



SPHERICITY MACHINE

球形化装置



研发
R&D



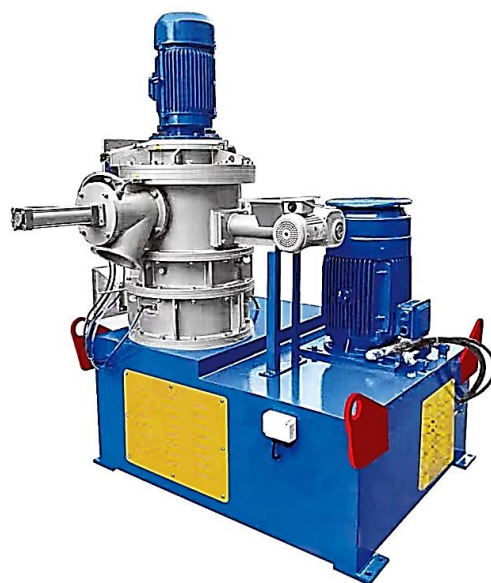
生产
Production



销售
Sales



售后
After sales



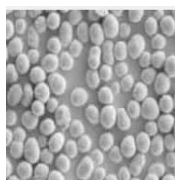
设备原理 Equipment principle

◆球形化原理

通过高速旋转刀盘产生的气流以及与内衬之间的撞击进行原料角粉碎。
根据内藏分级轮的转速调整球形到希望产品。
伴随空气循环进行粉碎,可抑制热量产生。

◆ Spherical principle

The airflow generated by the high-speed rotating cutter head and the inner lining,
The corner of raw materials is crushed by impact.
Adjust the sphere to the desired product according to the speed of the built
grading wheel. Crushing with air circulation can inhibit heat generation.



设备名：粒子球形化装置

用途：原材料整形用

型号：XRD-400 XRD-600

磨盘径：φ400mm φ600mm

Equipment name : Particle spheroidizing machine

Purpose : Raw material shaping

Model : XRD-400 XRD-600

Grinding disc diameter : φ400mm φ600mm



关于振实密度

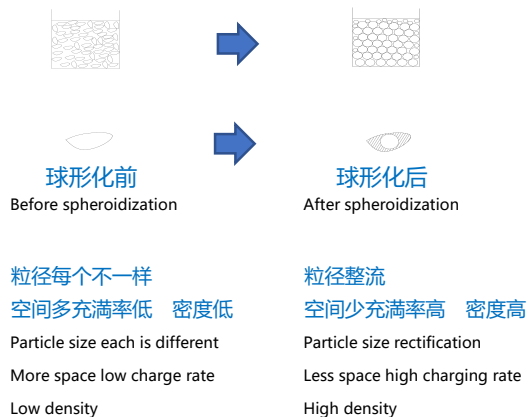
为什么振实密度在球形化设备中很重要？

On Compaction Density

Why is compaction density important in spheroidizing equipment?

振实密度的变化原理

Principle of variation of vibronic density



【应用领域】

锂电池负极材料 复印机墨粉 去除食品淀粉和污垢粉末
从树脂粉末中去除纤维状物质 从电子基材中回收有价值物

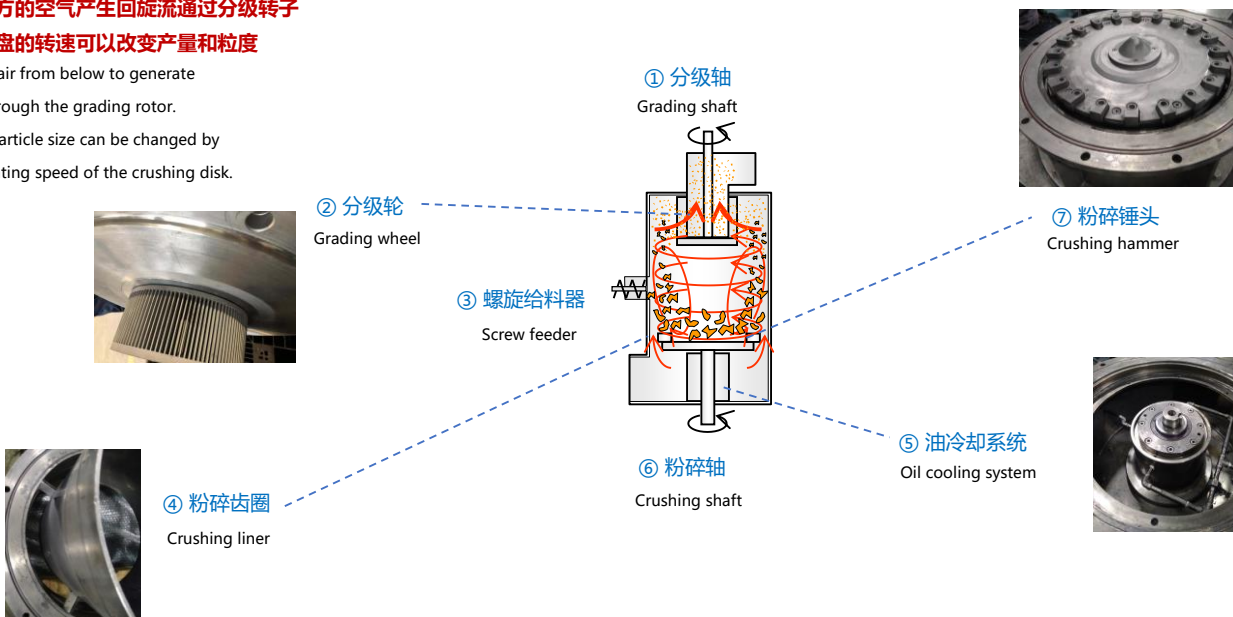
【Application】

Lithium battery anode materials Copier toner Removal of food starch and dirt powder
Removal of fibrous materials from resin powder Recovery of valuable materials from electronic substrates

设备结构 Equipment structure

风机拉动从下方的空气产生回旋流通过分级转子
通过调节破碎盘的转速可以改变产量和粒度

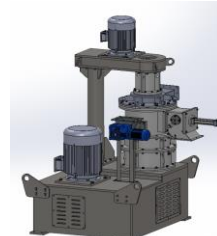
The fan pulls the air from below to generate
a swirling flow through the grading rotor.
The output and particle size can be changed by
adjusting the rotating speed of the crushing disk.



型号 Model	XRD-400	XRD-600
粉碎盘动力 Crushing disk power	22 kW	55kW
分级轮动力 Classifying wheel power	7.5kW	11kW
粉碎盘转数 Pulverizing disk revolution	4,500~6,000 r/min	3,000~5,200 r/min
机器尺寸 Machine size	W1,440×L1,200×H2,450mm	W2,300×L2,400×H2,930mm
设备重量 Equipment weight	2,500Kg	5,000 Kg



XRD-400



XRD-600

设备特点 Equipment features

负极材料粉碎后，进行球形化！

提高振实密度，使电池材料高性能化！

After the cathode material is crushed, spheroidize it!

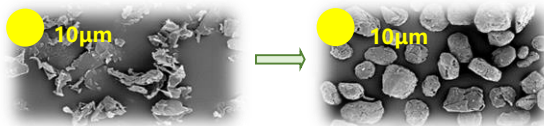
Improve vibrating density and make battery materials high-performance!

设备特点

Equipment Features

- ❖ 生产工艺的大幅度简化
- ❖ 以往的球形化设备是整形机、分级机2台设备
- ❖ 本设备采用分散构造，在颗粒分散状态下进行球形化
- ❖ 分级大颗粒与小颗粒、颗粒表面处理用1台设备同时进行
- ❖ 设备调节简便
- ❖ 微粉分类由分级轮的转速来调节
- ❖ 可24小时连续生产

- ❖ Substantial simplification of production process.
- ❖ The former spheroidizing equipment is two sets of shaping machines and graders.
- ❖ The equipment adopts dispersion structure and spheroidizes under particle dispersion state.
- ❖ Grading of large particles, small particles and particle surface treatment shall be carried out simultaneously with one equipment.
- ❖ Easy to adjust the equipment.
- ❖ Fine powder classification is regulated by the speed of grading wheel.
- ❖ 24-hour continuous production.



适用例

Application Examples

负极石墨的球形化

以球形化加大比重，增加充填量

提高球形度，减小比表，提高振实

Spheroidization of anode graphite

Increase the specific gravity with spheroidization to increase the filling volume.

Improve sphericity, reduce specific meter, and improve vibration compaction.

墨粉球形化及微粉去除

粉碎后的物料在腔体内，撞击刀盘和齿圈磨去菱角部

可同时进行微粉分级，球形化

Toner spheroidization and micro powder removal

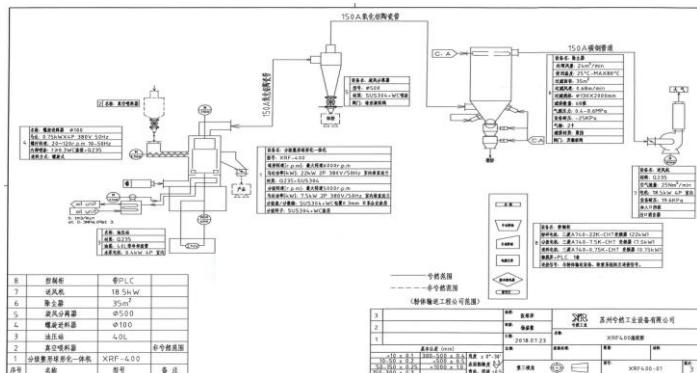
The crushed material is in the cavity and impacts the cutter head and gear ring to remove the water chestnut,

Fine powder grading and spheroidization can be carried out at the same time.



粒子球形化装置系统图

System diagram of particle spheronization device



球形化所需的因素

Factors required for spheroidization

因素

粉碎盘的转速 ⇒ 调整球形原料的粒度

集尘风量 ⇒ 细粉去除

机内滞留时间 ⇒ 球形化时间

密封空气量 ⇒ 将必要的粒径留在机内

目的

调整球形原料的粒度

细粉去除

球形化时间

将必要的粒径留在机内

Factor

Rotating speed of the crushing disk ⇒ Adjust the particle size of spherical raw materials

Dust collection air volume ⇒ Fine powder removal

In machine retention time ⇒ Spheroidization time

Sealing air volume ⇒ Leave the necessary particle size in the machine

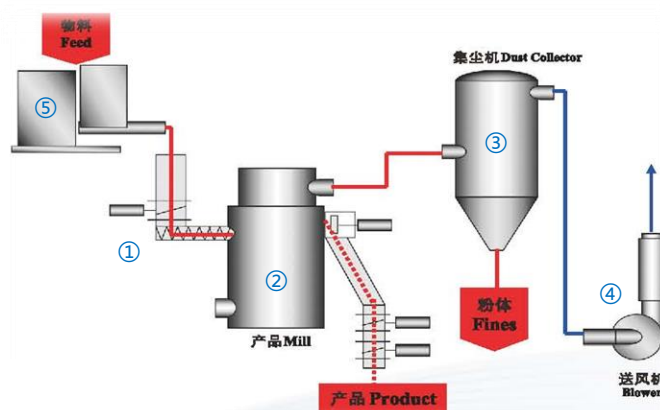
Purpose

Adjust the particle size of spherical raw materials

Fine powder removal

Spheroidization time

Leave the necessary particle size in the machine



生産系統流程

Production system process

① 螺旋喂料机

Screw feeder

② 球形主机

Spherical host

③ 布袋集尘器

Bag type dust collector

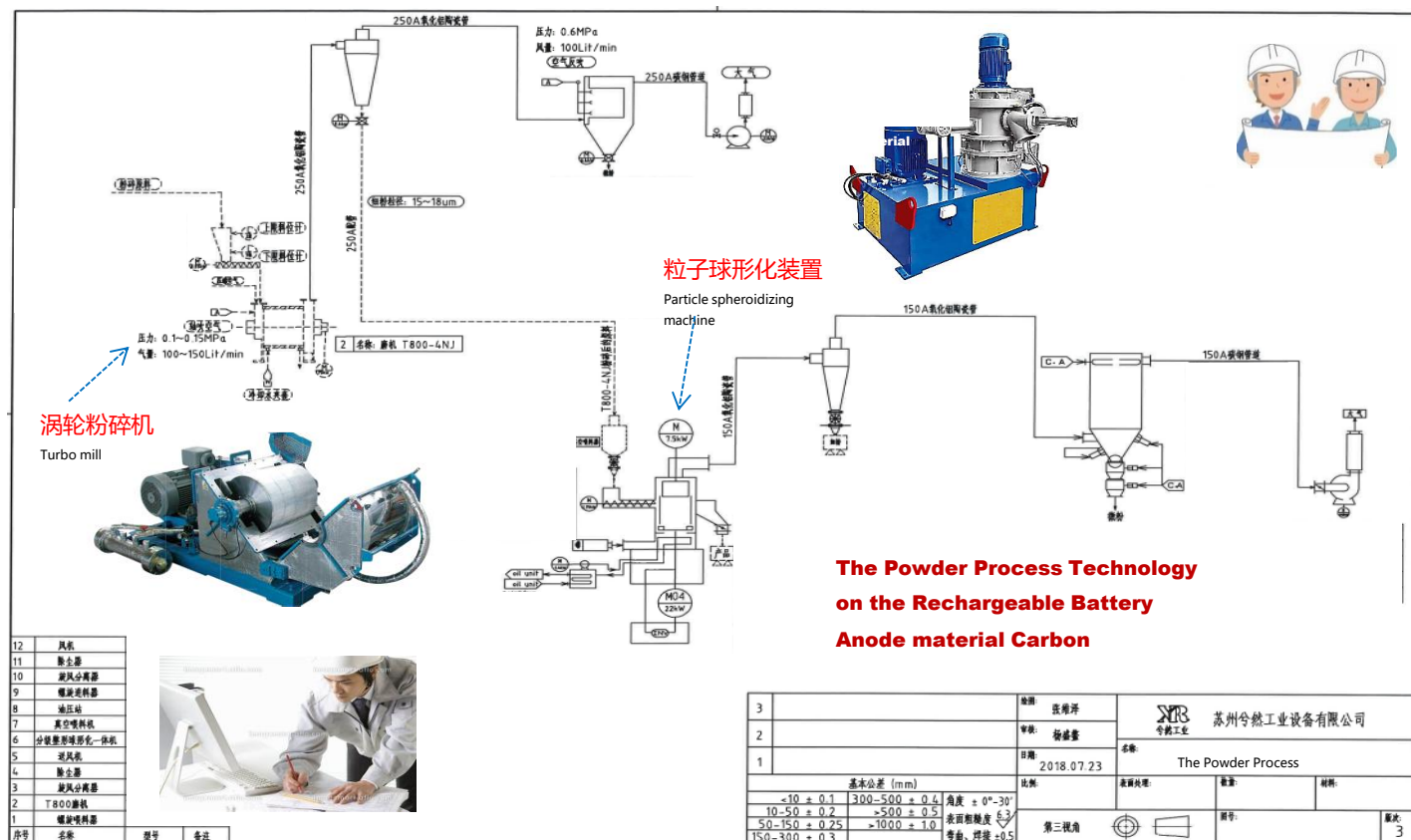
④ 风机

Fan

⑤ 原料料仓

Raw material silo

石墨生产流程图 Graphite production flow diagram



试验案例 Experimental cases

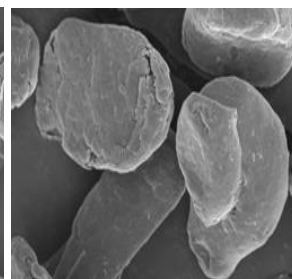
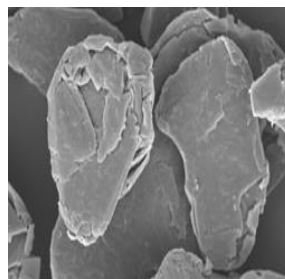
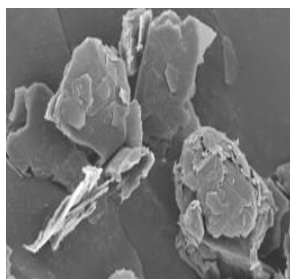


天然石墨球形化SEM报告
SEM Report on Spheroidization of Natural Graphite

当原料被送入
At the time of feeding raw materials

循环周期60秒
1 cycle 60 sec.

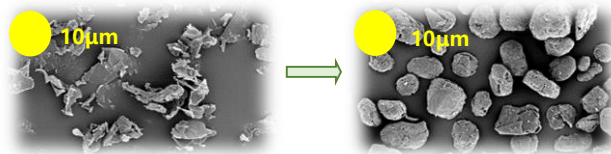
循环周期120秒
1 cycle 120 sec.



堆积密度 Packed bulk density	0.29g/cc	0.74g/cc	0.81g/cc
球形化 Circularity	0.915	0.942	0.954
比表面积 Sp.Surface Area BET	0.57m2/g	0.56m2/g	0.56m2/g
D50 D50	8.0 micron	10.8 micron	10.5 micron
产量 Throughput	-	120kg/h	60kg/h
回收率 Product yield	-	84%	75%

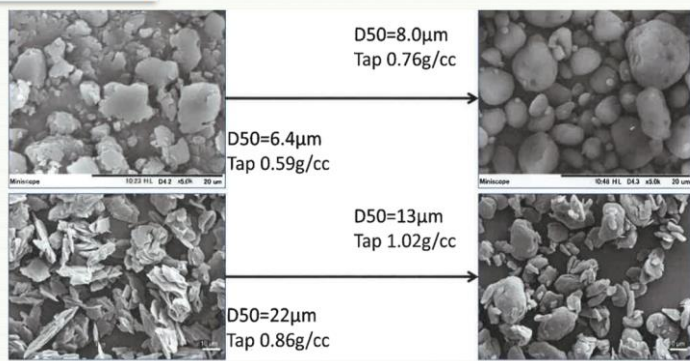


石墨球形化形状SEM报告



【Requirement】
Maintaining Sp.Surface Area
Sphericalization Densification

应用案例-焦炭球形化



焦炭球形化测试SEM报告
SEM report of coke spheroidization test



试验案例 Experimental cases



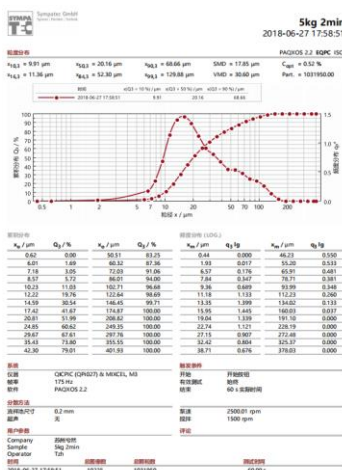
EQPC	30.858 μm	EQPC	38.616 μm	EQPC	33.146 μm
FIRET MAX	33.100 μm	FIRET MAX	45.863 μm	FIRET MAX	34.497 μm
FIRET MIN	29.350 μm	FIRET MIN	37.761 μm	FIRET MIN	32.913 μm
球面度	0.870	球面度	0.854	球面度	0.866
长焦距	0.836	长焦距	0.830	长焦距	0.954
公差	0.956	公差	0.939	公差	0.964
EQPC	20.583 μm	EQPC	20.063 μm	EQPC	18.824 μm
FIRET MAX	23.394 μm	FIRET MAX	22.013 μm	FIRET MAX	28.724 μm
FIRET MIN	18.820 μm	FIRET MIN	18.182 μm	FIRET MIN	18.480 μm
球面度	0.874	球面度	0.896	球面度	0.793
长焦距	0.840	长焦距	0.848	长焦距	0.394
公差	0.940	公差	0.948	公差	0.955
EQPC	17.666 μm	EQPC	18.903 μm	EQPC	15.911 μm
FIRET MAX	22.889 μm	FIRET MAX	21.320 μm	FIRET MAX	18.636 μm
FIRET MIN	14.020 μm	FIRET MIN	16.728 μm	FIRET MIN	14.480 μm
球面度	0.861	球面度	0.883	球面度	0.882
长焦距	0.613	长焦距	0.785	长焦距	0.763
公差	0.933	公差	0.948	公差	0.938
EQPC	15.937 μm	EQPC	16.438 μm	EQPC	17.699 μm
FIRET MAX	18.910 μm	FIRET MAX	19.430 μm	FIRET MAX	20.430 μm
FIRET MIN	15.506 μm	FIRET MIN	16.187 μm	FIRET MIN	17.153 μm
球面度	0.894	球面度	0.880	球面度	0.894
长焦距	0.939	长焦距	0.903	长焦距	0.866
公差	0.934	公差	0.933	公差	0.939

 EQPC FERET_MAX 16.938 μm FERET_MIN 20.208 μm FERET 15.107 长径比 0.744 圆度 0.931	 EQPC FERET_MAX 15.012 μm FERET_MIN 17.616 μm FERET 14.855 长径比 0.867 圆度 0.943 圆度 0.933	 EQPC FERET_MAX 15.806 μm FERET_MIN 20.136 μm FERET 12.294 μm 长径比 0.821 圆度 0.955 圆度 0.920
 EQPC FERET_MAX 16.461 μm FERET_MIN 19.627 μm FERET 15.107 长径比 0.834 圆度 0.940 圆度 0.970	 EQPC FERET_MAX 15.946 μm FERET_MIN 22.660 μm FERET 11.930 μm 长径比 0.813 圆度 0.926 圆度 0.918	 EQPC FERET_MAX 18.656 μm FERET_MIN 23.176 μm FERET 13.856 μm 长径比 0.885 圆度 0.964 圆度 0.920
 EQPC FERET_MAX 18.646 μm FERET_MIN 21.460 μm FERET 17.266 μm 长径比 0.868 圆度 0.905 圆度 0.951	 EQPC FERET_MAX 19.146 μm FERET_MIN 22.860 μm FERET 16.187 μm 长径比 0.708 圆度 0.970 圆度 0.946	 EQPC FERET_MAX 19.166 μm FERET_MIN 27.152 μm FERET 13.480 μm 长径比 0.893 圆度 0.947 圆度 0.935
 EQPC FERET_MAX 19.349 μm FERET_MIN 21.010 μm FERET 18.919 μm 长径比 0.896 圆度 0.943 圆度 0.985	 EQPC FERET_MAX 27.924 μm FERET_MIN 82.917 μm FERET 19.919 μm 长径比 0.786 圆度 0.943 圆度 0.943	 EQPC FERET_MAX 38.874 μm FERET_MIN 40.185 μm FERET 38.874 μm 长径比 0.908 圆度 0.973 圆度 0.973

球形化形状SEM报告
Spherical shape SEM report



球形化实验报告
Spheroidization Experiment Report



实验数据报告书

[illegible]

我有试验机
 We have testing machine.



高新技术企业
High-tech enterprise



高新技术产品认定
High-tech product identification



中国科学院苏州纳米研究所产学研基地
Suzhou Institute of Nanotechnology, Chinese Academy
of Sciences, Designation of Joint Research Centers



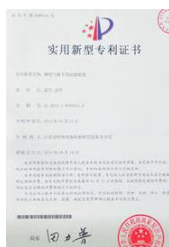
中南大学合作设立博士生工作站
Collaboration with Central South University
to establish a doctoral internship



ISO9001认证
ISO9001 certification



ISO14001认证
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专利证书
Patent certificate

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CE certification in Europe



韩国KCs认证
KCs certification in Korea



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防爆设备安装认证
Explosion-proof equipment
installation certification



防爆设备维护认证
Explosion-proof equipment
maintenance certification

锂电设备 粉体机器

