

Metso

Grinding services solutions

Increasing safety in your grinding circuit

Horizontal and stirred mills

Top five issues
to consider



Contents

For horizontal grinding mills

Mill shutdown safety	04
Mill feed chute service	05
Gear and pinion failures	06

For vertical grinding mills

Media handling issues	07
Heavy component handling	08





Safety impacts the bottom line

As grinding circuit operators strive to maximize equipment availability and achieve production targets, protecting employees from workplace risk is vital. Globally, mining and minerals processing workers have the third highest rate of workplace injury since 2023*. Risk mitigation solutions throughout the grinding circuit can help keep the workplace safe while maintaining operating efficiency for both horizontal and vertical grinding mills.

Standard industry personal protective equipment (PPE) such as hard hats, safety glasses, hearing protection, gloves and safety-toed footwear can go a long way to foster workforce safety.

However, horizontal and vertical grinding mill service solutions add an extra layer of protection for employees working with and around grinding equipment.



1.

Horizontal grinding mills

Mill shutdown safety

Positioning and rotating grinding mills can be challenging during inspection and maintenance. Grinding material can dry out during these stoppages, creating a solidified or dropped charge. When the mill begins rotating at start up, the solidified material free falls onto the shell with force and impact that can cause permanent damage and deformation, leading to unplanned downtime.

Mills must be turned at very low speeds during shutdowns to redistribute material and avoid dropped charge. Dropped charge can cause the mill to roll and accelerate, damaging the mill and posing safety risks to service personnel.

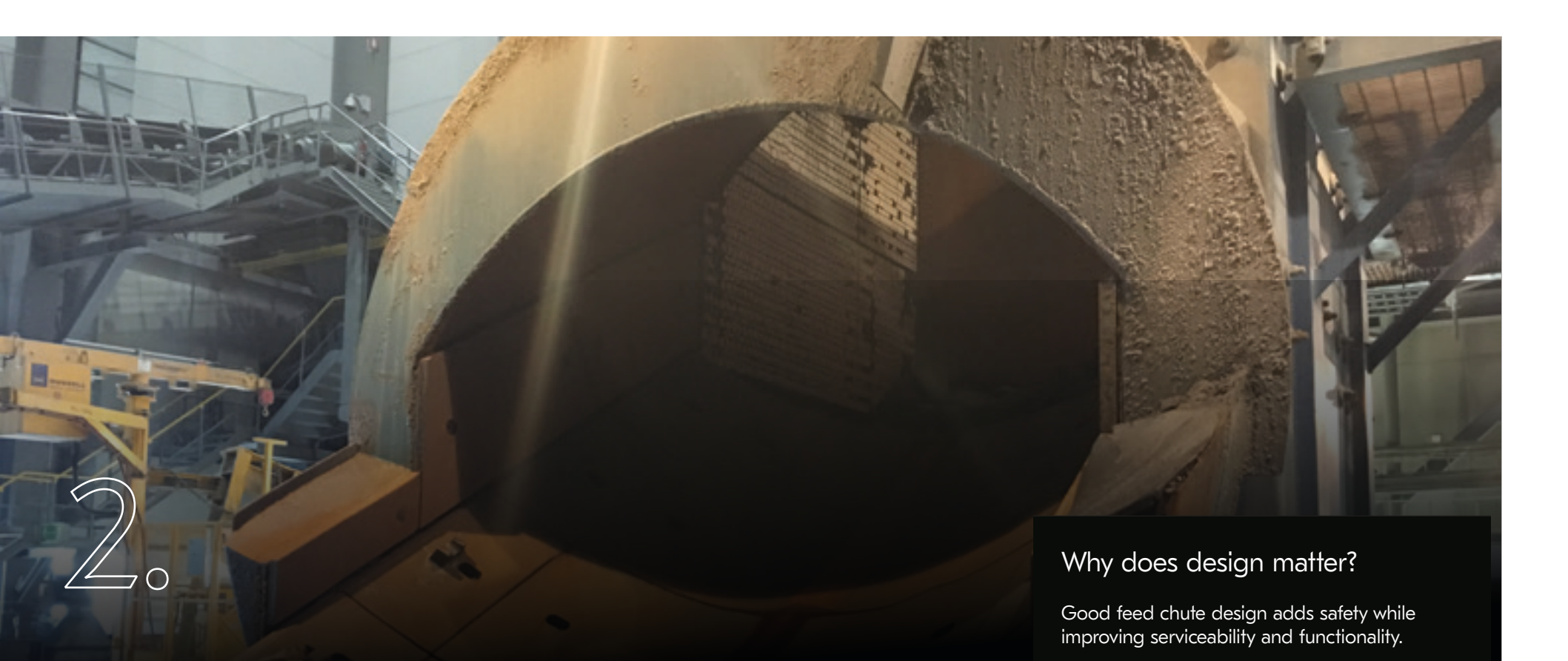
Generally, the mill's main motors cannot be used to turn the mill at low speeds, particularly if the motor is being serviced during the shutdown. When the main motor is disabled, an inching drive, or auxiliary drive with stopping mechanisms, is needed to position and safely lock the mill in place for service or inspection.

Inching drives also work to balance the charge inside the mill to prevent dropped charge when restarting the mill after a prolonged downtime.

What does an inching drive upgrade include?

The Metso inching drive retrofit features everything needed to maintain a safe workplace, including a custom-designed drive and power unit, a safety interlock system to prevent accidental mill start up, and accessory kits to make the drive adaptable to other mills. The kit includes a sole plate, driven gear hub for mounting, coupling guard and an interlock set to connect the inching drive to the drive motor.

Each inching drive application is custom designed to a mill's drive train configuration, either directly coupled to the pinion shaft or the reducer's high-speed shaft, and mounted with a sole plate or to a torque arm using a reaction bracket.



Horizontal grinding mills Mill feed chute service

A grinding mill is only as efficient as its operating components. Parts that are damaged, difficult to access or pose maintenance safety risks can cost valuable production time.

The mill feed chute plays a key role in the horizontal grinding process, yet is often overlooked during service and maintenance. A well-designed and properly maintained feed chute not only supports mill performance, but can also enhance workplace safety.

Feed chute design enhancements can facilitate access to components and hard-to-reach areas during service and

maintenance. Removable chute covers provide easy access to wear liners during installation and replacement. Chute covers and wear liners fitted with lifting points can further simplify liner replacement and reduce risks associated with handling large and bulky components. Operators struggling to access the top of the feed chute may benefit from an access platform that provides a safe and stable space to perform maintenance tasks.

When a feed chute is not properly maintained, spillage can occur, causing slippery and unsafe conditions around the equipment. Components designed with drip chutes can help to minimize spillage and prevent workplace hazards.

Why does design matter?

Good feed chute design adds safety while improving serviceability and functionality.

The Metso feed chute includes field-tested features that expedite maintenance and improve equipment availability.

- A removable chute cover offers safe and easy access to wear liners for installation and replacement.
- Lifting lugs reduce maintenance downtime and provide safe and convenient handling.
- An access platform provides a safe and stable area for inspection and maintenance.
- A mill equipment transporter to lift and position the chute during maintenance.
- Watch the animation: [Metso Mill Feed Chute](#)



3.

Horizontal grinding mills

Gear and pinion failures

Grinding gear and pinion operating conditions affect system profile temperatures. High temperatures can result in unplanned stoppages and damaging loss.

During standard temperature measurement, an operator opens the mill gear guard to manually read the pinion profile temperature using a handheld infrared device. Quality data from this labor-intensive task is subject to a consistent profile reading location and frequency that could yield inaccurate results.

Automated pinion temperature monitoring systems use infrared sensors and thermographic imaging to measure the gear set profile temperature across the full pinion width for more accurate readings. This can improve safety by eliminating manual practices and help to increase productivity, reduce downtime and maximize components' useful life.

An automated system can also serve as a critical indicator of operating factors such as gear set alignment and lubrication, and provide real-time operating data needed for maintenance program planning.

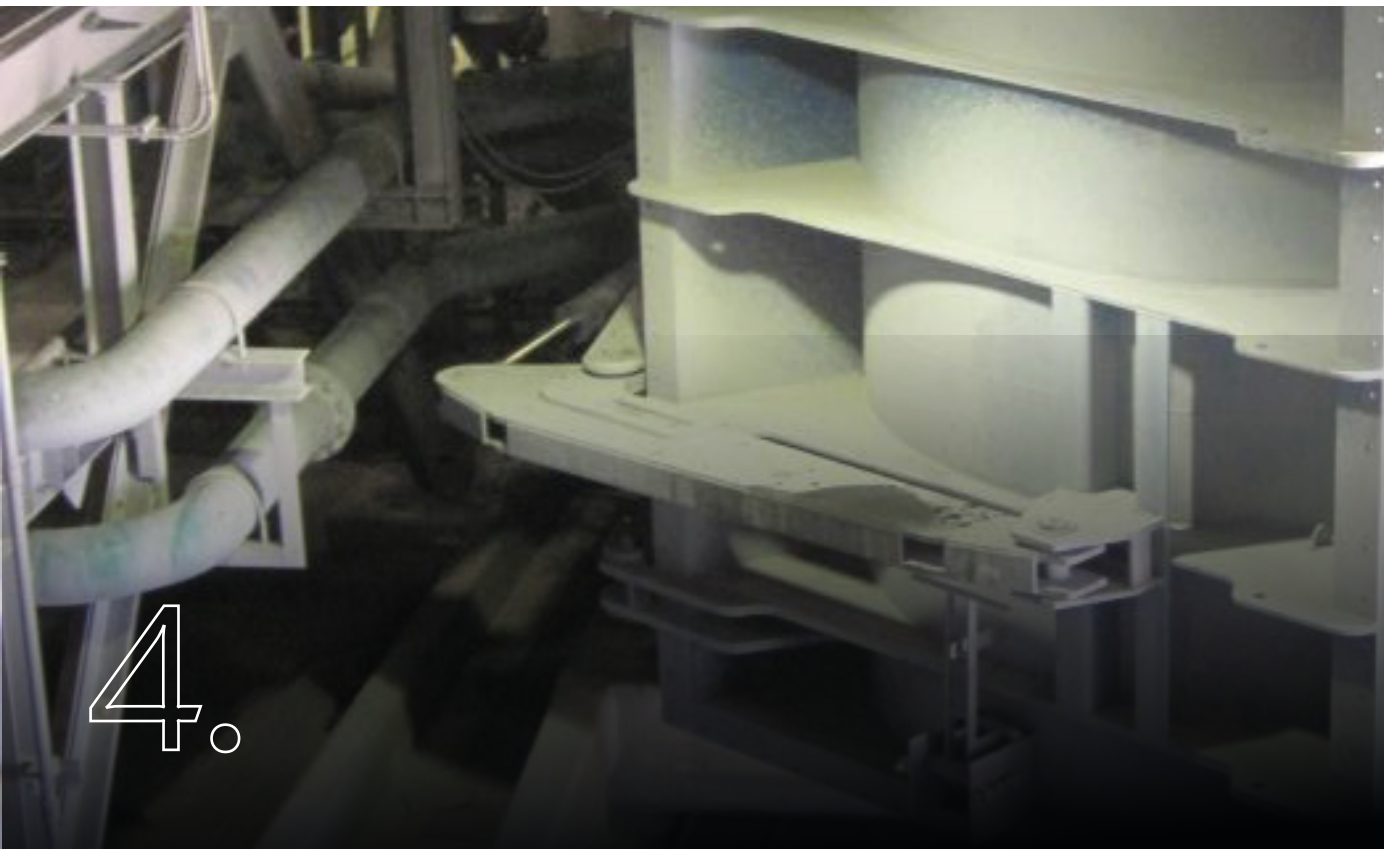
Why is pinion temperature monitoring important?

Proper pinion temperature control can mean the difference between a healthy asset life cycle and damaging loss.

The Metso pinion temperature monitoring system uses an onboard thermographic camera and infrared sensors to provide temperature readings at three areas across the pinion profile. The components are conveniently located for maintenance and protected from gear lubrication spray that could affect accurate readings.

The system can be installed on any horizontal grinding mill equipped with a pinion and ring gear.

Watch the animation: [Pinion temperature monitoring system](#)



4.

Vertical grinding mills Media handling issues

Discharging grinding media from vertical mills using manually operated doors can be time consuming and present safety risks. Solutions improvised on site are not only unsafe, but can also lead to material spillage and damage the mill and its surroundings.

When the mill charge cannot be removed using a discharge valve, an automated door opening solution can save time and mitigate risk to both equipment and personnel. The mechanical activator safely controls the mill door opening and closure while eliminating the need for additional external equipment connections.

With a symmetrical design that can be mounted according to door orientation, the activator protects the operator from harm while opening the mill door, and increases workplace safety and maintenance efficiency.

The solution can be fitted to each machine and is available for vertical mills of various sizes and applications.

How does automation mitigate risk?

Removing vertical mill charge can be hazardous if not handled properly.

The Metso Vertimill® door actuator solution allows operators to safely open and close the mill door to avoid workforce harm and equipment damage. The hydraulically-operated system is designed to control door movement from 0 to 125 degrees using a variable speed drive control.

Each application is sized for the mill application and features a symmetrical design that allows it to be mounted according to door orientation. The system includes an actuator arm, hydraulic cylinder, cylinder mounting beam, attaching bracket and hydraulic power unit with operating controls.

5.



Vertical grinding mills Heavy component handling

Vertical grinding mills present unique challenges for accessing, handling and replacing components during maintenance. Equipment parts, such as the screw and liners, are also large and heavy, and difficult to lift and maneuver for service or repair.

This presents opportunities for unsafe work practices, such as performing maintenance inside the mill, working under heavy loads and standing or climbing on components while performing service, which can result in injury or catastrophic loss.

A screw handling system can provide various advantages for mill service and maintenance activities by facilitating access to mill parts and giving operators options for equipment service. The system can be used to remove the screw shaft from the mill, allowing maintenance to be performed outside the machine. This eliminates potentially hazardous work in confined spaces and potential interference with overhead structures. The system may also serve as a maintenance stand to improve access to parts being serviced or replaced.

How can I better access machine parts?

Vertical mills require updated methods and tools to increase safety and service time.

The Metso Vertimill® screw handling system provides safer access to parts and additional options for relining and maintenance.

The system features longer beams that allow the screw shaft to be removed from the mill, and a maintenance platform that gives operators the ability to replace liners outside of the machine. A transport cart makes it easy to rotate the screw shaft for easier access to parts. The maintenance platform rests on a portable support base with leveling feet, which can be relocated within the plant for use at different mills.

Summary

Grinding mills play a vital role in minerals processing operations. Equipment service and maintenance activities for critical parts and components can present workforce safety risks, leading to additional downtime and significant production losses.

When preparing asset maintenance programs, plant operators should identify potential risks that can impact safety, facilitate maintenance and repair practices, and increase equipment availability. As an OEM, Metso is a trusted partner in delivering solutions that can help to achieve performance targets. From operations controls, component design, temperature monitoring, maintenance systems and more, we offer a complete range of horizontal and vertical grinding service solutions to meet your needs.

Key takeaways



Auxiliary drives lock machines in place for service



Design improves serviceability and functionality



Temperature monitoring protects equipment and reduces downtime



Automation saves time



Enhanced systems improve parts accessibility



Your #1 service partner from pit to port

Are you looking to optimize production, reduce risks, lower operating costs and improve your sustainability performance?

End-to-end solutions

We carry the industry's most comprehensive aftermarket offering, and it's not limited to Metso equipment. We offer parts, process optimization and everything in between.

Optimized performance

Our expertise covers every stage of the minerals process. We connect the dots and solve bottlenecks in a holistic way, elevating your process performance to a whole new level.

Digital mine

Our 45+ digital solutions help add an extra boost to your performance, identifying hidden improvement areas and modeling the solutions with sophisticated simulations.

Sustainable operations

Responsibly produced, long-lasting parts, designed and optimized to minimize wastage, improve energy efficiency and emphasize safety.

Trusted partner

Our dedicated team of experts bring you the unique advantage of local presence backed up with a solid global network of first-class engineering, manufacturing and service.

- Support, manufacturing and parts stock close by
- Reliable, high-performing parts and services
- High safety/ethical/environmental standards
- Training and expertise

**You set the target.
We provide the solution.**



Visit our website

metso.com/grinding



Horizontal grinding upgrades

Learn more about our grinding mill upgrades and services



Vertical grinding upgrades

Find upgrades, parts and services for your vertical grinding needs



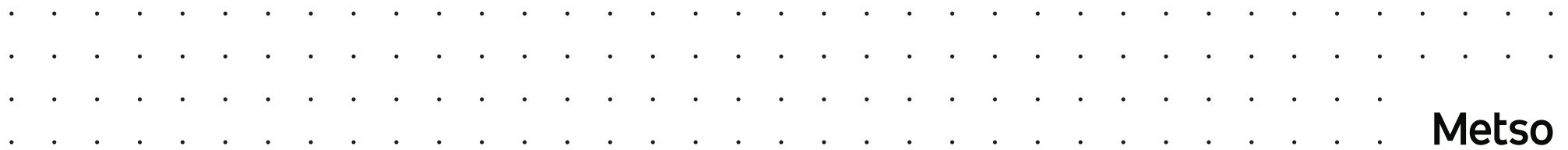
Contact us

Find your closest Metso sales office or distributor



Metso is a frontrunner in sustainable technologies, end-to-end solutions and services for the aggregates, minerals processing and metals refining industries globally. We improve our customers' energy and water efficiency, increase their productivity, and reduce environmental risks with our product and service expertise. We are the **partner for positive change**.

metso.com



Metso