polysius® ball mills
Strong performance for grinding and drying
Grinding and drying for a wealth of applications

Cost-effective, reliable and energy-saving: with its high-performance range of ball mills for the grinding and drying of a wide variety of materials, thyssenkrupp Industrial Solutions offers solutions to suit your every need.

Our customers not only benefit from the decades of experience we have gained through successfully commissioning more than 2,200 ball mills, but also from our comprehensive scope of services, ranging from maintenance and OEM spares procurement to the optimization of existing plants.

The grinding unit most commonly used for grinding brittle materials, such as cement, is still the ball-filled ball mill. The following types can be found:
- single-compartment mills,
- two-compartment mills,
- air-swept mills as well as special designs.

The ball mill that best suits your respective application depends on many factors, including feed grain size, grindability, moisture and drying properties. In conjunction with our customers, we analyze the requirements and together develop the optimum plant configuration.
Two-compartment separator mill for cement

The mill shell is divided by a diaphragm. Coarse grinding using big balls of up to 100 mm in diameter takes place in the first compartment. The peripheral wear lining is designed as a lifting or activator plate lining which, with the large balls, achieves a high energy input for comminution. The transfer diaphragm allows the flow of material into the second compartment to be adjusted. The transfer diaphragm is protected by wear plates.

The second compartment is equipped with a classifying plate lining for classifying the balls according to their diameter. The required product fineness is thus achieved in the last section of the second compartment. The finish-ground material is mechanically discharged via a discharge diaphragm.

The diaphragms supplied by thyssenkrupp Industrial Solutions offer numerous advantages:
- Separation of air and material flow
- Material flow through the diaphragm is adjustable
- Diaphragms with wear-optimized plating
- A large central grating reduces pressure loss and enables the material to pass from one compartment to the other.

Further optimization is achieved through the use of a sepol® separator, which separates the finished product from the ground material. The grits separated out by the separator are fed back into the mill as recirculating material; this prevents overgrinding of the finished product in the ball mill discharge.

Heat generated during the grinding process can be dispersed by good mill ventilation and by injecting water.
Air-swept mill and single-compartment mill

Air-swept mills are single-compartment mills. Material is discharged pneumatically by means of an air stream. The ground material can be fed directly into an air-swept separator; no additional ventilation using a filter and fan is required.

These mills are used to grind very moist materials that need to be dried using low-temperature air. If the relevant explosion-protection equipment is used, air-swept mills are optimally suited for grinding solid fuels, such as coal or pet coke.

Single-compartment mills are of a similar design to air-swept mills, but the material is discharged mechanically by a discharge diaphragm. These mills are well-suited for finer feed materials. They are used for secondary grinding downstream of a primary grinding unit or in a combi-grinding system with a polycom® high-pressure grinding roll.
Layout of a combi-grinding system for cement with polycom®, ball mill and sepol® PC.
Hydraulic cylinders located under the bearing shoes enable the entire mill shell to be raised and positioned. This allows any unevenness in the foundation to be compensated for and makes it possible to replace individual sliding shoes.

Shell-supported ball mills are becoming the mills of choice over those with trunnion bearings. Depending on the size of the mill, there are two, four or six sliding shoes per bearing assembly. The expected bearing load determines whether hydrostatically or hydrodynamically lubricated bearing shoes are used.

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Additional advantages are:

- No curved end walls and the resultant problems in terms of strength
- Mill load is borne directly
- Maximum possible opening in the inlet and outlet
- Better mill ventilation
- Mill inspection via the inlet is possible, thus increasing personnel safety
- Less wear and simpler form of wear lining on straight end walls
- Short inlet cone
- Less bearing clearance and thus less mill shell deflection

There are two types of gear unit available for the mill drive unit. For higher drive powers, the combiflex® gear unit is the unit of choice. The combiflex® has an output of up to 8,000 kW, and with a dual drive up to 16,000 kW. Thanks to its floating shaft with hardened toothed wheels and its simple oil lubrication system, this gear unit offers optimum operating conditions.

For less drive power, a direct drive with a toothed wheel and pinion is ideal. In both gear unit types, the girth gear and the slide ring with sliding shoes are incorporated in a single housing. This, as well as the small size of the gear units, enables a very compact design.
Shell-supported mill with combiflex® drive