JETFLEX® burner
Setting the standard for today and tomorrow

**Key benefits**
- Increased reliability
- Lower fuel and power costs
- Long refractory life
- Lower maintenance costs
- Increased firing of alternative fuels
- Lower emissions
- Superior flame shaping

FLSmith’s JETFLEX® burner represents the latest evolution in rotary kiln burner technology. The design is targeted towards usage of traditional fuels such as oil, gas, pulverised solid fuels and high and medium-grade alternative fuel qualities.

The JETFLEX burner fires cement rotary kilns and is available at capacities up to 250 MW, catering for even the largest rotary kiln. The primary air supply to the burner enables a flame momentum of 7 N/MW up to 11 N/MW.

FLSmith offers two models: The standard JETFLEX burner with fixed jet air nozzles and the JETFLEX PLUS burner with rotatable jet air nozzles.

**Fundamental design features**

The JETFLEX burner is FLSmidth’s latest kiln burner design. It combines FLSmidth’s combustion and cement production know-how with industry requirements for reliability, energy efficiency, fuel flexibility and low emissions. The burner provides efficient fuel combustion and stable flame formation, ensuring stable kiln coating, long refractory lifetime and high clinker quality.

The following fundamental design features are especially important for its superior performance:
- Rectangular jet air nozzles and swirler
- Straight solid fuel channel
- Common solid fuel channel

**Rectangular jet air nozzles and swirler = Improving ignition and flame formation**

The JETFLEX 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. The axial air nozzles form flat rectangular high velocity jets with a relatively large surface area compared with a circular nozzle.

This enables fast and powerful mixing of fuel and hot secondary air ensuring fast ignition and stable flame formation. The concentric design enables high suspension of the fuel inside the flame.

The 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, wider and more intense flame.
Solid fuel dosing system with separate fuel channels

The combined effectiveness of the JETFLEX burner’s rectangular jet air nozzles and swirler has made it possible to eliminate the traditional annular fuel channel. In the JETFLEX burner, the solid pulverised or alternative fuels are injected through a straight, uninterrupted pipe design, in which fuels can pass without disturbance. This reduces wear, maintenance and unplanned kiln stops.

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

Straight solid fuel channel = Reduced blockages, reduced wear and increased availability

Common solid fuel channel = Lower heat and power cost

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

The JETFLEX 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, minimising the cold airflow entering from the fuel transport.
The standard JETFLEX burner has a fixed nozzle design that consists of a number of machined rectangular nozzles with a fixed angle concentrically surrounding the fuel. The design ensures efficient and well-defined mixing of hot secondary air with the fuel.

The front plate is easily exchangeable in case of increased production requirements or significant changes in fuel quality.

Fixed jet air nozzles
= Simple to operate and low maintenance

This model has no moving parts, offering simplicity and high reliability as limited parts are exposed to wear. The burner flame shape or momentum is easily controlled by simple regulation of the primary air pressure and flow.

Previously used burner settings can be easily repeated. This improves plant production by enabling smooth transition between production qualities or fuels.

The burner can be configured in many ways depending on the fuel quality and type.
JETFLEX® PLUS burner: For optimum combustion flexibility

PLUS benefits
- Superior combustion of cost-effective grade fuels
- Full flame forming control
- Increased fuel retention time

Two additional fundamental design features characterise the JETFLEX PLUS burner model:
- Rotatable jet air nozzles
- Retractable centre pipe for alternative fuel firing

Rotatable jet air nozzles = Highest possible alternative fuel substitution

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 to a narrower or a wider shape depending on fuel and process requirements. The flame can be shaped to suit the widest variety of fuel types and qualities.

The individual rotatable nozzles also enable fuel lift configuration, as shown on the right. 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.
The JETFLEX PLUS burner offers retraction of the swirler and central duct. In combination with the axial air nozzles, this enables a significant drop in fuel velocity in front of the burner. This feature strongly increases the fuel retention time in the flame and enables early ignition of low grade fuels. In combination with the fuel lift configuration as noted above, spillage to the charge is minimised. This allows the burner to contribute to superior flame and clinker quality control as well as a high alternative fuel substitution.

Retractable centre pipe for alternative fuel firing
= Achieving maximum low grade fuel substitution

Standard configuration for high and medium-grade fuels
Configuration for lower grade fuels

Fuel rich flame core
= Low emissions

Both JETFLEX burner designs are based on the well-proven principle of having a fuel-rich flame core with all flame-shaping primary air surrounding the fuel. Combined with a short ignition distance and a compact flame, this minimizes thermal NOx generation.

The JETFLEX burner is designed with the flexibility to produce the best flame shape and lowest NOx emissions for various fuel types and operating conditions.

Compact concept
= Cost-effective shipment and installation

Both JETFLEX burner designs are optimised for reduced shipment cost and time by container shipment as the design incorporates a simplified structure with a detachable beam and reduced overall length.

A JETFLEX burner with up to 9 metre burner pipe length would typically be shipped in a container.
Why choose the JETFLEX® burner?

Greater fuel flexibility = Lower fuel cost
Low risk of unplanned kiln stops = Increase revenue
Stable combustion and burning zone conditions = Long refractory life
Long fuel retention time in flame = High clinker quality
Burner settings can be easily repeated = Improve plant production
State-of-the-art rotatable jet nozzles* = Maximum alternative fuel substitution
Less transport air* = Lower operating cost
Low NOx emission = Reduced or no need for SNCR
Few and easy to change spare parts = Lower maintenance cost

* JETFLEX® PLUS burner

In addition to supplying the main burner, FLSmidth can design and supply a complete system covering all the equipment required for the fuel oil and gas regulating stations, solid fuel dosing systems, and state-of-the-art burner management systems. FLSmidth’s know-how covers equipment for calciner firing and auxiliary heat generators for milling systems.