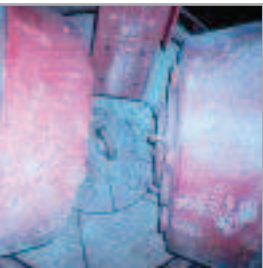




## VERTICAL ROLLER MILLS KTM

- Low operation and maintenance cost
- High capacity
- Compact design





Grinding plant with the KTM 1600 for ceramic material. (UAE)

Grinding plants equipped with KTM vertical mills are used in the cement and lime industry, chemical, metallurgical, energy, glass,

and food industries where very fine material grinding is required.

#### Main characteristics of KTM vertical mills

- Low operation and maintenance cost
- High efficiency
- Simple replacement of mill parts
- Easy operation and maintenance
- Robust structure
- High capacity

#### Operating principle

The ground material is supplied onto a rotating grinding table connected to a bevel-spur gearbox which is driven by an electric motor or possibly a hydraulic drive. Conical grinding runners are pressed on the material by means of hydraulic-pneumatic (or spring) force. The material passes from the table center to the runners where it is ground. On the table periphery the material falls over a retainer ring. There the material is picked up by air stream drawn from the lower part of the mill.

The ground material is carried through a blade ring upwards via a chamber, which narrows and transitions to a dynamic separator. The coarse fraction from the separator is returned onto the table.

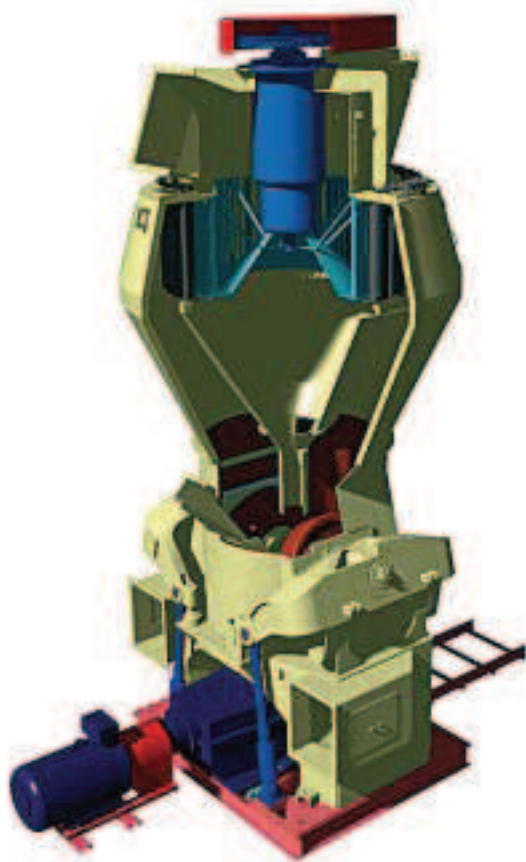
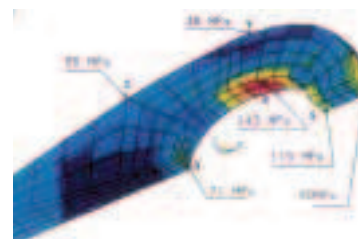
The final product is separated by cyclones or filters. The entire circuit has negative pressure, so it is dust free.

#### Advantages of the KTM vertical mills

- Reduced wear on the casings of runners (there is only wear caused by the material ground)
- Hydraulic-pneumatic compression of runners allows quick change of compression strength of the runners by changing oil pressure in the circuit
- Quick replacement of runner casings and grinding segments of the table without dismantling of the grinding chamber and separator
- Reduced civil works required for machine anchoring
- Material circulation between the separator and the grinding table is without any mechanical transport
- Short change over times and continuous regulation of the final product fineness
- Suitable for drying of raw materials with a high moisture content
- Low specific electric power consumption

#### Reconstruction

The reconstruction of existing KTM vertical mills with a new 3<sup>rd</sup> generation separator is possible in order to increase the capacity by up to 8% while maintaining outlet grain size distribution and other parameters of the grinding circuit.



3D model of the KTM vertical mill

For designing KTM vertical mills modern designing and computation such as Pro/Engineer and finite element method ANSYS are applied

# Vertical roller mills KTM

## Dynamic 3<sup>rd</sup> generation separator

The dynamic separator DTIM is an integral part of the KTM mill. It is designed to significantly extend service life and reduce wear. The fineness and sharpness of separation are controlled by:

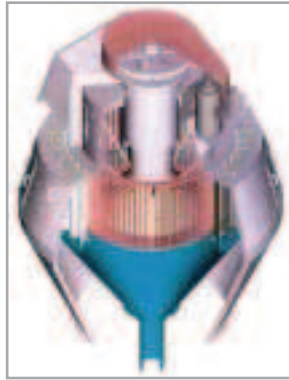
- Turning of the stator blades
- Changing of the speed of the rotor
- Changing the amount of air flowing through the separator

## Characteristics of DTIM separators

- High efficiency and sharpness of separation
- Possibility of separation of materials of different grain size distribution
- Easy adjustment of the final grain size of the product
- Low specific power consumption
- Drying capacity in the separator
- Cooling of material when ambient air is supplied
- Improvement of the grain size distribution of meal which affects favorably the subsequent burning process.



Complete separator DTIM 1500 before dispatch



3D model of the separator



Rotor of a DTIM separator

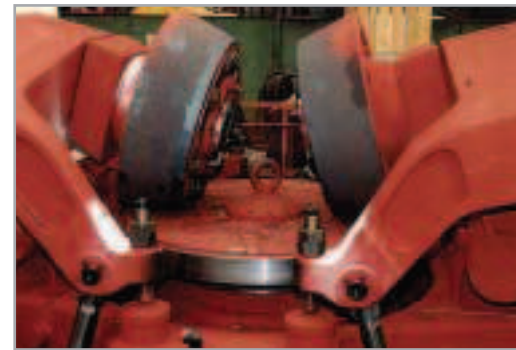


Dolomite grinding plant with a KTM 1200

## Integral equipment of KTM mills

When abrasive materials are ground, great attention is paid to the internal equipment of the mill:

- Casings of grinding runners and grinding segments are cast from a special material or hard facing is applied.
- The grinding chamber is armored with special shaped castings and plates.
- The separator rotor, its stator blades and other exposed surfaces are protected with Hardox plates or they are equipped with wear-resistant coatings.
- The separator body is equipped with welded armors and armors made of Hardox material.



Grinding table with runners



Armoring of the grinding chamber



Hard facing on the runner casing



Detail of the grinding chamber armoring



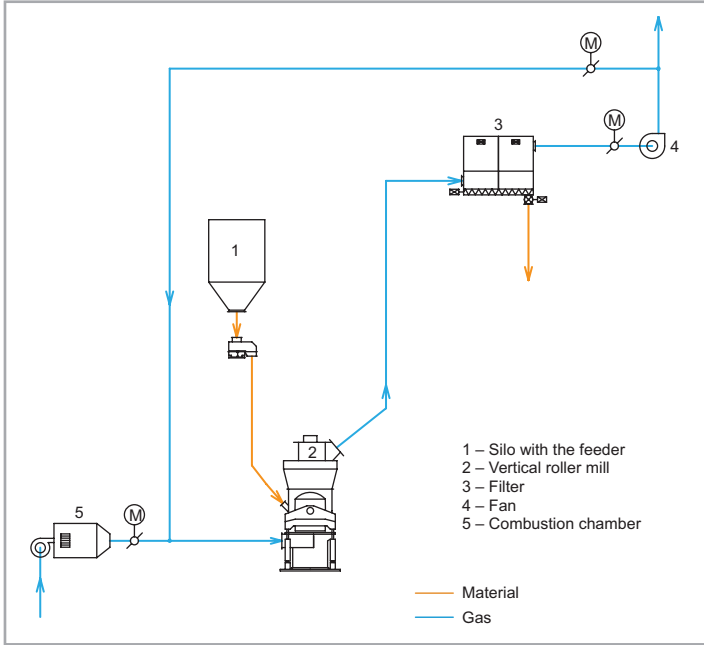
Electric motor with gearbox



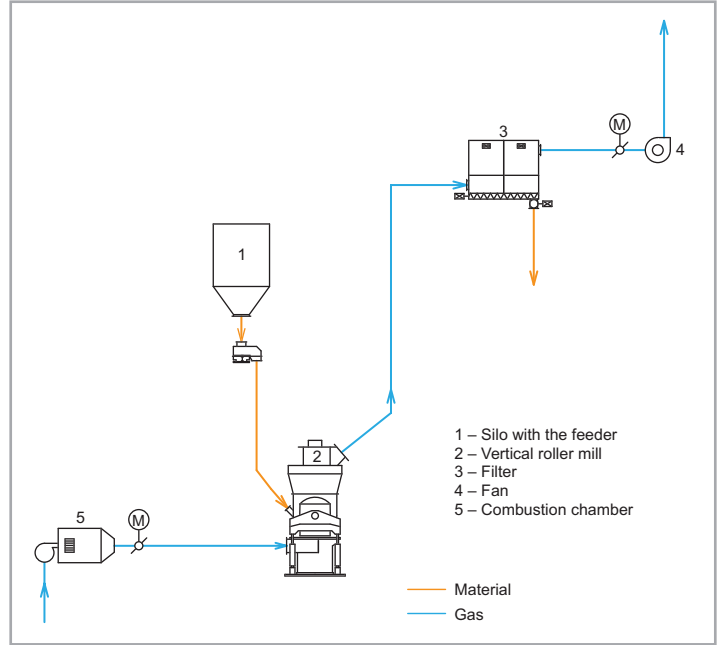
### Examples of arrangement of mills KTM in grinding circuits

#### Example 1

Equipment flow sheet of a grinding circuit with a KTM mill. The ground material is separated in the separator with concurrent drying. The built-up space is reduced. This alternative is suitable for grinding products of a high final fineness.



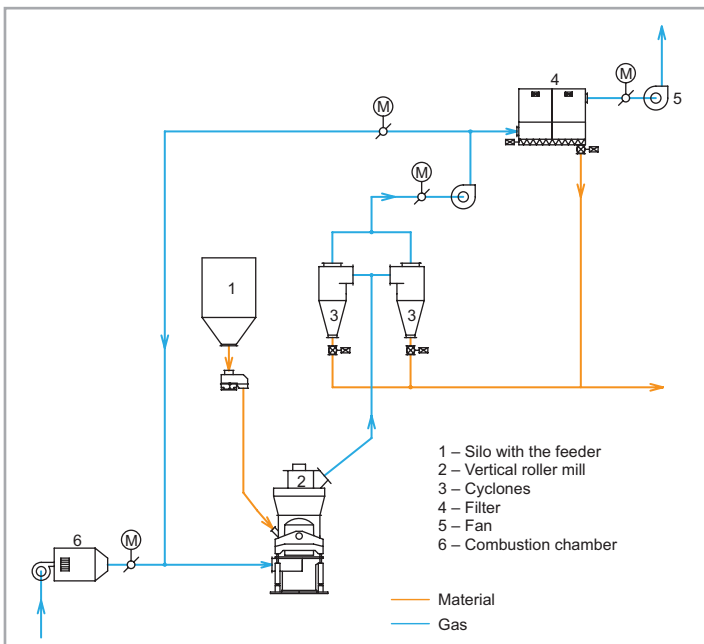
Closed circuit



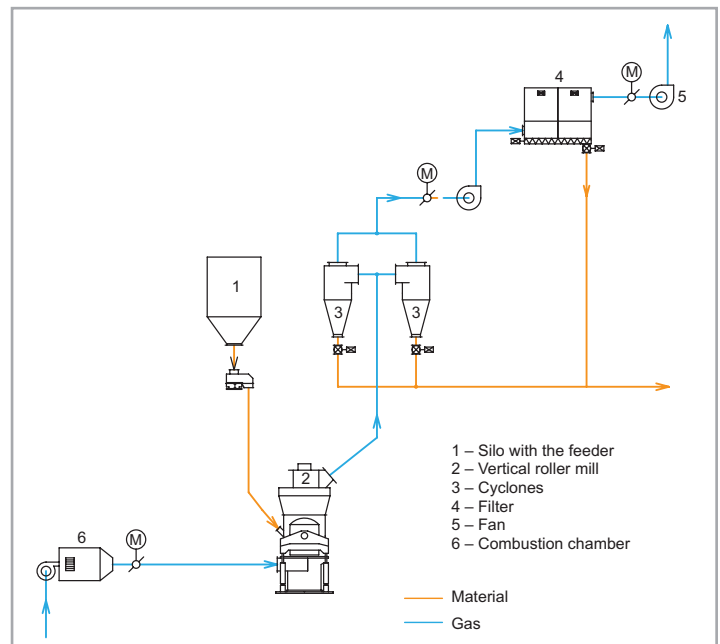
Open circuit

#### Example 2

Equipment flow sheet of a grinding circuit with a KTM mill. The ground material is separated in cyclones with concurrent drying. This technology is suitable for medium fineness reducing investment.

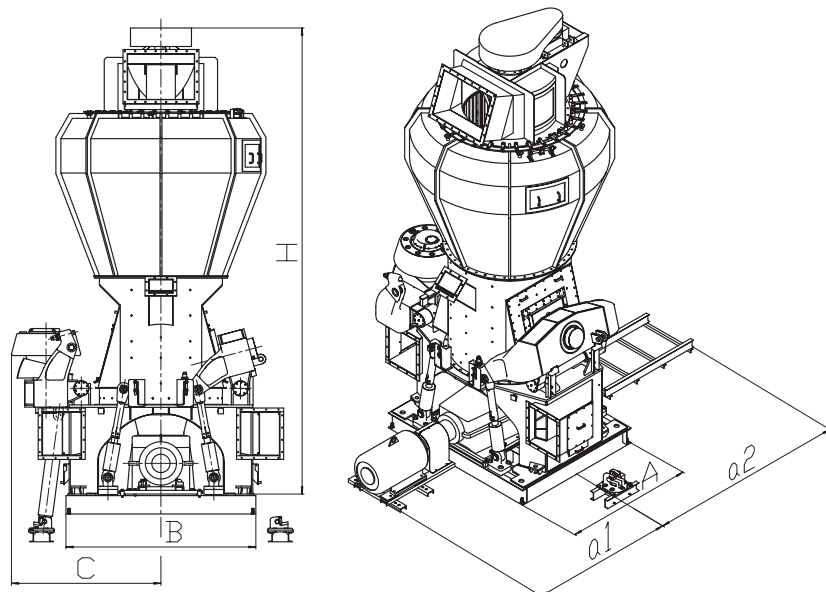


Closed circuit



Open circuit

# Vertical roller mills KTM



Main dimensions of KTM mills

Type	A	B	C	H	a1	a2
KTM	mm	mm	mm	mm	mm	mm
400	710	810	712	2 259	786	-
800	1 580	1 630	1 725	4 350	2 075	1 925
1000	1 940	2 150	1 900	5 070	2 200	2 970
1200	2 100	2 300	1 846	5 980	2 550	3 030
1400	2 200	2 800	2 175	6 834	3 300	3 610
1600	2 500	3 100	2 500	7 610	3 300	3 700
1800	2 860	3 400	2 750	8 750	3 550	3 810
2000	3 720	4 050	3 200	9 810	4 585	6 405

Principle parameters of KTM mills

Type	Grinding table dia.	Grinding runners dia./width	No. of grinding runners	Grinding table speed	Capacity	Air amount	Installed power of the mill/ separator	Mill weight
KTM	mm	mm	pc	rpm	t/h	m <sup>3</sup> /h	kW	kg
400	400	265/100	2	140	0.8*	2 000	15/2.2	1 150
800	800	615/200	2	92	4.7*	12 000	45/3	8 700
1000	1 000	778/250	2	76	7.6*	20 000	75/7.5	15 500
1200	1 200	895/269	2	58	10.5*	28 000	132/15	24 600
1400	1 400	1 000/310	2	52	18*	48 000	200/15	37 650
1600	1 600	1 046/362	2	46	28*	70 000	250/22	42 250
1800	1 800	1 327/414	2	41	38*	100 000	375/30	55 650
2000	2 000	1 430/460	2	37	50*	140 000	500/45	85 900

\* The mill capacities refer to a medium grindable limestone of maximum moisture of 3%, inlet grain size 0 – 15 mm and outlet fineness of 15% R 0.09 mm.



Assembly of a KTM 1600 for grinding material used for floor and wall tiles.



Reconstruction of a KTM 1400 with a DTIM 1500 separator