

## Metso inspections

# 3 inspection packages for your horizontal grinding mill

Avoid catastrophic failures by finding problems early



**Issues that are not caught early can lead to breakdowns and unplanned downtime, significantly increasing repair costs and production losses.**

### **Mill Visuals and Vitals**

Quickly catch cracks, oil contamination and slurry leaks

### **Mill Mechanical Verification**

Next level inspection with adjustments and fixes

### **Mill Comprehensive/Customized**

Complete, in-depth package with gear and pinion inspection



**Mill Visuals and Vitals:**  
An external crack discovered on a mill shell while performing a visual inspection.



**Mill Mechanical Verification:**  
Wash pockets discovered inside the mill trunnions. These can be detected from the outside through UT.



**Mill Comprehensive/Customized:**  
A crack and severe damage found on a gear tooth while performing a pinion and gear MPI.

	Mill Visuals and Vitals	Mill Mechanical Verification	Mill Comprehensive/Customized
<b>Core benefit - improved</b>	Mill reliability	Mill integrity	Mill longevity
<b>Downtime required*</b>	1 shift	4 shifts	6 to 8 shifts
<b>Inspection frequency</b>	2 per year	yearly	every 1-3 years
<b>Inspection offering</b>	<ul style="list-style-type: none"> <li>• OEM visual inspection of the mill with temperature, pressure, and flow readings.</li> <li>• Historical data helps predict mill component performance over time.</li> <li>• Detailed future inspections are recommended if needed.</li> </ul>	<ul style="list-style-type: none"> <li>• Visuals and Vitals, plus OEM inspection with guards and covers removed.</li> <li>• Mechanical adjustments and critical torque verifications.</li> <li>• Ultrasonic thickness verification of the trunnion journals to detect wash under the trunnion liners.</li> </ul>	<ul style="list-style-type: none"> <li>• Complete OEM mill inspection. Additional inspections and measurements performed. This includes gear and pinion.</li> <li>• Metso Engineers present retrofit designs and procedures if required.</li> <li>• Recommendations to use as is, monitor or repair.</li> <li>• Customizable on demand.</li> </ul>
<b>Inspection code</b>	FSE5032000517	FSE5432000517	FSE5532000517

\*Number of shifts mill needs to be stopped to complete each inspection with optimum number of millwrights.

Component	Task	Mill status	Package 1	Package 2	Customized
			Mill Visuals and Vitals (1 shift)*	Mill Mechanical Verification(4 shifts)*	Mill Comprehensive (6 to 8 shifts)*
Control room data	Collect basic operating data (tonnage, power draw, speed, etc.)	Operating	●	●	●
Coupling	Visual inspection	Stopped	●	●	●
Gear and pinion	Check temperatures, pinion teeth visual	Operating	●	●	●
Gear guard	Check for lube spills, leaks, and accumulations	Operating	●	●	●
	Check mud guard installation, pinion seal	Stopped	●	●	●
Gear spray	Visually inspect components, check quantity, sequence, and interlocks, verify type of lubricant	Operating	●	●	●
	Spray pattern check	Stopped	●	●	●
Head	Visual inspection	Stopped	●	●	●
Inching drive	Interlocks check (presence of Kirk keys)	Operating	●	●	●
Infrared system	Visual inspection of components, verify reading accuracy of infrared probes	Operating	●	●	●
Jacking cradle	Visual inspection (presence, damage, rust)	Operating	●	●	●
Lube units including brakes for gearless mills	Visual inspection of components (gauges, leaks), oil condition (color, air bubbles), check for noise and vibration, check oil levels (sight glass), pressure differential at filters, pressures and flows (main and pinion bearings), relief valves (closed), temperatures, valves for proper position (open or closed), verify type of lubricant	Operating	●	●	●
Main bearing	Check pressures and flows, seals	Operating	●	●	●
	Visual inspection, check main bearing clearances	Stopped	●	●	●
Pinion bearings	Check flows, temperature, vibration	Operating	●	●	●
Reducer	Check temperature, verify type of lubricant	Operating	●	●	●
	Visual inspection, inspection of oil condition (color, air bubbles)	Stopped	●	●	●
Shell	Visual inspection	Stopped	●	●	●
Soleplates and grout	Visual inspection	Stopped	●	●	●
Trommel	Visual inspection (frame wear, panel wear, drip ring)	Stopped	●	●	●
Trunnion	Check temperature	Operating	●	●	●
	Visual inspection	Stopped	●	●	●
Trunnion liners	Check weep holes for plugging (leaks, racing), inspect trunnions with camera through the weep holes, visual inspection for wear and cracks	Stopped	●	●	●
Brakes	Check brake pads, accumulators, filters for gearless mills	Stopped		●	●
Coupling	Alignment check, mechanical adjustment	Stopped		●	●
Feed chute and spout	Visual inspection (wear pattern), make necessary adjustments, inspect hydraulic unit (lateral wheels)	Stopped		●	●
Gear and pinion	Visual inspection of teeth, contact, backlash, and gear root check	Stopped		●	●
Gear guard	Check lube packing at pinion	Stopped		●	●
Motor	Hold down bolts torque check, internal clearance check, magnetic center check	Stopped		●	●
Pillow blocks	Cap and hold down bolts torque check	Stopped		●	●
Pinion bearings	Internal clearance check	Stopped		●	●
Reducer	Check soft foot, hold down bolts torque check	Stopped		●	●
Trunnion	Trunnion runout, UT inspection of journals	Stopped		●	●
Anchor bolts	UT inspection	Stopped			●
Concrete piers	Core sampling survey	Stopped			●
Gear and pinion	Gear wash	Operating			●
	MPI inspection teeth, axial and radial runouts, gear mounting bolt torque check, gear split bolt torque check	Stopped			●
Head	Circumferential and radial bolts torque check, UT inspection of flanges, UT inspection of wall thickness	Stopped			●
Mill positioning	Mill survey	Stopped			●
Shell	Longitudinal bolts torque check, MPI of welds, UT inspection of flange, UT inspection of shell plate	Stopped			●
Trommel	Bolt torque check	Stopped			●
Trunnion	Bolt torque check, UT inspection of flange	Stopped			●

A comprehensive inspection report outlining the data taken and assessment of the condition of the components is provided with each package.

The above represent standard recommended packages from Metso. Within each package, customization is possible, allowing you to add or subtract services to meet your specific needs.

\*Number of shifts mill needs to be stopped to complete each inspection with optimum number of millwrights.





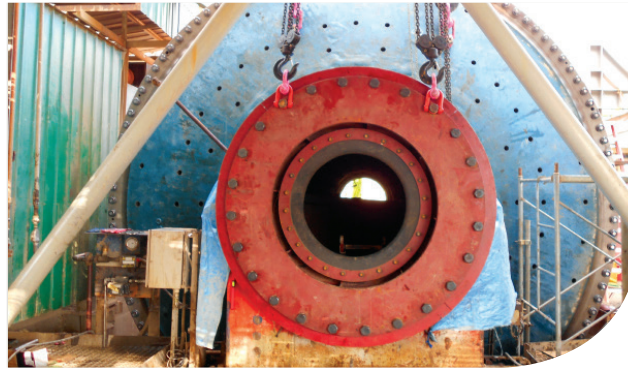
## A nickel mine in central Canada

**Challenge:** A critical Sag mill in the mine's concentrator plant was showing its age after years of production, creating a potential bottleneck. A preventive maintenance program was put in place, but unplanned downtime continued to rise due to problems with the mills trunnion bearings and pinion alignment. Using non-destructive testing to highlight problem areas, a major crack on the gear was detected.

**Results:** Because the crack could compromise the operation of the mill, the mine decided to completely replace the gear, pinions as well as the shell and gear guard in the coming year. Within 6 weeks all components were replaced and commissioned, saving multiple weeks of production. With the new shell and gear installed, the mill's reliability was restored to "as new".

### Metso solution

Leveraging its OEM knowledge of mill design, Metso designed and executed an innovative method of replacing the mill's shell. The shell was replaced one section at a time without a complete teardown. Metso designed custom alignment tools and lifting lugs with certified lifting plans to ensure accuracy and safety. Metso acted as the general contractor for the entire project, excluding the removal and installation of the liners.



## A gold mine in the Philippines - Masbate Gold Project

**Challenge:** The mine was experiencing issues with bolt breakage on one of their ball mill heads. The breakage originated from the trunnion to head connection and worsened with time. Metso conducted an inspection of the mill and recommended replacing the mill head rather than continue to suffer downtime and lost production.

**Results:** Metso manufactured the replacement head, with an integral trunnion to replace the bolted joint. Metso teams installed and supervised alongside the mine's engineers. Since the installation, the mine has not had any issues with the newly installed head, allowing them to improve the mill's availability by reducing unplanned service stoppages. Metso has now been awarded a second identical mill head order at the mine site.

### Metso solution

Designing the head with an integral trunnion required considerable reverse engineering of the existing parts while adhering to the strict tolerances needed to replace the existing third-party head. Metso Surabaya sent two crews to work in conjunction with Masbate's own mechanical fitters, for the installation and commissioning of the new mill head.



## A North American iron ore mine

**Challenge:** The mine's operations were expected to cease within a decade due to declining resources in the nearby ore bed. With new findings at a second ore bed, the plant suddenly needed to increase production. However, the existing grinding mills required an assessment to determine their actual condition. Metso was mandated to conduct a visual and non-destructive inspection of the mill.

**Results:** Through the inspections, the mine could better understand the current condition of their equipment and determine what actions were required to ensure the integrity of their assets. The mine is using the information to map out their options for refurbishments and upgrades.

### Metso solution

Metso conducted a complete inspection including verification of the condition of major components. This included the drive train, wear parts progression, instrumentation. Further tests were performed to spot cracks and defects. Metso supplied costing for supply and installation of parts as well as the estimated downtime to calculate production losses.

Read more at:

 [metso.com/showroom](https://www.metso.com/showroom)