

# SPRING TENSIONED GRAPHITE SEAL

Reliable and efficient kiln sealing

# RELIABLE AND EFFICIENT KILN SEALING

Efficient and reliable kiln sealing improves energy efficiency, reduces emissions and extends equipment life, helping you meet your environmental targets as well as your production goals. That's why we've enhanced our kiln seal with a new thrust mechanism design that improves sealing efficiency and service life.

## KEY BENEFITS

**Efficient sealing**

**Reliable long-lasting operation**

**Low maintenance**

**Reduced power and fuel  
consumption**

# WHAT'S NEW WITH THE SPRING TENSIONED GRAPHITE SEAL

The high sealing efficiency of the new FLSmidth Cement Spring Tensioned Graphite Seal prevents false air from entering the system and reduces the release of hot gasses and dust particles from the kiln.

Reduced fuel and power consumption go hand in hand with high sealing efficiency, providing you with a swift ROI. It's an easily adaptable solution for almost any kiln type. Immediate benefits, with no compromises.

Three key features contribute to the success of the Spring Tensioned Graphite Seal:

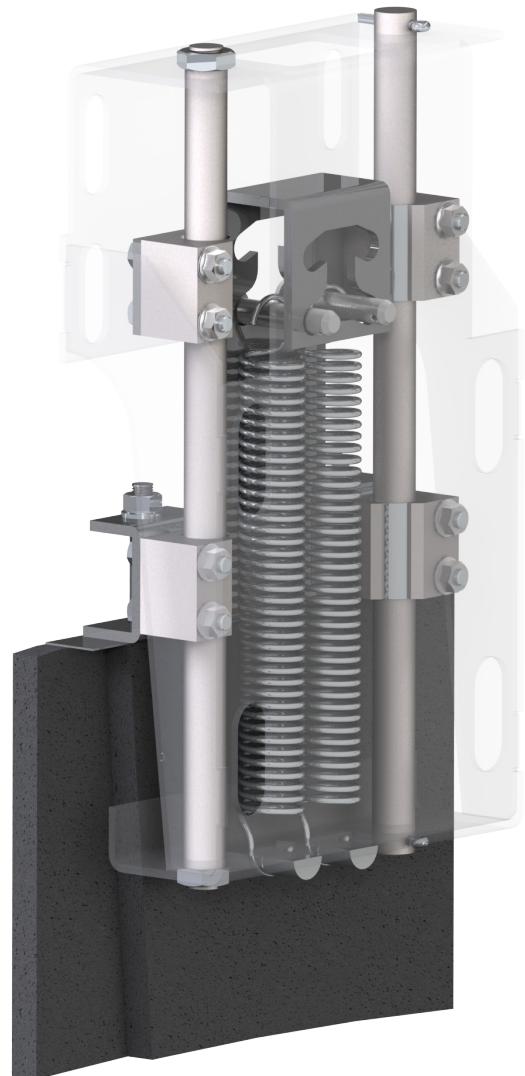
- Unique mechanism to thrust the graphite block against rotating parts
- Linear guide for each graphite block to control lateral movement
- A design that can handle a runout of up to  $\pm 50\text{mm}$

## Easy sealing

The inline row of graphite blocks that make up the FLSmidth Cement Spring Tensioned Graphite Seal are actuated by individual thrust modules, which ensure efficient sealing towards the rotating parts – i.e. the sealing ring or the cooling mantle – at inlet and outlet, respectively. This arrangement allows the graphite blocks to move individually with the movement of the kiln without any risk of getting stuck or damaged. We've also added a linear guide system to the tensioning module to prevent lateral movement and stop false air entering the kiln system.

## The thrust module – how it works

The compact thrust module generates the individual thrust to each graphite block by a spring suspended/tensioned in the module. Four bearings operate with low friction on two hardened stainless-steel shafts to secure a controlled and fast response to the kiln runout. The module easily takes up any movements of up to  $\pm 50\text{mm}$  caused by kiln runout, ovality or expansion. With an individual tensioning arrangement for each block, we eliminate the risk of failure across numerous blocks compared to other tensioning systems, such as wire ropes. The spring force can be adjusted as the graphite blocks wear.





Kiln inlet graphite seal 2.0 - main components

### A simple solution for kilns of all sizes

The Spring Tensioned Graphite Seal is highly flexible and easily adaptable to any size of kiln – both of FLSmidth Cement and third-party design. The graphite seal modules are designed to integrate with the existing casing and cooling mantle without any modification – they are the same irrespective of the kiln size. Other equipment, such as kiln shell, fans and hoppers can easily be adjusted, which helps keep the installation cost to a minimum.

### Fast and easy installation

To reduce downtime during installation, the kiln graphite seal is designed in flanged modules that can be easily pre-assembled.

The thrust modules are built in the workshop where the linear guide is tested and various graphite seal assemblies are match-marked for ease of installation. Depending on the scope, the typical installation of a new Spring Tensioned Graphite Seal requires 7 to 10 days.

### Built to last

The wear parts are made to run for a period of 3-5 years without any need to replace the parts during normal operations conditions. Maintenance is limited to a visual inspection and cleaning. When the wear parts need to be replaced, they are easily accessible and easy to replace.

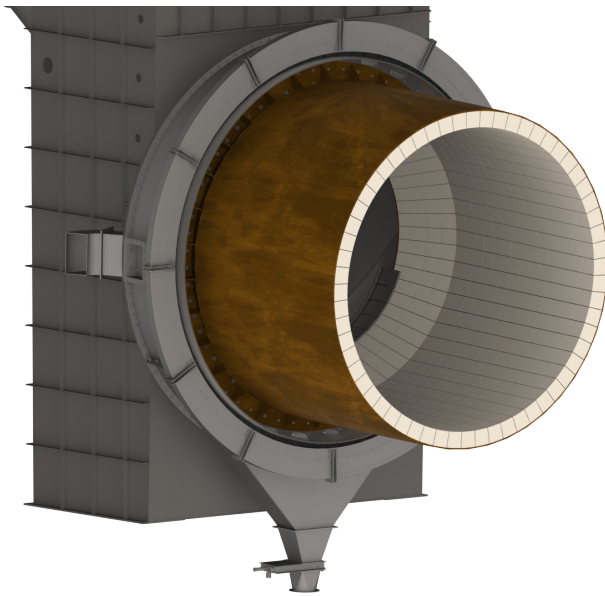
With most of the wear parts being visible and easily accessible the maintenance needs of the seal are easy to predict by simple visual inspection.

# KILN INLET SPRING TENSIONED GRAPHITE SEAL

## *Dust handling system*

Depending on the kiln design and the ability for integration of the existing dust handling system, the graphite seal can be delivered with a heat-resistant steel shovel arrangement, which effectively collects any back spillage and returns it to the kiln.

The casing, hopper and ducting serve as a material buffer and guide the excess raw meal to a bin or conveyor system. The hopper is designed with a sloping plate to avoid the dust build-up at the graphite sealing. A slide gate installed in the bottom of the hopper will allow any accumulated material to be disposed to the bin or conveying system when required.



# KILN OUTLET SPRING TENSIONED GRAPHITE SEAL

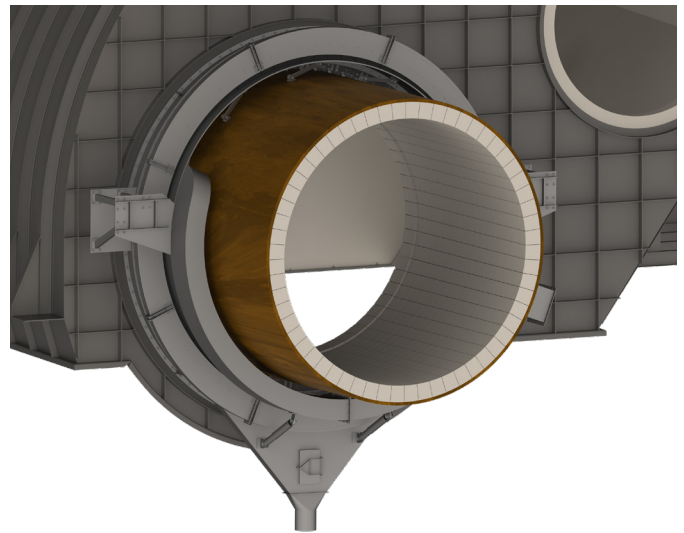
## *Dust handling system*

Depending on customer requests, the dust handling system can be designed to ensure that escaping dust from the kiln outlet is collected in a concentric dust chamber and returned directly to the cooler either to the first grate or to the external drag chain system via a chute.

The bottom part of the shovel chamber and cooling duct has a cone to avoid dust accumulation before the graphite.

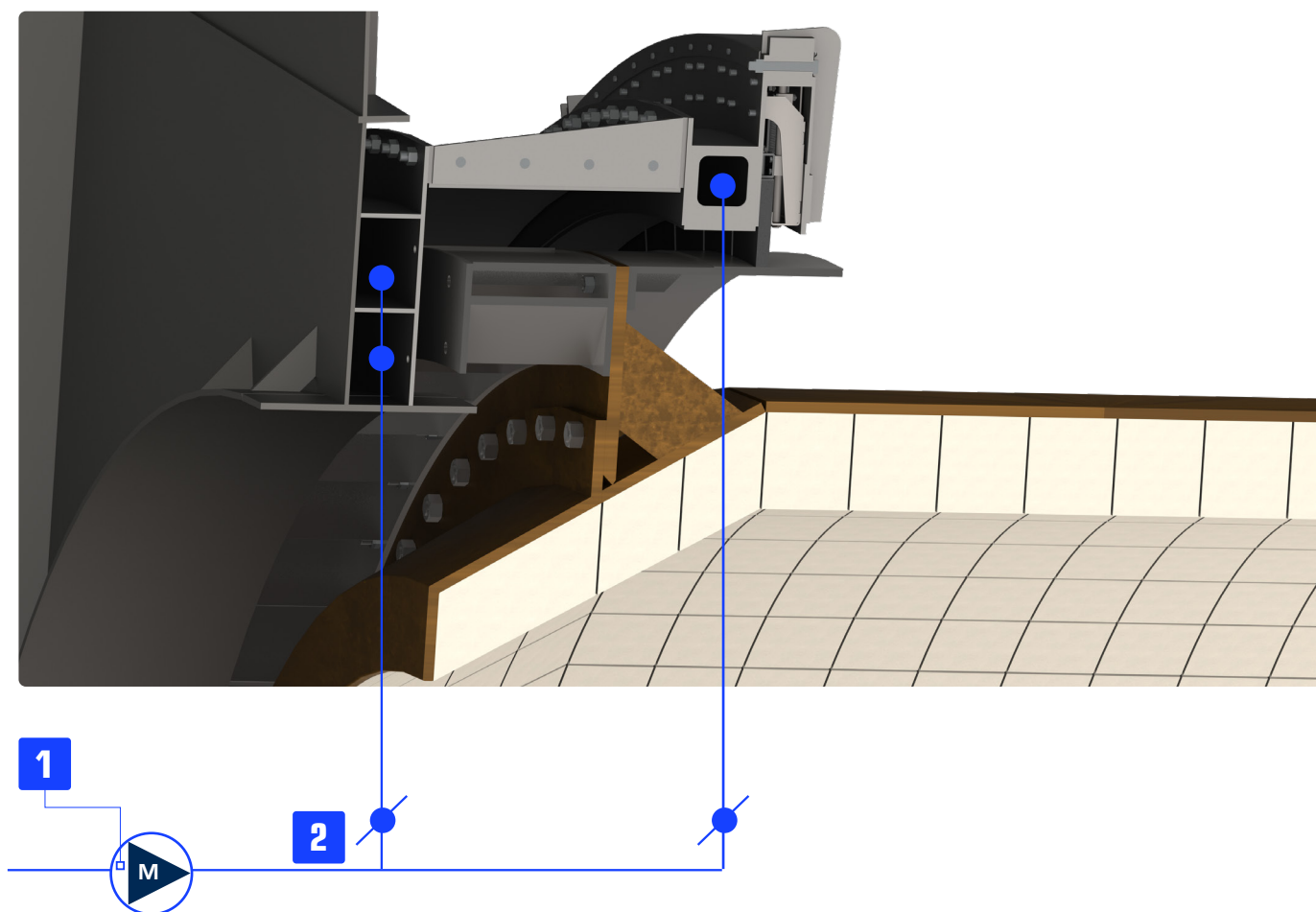
## **Heat shield**

A heat shield is installed in the casing to protect the graphite blocks from the radiant heat and from coming into direct contact with the clinker dust via a chute.



# AIR COOLING SYSTEM

## *Inlet*



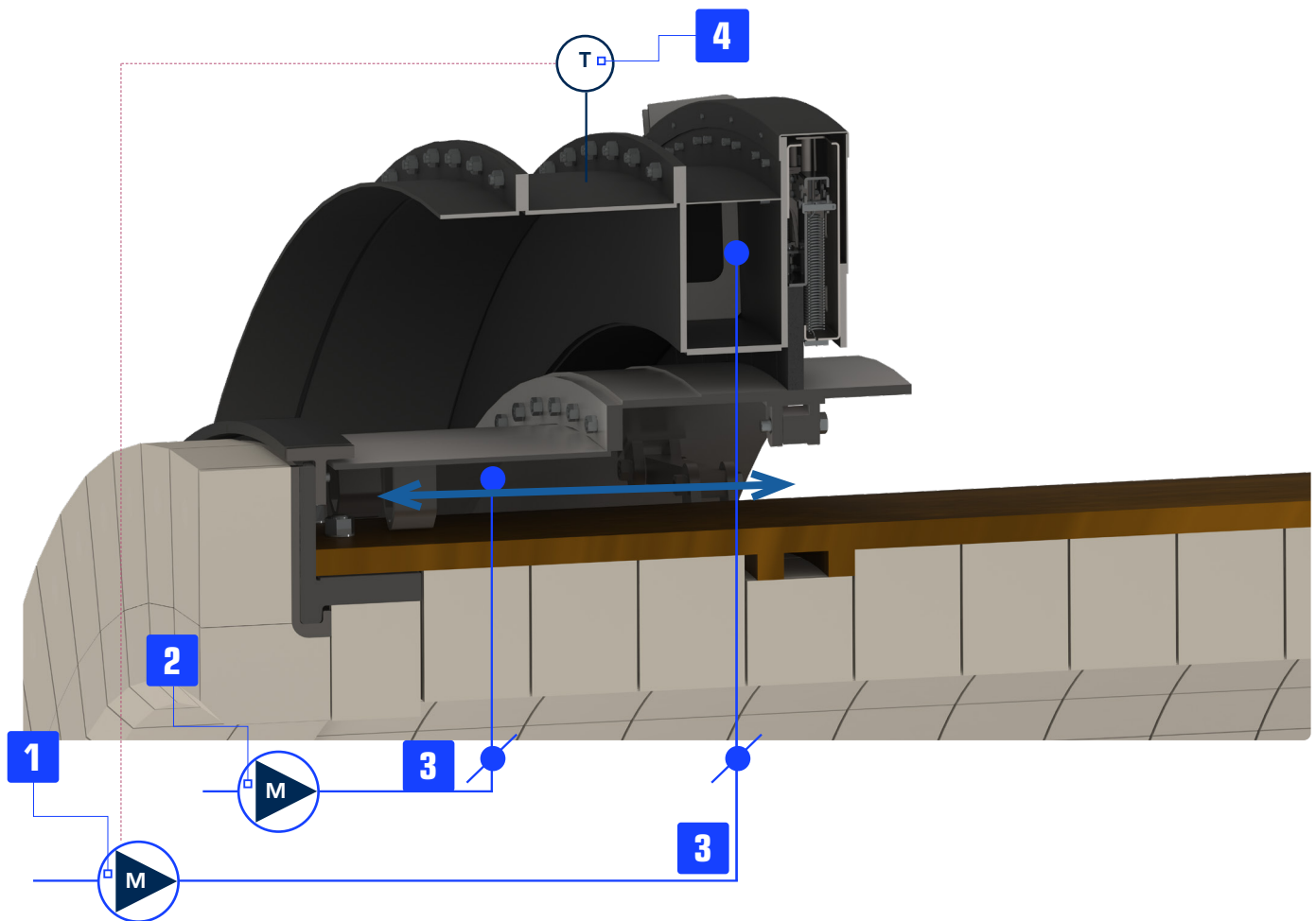
The inlet cooling system consists of a fan and a closed isolated ducting system to cool vital sealing components. The cooling air is distributed to the rear flange and the air cooling chamber attached to the kiln riser. The air will escape into the atmosphere.

### Cooling arrangement:

**1** FAN AND MOTOR

**2** MANUAL VALVES AND  
DUCTING Ø500/Ø350

## Outlet



The outlet cooling system is separated into two independent systems – one for the kiln shell and nose ring cooling and one for the graphite cooling. The graphite cooling is designed to maintain the temperature of the graphite blocks below oxidation temperature and secures the flatness of the flange module.

The closed rectangular cooling duct attached to the rear flange is cooled on a continuous basis, whereas part of the cooling air will be used to protect the graphite blocks from reaching high temperatures.

### Cooling arrangement:

- 1** FAN AND MOTOR FOR GRAPHITE COOLING
- 2** FAN AND MOTOR FOR NOSE RING
- 3** DUCTING Ø500/Ø350
- 4** TEMPERATURE SENSOR

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