systems are as follows:

- Equipment selection, sizing, material flows and balance calculations.
- Design and equipment modifications incorporating specific features and options. The Trunnion Magnet system may incorporate various options and features applicable to the process.
- Equipment layout and dimensional drawings. Modifications are common to fit an existing plant or provide specific operating characteristics.
- In-plant installation assistance
- In-plant audit to determine production flow rates and magnetic collection efficiency.

*Note: Some safety warning labels or guarding may have been removed before photographing this equipment*

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