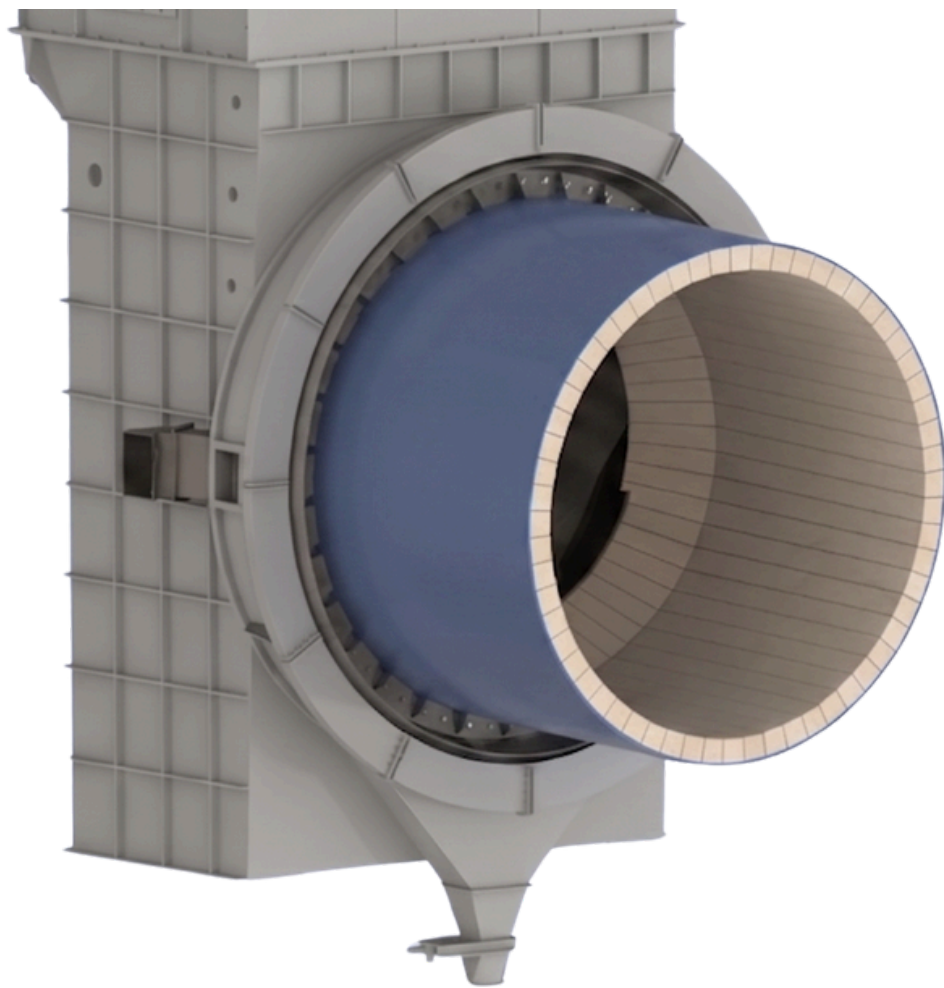


# OSWAL

kiln seals



## Duplex Kiln Sealing System

# Global Leader in Cement Process Technology Since 1985

Since 1985, Oswal Engineers 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

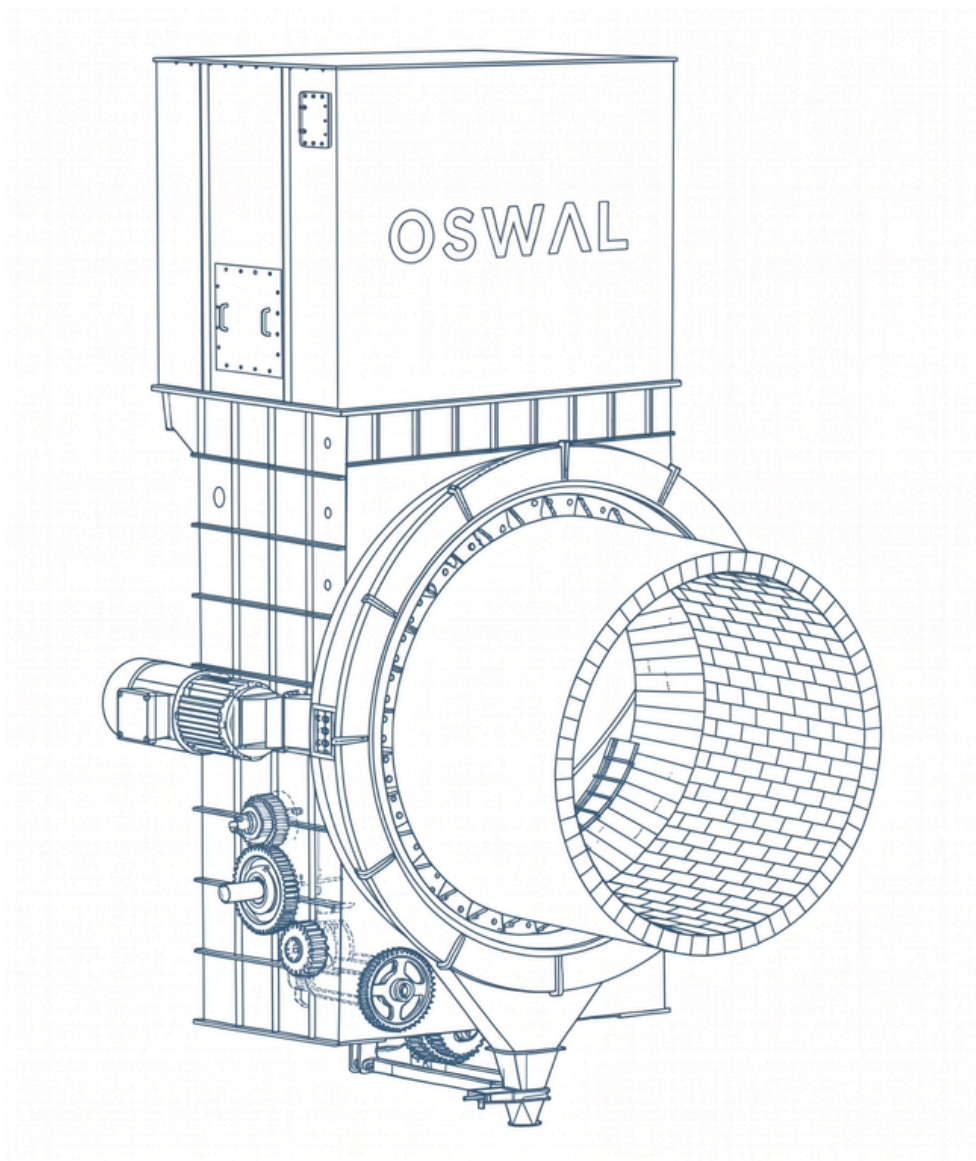
■  
Safety and  
Reliability

# Duplex Kiln Sealing System

Oswal's Duplex Kiln Sealing System represents a fundamental shift in how rotary kiln sealing is engineered.

Conventional sealing systems are designed for static conditions – while rotary kilns operate under continuous axial movement, thermal expansion, shell ovality, and mechanical distortion. This mismatch leads to sealing failure, false air ingress, and unstable kiln performance.

The Duplex system is engineered not for ideal conditions – but for real kiln behavior. By combining lamella-based flexibility with graphite-based thermal sealing, the system maintains continuous sealing integrity under dynamic operating conditions, ensuring stable combustion, controlled draft, and improved energy efficiency.



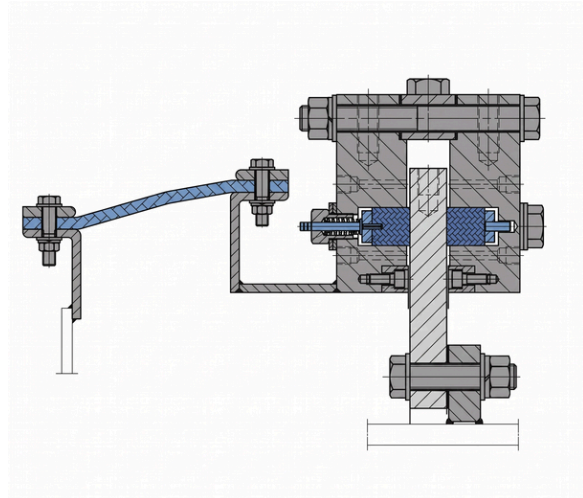
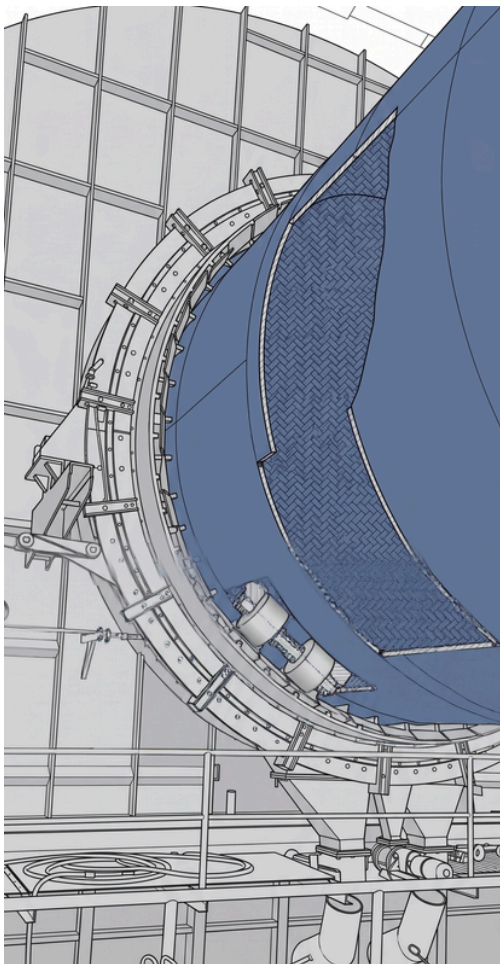
# Engineering Concept

Rotary kilns operate under continuously changing geometry. A rigid sealing system cannot sustain performance under such conditions.

The Duplex system introduces a **hybrid adaptive sealing architecture**:

- Lamella system absorbs mechanical movement
- Graphite system ensures thermal sealing continuity
- Combined system maintains uniform sealing pressure

This allows the seal to adapt dynamically rather than resist movement.



## Key Advantages

- Low false air ingress — sealing adapts to kiln movement
- High thermal stability under extreme operating temperatures
- Frees up energy losses caused by leakage and instability
- Environmentally optimized with reduced emissions variability
- Low noise and minimal mechanical stress
- Long operational life with reduced maintenance

## The Principle of Adaptive Sealing

Driving forces in kiln operation:

- Axial displacement
- Radial shell expansion
- Thermal growth
- Shell ovality

The Duplex system transforms these challenges into controlled behavior:

- Movement is absorbed
- Sealing pressure is maintained
- Leakage paths are eliminated

Result: **Stable sealing performance independent of kiln distortion**

## Duplex System Operation

- Continuous sealing under real kiln movement
- Lamella compensates axial & radial variations
- Graphite maintains high-temperature sealing contact
- Pressure distribution remains uniform across sealing interface

### Example:

A kiln with high ovality and thermal expansion continues to maintain sealing integrity without loss of performance.

## Proprietary Hybrid Sealing Design

- Dual-layer sealing system (Lamella + Graphite)
- Full-length sealing continuity — no dead zones
- Designed for extreme temperature and abrasive environments
- Adaptive response across entire kiln circumference

## Mechanical Design Architecture

- Primary lamella interface for movement compensation
- Secondary graphite interface for thermal sealing
- Heavy-duty structural housing for stability
- Controlled pressure distribution mechanism
- Modular design for easy installation and service

## False Air Control Performance

- Significant reduction in false air ingress
- Improved combustion efficiency
- Stable kiln draft and process control
- Reduced ID fan load
- Lower fuel consumption
- Controlled emission fluctuations

## Lifecycle & Operational Value

- Reduced maintenance frequency
- Lower seal replacement cost
- Extended refractory life
- Increased kiln availability
- Long-term energy savings

## Typical Applications

- Cement rotary kilns
- Lime kilns
- Mineral processing kilns
- High-temperature pyro systems



# Problem vs Solution

## The Challenge

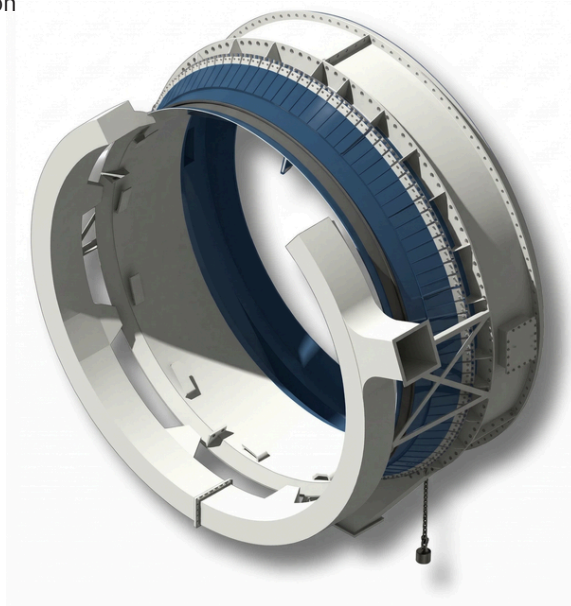
- Excessive false air ingress
- High fuel consumption
- Unstable combustion
- Frequent seal failures

## The Duplex Solution

- Lamella flexibility
- Graphite durability
- Adaptive axial & radial compensation

## Proven Industry Impact

- Reduced false air to minimum levels
- Improved thermal efficiency
- Stabilized kiln draft
- Increased production reliability
- Reduced overall energy consumption



## Engineering Outcome

**Adaptive sealing. Thermal durability. Dynamic compensation.**

The Duplex Kiln Sealing System by Oswal Engineers delivers **precision false air control under real kiln conditions** — ensuring stable combustion, optimized energy performance, and long-term operational reliability.

## Rapid Payback Period

The Oswal Duplex Kiln Sealing System delivers a **fast return on investment**, typically within **6 to 18 months**, driven by:

- Reduced fuel consumption
- Lower ID fan power usage
- Improved process stability

This ensures that the system not only enhances operational performance but also generates measurable financial impact within a short timeframe.

# SUSTAINABILITY IMPACT

## Reducing Energy Loss at the Source

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

Oswal Duplex Kiln Sealing Systems minimize uncontrolled air entry, directly reducing the thermal load on the kiln.

Result:

- Lower coal and fuel consumption
- Improved thermal efficiency
- Reduced CO<sub>2</sub> emissions per ton of clinker

## Energy Efficiency & Power Optimization

By stabilizing kiln 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 kiln 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 NO<sub>x</sub> 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 Kiln Sealing Systems enable more sustainable and efficient kiln operation.**



**OSWAL GROUP OF INDUSTRIES company**

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