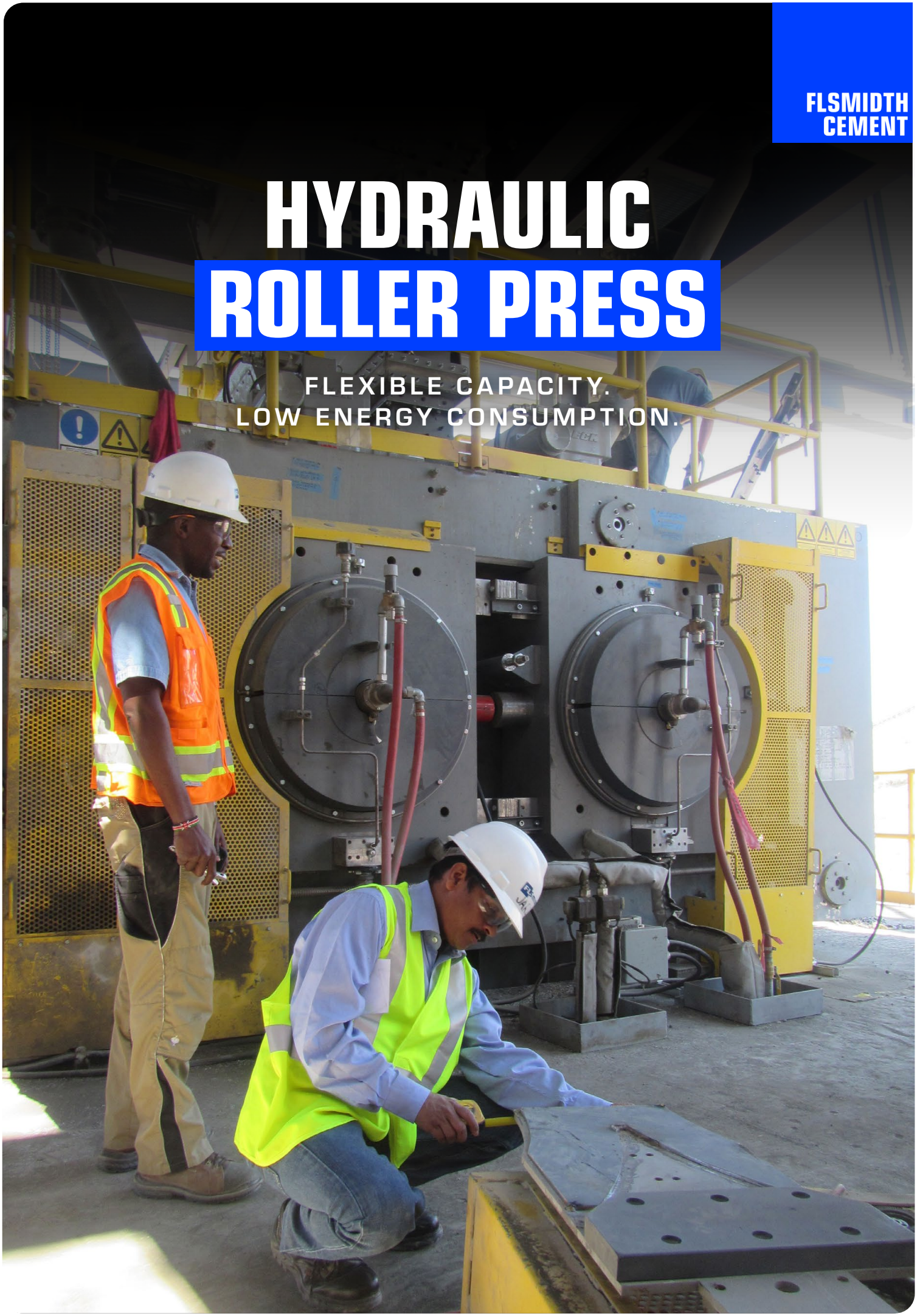
FLSMIDTH CEMENT

HYDRAULIC ROLLER PRESS

FLEXIBLE CAPACITY.
LOW ENERGY CONSUMPTION.



A FLEXIBLE AND SUSTAINABLE SOLUTION

Increase your capacity and reduce your specific energy consumption by up to 30 percent by upgrading your conventional grinding system to FLSmidth Cement's Hydraulic Roller Press (HRP).

Our highly efficient HRP is suitable for both upgrades and new installations. Since 1986, we have installed more than 113 HRP systems in cement plants to grind cement clinker, raw material, and slag.

KEY BENEFITS

- **A high level of energy efficiency**
- **Long wear life of parts**
- **Low operation and maintenance costs**
- **High reliability**
- **Low installation costs**

WANT TO CONTROL OPERATIONAL AND MAINTENANCE COSTS?

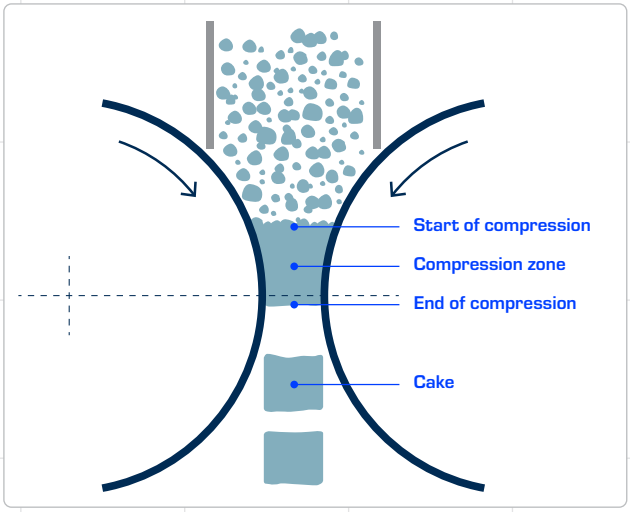
Controlling operational and maintenance costs is a crucial part of staying competitive in a consolidated global cement industry. Smart operators look past the installation cost towards how machines will perform when it comes to electrical usage, water positivity, and waste heat recovery. Other key factors include regional environmental compliance requirements, regional industry practices and local market preferences.

FLSmidth Cement's HRP ticks all the boxes. It offers waterless operation plus flexibility and energy efficiency, and it handles pre-grinding, semi-finish and finish grinding with ease.

How it works

HRP breaks down feed materials by exposing them to a very high pressure over a short time. The pressure forms micro-cracks in the feed particles, leading to the generation of a large amount of fine material.

For upgrade projects, using an HRP together with a ball mill significantly reduces overall specific power consumption and increases system production. In ball mills, less power is required to produce finished cement from HRP-pressed material than from unpressed material.



The figure shows how feed material is exposed to a very high pressure in the HRP.

Grinding pressure range in various grinding applications, kN/m2.

Ball mill	VRM	Latest generation VRM	HRP
N/A	600-800	1,000-1,100	5,500-6,600

Efficiency →

As shown on the figure, the HRP is the most efficient machine amongst all grinding machines.

Key benefits

High electrical energy efficiency

HRP has the highest grinding pressure (KN/m2) of any grinding machine in the cement industry. That means best-in-class electrical energy efficiency. Careful design, including an optimum width-to-diameter ratio of rollers, helps maintain that efficiency on a consistent basis.

Low total cost of ownership

Our HRP is designed to ensure reliability, efficiency, and minimal maintenance, leading to a low total cost of ownership. We have specifically focused on features such as solid forged single piece rollers, spherical bearings, oil lubrication, automatic control of skewing using a hydraulic system, and an easy roller removal mechanism for maintenance purposes.

Waterless operation – even with dry materials

Even with extremely dry materials, our HRP can operate without any water spray requirement for grinding purposes. Water conservation is an important parameter in many regions of the world.

THREE PROCESSES, TOP EFFICIENCY

Pre-grinding

Our HRP grinds the fresh feed and a certain amount of recirculated pressed flakes. This material mix then undergoes finish grinding in a conventional ball mill circuit. The result: an increase in production of approximately 25 percent, and a reduction in specific power consumption of about 10 percent compared to a conventional ball mill system.

Semi-finish grinding

Upgrading a ball mill system with an HRP in a semi-finish mode is a simple solution, and installation is easy. A compact, energy-efficient semi-finish grinding installation can be achieved by combining our HRP with the ROKSH/RAR-M Dynamic Separator and the CRPGS Static Separator with a conventional ball mill system.

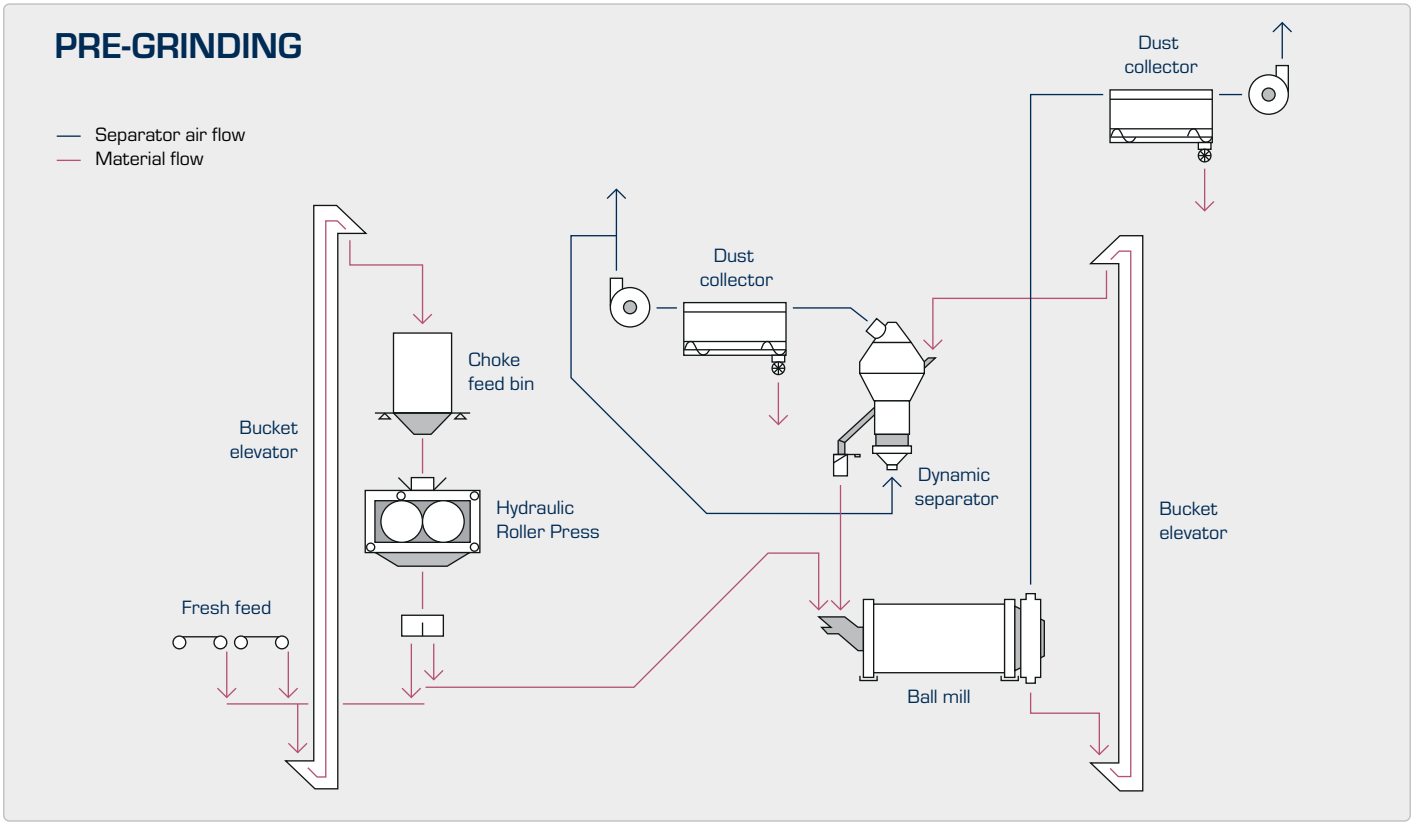
The two-stage separator system helps the HRP system achieve high efficiency. The static separator ensures deagglomeration and coarse separation, and makes sure the material is properly dried. The dynamic separator separates and maintains the final product's desired quality.

Upgrading a conventional ball mill with our HRP in semi-finish mode can increase production by 100 percent or more, while reducing specific power consumption by about 30 percent.

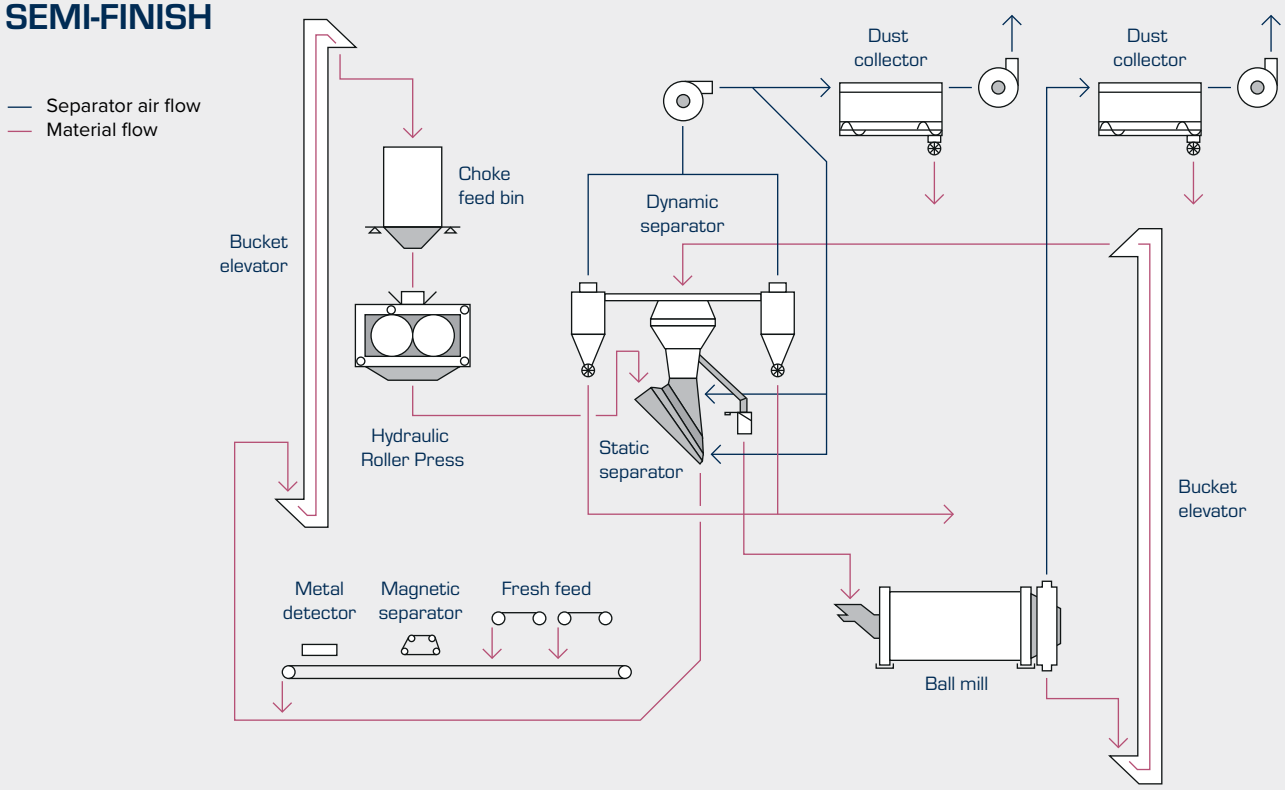
Finish grinding

If the HRP is used for finish grinding in a closed circuit with the two-stage separator system, there is no need to include other grinding machines. The HRP delivers higher efficiencies in finish grinding than ball mills and vertical mills.

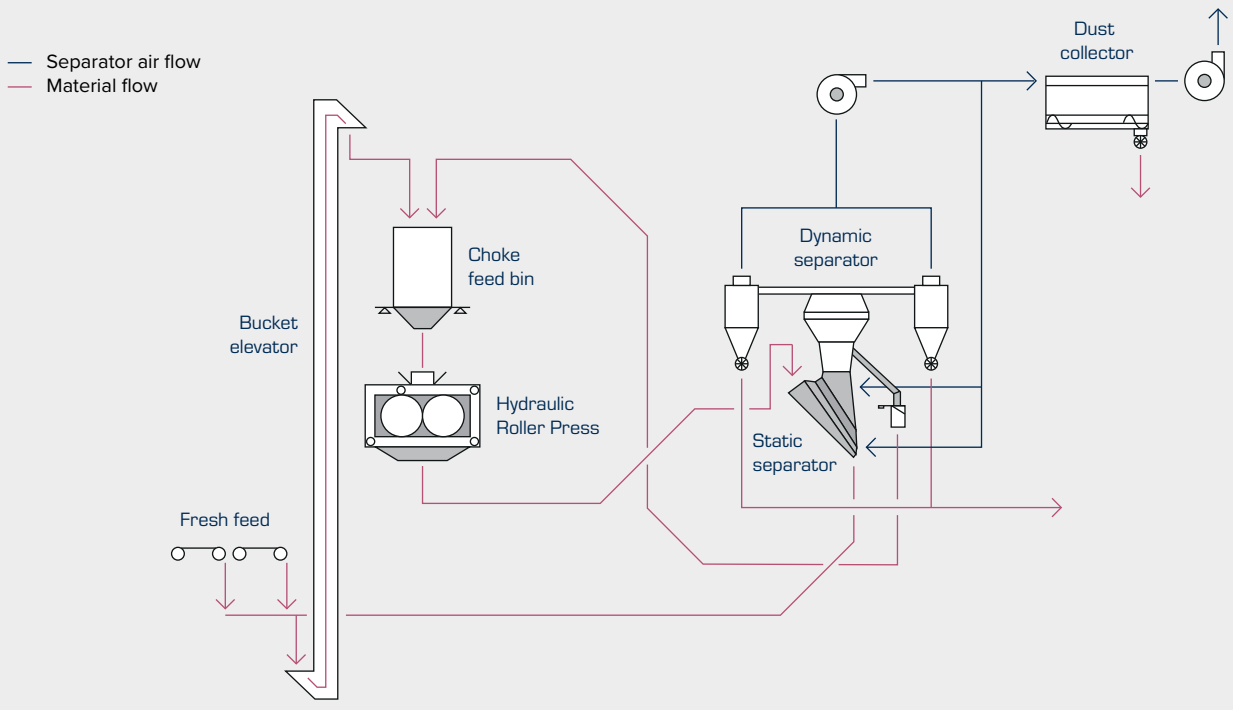
That means that our HRP can be the optimum solution for raw and slag grinding applications, helping to minimize operating and investment costs.



SEMI-FINISH



FINISH GRINDING

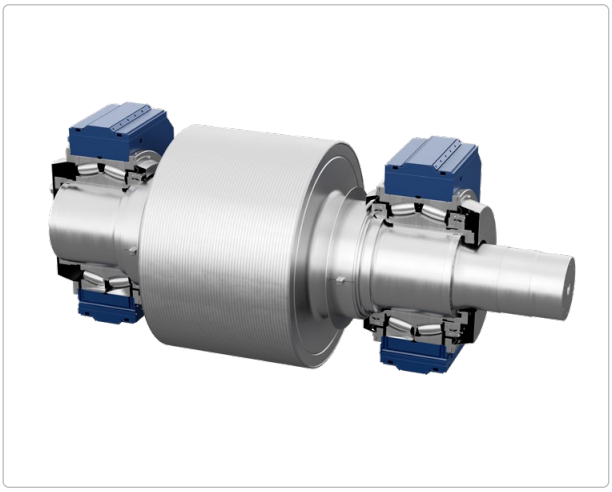


DESIGN ADVANTAGES

Our HRP comes with several features to ensure reliability, high energy efficiency, ease of maintenance, and low overall maintenance costs. The HRP has its own foundation, isolated from the rest of the building. This prevents the transfer of vibrations to the rest of the building. The HRP grinding system as a whole has a compact design, allowing for lower building heights and a layout with a low footprint. This reduces civil and structural costs and provides easy access to the equipment and more straightforward maintenance procedures.

Solid forged roller shaft with optimum width-to-diameter ratio

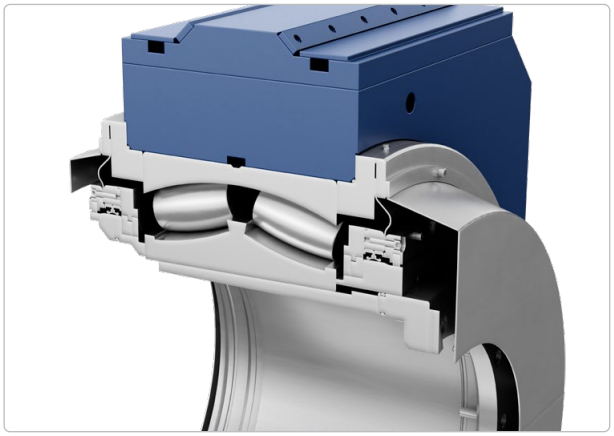
By default our HRP rollers come as solid forged single-piece rollers with no hollow shaft. Along with the optimum width-to-diameter ratio of the roller shafts, this helps ensure a high degree of reliability and smooth operations on a consistent basis.



The solid forged roller shafts ensure high degree of reliability and smooth operation.

Oil-cooled spherical bearings

When it comes to reliability, FLSmidth Cement's HRP comes with a highly advantageous combination of spherical bearings and oil lubrication. Low-pressure oil is pumped from the reservoir, filtered, temperature conditioned, and then routed to each of the shaft bearings. This system supplies filtered and cooled oil to the bearings, flushing away contaminants and carrying away heat that is generated during normal operation of the HRP.

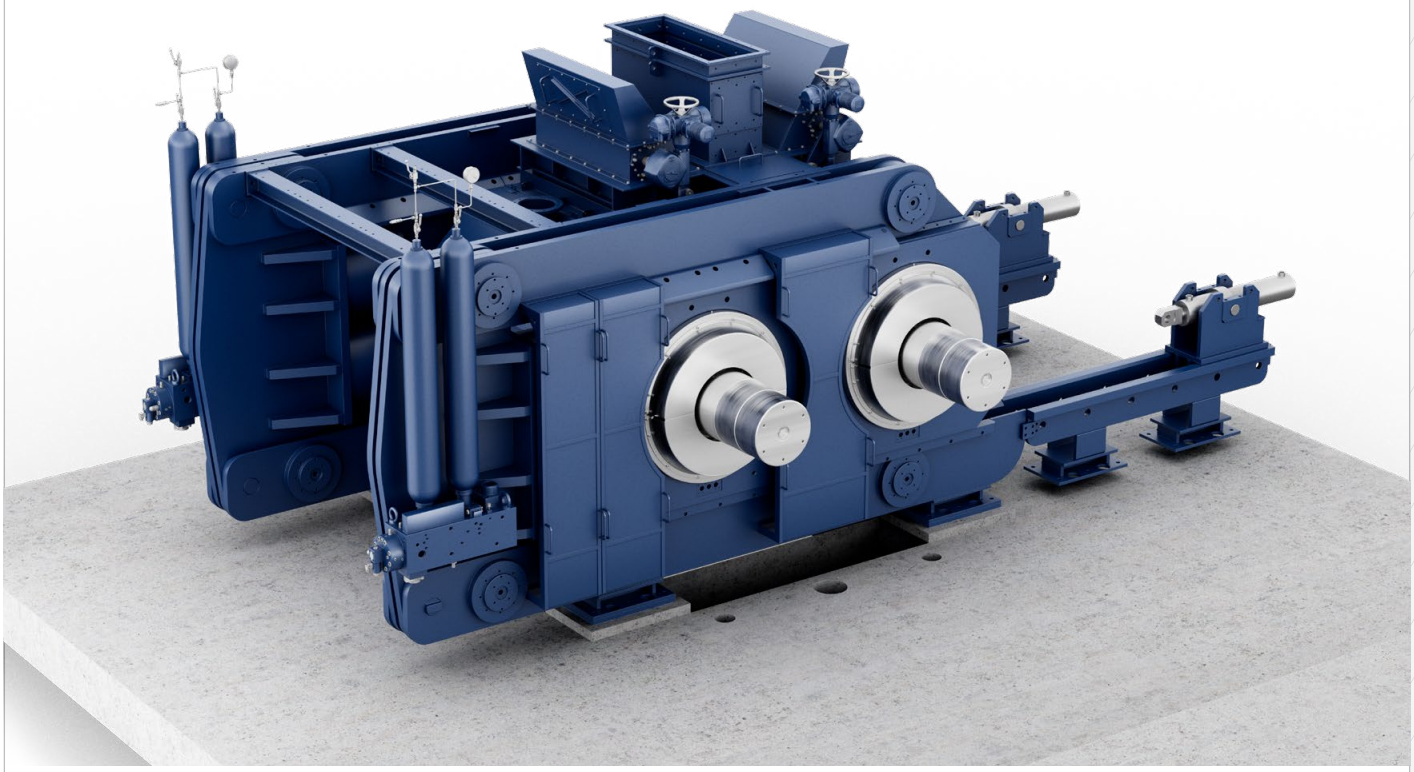


The oil-cooled spherical bearings.

Advantages

- No greasing/cleaning required
- Longer bearing life (vs grease packing)
- No requirement for additional shaft cooling with water circulation
- Spherical roller bearings are highly suitable for accommodating angular misalignments (skew conditions)
- Circulating oil lubrication for bearings with return oil passing through a conditioning circuit (cooling and filtering of lubrication media).

THE HRP COMES IN VARIOUS SIZES DEPENDING ON YOUR SPECIFIC GRINDING NEEDS.



Type range HRP-C

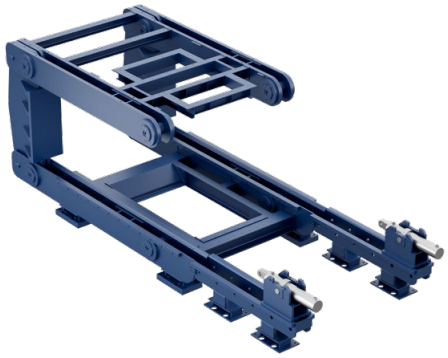
6,600 kN/m2 (For cement grinding)

Size (m2)	Diameter (m)	Width (m)	W/D
0.64	1.17	0.55	0.47
0.95	1.36	0.70	0.51
1.32	1.48	0.89	0.60
1.66	1.60	1.04	0.65
2.07	1.74	1.19	0.68
2.57	1.92	1.33	0.69
3.07	2.12	1.45	0.68
3.70	2.30	1.61	0.69

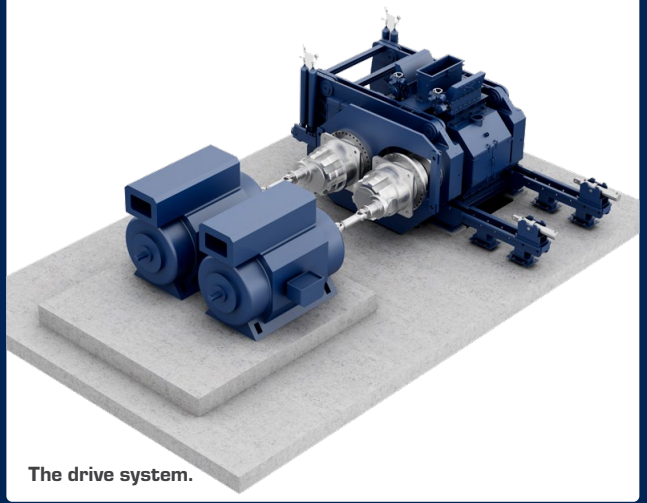
Type range HRP-R

5,500 kN/m2 (For raw grinding)

Size (m2)	Diameter (m)	Width (m)	W/D
0.77	1.17	0.66	0.56
1.13	1.36	0.83	0.61
1.55	1.48	1.05	0.70
1.98	1.60	1.24	0.77
2.47	1.74	1.42	0.81
3.07	1.92	1.60	0.83
3.69	2.12	1.74	0.82
4.42	2.30	1.92	0.83



The express frame.



The drive system.

Express frame

The HRP has an express frame which is designed and built for faster and safer replacement of the roller assembly. With the cement industry always trending towards larger equipment, the express frame has been developed to handle large and heavy components safely and easily.

Advanced Skew Control

Our HRP features Advanced Skew Control (ASC) via the hydraulic pumping system to the cylinders, monitored by linear variable differential transducers (LVDTs). As skewing starts to occur in the floating roll, the ASC system adjusts the press force applied to the hydraulic cylinders. This keeps the roll assemblies as close as possible to parallel during operation, while at the same time allowing them to adjust to the segregation of feed conditions over the roll width, especially for larger machines.

Drive system

The two-roll shafts are powered by induction motors driving planetary gear reducers. The gear reducers are mounted to a common torque-sharing arm assembly, eliminating the need for mounting these components to a foundation. This means there is no vibration transmission to the foundation.

Cardan shafts connect the main drive motors to the high-speed reducer shafts via torque-limiting couplings. These torque limiters are hydraulically engaged and critical for protecting the drive and HRP in the event of an overload situation. Rigid drive couplings attach the reducer output shafts to the roll shafts, completing the drive system.

Anti-Vibration Flow Control Gate (AVFC Gate)

The AVFC Gate is a manually-operated gate that allows us to control the material column entering between the rollers. In general, the AVFC gate is adjusted only when the production of the system changes significantly due to a change in the product quality.

Advantages

- The AVFC Gate makes it possible to align the center line of the material feed column with the center line between the operating rollers. This means the operator can balance the power draw between the two HRP motors more efficiently when needed.
- The AVFC Gate reduces the vibration level, because it helps reduce the amount of air trapped in the feed column entering between the rollers.
- The AVFC Gate also helps improve the torque factor value, which is related to actual power draw of the HRP motors.
- Minor adjustments in feed during continuous operation can be controlled with motorized feed gates provided below the AVFC gates when required.

TRIBOMAX®

Our TRIBOMAX wear solution is a unique, wear-resistant surface for hydraulic roller press installations, providing significant improvement in roller lifetime.

Advantages of TRIBOMAX®

- The strongest and most durable roller wear surface available, applied using a special welding technology much different from conventional welding.
- A TRIBOMAX® surface has a built-in roughness and offers high and constant torque factor due to hard carbide particles embedded in a softer matrix.
- A TRIBOMAX® surface doesn't need to have patterns, meaning almost no maintenance.
- A TRIBOMAX® surface forms an autogenous wear layer that helps improve machine lifetime.
- The TRIBOMAX® surface has been tested by feeding manganese steel balls into the roller gap. No surface damage appeared – only indentation marks.

Conventional wear surface: We also provide conventional wear surface for applications in which the feed materials do not have high abrasiveness.

Design analysis

To ensure our customers get the best in terms of efficiency, reliability, and quality, every HRP supplied by FLSmidth Cement is backed by a full complement of design analysis:

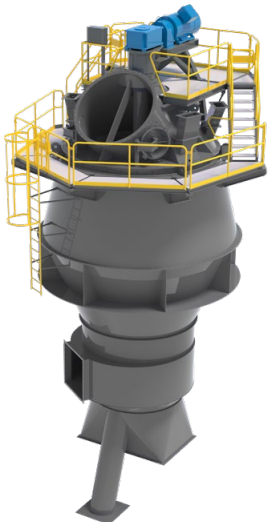
- Finite Element Analysis ensures the structural stability of the machine.
- Seismic Analysis (as required) – The HRP is designed to meet stringent seismic conditions to ensure reliability.
- Drive Train (Torsional) Analysis ensures the right drive mechanism is selected.
- Vibration Analysis ensures structural stability during operation.
- Gear designed to AGMA/DIN Standards – Our HRP gear boxes are designed to fulfill international industry norms.
- Field-tested Wear Surfaces – All our wear surfaces are proven in the industry.

TRIBOMAX® is the strongest and most durable wear surface available.

SEPARATORS

The efficiency of any grinding system largely depends on the efficiency of its separators. Both dynamic and static FLSmidth Cement separators are admired in the cement industry for their high efficiency.

Dynamic Separator
ROKSH (Cement grinding)



Dynamic Separator
RAR-M (Raw grinding)

Dynamic Separator

The FLSmidth Cement Dynamic Separator (ROKSH & RAR-M) offers:

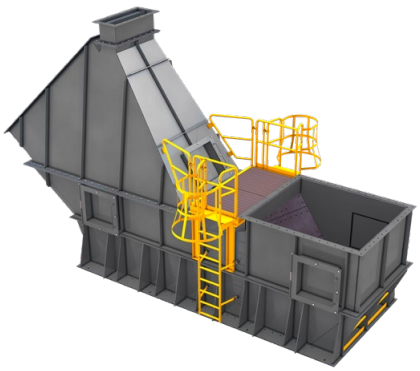
- High separation efficiency levels
- Low velocity through rotor cage
- Low power consumption of separator fan
- Compact design
- Enhanced wear protection

Static Separator

The FLSmidth Cement Compact Roll Press Grit Separator (CRPGS) offers:

- Compact design
- Optimum velocity in the separator zone
- Dedicated zone for deagglomeration
- Dedicated zone for coarse separation
- Enhanced wear protection

Static Separator
CRPGS



Hydraulic roller presses boost productivity at Orient Cement

Orient Cement shares how the installation of two hydraulic roller press systems supported the efficiency and sustainability objectives of their Karnataka plant.

Scan the QR code to read the story or visit flsmidth-cement.com.

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