Our new name is ThyssenKrupp Industrial Solutions
www.thyssenkrupp-industrial-solutions.com

POLYCOM® high-pressure grinding roll

Polysius
POLYCOM® high-pressure grinding roll
The reliable and energy-saving grinding system

One of the principal reasons for the outstanding success of the high-pressure grinding roll in the cement industry is its low power requirement. Today, this mill is employed all around the world for the grinding of cement raw material, cement clinker and granulated blast furnace slag.

For new plants, the POLYCOM® is an economically superior concept compared to conventional systems.

The POLYCOM® is also predestined as extension investment to achieve maximum throughput increases of existing plants. With its low space requirement and the high capacity in relation to machine size, the POLYCOM® can be easily integrated in existing plants.

Uneconomical plant components can be shut down and operating and maintenance costs can be saved.

POLYCOM® units are used for throughput rates in excess of 2,000 tph. The mill feed material can be dry or moist with a largest feed grain size of up to 60 mm. If necessary, the material can be predried.

The POLYCOM® can be used as machine component in finish-grinding systems or it can be used as an independent finishing mill.

The larger the amount of grinding work performed by the POLYCOM®, the greater is the reduction in power consumption.

Modern and user-friendly equipment for regulation, monitoring and control, combined with advanced process technology, ensure reliable and efficient operation of the plant.

Because of the short material dwell time in the mill, the machine settings can be quickly altered by the touch of a button, making the process easy to control and permitting rapid compensation for fluctuations in the properties of the feed material. Furthermore, a change between different mill feed materials is easy and problem free.
The high-pressure interparticle comminution in the POLYCOM® is based on the following principle:

Brittle material particles are fed to the POLYCOM® through a feed bin. The grinding elements are two counter-rotating rolls, between which the material is crushed. One roll is designed as a fixed roll and the other one as a floating roll.

The required comminution pressure is transmitted via the floating roll.

The high-pressure interparticle comminution produces compacted cakes of material containing a high proportion of fines and coarser particles showing extensive cracking. These compacted cakes are disintegrated or ground and separated.

The grinding action of a ball mill involves a mixture of compressive and shear forces, whereas the POLYCOM® imposes virtually pure compressive force on the layer of material between the rolls. In comparison with the shear stress, the compression stress built up in a particle of material in a POLYCOM® is almost five times higher.

The outcome of this type of comminution is that the POLYCOM® needs less than half the energy amount consumed by a ball mill.
The innovative POLYCOM® design

A guarantee for high availability and for economical continuous operation

The POLYCOM® grinding rolls have a length-to-diameter ratio lying between 0.3 and 1.0, so that they meet the demands made on interparticle comminution, such as:

- long service lives of roll surfaces,
- energy-efficient production of compacted cakes,
- optimum draw-in of material to be comminuted to assure a high throughput,
- quiet running to protect the machine,
- easy replacement of worn roll bodies.

This provides the following advantages:

- large shaft diameters for the absorption of bending and torsional stresses,
- bearings designed for safe and reliable operation,
- optimum distances between bearings minimising the bending moments,
- high tyre thickness for safe shrink fits,
- high wear layer thickness for long operating times and minimum wear costs.

The fixed and floating rolls are both mounted in bearing blocks. The bearing blocks are guided and movable in the longitudinal direction. Skewing of the floating roll is compensated by the respective bearings. The grinding forces are transmitted to the floating roll by 2 or 4 hydraulic cylinders.

A hydro-pneumatic spring system permits the setting of different pressure characteristics and different control methods, so that an optimum application of the grinding pressure in the roll gap can be ensured, and the machine can be protected against possible overloads.

The floating roll unit accommodates to changes in the feed material characteristics by moving outwards or inwards. Spacers prevent the rolls from touching each other. The fixed and floating rolls are of identical construction and can therefore be interchanged.
The drive system of the rolls comprises:

- electric motors with constant or variable speed,
- cardan shaft,
- mechanical overload coupling,
- planetary gear unit.

To ensure a uniform distribution of the drive power to the two drive motors, the vertical feed shaft is equipped with infeed guide plates, which permit the control of the feed material distribution entering the mill. The material filling level is monitored with load cells installed at the POLYCOM® feed bin.
Since the introduction of the POLYCOM®, the wear protection concept has been constantly improved to meet the requirements of the market. Polysius offers:

- forged, hardfaced rolls,
- chill cast tyres made of bainite,
- chill cast tyres of compound casting.

The profiles welded onto the grinding rolls provide optimum draw-in conditions for the feed material and minimise the relative movement between the comminuted material and the roll surface.

They run and run and run ... with the optimum solutions developed by Polysius for protection against wear.
In dependence on the requirements, a technological process is designed which combines the following process stages:

- material feeding,
- comminution,
- classifying.

Finish-grinding

The use of the high-pressure grinding roll for finish-grinding permits maximum energy savings. In comparison with conventional ball mill grinding systems, up to 50% of energy can be saved. Feed material with up to 6% moisture content is dried in the separator. Material with higher moisture contents is dried in a separate unit, for instance a shaft-type flash dryer.

Combi-grinding

In semi-finish-grinding, the use of the POLYCOM® leads to energy savings of up to 40% compared to conventional ball mill grinding systems. In existing plants, the throughput can be increased by over 100%. In new combi-grinding systems, series-connected ball mills can have correspondingly smaller sizes than usual. The material is dried in the ball mill.

This system allows for the incorporation of several ball mills and permits separate primary grinding of different components. The defined size of the feed material allows for optimum grading of the ball charge.

Depending on the field of application, the separation of the material stream in combi-grinding plants is realised by a joint separator or by several separate units.

<table>
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<th>Construction size</th>
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<th>3</th>
<th>4</th>
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