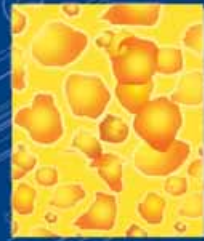
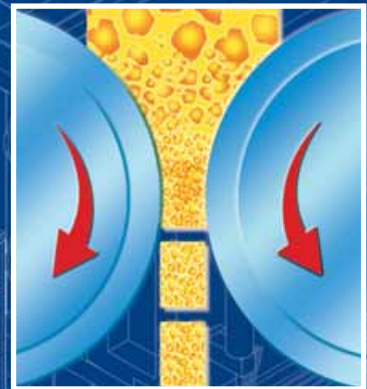
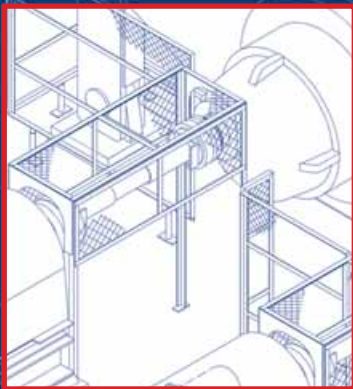


POLYCOM[®] high-pressure grinding roll.



A company
of ThyssenKrupp
Technologies

Polysius



ThyssenKrupp

POLYCOM® high-pressure grinding roll.

The proven 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.

Since the POLYCOM® was introduced by Polysius onto the market in 1985 more than 250 units have been sold, so that almost half of the approximately 500 mills operating worldwide on the interparticle comminution principle bear the name POLYCOM® and stand for **»Made by Polysius«**.

The popularity of this type of mill is due to the excellent operating results, the substantial reduction in energy consumption with resulting cost savings and the enormous throughput increases when incorporated into existing conventional grinding plants. Uneconomical plant components can then be shut down, slashing operating and maintenance expenses.

POLYCOM® units are designed for throughput rates of up to 1,300 tph. The mill feed material can be dry or moist with a largest feed grain size of up to 60 mm.

The POLYCOM® can be used as a primary mill in combination with – for example – tube mills, as a component of combi grinding systems, or as an independent finishing mill.

The larger the amount of grinding work performed by the high-pressure grinding roll, the greater is the energy saving.

Modern, user-friendly regulating, monitoring and control devices, combined with advanced process technology, ensure reliable and effective operation of the plant and an efficient process cycle.

POLYCOM® for clinker grinding in a combi grinding system in Saudi Arabia.



POLYCOM® for cement finish grinding in Belgium.





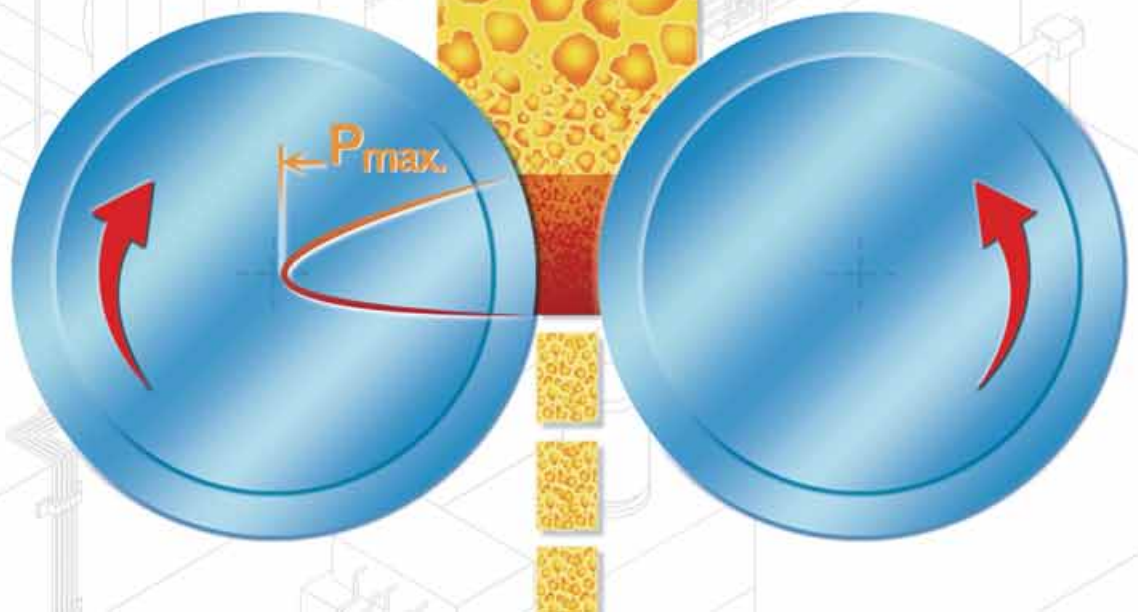
POLYCOM® for clinker grinding in a combi grinding system in the Lebanon.

Comminution in the POLYCOM® is based on the following principle:

When a brittle particle of material is subjected to pressure between two grinding media, only that one particle is comminuted. However, when a particle is subjected to pressure between two other particles, all three particles are comminuted. And this involves very little relative movement between the grinding elements and the material being ground and between the particles in the layer of material.

The outcome is that the POLYCOM® needs less than half the energy consumed by, for instance, a tube mill.

The grinding elements are two counter-rotating rolls, one fixed and the other floating, between which the material is crushed. The required comminution pressure is transmitted via the floating roll. This method of high-pressure interparticle comminution produces compacted cakes of material containing a high proportion of fines and coarser particles showing extensive cracking. Depending on the foreseen use of the product, the cakes can either simply be disagglomerated, or finish ground and fed to a separator.



Innovative POLYCOM® design.

The guarantee for high availability and economical continuous operation.



Drive system:
planetary gear unit with
electric motors (constant
or variable speed).

Material feed system.



The hydraulic system
includes the pressure application
and spring systems with
pressure cylinders and piston
accumulators.



In order to meet the demands placed on interparticle comminution, such as

- long service life of the roll surface,
- energy-efficient production of the compacted cakes,
- optimum material draw-in performance, in order to assure maximum throughput and
- very smooth running, in order to protect the machine

the POLYCOM® grinding rolls have a length to diameter ratio of between 0.3 and 0.7.

This provides the following advantages:

- large shaft diameter for absorbing the bending and torsional stresses,
- self-aligning roller bearings dimensioned for a safe and reliable operation,
- optimum distance between bearings, minimising the bending moments,
- thick roll bodies to ensure a safe shrink fit and
- thick wearing layers on the roll surface for long operating times.

The fixed and floating rolls are both mounted in bearing blocks. The self-aligning roller bearings, which compensate for tilting of the rolls, have a multiple seal system to prevent dust penetration and grease loss. The bearing blocks of the fixed roll are bolted onto the machine frame, while those of the floating rolls travel in a longitudinal slideway.

The grinding force is transmitted to the floating roll by 4 hydraulic cylinders.

A hydropneumatic spring system allows the setting of different pressure characteristics and different control methods to enable optimum application

of the grinding pressure in the roll gap and to protect the machine against possible overloading.

The floating roll automatically accommodates changes in feed material characteristics by moving outwards or inwards. Spacers prevent the rolls from touching.

The fixed and floating rolls are of identical construction and can therefore be interchanged.

The material feed device is designed to ensure optimal mass flow. The feed bin is mounted on weigh cells for continuous measurement of the filling level.

The walls of the vertical feed chute can be adjusted during operation, in order to adapt the POLYCOM® throughput to the respective requirements.

Since the introduction of the POLYCOM®, a continuous process of purposive wear protection advancement has taken place. With the development of

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

Polysius has created a wear protection program that provides optimal and reliable solutions for the broadest possible range of requirements.

While forged rolls with hard facing are used in all mill sizes as the favourably-priced standard solution for moderate wear conditions, chill cast alloy tyres made of compound casting or bainite ensure a long service life even when high comminution pressures are being applied.

However, the use of chill cast alloy tyres is limited to certain machine sizes and operating conditions.

The results of recent evaluations have proven the achievement of excellent service lives:

One POLYCOM® used for grinding raw material with a high quartz content achieved a service life of 55,000 (!) operating hours without needing a change of its compound cast tyres. Bainite tyres, which were introduced onto the market at a

They run and run and run ...

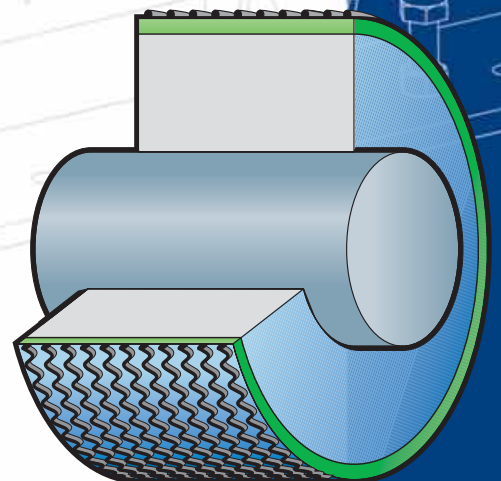
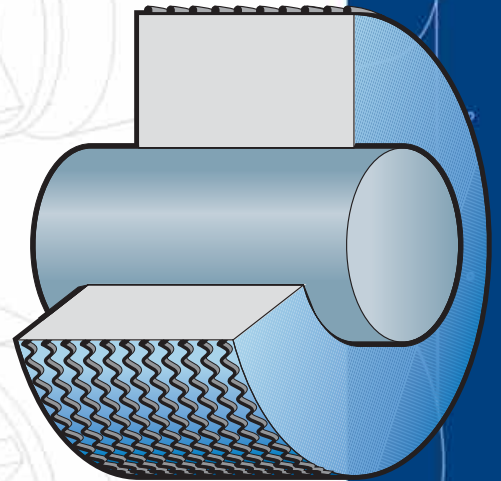
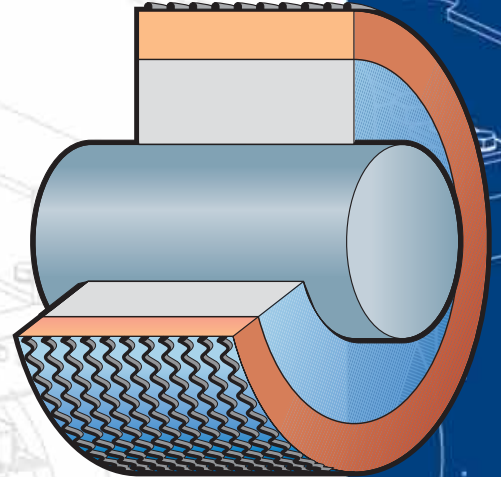
Centrifugally produced compound cast tyres have already achieved operating times of over 55,000 hours.

much later date, have already achieved preliminary (!) service life figures of over 40,000 operating hours.

The degree of reliability achieved today results in a drastic reduction in the amount of maintenance required by existing grinding plants and thus allows the efficiency of the POLYCOM® to be fully exploited.

To date, homogenous chilled casting rolls made of bainite have achieved operating times of 40,000 hours – already an outstanding attainment, but by no means the final value ...

Forged rolls with hard facing are a favourably-priced solution for many types of feed material.



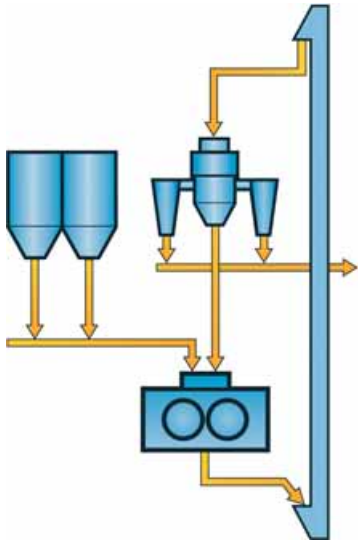
The profiles welded onto the grinding rolls maximise the feed material pull-in capability and minimise the relative movement between the material being ground and the roll surface.



Application examples.

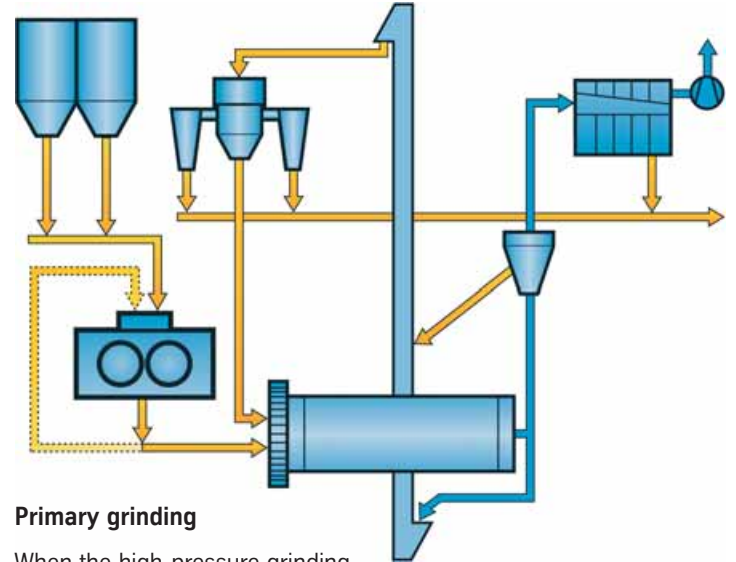
For different process technological tasks, there are a number of possible system configurations, in which the process steps

- material feeding,
 - comminution and
 - classification
- are combined. Additional process steps, such as
- drying,
 - moistening,
 - disagglomeration and
 - storage
- can be incorporated into the process as required.



Finish grinding

Use of the high-pressure grinding roll for finish grinding achieves the greatest energy savings, which can be as high as 50%, compared with conventional tube mill systems. Feed material with up to 4% 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.

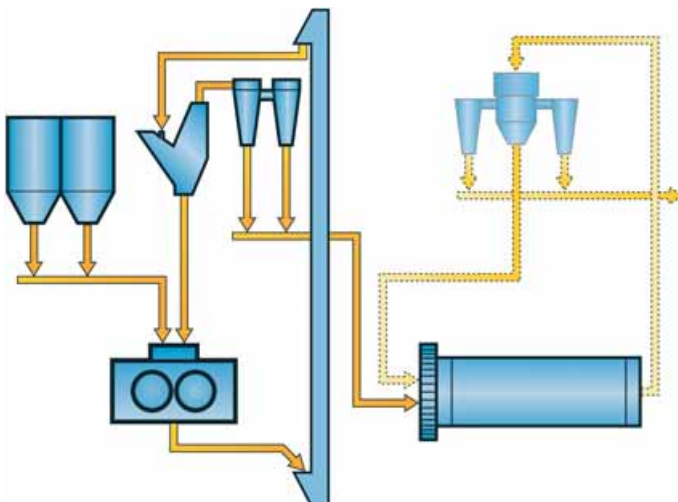


Primary grinding

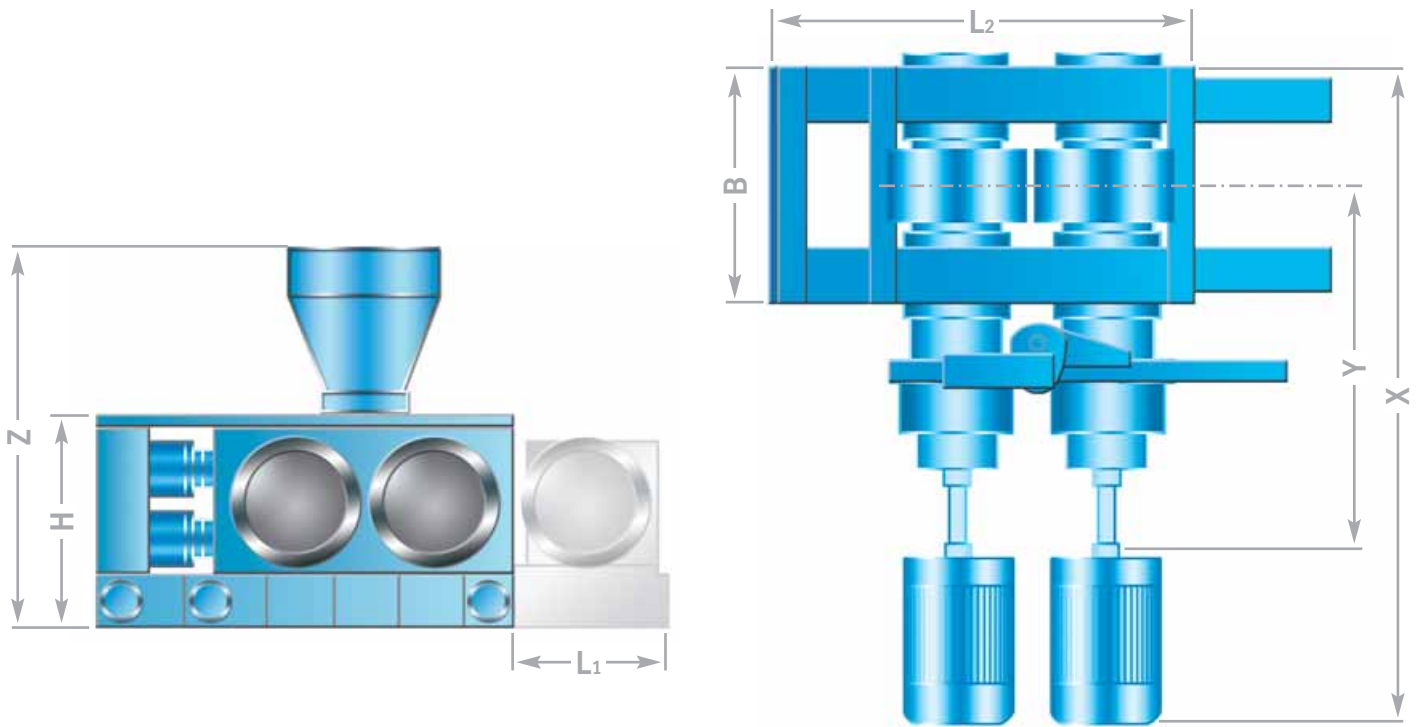
When the high-pressure grinding roll is used as a primary mill, the throughput of existing grinding plants is increased by up to 40% and the energy requirement of the overall plant is reduced by up to 20%.

Combi grinding

Used in combi grinding systems, the POLYCOM® brings energy savings of up to 40% compared with conventional tube mill systems, as well as increasing the throughput of existing



tube mill grinding plants by over 100%. As the product of the primary grinding circuit is separated material, the tube mills can be dimensioned smaller than usual if the combi grinding system is a new installation. The material is dried in the tube mill. This system allows the incorporation of several tube mills and permits separate primary grinding of different components. The defined size of the feed material allows optimum grading of the ball charge.



Size		1		2		3		4		5		6		7		8		9		10	
Type		10/3	10/4	12/4	12/5	13/5	13/6	14/6	14/7	15/7	15/8	16/8	16/9	17/10	17/11	19/11	19/12	20/12	20/13	22/13	22/15
Roll diameter	mm	1,050		1,200		1,300		1,400		1,520		1,600		1,740		1,870		2,050		2,200	
Roll width	mm	380	460	460	520	520	600	600	660	660	760	760	900	1,000	1,100	1,100	1,200	1,200	1,300	1,300	1,500
Grinding force	kN	3,400		4,300		5,700		7,000		8,600		11,000		13,500		17,000		20,000		26,000	
Drive power	kW	300		450		560		900		1,100		1,450		1,650		1,900		2,500		3,400	
L1	mm	1,700		1,900		2,000		2,100		2,400		2,500		2,600		2,900		3,000		3,200	
L2	mm	3,145		3,600		3,795		4,270		4,750		4,965		5,615		6,130		6,460		7,500	
B	mm	1,690		1,930		2,020		2,170		2,410		2,560		2,860		3,100		3,250		4,000	
H	mm	1,685		1,845		1,955		2,095		2,295		2,565		2,755		3,160		3,160		3,700	
Y	mm	3,795		3,990		4,150		4,675		5,675		5,750		6,000		6,700		6,910		8,000	
Z	mm	6,280		6,640		6,700		7,350		7,470		7,410		8,070		8,500		8,540		9,300	
X	mm	6,140		6,650		7,060		7,760		8,980		9,230		9,830		11,050		11,500		12,800	

– the stated dimensions may be altered as a result of further development –

The mobile 40 – 60 tph units (delivered in containers with the complete drive and control systems) permit realistic simulation of industrial processes.



The Polysius research centre is equipped with POLYCOM® units of different sizes for grinding tests in open circuit or closed circuit grinding systems.

Polysius Service.

To determine the comminution properties of different feed materials, Polysius uses various laboratory-scale POLYCOM® high-pressure grinding roll units in the firm's Research and Development Centre.

Especially if the high-pressure grinding roll is to be used for new applications, it is often useful to grind a large quantity of test material or to incorporate the high-pressure grinding roll into an existing pilot plant.

For this purpose, Polysius provides mobile, semi-industrial POLYCOM® units on a temporary rental basis.

