One Source

FLSmidth Cross-Bar™ Cooler

FLSmidth

The standard in clinker cooling technology

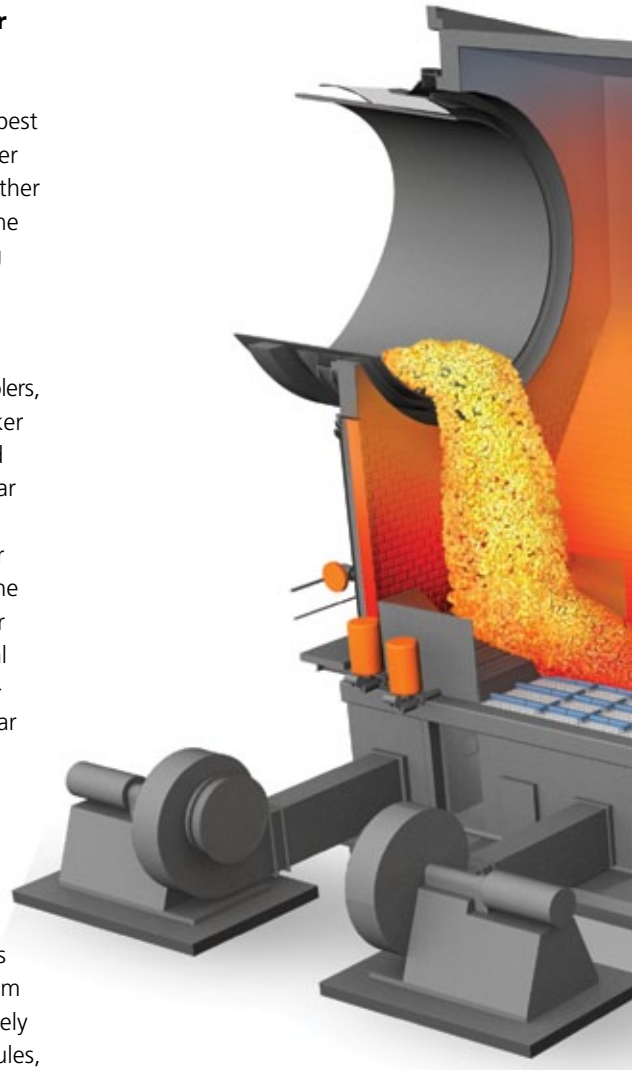
Key benefits

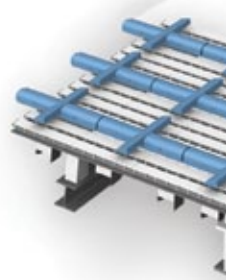
- **Superior reliability/availability**
- **Low, easy, predictable maintenance**
- **Consistently high thermal efficiency**
- **Low power consumption**
- **Fast, simple installation**
- **Highly flexible – can be used to upgrade most existing coolers**
- **Low civil, construction and operating costs**
- **No fall through of clinker – no requirement for undergrate spillage system**

Making the best even better
The FLSmidth Cross-Bar Cooler represents the latest evolution in cross-bar technology. It takes the best elements of proven FLSmidth cooler designs and refines them even further – resulting in a cooler that gives the highest standard in clinker cooling technology at a highly attractive investment level.

Similar to our previous cross-bar coolers, which revolutionised the way clinker coolers are installed, operated and maintained, the FLSmidth Cross-Bar Cooler features a stationary grate line with no undergrate spillage or conveying system, separation of the conveying and cooling systems, air distribution plates with mechanical flow regulators, and modular construction. In the FLSmidth Cross-Bar Cooler, all cross bars are movable and reciprocate so as to optimise transport efficiency and enable horizontal installation.

Quick and easy to install, the FLSmidth Cross-Bar Cooler ensures maximum availability with minimum maintenance. And with a completely new size and structure of its modules, it makes for an ideal new cooler or upgrade.





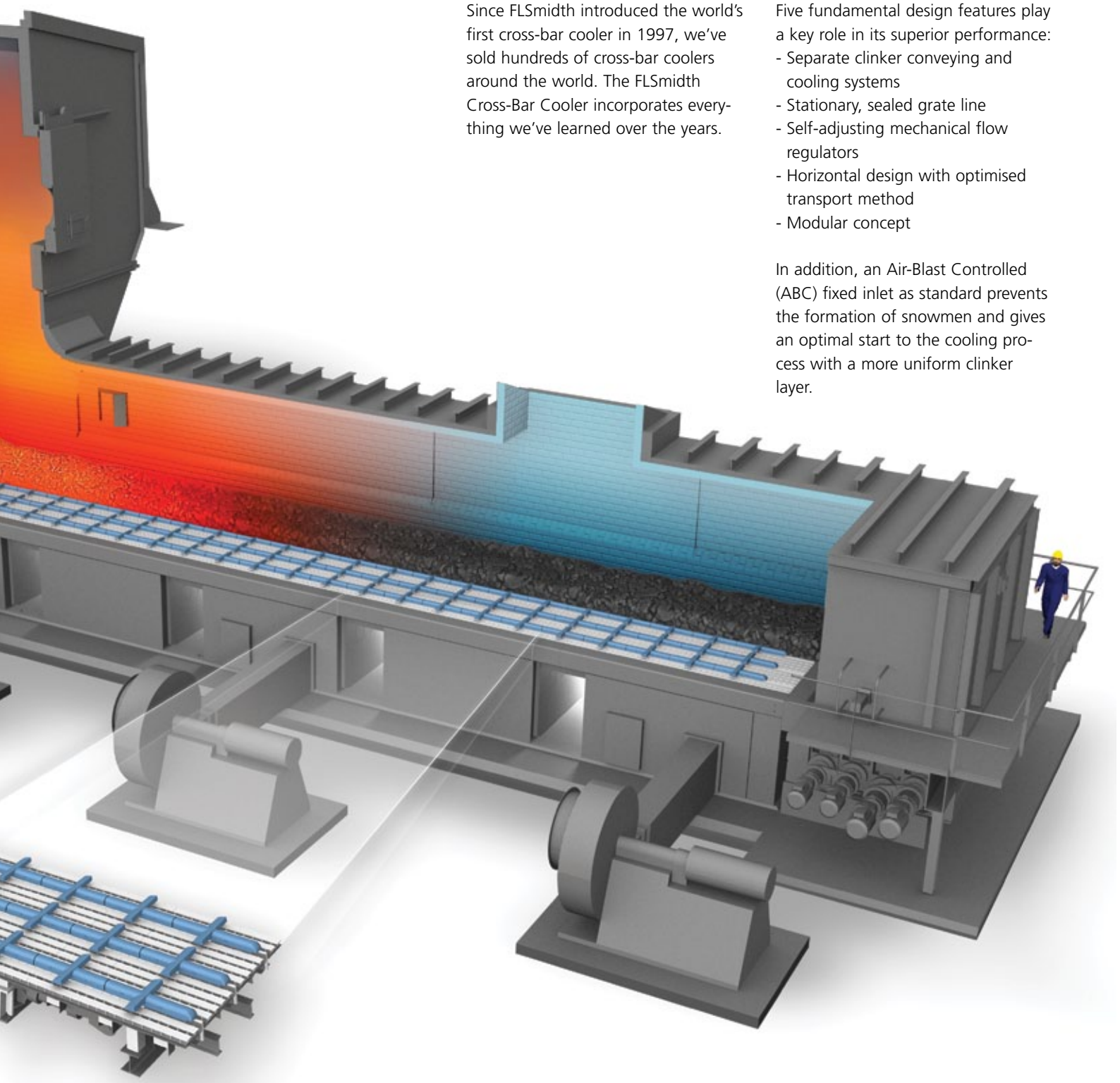
Five fundamental design features

Since FLSmidth introduced the world's first cross-bar cooler in 1997, we've sold hundreds of cross-bar coolers around the world. The FLSmidth Cross-Bar Cooler incorporates everything we've learned over the years.

Five fundamental design features play a key role in its superior performance:

- Separate clinker conveying and cooling systems
- Stationary, sealed grate line
- Self-adjusting mechanical flow regulators
- Horizontal design with optimised transport method
- Modular concept

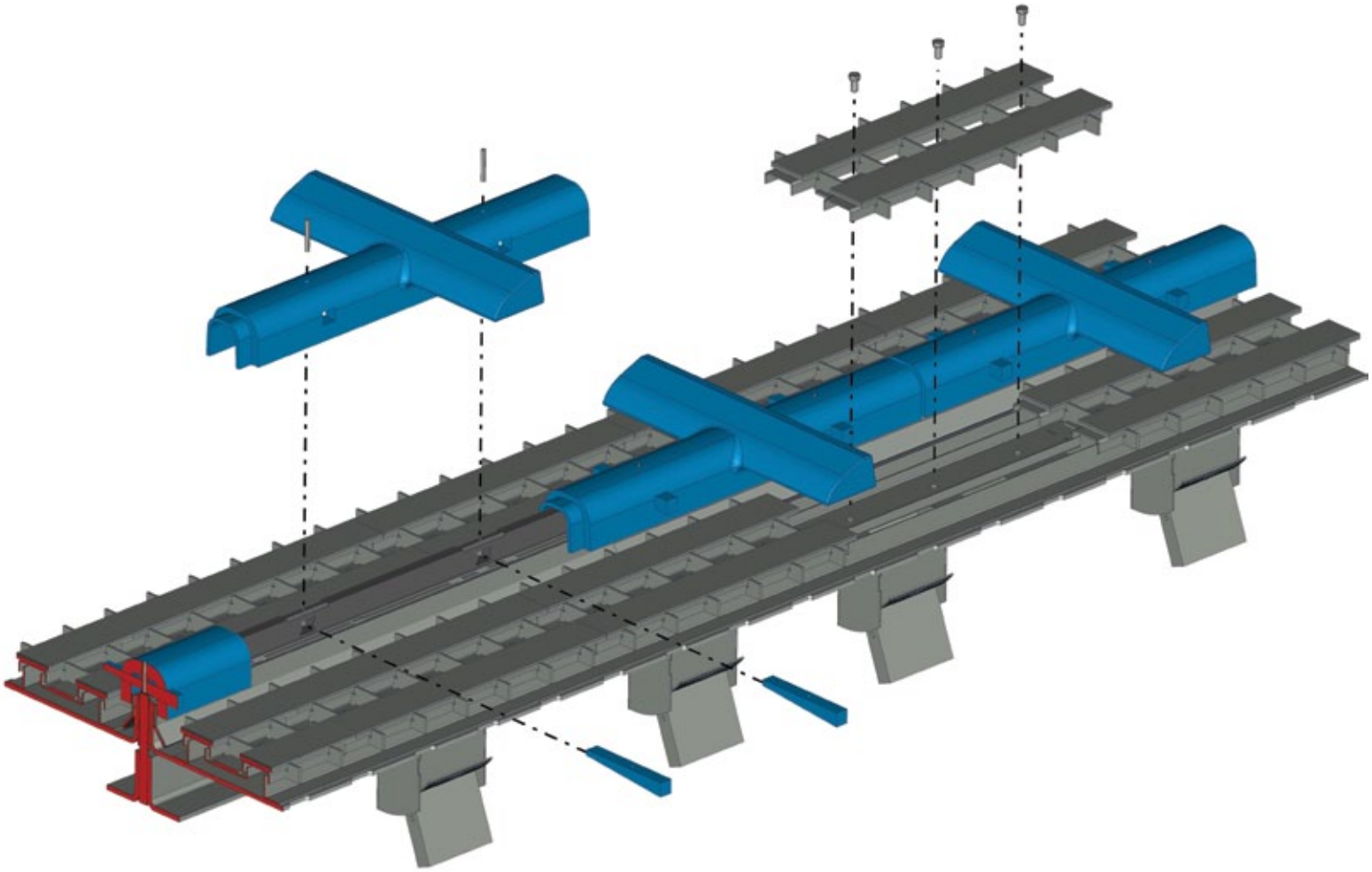
In addition, an Air-Blast Controlled (ABC) fixed inlet as standard prevents the formation of snowmen and gives an optimal start to the cooling process with a more uniform clinker layer.



Separate clinker conveying and cooling systems
= Consistently high thermal efficiency

Unlike other cooler designs, the FLSmidth Cross-Bar Cooler separates the clinker conveying and air distribution systems. Reciprocating cross bars fitted above the stationary air distribution system effectively convey, mix and shear the clinker while at the same time preparing the clinker for efficient exposure to the cooling air.

A further benefit to this separation is that gradual wear of the cross bars has no effect on cooler operation, and thermal efficiency stays high.



Stationary, sealed grate line
= High reliability

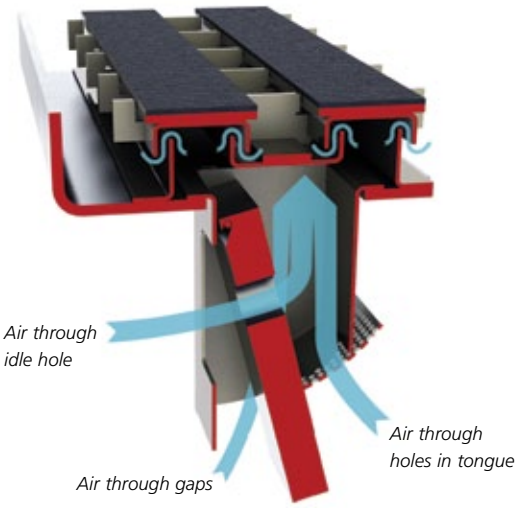
The FLSmidth Cross-Bar Cooler has no movable grate plates. There is no fall-through of clinker, and no under-grate clinker conveying system or gap management of grates is required. A static layer of clinker protects the air distribution plates against heat and wear, so the plates are no longer a standard wear part.

A patented sealing design consisting of U- and C-profiles around the drive plates forms a dust trap, preventing clinker from entering the undergrate compartment. The sealing profiles extend throughout the entire cooler length, which means that during the reciprocating movement of the profiles, the ends are never exposed to wear by the clinker.

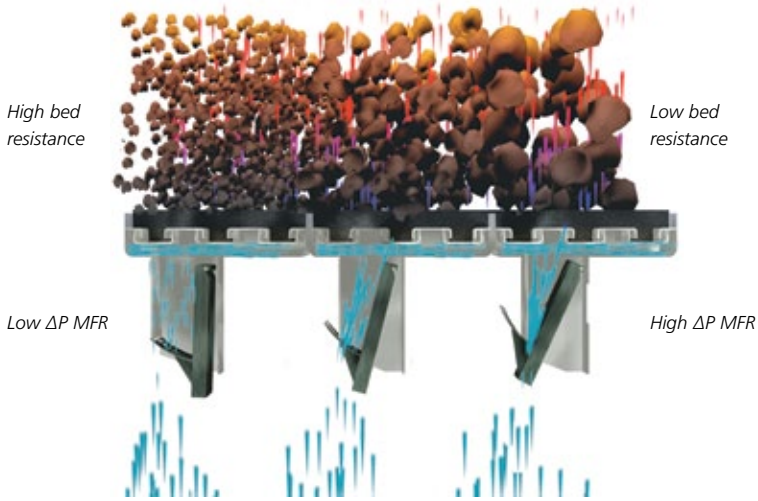
Self-adjusting mechanical flow regulators
= Stable operation, fuel savings

Each air distribution plate in the FLSmidth Cross-Bar Cooler is equipped with a mechanical flow regulator (MFR) that regulates the airflow via a self-adjusting orifice. This optimal principle of continuous airflow regulation was invented by FLSmidth and helps optimise heat recuperation and distribution of air throughout the entire cooler. In turn, it enables fuel savings and few installed cooling fans.

The MFR maintains a constant airflow through the air distribution plate and clinker bed, irrespective of clinker bed height, particle size distribution or temperature. Should the restriction of airflow through one area of the clinker layer change, the MFR automatically compensates for the variations in restriction and maintains the desired airflow based on simple physics, without operator intervention.



The proprietary mechanical flow regulator that each air distribution plate is equipped with automatically compensates for variations in restriction and maintains the desired airflow without operator intervention.



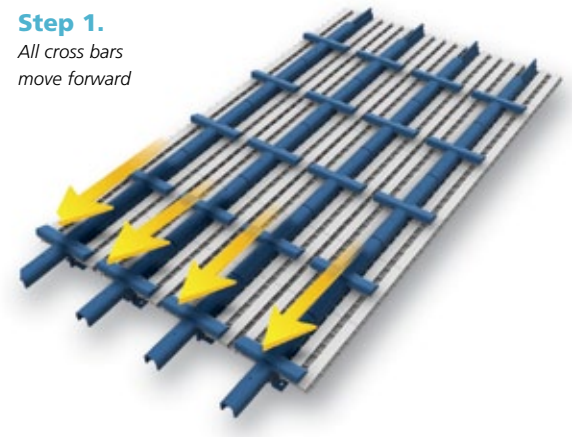
Constant air flow irrespective of overgrate conditions

Horizontal design with optimised transport method
= Low civil costs, low wear rates

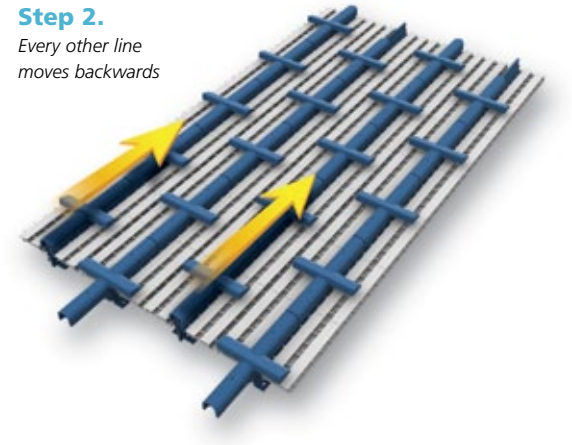
The cooler's new drive mechanism is designed to obtain optimal transport efficiency. Each line of movable frames in the cooler is operated by 2 or 4 hydraulic cylinders, depending on the cooler size, and has an independent drive. While all cross bars move in a shuttle motion, the movement of each line can also be separately adjusted to accommodate diverse clinker bed conditions.

High clinker transport efficiency allows horizontal construction in order to minimise installation height or maintain overgrate and kiln hood velocities in cooler upgrades – leading to low cost of civil work and reduced dust recirculation.

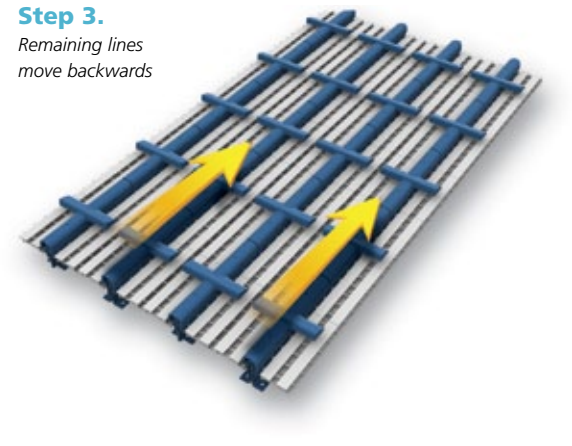
Step 1.
All cross bars move forward



Step 2.
Every other line moves backwards



Step 3.
Remaining lines move backwards



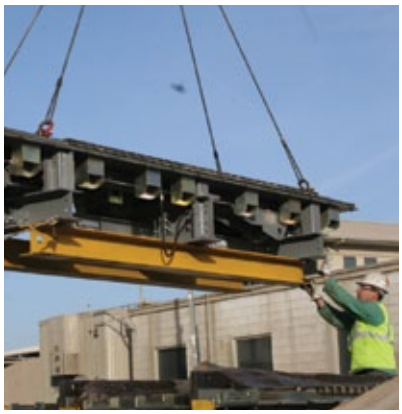
Each line of movable frames in the cooler is operated by 2 or 4 hydraulic cylinders. As standard, there are no hydraulic components in the first undergrate chamber.

Modular concept
= Fast, easy, cost-effective installation

The FLSmidth Cross-Bar Cooler is designed not only for completely new coolers, but also as an upgrade for most existing coolers. To meet these requirements, the cooler is constructed as a modular system with units of varying size.

The cooler has a fixed inlet module followed by standard units, each measuring 1.2 or 1.8 meters in width and 3.0 or 4.2 meters in length. The standard units are preassembled in the workshop to ensure high quality and swift, simple installation.

Depending on the width (1.2 or 1.8 meters), a unit includes either 2 or 3 movable frames, each 2 grates wide. Each movable frame rests on two roller bearings and includes a drive plate that penetrates the grateline via a slot that extends throughout the entire unit length. To form a whole cooler, a number of units are put together lengthwise and widthwise, and the movable frames are connected along the length of the cooler.



The modular FLSmidth Cross-Bar™ Cooler reduces installation time and costs, is manufactured to a high quality standard and ensures attractive equipment delivery times.

Keeping you productive today and tomorrow

Low, easy, predictable maintenance
The FLSmidth Cross-Bar Cooler has few wear parts, meaning easy and economical maintenance. The cross bar and U-profile is one integral piece, held simply in place by wedges and pins and easily accessible from the overgrate area. During operation, a protective layer of clinker is maintained between the air distribution plates and the movable cross bars, which ensures a long lifetime for the air distribution plates.

Experience has shown that the maintenance of cross-bar coolers is very predictable and simple to perform. This makes for increased flexibility of maintenance planning and prevents critical path situations during a typical kiln overhaul. When maintenance is required, it will normally only take a limited number of shifts to perform.

Attractive investment level
As part of our efforts to provide you with the best investment possible, we continuously develop our products, optimising them from the standpoint of both technology and economy.

The optimised design and manufacture of the FLSmidth Cross-Bar Cooler – with its horizontal construction, high thermal efficiency, low power consumption and low maintenance – enables us to offer this superior cooler with a low total cost of ownership.

Simple to operate

- Self-adjusting mechanical flow regulators
- No manual dampers
- No internal piping or air beams
- No sealing air fans
- Few fans

Simple to maintain

- No moving grates
- No clinker fall-through
- No side seals
- No spillage valves
- No undergrate conveying system
- Easy replacement of wear parts

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