Raymond® Roller Mills

SINCE 1887

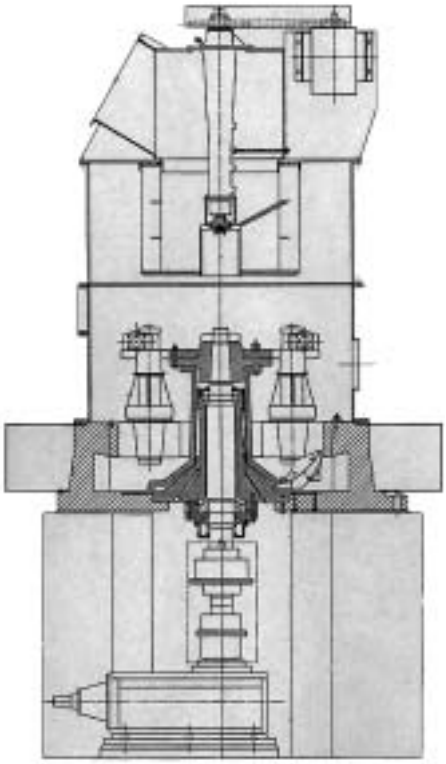
Air Preheater Company
Raymond Operations

Raymond® Roller Mills

The Industry Standard for Over a Century

More than 2,000 Raymond® roller mills have been supplied since the first mills were designed in the late 1800's. These early machines were the forerunner of the heavy-duty rugged ring-roll mills designed and manufactured by Alstom Power, Raymond Operations today. The Raymond® roller mill provides the needed flexibility to economically and efficiently process a wide variety of materials.

Roller Mill System
The typical Raymond® roller mill system is designed to dry, pulverize, classify and deliver a number of different types of materials.



Cross section of a Raymond #73 612 Roller Mill

From a feed ranging in size from approximately 10-40mm (½" to 1½"), the roller mill can produce particles ranging from coarse, granular products of approximately 10%R2000 micron (90% minus 10 mesh) to as fine as 0.002%R44 micron (99.998% minus 325 mesh). They can also be used to prepare feed for systems producing ultra-fine materials, such as a Raymond® vertical mill, ball mill or JetStream™ classifier system.

Cost Efficiency
The Raymond® roller mill provides efficient control of product size, with minimal power, resulting in cost-effective production. The system offers maximum flexibility and control over mill variables, delivering controlled product quality at minimum operating cost.

Custom Engineered Systems
Each roller mill system is custom designed to achieve the best solution for your processing application. The mill feeder, roller mill size, classifier, fan, cyclone, dust collector and other system components are selected to meet the requirements and characteristics of the material being processed.

Principal of Operation
The Raymond® roller mill is an airswept vertical ring-roll mill with an integral classification system. A vertical shaft rotates a "spider" assembly of arms from which are suspended free swinging journal assemblies with rolls attached. As the unit turns, centrifugal force drives the rolls against the inner surface of the vertical grinding ring. Plows, rotating with the assembly, lift feed material from the mill bottom and direct it between the rolls and the grinding ring where it is pulverized.

Air enters from below the grinding ring and flows upward, carrying fines to the classifying section. The classifier sizes the pulverized material and returns oversized particles to the grinding chamber for further processing. The mill operates under negative pressure conditions, thus minimizing mill maintenance and plant housekeeping problems, while maximizing the service life of major mechanical components.

Applications
A roller mill is most effective processing materials that are 5 or less on the Mohs scale of hardness. There are a few limitations, but the most practical materials are soft to medium hard materials. Ideal applications include various clays such as fire clay, bentonite and kaolin as well as other minerals like barytes, gypsum, limestone, hydrated lime, phosphate rock, talc and coal. Manufactured materials such as pigments, phenolic resins or similar materials can also be processed in a roller mill system.

Raymond® Roller Mills

Construction Features

Journal assembly - forged steel shaft supports a steel journal housing on carrying rings or roller bearings.

Roll - cast and machined wear resistant steel roll is fastened to the tapered lower housing of the journal.

Drive gears - cut steel bevel and pinion operate in a integral or independent housing.

Base - heavy cast iron mill base is machined to provide an airtight fit for the return air housing, gear housing and mill bottom.

Bull ring - high carbon forged steel bull ring is keyed to prevent rotation and is held in place by clamps to facilitate replacement.

Vertical shaft - cold rolled finished steel vertical shaft is engineered to support all moving parts.

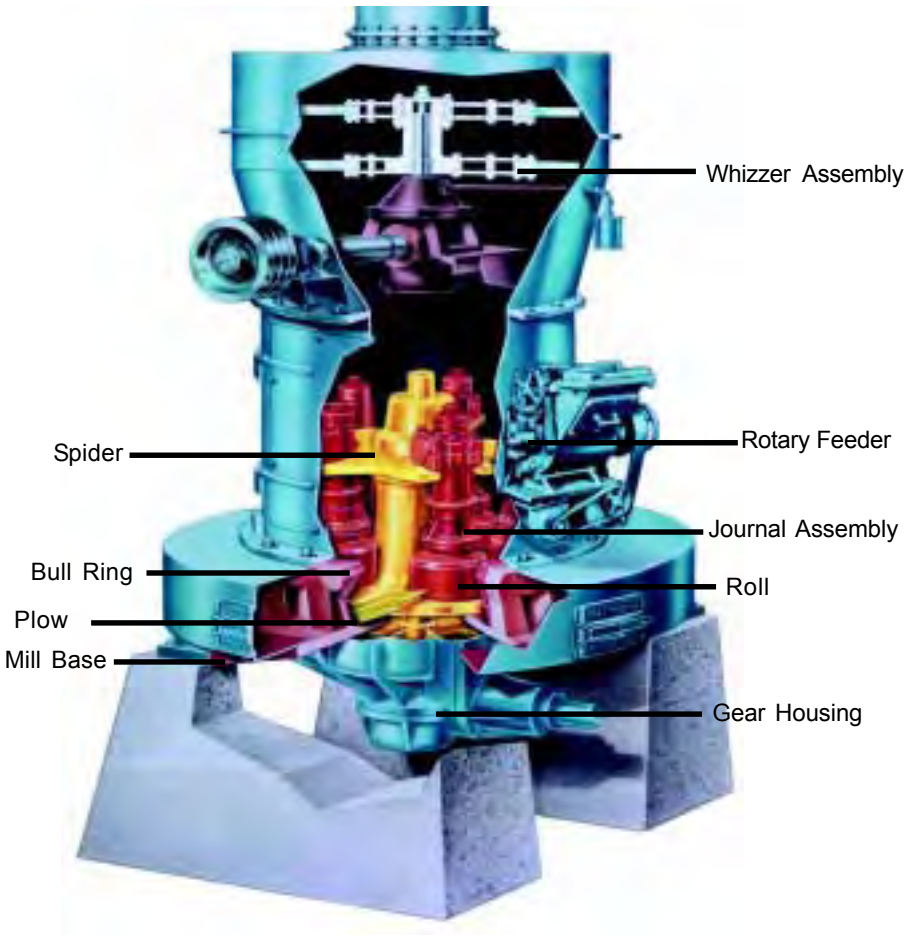
Mill bottom - cast iron mill bottom with with replacable liners fits into a machined recess in the base.

Spider - ductile iron or steel plate is keyed to the main vertical shaft.

Plow support - ductile iron plow support is bolted to the spider assembly.

Integral gear housing - heavy cast iron gear housing contains the lower thrust bearing for the vertical shaft as well as the bearing for the horizontal shaft.

Independent reducers - steel housing contains high efficiency gearing designed for maximum flexibility and extended service life.



Factors Influencing Capacity

Major factors affecting the capacity of any given roller mill include desired fineness, grindability and initial moisture. The capacity of the mill decreases when fineness increases. The harder a material is to grind, the lower the capacity of the mill. High initial moisture may also decrease mill capacity because of limitations on the drying capacity of the mill.

The roller mill, when equipped with a variable speed mill drive, can be used in applications requiring adjustable capacity. This allows the user to match product rate with downstream process requirements, thereby reducing the operating and maintenance problems associated with frequent starts.

Raymond® Roller Mills
Requirements and Capabilities

Airflow and Power Requirements for Raymond® Roller Mill Systems

Mill Size		Nominal* Airflow		Fan Power		Mill Power-max		Turbine Power	
in	mm	acfm	m^3/hr	hp	kW	hp	kW	hp	kW
30	760	3,900	6,600	30	22	30	22	25	18
50	1270	10,000	16,900	60	45	100	75	30	22
54	1370	12,600	21,400	75	55	150	110	40	30
60	1520	15,600	26,500	100	75	200	160	50	45
66	1670	22,500	38,200	150	110	300	225	75	55
73	1850	31,000	52,600	200	160	600	500	100	75
86	2180	46,500	79,000	300	225	900	700	150	110

*Airflow for many applications will exceed nominal values.

Nominal Capacity of Raymond® Roller Mills-stph

Material	Fineness		Mill Size						
	% passing	mesh	30	50	54	60	66	73	86
Baryte	90	325	2.0	7.1	8.8	12	19	29	45
Bentonite	80	200	2.5	9.0	11	15	23	37	56
Coal (HG=55)	80	200	1.7	6.0	7.5	10	16	25	38
Coke, Pet (HG=55)	95	200	1.5	5.3	6.6	9.0	14	22	34
EMD	85	200	1.0	3.5	4.4	6.0	9.0	15	22
Fire Clay	95	100	2.5	9.0	11	15	23	37	56
Gypsum	90	100	3.2	11	14	19	30	47	72
Kaolin	99.8	325	1.6	5.5	7.0	9.4	15	23	36
Lime, Burnt	70	325	3.0	11	13	18	28	44	67
Lime, Hydrated	99	200	2.8	10	12	16	26	41	63
Limestone	95	18	2.5	8.8	11	15	23	37	56
Limestone	85	200	2.0	7.1	8.8	12	19	29	45
Limestone	99	325	1.3	4.6	5.7	7.6	12	19	29
Phosphate Rock	70	200	2.4	8.5	11	14	23	35	54
Sulphur	90	325	1.7	6.0	7.5	10	16	25	38
Talc	80	325	1.7	6.0	7.5	10	16	25	38
Titanium Dioxide	99.97	325	0.5	1.8	2.2	2.9	4.7	7.4	11

Raymond® Roller Mills
Sizes and Systems

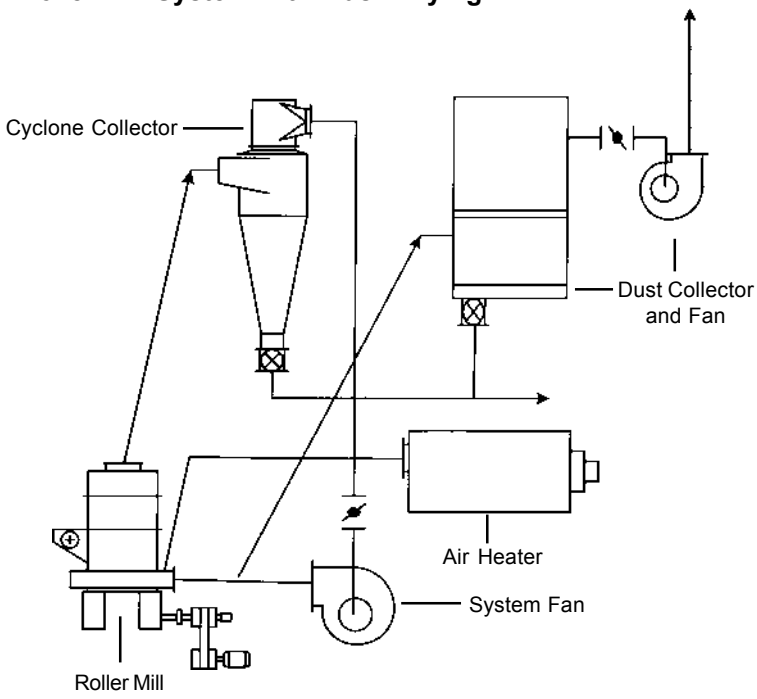
Standard Sizes
Raymond® roller mills are available with grinding ring diameters ranging from 30 inches to 86 inches (760 to 2180mm). Typical production rates are shown in the table above. These available sizes are capable of producing a wide range of product finenesses from a wide variety of materials.

Raymond® Roller Mill System with Flash Drying
Practically all naturally occurring nonmetallic minerals and many manufactured products contain a certain amount of free moisture. At one time it was necessary to dry these products in an independent system. The technique used by Raymond combines drying and pulverizing in the roller mill. This may make it possible to eliminate independent drying equipment reducing capital investmet, processing time and handling.

Flash Drying Principles of Operation
Heated air or waste gas is delivered to the mill return air housing and introduced through air ports to the grinding zone in the mill. The air turbulence and particle size produced during the grinding process are ideal for almost instantaneous evaporation of moisture.

Feed moisture is normally limited to what can be reliably fed into the mill. Typical product moistures are 0.1 to 0.5% by weight.

Typical Roller Mill System with Flash Drying



Maximum Water Evaporation* - lb/hr

30	50	54	60	66	73	86
700	1,800	2,300	2,800	4,000	5,600	8,400

* at nominal airflow and typical temperatures

Raymond offers the following to compliment the roller mill system:

- pilot plant material testing
- premium wear parts
- PLC-based control systems
- field service support

Contact us to learn more about Raymond® Roller Mills - The Industry Standard for Over a Century.

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