

**SINOIMA**

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Sinoma (Tianjin) Powder Technique Machinery Co.,Ltd.

**中材(天津)粉体技术装备有限公司**

中材(天津)粉体技术装备有限公司



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# COMPANY INTRODUCTION

## 公司简介

中材（天津）粉体技术装备有限公司作为中国中材装备集团有限公司旗下的专业化高科技公司，专门从事工业大型粉磨设备的理论研究、设计研发、设备供货以及粉磨系统设备成套、技术咨询和调试服务等业务。

公司多年从事粉磨设备研究，拥有一支高素质、高学历、专业性强、经验丰富的人才队伍。公司下设研发设计部、市场营销部、合同执行部、质量管理部、售后服务部等部门，并拥有技术国际领先的专业化粉磨研究试验室。

公司产品为TRM型系列辊式立磨，针对所粉磨的物料性质不同，分别开发出多种立磨，主要包括生料立磨、矿渣水泥立磨、粉煤灰立磨、钢渣立磨、煤立磨和脱硫石灰石立磨等产品，应用领域已经涉及水泥、冶金、电力、化工、煤炭等多个行业。

目前，公司产品可以为700t/d~10000t/d全系列新型干法水泥生产线提供成套粉磨设备，合作伙伴遍布全球，先后同拉法基集团（Lafarge Holcim）、海德堡集团（Heidelberg）、台湾亚泥、台湾幸福、华润、金隅、红狮、天山、山水、豪龙、京兰敬业等国内外知名企业合作，设备远销东南亚、欧洲、非洲、南美洲等二十多个国家和地区。

多年以来，粉体公司发挥技术优势，一直致力于新磨型的开发，在不断完善固有磨型基础上，持续创新，在水泥行业内屡次创造“国内第一台”、“国产最大”等业绩，包括国内首台国产TRMS32矿渣立磨、首台TRMR53(5000t/d)生料立磨、首台TRMK45水泥立磨，以及国产最大规格生料立磨TRMR60，且都已投产指标优秀，逐项填补了中国国产立磨空白。同时，在非水泥传统行业之外，粉体公司又陆续推出钢渣立磨、粉煤灰（干/湿）立磨、凝灰岩立磨，同时进入尾矿处理行业、磷化工行业、铁矿选矿行业等，大大拓展了立式辊磨的应用范围，将立磨技术应用推向新高度。

经过多年的发展和完善，粉体公司形成了从售前咨询、方案规划、合同执行、设备调试、售后反馈的一整套专业服务体系，依托雄厚技术力量，为国内外客户提供“专业粉磨系统解决方案”，为您的项目保驾护航。

“专业、务实、热情、共赢”是粉体公司的企业文化理念，我们将始终为成为国际一流立磨供应商和粉磨系统方案解决专家而不懈努力，愿与国内外广大客户和合作伙伴共同发展，携手共创美好未来！

As a professional high-tech company under Sinoma (Tianjin) Powder Technique Machinery Co.,Ltd, Sinoma Technology & Equipment Group Co.,Ltd specializes in the theoretical research, design and development, equipment supply, complete set of grinding system, technical consultation and commissioning of industrial large grinding equipment.

Our company has been engaged in the study of grinding equipment for many years; we have a talent team of high quality, high education background, strong professional degree and rich experience. Our company has R&D department, marketing department, contract enforcement department, quality control department and after-sales-service department, etc. We have technically and international leading professional grinding study laboratory.

Our product is TRM series VRM. We developed many kinds of vertical mills according to the different nature of the raw materials. In the category are mainly raw material vertical mill, slag/cement vertical mill, steel slag vertical mill, coal vertical mill and limestone vertical mill for desulfurization in power plant, etc. The application covers many industries including cement, metallurgy, electric power, chemical industry, coal chemistry.

Currently, our company can provide complete sets of grinding equipment for 700t/d~10000t/d full series of new dry process cement production line. Our cooperation partners are all over the world; we successively cooperated with well-known enterprises at home and abroad including Lafarge Holcim Group, Heidelberg Group, Asia Cement (China) Holdings Corporation, Taiwan Lucky group, China Resources Cement Holdings Limited, BBGM, HONGSHI HOLDING GROUP CO., LTD, Sinoma-Tianshan Group, etc.; our equipment were exported to more than 20 countries and regions including Southeast Asia, Europe, Africa, South America.

For many years, our company exerts technical advantages and has been devoted to the development of new grinding types; on the basis of continuous improvement of inherent grinding types, by continuous innovation, we repeatedly created the performances of “domestic first” and “domestic largest” in cement industry, including the first domestic homemade TRMS32 slag vertical mill, the first TRMR53(5000t/d) raw material vertical mill, the first TRMK45 cement vertical mill and the raw material vertical mill of domestic largest specifications, TRMR60; they all have excellent production capacity and filled the blank of Chinese domestic vertical mills. At the same time, out of the non-cement traditional industries, the power company launched steel slag vertical mill, fly ash (dry/wet) vertical mill and tuff vertical mill in succession and entered into tailings treatment industry, phosphorus chemical industry, iron ore dressing industry, etc. This greatly expanded the application range of vertical mills and pushed the application of vertical mill technology to a new height.

After many years of development and improvement, the power company has formed a whole set of professional service system which includes pre-sale consulting, program planning, contract execution, equipment debugging and after-sales feedback. Depending on strong technical force, we provide “professional grinding system solution schemes” for domestic and abroad clients and escort your project.

“professional, practical, enthusiastic and win-win” is the enterprise cultural concept of the power company. We will put unremitting effort in becoming a world-class provider of vertical mills and expert of grinding system schemes solution. We are willing to develop with the vast number of customers and partners at home and abroad together and crate a beautiful future hand in hand!

1978-2005

1978

天津水泥院辊式立磨的开发研究始于 70 年代末期，主要是基础理论方面研究。

Tianjin Cement Industry Design & Research Institute began to research on the Roller Vertical Mill

1993

第一台 TRMR25.2 型辊式立磨，用于河南新乡水泥厂新型干法生产线。

the First TRMR25.2 VRM in Henan, China

2003

粉体公司成立，天津水泥工业设计研究院正式将所研发的立磨技术推向市场。

Sinoma (Tianjin) Powder Technique Machinery Co., Ltd. was founded.

2005

自主研发的 TRMS31.3 型矿渣辊磨在杭州成功投产，并于 2006 年举行成果鉴定会。这是我国自行研制、投入运行的首台国产矿渣立磨，主要性能达到或超过同类矿渣辊磨的国际先进水平。

First "designed and made in china" Slag VRM was put into running in Hangzhou, China. In 2006 it was recognized as important Technology approach by nation.

2005

用于重庆拉法基水泥有限公司 2500t/d 水泥生产线的 TRMC20.2 煤粉辊式立磨投产。

TRMC20.2 Coal Vertical Mill for Lafarge was running in Chongqing.



TRMR38.4 原料立磨  
广州韶南-2005年



TRMR38.4 原料立磨  
国投海南-2005年

2006-2008

2006

浙江国华浙能发电有限公司的两台 TRML16.3 脱硫立磨、都江堰拉法基水泥有限公司 3200t/d 水泥生产线的 TRMR38.4 原料辊式立磨与 TRMC23.3 煤粉辊式立磨投产。

TRMR38.4 Raw VRM and TRMC23.3 Coal VRM were running in Dujiangyan for Lafarge. Two sets of TRML16.3 Limestones Mill running in Guohua Power Plant.

2007

与辽宁富山水泥有限公司签订中国首台国产用于 5000t/d 水泥生产线的 TRMR53.4 生料立磨，该立磨为当时国内最大的国产立磨。2008 年成功投产运转，2009 在天津召开“TRM53.4 生料辊磨的研制及应用”科技成果鉴定会。

Contract with Liaoning Fushan Cement Co., Ltd for first TRMR53.4 VRM, which was the largest one in China for raw mill at the time. It was put into running in 2008.

2008

与台湾幸福水泥股份有限公司关于越南 5000t/d 水泥生产线所用的 7 台磨机（包括 TRMR53 原料磨、TRMK45 水泥磨及 TRMC36 煤磨）的合同签字仪式在天津举行。其中 TRMK45 水泥磨为国内首台自主研发并制造的水泥立式辊磨，并且首台即出口国外。2010 年项目完成，全部立磨均达产达标。

Contract with Taiwan Lucky Cement Co., Ltd for 7 Vertical Mills. Including 3 Raw Mills, 3 Cement Mills and 1 Coal Mill. All the mills were put into operation in 2011



TRMK50.2 水泥立磨  
越南 hume-2012



TRMK45.4 水泥立磨  
越南幸福-2010

# MILESTONES

## 历史印记

2010-2012



TRMR38.4 原料立磨  
高安红狮 - 2008 年



水泥立磨

2010.

与天津钢铁集团有限公司顺利签订 2 台 60 万吨 / 年 TRMS43 矿渣立磨的供货合同。标志着国产大型矿渣立磨开始进入了国有大型钢铁企业的视野。

Contracts with Tianjin Steel Group Co., Ltd and Tianjin Steel Group for 2 Slag Vertical Mills. The mills type were TRMS43.4 with capacity of 90t/h.

2011.

同陕西尧柏集团签订 9 台 TRMK45.4 水泥立磨，水泥立磨累计销售超过 40 台，得到国内外客户的广泛认可。

Contracts with Shanxi Yaobai Group Cement Co., Ltd for 9 TRMK45.4 Cement Vertical Mill. We have sold more than 40 sets mills for Cement till now.

2011.

与河北矿峰水泥有限公司签订 TRMR60.4 生料立磨，设计产量 540t/d，该立磨打破了超大型立磨国外产品垄断国内市场的局面，是中国立磨事业的发展的重要里程碑。

First TRM60 raw mill for 6,000tpd clinker line in Kuangfeng, Hebei, output of 540t/h. The TRM60.4 was largest one in China in 2011.

2011.

年度累计辊式立磨合同额超过 10 亿  
total revenue: over ¥ 1 billion.

2012.

首台用于处理铅锌尾矿的辊式立磨合同在福建尤溪签订。2013 年顺利投产

First mill for Lead and Zino Tailings line in Youxi, Fujian.

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2013-2016

2013.

与广西防城港市万鑫建材有限公司签订 TRMS60 矿渣立磨合同，该立磨为目前国内最大国产矿渣立磨，年产量达到 120 万吨，并于 2015 年成功投产。

First Domestic TRM60 Slag Mill (output of 180tph) contract signed at Fangchenggang, Guangxi. It was the largest one in China.

2014.

国内首台专门用于粉磨电厂湿排粉煤灰辊式立磨在浙江宁海投产，各项指标均达到先进水平，公司产品研发迈上新的台阶。

First Domestic Bottom Ash Mill was running in Ninghai, Zhejiang. The indicators of our products reach the world advanced level. New Product Development. It push the new type VRM to a new level.



TRM122.3 辊渣立磨  
浙江玉环电厂 - 2007 年



TRMS31.3 矿渣立磨  
福建三明钢铁 - 2008 年

2015.

同河南信阳市天力新型建筑材料有限责任公司合作，签订专门用于粉磨凝灰岩的新型立磨合同，外行业拓展的又一成果。

Contracts with Xinyang Xintianli New Type Building Material Co., Ltd for a Tuff VRM.

2015.

完成与泰国 LV 公司的选粉机技术引进工作，可以独立使用 LV 技术进行选粉机的设计与制造，继续保持其在技术上的领先地位。

Bring the LV Separator technology into our company. With the new technology we maintain their leading positions in R & D of.

2016.

同福建三宝钢铁有限公司签订年产 30 万吨矿渣微粉生产线 EP 总承包合同，着力打造一流粉磨工程总承包服务商。

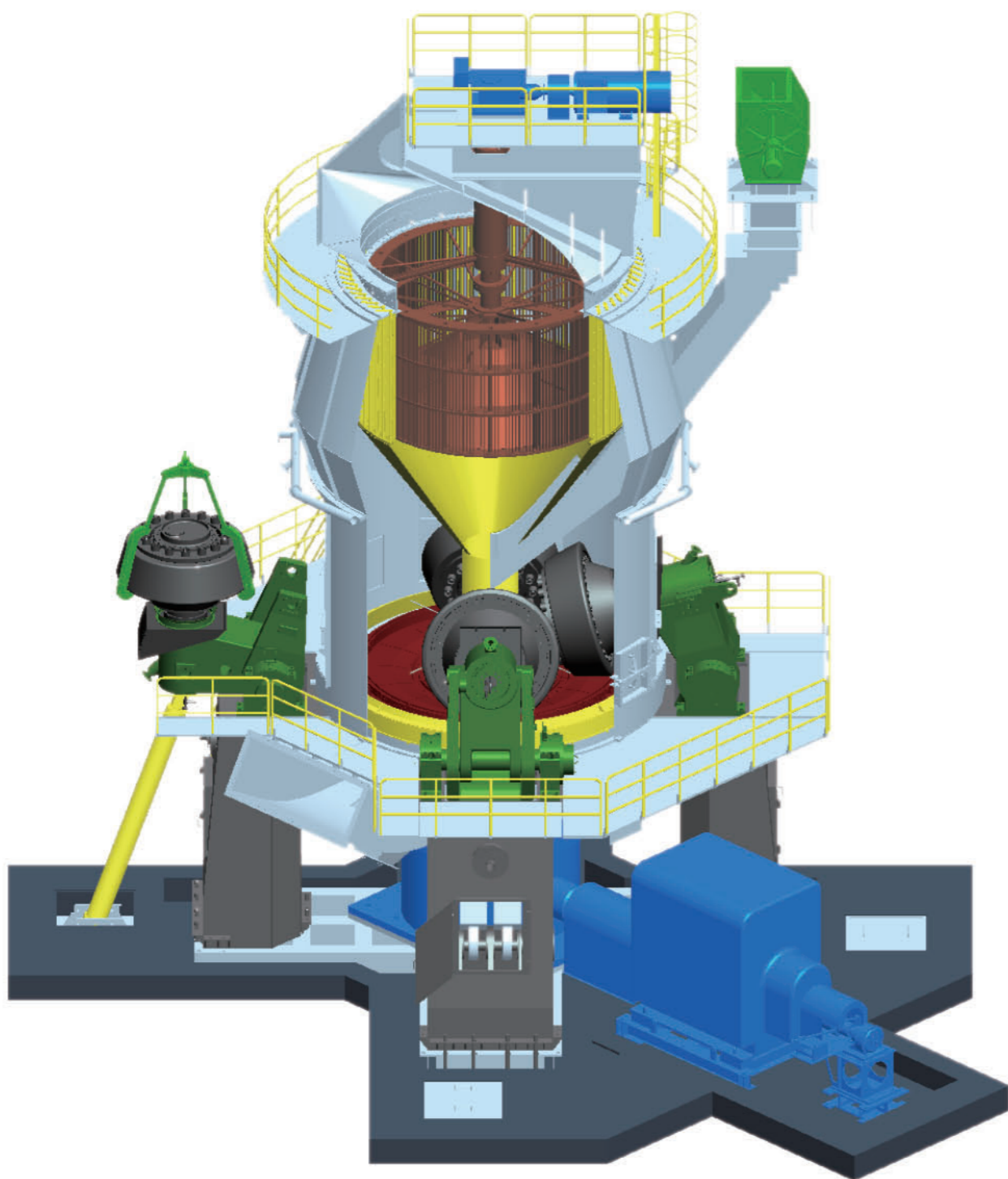
Contracts with Fujian Sanbao Steel Co., Ltd for a EPC Project. We want to be a world-class General contractor.



TRMR63.4 原料立磨  
辽阳恒成 - 2008 年

# VERTICAL MILL OVERVIEW

## 立磨总体介绍



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### TRM型辊式立磨简介

立磨作为一种理想的大型粉磨设备，广泛应用于水泥、电力、冶金、化工、非金属矿等行业。集粉磨、干燥、分级、输送于一体，生产效率高，可将块状、颗粒状及粉状原料磨成所要求的粉状物料。

第一台立磨是 20 世纪 20 年代德国研制出来的。它的粉磨原理类似于中国祖先碾磨粮食的磨，采用料床粉磨原理粉磨物料，克服了球磨机粉磨机理的诸多缺陷，具有粉磨效率高、电耗低（比球磨机节电 20%~30%），烘干能力大，适应入磨物料粒度分布比较大，粉磨工艺流程简单，占地面积小，土建费用低，噪音低，磨损小，寿命长，操作容易等优点。

天津水泥工业设计研究院有限公司 (TCDRI) 从事辊磨的研究开发工作最早始于二十世纪七十年代末。经过三十年不断的科研创新和技术进步，现已开发出多种规格的 TRM 型原料辊磨、煤辊磨、矿渣辊磨和水泥辊磨，并得到了广泛的应用，获得了用户的认可。TCDRI 在研发各种不同辊磨的同时，形成了完备高效的辊磨研发体系，培养出一批辊磨研发的专业人才。

进入 2000 年以来，结合国外先进经验和几十年来所研发出的技术成果，形成了具有自主知识产权的 TRM 型辊式立磨，在各个行业进行推广，取得了优秀的业绩，并在业内拥有良好口碑。

### VERTICAL ROLLER MILL CHARACTERISTICS

## 立磨特点

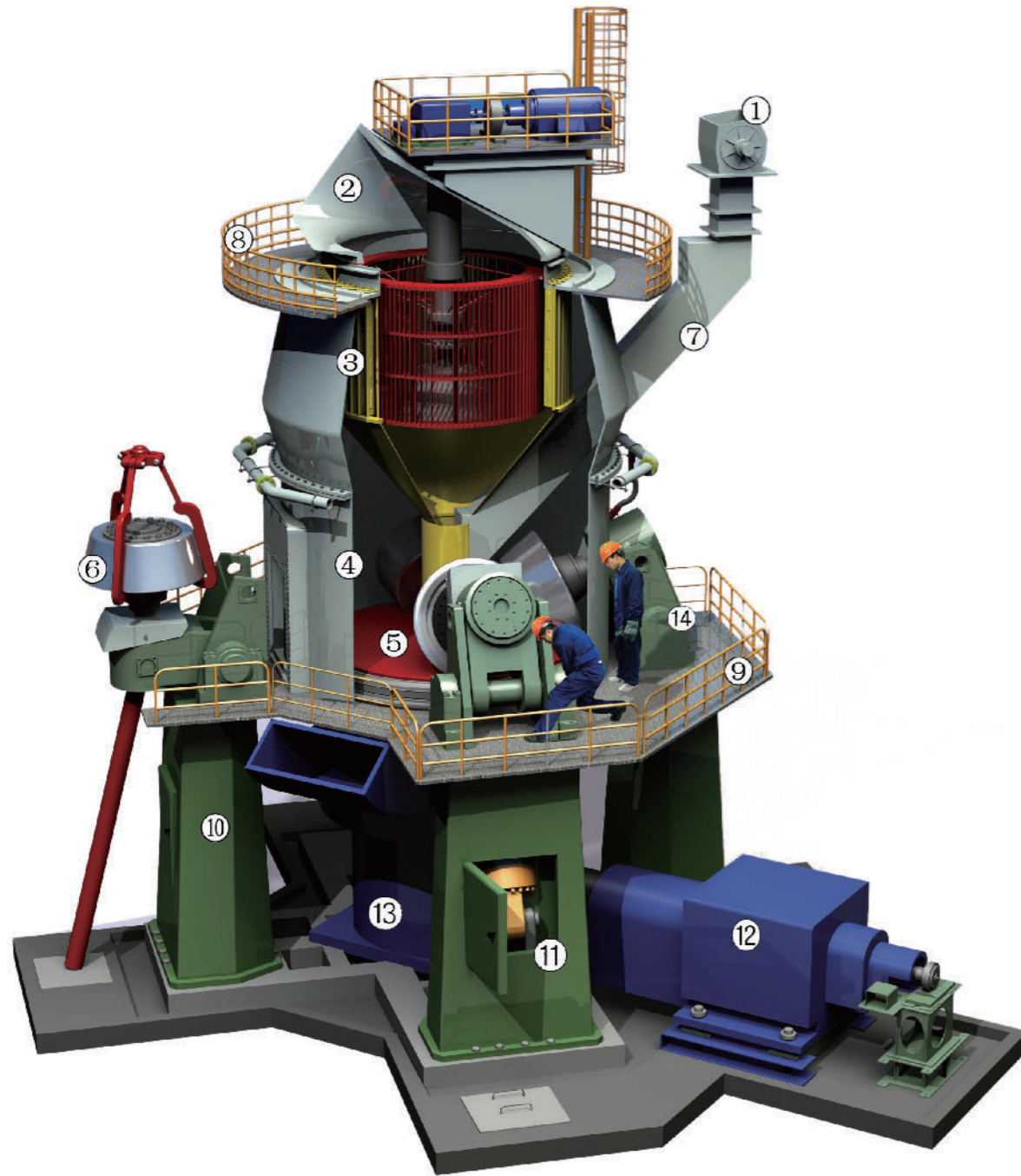
- 工艺流程简单，同时完成对物料粉磨、烘干及颗粒分选功能
  - 占地面积小、布置紧凑、系统设备重量轻、土建建设投资低
  - 粉磨效率高，电耗低
  - 单位产品金属消耗小
  - 具有自动抬辊、落辊功能，可以实现空载启动
  - 优化的锁风密封结构，结构简单可靠，密封效果好
  - 磨辊轴承采用稀油集中润滑，保证轴承低温运行，确保润滑油清洁度，保障润滑效果，有效延长轴承寿命
  - 机械限位机构避免磨辊与磨盘发生直接金属摩擦，保障设备安全
  - LV 选粉机保障选粉效率，降低磨内风阻压差，优化成品颗粒分布
  - 翻辊装置设计可以降低磨辊维护工作量，便于检修
  - 液压系统操作压力低，降低漏油故障，降低磨机振动，有利于操作与管理
- 
- Simply process, Grinding, Drying and Classification at the meantime;
  - Less Area Occupation, more Compact layout, Less Equipment Weight and Lower Investment;
  - High Grinding Efficiency and Low Power Consumption;
  - Less wear-out;
  - Low noises emission and no Pollution.
  - Automatically Mill rollers lifting and falling;
  - Simple structure, reliable operation and good sealing effect.
  - The centralized circulating oil lubrication is applied for the roller bearings, which ensures the roller bearings can run at favorable temperature and with clean oil to achieve longer life.
  - Mechanical Limitation switch unit avoid the friction and collision between Roller Tire and Grinding Table Liner
  - LV-High efficiency separator can reduce the wind resistance and improve cement particle distribution.
  - Hydraulic roller swing-out device helps to ease maintenance.



# Operational Principle

## TRM型立磨工作原理

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### 注释：

- ① 下料器 Feeder Valve
- ② 出风口 Gas Outlet
- ③ 选粉机 Separator Assembly
- ④ 中壳体 Middle Casing
- ⑤ 磨盘 Grinding Table
- ⑥ 磨辊 Roller
- ⑦ 进料管 Feeding Chute
- ⑧ 选粉机操作平台 Separator Platform
- ⑨ 磨机操作平台 Mill Platform
- ⑩ 机架 Mill Stand
- ⑪ 加压油缸 Hydraulic Cylinder
- ⑫ 主电机 Main Motor
- ⑬ 主减速机 Main Gear Box
- ⑭ 摇臂 Rocker Arm

## TRM型立磨 工作原理

物料通过下料器①、下料管落到磨盘⑤中央，由主电机⑫通过减速机⑬带动磨盘⑤恒速旋转，借助于离心力的作用将物料向外均匀分散、铺平，使其形成一定厚度的料床。在此过程中物料同时又受到磨盘上多个磨辊⑥的碾压，并在辊子的作用下被粉碎。在离心力的连续驱使下物料不断向磨盘⑤外缘运动，在围绕磨盘⑤周围的风环区，进入磨机的热风，经风环向上吹动，捕捉离开磨盘的物料遇到通过风环进入磨内的热气体并随之上升经磨机中壳体进入到分离器中，在此过程中物料与热气体进行了充分的热交换，水分迅速被蒸发。分离器③控制着磨出口的产品粒度，大于规定尺寸的颗粒被分离，并送回至磨盘⑤，只允许满足要求的颗粒通过。

Materials will be discharged through the Rotary Feeder Valve① and fall onto the middle of the Grinding Table⑤; Grinding Table is powered by the motor⑫, rotates with constant speed; Under the effects of the centrifugal force, the material on the grinding table will move into the gap under the Rollers⑥ and will be ground there. The TRM Vertical Roller mills are designed with conical Roller tires and flat grinding table.

The hot gas coming into the mill blow up through the Louver Ring, the ground powder from the table will be carried by the hot gas and risen up into the Separator③, during this process the ground material will be dried.

With the separator, we can control the Product Fineness to get the target product.

# LV CLASSIFIER NEW TYPE CLASSIFIER TECHNOLOGY

## LV—全新形式的选粉机技术

我们采用LV型选粉机技术是一种全新概念的物料分离设备技术，并且在立磨的改造中得到了广泛应用。

We adopt LV type classifier technology to separate the material. Now we have many references in mill modification.

这种选粉机具有一种独特结构的导风叶片——我们把它叫做LV-POCKET，在这种新式结构的帮助下，我们能够使粗颗粒物料和细颗粒物料更加有效的从高速气流中选出，从而更好的提升选粉效率。

LV classifier has the unique guide vanes—LV POCKET. The material and gas enters to the pocket at higher velocity after which the velocity gets reduce to create the next classification.

提升气体的磨内流速并在气体到达导风叶片时达到最大，目的是主要是将一旦离开磨盘的所有物料带上来。尽量避免物料在磨体和选粉机之间循环，磨体和选粉机见的压降随之间的压降随之减少。即气流速度越高，压力损失越大。

This makes possible to get preferable gas velocity between casings and funnel cone and to eliminate material internal circulation. Pressure loss becomes smaller by reducing internal circulation of material.

特殊的Z（动）+POCKET（静）气室是根据粗细颗粒在此处具有不同的动能这一原理设计的。在气流中的粗颗粒由于动能的作用被分离，被分离的物料在重力的作用下通过气室降至漏斗锥，通过溜子将物料送至漏斗锥顶。

Special Z(dynamic)+POCKET(Static) gas chambers are designed according to the different kinetic energy principle. The "Gravity Force" trying to pull the material down to the table below the classifier.

转子风叶的圆周线速度几乎与 LV 气室喷出的气体速度相同。这可以降低物料对转子风叶上冲刷，从而减少了对转子的磨损。

Rotor vanes peripheral speed is almost the same as the gas from LV chamber, which may reduce material wearing to rotor.

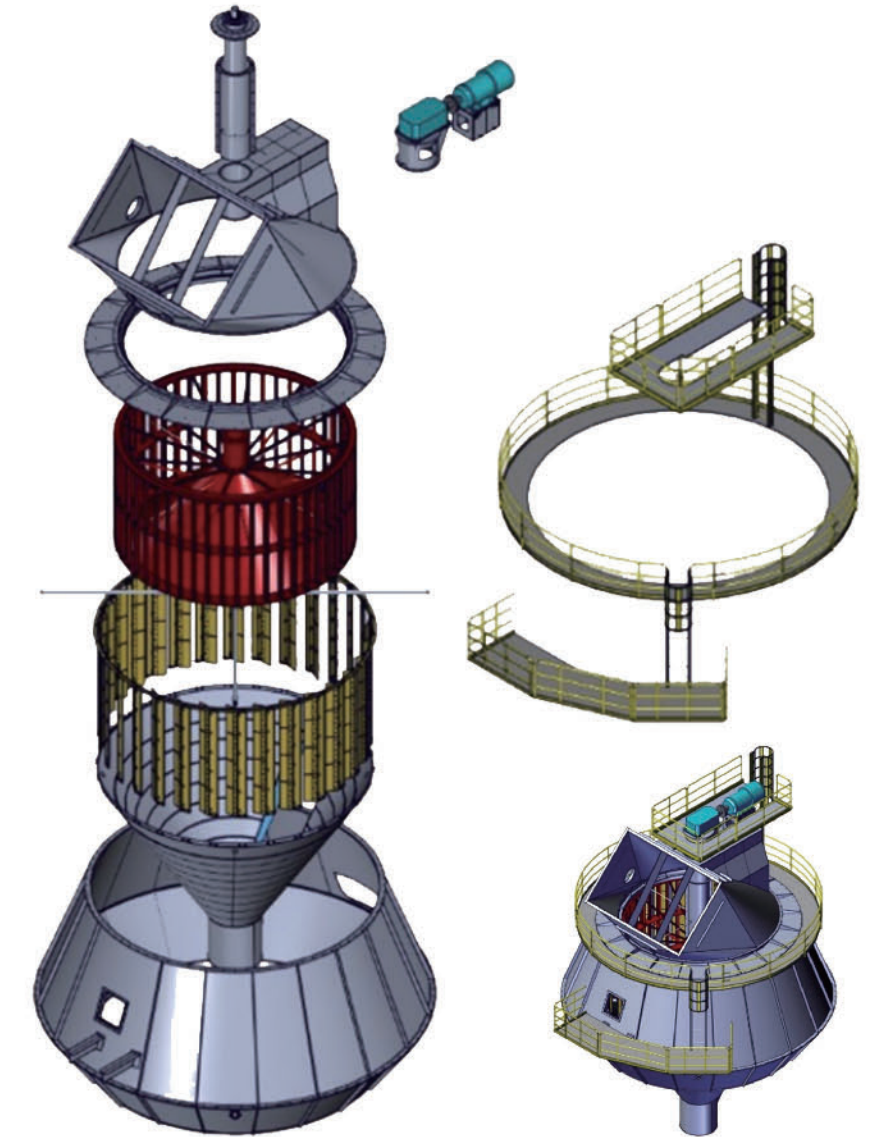
我们通常采用较硬材料，例如UP板，寿命既长又免维护。即使对于粉磨矿渣和熟料，气室导风叶片和转子风叶的磨损也很小，运转半年后，在转子风叶上的喷涂料都看不出有何变化。

We always adopt the harder material, for example UP plates, to prolong the lifetime and reduce maintenance. Even though grinding slag and clinker, the guide plates and vanes wear are lower. After half a year, there is no difference in vanes coating.

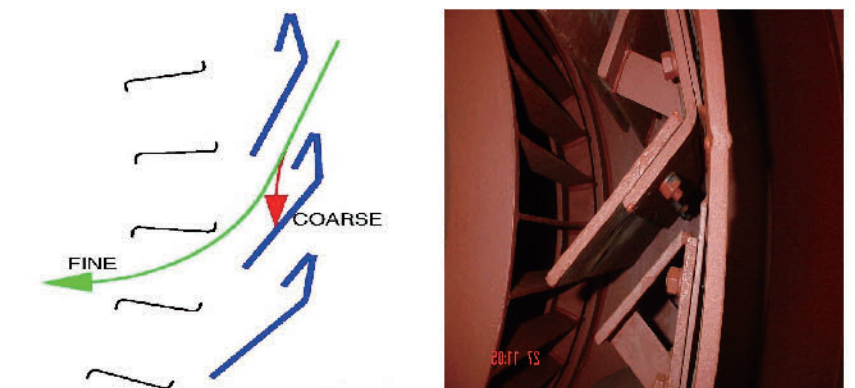
通过我们的新型选粉机技术，使我们的立磨同旧式立磨相比产量能够提升12%~30%，系统电耗降低5%~15%

All LV Classifier shows higher production rate about 12-30% and less specific power consumption about 5%~15%, comparing with other Separators.

## 选粉机结构



## 新的叶片形式 Nnique Guide Vanes



# TRMR

## VERTICAL ROLLER MILL FOR RAW GRINDING

### TRMR原料磨系统介绍

Typical Diagram of TRM Vertical Roller Mill for raw grinding system

#### 典型的 TRM 型原料辊磨系统图所示

早在 20 世纪 70 年代，天津水泥工业设计研究院就开始了辊式立磨的研究，并致力于立磨国产化的实现。在经过多年研究实践，将国外先进技术和自身特点相结合，研制出了 TRMR 型水泥生料立磨，一经推入市场即获得广大业主好评，该型立磨目前可配套日产 700~6000 吨熟料生产线。

Back in 1970s, Tianjin Cement Industry Design & Research Institute started the research of vertical mills and was devoted the realization of localization of vertical mills. After years of research and practice, they combined abroad advanced technologies and their own features and developed TRMR type cement raw material vertical mill which got good reviews of the majority of owners once pushed into the market. This type of vertical mills can complete the production line of 700~6000 tons of clinker per day.



TRMR36.4 原料立磨 - 陕西尧柏 - 2010

#### 生料立磨业绩总汇 (截止至 2015 年 12 月) Sales Reference of Raw Mills (till Dec. 2015)

规模 Capacity	磨机 TYPE	业绩 SETS
5000 t/h 及以上	TRMR53 / TRMR56 / TRMR60	44 (单台原料磨)
5000 t/h 以下	TRMR17~TRMR45	94 台

## TRMR型水泥生料立磨特点 Raw Material Vertical Mill



- 1、实现大型化生产，能够保证日产 700~6000 吨水泥熟料生产线的“一磨+一窑”配置，一次投资和运行成本比两磨配置要低，目前最大规格为 TRMR60.4 生料立磨，设计产量 540t/h。
- 2、依托公司强大的研发能力，借助国际领先的立磨实验室，提前对物料的易磨性、磨蚀性进行实验，为磨机的选型提供了科学、准确的保证，做到每一台磨机都是量身定制，避免过度投资或者由于磨机选型偏小造成的产能不足。
- 3、大于 300 天的高效、可靠运转率，以及充分满足回转窑的要求的磨机生产能力，保证了水泥生产线的可靠运转，最大限度提高工厂经济效益。
- 4、合理利用回转窑及循环热风，大大降低能耗。
- 5、采用国际上广泛应用的平盘锥辊形式，减小磨辊大小端线速度差，在粉磨后期仍保证磨辊形状变化不大，这既保证了生料成品产量，又保证了产品细度稳定。
- 6、可根据烧成工艺的需求，对成品细度灵活控制。
- 7、进料采用回转下料器，根据成品产量精心设计，并选择最合适的规格，极大程度减少堵料情况且保证良好的密封效果。

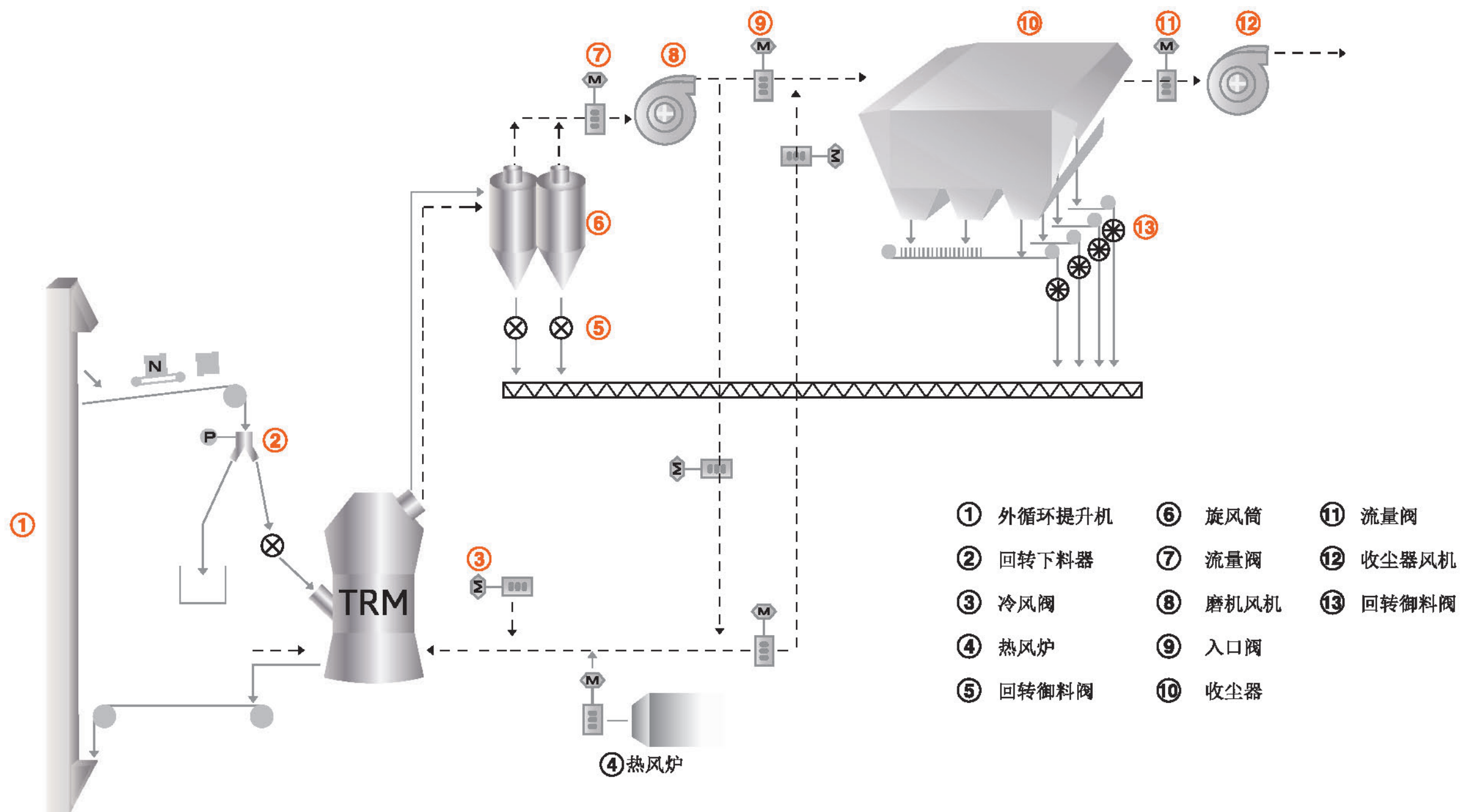
- 1、Realize large-scale production and can ensure the "one mill + one kiln" configuration of 700~6000 tons of cement clinker production line per day; the investment and operation cost of one time is lower than two-grinding configuration; the current largest specification is TRMR60.4 raw material vertical mill; its designed output is 540t/h.
- 2、Depending on the strong R&D ability of the company, with the help of international leading vertical laboratory, we experimented on the grindability and corrosivity of materials and provide scientific and accurate guarantee for the grinder's selection so that each grinder is tailored and we can avoid excessive investment or insufficient production capacity caused by partial small grinder type.
- 3、The efficient, reliable operating rate of more than 300days and grinder production ability which fully meets the demand of rotary kiln ensure the reliable operating of cement production lines and improve the economic benefits of factories to the largest extent.
- 4、We take advantage of the rotary kiln and circulation hot blast so that the energy consumption is greatly decreased.
- 5、We adopt the flat cone roller form which is widely used in the world; this reduces the roller linear velocity difference between the big end and the small end and can ensure that the shape of the grinding roller doesn't change much latterly in the grinding, which ensures both the output of raw materials products and the stability of product fineness.
- 6、We can control the product fineness flexibly according to the demands of firing process.
- 7、The feed is conducted by rotary feeder; it is well-designed according to the product output and chooses the most suitable specification, which decreases blocking situations to a large extent and ensures great sealing effect.

#### TRMR 系列水泥生料立磨技术参数表 Specification of TRMR Vertical Roller Mill for Raw Grinding

型号 Model	磨盘直径 Diameter of Table	基准装机功率 Installation Power	基准生产能力 Benchmark Capacity	最大入磨粒度 Max. Feeding Size	能力范围 Capacity Range
	(mm)	(kW)	(t/h)	(mm)	(t/h)
TRMR70.6	7000	7100	750	100	700-900
TRMR63.4	6300	5600	600	100	600-700
TRMR60.4	6000	5000	540	80	500-580
TRMR56.4	5600	4500	480	80	400~550
TRMR53.4	5300	4000	400	80	330~510
TRMR45.4	4500	3350	350	80	300~400
TRMR42.4	4200	2800	280	80	230~330
TRMR40.4	4000	2500	250	80	200~300
TRMR38.4	3800	2240	220	80	185~280
TRMR36.4	3600	2000	200	80	170~260
TRMR31.3	3100	1250	120	40	90~150
TRMR25.2	2500	800	75	40	60~90

说明：原料入磨水份≤7%（正常窑尾废气可烘干的水分）；成品水份≤0.5%；成品细度R80μm=12%~18%；原料易磨性指数TMF=0.7~1.2；入磨粒度是指95%质量通过率的颗粒尺寸。

NOTES: Feeding Moisture≤7% (to be dried by hot gas from kiln back end); final products moisture≤0.5%; fineness R80μm=12%~18%; Grindability of Raw Material TMF=0.7~1.2; Feeding size refers to the particle size of 95% passing rate



TRMR53.4工艺流程图

- |          |        |         |
|----------|--------|---------|
| ① 外循环提升机 | ⑥ 旋风筒  | ⑪ 流量阀   |
| ② 回转下料器  | ⑦ 流量阀  | ⑫ 收尘器风机 |
| ③ 冷风阀    | ⑧ 磨机风机 | ⑬ 回转卸料阀 |
| ④ 热风炉    | ⑨ 入口阀  |         |
| ⑤ 回转卸料阀  | ⑩ 收尘器  |         |

# TRMS矿渣立磨

## 我们将为您提供系统交钥匙工程

### ——典型TRMS矿渣粉磨系统

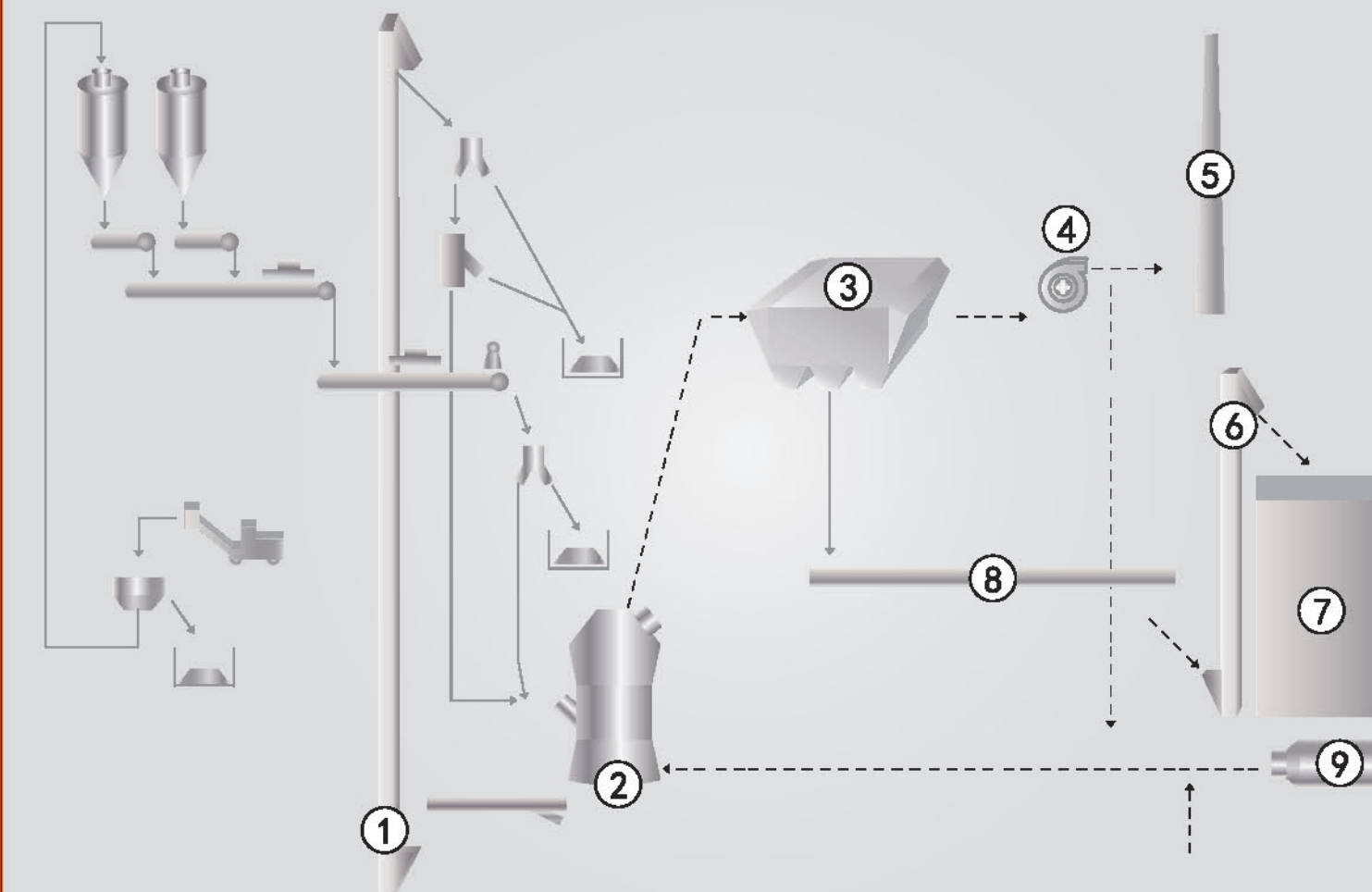
自2005年国内首台国产矿渣磨问世以来，累计销售矿渣立磨150台套以上，积累了大量矿粉生产经验，并形成了从系统设计到售后服务的完善服务体系。

Since the first set of "designed by and made in China" Slag VRM was successfully put into running in 2005, we have sold over 150 sets of Slag VRMs inland China and overseas. Extension experience on slag grinding and treatment have been accumulated from the projects we have carried out. A complete system of Design and Service have been built up.

### 我们将为您做到： We will offer you

SINOMA

<p>设计Design</p>	<p>1、项目前期，为您的项目量体裁衣，制定最符合您现场情况的专业系统设计方案，根据不同的地形、地貌、气候、海拔条件制作出个性化方案。</p> <p>Prior to the project execution, based on your specific technical requirement and local condition, including altitude, weather, geographic condition, etc. we will provide you a tailor-made system design to meet your needs.</p> <p>2、工艺优化：通过过硬的系统设计能力和多年源自现场经验的立磨优化方案，降低系统投资成本，如果是交钥匙工程，我们将保证系统电耗小于45度电/吨。</p> <p>Optimization of Process Design: Based on our excellent System Design Team and various System optimization planning from field experience, we can provide you a best cost-effective system design. If a turn-key project is considered, the total system power usage will be less than 45kwh/t.</p>
<p>项目执行 Project Execution</p>	<p>1、安排专业的执行经理监控整个设备加工进度和几乎苛刻的加工质量，保证专业品质的产品如期到达现场，以保证项目进度。</p> <p>For each project one project manager will be appointed to monitor the working process and control of the quality, to ensure that our equipment will be delivered to the site on time and without any quality flaw. Therefore the project time plan will not be delayed.</p> <p>2、定期汇报加工进度，让业主实时了解项目进展。</p> <p>Progress report will be sent to the customer, therefore the project can be carried out more effectively.</p> <p>3、指定拥有多年调试经验的工程师，在立磨安装的各个关键点上为您进行指导，保证安装质量。</p> <p>Experienced service Engineers will be sent to the site, to give guidance to the erection of the mill, to ensure a perfect installation.</p> <p>4、时时跟踪项目进展情况，对系统出现的问题进行专业化诊断，提供项目在操作、使用上的优化方案。</p> <p>We will follow the running of the mill from contract signing till normal operation, diagnose the problems and give our suggestion in time. Keep the customers noticed if we have any optimization in machine or in system design.</p> <p>5、成为我们的永久客户，成为TRM矿渣磨俱乐部的一员，分享高产业主的设备操作经验，定期提供公司新产品前沿信息，免费的老项目技术改造优化方案，使您的产品在使用中不断升级。</p> <p>Every customer is our customer forever. You will be a member of the TRM Slag Mill user club. Information pool is built for the users to share the information, working experience and new technology from us. Technology updates sharing just for free. You can keep your Technology upgrading continuously.</p>
<p>备件 Spare Parts</p>	<p>○立志于成为世界最大的立磨备件供应基地，充足的备件，优惠的价格，不变的品质，为您解决了后顾之忧。</p> <p>We are going to build the biggest spare parts supply base in world. Sufficient quality spare parts with discounted price will solve all your urgent spare parts problem.</p>



- |                                     |                                      |
|-------------------------------------|--------------------------------------|
| 1. 外循环提升机 Bucket Elevator For Cycle | 6. 成品提升机 Bucket Elevator For Product |
| 2. TRMS辊式立磨 TRMS VRM (For Slag)     | 7. 成品库 Product Bin                   |
| 3. 收尘器 Bag Filter                   | 8. 空气输送斜槽 Air Slide                  |
| 4. 循环风机 Fan                         | 9. 热风炉 Hot Gas Generator             |
| 5. 烟囱 Chimney                       |                                      |

## TMRS矿渣粉磨系统典型流程

### Typical Design of TRMS Slag Grinding System

#### 矿渣计量及输送 Slag weighing and transportation

矿渣经汽车运输至厂，卸入露天堆场储存。自然晾干后的矿渣（水分 $\leq 15\%$ ）通过铲车送至卸车坑内，卸车坑底采用棒阀和胶带板式给料机控制卸料并且进行计量，经过计量后的矿渣由胶带输送机送至磨内。为保证矿渣磨的安全运行，矿渣输送设置除铁器进行除铁。

Slag will be transported into the plant by Trucks and will be stored in open yard. Natural dried slag (moisture  $\leq 15\%$ ) will be delivered to the unloading pit by forklift. Weighing will be done under the unloading pit using rod valve and belt feeder. Weighed slag will be transported by belt conveyor into the mill. To keep the mill running safely, iron remover must be equipped in this phase.

#### 矿渣粉磨 Slag Grinding

矿渣粉磨系统采用辊式矿渣磨。矿渣经过螺旋输送机喂入立磨，物料随磨盘的旋转从其中心向边缘运动，同时受到磨辊挤压而粉磨。粉磨后的矿渣粉在磨盘边缘处被从风环进入的热气体带起，粗粉回到磨盘再粉磨，合格细粉由废气带入袋收尘器收集后由空气输送斜槽送至矿渣库侧提升机入库。部分难磨的大颗粒物料在风环处不能被热风带起，经吐渣口进入外循环系统，经除铁后再入磨粉磨。

Slag VRM is used for the Slag Grinding. Slag will be pushed into the mill table center by screw feeder, and then will be moved to the edge of the mill table because of the rotation movement of the table, at same time the slag will be ground by the pressure of the roller. Ground slag powder will be blown up by the hot gas through the air vent at the edge of the mill table. Coarse parts of the slag powder will be blown back onto the mill table and be ground once again while the fine parts will be blown up to the classifier for the classification. The classified powder will be collected by the bag filter and transported into the silo by air chute. There are still parts of slag that cannot be blown up, they will fall into the recirculation system and be fed into the mill again after the magnet separator.

采用热风炉作为磨机烘干热源，燃料可以是煤、石油焦或者高炉煤气等。热风通过管道进入磨机，出收尘器气体净化后由系统风机排入大气，其中一部分作为循环风再入磨。物料在磨内粉磨的同时被烘干，由于磨机通风量大，烘干能力强，物料在不增加预烘干设备的情况下可粉磨水分 $\leq 18\%$ 的湿矿渣。

Hot gas generator will be used as source for drying gas. The fuel can be coal, pet-coke or blast furnace gas. Hot gas will be blown into the mill though air vent. Rest gas from the bag filter will be cleaned and then discharged into the air through system fan. A part of the rest gas will be sent back into the drying process as part of the drying gas. The slag will be dried during the grinding, transportation movement inside of the mill. The mill is big enough for the big amount of the drying gas. Drying Capacity is up to 18% moisture slag without additional drying equipment.

矿渣粉的取样装置设在入库提升机之前，取样器可取样至样筒，由人工将样筒送到中央控制室进行制样分析。

Sampling device will be installed right before the elevator to the silo. Using the sampler the slag powder will be collected into a sample bin and delivered to the control center to test.

#### 矿渣粉储存及散装 Storage and Packing

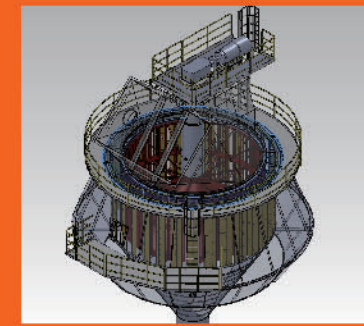
设置矿渣粉储存及散装库。来自矿渣粉磨系统的矿渣微粉经斗式提升机、空气输送斜槽送入矿渣粉储存及散装库内。库内设置充气箱，由罗茨鼓风机供气。库内矿渣粉经过卸料装置和散装机后进入罐车出厂。矿渣库顶及库下散装考虑收尘，含尘气体经袋收尘器净化后排入大气。

Slag Silo will be used to storage the slag powder. The powder from the bag filter will be delivered into the silo using bucket elevator and air chute. Plenum boxes is installed inside the silo. Air will be provided by roots blower. Powder in the silo will be fed into the tanker through discharge valve and bulk machine. Under the slag powder silo and by the bulk machine dust collector must be installed to keep the rest gas clean.

#### 空压机站 Compressor stations

设置一座空压机站，选用两台螺杆式空压机，其中一台备用，能力20m<sup>3</sup>/min，压力1.0MPa。压缩后的气体经净化干燥，作为脉冲阀及仪表等的用气气源。

One set of air compressor station is equipped with two sets of screw compressors. One is running while the other is hot-standby. The compressor is with 20 m<sup>3</sup>/min Capacity and total pressure by 1.0 MPa. Dried compressed air will be used as the air source for the pulse valve and other meters.



高效动静态新型选粉机

### TRMS型矿渣立磨特点 Characteristic of TRM Slag Mill

矿渣水分含量高、喂料粒径小、粘度大、传统进料方式极易造成堵料，往往由此造成磨机停产维护，TRMS型矿渣立磨采用螺旋绞刀进料，其强制进料的方式防止了堵料现象的发生。

Raw blast furnace slag has a higher water content, very small feeding size, and more important, the slag powder owns a very good Cement character, all these lead a very high possibility of blockage in the feeding equipment. This causes more stoppage of the grinding system. To solve this phenomenon, more equipment has to be added to the system like air cannon or rapper. Rotary screw feeder has been applied on the TRM Slag Mill, its feeding with force method has ensured no more blockage.

新型的进料方式是立磨落料点降低6m以上，充分节省了皮带长度和回料提升机高度，节省了工艺生产线长度，减少了系统投资和电耗。

Feeding point of the mill is lowered by 6m (TRMS32 - equipped for 300,000 t/a line) because of the new screw feeder method. Transportation belt is shortened and height of circulation elevator is lowered. The total length of the production line is shortened, also the system investigation and total power Consumption is lowered.

螺旋绞刀采用耐磨处理，使用周期长，设计上优化了结构使更换更加方便，内部轴承考虑防尘保护，提高运转率。

The core part, "reamer" of the screw feeder is hard-surfaced to achieve a longer lifetime. Optimized design makes the change of reamer more easily. Anti-dust and anti-corrosion design of the inner part of the screw feeder ensures a longer lifetime.

由于矿渣易磨性较差，成品细度要求较高，采用了更高的磨辊压力，独立加压方式使操作、维修，在设计上增加了缓冲装置使生产时的震动降低。

Due to the poorer grindability and higher output Blaine of the Slag, higher grinding pressure is needed. Thus independent pressuring system with system backpressure is designed, therefore also other advantages like easy operation and maintenance, flexible control are realized.

辊轴与磨盘夹角重新设计，使产品达到最佳的细度，和最小的磨损。

Optimized structural design for the angle between roller and table, ensure higher grinding efficiency and less worn.

矿渣粉磨的投影压力比常规物料更高，选用高可靠度的原装进口轴承，保证了立磨运转率，同时每年为轴承预投1.2亿RMB以保证进口轴承的现货供应。

Technically, Slag grinding needs a higher projected pressure than grinding raw material and coal. In this case, we select brand bearings from FAG/SKF/TIMKEN/NSK on the roller. We have a long-term cooperation with the mentioned bearing supplier and signed Pre-investment contract with them to ensure the supply.

采用LV型选粉机，大大提高了选粉效率，且方便检修更换。

LV-Technology Classifier is applied to increase the Classify Efficiency and also easy to maintain.

选用国际品牌堆焊材料，使设备运转率更高。

Using international brands rewelding material, ensure longer wearing parts life.

## 核心设备

### TRMS高炉矿渣立磨简介 Core Equipment TRM Slag VRM

#### 原料分析：高炉水渣 Content: Blast furnace slag

矿渣高炉炼铁熔融的矿渣在骤冷时，来不及结晶而形成的玻璃态物质。呈细粒状。熔融的矿渣直接流入水池中冷却的又叫水淬矿渣，俗称水渣。矿渣经磨细后，是水泥的活性混合材料。近年来，随着TRMS国产矿渣立磨在国内的普遍推广，立磨粉磨矿渣电耗低、操作、工艺流程简单的诸多优点，使其成为矿渣粉磨的必选设备。

Slag is the glass-like by-product left over after iron has been separated from its raw ore. Slag is usually a mixture of metal oxides and silicon dioxide. Two major uses of GGBS are in the production of quality-improved slag cement, namely Portland Blast furnace cement (PBFC) and high-slag blast-furnace cement (HSBFC), with GGBS content ranging typically from 30 to 70%; and in the production of ready-mixed or site-batched durable concrete. Recent years, with the TRMS slag vertical mill was put into use domestically, vertical mill grinding slag with its advantages in lower power consumption, easy operation, simple process and other advantages in use has been approved by more and more customers. Now VRM is the first and only choice by grinding slag.



高炉矿渣 Granulated blast furnace slag



矿渣粉成品 GGBS

# TRMS

## 矿渣立磨

# KEY PERFORMANCE TABLE

## 主要业绩表

TRMS 系列矿渣立磨技术参数表  
Specification of TRMS Vertical Roller Mill for Slag Grinding

型号 Type	磨盘直径 Dia of Table	装机功率 Installation of Power	最大入磨粒度 Max. Feeding Size	生产能力 Capacity
	(mm)	(kW)	(mm)	(t/h)
TRMS60	6000	6000	180-200	1,200,000
TRMS56	5600	5600	160-180	1,100,000
TRMS53	5300	5000	140-150	1,000,000
TRMS50	5000	4200	120-130	900,000
TRMS45	4500	3550	105-110	700,000
TRMS43	4300	3150	90-95	600,000
TRMS40	4000	2800	75-80	500,000
TRMS36	3600	2000	55-60	400,000
TRMS32	3200	1600	45-50	300,000



TRMS31 杭州紫恒



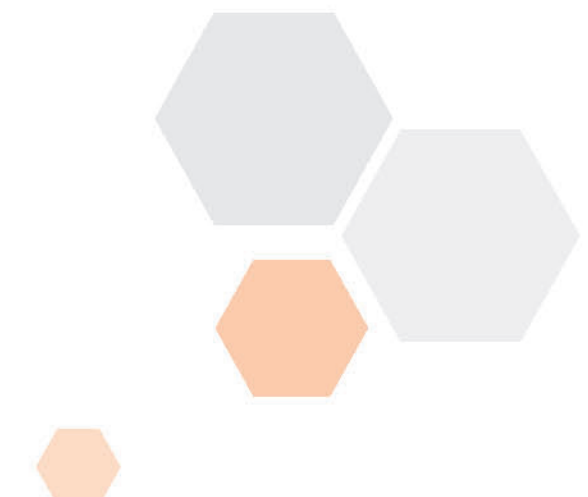
TRMS31 福建三钢

说明: 矿渣入磨水份 $\leq 15\%$ ; 入磨粒度 $\leq 10\text{mm}$ ; 成品水份 $\leq 0.5\%$ ; 出磨成品细度 4000 cm<sup>2</sup>/g ~4500cm<sup>2</sup>/g; 磨机电耗 < 30kWh/t

NOTES: Feeding Moisture $\leq 15\%$ ; Feeding Size $\leq 10\text{mm}$ ; Output Moisture $\leq 0.5\%$ ; Fineness(Blaine): 4,000  $\pm$  200 cm<sup>2</sup>/g; Power Consumption of Slag VRM  $\leq 30\text{kWh/t}$

矿渣立磨业绩 (截止 2015 年 12 月)  
Sales Reference of Slag Mills (till Dec. 2015)

规模 Project Scale	型号 Model	业绩 sets sold
100万吨/年 1,000,000 t/a	TRMS56 / TRMS60	4
60万吨/年 600,000 t/a	TRMS43 / TRMS45	33
40万吨/年及以下 less than 400,000 t/a	TRMS40 / TRMS34 / TRMS32	113



# 领先一步

## ——水泥立磨 Cement VRM



多选 越南福山 TRMK45.4

随着辊式立磨的高效性、易操作性、细度控制的灵活性和更加的简单的工艺流程得到大众越来越多的肯定，立磨粉磨熟料逐渐取代传统工艺，成为水泥生产线熟料粉磨的主流设备之一。

自20世纪70年代以来，经过几十年的不懈研究，公司首台水泥熟料立磨于2010年在越南成功（TRMK45.4@150t/h）投产，各项技术指标均达到了设计要求，一举打破国外熟料立磨对中国市场的垄断局面，随着喀什天山（TRMK50.4★@80t/h）、陕西尧柏九台套一揽子采购（TRMK45.4@150t/h）、新疆青松（TRMK53@200t/h）的顺利达产达标，使国内的传统熟料粉磨观念转变有了极大的促进作用，目前，TRMK型水泥立磨已经累计销售40余套。



多选一 喀什天山 TRMK50.4

It has been approved by more and more customers, that the VRM has so many advantages compared with the traditional Grinding process, like higher efficiency, ease of operation, easy to control the output fineness and much simpler process. Cement final Grinding using VRM has been replaced the traditional grinding process and became the mainstream. Since the 1970th, after over 30 years of research and accumulation of various experience, first "made in China" cement VRM was put into use in Vietnam in 2010 (TRMK45@150t/h), all the technical requirement were fulfilled. This is a historic moment that we have broken the monopoly of the foreign supplier in cement VRM. After that, more and more projects were successfully put into running Kashgar (TRMK50@180t/h), Yaobai Projects (Nine Sets of TRMK45), Qingsong (TRMK53@200t/h), which also is changing the traditional Chinese customers' "Cement only with Ball Mills" thoughts, has improved the grinding Technology significantly. Till now, TRMS Cement Mill (Model TRMK) have been sold over 40 sets in China inland and overseas.

## 熟料粉磨的传统工艺与现代工艺

### Title traditional and modern process of Clinker Grinding

目前，在水泥粉磨领域有三种不同的工艺系统：  
Now, in the area of Cement Grinding, three kind of processes are used in most cases.

1. 辊压机与球磨组成的开流联合粉磨系统，由于辊压机采用了料床粉磨原理，粉磨电耗大幅降低，但开流球磨的粉磨效率较低，水泥成品的温度较高。

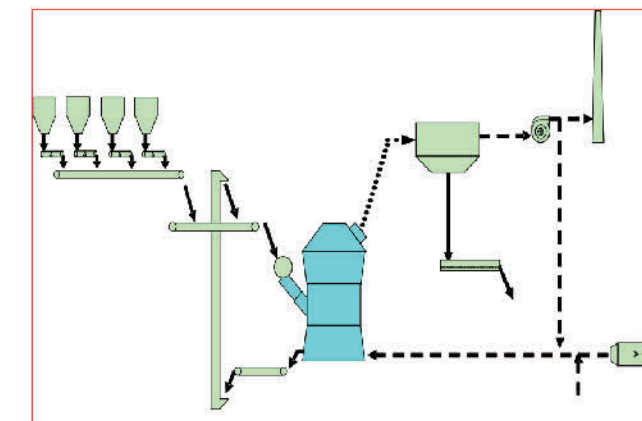
Combined Grinding System with Open circuit ball mill and roller presser: material bed grinding Technology is applied in the roller press, therefore the power Consumption is decreased significantly, but the open circuit ball mill is still working by lower Grinding efficiency, which ends up with a higher cement temperature.

2. 辊压机与球磨组成的闭流联合粉磨系统，由于辊压机采用了料床粉磨原理，粉磨电耗大幅降低，但系统流程比较复杂。

Combined Grinding System with closed circuit ball mill and roller presser: Material bed grinding Technology is applied in the roller press, therefore the power Consumption is decreased significantly, but the system is equipped with a lot of small machines, the operation and the maintenance is complex.

3. 立式辊磨终粉磨系统，由于采用了料床粉磨原理，粉磨电耗大大降低，而且系统流程简单，辊磨终粉磨水泥技术在国际上也已经成熟，应用日趋广泛，在国内的应用则刚刚起步，方兴未艾。

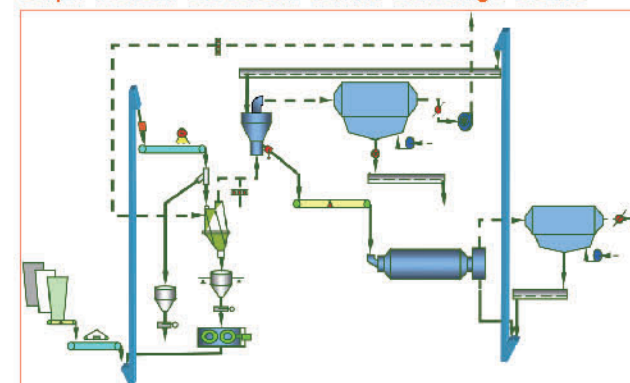
VRM Final Grinding system, compared with the other systems, power Consumption is lower, system is equipped with lesser machines, and also easy to control, less to maintain. This Technology has been approved by customers in the international market. But in the Chinese inland market, it is not as popular as the two processes we have mentioned before.



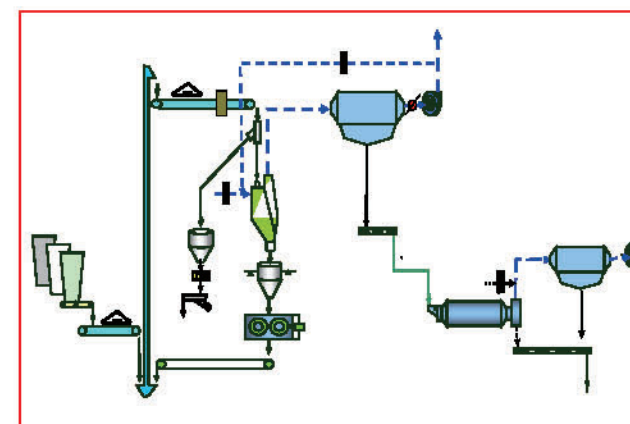
系统3 辊磨终粉磨系统流程（简单）  
VRM final Grinding System (simple)

### 系统流程比较

Comparison of different Cement Grinding Process



系统1 开流联合系统流程（较复杂）  
Combined Grinding System with Open circuit ball mill and roller presser (relative complicated)



系统2 闭流联合粉磨系统流程（复杂）  
Combined Grinding System with Closed Circuit Grinding System (complicated)

### 技术指标比较

Comparison of the Specification

项目 Item	系统一 System 1	系统二 System 2	系统三 System 3
水泥品种 Cement Type	P·O42.5	P·O42.5	P·O42.5
水泥配比 % Ingredients %	熟料 Clinker	90	90
	石灰石 Limestone	5	5
	石膏 Gypsum	5	5
水泥比表面积 Blaine, cm <sup>2</sup> /g	3500	3500	3500
系统产量, t/h System Capacity	145	160	160
系统装机功率 kW Installed Power	6175	6570.3	6202.1
单位产品装机功率, kWh/t Installed Power je product	42.6	41.1	38.8
主机电耗, kWh/t Main Equipment Power Consumption	30	27	20
系统电耗, kWh/t System Power Consumption	40	30~34	26~30
年节约电费(万元) Spared Electricity Cost (10k RMB)	—	400	700
金属磨损, g/t Wearing rate	30(钢球+辊面)	30(钢球+辊面)	5(磨辊+磨盘)
烘干能力 Drying Capacity	弱	中等	强

从对比中可以看到，在保证产量、细度相同的条件下，立磨终粉磨系统电耗要比联合粉磨系统节省4 kWh，全年节省费用：  
4kWh/t\*160t/h\*24h/t\*300day/year= 460,8 万 kWh  
As we can see from the comparison, with the same output and same Blaine, the power Consumption of VRM final grinding is 4 kWh/t less than the combined Grinding System. Which means an annual energy saving is 4kWh/t\*160t/h\*24h/t\*300day/year= 4,600,800 kWh / a



# CHARACTERISTIC OF TRMK CEMENT VRM

## TRMK型水泥熟料立磨特点

提供水泥熟料粉磨系统解决和建设方案。

We supply you System Solutions for Cement Grinding Station Design and Construction

磨辊与磨盘夹角优化设计，使熟料粉磨运转更加平稳。料床稳定，立磨运行过程中不再需要喷水，保证了水泥性能。

Optimized Design of Angel between Roller and Mill Table. With that the operation of the mill would be smoother, the material bed is more stable and also the water injection is no more necessary during the operation. So the strength of the cement is not decreased due to the grinding process.

选粉机结构重新设计，使产品细度控制灵活、产品标号可几分钟内转换，水泥颗粒分布、需水量、性能指标符合国家标准。

Optimized Classifier design (using LV-Technology), ensure us that we can control the Blaine of the cement much more easily. Type of the cement can be changed within minutes, which is also one of the VMR Grinding Technology advantages. The Particle distribution, water Consumption by concrete process and strength are all met the requirement of the NORM.

盘体铸件设计采用“T”型设计，使盘体的刚性更高，适应高负荷运转。

T-Design of the Mill Table body ensures better strength of the Mill Table, which adapts to the high-load operation.

根据具体情况选用堆焊材料或者耐磨陶瓷材料，确保设备使用寿命，提高设备运转率

Rewelding material or Sinter-Cast will be applied according to the project requirement, Ensure wearing parts life, improve equipment running rate.

可以实现熟料和矿渣粉磨的快速切换。由于矿渣和熟料的物性相近，粉磨机理类似，使两种物料在水泥熟料立磨上可以快速的切换。

Quickly switch between cement and slag grinding.

Due to the similar character and grinding principle of the cement and slag, TRM vertical mill could quickly switch to grind cement or slag.

磨辊加压系统智能设计，极大降低磨机震动，检修方便。关键密封件、阀件选用进口，大大减少故障率。

The advantages of intelligent hydraulic unit are lower mill vibration and convenient maintenance. The key sealing and imported valve could reduce the failure rate.

大型水泥磨加压为双油缸形式，有效降低故障率。

The large cement mills are designed to use double-cylinder which will reduce the failure rate.

风环采用可变径设计，可根据现场情况进行调整。

The louver ring adopts variable diameter design and could adjust the gas flow at the construction site.

# 水泥立磨粉磨的各项产品性能指标

## PRODUCT PERFORMANCE INDEX OF CEMENT GRINDING

### 产品性能 Product Performance

中国水泥发展中心物化检测所对TRMK45.4、TRMK50.4水泥辊磨的成品分别进行了性能检测，结果表明该系统生产的水泥成品性能优良。China Cement Development Center Material Testing Laboratory tested the finished material which was ground by TRMK45.4 and TRMK50.4. The test result shows that the cement product performance is good.

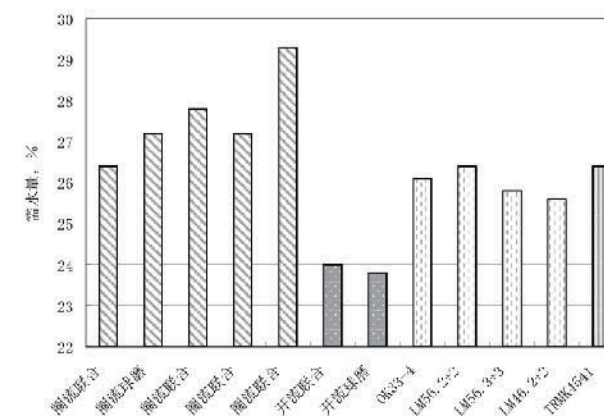
### 产品颗粒分布及需水性 Particle Distribution and Water Demand

水泥成品的颗粒分布 Particle Distribution of cement product

水泥品种 Cement Type	颗粒含量 Particle Content, %						筛余 residue, % n值	筛余 residue, %		比表面积, m <sup>2</sup> /kg Blaine
	≤5μm	5-10μm	10-30μm	30-45μm	45-60μm	≥60μm		30μm	45μm	
OPC	24.11	13.64	34.44	16.49	8.28	3.04	0.98	25.1	13.6	320
PCB40	26.19	13.74	31.86	13.80	9.38	5.03	0.90	29.8	16.3	330

可以看出，TRMK水泥辊磨的成品颗粒分布很宽，n值小于1。与此相对应，水泥的标准稠度需水量较低，只有26.4%，与圈流球磨系统产品相当。不同粉磨系统的水泥需水量如下图。

It shows that the cement particle is wider and n value is less than one. At the same situation, the water demand of standard consistence is just 26.4% which is similar to the product by closed circuit ball mill system. The water demand of different grinding system is showed as following:



不同粉磨系统的水泥标准稠度需水量,%

The water demand of different grinding systems

### 混凝土的流动性 Concrete liquidity

TRMK辊磨粉磨的水泥成品配制的混凝土坍落度测定结果及与国外水泥辊磨的比较如下：

The concrete slumps comparison: the concrete batching is from TRMK mill grinding cement compared to foreign cement mill.

水泥品种 Cement Type	混凝土类型 Concrete Type	混凝土配合比 concrete mix proportion							坍落度 Slump mm
		水灰比 water cement ratio	水 water kg	水泥 cement kg	矿粉 slag kg	砂 sand kg	石 stone kg	减水剂 water reducing agent	
TRMK4541-PCB40	C60	0.3	154	453.0	77.0	705.0	1014.0	聚羧酸 polycarboxylic acid 1.2%	240
国外辊磨-PCB40 Foreign mill	C60	0.3	154	453.0	77.0	705.0	1014.0	聚羧酸 polycarboxylic acid 1.2%	200

从上表可以看出，本系统生产的水泥成品配制的混凝土坍落度较大，具有良好的工作性能，有利于工程现场施工。

From the above charts, the concrete slump is bigger (cement is from TRMK). The concrete has better performance and benefits to operate at site.

# TRMK系列

## 水泥熟料立磨型谱及主要业绩

TRMK Series of Cement Mills and References

熟料微观图  
Microstructure SINOMA

TRMK系列水泥磨技术参数表 (以生产P.O 42.5水泥为基准)

Specification of TRMK Vertical Roller Mill for Cement Grinding (Based on P.O.42.5)

型号 Type	磨盘直径 Dia of Table	装机功率 Installation of Power	最大入磨粒度 Max. Feeding Size	生产能力 Capacity
	(mm)	(kW)	(mm)	(t/h)
TRMK56	5600	5600	35	220-230
TRMK53	5300	5000	35	190-210
TRMK50	5000	4200	35	170-180
TRMK45	4500	3550	35	150-160
TRMK43	4300	3150	35	95-105
TRMK40	4000	2800	35	90-95
TRMK36	3600	2000	35	80-90
TRMK32	3200	1600	35	70-80

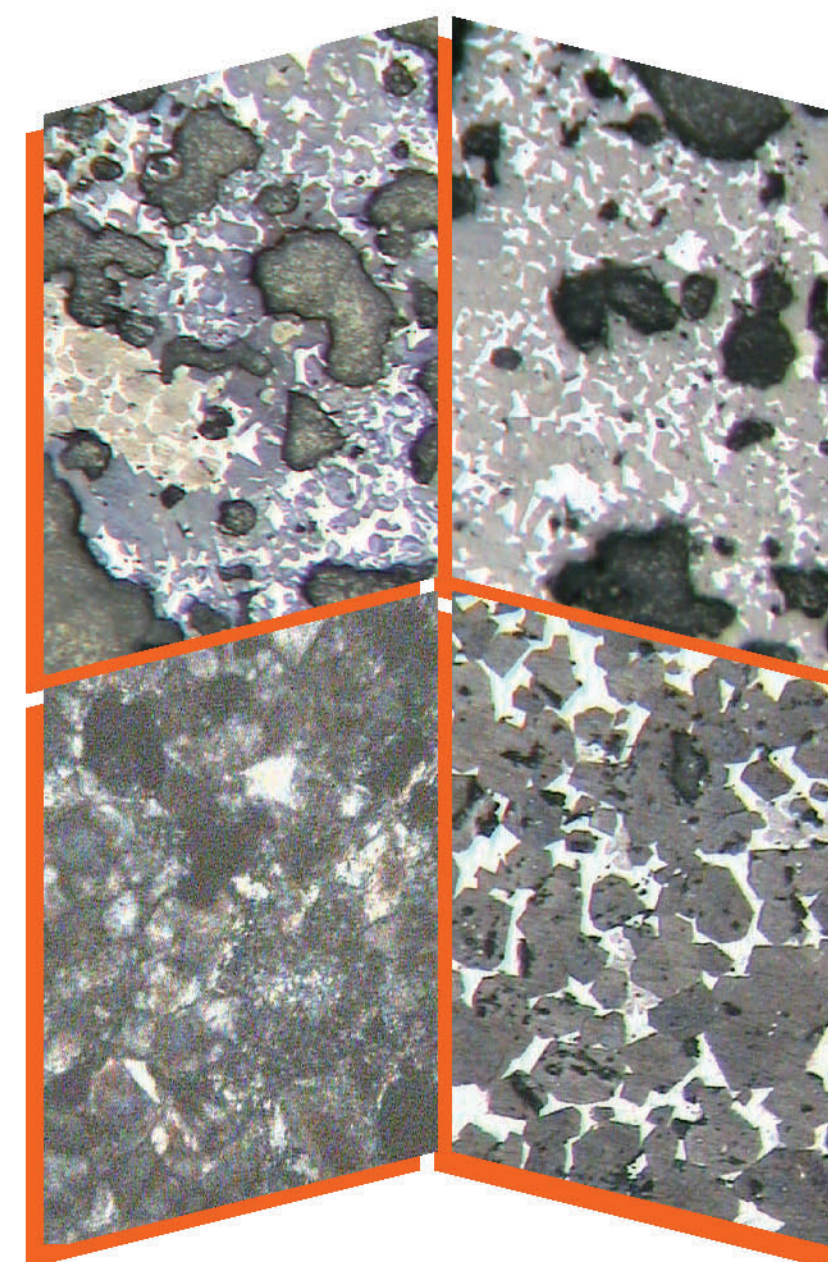
说明: 允许入磨物料最大水分 $\leq 1.5\%$ ; 成品水分 $\leq 0.1\%$ , 成品细度 3300  $\text{cm}^2/\text{g}$ ,  $R_{80\mu\text{m}} \leq 1\%$ ,  $R_{45\mu\text{m}} \leq 8\%$

NOTES: Max. Feed Moisture $\leq 1.5\%$ ; Outlet Moisture $\leq 0.1\%$ , Fineness: 3300  $\text{cm}^2/\text{g}$ ,  $R_{80\mu\text{m}} \leq 1\%$ ,  $R_{45\mu\text{m}} \leq 8\%$

主要业绩 (截止至2015年12月, 包含水泥矿渣立磨)

References (Up to Dec.2015, including cement/slag mills)

型号 Type	生产能力 Capacity	台数 sets
TRMK56	220~230t/h	2台
TRMK53	190~210t/h	3台
TRMK50	170~180 t/h	5台
TRMK45	150~160t/h	16台
TRMK43	120~150t/h	2台
TRMK32	70~80t/h	台



# TRMC

## TRMC型煤立磨特点

根据科研中心的粉磨实验获得的实验数据 (HGI、TMF 等), 优化部件及配置, 选择最符合要求产量的立磨。

1. 秉承安全、可靠、耐用的设计理念, 磨机本体的抗爆能力极强。
2. 严格控制磨外空气进入磨内, 保证磨内低氧环境, 极大提高运转安全性
3. 设有限位装置, 粉磨部件 (辊套、衬板) 不会发生金属摩擦, 避免产生火花造成危险。
4. 独立的磨辊加压系统, 可以空载启动, 并且降低磨机震动、方便检修。同时, 可调节压力以适应粉磨不同的固体燃料。
5. 提供多种耐磨材质的粉磨部件, 适应不同种原料的磨蚀性, 保证更高的运转率。
6. 平盘锥辊的形式很好的保证了成品细度在整个生产阶段的稳定。
7. 通过变频调速的高效动静态选粉机获得细度稳定的产品, 且调节灵活。



TRMC20.2 煤立磨 - 重庆拉法基 - 2005



TRML16.3 脱硫磨 - 浙江宁海电厂 - 2006年

# Sinoma

## 煤立磨 Coal Vertical Roller Mills

### TRMC 型煤立磨特点 TRMC coal mill features

- 根据科研中心的粉磨实验获得的实验数据 (HGI、TMF 等), 优化部件及配置, 选择最符合要求产量的立磨。  
According to the test data (like HGI、TMF etc.) from test center, optimize parts and disposition ,select the most suitable mills.
- 秉承安全、可靠、耐用的设计理念, 磨机本体的抗爆能力极强。  
Mill design concept is safety、reliable and durable. Coal mills have the strongly anti-explosion ability.
- 严格控制磨外空气进入磨内, 保证磨内低氧环境, 极大提高运转安全性  
The outside gas is forbidden to flowing into the mill. It will guarantee the lower oxygen inside mill and increase the safety of mill.
- 设有限位装置, 粉磨部件 (辊套、衬板) 不会发生金属摩擦, 避免产生火花造成危险。  
There is limiting device which will avoid causing the metal friction and spark of grinding parts (roller tyres and liners).
- 独立的磨辊加压系统, 可以空载启动, 并且降低磨机震动、方便检修。同时, 可调节压力以适应粉磨不同的固体燃料。  
Independent roller hydraulic units could realize no-load start, lower mill vibration and convenient maintenance. At the same time, it could adjust pressure to adapt to the different solid fuels.
- 提供多种耐磨材质的粉磨部件, 适应不同种原料的磨蚀性, 保证更高的运转率。  
Different wear-resisting grinding parts could adapt to different material abrasability to increase operation rate.
- 平盘锥辊的形式很好的保证了成品细度在整个生产阶段的稳定。  
Horizontal table and conical rollers type guarantee the fineness stability during operating.
- 通过变频调速的高效动静态选粉机获得细度稳定的产品, 且调节灵活。  
High-efficiency frequency conversion static-dynamic separator helps to get the stable fineness product and flexible adjustment.



TRML16.3 脱硫磨 - 浙江宁海电厂 - 2006年



TRML16.3 脱硫磨 - 浙江宁海电厂 - 2006年

# TYPE SPECTRUM

COAL MILL / LIMESTONE VERTICAL MILL

## 煤磨/石灰石立磨型谱

### 用于粉磨烟煤 For Bituminous Coal

序号	型号规格 Type	磨盘直径 Dia of Table	装机功率 Installation of Power	生产能力 Capacity
		(mm)	(kW)	(t/h)
1	TRMC40	4000	1400/1600	80~90
2	TRMC36	3600	1250	70~80
3	TRMC31	3100	800/900/1000	55~65
4	TRMC28	2800	710	40~44
5	TRMC23	2300	560/630	32~35
6	TRMC20	2000	355/400	20~22
7	TRMC16	1600	200	11~13

### 用于粉磨无烟煤和石油焦 For Anthracite Coal or Petrol Coke

序号	型号规格 Type	磨盘直径 Dia of Table	装机功率 Installation of Power	生产能力 Capacity
		(mm)	(kW)	(t/h)
1	TRMC40	4000	1400/1600	48~65
2	TRMC36	3600	1250	42~55
3	TRMC31	3100	800/900/1000	33~45
4	TRMC28	2800	710	25~32
5	TRMC23	2300	560/630	20~25
6	TRMC20	2000	355/400	12~16
7	TRMC16	1600	200	7~9

说明：原煤入磨水份≤15%；成品水份≤1%；成品细度R80μm=10%~15%（烟煤）；成品细度R80μm=1%~5%（无烟煤）原煤易磨性HGI=45~80

NOTES: Feeding Moisture≤15%; final products moisture≤1%; fineness R80μm=10%~15% (Bituminous Coal); fineness R80μm=1%~5% (Anthracite Coal or Petrol Coke); Grindability of Coal Material HGI=45~80.

### 系列脱硫辊式立磨技术参数表 FOR LIMESTONE

序号	型号规格 Type	磨盘直径 (mm)	生产能力 (t/h)	主电机功率 (kW)
1	TRML31	3100	60~65	1120
2	TRML28	2800	50~55	900/1000
3	TRML25	2500	45~50	800
4	TRML23	2300	35~40	630
5	TRML22	2200	22~30	400/560
6	TRML16	2000	14~16	250

说明：石灰石入磨水份≤3%；成品水份≤0.5%；成品细度R45μm=5%~20%。  
NOTES: Feeding Moisture≤3%; Output Moisture≤0.5%; Fineness R45μm=5%~20%



中国水泥发展中心物化检测所



# TECHNICAL CENTER

## 立磨技术中心

### 我们的技术中心

——中国水泥发展中心物化检测所

China Cement Development Center Material Testing Laboratory

我们多年来在立磨的设计和选型上，积累了大量经验，主要从事水泥及其原料和燃料的化学成分、物理性能、矿物组成和工艺性能的分析检测；水泥原料和燃料的工艺性能试验方法的研究。利用实验室中的TRM3.6、TRM5.6等4台粉磨不同物料的辊式立磨，得到接近真实生产情况下的实验结果，使立磨的选型更加科学、合理。

Our Technical Center—China Cement Development Center Material Testing Laboratory

We have accumulated much experience in mill's design and option. Mainly engaged in the raw materials and fuel's chemical, physical performance, minerals and analysis of the performance of tests; we use including TRM3.6, TRM5.6 and other two sets to carry out experiments, experimental result looks like the actual production conditions, to make the option more scientific.

# MANUFACTURING BBASE

## 加工厂物料中心

### 我们的加工基地

——中材（天津）重型机械有限公司

——中材（徐州/淄博）重型机械有限公司

Sinoma Technology (Xuzhou/Zibo) Heavy Machine Co.,Ltd

### SINOMA

徐州中材装备重型机械有限公司是中材装备集团有限公司的水泥机械生产基地，中材（天津）粉体技术装备有限公司大部分结构件都在徐州加工，该基地 2006 年获得“中国建材机械行业龙头企业”“全国建材工业质量认证活动优秀企业”、“江苏省高新技术企业”等称号。

中材淄博重型机械有限公司是国内第一家引进 O-Sepa 高效选粉机的厂家，加工经验丰富，自粉体公司成立以来，选粉机等多数在该基地加工，受到广大业主好评。中材淄博重型机械有限公司被山东省认定为高新技术企业，被批准成立山东省建材装备工程技术研究中心。

Manufacturing Bbase—Sinoma Technology (Xuzhou/Zibo) Heavy Machine Co.,Ltd.

Sinoma Technology (Xuzhou) Heavy Machine Co.,Ltd is the manufacturing base of Sinoma Technology & Equipment Group Co.Ltd. Most of mechanical parts are manufactured by Xuzhou, in 2006, Xuzhou achieve "Chinese building machinery industry enterprise", "The country building materials industry quality certification activities outstanding enterprises", "High-tech enterprises in Jiangsu province".

Sinoma Technology (Zibo) Heavy Machine Co.,Ltd. is the first factory which brought in O-Sepa Separator in China, has abundance experience. Since our company was established, the separator manufactured by Zibo was given praise by many buyers. Sinoma Technology (Zibo) Heavy Machine Co.,Ltd has been recognized as "New and High-tech Enterprises" by Shandong province, and has been approved "Building materials and equipment engineering research center" by Shandong province.

中天仕名科技有限公司



加工车间



数控重型立式车床



数控卧式车床



# SPARE PARTS 备品备件服务

SINOMA

备品备件作为客户工厂的战略化需要，但一次性购入成本高，突发性备件需求与长时间制造周期的生产损失，高昂的备件仓储和维护费用，山寨备件的质量难以保证，都增加了客户资金的占用，往往成为客户头疼的问题。

Spare parts are the strategic needs for the owners in the industry. But they are constantly faced with a dilemma: spare parts take up a large amount of cash flow, but equipment and spare parts are not readily available if they don't have them in store.

粉体公司一直致力于为广大客户提供优质且专业化服务，拥有十余年专业立磨研发生产经验的粉体公司，立磨生产早已形成规模化、系列化，为广大客户提供全系列立磨整机备件现货供应，提出立磨备件“现货云仓储”服务理念，我们邀请您成为粉体公司立磨备件VIP会员，粉体公司将作为您备件的平台，预先为您采购备品备件，大大减少客户备件投资资金成本和时间成本，同时，我们也将加强售后服务，以“服务带动备件发展”为宗旨，竭诚为广大客户保驾护航。

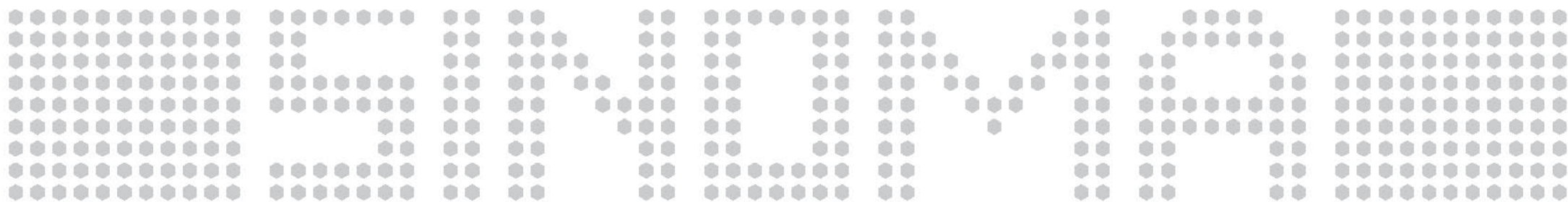
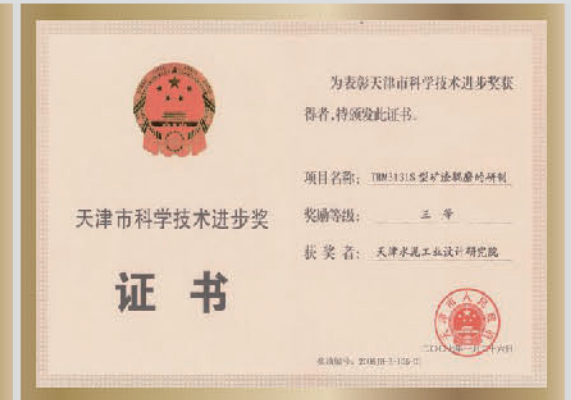
Sinoma (Tianjin) Powder Technology Machinery Co., Ltd. supplies the high quality and professional services for our customers. The company has more than ten experiences in designing the vertical roller mills that has been large-scale developed and serialized. Our company also supplies the whole mill spare parts and the service concept is 'good in cloud stock'. We hope that you could be the VIP of our company. Sinoma (Tianjin) Powder Technology Machinery Co., Ltd. will supply the spare parts support so that the customers will reduce the investing and time cost. Meantime, we will strength the after-sale service. The purpose is 'service pushing the development of spare parts', being the protector of the customers.



# HONOR

## 企业荣誉

SINOMA





## 我们为您提供完善的服务体系

- 专业的营销团队** Professional Marketing Team  
持续关注客户需求，为客户提供专业产品咨询服务，解决项目工程问题，并提出令人信服的创新建议  
Perpetual satisfy customers' needs, supply the professional consulting services, solve the project engineering problems and give the convincing innovative advice.
- 专业的技术团队** Professional Technical Team  
根据多年的立磨研发及制造经验，为客户提供专业的灵活的技术方案，不仅为您的项目节省投资，同时为设备的可靠运转提供保障。  
According to the mill researching and manufacturing experience, supplying for the customers professional and flexible technical plan, so that reducing the project investment and provide reliable guarantee.
- 专业的执行团队** Professional Execution Team  
在签订合同后，我们将为您安排项目经理 1 对 1 服务，按计划对制造进度及加工质量进行实时反馈，保证您的工程进度。  
After signing the contract, we will arrange the project manager to provide one-to-one service. We will give the timely feedback to guarantee the project schedule.
- 专业的售后服务团队** Professional After-sale Team  
在设备安装、调试阶段，公司将安排身经百战的优秀售后人员，为客户提供技术指导，为项目的正常运转保驾护航。  
The company will arrange the experienced service engineers to provide the technical guidance and support.

## 卷尾语

### 传承辉煌，续写新篇

The glorious heritage, writing a new chapter

以中国中材集团“创新型、国际型、价值型”企业理念为指导，粉体公司始终持续专注客户需求，创新自主技术，提升管理水平，实现“专业品质，高端制造”的企业发展战略目标。

粉体公司愿与广大客户及合作伙伴共同发展、共同成长，携手开创更加美好的明天。

Innovative, international and valuable enterprise is the guideline of China Sinoma Group. Sinoma Technology & Equipment Group Co.,Ltd. is still paying the customers' needs, innovate proprietary technology, promoting management level and achieving the target of 'professional quality and top manufacture enterprise'. The company hopes to mutually develop, grow with the customers and has a better future.