



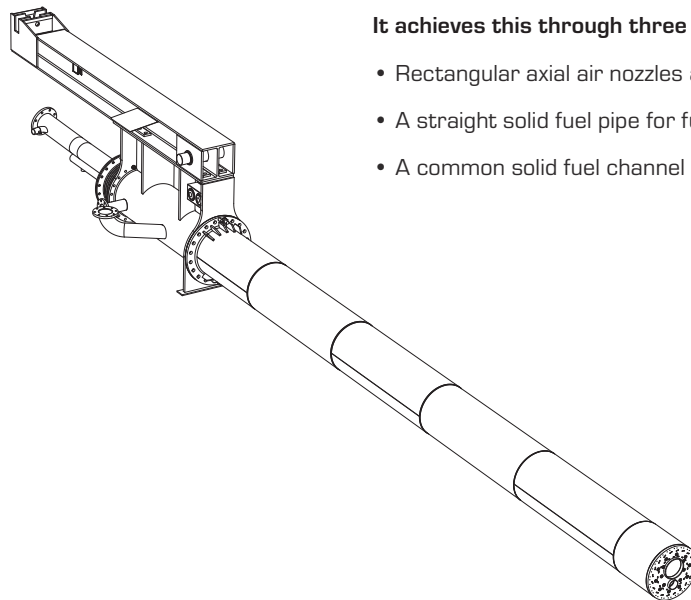
JETFLEX[®] 2.0 KILN BURNER

Stable burning of alternative fuels

YOUR MOST EFFICIENT OPTION FOR ALTERNATIVE FUEL FIRING

Switching fossil fuels for more environmentally-friendly alternatives is one of the simplest ways for the cement industry to reduce its environmental impact. But how do you do that without affecting your process? Choosing the right burner is key – the better your fuel burns, the more stable your process and the higher your clinker quality.

In line with our MissionZero objectives to reduce emissions for the cement industry to zero by 2030, we have designed the ultimate burner for alternative fuel firing. The JETFLEX® 2.0 burner is a highly flexible kiln burner, designed to produce the best flame shape and lowest NOx emissions for a wide range of fuel types and operating conditions.



It achieves this through three key features:

- Rectangular axial air nozzles and an efficient swirler design
- A straight solid fuel pipe for fuel flexibility
- A common solid fuel channel reduces total conveying air flow

KEY BENEFITS

**Reliable operation
and low maintenance**

**Increased AF
firing potential**

**Lower emissions
and high clinker quality**

**Reduced power
consumption**

SOLVING THE PROBLEM OF ALTERNATIVE FUELS

BURNING ALTERNATIVE FUELS USED TO MEAN COMPROMISE: MORE MAINTENANCE, LESS STABILITY. NOT ANYMORE

You shouldn't have to sacrifice productivity for sustainability. The clever design of the JETFLEX® burner gives you both by ensuring a good flame shape and consistency, whatever fuel you're burning. You can burn pulverized coal, petcoke, anthracite, oil, natural gas, or any mixture of these fuels, and/or alternative fuels - the results will be the same.

Reliable operation and low maintenance

The benefit of a good flame can be felt throughout your pyro process. It reduces hot spots, minimises volatility in the kiln and so reduces maintenance on the kiln and lining. With that comes increased productivity, reduced OPEX and greater peace of mind. When your burner is operating reliably and consistently, you can achieve optimum clinker quality.

Increased AF firing, reduced emissions

With the potential to increase alternative fuels utilisation you can significantly reduce your plant's emissions from burning fossil fuels - a huge environmental gain.

Reduced power consumption

Due to the efficiency of the JETFLEX 2.0 air nozzle design it will be possible to reduce the primary air percentage. Due to the low pressure drop in the common fuel pipe for coal, petcoke and anthracite fired kiln burners, the JETFLEX 2.0 offers a further reduction in conveying air flow compared to traditional kiln burners with annular coal channels.



THE LATEST EVOLUTION IN ROTARY KILN BURNER TECHNOLOGY

A new design for premium performance. With the JETFLEX 2.0 and JETFLEX 2.0 PLUS, we have simplified the design for even better flame formation, greater stability and improved reliability.

New JETFLEX® 2.0 features:

- Stronger front plate as single unit
- Expansion joint to obtain heat expansion
- Easier maintenance

Rectangular jet air nozzles and swirler – improving ignition and flame formation

The JETFLEX 2.0 burner has two flame controlling and forming systems for axial and swirl air. Axial air is introduced through rectangular jet air nozzles concentrically surrounding the fuel. This increases the surface of the jet air stream and drags more hot secondary air into the flame, enabling fast and powerful mixing of fuel and hot secondary air, which gives you fast ignition and stable flame formation. The concentric design enables high suspension of the fuel inside the flame and reduces NOx formation.

The efficient swirler is the main mechanism for shaping the flame during start-up and daily operation. Increasing the swirl air leads to faster mixing and a shorter and more intense flame.

Straight pipe design – stable firing process

In the JETFLEX 2.0 burner, the solid pulverised or alternative fuels are injected through a straight, uninterrupted pipe design. This ensures the fuels can pass without disturbance, giving reduced pressure drop and thus reducing power consumption, wear, maintenance and unplanned kiln stops.

The central part of the JETFLEX 2.0 burner can be individually configured with solid fuel pipes, depending on the fuel quality and dosing system available.

In addition, the expansion joint for guiding fuel injection pipes ensures accurate control of thermal elongation during operation.

Two versions are available: the JETFLEX 2.0 Burner with fixed jet air nozzles and the JETFLEX PLUS 2.0 Burner with rotatable jet air nozzles. Both models are available at capacities up to 250 MW, catering for even the largest rotary kiln.

Common solid fuel pipe – greater fuel efficiency

Transporting and injecting multiple solid fuels simultaneously in separate injection lines increases cold combustion air to the kiln systems, which increases power and fuel consumption.

The JETFLEX 2.0 burner enables the use of only one solid fuel pipe as a common fuel channel for multiple solid fuels, such as coal, petcoke and solid alternative fuels. This improves heat and power consumption and NOx generation by, minimising the cold airflow entering from the fuel transport. It also offers very low pressure drop, the possibility to optimise the size of the burner pipe, low wear, and easy and low-cost maintenance.

Fast and easy maintenance

Thanks to the burner's simple design, maintenance is quick and straightforward, including:

- Easy disassembly and replacement of wear parts
- The JETFLEX 2.0 design entails fewer and stronger parts than its predecessor
- Single front plate for easy exchange

It is also possible to convert existing JETFLEX installations to JETFLEX 2.0, or upgrade DUOFLEX™ burners to a semi or complete JETFLEX 2.0 with a simple kit, available on request.

FIXED OR ROTATING JET AIR NOZZLES

Choose between the JETFLEX 2.0 or the JETFLEX 2.0 PLUS depending on fuel substitution rate and fuel characteristics.

JETFLEX® 2.0 – Fixed jet air nozzles

The standard JETFLEX burner has a patented fixed nozzle design that consists of a number of machined rectangular nozzles with a fixed angle concentrically surrounding the fuel. This model has no moving parts, offering simplicity and high reliability, as limited parts are exposed to wear.

Main features:

- Efficient and well-defined mixing of hot secondary air with the fuel
- Front plate is easily exchangeable in case of increased production requirements or significant changes in fuel quality
- The burner flame shape or momentum is easily controlled by simple regulation of the primary air pressure and flow as well as swirl air valve position

Previously used burner settings can be easily repeated especially when adding our automation kit. This improves plant production by enabling smooth transition from start up to full production.

JETFLEX 2.0 PLUS – Rotatable jet air nozzle

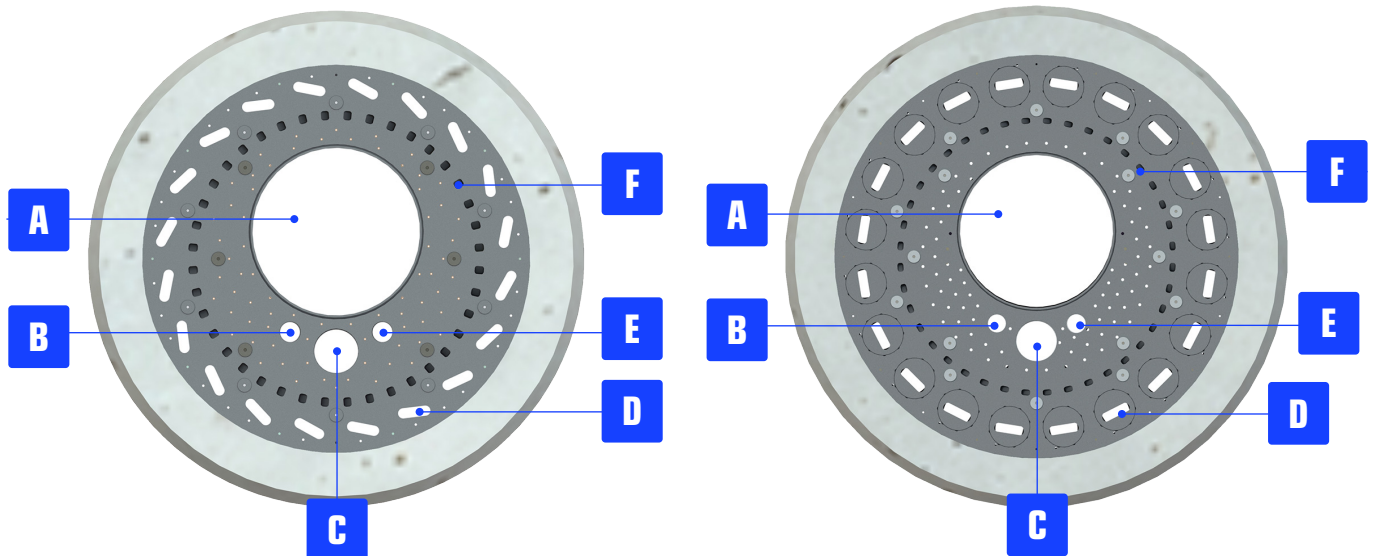
The rotatable jet air nozzle design consists of a number of individually rotatable nozzles concentrically surrounding the fuel. Rotating the nozzles allows for optimal adjustment of the flame depending on fuel and process requirements. The flame can be shaped to suit a large and different variety of fuels.

The individual rotatable nozzles also enable fuel lift configuration. This configuration is used with solid alternative fuels to increase fuel retention time in the flame. The result is less fuel drop-out, improved combustion, and improved clinker quality.

The rotatable nozzles are exchangeable in case of increased production requirements or significant changes in fuel quality. All heat exposed parts in the burner tip are easily exchangeable.

JETFLEX 2.0 with fixed jet air nozzles

JETFLEX 2.0 PLUS with rotatable jet air nozzle



A SOLID FUEL CHANNEL	C FUEL LANCE	E IGNITER
B FLAME SCANNER	D AXIAL AIR NOZZLES (FIXED OR ROTATABLE)	F SWIRL AIR

ACCESSORIES GUARANTEED TO PERFORM

ACHIEVE THE MAXIMUM
AF SUBSTITUTION WITH A
MINIMUM OF IMPACT ON
PERFORMANCE OR QUALITY.

Telescopic solid fuel connection

The Telescopic coal connection enables the burner operator to move the kiln burner to the optimum position during operation. With the Telescopic coal connection the kiln burner can be easily moved by ± 1 m, provided you have a minimum 4 m straight coal duct.

Air blaster for rhino horn removal

Should you get buildup on top of the burner (rhino horn), you can now take advantage of our air blaster system, comprising:

- Control box
- Tank, 100 L
- Air filter unit

Automation kit (Remote control set for primary air and automatic cooling air for common fuel pipe)

Take full control of your burner from the central control room with our automation kit. Adjust the axial and swirl air ratio remotely, so that you can achieve optimum burner performance during heat up and with different fuel configurations.

As well as 2-3 butterfly valves with electric actuators, the kit includes pressure transmitters so that actual swirl and axial air operation pressure can be monitored before and after adjustment.

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