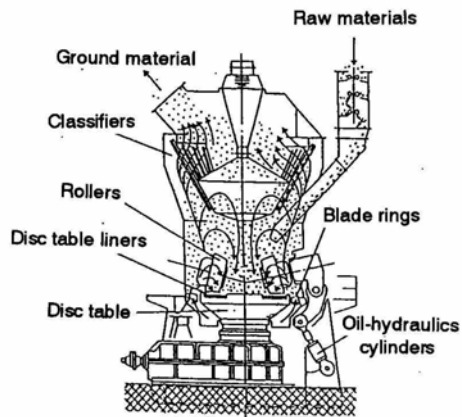
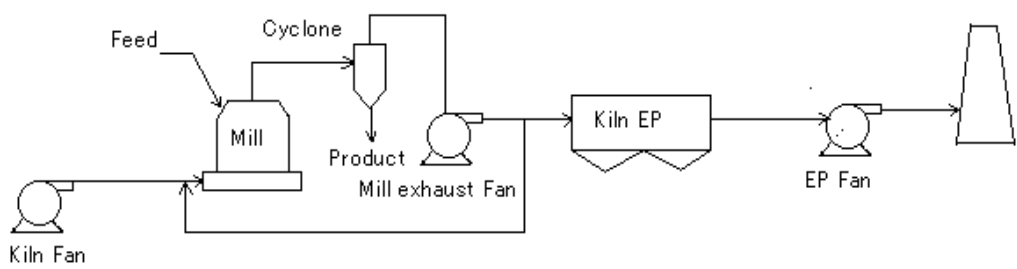


Item	Vertical roller mill for raw materials	Application process																
		Raw material process																
Background	Grinding raw materials needs lots of energy. Tube mills had been used for grinding, but the energy efficiency level was lower. Therefore, the introduction of highly efficient grinding equipment was anticipated.																	
Descriptions	<p>The vertical roller mill has high energy efficiency and the installation space is smaller compared with tube mills. These days, the vertical roller mills have been widely adopted.</p> <p>A) Structure</p> <p>(1) The rollers are hydraulically pressed against a disc table and the feed is ground between the rollers and the disc table.</p> <p>(2) The classifier is housed above the rollers.</p> <p>B) Feature</p> <p>(1) The power consumption level for grinding is lower than that of tube (ball) mill.</p> <p>(2) The remaining time of raw materials in this type of mill is much shorter than that in tube (ball) mill; therefore, the crushing process and mixing process became more harmonized and this contributes to quality control.</p> <p>(3) The installation space is smaller and this leads to lower noise level.</p> <p>(4) This type of mill can crush materials which are too large to be fed into the tube (ball) mill.</p> <p>(5) Ground materials are dried by the flue gas from the kiln.</p>																	
	 <p><b>Fig.1 Vertical roller mill</b></p>  <p><b>Fig.2 Schematic process flow of vertical roller mill for grinding of raw materials</b></p> <p>Vertical roller mills are adopted in 20 cement plants (44 mills) in Japan.</p>																	
Results	<p><b>Table Energy saving effect of the vertical roller mill</b></p> <table><tr><th></th><th>Ball mill</th><th>Vertical roller mill</th><th>Effect(%)</th></tr><tr><td>Production %</td><td>1 0 0</td><td>160~180</td><td>60~80(increase)</td></tr><tr><td>Specific power consumption kWh/t-RM</td><td>20~26</td><td>14~18</td><td>About 30 (Reduction)</td></tr><tr><td>The reduction of power consumption(*) kWh/y</td><td></td><td></td><td>2,240,000</td></tr></table>			Ball mill	Vertical roller mill	Effect(%)	Production %	1 0 0	160~180	60~80(increase)	Specific power consumption kWh/t-RM	20~26	14~18	About 30 (Reduction)	The reduction of power consumption(*) kWh/y			2,240,000
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Cost estimation	About 14million US\$ [Newly-built] and about 230 million US\$ [retrofitted], including the cost of supplemental facilities [200t-RM/h] [1US\$=¥110]																	
Related matters																		
References																		