

# Metso

Inspection packages

## Rotary kiln inspection packages



Application

Regular, systematic inspections provide you with a clear understanding of the current condition and maintenance needs of your equipment to keep your operations running.

Three inspection packages for your Metso rotary kiln designed to reduce unplanned downtime, equipment failure and tasks associated with operating faulty equipment.



### Benefits

- Reduced downtime
- Extended kiln lifetime
- Increased reliability
- Improved safety
- Minimized plant downtime
- Better visibility of maintenance requirements

As production rates increase and fluctuate, mechanical and alignment issues can creep up with your kiln. If potential problems are not caught early, they can lead to unplanned shutdowns and breakdowns that have significant operational and financial impact.

Get fast, accurate information about the condition of your equipment, recommendations for maintenance and improved operation with our systematic rotary kiln inspections.

The information provided will assist in minimizing unscheduled downtime and reduce long-term operating expenses. Our specialists can also recommend service agreements and spare parts.

### Features

- Faster, easier inspections mean you get recommendations you can quickly act on
- Reports are clear, thorough and easy to share with colleagues
- Benchmark your kiln and identify trends based on current and historical data
- Comprehensive data gathering improved your decision-making

### 1. Kiln visuals and vitals

Complete visual inspection of all kiln components, evaluation of overall condition

### 2. Kiln mechanical verification

Inspection of internal and external mechanical components, diagnostic and root-cause analysis

### 3. Kiln comprehensive/customized

End-to-end survey using specialized equipment

# Kiln inspection packages



|                                     | 1. Visuals and vitals  | 2. Mechanical verification  | 3. Comprehensive/customized  |
|-------------------------------------|--|---|--|
| Core benefit                        | Predictive maintenance, improving equipment availability and planning  | Operational effectiveness, enhancing fuel efficiency and throughput   | Long-term reliability, increasing the overall life of your kiln  |
| Downtime required                   | 0 shifts - completed during normal operation   | 0 shifts for all external inspections<br>1-2 shifts for internal inspection during your planned shutdown  | 0 shifts - completed during your normal operation<br>*Optional: 1-2 shifts for internal inspection during your planned shutdown  |
| Inspection frequency recommendation | Annually   | Annually during planned shutdowns   | Every 2-3 years and immediately for older kilns that have not been inspected recently  |
| Inspection offering                 | OEM inspection, targeting cooling and emergency equipment, contact and wear patterns, as well as seal and shell conditions. Trained personnel provide comprehensive reports and recommendations. | In addition to a complete Visual & Vitals inspection, a full mechanical evaluation is performed. During shutdown, the kiln's internal systems are also analyzed as well as a full bearing inspection. | Using the latest technology, OEM experts analyze shell profile, ovality, roller shaft flexing and distortion, tire and gear runout. This package can easily be accomplished by a hot kiln alignment. |

**Metso is the OEM for Allis Chalmers, Kennedy Va Saun, Stansteel, Svedala and others.**

**With decades of experience, we have the expertise to ensure rotary kilns are functioning properly and efficiently — no matter the make or model.**

**Most kiln problems can be attributed to five core issues, all of which can be found and subsequently addressed through our inspection packages:**

- |  |   |
|--|---|
| 1. Improper lubrication of kiln components                         | 4. Shell crank effect on carrying stations (dogleg) |
| 2. Misalignment in horizontal & vertical axis (hot kiln alignment) | 5. Shell flex at each pier (ovality)                |
| 3. Carrying roller thrust balance at each pier (kiln float)        |   |

# Rotary kiln - inspection packages

| Component                                       | Task   | Kiln status   | Package 1          | Package 2               | Customized                |
|---|--|---------------|--------------------|-------------------------|---------------------------|
|   |  |               | Visuals and Vitals | Mechanical Verification | Comprehensive/ Customized |
| Satellite Cooler/ Tube Cooler Condition         | Inspect product cooling equipment external components  | Operating     | ●                  | ●                       | ●                         |
| Carrying Roller Face Condition                  | Visual inspection of contact and wear pattern  | Operating     | ●                  | ●                       | ●                         |
| Riding Ring/Tyre Face Condition                 | Visual inspection of contact and wear pattern  | Operating     | ●                  | ●                       | ●                         |
| Carrying Roller Station Condition               | Visual inspection of grout, base frame, carrying roller bearing housing & thrust roller at drive pier                    | Operating     | ●                  | ●                       | ●                         |
| Gear Condition                                  | Visual inspection of tangent plates, welds, and bolts  | Operating     | ●                  | ●                       | ●                         |
| Feed & Discharge Air Seal Condition             | Visual inspection of air seal components   | Operating     | ●                  | ●                       | ●                         |
| Shell Condition                                 | Visual inspection of shell profile   | Operating     | ●                  | ●                       | ●                         |
| Filler Bar Assembly Condition                   | Inspection of riding ring/tyre retaining block, side and end key blocks condition and the filler bar for wear and cracks | Operating     | ●                  | ●                       | ●                         |
| Roller Bearing Housing Internal Condition       | Verify condition of internal components  | Not operating |                    | ●                       | ○                         |
| Carrying Roller Shaft Condition                 | Inspect shaft for any scoring (excluding UT)   | Not operating |                    | ●                       | ○                         |
| Carrying Roller Bearing House Bronze Liner Wear | Inspect liner for major wear   | Not operating |                    | ●                       | ○                         |
| Drive Component Condition                       | Verify all major components of kiln main drive and emergency drive   | Not operating |                    | ●                       | ○                         |
| Gear and Pinion Pitch Lines                     | Verify pitch line separation   | Not operating |                    | ●                       | ○                         |
| Kiln Internals (Lifters, chains, feed spirals)  | Inspect components for wear and damage   | Not operating |                    | ●                       | ○                         |
| Discharge Castings                              | Inspect grizzly lump breakers, discharge end castings and port grate castings  | Not operating |                    | ●                       | ○                         |
| Burner Condition                                | Inspect burner assembly  | Not operating |                    | ●                       | ○                         |
| Gear Profile                                    | Profile 2-3 teeth at four locations  | Not operating |                    | ○                       | ○                         |
| Ovality   | Collect and analyze data at each pier  | Operating     |                    |                         | ●                         |
| Shell Profile (runout)                          | Collect and analyze data along length of kiln  | Operating     |                    |                         | ●                         |
| Roller Shaft Deflection                         | Collect and analyze data at roller shafts  | Operating     |                    |                         | ●                         |
| Roller & Base Slope                             | Verify slope of roller and base  | Operating     |                    |                         | ●                         |
| Gear Axial & Radial Runout                      | Collect and analyze runout data  | Operating     |                    |                         | ○                         |
| Tyre Wobble (axial runout)                      | Collect and analyze runout data  | Operating     |                    |                         | ○                         |
| Kiln Alignment Measurements                     | Collect and analyze measurements to define hot kiln axis of rotation   | Operating     |                    |                         | ○                         |

● = included in package ○ = optional

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

The above represents standard recommended packages from Metso. Customization is possible within each package, allowing you to add or remove services to meet your specific needs.

Note that some services are subject to availability, depending on region and operating condition. All details, specific to your operations, will be provided in the proposal.

# Kiln inspection packages

## 40 year old lime recovery kiln – Australia

### Challenge

The aging, 3-pier, 70 m long kiln at an Australian paper mill was suffering a range of issues that were severely impacting availability and thermal efficiency. Commissioned in the 1980s, this non-Metso kiln had undergone numerous small repairs during its lifetime. However, wear and tear and an outdated design meant that the client was faced with major repairs and modifications to return the kiln to optimum performance while staying within capital budget constraints. Numerous issues were visible to the eye, however, the root cause had not been determined and a real repair plan had not been put in place.

### Results

A comprehensive mechanical inspection and detailed alignment brought the true cause of numerous issues to light. With detailed data in hand, the customer opted to work with Metso to implement interim repairs right away, followed by major refurbishments. Repairs and upgrades to the refractory lining, discharge seal, and a shell replacement resulted in a significant reduction in fuel consumption, improved kiln mechanical reliability and a distinct reduction in unplanned stoppages for mechanical issues. The culmination of these enhancements increased the kiln's availability and efficiency, providing a significant improvement in the client's operating costs.

### Solution

After a visual inspection, it was clear that the biggest issue impacting kiln availability was the breaking of tangent plates, with the resulting wear on the gear and pinion. These types of issues can be caused by numerous issues such as poor welding procedures, material quality and lubrication, among others. The operator had tried multiple repair methods for the tangent plates over the previous two years, to little result, except an unfortunate waste of time and money. This is a very typical scenario especially among large mechanical installations, where a lack of resources affects the ability to do a true root cause analysis.

At that point, the kiln was subjected to the Metso Hot Kiln Alignment and Mechanical Inspection program to identify the major causes of the various issues. Metso then worked with the client to develop the most cost-effective solution. One of the main problems identified was that the high run-out of the kiln shell was the real cause of the high wear on the gear and pinion and continual breakage of tangent plates.

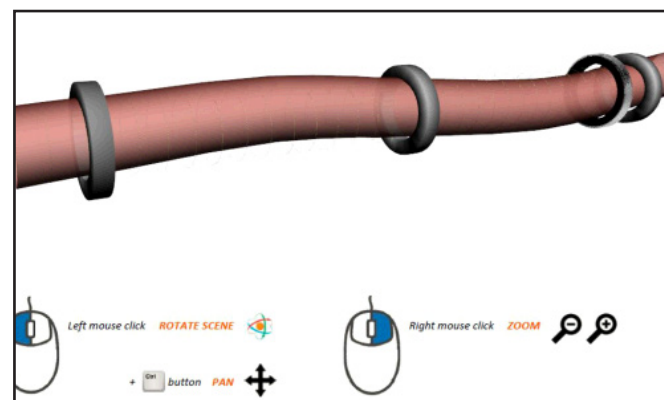
Then, using a shell profile analysis that is part of Metso's standard package, the most critical areas of kiln shell deformation were identified and recommended for replacement. Further detailed measurements indicated that the wear on the gear teeth was close to the limit and gear/pinion replacement was also advised.

### Key learning

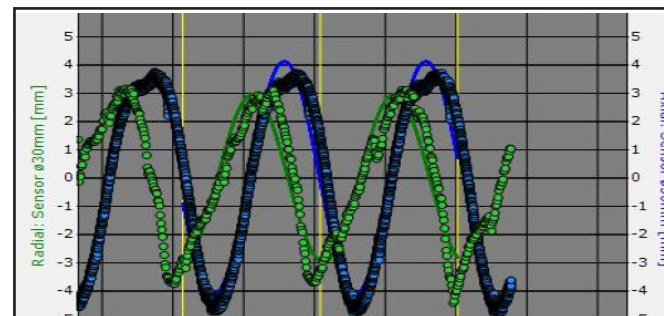
Many kiln problems are due to poor alignment, but not all. A visual observation can identify misalignment, but the necessary adjustments to correct this condition and possibly identify others can only be determined after measurements and analysis. When inspections are done on a regular basis, operators are armed with the data to make better more informed decisions.



Extracts from the inspections and measurement report



The eccentric motion of the kiln shell during rotation is measured, together with the deformation of the shell shape profile.



The axial and radial run-out of the gears are measured and compared with industry tolerances.