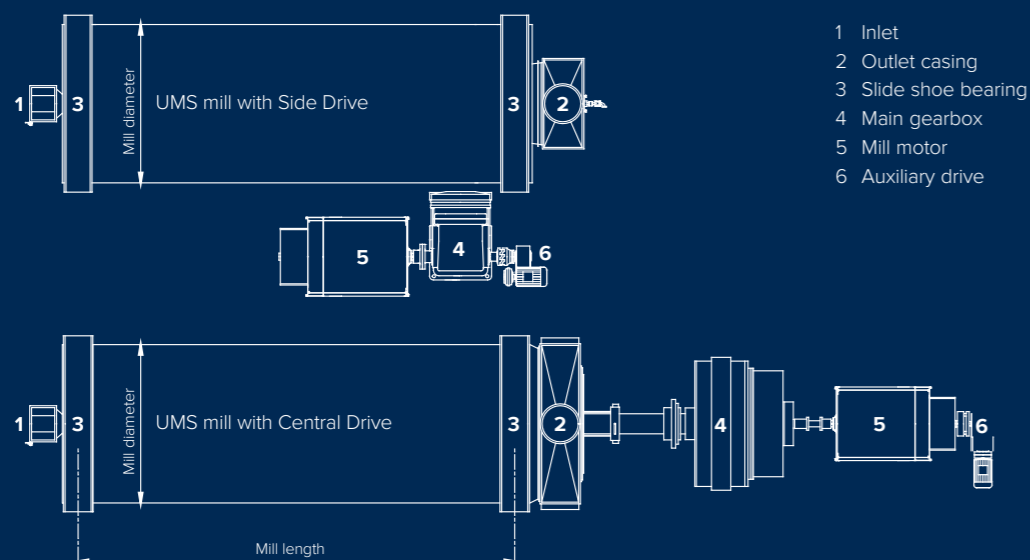


Ball mill

Superior cement quality,
More flexibility, higher reliability



Flexible, efficient cement grinding based on more than a century of experience



- 1 Inlet
- 2 Outlet casing
- 3 Slide shoe bearing
- 4 Main gearbox
- 5 Mill motor
- 6 Auxiliary drive

Key benefits

- Robust and reliable
- Adaptable drive system
- Flexible, modular design
- Low pressure drop
- Simple maintenance

Cement grinding is a crucial stage of the flow sheet, where both cement quality and process efficiency are decided. Achieving the required fineness with maximum efficiency is down to the design of the ball mill and how well it runs. An inefficient system can push your energy bill right up, making it a lot more expensive to produce the desired product quality. Poor design could also result in overgrinding, inadequate mixing and even insufficient product quality.

The best ball mills, however, enable you to achieve the desired product quality quickly and efficiently, with minimum energy expenditure. That's what the FLSmidth ball mill is designed to do – with the added benefit of high flexibility. You decide whether to operate the mill in open or closed circuit, with or without a pre-grinder. It's a versatile design that can be adapted to your requirements in terms of plant layout, mill drive, lining types and end product specifications.

In addition, the large through-flow areas enable the mill to operate with large volumes of venting air and a low pressure drop across the mill. This reduces the energy consumption of the mill ventilation fan and keeps your energy costs down.

Cement grinding – taking on the tough tasks

Cement ball mills have to achieve the desired grinding fineness with maximum grinding efficiency and minimal wear and tear. It's a tough job when you consider the operating conditions of the mill – but our equipment is built to last.

Hard - wearing kit

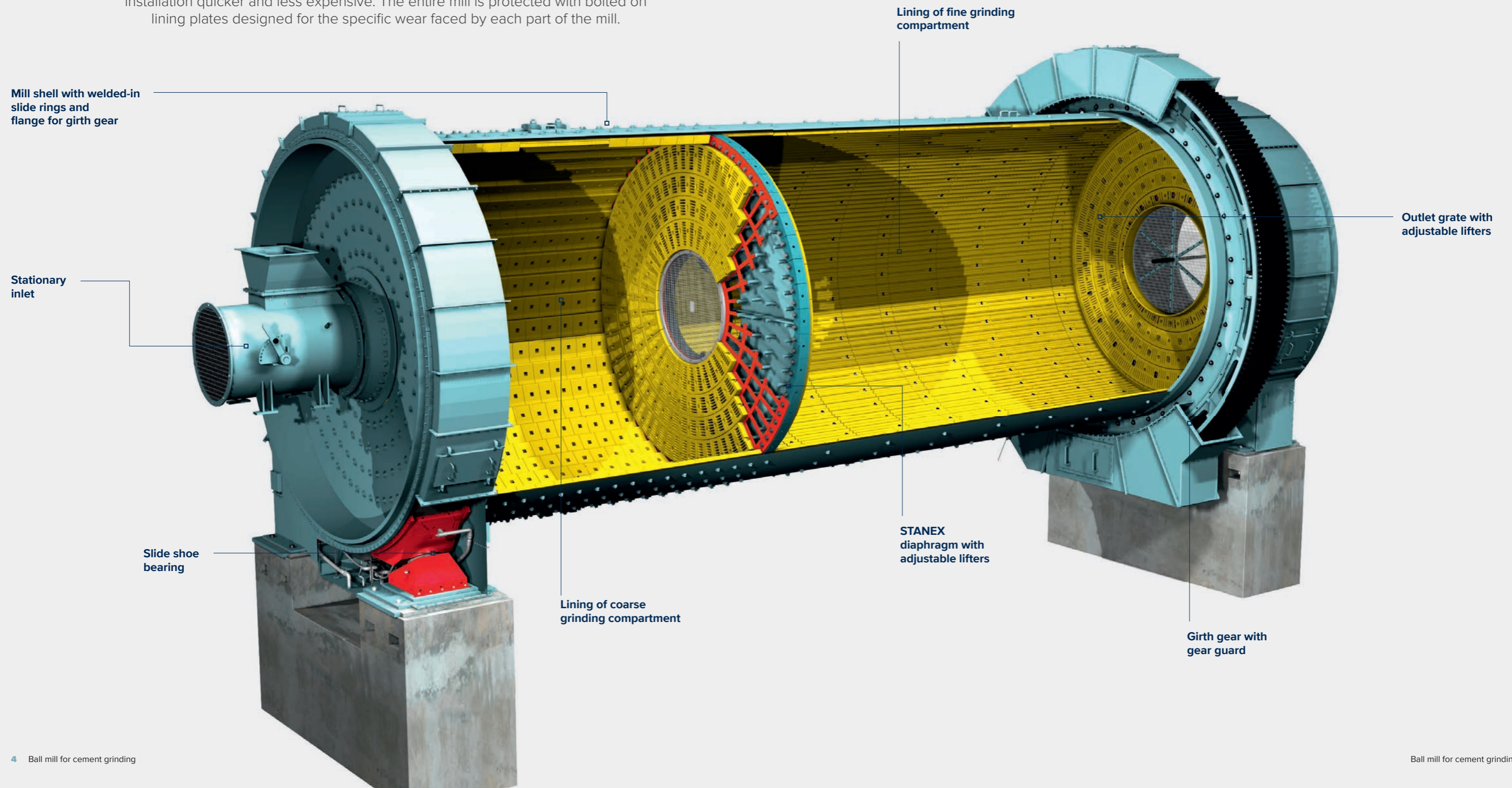
Our shell linings are designed to suit the task at hand. In our two-compartment cement mills, the first compartment (for coarse grinding) has a step lining suitable for large grinding media. It protects the shell while ensuring optimum lifting of the mill charge. In the second compartment (and also in our one-compartment cement mills) we use a corrugated lining designed to obtain the maximum power absorption and grinding efficiency. For special applications, we can supply a classifying shell lining for fine grinding in the mill.

In fact, the entire mill is protected with bolted on lining plates designed for the specific wear faced by each part of the mill. This attention to detail ensures both minimal wear and easy maintenance. When a wear part has reached the end of its life, it is easily replaced.



FLSmidth ball mill

The mill is based on standard modules and can be adapted to your plant layout, end product specifications and drive type. The horizontal slide shoe bearing design enables much simpler foundations and reduced installation height, making installation quicker and less expensive. The entire mill is protected with bolted on lining plates designed for the specific wear faced by each part of the mill.



Optimum grinding efficiency

The grinding media are supplied in various sizes to ensure optimum grinding efficiency. In the coarse grinding department, the grinding media are sized to crush just the coarsest particles in the mill feed, enabling the right-sized material to pass through the diaphragm into the second compartment. For fine grinding, we use small balls to ensure the best possible grinding efficiency without obstructing the material flow.

The STANEX diaphragm screens the material passing from the coarse to the fine grinding compartment. It is fitted with adjustable lifters to ensure the material levels in each compartment are right. Best of all, the STANEX diaphragm works for all applications, even when material flow rates are high and the mill feed is moist.

Careful controls

The more control you have over the mill, the better your grinding efficiency is likely to be. Our ball mills include monitoring systems to continuously measure the material and air temperatures as well as the pressure at the mill exit. The venting of the mill is adjusted by a damper in the inlet to the mill fan. And the material fill level is continuously monitored by means of sensors. For ball mills operating in closed circuit, the circulation load is monitored by weighing the flow of reject material from the separator. These measures ensure you achieve optimum mill performance, giving you the quality, efficiency and reliability that you need.

So that you don't end up with a mill that's too hot, an internal water cooling system can be installed in one or both grinding compartments to optimize mill performance both inside the mill and at the discharge end. This is a separate unit comprising water tank, pump(s) and valves. The flow of cooling water is controlled automatically according to temperature monitors in the mill and at the outlet. Special nozzles ensure optimum spraying without the use of compressed air for maximum energy efficiency.

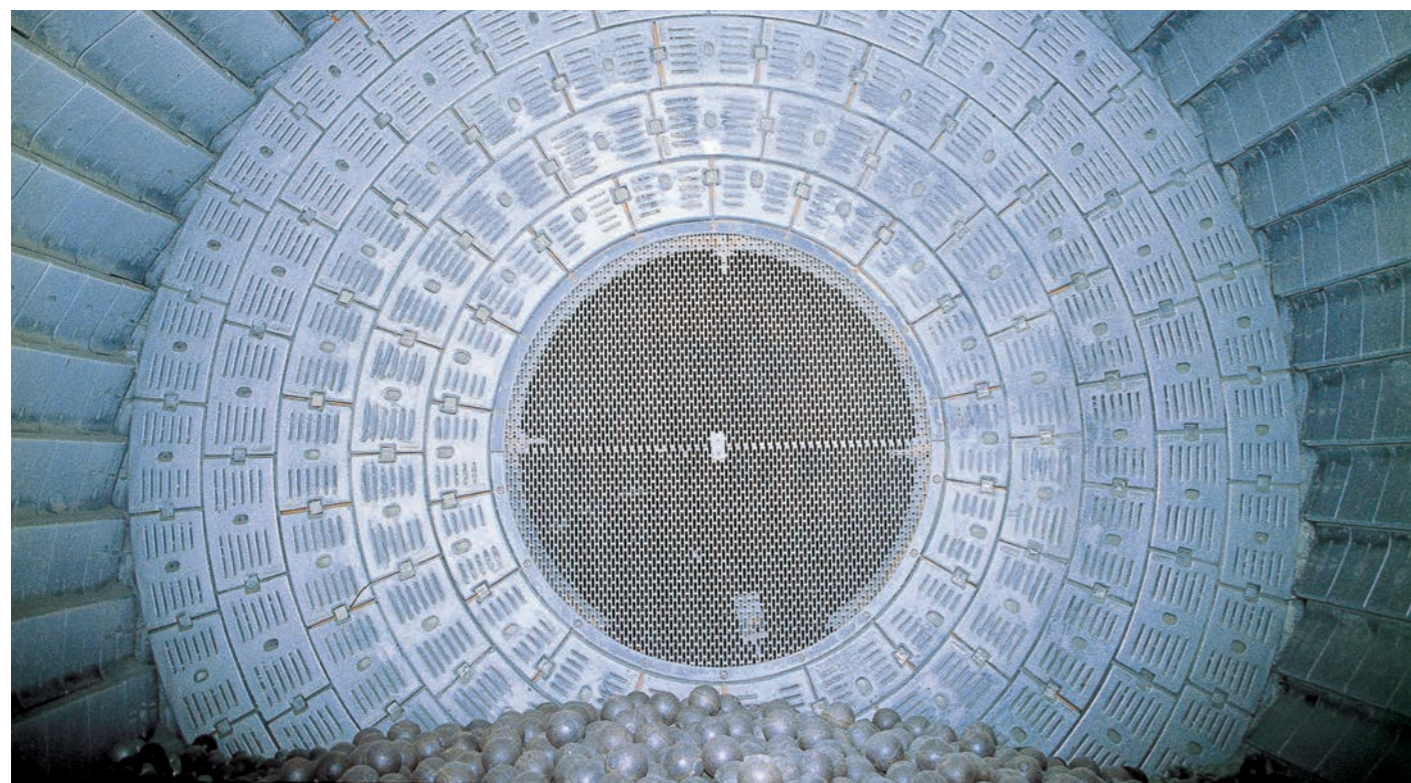
And if you have excess moisture in your materials that needs additional drying, you can opt for a bolted-on drying compartment with lifters.

Proven mill design

Buying a new mill is a huge investment. With over a century of ball mill experience and more than 4000 installations worldwide, rest assured – we have the expertise to deliver the right solution for your project. Our ball mill is based on standard modules and the highly flexible design can be adapted to your requirements. The mill comprises the following parts.

Mill body

The mill body consists of an all-welded mill shell and a T-sectional welded-up slide ring at either end, the cylindrical part of which is welded onto the ends of the shell. The mill shell has four manholes, two for each grinding compartment.



Stanex diaphragm

Slide shoe bearings

Each slide ring runs in a bearing with two self-aligning and hydrodynamically lubricated slide shoes. One of the slide shoes at the drive end holds the mill in axial direction. In the others, the slide rings can move freely in axial direction to allow for longitudinal thermal expansion and contraction of the mill body.

The slide shoes are water-cooled, and each bearing is provided with a panel-enclosed lubrication unit including oil tank, motorised low- and high-pressure oil pumps, as well as an oil conditioning circuit with motorised pump for heating/cooling and filtration of the oil.

Horizontal slide shoe bearing design has much simpler foundation and reduced installation height results in lower civil cost. Uncomplicated alignment of base plates ensures low installation time and cost. Proven bearing design makes it easier for maintenance enables lower down time of ball mill.

Benefits

- Much simpler foundations and reduced installation height. - **Lower civil costs.**
- Uncomplicated alignment of base plates. **Lower installation time and cost**
- Independent installation of slide shoes and casing.
- Simple installation of casing.
- No oil spillage from bearing casing. – **Low Maintenance time and cost.**
- Easy replacement of slide shoes if needed. – **Faster replacement, lower downtime!**
- No risk for blocking of moveable bearing since rollers are removed. – **NO RISK**

Inlet

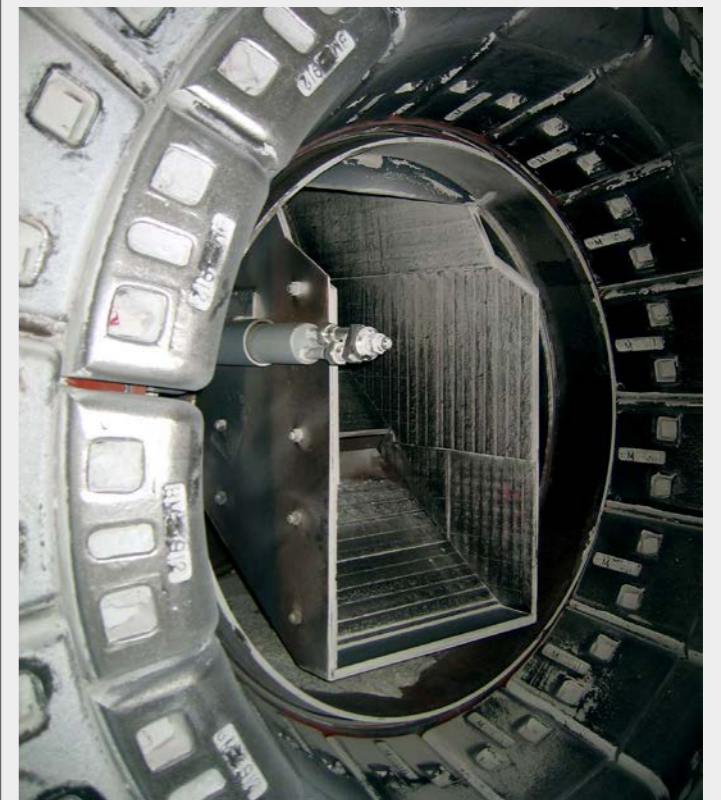
The stationary steel plate inlet duct leads the venting air into the mill. It is equipped with a manually operated throttle valve and a pressure monitor to adjust the pressure at the inlet end, thus preventing dust emission from the inlet. The feed chute is lined with bolted-on wear plates and slopes down through the air duct to the mill inlet opening.

Outlet

The stationary steel plate outlet casing is insulated with mineral wool and provided with seals between the casing and the rotating outlet cone.



Slide shoe bearing

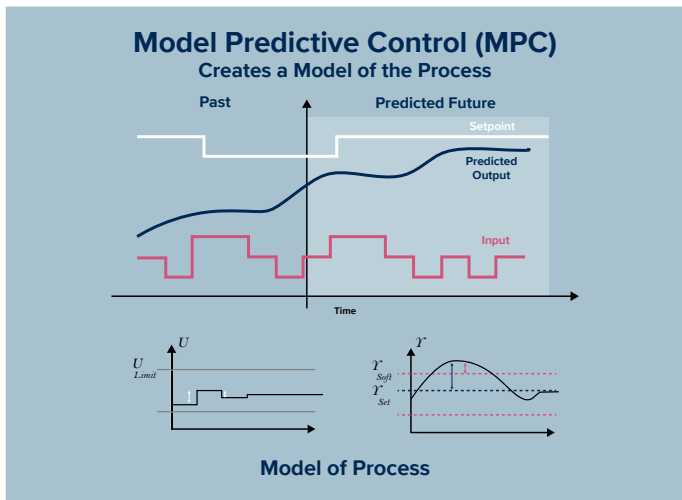


Mill inlet

Digitalization drive

When your mill is performing at its best, you achieve better energy efficiency, improved product quality and lower overall costs. Digitalization enables you to maximize mill performance by increasing control over all operating parameters. With our ball mills, basic monitoring systems are included as standard to continuously measure critical process and operating parameters, such as the material and air temperatures as well as the pressure at the mill exit. You can also add to that our advanced expert control system, ECS/ ProcessExpert.

This modular offering performs complex and continuous evaluation of process conditions and responds with the required control actions more quickly, frequently and consistently than is possible for human operators. This high-level control system ensures you achieve optimum mill performance, giving you the quality, efficiency and reliability that you need.



We can also offer a number of digital based services and applications such as, SiteConnect™, which enable you to

- Improve visibility of plant and equipment performance
- Optimize asset management
- Quickly respond to unplanned events

Overall, digital services help you increase plant reliability and uptime, giving you greater productivity and a lower total cost of ownership. With expert guidance on tap 24/7, you can get proactive on maintenance, developing action plans that go beyond ensuring mill health and allow you to truly optimize mill performance.

Side drive or central?

The mills are typically driven by our FLSmidth MAAG LGDX side drive. Gearing rated to the latest proven AGMA standards. The mill drive is provided with an auxiliary drive for slow turning of the mill. The LGDX includes two independent lubrication systems, one which services the girth gear guard and intakes more dust, and a second which supplies oil for the fast-rotating gearing and bearings and stays clean. If requested, however, the mills can be provided with a central drive: the FLSmidth MAAG CPU planetary gearbox. The mill design differs slightly, depending on whether the side or central drive is chosen .

A wide range of equipment

Mills should be designed to fit your requirements, not the other way around. This table shows the range of FLSmidth ball mills for cement grinding, with capacities up to ~10 000 kW in an array of mill diameters and lengths. FLSmidth MAAG LGDX side drives are supplied as standard but other drive types are available on request.

Specifications

| Mill | | Motor * |
|--------------|-------------|----------------------------|
| Size (D x L) | Speed (rpm) | Installed motor Power (kW) |
| 3.8 x 13 | 16.86 | 2570 |
| 4.2 x 12.5 | 16.03 | 3130 |
| 4.2 x 14.5 | 16.03 | 3660 |
| 4.6 x 13.5 | 15.33 | 4205 |
| 4.6 x 14.5 | 15.33 | 4535 |
| 4.6 x 15.5 | 15.33 | 4870 |
| 5.0 x 14 | 14.69 | 5345 |
| 5.0 x 15 | 14.69 | 5750 |
| 5.0 x 16.5 | 14.69 | 6355 |
| 5.4 x 15 | 14.13 | 6985 |
| 5.4 x 16.5 | 14.13 | 7725 |
| 5.8 x 15.5 | 13.62 | 8680 |
| 5.8 x 17 | 13.62 | 9560 |

* Max. power is calculated at Ch1 = ~30% of total power consumption

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