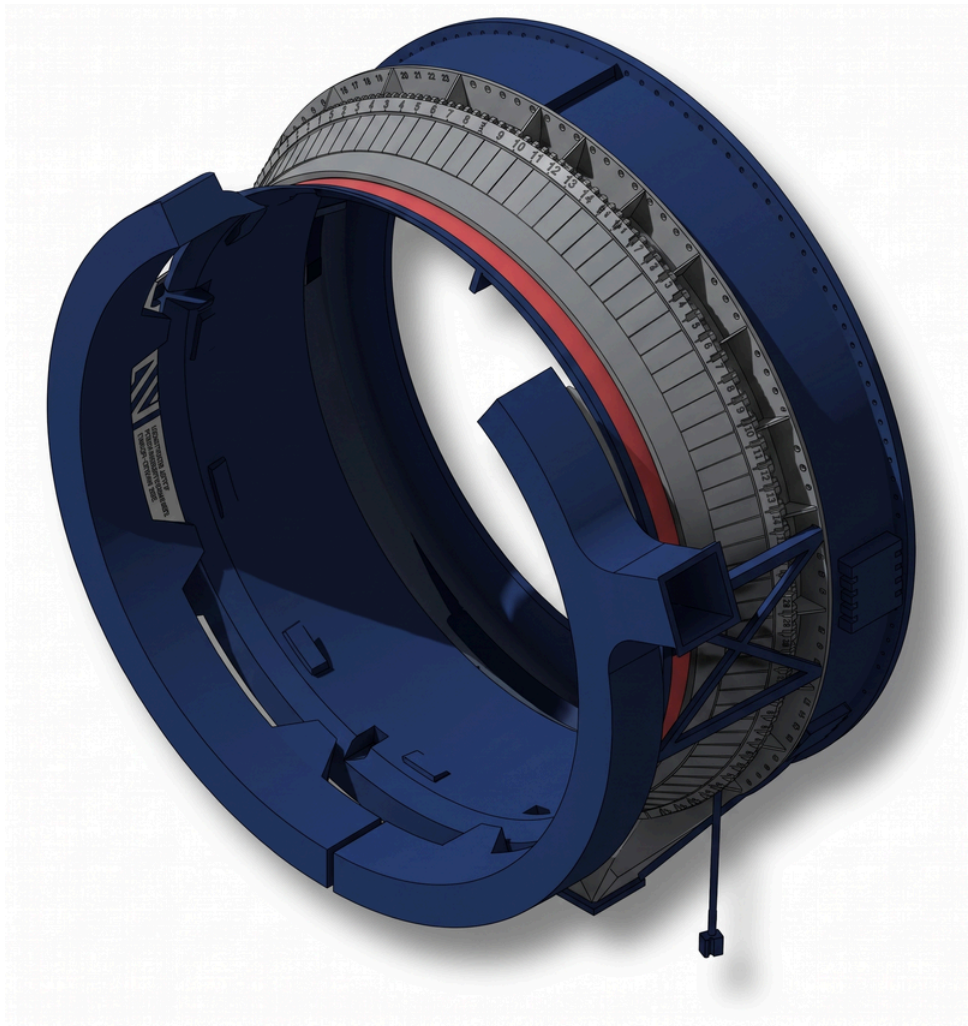




Lamella-Based Sealing Elements

Global Leader in Cement Process Technology Since 1985

Since 1985, Oswal kiln seal has specialized in precision-engineered systems for the cement industry, focusing on process stability, material handling, and quality control. With deep domain expertise and a process-driven approach, the company delivers reliable solutions that enhance efficiency, reduce variability, and ensure consistent plant performance aligned with global standards.

Key Benefits

■
Industry
Leadership

■
Pioneering
Innovation

■
Maximise energy
efficiency

■
Optimise
performance

■
Safety and
Reliability

Lamella-Based Sealing Elements

Rotary kilns operate under continuously changing mechanical conditions — where shell ovality, axial displacement, thermal expansion, and structural deformation are inherent to normal operation.

In such environments, sealing systems must do more than resist movement — they must adapt to it in real time.

Lamella-based sealing elements represent a fundamentally different engineering approach.

Instead of rigid contact, they provide controlled flexibility, allowing each sealing segment to conform dynamically to the kiln shell while maintaining continuous sealing integrity.

Conventional rigid sealing systems fail under these conditions due to loss of contact, excessive stress concentration, or structural fatigue. Lamella systems, by contrast, are engineered to deflect, absorb, and adapt, ensuring consistent sealing performance under real kiln behavior.

Oswal Kiln Seal designs lamella-based sealing elements engineered for dynamic compensation, controlled contact pressure, and long-term durability, enabling reliable sealing performance across all operating cycles.

Key Advantages

- Adaptive sealing under continuous shell movement
- Effective compensation for shell ovality and deformation
- Reduced false air ingress through maintained contact
- Controlled sealing pressure with low mechanical stress
- Improved combustion stability and thermal efficiency
- Extended service life with reduced maintenance

Engineering Concept

Lamella sealing is based on the principle of controlled elastic deflection.

Each segment is designed to:

- Conform to the kiln shell geometry
- Maintain sealing contact during movement
- Absorb mechanical variation without overstressing

This ensures continuous sealing performance without structural failure or loss of contact.

The Principle of Dynamic Adaptation

Key operational challenges:

- Shell ovality due to tyre loading
- Thermal expansion and contraction
- Axial displacement
- Mechanical deformation cycles

The lamella system ensures:

- Adaptive deflection to match shell profile
- Uniform contact across sealing interface
- Continuous sealing during deformation cycles

Result: Stable sealing performance under dynamic kiln conditions

Lamella System Operation

Continuous sealing maintained during:

- Shell ovality fluctuations
- Thermal expansion cycles
- Axial and radial movement
- Mechanical stress variations

Adaptive response to:

- Surface irregularities
- Process disturbances
- Load redistribution

Outcome: Consistent sealing contact without rigidity-induced failure.

Adaptation to Shell Ovality

- Deflection of lamella segments under shell deformation
- Maintenance of uniform contact across sealing arc
- Prevention of gap formation during deformation cycles
- Compensation for tyre-induced ovality effects

Contact Pressure Control

- Even pressure distribution across sealing surface
- Controlled deflection characteristics
- Minimal localized stress concentration
- Stable friction behavior under sliding contact

Mechanical Resilience

- Fatigue resistance under continuous cyclic flexing
- Structural elasticity for long-term performance
- Dimensional stability under thermal load
- Wear resistance under dynamic contact conditions

Integration with Hybrid Systems

Lamella elements are integrated across Oswal sealing architectures:

- Duplex Kiln Sealing Systems
- Kiln Inlet Sealing Systems
- Kiln Outlet Sealing Systems
- Radial Sealing Configurations

In hybrid systems:

- Lamella flexibility complements graphite durability
- Balanced sealing performance under thermal and mechanical stress

Draft & Process Impact

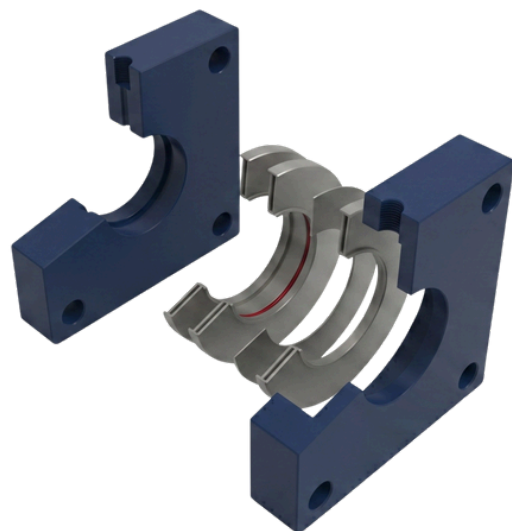
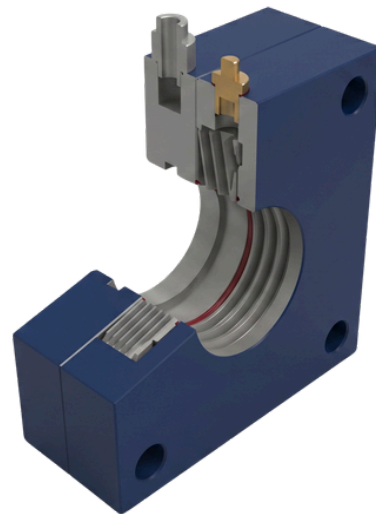
- Reduced false air ingress
- Stabilized draft conditions
- Improved combustion consistency
- Enhanced thermal efficiency
- Reduced energy losses

Operational Advantages

- Continuous sealing under dynamic movement
- Reduced mechanical stress on sealing components
- Extended sealing system lifespan
- Lower maintenance requirements
- Improved kiln reliability

Typical Applications

- Cement rotary kilns
- High-temperature clinker production systems
- Lime and mineral processing kilns



Problem vs Solution

The Challenge

- Loss of sealing due to shell deformation
- Stress concentration in rigid systems
- Gap formation under ovality
- High wear and fatigue

Oswal Lamella Solution

- Flexible adaptive sealing elements
- Controlled deflection mechanism
- Uniform pressure distribution

Proven Industry Impact

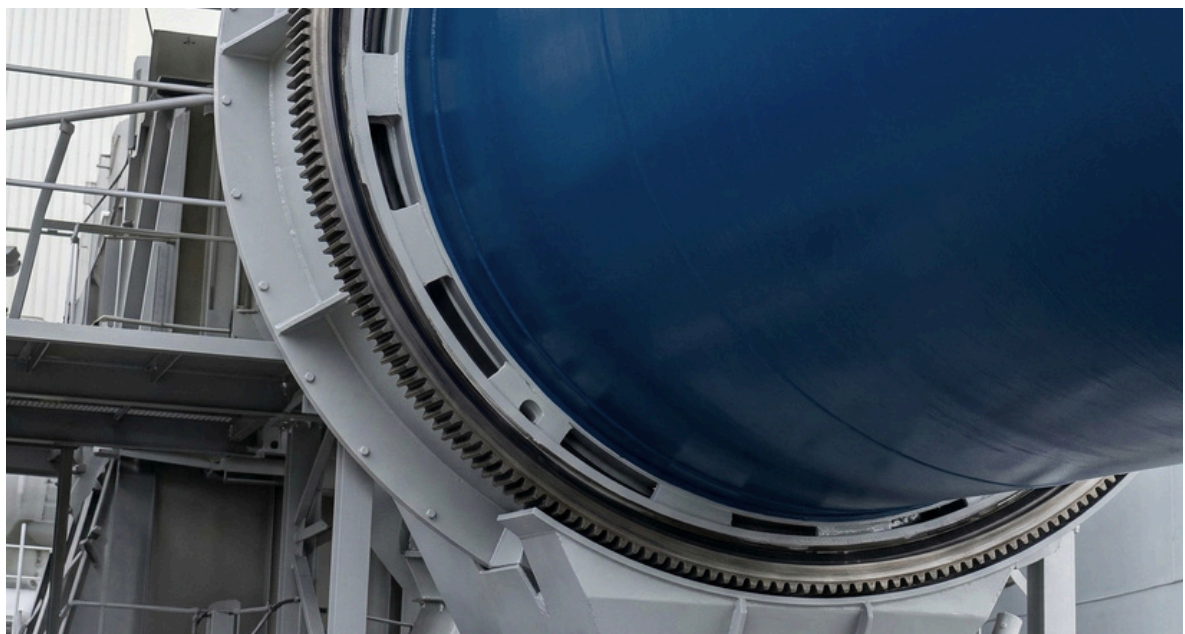
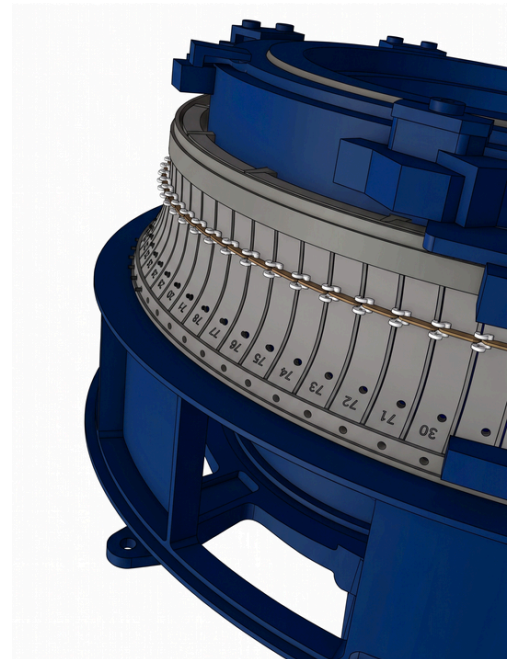
- Improved sealing reliability under dynamic conditions
- Reduced maintenance and replacement frequency
- Enhanced process stability
- Increased equipment life
- Lower operational cost

Engineering Outcome

Dynamic movement compensation. Controlled sealing pressure.

Continuous contact under shell deformation.

Lamella-Based Sealing Elements by Oswal Kiln Seal deliver flexible, resilient sealing performance in high-temperature clinker production environments — ensuring reliable operation, improved efficiency, and long-term durability.



SUSTAINABILITY IMPACT

Reducing Energy Loss at the Source

False air ingress is a major hidden driver of excess fuel consumption in rotary kilns.

Oswal Lamella-Based Sealing minimize uncontrolled air entry, directly reducing the thermal load on the kiln.

Result:

- Lower coal and fuel consumption
- Improved thermal efficiency
- Reduced CO₂ emissions per ton of clinker

Energy Efficiency & Power Optimization

By stabilizing seal pressure and airflow, the system enables:

- Reduced ID fan speed
- Lower electrical power consumption
- Optimized fuel-to-output ratio

Mechanical precision translates into measurable energy savings.

Aligned with Global Sustainability Goals

Oswal Lamella-Based Sealing systems support industry-wide initiatives focused on:

- Energy efficiency improvement
- Emission reduction
- Operational excellence in cement manufacturing

Emission Control & Environmental Performance

Effective sealing improves process control and reduces environmental impact:

- Lower NOx and CO variability
- Reduced dust leakage at kiln interfaces
- Improved particulate containment

Supports compliance with modern environmental standards.

Process Stability & Resource Efficiency

Stable combustion and controlled draft conditions lead to:

- Consistent clinker quality
- Reduced process fluctuations
- Lower material wastage

Improved process efficiency supports sustainable production.



Lower fuel consumption. Reduced emissions. Optimized energy use.

Oswal Lamella-Based Sealing enable more sustainable and efficient kiln operation.



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