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TRM型粉煤灰辊磨

TRM SERIES VERTICAL ROLLER MILL FOR FLY ASH GRINIDNG

主要技术优势
Main technical advantages

- 采用平–斜磨盘和锥形磨辊；
- 采用组合式高效笼型选粉机；
- 各磨辊独立施压；
- 磨辊轴承采用稀油循环润滑，三道氟橡胶骨架密封；
- 风环面积和挡料圈高度可调；
- 磨辊可抬起，以实现空载启动；
- 磨机操作简单，运行平稳，振动小；
- 产品细度控制灵敏；
- 设备运转率高；
- 磨辊可依靠液压翻出机壳，维修方便；
- 耐磨部件采用堆焊技术，维护方便。

- Flat or inclined grinding table and cone type grinding roller
- Using static and dynamic high efficiency cage type separator
- To pressurize grinding table relatively independently
- Oil lubrication system for grinding roller
- Triple fluororubber framework oil seal for grinding roller
- Adjustable gas ring area and dam ring height
- Auto liftup grinding roller and no load startup
- Simple and stable operation, less vibration
- Strict and flexible control of fineness of product.
- Auto swing out grinding roller and easy maintenance
- Hardfacing for wear part and easy maintenance

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1 粉煤灰概况

GENERAL CONDITION OF FLY ASH

2010年全国粉煤灰年排放量约为4亿吨，预计2015年可达5.5亿吨，多年积累的堆灰已超过25亿吨。目前全国粉煤灰利用率约50%，但地区差异很大，东部和沿海地区几近100%，西部和北部地区利用率很低，大多予以堆存或填埋，不但污染环境而且浪费资源。

粉煤灰用于水泥和混凝土，利用程度和技术含量都相对较高，不但能降低混凝土的成本，而且能改善其工作性和耐久性，是当今混凝土技术的一大特色。

但受混凝土欢迎的主要是I级灰，而电厂排放的I级灰只占少数，其余粗灰活性较低需水量较高难以直接利用，为利用需予以适当处理，常见的处理方式就是粉磨，但限于能耗一般只磨到I级灰的细度（R45um<12%）。如果能经济地磨得更细（R45um<1%），对粉煤灰自身的利用和混凝土性能的改善都大有好处，而这正是粉煤灰辊磨的使命。

In 2010, the overall fly ash of China is about 400 million tons. It is expected to reach 550 million tons by year of 2015. By years, there accumulated over 2.5 billion tons fly ash. Presently, the utilization of fly ash is about 50% in whole China, but very different in different regions. In east and coast cities, almost 100% fly ash has been utilized, but very little used (mostly stored or filled) in west and north regions.

It will be of higher utilization and technology to use fly ash in cement and concrete, which can not only reduce the cost, but also improve the workability and durability of concrete. It is one type of characteristics of state of art concrete technology.

Grade I fly ashes the most welcomed type for concrete, but only taking minor of all fly ash from power plant. Rest coarse fly ash, due to low activity and high water demand, is difficult for direct use. The general disposal of such fly ash is to grind them. But owing to energy consumption, it can only be ground to fineness of Grade I (R45um<12%). If it can be ground more finer (R45um<1%) economically, it will be very good to utilization of fly ash and concrete property.

2 TRM型粉煤灰辊磨的特点

CHARACTERISTICS OF TRM SERIES VERTICAL ROLLER MILL FOR FLY ASH GRINIDNG

- 采用平–斜磨盘和锥形磨辊；
- 采用组合式高效笼型选粉机；
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- 磨辊轴承采用稀油循环润滑，三道氟橡胶骨架密封；
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- Hardfacing for wear part and easy maintenance

3 TRM型粉煤灰辊磨系统与球磨系统的对比

COMPARISON BETWEEN TRM SERIES VRM and BALL MILL SYSTEM FOR FLY ASH GRINDING

TRM型粉煤灰辊磨的能效约为球磨的两倍，系统能效也明显较高（如下表）。

TRMseries VRM for fly ash grinding saves 2 times energy consumption comparing with that of ball mill (see table below)

系统类别	球磨	辊磨
产品要求	$R_{45\mu m}$≤10%	
主机电耗,kWh/t	30~35	15~18
系统电耗,kWh/t	40	＜30
烘干能力	差（单独烘干）	≤18%（磨内烘干）
影响运转率的主因	入磨粉煤灰水分不能大于5%	磨辊及磨盘磨损后修复
规模化难度	难	易

	Ball Mill	Vertical Roller Mill
Fineness	$R_{45\mu m}$≤10%	
Power Consumption of main equipment,kWh/t	30~35	15~18
System Power Consumption,kWh/t	40	<30
Drying Capacity	bad(separate drying)	≤18%(in mill drying)
Factors impacting availability	Feed moisture not more than 5%	Repair to grinding table and roller after wear
In Scale	difficult	easy

注：原灰细度为R45μm=70~80%。 Remark: fineness of raw fly ash is R45μm=70~80%.

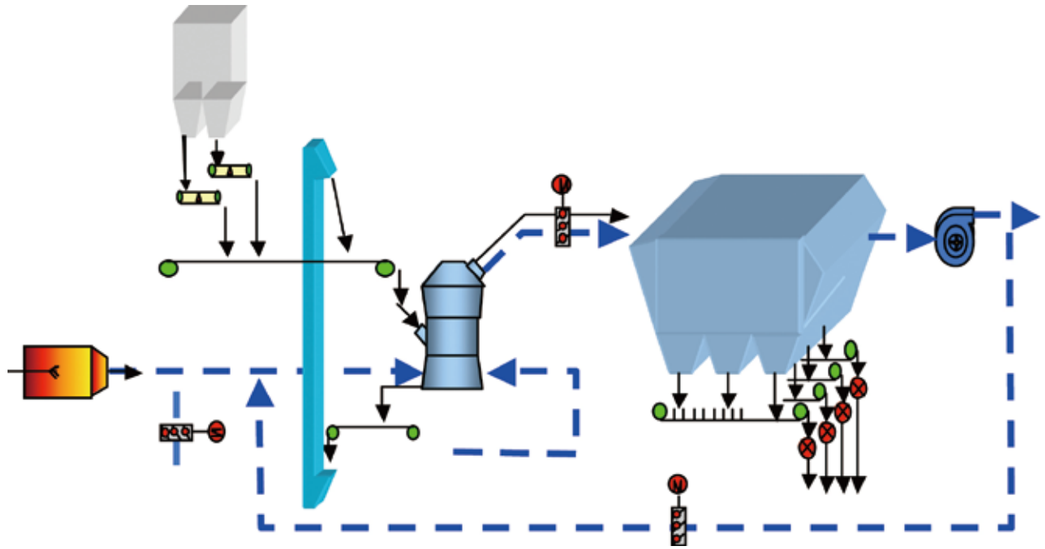
4 TRM型粉煤灰辊磨系统工艺流程

PROCESS OF TRM SERIES VRM FOR FLY ASH GRINDING

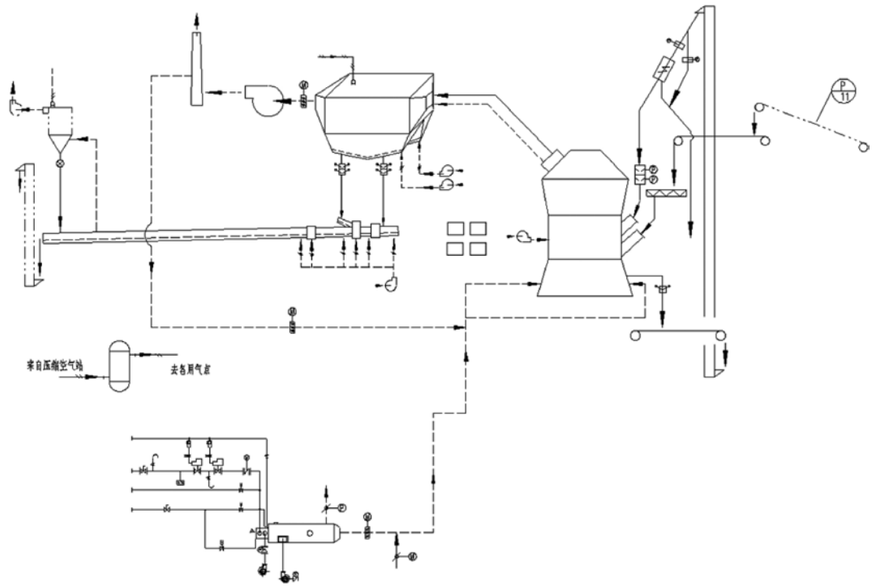
粉煤灰通常单独粉磨，只需设一个原灰库，库下设计量系统（湿灰宜设皮带秤），下游设胶带输送机、电磁除铁器、喂料锁风阀等。

物料入磨后首先落到磨盘中央（为防物料粘结湿灰需单独入磨），接着向磨盘边缘运动，运动中受到磨辊挤压，随后脱离磨盘被风环热气体带起，大颗粒落回磨盘，细颗粒被带入选粉机，与此同时受到烘干作用；选粉机粗粉返回磨盘继续粉磨，细粉随气体入高浓度袋收尘器收集为成品，然后通过空气输送斜槽、提升机入成品库。出磨气体经收尘器净化后通过系统风机，一部分排入大气，一部分循环入磨。

Generally fly ash will be ground separately. It is equipped with one raw fly ash silo, weighing system at silo bottom (belt scale better for wet fly ash), belt conveyor, magnetic separator, air lock valve and etc. Fly ash firstly falls down to the center of grinding table (wet fly ash to befed to VRM separately for avoiding choking) and moves to edge of grinding table. With rotation of grinding table, it is pressed by grinding rollers, and then brought by hot gas. Coarse particles back grinding table. Fine particles brought to separator and dried also. Coarse particles after separator will back for recirculation. Fine particles will be collected by bag filter as final product, and conveyed by air slide and bucket elevator to fly ash silo. Gas after VRM will be purified by bag filter and via system fan, partially vent to air and partially recirculate to mill.



TRM型粉煤灰辊磨系统工艺流程



5 TRM型粉煤灰辊磨系统配置

CONFIGURATION OF TRM SERIES VRM FOR FLY ASH GRINDING

系统规模	60万吨/年Ⅰ级灰	30万吨/年Ⅰ级灰
产　　量	90t/h	45t/h
成品细度	$R_{45\mu m}$≤12%	
磨机电耗	15~18 kWh/t	
系统电耗	＜30 kWh/t	
辊磨规格	TRM4341F 2000kW	TRM3131F 1000kW
风机规格	360000 m^3/h	180000 m^3/h

annual output	600000t/y	300000t/y
Capacity	90t/h	45t/h
Fineness of product	$R_{45\mu m}$≤12%	
VRM Power Consumption	15~18 kWh/t	
System Power Consumption	<30 kWh/t	
Model of VRM	TRM4341F 2000kW	TRM3131F 1000kW
Fan Spec.	360000 m^3/h	180000 m^3/h

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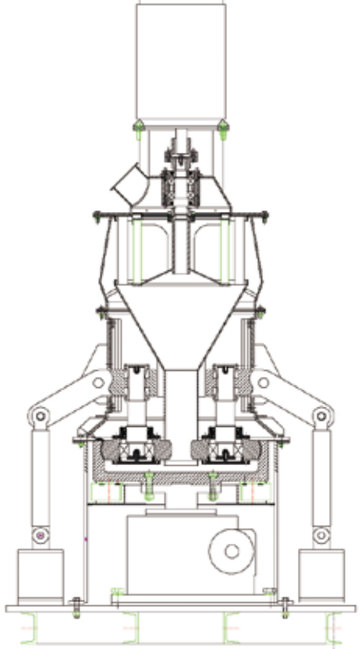
6 粉煤灰高细粉磨技术
SUPER FINE FLY ASH GRINDING SYSTEM

TRM型辊磨主要适合于磨制一级灰，难以进一步提高产品细度。为满足高细粉磨的需要，我们又开发了TRMF型辊磨（下图），其磨盘剖面呈“凹”字形（料床形成在内侧立面），能很好地限制物料的离心运动，并充分利用离心力提高料床的密实度，大大提高料床的稳定性，因而能适应流动性较大的物料。该辊磨已获实用新型专利（ZL200820141666.9）。

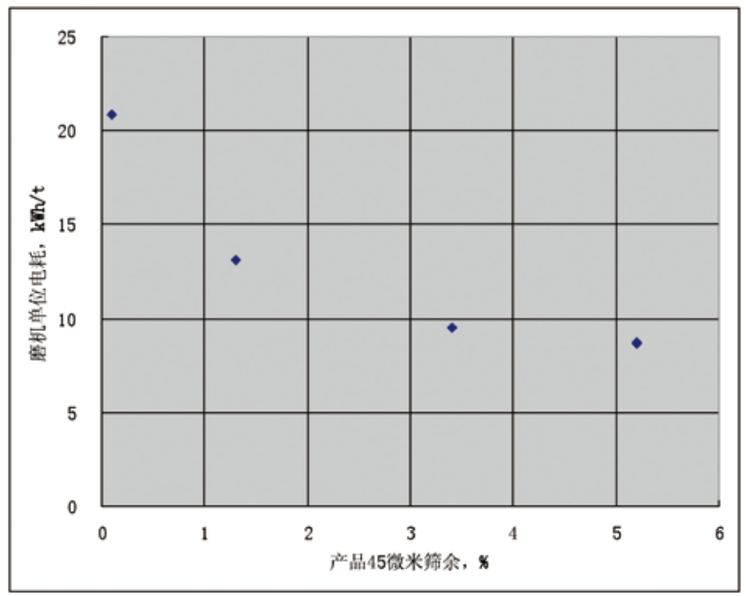
TRM series grinding mill is suitable to grinding Grade I fly ash, but difficult to improve the fineness of product. In order to fulfill superfine grinding of fly ash, we developed TRMF vertical roller mill (see figure below). The grinding table is in the shape of “concave” (material bed formed at inner side), which can effectively restrict the eccentric move of material, and fully use eccentric force to compact and stabilize the material bed, so appropriate for high fluid material. Such VRM is already patented utility model (ZL200820141666.9).



TRMF型粉煤灰辊磨试验系统
TRMF VERITCAL ROLLER MILL FOR FLY ASH GRINDING

TRMF型辊磨不仅能满足高细粉磨的需要，同样也能用于生产一级灰。值得一提的是，其磨机单位能耗比TRM型辊磨更低；生产一级灰（R45um<12%）可低于10kWh/t，生产高细灰（R45um<1%）可低于20kWh/t。

Except for superfine grinding, TRMF series vertical roller mill can also used for Grade I fly ash grinding. It’s worthwhile to mention its unit power consumption for mill is lower than TRM series vertical roller mill. For producing Grade I fly ash (R45um<12%), it can reach lower than 10kWh/t. For producing superfine fly ash (R45um<1%), it can reach lower than 20kWh/t.



TRMF型粉煤灰辊磨的磨机单位能耗（原灰R45um =45.5%）
UNIT POWER CONSUMPTION OF TRMFSERIES VRM (RAW FLY ASH FINENESS @R45um =45.5%)

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