

# Metso:Outotec

Inspection services

## Rotary kiln inspection packages



3 Inspection packages for your Metso Outotec rotary kiln designed to reduce unplanned downtime, equipment failure, and risks associated with operating faulty equipment.



As production rates increase and fluctuate, mechanical and alignment issues with your kiln can creep up. If potential problems are not caught early, they can lead to unplanned shutdowns and breakdowns which 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 improves 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 & root-cause analysis

### 3. Kiln Comprehensive/Customized

End-to-end survey using specialized equipment, and a deep-dive into potential issues

### Benefits

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

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

# Metso Outotec kiln inspection packages



	1. Visual 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 1-2 shifts for internal inspection, during your planned shutdown	0 shifts- completed during normal operation *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 which 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 accompanied by a hot kiln alignment.

**Metso Outotec is the OEM for Allis Chalmers, Kennedy Van 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
2. Misalignment in horizontal & vertical axis (hot kiln alignment)
3. Thrust balance of carrying rollers at each pier (kiln float)
4. Shell crank effect on carrying stations (dogleg)
5. Shell flex at each pier (ovality)

# 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 Outotec. 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.



# Rotary kiln inspection case study

## 40 year old Lime Recovery Kiln – Australia

### Challenge

The ageing, 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 1980's this non-Metso Outotec kiln had undergone numerous small repairs during its lifetime. However, wear and tear as well as an outdated design meant that the client was faced with major repairs and modifications to return the kiln to optimum performance, whilst keeping within capital budget constraints. Numerous issues were visible to the eye; however, the root cause had not been determined and therefore 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 Outotec 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 availability and efficiency of the kiln, 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, lubrication, as well as many 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 Outotec Hot Kiln Alignment and Mechanical Inspection program to identify the major causes of the various issues. Metso Outotec 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.

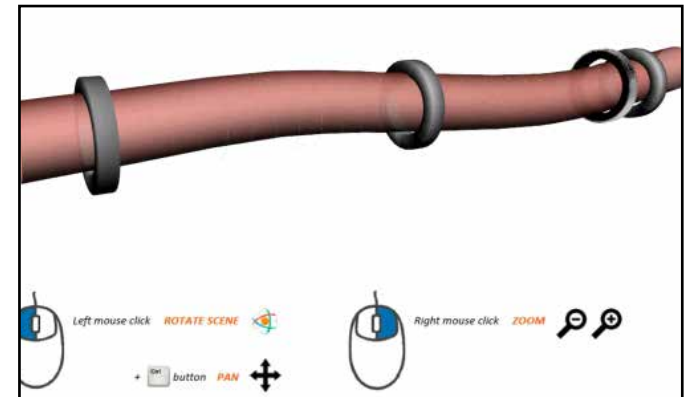
Then, using a shell profile analysis which is part of Metso Outotec's standard package, the most critical areas of kiln shell deformation were identified and recommended for replacement. Further detailed measurements indicated that the wear on the gear teeth was close to the limit and gear/pinion replacement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

### Key learning

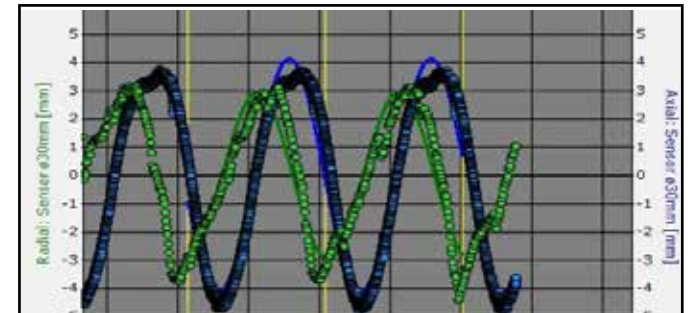
Many kiln problems are due to poor alignment, but not all. A visual observation can identify mis-alignment but the necessary adjustments to correct this condition and possibly identify others, can only be determined after measurements and analysis. With inspections being done on a regular basis, operators 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.