Metso

Calcination solutions

Lime calcination systems







Proven experience

Metso has supplied more than 210 lime calcining systems, with over 115 of them as preheater/rotary kiln systems. The worldwide total annual production capacity from Metso-supplied systems exceeds 30 million metric tons per year.

The Metso experience encompasses complete plant design including limestone crushing and screening, calcining (of both high calcium and dolomitic limestones), kiln firing, emissions, product handling and storage, and lime hydration. Metso's worldwide experience and expertise allows for local sourcing of major system components near the installation site, thus minimizing total project costs. In addition, with a local presence in more than 50 countries, Metso remains close to its customers throughout the service life of the calcining equipment and systems it provides.

Product quality
Using its proprietary Limestone Evaluation (LSE) procedures, Metso begins its lime plant design with laboratory testing of the proposed limestone feed to determine its physical and chemical properties.

This evaluation of the feed material includes such things as chemical analysis, laboratory calcination and reactivity testing, as well as certain proprietary tests to determine the material's susceptibility to degradation.

The evaluation results are used for the necessary process calculations, to select the proper type and size of calcining equipment, and to design the overall system required.

By thoroughly examining the proposed feed material, Metso is also able to forecast the quality of lime product that can be achieved, as well as estimate the rate at which utilities such as fuel and electric power will be consumed.

Operational efficiency and flexibility
The KVS preheater/rotary kiln calcining system is selected when a uniform, high quality lime product is required. Metso can also supply long rotary lime calcining systems, but the KVS preheater/rotary kiln system approach to lime calcining is the technology of choice for the more demanding applications.

The preheater-kiln system can be designed to process limestone feed as large as 75mm or as small as 6mm, with a nominal 4:1 ratio of largest to smallest. This tends to maximize quarried stone utilization, and in turn, minimize kiln feed preparation costs. This calcining system is fired with a single burner that can be designed for a wide variety of fuels, including coal, pet coke, natural gas, light and heavy fuel oils, blast furnace gas and coke oven gas.

Certain waste fuels can also be used. The firing systems can be designed to fire a single fuel, or combinations of two or three different fuel types.

Preheater features

Metso's preheater-kiln lime calcining system has been the preferred solution for over 70 years. Our preheater-kiln system includes an integral "live" stone storage bin, and has a design that has undergone continuous developments throughout the years. Ultimately, these innovations lead to better efficiency and high-capacity performance for your operations.

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Efficient Preheater Design for Optimized Lime Calcining

The preheater system includes vertical chutes that provide an air seal between the process and ambient while allowing gravity-fed stone flow. Kiln exhaust gases enter the preheater at 1010–1095 °C, and as they pass through the preheater, heat is transferred to the bed of material within. This results in the release of 25–35% of the CO2 from the limestone within the preheater.

The partially calcined material is discharged from the preheater by controlled, sequential stroking of hydraulic plungers at its perimeter. The material then passes through the transfer chute and enters into the rotary kiln. Exhaust gases leaving the preheater have an average temperature of 230–260 °C and are typically filtered in a baghouse type dust collector, before being discharged to the atmosphere through a separate, free-standing exhaust stack.

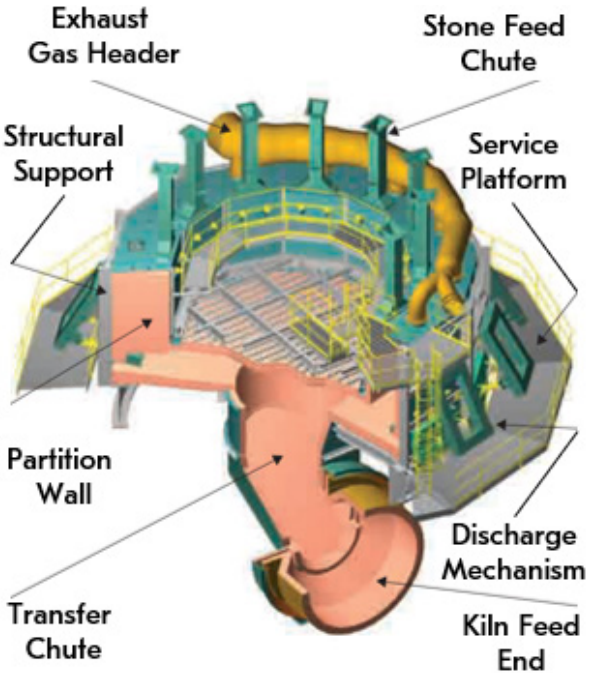
Online Maintenance Without Interruptions

The Metso preheater-kiln system features partition walls between adjacent modules, allowing for maintenance without interrupting the normal operation of the kiln system. By closing a damper provided at the outlet of a given module and "pinning" the stone feed chute of the same module, the module can be stroked free of material to accommodate online maintenance.

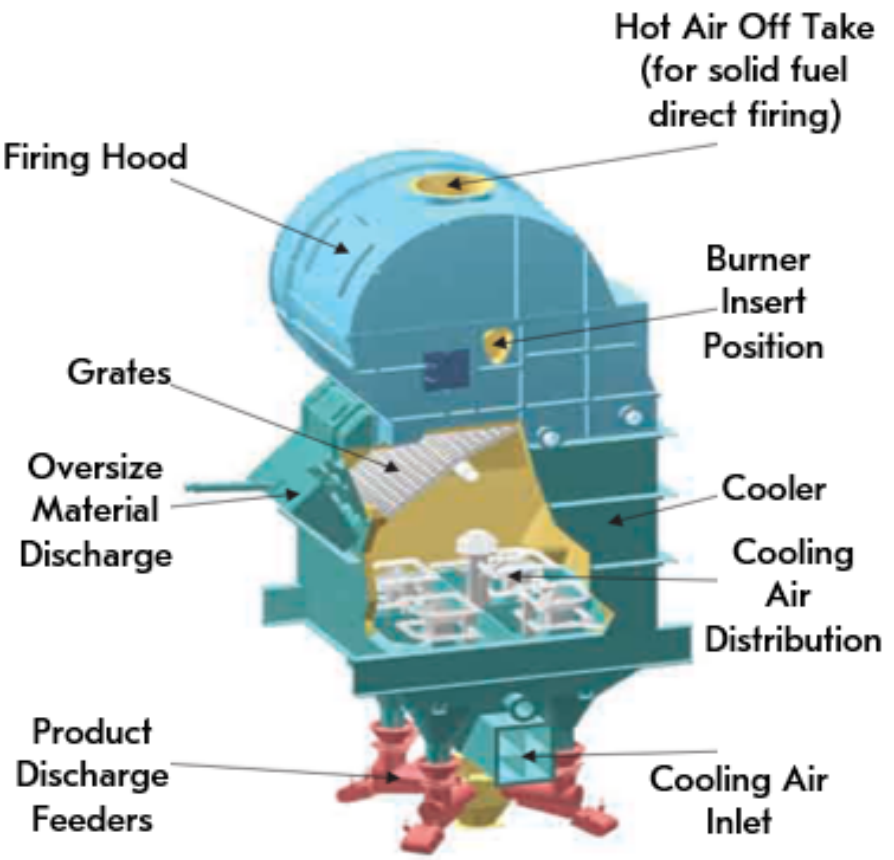
High-Capacity Lime Calcining System for Every Need

Metso supplies rectangular preheater designs for system capacities between 300 and 700 TPD and polygon style designs for capacities from 600 TPD to 1200 TPD and greater. The polygon style boasts 12-22 modules, while the rectangular preheater has 6-10 modules. However, the dimensional details of the preheater components remain essentially the same for both designs.









Coolers

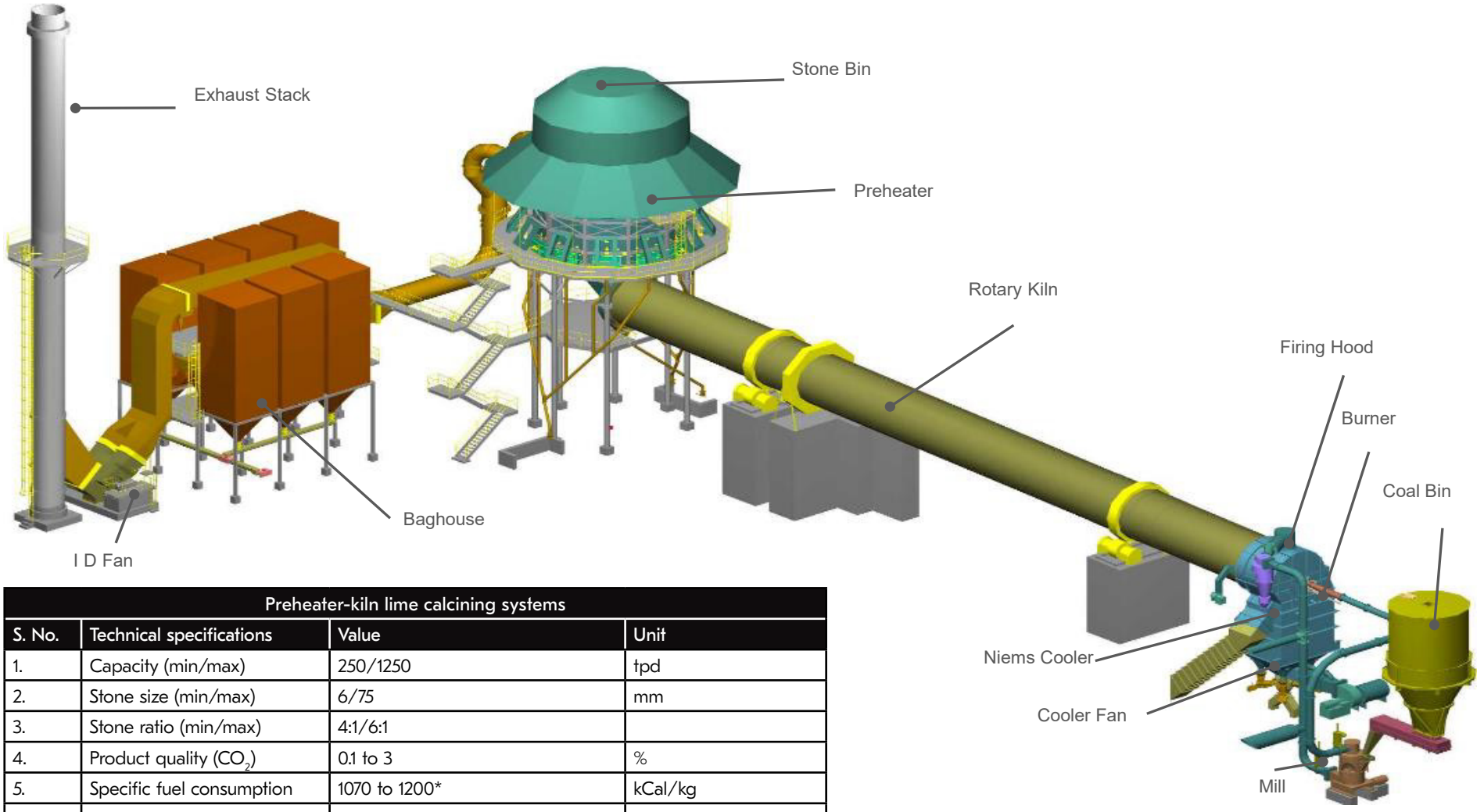
Metsos's lime calcining technology includes the Niems high efficiency contact cooler. With heat recovery efficiencies of >90%, this direct contact, counter-flow heat exchanger provides both extensive cooling of the lime product, and significant preheating of secondary combustion air for the kiln firing system.

The kiln burner is mounted in the firing hood, directly above the cooler. Firing hood and cooler are designed to be complementary to one another. Ambient air is blown into the four quadrants of the cooler's lower chamber through a common cooling air duct. The cooling air enters the bed of hot granular lime product, uniformly, through a collection of fixed stainless steel louvers.

The level of material in the cooler is controlled by how often the four vibratory feeders beneath the cooler are cycled between maximum and minimum speeds. Thermocouples mounted in each of the four cooler discharge spouts monitor product temperatures and material flow through each spout. They are automatically adjusted to provide uniform cooling of the lime product, while at the same time, maximize heat recovery.

In addition to providing uniform product cooling and excellent heat recovery to the process (because it has virtually no moving parts, with the exception of the discharge feeders), the Niems cooler has the lowest of maintenance requirements, and offers optimum reliability.

Technical specifications



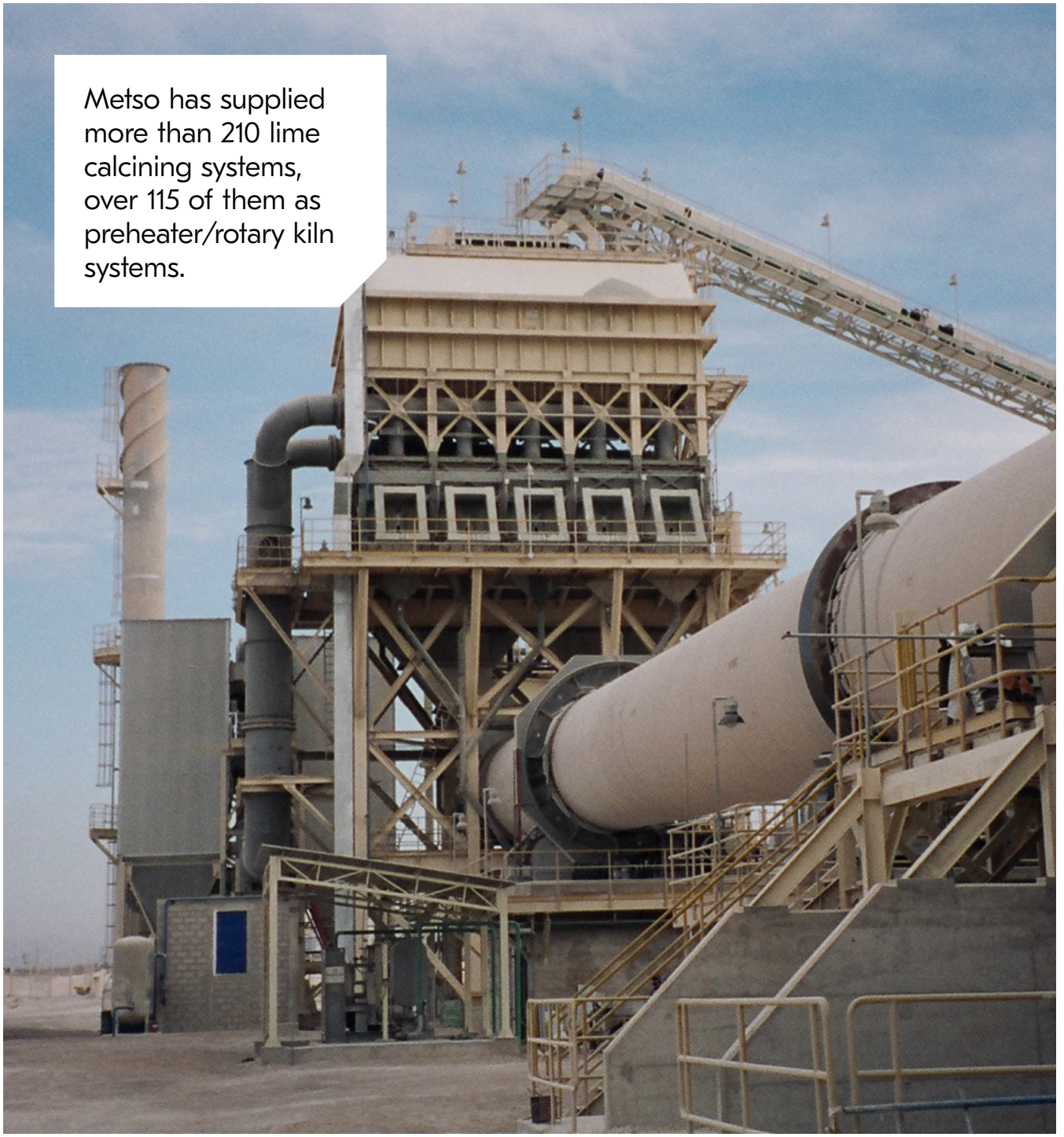
Preheater-kiln lime calcining systems			
S. No.	Technical specifications	Value	Unit
1.	Capacity (min/max)	250/1250	tpd
2.	Stone size (min/max)	6/75	mm
3.	Stone ratio (min/max)	4:1/6:1	
4.	Product quality (CO_2)	0.1 to 3	%
5.	Specific fuel consumption	1070 to 1200*	kCal/kg
6.	Electrical energy	20 to 40*	kWh per calciner
7.	Type of fuel	Gas, coke, oil, coal, coke oven gas	type

Pre-heater Calciner Advantages:

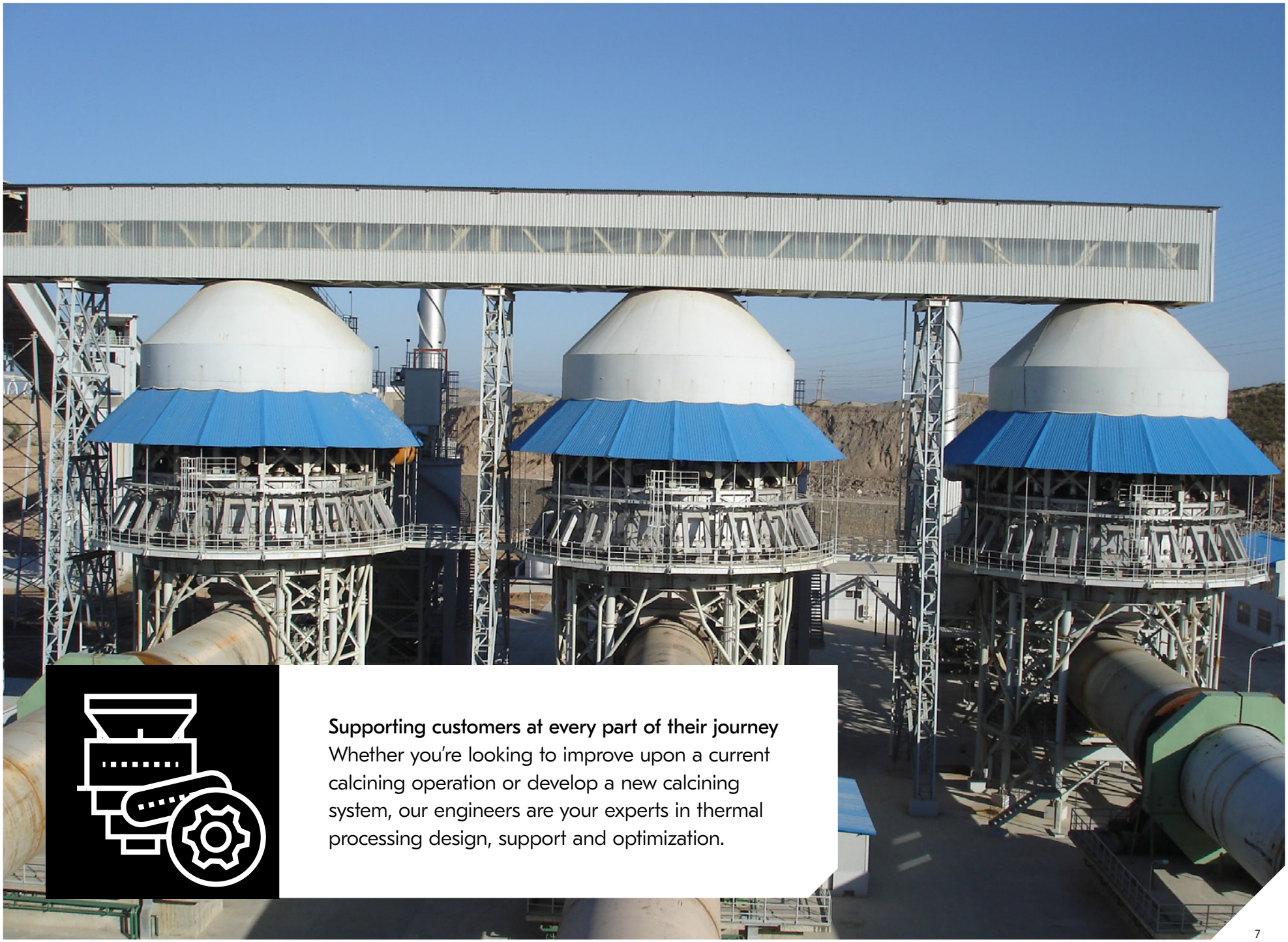
- Highest product quality
- Easy Pulverized solid fuel firing
- Large capacities
- Maximum stone utilization

Cooler Advantages:

- Sloped grates for easy ash removal
- Grate bars perpendicular to kiln are raised relative to bars parallel to kiln
- All grate bars are vertical for better combustion air flow
- Extensive air distribution
- Air distributors are stainless steel
- A single combustion / cooling air fan is used for positive air flow control
- Cooler roof under the kiln is sloped in 2 directions to eliminate dust build-up
- Grate support tubes are forced air cooled



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Supporting customers at every part of their journey
Whether you're looking to improve upon a current calcining operation or develop a new calcining system, our engineers are your experts in thermal processing design, support and optimization.

Metso is a frontrunner in providing sustainable technologies, end-to-end solutions and services for the aggregates, minerals processing and metals refining industries globally. By helping our customers increase their productivity, improve their energy and water efficiency and environmental performance with our process and product expertise, we are the **partner for positive change.**

Metso

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