



**粉体研磨分级改性设备领导品牌**

THE CHINESE LEADING BRAND OF  
GRINDING AND COATING EQUIPMENT

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科技改变品质

TECHNOLOGY IS CHANGING THE QUALITY

出色源于专业

EXCELLENCE COMES FROM PROFESSIONALISM

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**广东五全机械有限公司**

DONGGUAN VSUNNY MACHINERY CO., LTD





# 五全立磨

多样化粉体生产新选择

VSUNNY VERTICAL ROLLER MILL  
THE NEW CHOICE OF DIVERSIFIED  
POWDER PRODUCTION



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# VSUNNY

## 公司简介

广东五全机械有限公司成立于2012年，是一家专注于研发、设计、制造超细立磨、新型环辊磨、蜂窝磨、钉盘活化机、粗粉立磨、涡轮分级机、活化改性机、自动包装机和助剂的国家高新技术企业。

经过多年的技术研发，已经拥有十余项专利技术。公司于2015年9月通过了ISO9001:2015国际质量管理体系认证，先后获得“国家高新技术企业”，“广东省高新技术产品”荣誉称号。并于2016年4月通过瑞士公证行SGS认证。

公司专注于为各类粉体生产厂家提供从破碎、洗矿、研磨、转输、分级、活化、包装到整厂设备的设计、制造、安装、调试、生产团队的培训等全套超微细粉体生产线工程，并可提供高附加值的售后服务及技术支持。整个生产过程全程自动化控制，具有设备运行稳定、产品细度稳定和生产环境干净卫生等优势，已达到国际领先水平。公司拥有一批资深的高端技术人才和高素质的管理团队，现有员工100余名，技术人才占80%、研发人才占10%。多年来，公司在研磨领域不断探索、反复攻坚克难，深入研究国内外最先进的研磨、分级、改性技术，坚持研发与创新，形成了一整套成熟的、具有自主知识产权的立磨、分级和活化工序，应用于超微细粉体的生产。同时，五全也是国内唯一一家可以生产单、双液压立磨的企业。从成立至今，在“科技改变品质、出色源于专业”的企业经营理念指引下，公司已成为国内高端立磨设备、活化设备的研发、设计领导者。

为更好地服务客户，公司在广东、广西、河南、四川等地自建多条超细立磨和环辊磨生产线，带二次、三次分级及活化改性机设备。另外，公司在佛山自建了一个现代化、多功能的粉体检测研发中心，拥有粉体及助剂研发人员六名，其中高分子专业和有机化学专业的博士各一名。此研发中心拥有英国马尔文Mastersizer2000、3000激光衍射粒度分析仪、美国赛默飞世尔ICE3500型石墨炉-火焰一体原子吸收分光光度计、美国康塔氮气吸附比表仪、日本台式分光测色计、矿石成份分析仪、粉体综合特性测试仪、接触角测量仪、行星式球磨机、塑料挤出机、双螺杆造粒机、电子万用力学性能试验机、转矩流变仪、高温老化测试仪等一大批先进的原料检测和应用性能测试仪器与设备，可对各类粉体的各种物理与化学性能进行全面测试与表征，能对粉体在塑料、橡胶、涂料油墨等应用领域中的应用性能进行部分测试。

公司所生产的各种设备已广泛应用于大理石、方解石、滑石、重晶石、白云石、高岭土、硅灰石、石灰石、长石、云母、石膏、叶腊石、陶瓷、氧化铝、氢氧化铝和氢氧化镁等各个行业及不同领域的各类超微细粉体制备。客户遍布于全国各地，产品深受客户好评。

五全机械将立足中国，并一直为走向世界而努力！

# THE CHINESE LEADING BRAND OF ULTRAFINE VERTICAL ROLLER MILL 中国超细立磨领导品牌



## COMPANY PROFILE

Established in 2012, Dongguan Vsunny Machinery Co. Ltd., is a national innovative and high technology enterprise that has been engaging in research and development, design, manufacturing of ultrafine vertical roller mill, new ring roller mill, cell mill, pin mill, coarse powder vertical mill, turbo air classifier, coating machine, automatic packing machine and grinding aids.

After many years of research and development, the company has earned more than ten patented technologies. In September 2015, the company passed the certification of ISO 9001:2015 international quality management system, successively received "national high-tech enterprise", "Guangdong Province high-tech products" honorary title. In April 2016, it was certified by SGS, Swiss surveyor.

We focus on providing all types of powder manufacturers with a turnkey project comprising a whole set of ultrafine powder production lines, from crushing, ore washing, grinding, transportation, classifying, coating, packing to the design, manufacturing, installation, commissioning, training of production team of the whole plant equipment, as well as delivering excellent after-sales services and technical support. Because the production process is automatically controlled and has reached the international leading level, we have such advantages as more stable production lines, more environmentally friendly production environment and more exemplary product quality. In addition, we have a patch of experienced, high-quality technical and management talents with over 100 employees, of which technical personnel account for 80% and R&D personnel areas, make in-depth occupy 10%. Over the year, we continue to explore grinding research of the most advanced grinding, classifying and coating techniques home and abroad, insist on research and development and innovation, thereby form a set of mature ultrafine powder production with independent intellectual property rights for vertical roller mill, classifying, coating processes and to be used in the production of ultrafine powder. At the same time, our company is the only enterprise that can produce single and dual hydraulic vertical mills. Since its inception, under the business goal of "technology is changing the quality, excellence comes from professionalism", our

company has taken the lead in developing and designing a national brand for high-end vertical roller mill equipments and coating equipments.

In order to serve customers better, our company self-built many ultrafine vertical roller mill and new ring roller mill production lines in Hezhou City, Guangxi with a full set of secondary, tertiary classifying system and coating machine. In addition, the company has built a modern, multi-functional Powder R&D Center in Dongguan with six powder and additives R&D personnel, including one polymer Ph.D. and one organic chemistry Ph.D. The Powder R&D Center possesses a large number of advanced, first-class raw material testing and application performance testing instruments & equipments, like Malvern Mastersizer 2000 & 3000 Laser Diffraction Particle Size Analyzer, ThermoFisher Thermo Scientific iCE3500 AAS, Quantachrome NOVA Surface Area Analyzers, Japan Spectrophotometer, Mineral Element Analyzer, Powder Overall Characteristic Tester, Optical Angle Measurement, Planetary Mill, Plastics Extruder, Twin Screw Granulator, Electronic Universal Testing Machine, Torque Rheometer, High Temperature Ageing Oven. These testing equipments can do the comprehensive test and analyze the characterization for physical and chemical performance of various powder, while they can test some application performances of the powder applied in plastic, rubber, paint and other fields.

A variety of equipments we produce have been widely used in preparing various kinds of ultrafine powder in different fields, including marble, calcite, talc, barite, dolomite, kaolin, wollastonite, limestone, feldspar, mica, gypsum, pyrophyllite, ceramic, aluminium oxide, aluminum hydroxide and magnesium hydrate. Our products are well received by customers nationwide.

Vsunny has already kept its foothold in China, and now is walking up to the whole world.





## 公司发展历程

- 2004年3月，公司初创在湖南耒阳，以生产水磨钙为主。
- 2006年，引进湖南第一台全进口超细立磨LM1050加二次分级生产线。
- 2008年，在引进台湾立磨企业核心人才并在原有粉体生产技术的基础上，五全全套吸收、掌握、改进超细立磨及二次分级生产工艺。
- 2009年，隆重推出双液压的大陆原创加大型立磨VSLM-1100H生产线，成功申请两项实用新型专利。
- 2010年，隆重推出改进型VSFJ-3/350、VSFJ-4/350二次分级机生产线，可一次分级 $2\mu\text{m}\geq 70\%$ 以上的粉体，并成功申请两项实用新型专利。
- 2011年，隆重推出改进型VSGXJ-600三辊连续活化改性机，实现了无机非金属粉体洁净式连续活化生产，并成功申请两项实用新型专利。
- 2012年，成立东莞市五全机械有限公司，注册“五全”和“VSUNNY”商标，并成功申请四项实用新型专利。
- 2013年，隆重推出单液压超细立磨VSLM-1100H生产线，成为国内唯一一家能够同时生产单、双液压两种立磨类型的企业。
- 2014年，隆重推出VSLM-3500H加大型立磨，时产人造大理石粉粉体60吨，公司进入金属矿研磨行业。
- 2015年9月，公司通过了ISO9001:2015国际质量管理体系认证。
- 2016年2月，五全机械的新厂房正式落成，整个机械加工车间将会搬迁到新厂区，标志着公司的设备加工能力又迈上了一个新台阶。
- 2016年12月，公司获得“国家高新技术企业”荣誉称号，产品“超细立磨”被认定为“广东省高新技术产品”。
- 2017年12月，五全机械自主研发的“活化改性机”、“气流分级机”、“粉体包装机”被认定为“广东省高新技术产品”。
- 2018年5月，公司获得“中小型科技型企业荣誉称号”。
- 2018年9月，公司通过ISO9001:2018国际质量管理体系认证。
- 2019年8月，五全机械自主研发的钉盘活化机投产。
- 2020年8月，五全机械自主研发的蜂窝磨投产。
- 2021年经公司研发团队的努力，推出第四代超细立磨，突破了超细微粉分选技术极限。五全VSLM全系超细立磨采用新的分级装置，可直接生产 $2\mu\text{m}$ 含量45%-75% (马尔文3000标准)超细粉体。
- 2022年推出VSFCM系列蜂窝磨改性机，实现一机多用。解聚、改性、干燥、整形、分级一体化活化率可高达99.5%。
- 2023年首次将含氧化铝的陶瓷涂层材质及超音速火焰碳化钨工艺应用于公司的超细立磨，提高了立磨应用于石英石、高岭土、海泡石等高含硅量超硬材质的立磨设备的耐磨性，并极大限度的控制了铁粉等杂质产生。
- 2024年与电机供应商共同研发的永磁同步电机已成熟稳定地应用于五全公司全系列产品，比传统异步电机节能10%-15%，符合客户降本增效的需求。

# COMPANY DEVELOPMENT PROCESS

- In 2012, our company set up Dongguan Vsunny Machinery Co., Ltd. and registered the trademark "VSUNNY" and "五全". In addition, our company applied for four utility model patents successfully.
- In 2013, Vsunny ultrafine vertical roller mill launched the single hydraulic vertical mill VSLM-1100H production line. At that time, our company was the only domestic enterprise that could produce two types of vertical mill machines: single and dual hydraulic cylinder roller system.
- In 2014, our company ceremoniously introduced VSLM-3500H super-large vertical roller mill, which had calcium carbonate powder output of 60 tons/h that used for artificial marble. The company entered the metal ore grinding industry.
- In January 2015, our company specially launched the third-generation ultrafine vertical roller mill after the technological transformation. Compared to previous generations, it has made dramatic improvements in terms of energy consumption and product stability.
- In September 2015, Vsunny passed the certification of ISO9001:2015 international quality management system.
- In February 2016, The new plant of Vsunny Machinery is officially completed, the whole manufacturing department moved to the new plant area, it marks that our company equipment capacity has climbed to a new level.
- In December 2016, Vsunny accessed the title of "National high-tech enterprise" while the product "ultrafine vertical mill" was identified as "Guangdong high-tech product".
- In December 2017, the products "coating machine", "air classifier", and "powder packaging machine" were identified as "Guangdong high-tech product".
- In May 2018, Vsunny accessed the title of "SEM Technology Enterprise".
- In September 2018, Vsunny passed the certification of ISO9001:2018 international quality management system.
- In August 2019, Vsunny officially launched the self-developed pin mill into the market.
- In August 2020, Vsunny officially launched the self-developed cell mill into the market.
- In 2021, through the efforts of the Vsunny's R&D team, the fourth generation of ultrafine vertical mill was launched, which breaks through the limit of ultrafine powder sorting technology. The whole series ultrafine vertical roller mill adopts new classifying device, which can directly produce ultrafine powder with 2 $\mu$ m content 45%-75% (Malvern 3000 standard).
- In 2022, VSFCM series cell mill was launched to realize multi-purpose. De polymerization, coating, drying, shaping and classifying are integrated, and the coating rate can be as high as 99.5%.
- In 2023, the ceramic coating material containing alumina and the supersonic flame tungsten carbide process were applied for the first time to Vsunny's ultrafine vertical mill, which improved the abrasion resistance of the vertical roller mill that grinds ultrahard materials with high silica content, such as quartzite, kaolin, and seafoam, and controlled the generation of impurities, such as iron powder, to a great extent.
- In 2024, the permanent magnet synchronous motors jointly developed with motor suppliers have been maturely and stably applied to the whole series of VSUNNY products, which are 10%-15% more energy-saving than the traditional asynchronous motors, in line with the customer's demand for cost reduction and efficiency.

WE MAY NOT BE THE LARGEST  
IN THE INDUSTRY,  
BUT WE ARE THE MOST  
PROFESSIONAL CERTAINLY.

我们可能不是行业内规模最大的  
但我们一定是行业内最专业的



## 董事长致辞

粉体界的各位好友：

上善若水，厚德载商。承蒙各界朋友的厚爱与支持，五全机械经过十多年的快速发展，公司已经成为中国细粉立磨行业一股中坚力量。五全机械自成立以来，一直不断打造一个强大且不断学习、进取的专业团队。不断提升设备品质，是整个五全团队孜孜不倦的追求。让先进的技术创造价值，是五全团队给客户的郑重承诺，也只有给客户优秀的技术和过硬的产品质量，才能获得客户的青睐，才能保证企业在激烈的市场竞争中立于不败之地。

厚德载商，五全人自强不息。目前国内粉体研磨、分级、改性技术不断更新，正在缩小着中国大陆粉体行业与国外技术的差距。在此过程当中，五全机械团队所有成员愿贡献自己的力量。而面对中国经济快速发展提供的机遇，五全人一定会秉承“技术立企”的理念，做行业内最专业的立磨设备制造企业，并在坚持商业诚信与团队精神的基础上，精工打造每一个细节。“不断提升品质，只为您创造价值”，让我们携手为中国碳酸钙行业的转型升级贡献自己的一份力量。

再次深深的感谢各位朋友们的支持与配合！

## ADDRESS FROM CHAIRMAN OF BOARD

My friends in the powder industry,

The highest goodness is like water. Thus the superior man who has breadth of character carries the outer world. Thanks to love and support by friends in all walks of life, Vsunny machinery has gone through over 10 years' rapid development and become the backbone in China vertical roller mill industry. Since establishment, Vsunny machinery adheres to study, keeps making progress and we have created a strong professional team. Keep improving the quality of equipment has been the tireless pursuit for the whole team. Our solemn commitment to customers is to let advanced technology create value. To provide customers with excellent technology and exceptional product, win customers' favor and remain invincible in the fierce market competition, which is our constant pursuit.

In Vsunny, the superior man with his large virtue supports commerce and Vsunny constantly strive ourselves for self-improvement. Currently domestic powder grinding, classifying and coating technologies have been constantly updating and narrowing down the gap between the powder technology home and abroad. In this process, all team members in Vsunny machinery are willing to contribute their efforts. In the face of the opportunities provided by China's rapid economic development, we will be adhering to the concept of "establishing the enterprise by technology", be the most professional vertical roller mill equipment manufacturing enterprise in the industry, and exquisitely create every detail by upholding business integrity and teamwork. "Continue to enhance quality and only create value for you". Let's join hands to contribute to upgrading the transformation of China's powder industry.

Deeply thank your support and cooperation again!



# 五全之企业精神 VSUNNY SPIRIT

## 诚信

Integrity



## 团结

Solidarity



## 专业

Professionalism



## 创新

Innovation

以真诚之心，行信义之事。诚者，真实无妄之谓；信者，人言为信。诚信，是诚实无欺，信守诺言，言行一致，表里如一。所以“诚信”正是五全人立身之本，交友之道，为商之法。

Act in good faith with a sincere heart. Integrity means real, honesty and trust worthiness. It also suggests no deception or guile, being faithful to one's promise, matching word to deed and conformity of profession and conduct. Therefore, integrity is fundamental to Vsunny people to do business and make friends.

“团”原指线团，“结”原指绕结，比喻为了集中力量实现共同理想或完成共同任务而联合。“团结”就是相互配合的精神，是五全成功的基石！

Solidarity means unity in order to concentrate efforts to achieve the common ideal or complete common tasks. Solidarity is the spirit of mutual cooperation. And it is the cornerstone of Vsunny's success!

用专业的态度，以专门的学问和科学的分工，努力专注地做事！五全的出色就是源于“专业”！

Use a professional attitude, specialized knowledge and scientific division of labor to concentrate efforts to do things! Vsunny is outstanding as a result of professionalism!

以现有的思维模式提出有别于常人思路的见解，利用现有的知识和物质，本着更加理想化的需要，而改进或创造新的事物和方法等，并能获得一定有益效果的行为。“创新”是五全发展的主要动力。

Use the existing mode of thinking to put forward distinctive ideas, use current knowledge and materials based on more idealized needs to improve or create new things and methods, and to get some behavior that is conducive to effects. Innovation is the main driving force of Vsunny's development.

# 企业荣誉 ENTERPRISE HONOR



广东省高新技术产品  
Guangdong High-tech Product



质量管理体系证书ISO9001:2015  
Certificate of Registration ISO 9001:2015



国家高新技术企业  
National High-tech Enterprise



广西非金属工业协会会员单位  
Member Unit of Guangxi Nonmetal Industry Association



中国东盟矿业大会支持单位  
Supporting Units of China ASEAN Mining Conference



中国非金属矿业行业优秀设备企业  
Excellent Equipment Enterprise in China Nonmetal Mining industry



广东建材20年新质生产力发展企业  
New Quality Productivity Development Unit of Guangdong Building Materials 20-year



东莞超细特种功能粉体工程技术研究中心  
Dongguan Ultrafine Special Functional Powder Engineering Technology Research Center



SGS 瑞士公证行认证  
Certificate of SGS



东莞市高新技术产业协会第一届会员单位  
Member Unit of the First Dongguan High-tech Industry Association



技术实力  
TECHNICAL STRENGTH

# 主营产品 MAIN PRODUCT



## VSLM

### 超细立磨

ULTRAFINE VERTICAL  
ROLLER MILL



## VSHGM

### 新型智能环辊磨

NEW INTELLIGENT RING  
ROLLER MILL

## VSCM

### 粗粉立磨

COARSE VERTICAL  
GRINDING MILL



## VSHGM

### 新型智能环辊磨

NEW INTELLIGENT RING  
ROLLER MILL



## VSWF

### 涡轮气流分级机

TURBO AIR CLASSIFIER



## VSGXJ

### 连续式活化改性机

CONTINUOUS MODIFICATION  
AND COATING MACHINE

## VSFCM

### 蜂窝磨

CELLMILL



## VSGXJ

### 连续式活化改性机

CONTINUOUS MODIFICATION  
AND COATING MACHINE



## VSDPM

### 宽腔钉盘活化机

PIN MILL



## VSBZJ

### 全密封自动包装机

FULLY-SEALED AUTOMATIC  
PACKING MACHINE

## VS

### 助剂

GRINDING AIDS



## VSBZJ

### 全密封自动包装机

FULLY-SEALED AUTOMATIC  
PACKING MACHINE



超细立式研磨机生产线 -- 工艺流程图

Process flow chart of ultrafine vertical roller mill production line



A. 进料系统 Feeding system	
A1	原料仓 Raw material silo
A2	高低料位开关 High/low material level switch
A3	棒闸 Rod gate
A4	螺旋输送机 Screw conveyor
A5	斗式提升机 Bucket elevator
A6	铁质分离器 Permanent-magnetic iron remover
A7	待磨料仓 Trest material feed silo
A8	高低料位开关 High/low material level switch
A9	棒闸 Rod gate

A10	带定量称的皮带输送机 Belt conveyor with quantitative weighing
A11	皮带输送机 Belt conveyor
A12	螺旋输送机 Screw conveyor
A13	加水与助剂系统 Adding water & aids system
B. 研磨系统 Grinding system	
B1	减速机润滑系统 Gear box lubrication system
B2	磨辊润滑系统 Roller lubrication system
B3	磨辊液压控制系统 Roller hydraulic control system
B4	磨辊气送风机 Roller air-fight blower
B5	涡轮气流分选机 (一次分选) Turbo air classifier (primary classification)

B6	立式滚轮研磨机 Vertical roller mill
B7	气箱脉冲除尘设备 Air box pulse dust collector
B8	研磨风机 Grinding blower
B9	螺旋输送机 Screw conveyor
B10	关风器 Air locker
B11	成品仓 Finished product stock silo
B12	高料位开关 High material level switch
B13	手动风量调节阀板 Manual air damper
B14	电动风量调节阀板 Electric air damper
B15	新鲜空气调节阀板 Fresh air damper

B16	消音管 Silencer
B17	风管和料管 Air duct & material duct
B18	送料螺旋输送机 Feed screw conveyor
C. 包装系统 (立磨) Packing system for vertical mill	
C1	螺旋输送机 Screw conveyor
C2	包装机 Packing machine
D. 气压系统 Pneumatic system	
D1	空气储罐 Gas tank
D2	冷冻式干燥机 Refrigerated dryer
D3	空气压缩机 Air compressor

E. 分级系统 Classifying system	
E1	螺旋输送机 Screw conveyor
E2	关风器 Air locker
E3	分级风机 Classification draught fan
E4	涡轮气流分选机 (二次分选) Turbo air classifier (secondary classification)
E5	旋风分离器 Cyclone powder collector
E6	侧吸脉冲除尘设备 Side-jet pulse dust collector
E7	集尘风机 Powder collecting fan
E8	螺旋输送机 Screw conveyor
E9	关风器 Air locker

E10	分选上料料仓 Finer powder silo
E11	分选下料料仓 Coarser powder silo
E12	高料位开关 High material level switch
E13	电动风量调节阀板 Electric air damper
E14	手动风量调节阀板 Manual air damper
E15	手动风量调节阀板 Manual air damper
E16	手动风量调节阀板 Manual air damper
F. 包装系统 (分选机) Packing system for secondary classification	
F1	螺旋输送机 Screw conveyor
F2	包装机 Packing machine

G. 连续活化改性系统 Continuous modification & coating system	
G1	螺旋输送机 Screw conveyor
G2	药剂系统 Adding additives & aids system
G3	粉体表面活化改性机 Continuous modification & coating machine
G4	扩散式旋风除尘器 Diffusing cyclone dust collector
G5	脉冲除尘器 Pulse dust collector
G6	关风器 Air locker
G7	螺旋输送机 Screw conveyor
G8	消音管 Silencer
G9	高压风机 High pressure air blower

G10	供料器 Rotary feeder
G11	罗茨风机 Roots blower
G12	加速器 Accelerator
G13	仓顶除尘器 Silo top dust collector
G14	成品仓 Finished product stock silo
G15	包装机 Packing machine



## VSLM 超细立磨生产线立体图

3D rendering of VSLM ultrafine vertical roller mill production line



## “磨粉利器”——VSLM 系列超细立磨

VSLM系列超微细粉体立式滚轮研磨机是五全机械公司以十多年生产超细粉体经验为依托，吸收国外的超细立磨技术，并采用优质的耐磨件，研发出中国内地第一款真正意义上拥有二次分级技术的磨粉设备。技术团队的成员90%来自台湾立磨厂家，立磨生产的成品细度可达到2微米以下累计百分比含量20%~80%（马尔文3000激光衍射粒径分析仪检测）。

VS LM系列超细立磨设备，可广泛应用于方解石、大理石、石灰石、重晶石、滑石、高岭土、白云石、硅灰石、石膏、长石、叶腊石等非金属矿的大规模超细干粉加工。



小方解石 calcite



大方解石 calcite



大理石 marble



石灰石 limestone



重晶石 barite



滑石 talcum



高岭土 kaolin



白云石 dolomite



硅灰石 wollastonite



石膏 gypsum



长石 feldspar



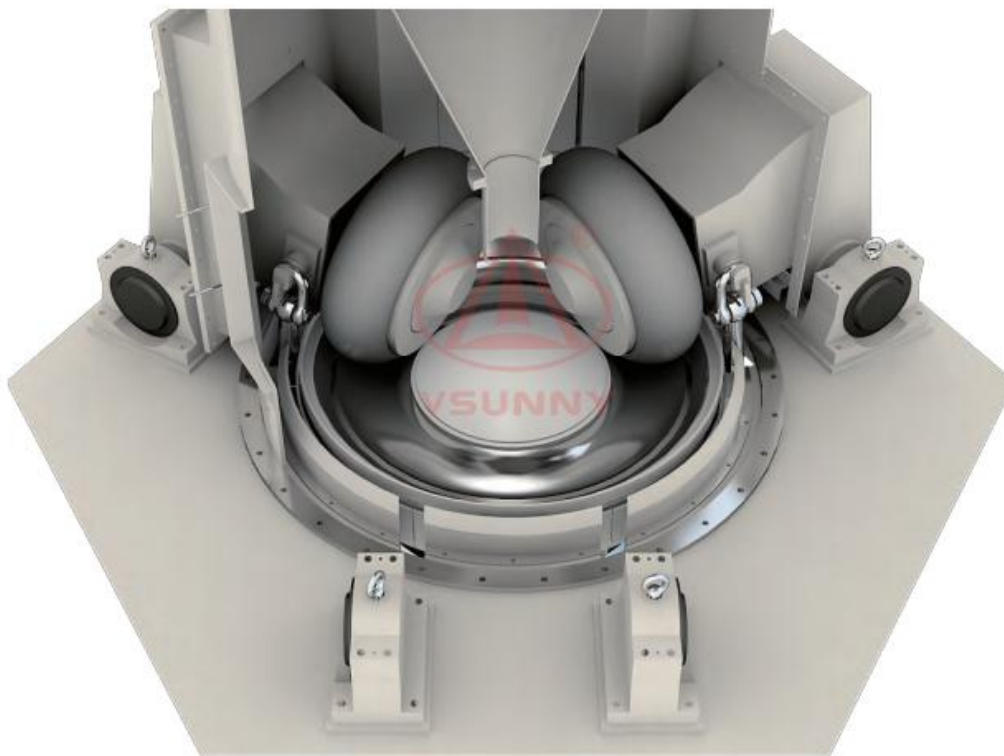
叶腊石 pyrophyllite

## "GRINDING SWORD" — VSLM SERIES ULTRAFINE VERTICAL ROLLER MILL

VSLM Series Ultrafine Vertical Roller Mill was produced by Dongguan Vsunny Machinery Co., Ltd. relying on over 10 years of experience in the production of ultrafine powder and based on oversea ultrafine vertical mill technologies. 90% of the team members were from vertical mill manufacturers in Taiwan. Besides, high-quality wear-resistant parts are used to develop milling equipment which in a real sense marks the first secondary classifying technology in mainland China, having product fineness which 2 $\mu$ m powder content is 20%~80% (measured by Malvern 3000 laser particle size analyzer).

VSLM Series Ultrafine Vertical Roller Mill can be widely applied to process large-scale ultrafine powder, encompassing calcite, marble, limestone, barite, talcum, kaolin, dolomite, wollastonite, gypsum, feldspar, pyrophyllite and other non-metallic minerals.





## 工作原理

主电机通过减速机带动磨盘转动，物料经螺旋输送机进入立磨主机内，受重力作用而落到磨盘中央，同时风机产生的气流从进风口进入主机。在离心力作用下，物料从磨盘中央向边缘均匀移动，经过磨盘上的辊道区域时，受磨辊碾压，大块物料直接被压碎，细粒物料受挤压后形成料层，进行粒间粉碎。粉碎后的物料继续向磨盘边缘移动，直到被磨盘外围环形导流槽的强气流向上带走，较粗的物料由于自身重力较大而再度落至磨盘内，再次进行研磨；较细物料则随气流上升进入主机上方的选粉系统进行分级。在分级机转子叶片的作用下，较粗的颗粒被叶片打落，重新回到磨盘内进行粉磨，合格的细粉将随负压气流带出选粉系统，进入除尘设备，然后经集粉器收集，即为成品。另外，其余大颗粒物料和杂物会在研磨时落入磨机下腔，被刮料板刮入排渣口排出，有效地保证了成品质量。

通过调节液压系统的压力可调节磨辊压力，一定范围内可以适应不同硬度的原料。多个分级轮的分级系统的转子转速可调可控，可获得多种不同规格的合格成品。

## Working Principle

The main motor drives the grinding table by the reducer. Materials are conveyed into the vertical mill main unit by the screw conveyor, falling into the central of the grinding table under the effect of gravity. At the same time, the airflow produced by the blower enters into the main unit from the inlet. Under the effect of the centrifugal force, materials move evenly from the mill's central to the edge. When moving through the roll table area of the mill, larger materials are directly crushed and fine materials form material layer after extrusion under the compaction of the roller, after which intergranular pulverization begins. Shredded materials continue to move towards the mill edge, until they are taken upward by the strong airflow of the outer ring grooves of grinding table. Coarser materials fall to the mill again due to its large self-gravity and get reground. And finer materials rise into the powder classifying system at the top of the main unit along with the airflow for classification. Under the function of the rotor blade of classifier, coarser powders are torn down by the blade and go back to the mill for regrinding. Qualified fine powder will go out of the classifying system, enter into dust removal equipment along with negative pressure air stream, be collected by a powder collector and become the finished product. In addition, other larger material and impurities will fall into the bottom cavity of the mill and will be scraped into the outlet by scraper by the time, effectively guaranteeing the product quality.

The roller pressure can be adjusted by adjusting the pressure of hydraulic system and it can adapt to different hardness of raw materials in certain range. The rotor speed of the powder classifying system of multiple classifier can be controlled so that various qualified finished products of different specifications can be obtained.





## 技术优势

1. 产品多样性强，VSLM 系列研磨主机配备涡轮气流分级机，可产成品粒径范围大， $2\mu\text{m}$ 以下累计百分比含量可达到20%~80%， $D_{97}=4\sim 45\mu\text{m}$ ，比表面积 $21000\text{cm}^2/\text{g}$ ，而 $D_{97}\geq 6\mu\text{m}$ 的产品则可直接由主机生产。
2. 采用优化的生产线流程设计，VSLM系列超细立磨能耗比同类型的立磨能耗更低。
3. 主机生产的超细粉体经分级后，具有粒径分布窄， $2\mu\text{m}$ 含量可调可控，粉体成品利润附加值高，单个颗粒形状好的优势。成品多样性强，竞争力大，可应用领域广泛。如人造岗石、塑料母粒、PVC 管材、电线电缆、尿不湿、无纺布等行业领域。具有活化效果好和吸油值低的优点。
4. 经公司改进后的滚轮，磨盘，导流系统及内部循环系统，极大的提高研磨效率，相比国内同类产品，产量高出了15%~30%，相比球磨机等设备节电率达30~60%。
5. 领先的粉磨装置技术，经改进后的磨床，可在低振动下运转，与台湾或国内品牌相比，VSLM系列研磨机噪音更低。

## Technical Advantages

1. Strong product diversity. VSLM series grinding main unit is equipped with a turbo air classifier, which can produce a large range of product sizes. The product fineness in  $2\mu\text{m}$  powder content can reach 20%~80%,  $D_{97}=4\sim 45\mu\text{m}$ ; the specific surface area is  $21000\text{ cm}^2/\text{g}$ , while products of  $D_{97}\geq 6\mu\text{m}$  can be directly produced by the main unit.
2. Use optimized production line process design, VSLM series Ultrafine Vertical Roller Mill consumption is lower than vertical mill consumption of the same type.
3. After classification, the ultrafine powder produced by the main unit is characterized by a narrow particle size distribution, control gap of  $2\mu\text{m}$  powder content, high profit margins and added value to produce finished powder products, and good single particle shape. Because of the diversified finished product and strong competitiveness, it has the widely available applications, such as artificial stone, plastic masterbatch, PVC pipe, wire and cable, diapers, non-woven fabrics and other industries, with such advantages as good coating effects and low oil absorption.
4. After being improved, rollers, grinding table, diversion systems and internal circulation systems can greatly improve the grinding efficiency and improve output by 15%~30% compared to the same type of domestic products, and can save electricity by 30%~60% compared to ball mills, etc.
5. With leading grinding equipment technology, the improved grinder can be operated at low vibration. Compared with Taiwan or domestic brands, VSLM series grinder has lower noise.

6.整个系统为全密闭循环系统，粉尘污染小，使生产环境干净卫生、更环保。

7.研磨主机，主要耐磨件全部采用进口耐磨材质，增长了研磨机的使用寿命，降低了维护成本。

8.研磨过程中，可全自动电脑控制添加助磨剂，进行粉体处理，提高产品附加值。整条生产线工艺，全程 PLC 控制，Flash实时显示，并可与连续改性机中控系统完美衔接，实现高度人工智能化。

6.The whole system is fully closed-loop system, with small dust pollution, so the production environment is more clean and environmentally friendly.

7.In the main grinding mill, the main wear-resistant parts are all imported wear-resistant materials, which can increase the service life of the grinding machine and reduce maintenance costs.

8.The grinding process can fully automatically use computer to control the addition of grinding agent for powder processing, thus increasing product added value. The complete production line is fully under PLC control, flash real-time display and can perfectly link the machine control system of continuous modifier to achieve a high degree of artificial intelligence.



PVC封边条 PVC edge banding



PVC管道 PVC pipes



电线电缆Cable and Wire



人造大理石Artificial marble



填充母料Plastic masterbatch



油漆涂料Paint and Coatings



无纺布Non woven fabric



造纸 Papermaking



## VSLM-900H 立式滚轮研磨机生产参数 (以方解石为研磨物料)

Production parameters of VSLM-900H vertical roller mill (Base on calcite material)

### 生产重质超微细碳酸钙产品、规格及产量数据

The production of ultrafine ground calcium carbonate products, specifications and yield data.

测定项目 Measurement items	单位 Unit	重质超微细碳酸钙 Ultrafine ground calcium carbonate				
每小时产量 Output per hour	吨数 Ton	6.5~7.0	5.5~6.5	4.0~4.5	2.8~3.3	1.9~2.4
小于 2 $\mu$ m 含量 Less than 2 $\mu$ m powder content	%	16 $\pm$ 2	23 $\pm$ 2	26 $\pm$ 2	36 $\pm$ 2	46 $\pm$ 2
中位粒径 D50 Median particle diameter D50	$\mu$ m	6.2	4.7	3.9	2.9	2.1
粒径分布 D97 Particle size distribution D97	$\mu$ m	29	21	16.3	11.5	7.8
粒径切割点 D100 Particle size cut point D100	$\mu$ m	48	38	25	18	13
水分含量 Moisture content	%	0.3% 以下 Less than 0.3	0.3% 以下 Less than 0.3	0.3% 以下 Less than 0.3	0.3% 以下 Less than 0.3	0.3% 以下 Less than 0.3
能耗 (磨机、风机、分级机) Energy consumption (main units, blower, classifier)	KW/T	45	58	72	101	138

1. 粒径分布: 以英国 Malvern 公司 Micro 激光衍射粒径分析仪测定。

2. 比表面积: 单位为 1 克的粉末中所有颗粒表面面积的总和。

3. 中位粒径: 粉体样品的累计粒度分布百分数达到 50% 时所对应的粒径。

4. 325 目筛余量: 以湿式法将 10 克的试样放在 325 目筛网过筛, 计算残余物料的百分比。

5. 假比重: 放 50 克的试样在 100 毫升的附栓量筒中, 从 5 厘米落下 150 次后之测定值。

6. 水分含量: 105°C 烘干至恒重, 然后计算挥发分含量。

7. 沉降体积: 将 15 克试样放在 100 毫升的附栓量筒中, 加水至 100 毫升激烈摇动后使其静止 3 小时后, 测定沉降体积 (室温在 20~25 摄氏度)。

8. 适磨原料: 石灰石, 方解石, 白云石, 滑石, 重晶石, 硅灰石, 水镁石, 石膏等。

9. 上述生产参数以方解石为生产标准。

1. Particle size distribution: measured by British Malvern Micro laser particle size analyzer.

2. The specific surface area: the total surface area of all the particles of 1g powder.

3. Median particle size: the particle size corresponding to the cumulative granularity distribution of powder sample reaching 50%.

4. 325 mesh remaining amount: a wet process is used to filter 10g of the sample on a 325 mesh, to calculate the percentage of remaining material.

5. Apparent specific gravity: put 50g sample in a 100ml graduated cylinder and the value measured after from dropping it down from 5cm for 150 times.

6. Moisture content: dry the powder at 105°C to a constant weight, then calculate the volatile content.

7. Settlement volume: place 15g sample in a 100ml graduated cylinder, add water to 100ml and shake it intensely and place it motionless for 3 hours and measure the settlement volume (room temperature at 20~25°C).

8. Suitable raw materials: limestone, calcite, dolomite, talcum, barite, wollastonite, brucite, gypsum and so on.

9. All the above parameters is based on the production of calcite material as standard.

## VSLM-1300H 立式滚轮研磨机生产参数（以方解石为研磨物料）

Production parameters of VSLM-1300H vertical roller mill (Base on calcite material)

生产重质超微细碳酸钙产品、规格及产量数据 The production of ultrafine ground calcium carbonate products, specifications and yield data.						
测定项目 Measurement items	单位 Unit	重质超微细碳酸钙 Ultrafine ground calcium carbonate				
每小时产量 Output per hour	吨数 Ton	10.5~11.0	9.0~9.5	7.5~8.0	4.5~5.0	3.5~4.0
小于 2 $\mu$ m 含量 Less than 2 $\mu$ m powder content	%	16 $\pm$ 2	23 $\pm$ 2	26 $\pm$ 2	36 $\pm$ 2	46 $\pm$ 2
中位粒径 D50 Median particle diameter D50	$\mu$ m	6.2	4.7	3.9	2.9	2.1
粒径分布 D97 Particle size distribution D97	$\mu$ m	29	21	16.3	11.5	7.8
粒径切割点 D100 Particle size cut point D100	$\mu$ m	48	38	25	18	13
水分含量 Moisture content	%	0.3% 以下 Less than 0.3	0.3% 以下 Less than 0.3	0.3% 以下 Less than 0.3	0.3% 以下 Less than 0.3	0.3% 以下 Less than 0.3
能耗(磨机、风机、分级机) Energy consumption (main units, blower, classifier)	KW/T	41	49	59	98	122

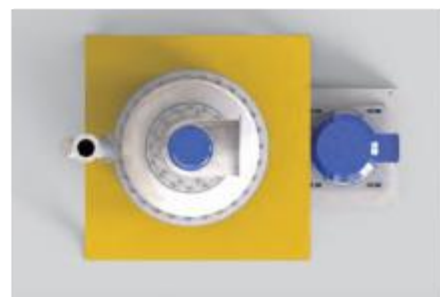
## VSLM-1800H 立式滚轮研磨机生产参数（以方解石为研磨物料）

Production parameters of VSLM-1800H vertical roller mill (Base on calcite material)

生产重质超微细碳酸钙产品、规格及产量数据 The production of ultrafine ground calcium carbonate products, specifications and yield data.						
测定项目 Measurement items	单位 Unit	重质超微细碳酸钙 Ultrafine ground calcium carbonate				
每小时产量 Output per hour	吨数 Ton	16.0~17.0	13.0~14.0	10.0~11.0	7.0~7.5	5.5~6.0
小于 2 $\mu$ m 含量 Less than 2 $\mu$ m powder content	%	16 $\pm$ 2	23 $\pm$ 2	26 $\pm$ 2	36 $\pm$ 2	46 $\pm$ 2
中位粒径 D50 Median particle diameter D50	$\mu$ m	6.2	4.7	3.9	2.9	2.1
粒径分布 D97 Particle size distribution D97	$\mu$ m	29	21	16.3	11.5	7.8
粒径切割点 D100 Particle size cut point D100	$\mu$ m	48	38	25	18	13
水分含量 Moisture content	%	0.3% 以下 Less than 0.3	0.3% 以下 Less than 0.3	0.3% 以下 Less than 0.3	0.3% 以下 Less than 0.3	0.3% 以下 Less than 0.3
能耗(磨机、风机、分级机) Energy consumption (main units, blower, classifier)	KW/T	39	47	57	92	114

备注：所有测试方法与 VSLM-900H 超细立磨机相同。All the test methods is same as VSLM-900H vertical roller mill.





## VSHGM 系列新型智能环辊磨

### VSHGM SERIES NEW INTELLIGENT RING ROLLER MILL

#### 设备简介

VSHGM系列新型环辊磨，是东莞市五全机械有限公司借鉴国内外同类型环辊磨粉机，并结合自身在使用该类型磨粉机加工粉体过程中遇到的实际问题，而研发的一款更具有实用性、产量更大、耐磨件使用寿命更长的环辊磨设备，不需要烘干系统，即可研磨水分达6%以下的各类合格的非金属矿粉体物料。

该系列环辊磨可加工大理石、石灰石，方解石、碳黑、白碳黑、氧化钙、氢氧化钙、石膏、重晶石、滑石、叶腊石、高岭土、膨润土、伊利石、蛭石、海泡石和钾矿石等各类矿石。成品粉体细度在200目~2500目之间。

#### Brief Introduction

Based on the actual problems encountered in the production and processing of powders, and drawing on similar equipment at home and abroad, Dongguan Vsunny Machinery Co., Ltd. has developed a ring roller mill which is more practical, higher-yield, and has longer service life of wear-resistant parts. This equipment does not require a drying system and can grind all kinds of qualified non-metallic mineral powder materials with a moisture content of less than 6%.

This series of ring roller mill can grind all kinds of ores such as marble, limestone, calcite, carbon black, white carbon black, calcium oxide, calcium hydroxide, gypsum, barite, talc, pyrophyllite, kaolin, bentonite, illite, vermiculite, seafoam, and potash ore. The fineness of the finished powder is between 200 mesh~2500 mesh.

## 工作原理

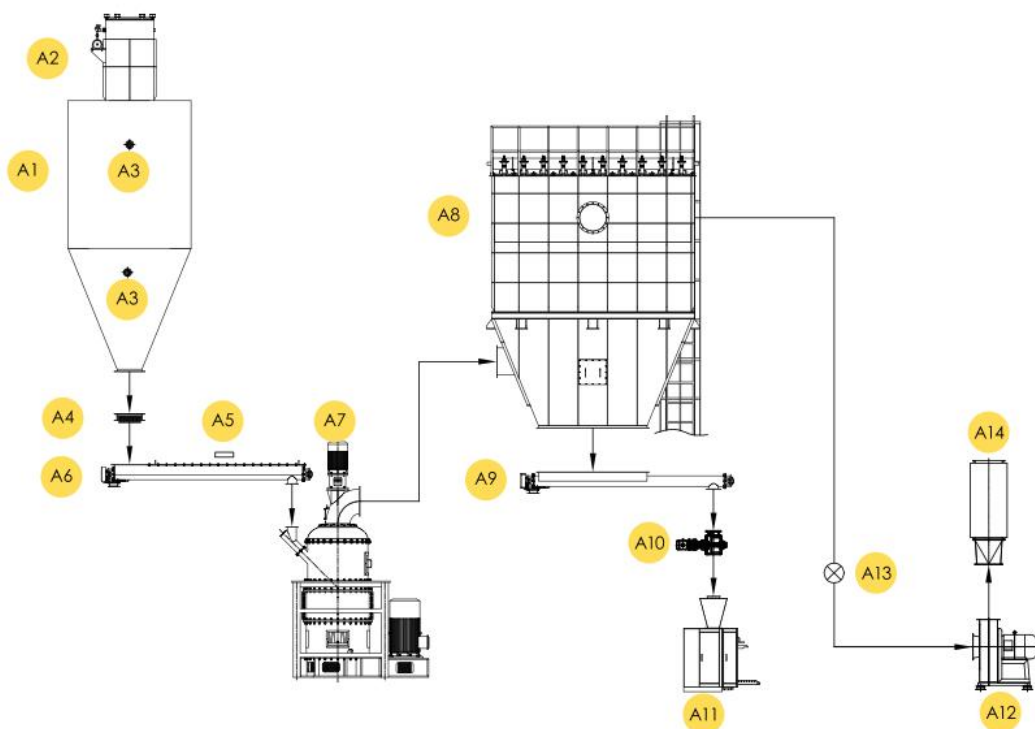
环辊磨采用冲击、挤压、研磨的原理对物料进行粉碎，安装在转盘上的磨辊与销轴之间有很大的活动间隙。当转盘随主轴公转时，磨辊受离心力的作用甩向磨环，并压紧磨环内壁又围绕销轴自转，物料通过磨辊与磨环的间隙时，受到磨辊的冲击、挤压、研磨而粉碎。被第一层磨辊与磨环研磨后的物料，将会落入第二层磨辊，以同样的原理继续进行研磨，接着是第三层和第四层。经过最后一层磨辊研磨后的物料，在重力作用下落到底部甩料的圆盘，而被甩至研磨设备的最下层，并被负压气流带入中筒内壁与外壁之间的夹层，再上升到顶部的一次分级系统进行分级。合格的细粉通过分级轮进入脉冲除尘系统收集，粗料直接被打落至研磨盘，重新落入粉碎室进行粉碎。转盘为上下多层分布。因此，物料被充分粉碎，达到理想的产品细度。

## Working Principle

Ring roller mills crush materials by impact, extrusion and grinding. There is plenty of moving clearance between the grinding roller mounted on the turntable and the axis pin. When the turntable revolves round the main shaft, the grinding roller will be stretched out to the grinding ring by centrifugal force, and press the grinding ring inner wall and rotate round the axis pin. Through the clearance between the grinding roller and the grinding ring, the material will be crushed by the impact, extrusion and grinding of the grinding roller. The material is ground by the first layer of the grinding roller and grinding ring, then will fall into the second layer of the grinding roller be ground again as per the same principle, followed by the third and fourth layers. After the material is ground by the grinding roller in the last layer, it will fall onto the disk under gravity and stretched out to the lowermost milling equipment, and brought to the interlayer between the inner and outer walls of the cylinder by negative pressure airstream, and once again rise to the top classifying system for classifying. Qualified fine powder will pass through the classifying wheel and enter into the pulse dust collector; coarse materials will be directly knocked to the grinding table and resettle in the pulverizing room for pulverization. The turntable is distributed in multiple layers. Thus, the material is sufficiently crushed to reach the desired fineness.

# VSHGM 系列新型智能环辊磨

## VSHGM SERIES NEW INTELLIGENT RING ROLLER MILL



A1	原料仓及钢架 Raw material silo and steel frame	1
A2	仓顶除尘器 Silo top dust collector	1
A3	高/低位料位开关 High/low material level switch	2
A4	棒闸 Rod gate	1
A5	铁质分离器 Iron remover	1
A6	螺旋输送机 Screw conveyor	1
A7	环辊磨 New ring roller mill	1
A8	侧喷脉冲袋式除尘器 Side-jet pulse dust collector	1
A9	螺旋输送机 Screw conveyor	1
A10	关风器 Air locker	1
A11	增强型叶轮包装机 Packing machine	1
A12	高压风机 High pressure air blower	1
A13	电动风量调节挡板 Electric air volume regulating damper	1
A14	消音管 Silencer	1

# VSHGM 新型环辊磨技术参数

## Technical parameters of VSHGM new ring roller mill

型号 & 参数指标 Model & Parameter index		VSHGM-37	VSHGM-48
进料颗粒尺寸 (mm) Feed size (mm)		≤10	≤10
入料水分 (%) Moisture of the feed (%)		≤6	≤6
装机功率 (KW) Energy Consumption(KW)	主机 Main unit	132KW	200~250KW
	分选机 Classifier	30~37KW	55~75KW
	风机 blower	55~75KW	110~132KW
	进料机 Feeder	1.1KW	1.5KW
	出料螺旋 Discharging screw	2.2KW	2.2KW
使用压缩空气量(m3) Compressed air volume (m3)		2.5	3.5
生产能力 (t/h) Production capacity(t/h)	600 目 600 mesh	3.0~4.0	8.5~9.5
	800 目 800 mesh	2.5~3.0	7.0~8.0
	1250 目 1250 mesh	1.8~2.3	5.5~6.5
	1500 目 1500 mesh	1.4~1.8	4.0~5.0
	1800 目 1800 mesh	0.9~1.3	2.5~3.5

因各种物料的特性不同，以上所有数据仅作参考，波动一般±15%以内。按照英国马尔文MALVERN公司的 Mastersizer 3000E 型激光粒度分析仪中“检测碳酸钙 CaCO<sub>3</sub> 的设置”来检测产品细度。

Due to the different characteristics of various materials, all the above data is for reference only, and the fluctuation is generally within ±15%. The fineness of the product is tested according to the "Setting for the detection of Calcium carbonate CaCO<sub>3</sub>" in the Mastersizer 3000E laser particle size analyzer of MALVERN, UK.

## 技术优势

1.采用PLC控制的恒温系统，使研磨的物料可以不用常规的烧煤烘干，可节省大量烘干费用，极大地节约了成本并增加了利润。

2.因采用恒温控制系统，并且改进了流程设计，是五全智能环辊磨可灵活地添加各类助剂，使粉体的应用范围大为拓展。

3.辊珠、销钉、支架采用立磨铸造件材料制作，使用寿命由目前通用型环辊磨连续研磨1800~2500目重晶石粉（酸洗矿）的11~18天增加到35天左右，达到实际生产天数，控制系统自动提示要更换耐磨件。减少维修时间并增加使用寿命，极大提高了制粉工厂的利润空间。

4.采用立磨铸造件的铸造技术，使本司的智能环辊磨的磨损降低，并通过多道除铁装置，使研磨后粉体杂质含量降低。并使研磨的粉体白度不降低，改变了以往通用型环辊磨粉降低白度的缺点。

5.采用改进的、更合理的立体设计，一改以往通用型环辊磨低、矮的缺点，本司的智能环辊磨可以无缝衔接自动打包机，改变了以往人工打包的低效率操作，既提高打包效率，也降低人工成本。

6.采用触屏式PLC控制系统，既可实时监控各部位的温度、压力、电流、风速，使操作更加便捷化、直观化，减少以往全靠操作工经验操作、次品率居高不下的弊端。

7.本司智能环辊磨加装三十秒不进料自动停机的控制系统，使传统环辊磨因突然停机而出现大颗粒的状况被杜绝。

8.采用更合理的流道设计和分级技术，与同样的设备相比产量提高。

## TECHNICAL ADVANTAGE

1.Adopting PLC controlled thermostatic system, the materials can be ground without conventional coal drying, which can save a lot of drying costs, greatly saving the cost and increasing the profit.

2. Because of the constant temperature control system and the improved process design, the Vsunny intelligent ring roller mill can flexibly add all kinds of additives, so that the application range of powder is greatly expanded.

3. Roller beads, pins and brackets are made of vertical mill casting materials, and the service life is increased from 11~18 days for the current general-purpose ring roller mill to 35 days for continuous grinding of 1800~2500 mesh barite powder (pickled ore), and the control system automatically prompts the replacement of wear-resistant parts when the number of days of production reaches the actual number of days. Reduce the maintenance time and increase the service life, greatly improving the profit margin of the powder plant.

4. Adopting the casting technology of vertical mill casting parts, the grinding consumption of Vsunny intelligent ring roller mill is reduced, and through the multi-channel iron removal device, the impurity content of the powder after grinding is reduced. And the whiteness of powder is not reduced, changing the shortcomings of the previous general-purpose ring roller mill grinding powder to reduce the whiteness.

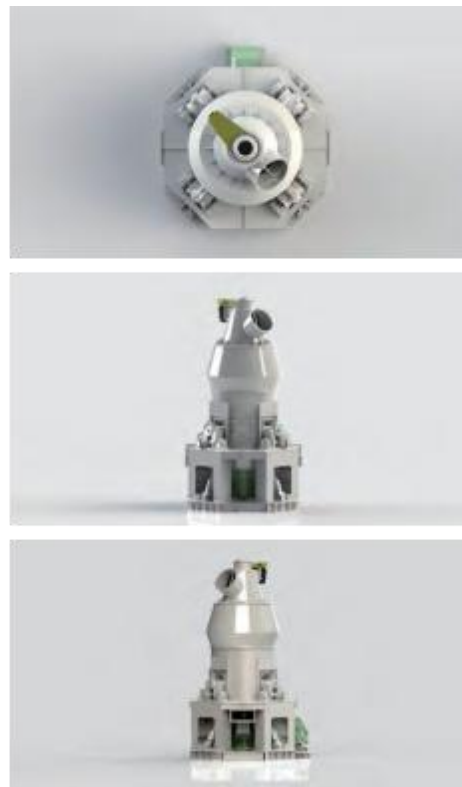
5. Adopting improved and more reasonable three-dimensional design, changing the shortcomings of the previous general-purpose ring roller mill low, short, the Vsunny intelligent ring roller mill can be seamlessly connected to the automatic packing machine, changing the previous low-efficiency operation of the manual packing, not only to improve the efficiency of the packing, but also to reduce the cost of labor.

6. The touch screen PLC control system can monitor the temperature, pressure, current and wind speed of each part in real time, which makes the operation more convenient and intuitive, and reduces the disadvantages of relying on the operator's experience and the high rate of defective products in the past.

7. The intelligent ring roller mill is equipped with the control system of automatic shutdown without feeding for thirty seconds, so that the situation of large particles appearing in the traditional ring roller mill due to sudden shutdown is eliminated.

8. Adopting more reasonable flow channel design and classifying technology, the output is increased compared with the same equipment.





## VSCM 系列粗粉立磨

### VSCM SERIES COARSE VERTICAL GRINDING MILL

#### 设备简介

目前，粗粉生产企业基本采用雷蒙磨机、球磨机等粉磨设备，在一定程度上还是能满足当前的市场需求，但是随着工业现代化的发展，国家环保政策将会越来越严格。节能、环保、高产能一定会是往后的市场需求，因此五全机械在吸收国外的超细立磨技术的基础上开发出的VSCM系列粗粉立磨，采用优质的耐磨件，其粉体产品的细度为60目至500目，是高效节能和具有烘干、粉磨功能的高新技术设备。该立磨机在电厂脱硫、建筑行业的腻子粉、石膏粉生产线以及造纸等行业上得到广泛使用。

#### 应用范围

VSCM系列粗粉磨机，可广泛应用于方解石、大理石、石灰石、重钙、滑石、重晶石、白云石等非金属矿的大规模超细干粉加工产品细度可达 60~500 目。

#### Brief Introduction

At present, most of coarse manufacturers adopt Raymond mills and ball mills, which can meet the current market demands to some extent. However, with the development of industrial modernization, environmental policies become more and more strict. Energy conservative, environment protection and high yield will be the future market demand. Based on this and adopted with oversea superfine vertical grinding technology, Dongguan Vsunny Machinery Co., Ltd developed the VSCM series coarse vertical grinding mill. It uses the high-class wear-resistant parts, and the fineness of ground powder product will be from 60~500 mesh. It is a high-tech machine with drying & grinding capability featured by high efficiency and energy-saving, and is widely applied in power plant desulphurization, construction putty powder, gypsum powder production and paper making industries.

#### Applications

VSCM series coarse grinding mill can be widely used in mass production of super fine powder of non-metallic minerals including calcite, marble, limestone, coarse whiting, talc, barite and dolomite, etc. The fineness can be 60~500 mesh.

## 工作原理

主机下方的电动机驱动减速机带动磨盘转动，物料经螺旋输送机送入研磨主机，在重力的作用下物料落到磨盘中心，然后在离心力作用下，物料向磨盘周边移动，形成一个研磨料层。在磨辊和磨盘的间隙压力的作用下，物料受到挤压、研磨和剪切作用而被粉碎。粉碎后的物料随着环形风槽之气流往上吹起，较粗的物料落回磨盘重新粉磨，较细物料则由热风带入分级机进行分级，合格的细粉随同气流带出研磨主机，再经过脉冲除尘器，最后由集粉器设备收集下来即为成品。不合格的粗粉在分级机转子叶片的筛选后重新落至磨盘中心重新研磨，粒度较大的物料通过风环下落至下壳体排渣回到料仓中。

## Working Principle

The motor under the main unit drives the reducer to run the grinding table. Materials are fed into the main grinding unit through the screw conveyer, and fall to the central grinding table under the action of gravity. Then the material is thrown out of by centrifugal force, and move to the side area of the grinding table and form a material layer. Under the effect of the gap pressure of the roller and the grinding table, the materials are grinded up after extrusion, grinding and cutting. The grinded materials are blown up with the airflow of the annular air groove; coarse materials are blown back to grinding table for further grinding; fine materials are blown to powder classifier with hot wind for classification; qualified fine powder are output with airflow and go through dust filter then collected by powder collector, which are the finished products; unqualified coarse powder are screened through the rotor blade of the classifier and dropped onto the grinding table center for further grinding; larger-grained materials are dropped into the lower housing and discharged to the material hopper.

## VSCM 粗粉立磨技术参数

### Technical parameters of VSCM series coarse vertical grinding mill

规格型号 Model	VSCM-1700	VSCM-2200	VSCM-2800	VSCM-3500
生产能力 (T/H) Production capacity	25~35	30~50	40~65	50~80
入磨物料水分 (%) Moisture of the feed	≤ 6%	≤ 6%	≤ 6%	≤ 6%
入磨物料尺寸 (mm) Feed size	<30	<30	<30	<30
成品物料水分 (%) Moisture of finished product	<1%	<1%	<1%	<1%
主电机功率 Main motor power(KW)	450~500	630~710	800~1000	1120~1250

## 技术优势

- 1.粉磨效率高，综合运行成本低。立式辊磨采用料层粉磨原理粉磨物料，能耗低，粉磨系统的电耗比球磨机低20%~35%，节电效果更加明显；
- 2.建设，投资费用低。立式磨机集细碎，烘干，粉磨，选粉，输送为一体，不需要另置烘干，选粉，提升等设备，除尘部分直接由高浓度脉冲除尘器收集，布局紧凑，建筑面积约为球磨机的50~60%，工艺流程简单，占地空间小；
3. 运行稳定，操作简便；
4. 产品质量稳定，适用于大批量生产；
- 5.特别改进的滚轮、磨盘、导流系统及内部循环系统，大大提高了研磨效率，采用特殊材质的耐磨件极大的提高了使用寿命；
- 6.设备环保，噪音低，扬尘少，操作环境清洁。磨辊，磨盘不直接接触，降低了噪音，使操作环境清洁；
- 7.研磨过程中,可由全自动电脑控制，操作简单，减少了人力使用，产品可控，可调节。

## TECHNICAL ADVANTAGE

- 1.High grinding efficiency with low operation cost. The principle of vertical roller mill is to use material layer to grind the materials. This kind of mill has low energy consumption. The electricity consumption is 20%~35% lower than that of ball mill, and the electricity conservation is more obvious ;
- 2.Low cost of construction and investment. All the processes of grinding, drying, milling, powder screening and transporting are realized in one vertical grinding mill; no need for extra drying, screening or improving equipment. The dedusting part is collected by a high concentrated pulse dustur. The whole unit is compact and the construction area is about 50~60% of the ball mill. The technological process is simple and requires small space;
- 3.The running is stable. The operation and maintenance are also simple and convenient;
- 4.The products have stable quality and can be produced in a large amount;
- 5.The specially improved roller, grinding table, diversion system and internal recirculation system greatly improved the grinding efficiency of the equipment. The special wear-resistant parts also prolonged the lifetime of the grinding mill;
- 6.The eco-friendly equipment has low noise and less dust with clean operation environment. The roller and the grinding table has no direct contact, which lower the noise. and makes the operation environment clean;
- 7.The grinding process can be fully controlled by computer; simple operation with less manpower; the grinding products can be controlled and adjusted.

# VSUNNY





## VSFCM 系列蜂窝磨

### VSFCM SERIES CELL MILL

#### 设备简介

VSFCM系列蜂窝磨是东莞五全机械借鉴国外的技术，结合自己多年的粉体生产经验，专为生产具有严格粒度分布控制的超细粉末而开发的，可以对粉体进行干燥、粉碎（解聚）、化学改性和分级的高效磨机。

其主机由解聚轮、出料门、进风口、分级机、进料口、多路表面分散剂入口和喂料机组成。解聚轮为核心关键部件，由一个风量室、一个干燥腔、粉碎腔和混合腔组成，其空间结构形似于蜂窝，故名蜂窝磨。其主研磨元件是垂直安装的多级转子，其中每层由最多180个叶片组成，夹在安装在中心轮毂上的两个支撑盘之间。根据研磨程度，磨机内有7个转子层共1,260个叶片。在距离研磨轨道3毫米内的区域，磨削叶片以每秒120米的速度旋转，轨道层是一种独特的带筋骨的静态衬板。叶片和衬板之间的相互作用产生多达1,400个混乱的“蜂窝孔”，物料是在冲击、剪切和摩擦的综合作用力下被粉碎成超细粉末的。

针对某些行业对铁杂质有特殊要求，我公司推出X系列蜂窝磨，该设备所有与物料的接触的部件、管道，可选装304不锈钢+超音速火焰喷涂碳化钨或PTFE工艺，确保生产过程中铁杂质的带入率 $\leq 10\text{PPM}$ 。

## Brief Introduction

VSFCM series Cell Mill is a high-efficiency mill specially developed for the production of ultra-fine powder with tightly controlled of particle size distribution. It will simultaneously grind, dry, classify and chemically modify the surface of powders. It will perform similar functions in the de-agglomeration of wet ground filter cakes and slurries. Learning from the technology of foreign country, Dongguan Vsunny Machinery make the cell mill combining with its own experience of powder production for years.

The main machine is composed of de-agglomeration system, product discharge, air inlet, classifier, feed inlet, multi-channel additives inlet and feeding unit. De-agglomeration system is the core component, which is composed of an airflow chamber, a drying chamber, a grinding chamber and a mixing chamber. The main grinding element is a vertically-mounted multi-stage rotor, in which each layer consists of up to 180 blades clamped between two support discs mounted on the central hub. According to the degree of grinding, there are 7 rotor layers in the mill with 1,260 blades. In the area within 3 mm from the grinding track, the grinding blades rotate at a speed of 120 meters per second, and the track layer is a unique static liner with bones. The interaction between the blades and the liners creates up to 1,400 turbulent "cells" in which the combined forces of impact, shear and friction rapidly produce ultra-fine powders.

In view of the special requirements of some industries for iron impurities, our company has launched the X series cell mill. All parts and pipelines of this equipment that come into contact with materials can be equipped with 304 stainless steel + supersonic flame sprayed tungsten carbide or PTFE process to ensure that the rate of iron impurities introduced during the production process is  $\leq 10\text{PPM}$ .

## VSFCM蜂窝磨常见物料处理

### Typical Feed Materials of VSFCM Cell Mill

矿产 Minerals	化学制品 Chemicals	食品 Foodstuffs
天然石墨 NATURAL GRAPHITE	电池正负极材料 ANODE AND CATHODE MATERIALS OF BATTERY	动物蛋白质 ANIMAL PROTEINS
高岭土 (天然和煅烧) KAOLIN	石墨电极材料 GRAPHITE ELECTRODE	酪蛋白 CASEIN
石灰石, 大理石 LIMESTONE, MARBLE	磷酸铁 IRON PHOSPHATE	可可 COCOA
方解石 CALCITE	石油焦 PETROLEUM COKE	豌豆 PEAS
白云石 DOLOMITE	重质碳酸钙、轻质碳酸钙 GCC, PCC	马铃薯蛋白 POTATO PROTEIN
磷酸盐 PHOSPHATES	氧化铁 IRON OXIDE	糖 SUGAR
石膏 GYPSUM	沉淀二氧化硅 PRECIPITATED SILICA	小麦粉 WHEAT FLOURS
滑石 Talc	氢氧化铝、氢氧化镁 MAGNESIUM HYDROXIDE AND ALUMINUM HYDROXIDE	小麦面筋 WHEAT GLUTEN
沸石 ZEOLITES	二氧化钛 TITANIUM DIOXIDE	小麦淀粉 WHEAT STARCH

### 工作原理

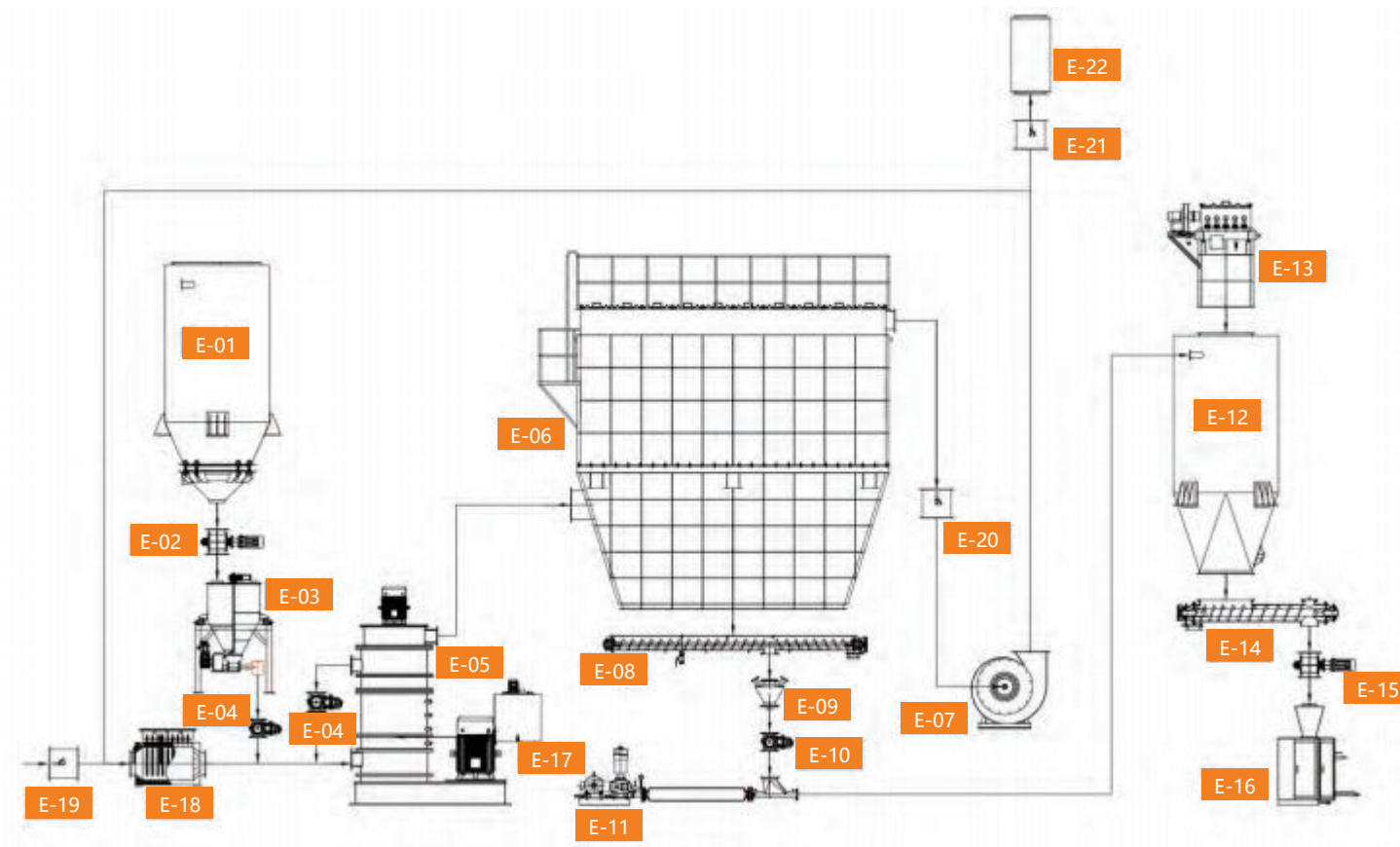
物料在负压作用下经物料入口进入系统，根据不同的物料特性可以通过变速装置控制计量或定量给料机，经过主机的研磨解聚，根据需要进行产品的活化改性，用一定的分量和一定的速率将表面活性剂加入到磨机的研磨区域中，从而实现表面活性剂在研磨中的应用。在某些情况下，可以同时加入一种以上的改性助剂。根据所需产品的细度经过主机上方的分级机进行分级得到成品，成品随着气流进入旋风分离器然后进入脉冲布袋收尘器进行产品收集。对于液料或压滤后的滤饼可将系统用空气加热器加热，此时蜂窝磨是一台高效的干燥机，其允许的进风温度可达450℃，可根据需求调整磨机出口温度来控制对产品的干燥程度，典型的磨机出口温度是95℃而产品含水率可控制在0.2%以下，最低可控制在0.05%，滤饼、软泥或浆料可进行一次性操作同时实现干燥、粉碎、解聚，出磨后的粒径分布可还原物料干燥前的初始粒径。

### Working Principle

The material enters the system through the material inlet under the negative air pressure. According to the different material characteristics, the feeding can be controlled by the metering or quantitative feeder with variable speed device. After the grinding and de-agglomeration of the main machine, the product is activated and modified according to the needs by adding certain amount of coating agent to the grinding area of the mill in a certain rate, so as to realize the application of coating agent in grinding use. In some cases, more than one coating agent can be added at the same time. According to the fineness of the required products, qualified fine powder will go out of the classifying system, enter into dust removal equipment along with negative pressure air stream, be collected by a powder collector and become the finished product. For the liquid material or the filter cake after pressure filtration, the system can be heated with an air heater. At this time, the Cell Mill is an efficient drying machine. The Cell Mill can accept inlet temperatures up to 450°C. The dryness of the product is controlled by the outlet temperature, which is typically in the region of 95°C. And product moisture content can be controlled under 0.2%, the minimum can be controlled in 0.05%. Filter cakes, sludges and slurries can be dried, ground and de-agglomerated close to their natural particle sizes in a single operation.

# 五全蜂窝磨 -- 工艺流程图

## Process Flow Chart



设备编号 Code	名称 Name
E-01	原料仓 RAW MATERIAL SILO
E-02	旋转阀 ROTARY VALVE
E-03	失重喂料机 LOSS-IN-WEIGHT FEEDER
E-04	旋转阀 ROTARY VALVE
E-05	蜂窝磨 CELL MILL
E-06	脉冲除尘器 PULSE DUST COLLECTOR
E-07	高压风机 HIGH-PRESSURE BLOWER
E-08	螺旋输送机 SCREW CONVEYOR
E-09	抽气室 ASPIRATING CHAMBER
E-10	旋转阀 ROTARY VALVE
E-11	罗茨风机 ROOTS BLOWER
E-12	成品仓 FINISHED PRODUCT SILO
E-13	仓顶除尘器 SMALL DUST COLLECTOR
E-14	螺旋输送机 SCREW CONVEYOR
E-15	旋转阀 ROTARY VALVE
E-16	包装机 POWDER PACKING MACHINE
E-17	药剂系统 GRINDING AIDS DOSING SYSTEM
E-18	加热器 HEATER
E-19	风量调节阀 MANUAL AIR DAMPER
E-20	风量调节阀 MANUAL AIR DAMPER
E-21	风量调节阀 MANUAL AIR DAMPER
E-22	消音器 SILENCER



## 流程系统

物料通过气流输送进入磨机。根据物料的特性，物料被经过精准计量后，通过各种变速装置随气流进入磨机中。在进行研磨操作之后，成品从蜂窝磨中排出并随气流进入到袋式除尘器。

## 分级机

对于需要严格控制产品粒度分布的粉体应用领域，或需要去除硬杂质的应用领域，蜂窝磨可配备独立驱动的气流分级机，其速度由变频驱动控制。超大尺寸的颗粒要么被丢弃，要么再循环到进料口。

## 干燥功能

当使用热风机加热处理空气时，蜂窝磨是一种高效的干燥器。蜂窝磨可以接受高达450°C的入口温度。产品的干燥程度由出口温度控制，出口温度通常在95°C的范围内。一般的浆料可以在一次操作中进行干燥和解聚，还原其原来的颗粒尺寸。

## 浆料注入

随着对各种固体浓度干燥浆料需求的不断增加，蜂窝磨的特殊部分已经开发出更重的负载部件，以应对增加的机械负载。通常浆料通过宽喉泵专门设计的喷嘴进料到磨机中。

## 活化及表面改性

不同性能的矿物经常需要通过表面处理来改变其功能、提高其性能。以合适的分量和合适的速率将表面活性剂经简单计量后加入到磨机的研磨区域中，从而实现表面活性剂在研磨中的应用。在某些情况下，可以同时加入一种以上的改性助剂。

## Process System

Material is conveyed through the system in an air stream. Depending on material characteristics, feed material is metered into the inlet air stream using a variety of variable-speed devices. After the grinding operation, the finished product is discharged from the Cell Mill and is carried in the air stream to the bag filter.

## Classifier

For powder applications that require strict control of product particle size distribution, or applications that require removal of hard impurities, the cell mill can be equipped with an independently dynamic air classifier, the speed of which is controlled by a variable-frequency drive. Oversize material is either discarded or recycled to the feed inlet.

## Drying Function

The Cell Mill is an efficient dryer when the process air is heated using a hot air generator. The Cell Mill can accept inlet temperatures up to 450°C. The dryness of the product is controlled by the outlet temperature, which is typically in the range of 95°C. General slurry can be dried and de-agglomeration close to their natural particle sizes in a single operation.

## Slurry Injection

With the increasing demand for dry slurries of various solid concentrations, the special part of the Cell Mill has developed with heavier load components to deal with the increased mechanical load. Generally the slurry is fed into the mill by a wide-throat pump through specially designed nozzles.

## Coating and Surface Modification

Performance minerals frequently require surface treatment to influence their functionality and improve their performance. A whole range of surfactants can be successfully applied during the milling operation by simply metering them at the relevant rates into the grinding zones of the mill. In certain circumstances more than one coating agent can be applied simultaneously.

## 技术参数 Technical Data

蜂窝磨 Cell Mill	单位 Units	FCM500	FCM750	FCM1000
最大速度 Maximum Rotating Speed	转/分钟 RPM	4,500	3,000	2,250
最小气流量 Minimum Air Flow	立方米/小时 M³/H	2,000	3,000	4,000
最大气流量 Maximum Air Flow	立方米/小时 M³/H	6,000	12,000	15,000
最低功率 Minimum Power	千瓦 KW	22	45	75
最大功率 Maximum Power	千瓦 KW	55	95	132
分级机功率 Power of Classifier	千瓦 KW	7.5	15	22
生产能力 Production Capacity	吨/小时 T/H	1.0~1.5	1.5~3.0	3.0~5.0

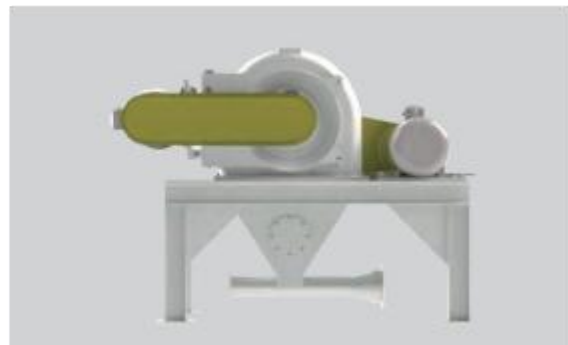
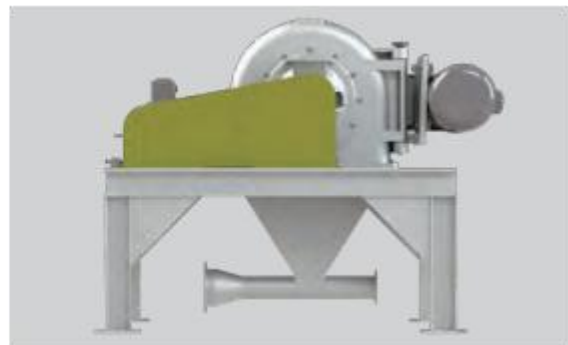
## 技术优势

- 1、提高产品的附加值，拓宽粉体的适用性。可用于各种非金属矿物、电池材料、食品和药品等领域的超细粉体的干法表面改性。
- 2、集粉体干燥、研磨解聚、复合改性和分散处理于一体。采用模块化结构，工艺非常灵活，适合定制设计。
- 3、结构紧凑、体积小、操作简便、易维护易检修。
- 4、叶轮叶片采用淬硬钢材材质，运行平稳、维修率低、噪音低。
- 5、粉体包覆率极高，可高达97%-99.5%，能耗低。干燥水平高，含水量可达极低水平。
- 6、用工少，劳力强度低，机械运转无需要操作，只需少量原料检查、成品包装等人员。
- 7、系统全密闭运转，粉尘污染小，生产环境干净卫生，工厂周边环境无显著影响。

## Technical Advantages

1. Increase the added value of products and broaden the applicability of powders. It can be used for dry surface modification of ultrafine powders in various fields such as non-metallic minerals, battery materials, food and medicine.
2. It integrates powder drying, grinding and depolymerization, composite modification and dispersion treatment. It adopts modular structure, and the process is very flexible and suitable for customized design.
3. Compact structure, small size, simple operation, easy maintenance and easy repair.
4. The impeller blades are made of hardened steel, with stable operation, low maintenance rate and low noise.
5. The powder coverage rate is extremely high, up to 97%-99.5%, and the energy consumption is low. The drying level is high and the water content can reach an extremely low level.
6. Fewer workers, low labor intensity, no need to operate the machine operation, only a small number of raw material inspection, finished product packaging and other personnel are required.
7. The system is fully enclosed, with low dust pollution, clean and hygienic production environment, and no significant impact on the surrounding environment of the factory.

# VSUNNY



## VSDPM 系列宽腔钉盘活化机

### VSDPM SERIES PIN MILL

#### 设备简介

VSDPM系列宽腔钉盘活化机是东莞五全机械借鉴国外的活化改性技术，结合自己多年的粉体生产经验，而研发出的一款专为处理中硬质物料以及粉体表面改性的设备。主机由两个带有销钉状转子的圆盘组成，圆盘由电机、皮带、主轴、轴承和转子等组成，转子在圆盘内进行高速旋转，让物料得到充分打散解聚的情况下与改性剂混合，获得高度均匀的活化改性效果。该设备生产能力约1吨/小时至5吨/小时，粉体包覆度可达99%，单位产品能耗低，粉体成品附加值高。

该设备可应用于各种非金属矿物、电池材料、食品和药品等领域的超细粉体的干法表面改性，如轻质碳酸钙、重质碳酸钙、超细和沉淀硫酸钡、石墨粉、水洗高岭土、煤系煅烧高岭土、滑石、石英粉、云母、白炭黑、钛白粉、绢云母等物料，应用领域相当广泛，节能环保。

#### Brief Introduction

Learning from overseas coating technology, combined with our own actual experience in powder production, Dongguan Vsunny Machinery Co., Ltd. independently researched and developed this pin mill for the processing of hard materials and surface coating of the powder. The main unit consists of two discs with a pin-shaped rotor. The disc is composed of motor, belt, main shaft, bearing, rotor, etc. The rotor rotates at a high speed in the disc, so the material can be fully dispersed and depolymerized, and mixed with the additives to obtain a highly uniform effect of coating and modification. The production capacity of this equipment is about 1 t/h to 5 t/h, the coverage rate of powder can reach 99%, the energy consumption in per unit product is low, and the added value of powder products is high.

The equipment can be used for dry surface modification of ultrafine powder in various non-metallic minerals, battery materials, food and medicine fields, such as light calcium carbonate, ground calcium carbonate, ultrafine and precipitated barium sulfate, graphite powder, washed kaolin, calcined coal kaolin, talcum, quartz powder, mica, white carbon black, titanium dioxide, sericite and other materials, while at the same time it can depolymerize and scatter the powder. It has a wide range of applications and realizes energy saving and environmental protection.



## 工作原理

本机组对粉体物料的表面活化改性处理，是将经过温控加药系统精确计量过的表面改性剂通过特制的雾化喷嘴被送至雾化室，让表面改性剂与干燥的粉体物料在雾化室进行混合。若使用固体状改性剂，改性剂会先在温控加药系统内被加热融化至液态。表面改性剂与被改性的粉体物料先进入雾化室进行混合，接着自动连续地进入钉盘内，受到盘内不同方向的气流冲击，高速旋转的转子让特殊设计的钉盘内形成涡旋二相流，让物料和改性剂被充分打散。依靠转子高速旋转与粉体物料的冲击、剪切和摩擦作用所产生的热量，粉体和改性剂在盘内迅速升温，达到改性需要的温度，也因此让两者得以充分接触、混合，改性剂能迅速、均匀地与粉体颗粒表面作用，包覆于颗粒表面，完成对粉体的表面包覆改性。接着然后改性后的粉体成品进入后端的气流分级机系统进行分选，合格的细粉将会被选到旁边的旋风集粉器进行冷却和收集。

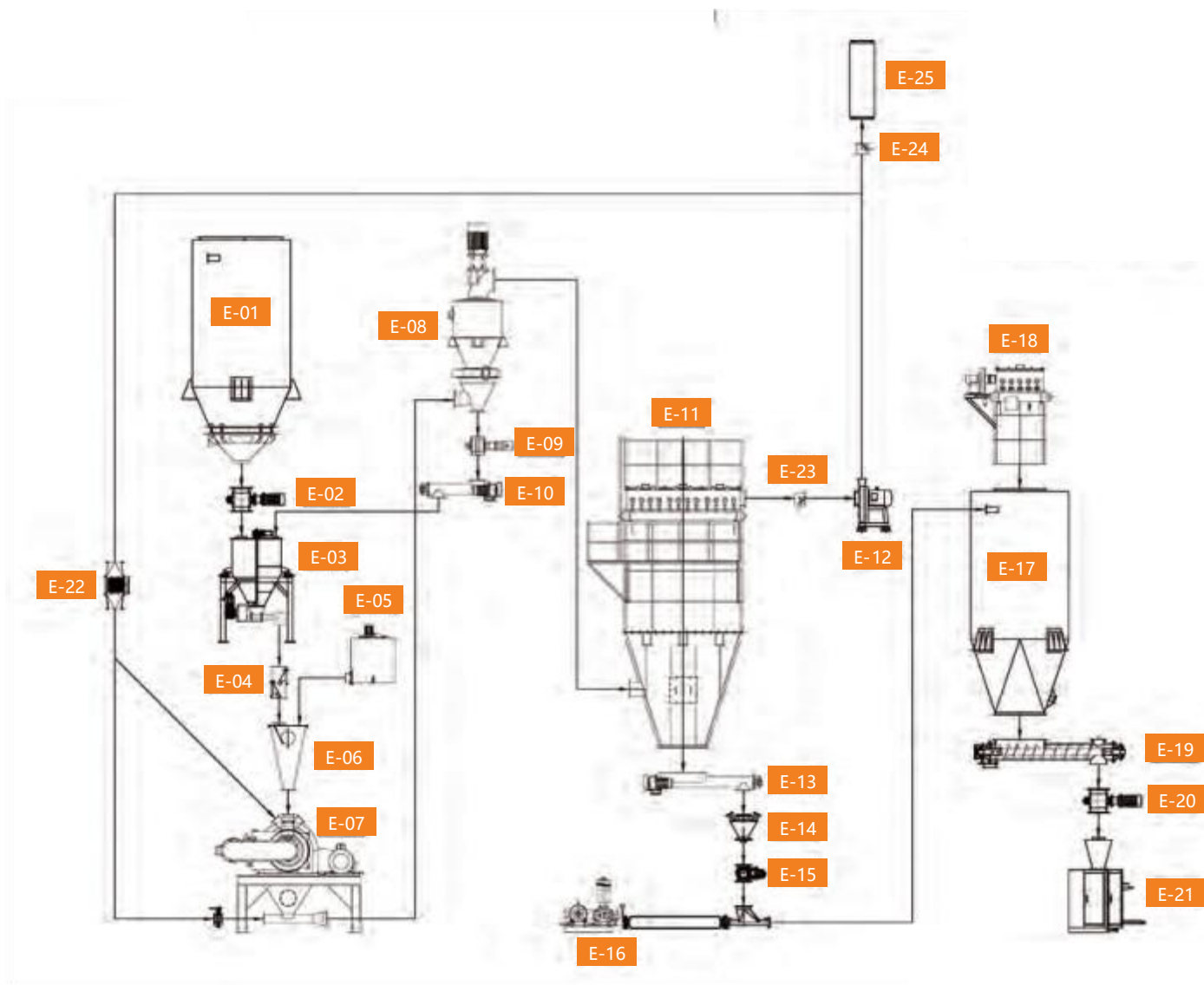
整套系统无粉尘污染，操作简便；单位产品改性剂用量少，单位产品能耗低，包覆率高；不需要另设粉体加热装置，腔体内温度可以根据需要调节。改性产品不团聚，对于超细粉体有较强的打散、解聚作用，特别适用于超细粉体的表面改性；既可以实现二种以上改性剂的复合改性和二种以上粉体的复合改性，又能与干法磨机组成生产线，实现研磨改性一体化工艺。

## Working principle

In order to achieve the surface modification and coating of powder, the mill will spray the surface modifying additives measured by the temperature-controlled dosing system into the feeding material accurately. In the atomization chamber, the modifying additives come out from a special atomizing nozzle and spray on the dry materials, then mixed in this atomization chamber. If a solid modifying additives is used, the additives will be heated and melted to a liquid state in the temperature-controlled dosing system. The following is the detailed process of the surface modification and coating of powder. First, the modifying additives and the modified powder materials enter the atomization chamber for mixing, and then enter the nail disc automatically and continuously, which is impacted by the airflow in different directions inside the mill. The high-speed rotating rotor allows the specially designed nail disc to form a two-phase swirling to allow materials and modifying additives to be fully dispersed. Second, relying on the heat generated by the high-speed rotation of the rotor and the impact, shear and friction of the powder. The powder and the modifying additives quickly heat up in the disc to reach the temperature required for the modification, and then they can be fully contacted and mixed. So the modifying additives can act quickly and evenly on the surface of the powder particles, coat the surface of the particles and complete the surface modification of the powder. Finally, the modified powder product enters the back-end air classifier system for sorting, and the qualified fine powder will be selected to the cyclone for cooling and collection.

The whole system has no dust pollution and is easy to operate; the amount of modifying additives used in per unit product is low, the energy consumption in per unit product is low, and the coating rate is high; no additional powder heating device is required, and the temperature in the cavity can be adjusted as needed. Modified products do not agglomerate, and have strong disintegration and deagglomeration for ultrafine powders, especially suitable for surface modification of ultrafine powders; not only can realize the composite modification of more than two modifying additives and powders, the machine can also form a production line with a dry mill to achieve an integrated grinding and modification process.

# 工艺流程图 Flow chart



设备编号 Code	名称 Name
E-01	原料仓 RAW MATERIAL SILO
E-02	旋转阀 ROTARY VALVE
E-03	失重称 LOSS-IN-WEIGHT FEEDER
E-04	除铁器 IRON SEPARATER
E-05	药剂系统 GRINDING AIDS DOSING SYSTEM
E-06	雾化室 ATOMIZING CHAMBER
E-07	钉盘磨 PIN CELL
E-08	涡轮气流分级机 TURBO AIR CLASSIFIER
E-09	旋转阀 ROTARY VALVE
E-10	螺旋输送机 SCREW CONVEYOR
E-11	脉冲除尘器 PULSE DUST COLLECTOR
E-12	离心通风机 CENTRIFUGAL FAN
E-13	螺旋输送机 SCREW CONVEYOR
E-14	抽气室 ASPIRATING CHAMBER
E-15	旋转阀 ROTARY VALVE
E-16	罗茨风机 ROOTS BLOWER
E-17	成品仓 FINISHED PRODUCT SILO
E-18	仓顶除尘器 TOP DUST COLLECTOR
E-19	螺旋输送机 SCREW CONVEYOR
E-20	旋转阀 ROTARY VALVE
E-21	包装机 PACKING MACHINE
E-22	加热器 HEATER
E-23	风量调节阀 MANUAL AIR DAMPER
E-24	风量调节阀 MANUAL AIR DAMPER
E-25	消音器 SILENCER

## 活化超细重质碳酸钙的生产参数

## Production parameters of coated ground calcium carbonate

测定项目 Measurement	单位 Units	活化重质碳酸钙（方解石） Coated ground calcium carbonate (calcite)				
每小时产量 Output per hour	吨/小时 T/H	0.8~1.0	1.3~1.4	1.8~2.0	2.3~2.5	2.8~3.0
小于2 $\mu\text{m}$ 含量 Less than 2 $\mu\text{m}$ power content	%	70 $\pm$ 2	60 $\pm$ 2	40 $\pm$ 2	30 $\pm$ 2	20 $\pm$ 2
中位粒径 D50 Median particle diameter D50	$\mu\text{m}$	1 $\pm$ 0.1	1.5 $\pm$ 0.1	2.2 $\pm$ 0.1	3 $\pm$ 0.2	5 $\pm$ 0.2
粒径分布 D97 Particle size distribution D97	$\mu\text{m}$	4 $\pm$ 1	6 $\pm$ 1	7 $\pm$ 1	10 $\pm$ 1	15 $\pm$ 1
粒径切割点 D100 Particle size cut point D100	$\mu\text{m}$	7 $\pm$ 1	10 $\pm$ 1	12 $\pm$ 1	16 $\pm$ 1	22 $\pm$ 1
粉体成品活化度 The coated percentage of final product	%	99	99	99	99	99
能耗 Energy consumption	KWH/T	250	180	126	100	84

## 技术优势

1. 钉盘活化机可连续稳定生产，自动化程度高，适合各种规模的工业化生产。
2. 改性助剂的使用率高，用量小，活化重钙的硬脂酸用量在千分之五到八左右。
3. 粉体包覆率极高，可达到99%，用电能耗低。
4. 独立控制的钉盘驱动器，可控制其转速和旋转方向，有效改善粉体改性后的二次团聚问题。
5. 活化产品的附加值高，为生产企业带来更加丰厚的利润和缩短成本回收的时间。
6. 采用独特的雾化喷嘴设计和涡流式混合运行模式，物料与助剂作用时间长，改性效率高。
7. 全系统负压运行，密封性好，粉尘不泄漏，生产环境干净，无粉尘污染。
8. 人工智能的中控系统，全程PLC控制，Flash实时显示，操作简单。
9. 可实现在线诊断设备问题和远程监测，及时处理设备故障。

## Technical advantages

1. This pin mill can continuously and stably produce with a high degree of automation, suitable for all scales of industrial production.
2. High utilization rate of coating agents and small consumption of agents used for coating the GCC powder. The dosage of additives is only 0.5% to 0.8%.
3. The coating rate of the powder is high, which can reach 99%, and energy consumption is low.
4. Independently controlled driver of pin disc can control its speed and direction of rotation, effectively improving the secondary agglomeration problem after powder modification.
5. The added value of the coated product is high, which brings more lucrative profits and shortens the time of cost recovery for the enterprise.
6. Adopting unique atomizing nozzle design and vortex mixing operation mode, the material and additives have a long action time and high modification efficiency.
7. The whole system is working under negative pressure with good sealing. No leak of the powder, clean production environment, no dust pollution.
8. Central control system of artificial intelligence, PLC control, flash real-time display, easy to operate.
9. Can realize online diagnosis of equipment problems and remote monitoring, and timely treatment of equipment failures.





## VSGXJ 系列连续性活化改性机

### VSGXJ SERIES CONTINUOUS MODIFICATION & COATING MACHINE

#### 设备简介

东莞五全机械有限公司，借鉴国外活化改性技术，结合自己粉体生产的实际经验，自主研发的一款用于各种无机粉体表面处理的深加工设备，用于D97在4到25微米的轻质碳酸钙、重质碳酸钙、天然硫酸钡、煅烧高岭土等物料的表面改性，生产能力达到2.5~4.5吨/小时，活化指数 $\geq 85\%$ ，单位产品能耗 $\leq 35\text{kwh/t}$ 。该型活化改性机可应用于500目至3000目各种细度粉体的干法表面改性，同时兼具对物料的解聚打散功能。

该型活化改性机可应用于325目至6000目各种细度粉体的干法表面改性，如轻质碳酸钙、重质碳酸钙、水洗高岭土、煤系煅烧高岭土、滑石、石英粉、云母、氢氧化铝、氢氧化镁和水镁石、超细和沉淀硫酸钡、立德粉、白炭黑、钛白粉、粉煤灰、绢云母、氧化锌等物料的表面改性活化，同时兼具对物料的解聚打散功能。

#### Brief Introduction

Dongguan Vsunny Machinery Co., Ltd., drawing on overseas coating and modification technology, combined with its own powder production experience, independently developed a deep processing equipment used for a variety of inorganic powders for surface treatment for D97 in 4 to 25 micron light calcium carbonate, GCC, natural barium sulphate, calcined kaolin and other materials, surface modification, production capacity of 2.5~4.5 tons/hour, coating index is  $\geq 85\%$ , energy consumption per unit product is  $\leq 35\text{kwh/t}$ . This type of coating and modification machine can be applied to the dry surface modification of various finenesses of powders from 500 mesh to 3,000 mesh, and at the same time, it also has the function of depolymerization and dispersing of materials.

This continuous modification and coating machine can be used for dry surface modification of powder of various fineness from 325 mesh to 6000 mesh, such as the surface modification and activation of light calcium carbonate, heavy calcium carbonate, washed kaolin, calcined coal kaolin, talcum, quartz powder, mica, aluminum hydroxide, magnesium hydroxide and brucite, ultrafine and precipitated barium sulfate, lithopone, white carbon black, titanium dioxide, coal ash, sericite, zinc oxide and other materials, while at the same time it can depolymerize and scatter the materials.

## 工作原理

为了实现对粉体的表面改性处理，本活化机需要先把改性剂（硬脂酸）加到温控加药系统内，将其加热融化至液态，再用计量泵把精确计量过的改性剂（硬脂酸）输送到雾化室上方的喷嘴，在雾化室内干燥的粉体和被雾化后的改性剂（硬脂酸）同时送至主机内。

主机由三个品字形的改性筒组成，改性筒由主轴、冲击锤、固定销等组成。改性剂与物料连续地进入第一个改性筒，然后流经各改性筒，在此过程中会受到不同方向的气流冲击。高速旋转的转子让特殊设计的改性筒内形成涡旋二相流，让物料和改性剂被充分打散。依靠转子高速旋转与粉体物料的冲击、剪切和摩擦作用所产生的热量，改性剂和物料在筒内迅速升温，达到改性需要的温度，也因此让两者得以充分接触、混合，改性剂能迅速、均匀地与粉体颗粒表面作用，包覆于颗粒表面，完成对粉体的表面包覆改性。最后，成品将由后端的脉冲除尘器收集。

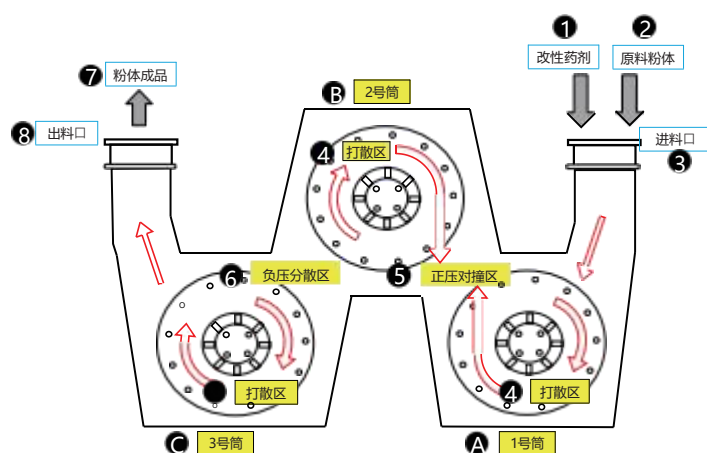
整套系统无粉尘污染，操作简便；单位产品改性剂用量少，单位产品能耗低；不需要另设粉体加热装置，改性温度可以根据需要调节；改性产品不团聚，对于超细粉体有较强的打散、解聚作用，特别适用于超细粉体的表面改性。

## Working Principle

In order to realize the surface modification treatment of powder, this coating machine needs to add the coating agent (stearic acid) into the temperature-controlled dosing system first, and melt it to liquid state by heating it, and then use the metering pump to convey the precisely measured coating agent (stearic acid) to the nozzle above the atomization chamber, and the dry powder and the atomized coating agent (stearic acid) in the atomization chamber are sent to the main machine at the same time.

The main machine consists of three zigzag modified cylinders, which are composed of spindle, impact hammer, fixed pin and so on. The coating agent and material continuously enter into the first coating cylinder, and then flow through the coating cylinders, during which they will be impacted by the airflow in different directions. The high-speed rotor makes the vortex two-phase flow in the specially designed modifier cylinder, so that the material and modifier are fully dispersed. Relying on the heat generated by the impact, shear and friction between the rotor and the powder material at high speed, the modifier and the material in the cylinder will rapidly heat up to the temperature required for coating and therefore the two can be fully contacted and mixed, and the coating agent can quickly and evenly interact with the surface of the powder particles and coat the surface of the particles, thus completing the surface-coating modification of the powder. Finally, the finished product will be collected by the back-end pulse dust collector.

The whole system has no dust pollution and easy operation; the dosage of coating agent per unit of product is less, and the energy consumption per unit of product is low; there is no need to set up another powder heating device, and the temperature of modification can be adjusted according to the need; the modified product is not agglomerated, and it has strong dispersing and depolymerizing effect for ultra-fine powder, which is especially suitable for the surface modification of ultra-fine powder.



1.Modifying agents  
2.Powder material  
3.Feed inlet  
4.Depolymerization area

5. Positive pressure collision area  
6. Negative pressure dispersion area  
7.Finished product  
8.Feed outlet

A.Cylinder 1  
B.Cylinder 2  
C.Cylinder 3

## 技术优势

1. 锤片技术改进：新锤片是用耐磨钢板一体式锻打而成，消除了拼装式锤片的接缝问题，使得锤片结构更加紧密，耐磨性更强。一体化的设计不仅提高了锤片的耐用度，也减少了维护和更换的频率，降低了维护成本，同时延长了设备的使用寿命。

2. 进料系统升级：引入失重称进料技术，可以实现对物料进料量的精准控制，进料量误差在1%以内。无论物料的形态和流动性如何，都能够稳定供给，减少了浪费，提高了生产效率和产品一致性，使得生产过程更加稳定可靠。

3. 药剂桶齿轮泵稳定性提升：采用药剂桶齿轮泵，具有更强的耐磨性和密封性能，不易受到物料性质的影响。泵体结构更加稳定，不易磨损和泄漏，大大减少了维护频率和成本，同时保证了设备长时间稳定运行。

4. 药剂雾化技术改进：引入喷雾式雾化技术，通过更细腻的喷雾，使药剂更均匀地覆盖在原料粉末上，提高了覆盖率和均匀度，从而改善了产品的表面质量和活化效果。此外，喷雾式雾化操作简便，更易于实现自动化控制，提高了生产效率和稳定性。

5. 温控系统优化：引入六个温控探头全程控温设计，可以实时监测并控制设备各处的温度变化，确保了整个活化过程中温度的均匀性和稳定性。这种优化提高了产品的质量一致性，降低了温度梯度，减少了产品的次品率，提高了生产效率。

6. 控制系统改良：采用固态继电器控制系统，具有响应速度快、温度控制精度高的特点，误差在正负1℃左右，能够更准确地控制温度从而保证粉体的包覆效果，提高了连续生产的稳定性和安全性。

7. 减速机的直驱模式：采用直驱模式的减速机，取消了传统皮带传动，降低了能量损耗，提高了能效，减少了维护成本和停机时间，同时减少了噪音和振动，大幅提高了设备的稳定性和可靠性。

8. 主机舱的优化：新的主机舱采用舱门设计，易于打开，减少了停机时间，便于检修维护。

## Technical advantages

1. Hammer Blade Technology Improvement: The new hammer blade is forged from wear-resistant steel plate in one piece, eliminating the seam problem of assembled hammer blades, making the hammer blade structure more compact and more wear-resistant. The one-piece design not only improves the durability of the hammer blade, but also reduces the frequency of maintenance and replacement, lowering the maintenance cost while extending the service life of the equipment.

2. Feeding system upgrade: The introduction of loss-in-weight weighing feeding technology can realize the precise control of material feeding quantity, and the error of feeding quantity is within 1%. Regardless of the form and fluidity of the material, it can be supplied stably, which reduces waste, improves production efficiency and product consistency, and makes the production process more stable and reliable.

3. Stability enhancement of the aids tank gear pump: The adoption of aids tank gear pump has stronger wear resistance and sealing performance, and is not easily affected by the nature of the material. The pump body structure is more stable, not easy to wear and leakage, greatly reducing the maintenance frequency and cost, while ensuring that the equipment for a long time stable operation.

4. Improvement of aids atomization technology: the introduction of spray atomization technology, through a more delicate spray, so that the aids more evenly covered in the raw material powder, improve the coverage and uniformity, thus improving the surface quality of the product and coating effect. In addition, the spray atomization is easy to operate and easier to realize automatic control, which improves the production efficiency and stability.

5. Optimization of temperature control system: The introduction of six temperature control probes for the whole process of temperature control design, which can real-time monitor and control the temperature changes in all parts of the equipment, ensuring the uniformity and stability of the temperature during the whole coating process. This optimization improves the consistency of product quality, reduces the temperature gradient, reduces the defective rate of the product and improves the production efficiency.

6. Improvement of control system: Adopting solid state relay control system, characterized by fast response speed and high precision of temperature control with an error of about plus or minus 1℃, it can control the temperature more accurately to ensure the coating effect of the powder and improve the stability and safety of continuous production.

7. Direct-drive mode of reducer: The adoption of direct-drive mode of reducer eliminates the traditional belt drive, which reduces energy loss, improves energy efficiency, reduces maintenance cost and downtime, and reduces noise and vibration, which significantly improves the stability and reliability of the equipment.

8. Optimization of the main cabin: The new main cabin is designed with a hatch that is easy to open, reducing downtime and facilitating access and maintenance.



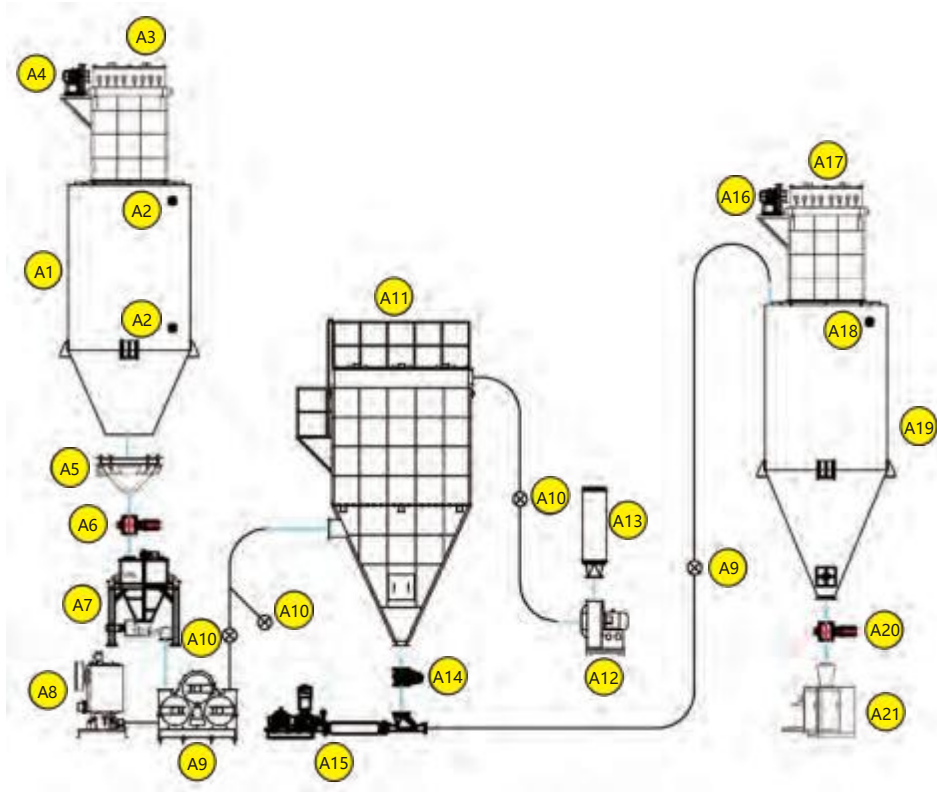
## VSGXJ 系列连续活化改性机技术参数

Technical parameters of VSGXJ series continuous modification and coating machine

型号 Model	VSGXJ-300	VSGXJ-600	VSGXJ-900
主机功率 Main unit power	18.5KW×3	37KW×3	75KW×3
风机功率 Blower power	5.5KW	22KW	45KW
主轴转速 Speed of main shaft	4500rpm	2970rpm	1500rpm
生产能力 Production capacity	1~2t/h	3~4.5t/h	6~8t/h

## VSGXJ 系列活化改性机工艺流程图

Process flow chart of VSGXJ series continuous modification and coating machine



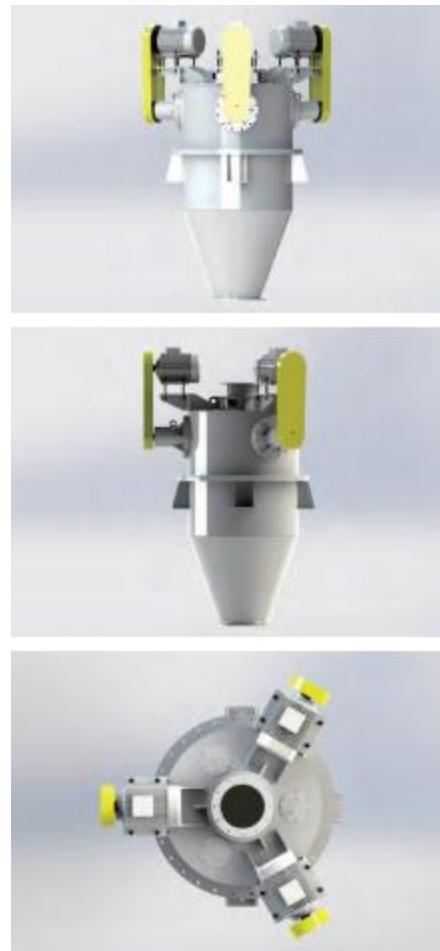
A1	原料仓及钢架 Raw materialsilo and steel frame	1
A2	高/低静电容料位计 High/low material level switch	1
A3	仓顶除尘器 Silo top dust collector	1
A4	离心风机 Centrifugal fan	1

A5	振动卸料器 Vibrating discharger	1
A6	旋转阀 Rotary valve	1
A7	失重称 Loss-in-weight feeder	1
A8	助剂系统 Adding system	1

A9	活化机 Coating machine	1
A10	风量开关 Air flow switch	1
A11	脉冲除尘器 Pulse dust collector	1
A12	离心风机 Centrifugal fan	1

A13	消音器 Silencer	1
A14	旋转阀 Rotary valve	1
A15	罗茨风机 Roots blower	1
A16	离心风机 Centrifugal fan	1

A17	仓顶除尘器 Silo top dust collector	1
A18	高静电容料位计 High material level switch	1
A19	成品仓及钢架 Finished product silo and steel frame	1
A20	旋转阀 Rotary valve	1
A21	包装机 Packing machine	1



## VSWF 系列涡轮气流分级机

### VSWF SERIES TURBO AIR CLASSIFIER

#### 设备简介

VSWF系列涡轮气流分级机，是东莞五全机械有限公司为了解决国内普通分级机分级效果差、产量低等问题，根据自己生产配套VSLM系列超细立磨分级技术，开发出来一款行业内领先，可分选1.5~30 $\mu$ m，2 $\mu$ m含量最高可达 90% 的涡轮气流分级机。

VSWF系列涡轮气流分级机，适用范围广泛，如重钙，轻钙，滑石，硫酸钡，硅灰石，叶腊石，白云石，石墨，高岭土，水镁石，皂石等各类非金属矿粉体。

#### Brief Introduction

VSWF series turbo air classifier is produced by Dongguan Vsunny Machinery Co., Ltd. to solve the problems of poor classification effects and low yield of domestic ordinary classifiers. Based on its self-produced VSLM series ultrafine vertical mill grading and classifying technology, the company has developed an industrial leading turbo-type air classifier which can sort 1.5~30 $\mu$ m, and its 2 $\mu$ m content can reach up to 90%.

VSWF series turbo air classifier has a wide range of applications, such as ground calcium carbonate, light calcium carbonate, talcum, barium sulfate, wollastonite, pyrophyllite, dolomite, graphite, kaolin, brucite, soapstone and other types of non-metallic mineral powder.

## VSWF 系列分级机性能参数

### Technical parameters of VSWF series turbo air classifier

型号 Model	VSWF - 3/350	VSWF - 4/350	VSWF - 6/350	VSWF - 9/350
分级轮数量 (个) Number of classifier	3	4	6	9
分级机功率 (KW) Classifier power	15KWx3	15KWx4	15KWx6	15KWx9
产品细度 D97(μm) Particle fineness D97 (μm)	3 ~ 60	3 ~ 60	3 ~ 60	3 ~ 60
生产能力 (T/H) Production capacity	4 ~ 6	5 ~ 7	8 ~ 10	12 ~ 14
小于 2μm 含量 Less than 2μm powder content	50 ~ 90%	50 ~ 90%	50 ~ 90%	50 ~ 90%

### 工作原理

进料螺旋输送机将储存于料斗的粉体物料，用电脑控制以固定的流量进入输风管。而在进入分级机前，粉料会与风机的主气流充分混合。充满粉料的主气流先进入分级机底部的涡卷室，运用涡卷室主气流的漩涡力与预分级室的上升次气流所产生的离心力相互作用下，对粉体进行预分级，较粗颗粒粉体会先行分出。

没有进入预分级室而从分级机底部落下的粗颗粒粉体，即为分级后的下品。次气流则由预分级室内的下方吸入，并且粗粉中再选出剩余的细粉。其余的含更细粉体的气流则被带入最终分级区，分级出口装有3个或者多个分级轮的自动分级机进行最终选粉工作。粉体在此分级区中，受到离心力，流体阻力，及自身重力等作用下，大于分级轮收束点的粉体则会被送回预分级室中，小于收束点的粉体则随着气流带出分级机，风机将气体中的细粉自分级机带出，经脉喷式袋滤机收集为成品。部分气体会从设备的排风管中排出进入大气，以维持整个分级系统可以在露点温度以上正常运作，其余空气则被循环使用为主气流。由袋滤机所收集的细粉，及预分级室中的粗粉，会通过气力输送系统，根据其产品细度而运送到指定的不同的成品仓中。

### Working Principle

The feed screw conveyor will put the powder materials stored in the hopper in the airflow transport duct at a constant flow rate by a computer, and mix the powder with the main stream before entering into the classifier. The main air stream with powder will enter into the volute chamber firstly at the bottom of the classifier, and uses both the vortex force of the main stream in the volute chamber and the centrifugal force generated by the rising secondary air stream in the pre-classifying chamber to make pre-classifying. Coarse particles are first sorted out.

Coarse powder which had not entered into the pre-classifying chamber will fall from the bottom of the classifier, which are the low-end powder after classification. The secondary air stream sucks from the bottom of the pre-classification chamber and picks the remaining fine powder from the coarse one. The remaining air stream containing finer powders are brought into the final classification zone, in which the outlet is equipped with an automatic classifier having three or more classifier for final classification. In this classification zone, the powder is under the action of the centrifugal force, fluid resistance, and its own gravity. Powder which is larger than the classifier convergent point will be sent back to the pre-classification chamber, while powder which is smaller than the convergent point will be brought out of the classifier along the air stream. The blower brings the fine powder from the classifier



and becomes the finished product collected by the jet bag filter machine. Part of the gas will be discharged from the exhaust pipe of the device into the atmosphere, in order to maintain the whole classifying system's temperature above the dew point in normal operation, whilst the remaining air is recycled as the main airstream. Collected by the bag filter, fine powder and coarse powder in the pre-classification chamber will be delivered to the designated different product hopper by the pneumatic conveying system, according to their specifications.



二次分级系统 Secondary classifying system

## 技术优势

1.精准的粒径分布。可根据所要求的收束点，调节控制，保持很窄的粒径分布。

2.产品稳定，连续可靠。通过变频调分级轮转速或调风阀开度可任意调节产品细度，产品品种的调节简单方便，连续稳定。

3.适用于大规模工业化分级生产，采用强力涡流分级原理设计，分级叶轮水平放置，有单叶轮和多叶轮结构，特别适合400~6000目微粉大规模工业化分级生产。

4.可设立独立的分级系统，单独使用。适用于直联各类粉磨设备(如球磨机、冲击磨、振动磨、立式磨、气流磨、搅拌磨等)，联合组成闭路连续超细生产系统。

5.全套分级机系统，采用PLC触屏智能控制，可实现实时显示，参数，指标，温度，产量等，并可做到可调可控。

## Technical Advantages

1.Accurate particle size distribution. Maintain a narrow particle size distribution through adjustment and control operations according to the convergent point required.

2.The product is stable, continuous and reliable. The fineness of the product can be adjusted freely by adjusting the rotating speed of the classifying wheel through frequency converter or adjusting the opening of the air valve. The adjusting of the product variety is easy and convenient, continuous and stable.

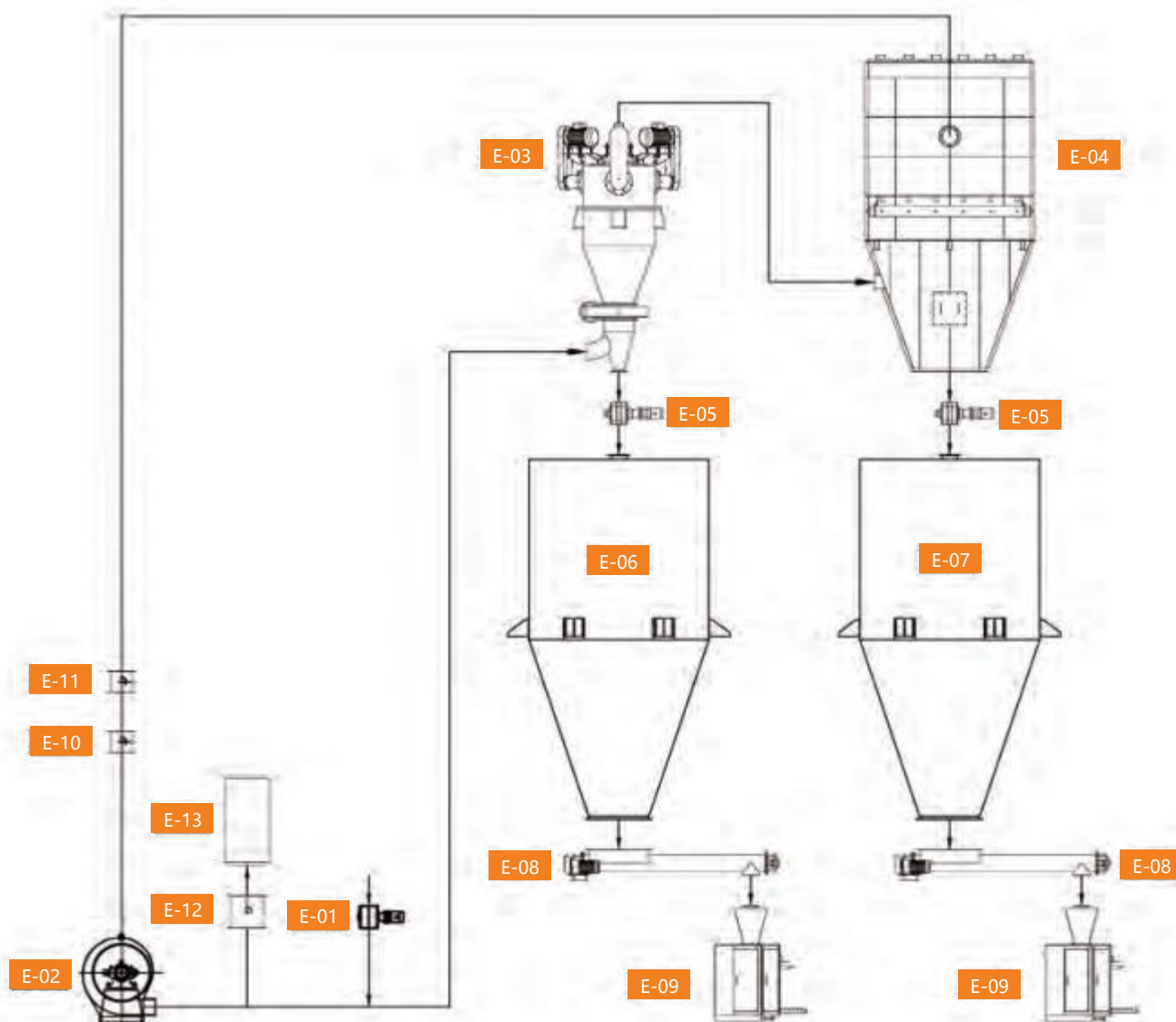
3.Support large scale of industrial classification production. Designed with mighty vortex classification principle and the classifying impeller located horizontally with single impeller or multiple impellers structure, the classifier is particularly suitable for large-scale industrial classification production of 400~6000 mesh micro powder.

4.Independent system can be established for independent purpose. Suitable for directly connecting various grinding equipment (such as ball mill, impact mill, vibration mill, vertical roller mill, air jet mill, and stirring mill, etc.) to form a closed-circuit continuous ultrafine production system.

5.A full set of classifier system with PLC touch screen intelligent control, showing real-time, adjustable and controllable parameter, index, temperature, production volume etc.

## 二次分级、三次分级生产工艺流程图

Process flow chart of secondary and tertiary classification



设备编号 Code	名称 Name
E-01	旋转阀 ROTARY VALVE
E-02	高压风机 HIGH PRESSURE BLOWER
E-03	涡轮气流分级机 TURBO AIR CLASSIFIER
E-04	脉冲除尘器 PULSE DUST COLLECTOR
E-05	旋转阀 ROTARY VALVE
E-06	下品成品仓 INFERIOR FINISHED PRODUCT SILO
E-07	上品成品仓 FINE FINISHED PRODUCT SILO
E-08	螺旋输送机 SCREW CONVEYOR
E-09	包装机 PACKING MACHINE
E-10	电动风量调节阀 ELECTRIC AIR DAMPER
E-11	手动风量调节阀 MANUAL AIR DAMPER
E-12	手动风量调节阀 MANUAL AIR DAMPER
E-13	消音器 SILENCER



## VSBJZ 系列全密封自动包装机

### VSBJZ SERIES FULLY-SEALED AUTOMATIC PACKING MACHINE

#### 设备简介

VSBJZ全密封自动包装机，是东莞五全机械有限公司，借鉴国内其它粉体自动包装机技术，结合自身粉体生产实际经验。针对普通包装机存在漏粉，粉尘污染大，称重不够精确，单机产量小等缺点开发出来的一款全密封自动包装机。

VSBJZ全密封自动包装机，主要适用于400目~6000目(35 $\mu$ m~2 $\mu$ m)非金属矿粉体，特别适合重钙，轻钙，硫酸钡，改性钙，硅灰石，钛白粉，高岭土，滑石粉，石膏等领域。

#### 技术优势

- 1.该包装机采用目前最前沿的，螺旋及叶轮同轴结构，填充速度快，单机产量大。
- 2.微重力传感称重结构，称重精确度高。
- 3.操作中各工作状态实时显示，具有仪表系统故障自诊断功能。
- 4.针对于包装 400目以上超细粉，漏粉量小，干净卫生。

#### Brief Introduction

VSBJZ Fully-sealed Automatic Packing Machine is developed by Dongguan Vsunny Machinery Co., Ltd. learning from domestic automatic packaging technologies of other powder, combined with its own actual experience in powder production. It is a fully-sealed automatic packing machine focusing on the shortcomings of general packing machines, including powder leakage, heavy dust pollution, inaccurate weighing, small single machine output, etc.

VSBJZ Fully-sealed Automatic Packing Machine is mainly applied to 400~6000 mesh (35~2 $\mu$ m) non-metallic mineral powder, especially suitable for ground calcium carbonate, light calcium carbonate, barium sulfate, modified calcium, wollastonite, titanium dioxide, kaolin, talcum, gypsum and other fields.

#### Technical Advantages

1. The packing machine uses the most cutting-edge screw and impeller coaxial structure, showing fast filling speed and large single output.
2. The micro-gravity sensing weighing structure and high weighing accuracy.
3. The real-time display of all working statuses during operation; have self-diagnostic functions of instrumentation system.
4. Focusing on packaging ultrafine powder of 400 mesh or more; few amount of powder leakage; clean and sanitary.



# VSBJ-2004 全密封自动包装机技术参数

Technical parameters for VSBJ-2004 fully-sealed automatic packing machine

型号 Model	双嘴包装机 Double ports packing machine	单嘴包装机 Single port packing machine
包装范围 Packaging range	最大称重量 10~50kg (weighing capacity 10~50kg)	最大称重量 10~50kg (weighing capacity 10~50kg)
称重感量 Weighing sensitive quality	0.2kg (200g) 即公差 Tolerance	0.2kg (200g) 即公差 Tolerance
包装能力 Packaging capacity	240~320 包 / 小时 bags/hour	120~160 包 / 小时 bags/hour
计量精度 Measurement accuracy	正负 0.2% Plus or minus 0.2%	正负 0.2% Plus or minus 0.2%
工作环境 Working temperature	0 to 40 摄氏度 degrees	0 to 40 摄氏度 degrees
使用电压 Service voltage	AC380V 三相 three-phase 50/60HZ	AC380V 三相 three-phase 50/60HZ
电源功率 Power	2*4KW	4KW
使用气压 Air pressure	4~8kg/cm2 (0.4~0.8mpa),	4~8kg/cm2 (0.4~0.8mpa),
外形尺寸 Dimensions	1428*1250*1820mm	1428*750*1820mm
设备重量 Machine weight	大约 About 800kg	大约 About 400kg
备注 Notes	包装能力因物料性能或供料压力而有所不同，以上仅供参考 Packaging capacity is different due to material properties or the supply pressure, only for reference	

# VS 系列助剂

## VS SERIES GRINDING AIDS



### 定义

按照GB/T29526-2013的定义，助磨剂是指提高粉碎研磨效率的外加助剂。更确切地说，助磨剂是指物料在粉碎研磨的过程中，为提高粉磨效率、降低能耗，而添加的少量（用量一般在1%以下）的化学添加剂。

### Definition

According to the definition of GB/T29526-2013, grinding aids refers to the chemical additive added in small dosage (generally lower than 1%) during the crushing and grinding process to enhance the grinding efficiency and to reduce energy consumption.

### 助磨剂的类型

- 人造大理石、人造岗石专用助磨剂
- 无卤阻燃剂专用助磨剂
- PVC管材、型材专用助磨剂
- PVC电线电缆专用助磨剂
- PVC压延膜专用助磨剂
- PVC发泡板专用助磨剂
- PP母粒、PE母粒专用助磨剂

### Types of grinding aids

- Grinding aids for artificial marble & artificial granite
- Grinding aids for halogen-free flame retardants
- Grinding aids for PVC pipe & PVC profile
- Grinding aids for PVC wire and cable
- Grinding aids for PVC rolling film
- Grinding aids for PVC foam board
- Grinding aids for PP & PE masterbatch

### 作用

其作用主要是提高研磨效率、加快矿石颗粒的破碎速度，并由于药剂的分散作用，而改变矿粉浆的流变学特征，有的还可以对钢球和衬板起缓蚀作用，最终达到降低能耗、钢球消耗和进行选择磨碎的目的。

### Functions

The main function of grinding auxiliary is to enhance the grinding efficiency and accelerate the crushing velocity of mineral grains. In addition, the dispersant effects of the grinding auxiliary can change the rheological features of mineral power fluid. Some can even slow down the corrosion process of the steel ball and the scale board, thus reducing the consumption of energy and steel balls, and realizing the aim of selective grinding.



# VSUNNY SALES SERVICE

## 定义

总结多年的实际生产经验和现场客户反馈的意见，公司建立了一套完备有效的服务体系，打造了一支经验丰富的服务团队。不仅会派专业技术人员现场指导、安装和调试设备，而且会提供各种有针对性的粉体生产与技术指导、各类助剂和粉体销售方案。公司服务网点遍布全国各大城市，有完的客户档案登记系统，使五全的服务更加贴心、高效。

Concluding many years of practical experience in production and on-site customer's feedback, the company has established a set of comprehensive and effective service systems and created an experienced service team. It not only sends technology professionals for on-site guidance, installation and commissioning of equipment, but also provides a variety of schemes tailored to powder production and technical guidance, and types of targeted grinding additives or activation additives or modifying additives, and a wide range of targeted powder marketing programs and so on. Our service outlets are located in major cities throughout the country, and we have a perfect customer registration system, making our service more intimate and efficient.

## 售前

- 1.帮助客户免费规划场地，进行设备选型；
- 2.设计安装基础图和流程图，指导生产车间的前期筹备工作；
- 3.免费派工程师到客户现场进行流程和方案设计。

## 售中

- 1.完善的品质管理系统，产品出厂前的严格检验；
- 2.免费提供物流信息，严格安排发货；
- 3.免费进行设备的地基制作指导；
- 4.免费提供设备的安装调试指导；
- 5.免费提供专业的技术培训和维修保养培训。

## 五星级售后服务

- 1.有针对性地提供各种粉体的生产与技术指导；
- 2.有针对性地提供各类研磨、活化与改性助剂；
- 3.有针对性地提供各类粉体销售方案；
- 4.可为客户的现有业务团队提供系统性并贴近实战的销售培训。

## Pre-sales

- 1.Help customer plan space and select equipment model for free;
- 2.Design the basic installation drawing and flow diagram, guide the preparatory work in the production workshop;
- 3.Send engineers to the customer's site for designing processes and programs for free.

## On-sale

- 1.Perfect quality management system, strict product testing before delivery;
- 2.Provide logistics information for free, strictly arrange delivery;
3. Guide ground production of the equipment for free;
4. Provide guidance to equipment installation and debugging for free;
5. Provide professional technical training and maintenance training for free.

## Five star after-sales service

1. Provide a variety of targeted powder production and technical guidance;
2. Provide various types of targeted grinding, coating and modifying additives;
3. Provide a wide range of targeted powder marketing programs;
4. Provide systematic sales training that is close to actual combats for customers' existing business team.



常用物料的硬度与易磨性

HARDNESS AND GRINDABILITY OF COMMON MATERIALS

(仅供参考Only for reference )

物料 Material	密度 Density g/cm³	莫氏硬度 Hardness	易磨性 Grindability
石墨 Graphite	2.1~2.2	1	1
石膏 Gypsum	2.3	1.5~2	2
正长石 Orthoclase	2.5~2.6	6	3
斜长石 Anorthose	2.6~2.8	6~6.5	3
石英 Quartz	2.5~2.8	7	3
方解石 Calcite	2.6~2.8	2~3	1
滑石 Talc	2.7~2.8	1	1
白云石 Dolomite	2.8~2.9	3.5~4.5	2
萤石 Fluorite	3~3.2	4	2
磷灰石 Apatite	3.2	5	3
孔雀石 Malachite	3.9~4.1	3.5~4	3
刚玉 Corundum	3.9~4.1	9	3
硅灰石 Wollastonite	3	5	2
石榴石 Garnet	4	7	3
云母 Mica	2~3	3	2
绢云母 Sericite	2~3	3	2
膨润土 Bentonite	2	2	1
金属铝 Al	2.7	5	3
伊利石 Illite	2	2	1
麦饭石 Maifan Stone	2	2~3	2
水镁石 Brucite	3~3.5	3~4	3

物料 Material	密度 Density g/cm³	莫氏硬度 Hardness	易磨性 Grindability
重晶石 Barite	4.3~4.7	3~3.5	2
金刚石 Diamond	3.5	10	3
煤 Coal	1.6	3	2
高岭土 Kaolin	2	2	1
重钙 Calcium Carbonate	2.6~2.8	2~3	1
石灰石 Limestone	2.6~2.8	2~3	1
钾长石 Potassium Feldspar	2.6~2.8	5	2
沸石 Zeolite	2.3~2.5	3	1
海泡石 Sepiolite	2	3	2
硅藻土 Diatomite	2~3	4	2
珍珠石 Perlite	2~3	2~3	1
粉煤灰 Pulverized Coal Ash	2	4~5	2
叶腊石 Pyrophyllite	3	4~5	2
锂盐渣 Lithium Slag	3~4	3~4	2
钢渣 Steel Slag	3.5~4	5~6	3
水渣 Water granulated slag	2.6~3	5	2
炉渣 Slag	2~2.5	3~4	2
矾渣 Jarosite Residue	2~3	3~4	2
煤矸石 Coal Gangue	2~3	2~3	2
金属铬 Chromium	7.1~9	7~8	3
蛭石 Vermiculite	2~3	2~3	1

# 筛孔与目数对照表

## COMPARISON TABLE FOR PARTICLE SIZE AND SCREEN MESH

(仅供参考Only for reference )

美国标准 (目) American standard(mesh)	日本标准 (目) Japanese standard (mesh)	德国标准 (孔 /cm²) Germany standard (hole/cm²)	颗粒大小 (微米) Particle size (micron or μm)	美国标准 (目) American standard (mesh)	日本标准 (目) Japanese standard (mesh)	德国标准 (孔 /cm²) Germany standard (hole/cm²)	颗粒大小 (微米) Particle size (micron or μm)
2	2.4		11100	110	131	1880	130
3	3.6	1.4	7090	120	146	2230	117
4	4.8	2.5	5160	125	149	2420	113
5	6.0	3.9	4040	130	155	2610	109
6	7.2	5.6	3350	140	167	3040	107
7	8.4	7.6	2870	150	178	3480	104
8	9.5	9.9	2460	160	191	3960	96
10	11.9	15.5	1900	170	202	4480	89
12	14.6	22.5	1520	175	209	4750	86
14	16.7	30.3	1300	180	215	5050	84
16	19.1	39.6	1130	200	238	6200	74
18	21.5	50.0	980	230	274	8200	65
20	23.8	60.2	864	240	286	8900	63
24	28.6	89.1	701	250	298	9700	61
28	33.4	122	577	270	322	1130	53
30	35.8	140	535	300	358	14000	46
32	38.2	159	500	325	388	16400	43
35	41.7	190	447	400	477	24800	35
40	47.7	248	381	500	596	38700	28
42	50.0	273	355	600	715	55800	23
45	53.6	314	323	800	955	99000	18
48	57.2	357	295	1000	1193	155000	13
50	59.6	388	279	1250	1600	178000	10
60	71.5	560	221	2000	2380	62000	6.5
65	77.5	655	203	5000	5960	3880000	2.6
70	83.5	760	185	8000	9550	9900000	1.6
80	95.5	990	173	10000	11930	15500000	1.3
90	107.3	1260	150	12500	15150	25000000	1.0
100	119.3	1550	140				

注 1：目前国内标准：颗粒大小“微米”与“目”的对应关系参照美国标准。  
Note 1:the present domestic standard for comparison table of particle size and screen mesh is referred to American standard.  
注 2:1mm=1000μm.  
Note 2: 1mm=1000μm.

## 客户现场 CUSTOMER SITE



广西南宁某地生产线  
Guangxi Nanning



广西贺州某地生产线  
Guangxi Hezhou



河南南召某地生产线  
Henan Nanzhao



广西贺州某地生产线  
Guangxi Hezhou





河南内乡某地生产线  
Henan Neixiang



安徽池州某地生产线  
Anhui Chizhou



广东连州某地生产线  
Guangdong Lianzhou



山东淄博某地生产线  
Shandong Zibo



## 客户现场 CUSTOMER SITE





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