

卧式圆盘干燥机
Horizontal Plate Dryer

万佳干燥
WANJIA DRYING

应用 Applications

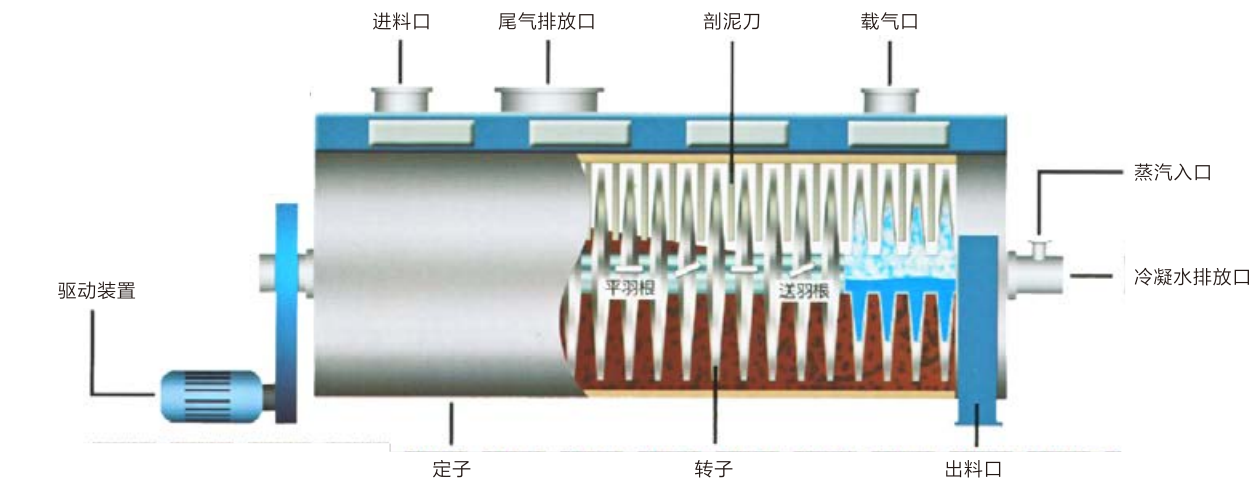
污泥(市政、化工、造纸、石油等)、食品残渣、药渣、酒渣、肥料、树脂等。

Sludge (municipal, chemical industry, papermaking, oil, etc.), food scraps, medical, wine residue, fertilizer, resin, etc.

原理 Principle

物料由进料口送入干燥机，工作介质在外壳和空心轴之间流动，通过夹套、空心轴和轴上焊接的空心盘片传输热量，物料被间接加热干化，产生的水蒸汽聚集在干燥机的穹顶，由载气带出干燥机。空心盘片与轴完全垂直，对物料没有切割，通过盘片边缘的推进 / 搅拌器的作用，对物料进行推进搅拌，不断更新干燥面，从而实现干燥的目的。

Material by the inlet into the drying machine, working medium flow between the shell and the hollow shaft, through jacket, hollow shaft and the shaft welding hollow blanks to transfer heat, the material being indirect heating and drying of steam gathered at the dome, dryer by the carrier gas out of the dryer. Hollow blanks and completely vertical axis, no cutting for the material, pushed by the edge of the disc/mixer, to promote mixing of materials, constantly updated dry surface, thus achieve the purpose of drying.



圆盘式干燥机结构图

● 定子

干燥机的定子形状近似为筒形，顶部设有穹顶，为载气和水蒸汽提供容积空间，并设有尾气出口和检修窗口，方便设备维护检修。定子端板采用法兰安装，便于检修，同时端板也用于固定转子的轴承。

● 转子

整台干燥机的承载部分，由一根中空轴和一组中空的圆盘组成。为提高圆盘的坚固性，空心内腔按环形布置几组支撑杆。在圆盘的外边缘装有推进 / 搅拌器，同时起到推进和搅拌物料的作用。

● 驱动装置

由嵌入式减速机、耦合器和电机等组成。用于驱动转子缓慢旋转。

● Stator

Stator shape approximation for cylindrical dryer, at the top of the dome, as a carrier gas and vapor volume of space, and is equipped with exhaust gas exports and maintenance window, convenient equipment maintenance. The stator end plate with flange installation, easy maintenance, also used in fixed rotor bearing end plate.

● Low rotor

Bearing part of the drying machine, by a hollow shaft and a set of hollow plate. To improve the robustness of the disc, the hollow inner cavity according to the circular arrangement several groups of support bar. On the edge of the outside of the disk with advance/mixer, have the effect of advance and mixing material at the same time.

● Low drive

By the embedded reducer. Coupler and motor, etc. Used to drive the rotor rotate slowly.

LPG系列高速离心喷雾干燥机
LPG Series High-Speed Centrifugal Spray Dryer

万佳干燥
WANJIA DRYING

概述 Descriptions

LPG系列高速离心式喷雾干燥机是一种适用于乳乳液、悬浮液、糊状物、溶液等液体干燥的专用干燥设备。在聚合物和树脂类；染料、颜料类；陶瓷、玻璃类；除锈剂、杀虫药类；碳水化合物、乳制品类；洗涤剂 and 表面活性性类；肥料类；有机化合物、无机化合物液体物料的干燥上，表现得尤为出色。

LPG series high-speed centrifuge atomizing dryer is a special equipment and is suitable for drying emulsion, suspending liquid, liquor and so on. Particularly it has unique advantage for drying polymers and resins; dyestuff and pigment; ceramics, glass; derust agent; pesticide; carbohy-drate, dairy products; detergent and surfactant; fertilizer, organic compound, inorganic compound and so on.



原理 Principle

空气通过过滤器和加热器，进入干燥顶部的空气分配器，热空气呈螺旋状均匀进入干燥器。料液由料液槽经过过滤器由泵送至干燥器顶部的离心雾化器，使料液喷成极小的物料液滴，料液和热空气并流接触，水份迅速蒸发，在极短的时间内干燥为成品。成品由干燥塔底部和旋风分离器排出，废气由风机排出。

Air is turned into hot air through air filter and heater and enters into hot air distributor at the top of dry chamber and then enters into dry chamber spirally and evenly. At the same time liquid of raw material is sent to centrifugal atomizer at the top of dry chamber pumped by pump through filter. In which liquid of raw material atomizes ting droplets. Air and liquid of raw material flows and contacts each other fully. The moisture vaporizes rapidly. Liquid of raw material is dried into finished product in a short time. The finished product is discharged through cyclone separator at the bottom of drier. The wasted air is exhausted through fan.

技术参数 Technical parameters

项目item	参数parameter	型号model	5	25	50	150	200~5000
入口温度 inlet temperature(℃)			140~350自控 automatic control				
出口温度 outlet temperature(℃)			80~90				
水份最大蒸发量 max.evaporated amount of moisture(kg/h)			5	25	50	150	200~5000
离心喷雾头传动形式 driving form of centrifugal nozzle		压缩空气传动 compressed air drive	机械传动 mechanical drive				
最高转速 revolution (r.p.m)		25000	18000	18000	15000	8000~15000	
喷雾盘直径 diameter of atomizing disk(mm)		50	120	120	150	180~240	
热源 heat source		电 electricity	蒸汽+电 steam+electricity		蒸汽+电、燃油、煤气、热风炉 steam+electricity,oilfuel,hotairfurnace		
电加热最大功率 max.power of electric heater(kw)		9	36	72	99		
外型尺寸 (长×宽×高) overall dimensions (LWH)(m)		1.8×0.93×2.2	3×2.7×4.26	3.5×3.5×4.8	5.5×4×7	按实际情况确定 affirm it in accordance with practical conditions	
干粉回收 recovery rate of dry powder(%)			≥95				

注：水份蒸发量与物料的特性及热风进、出口温度有关。其水份蒸发曲线见上面(供选型参考)，用户可根据当地能源情况选定加热方式，根据物料特性选择收尘方式。
Note: the evaporated amount of moisture is related to characteristics of raw material and outlet temperature of hot air.



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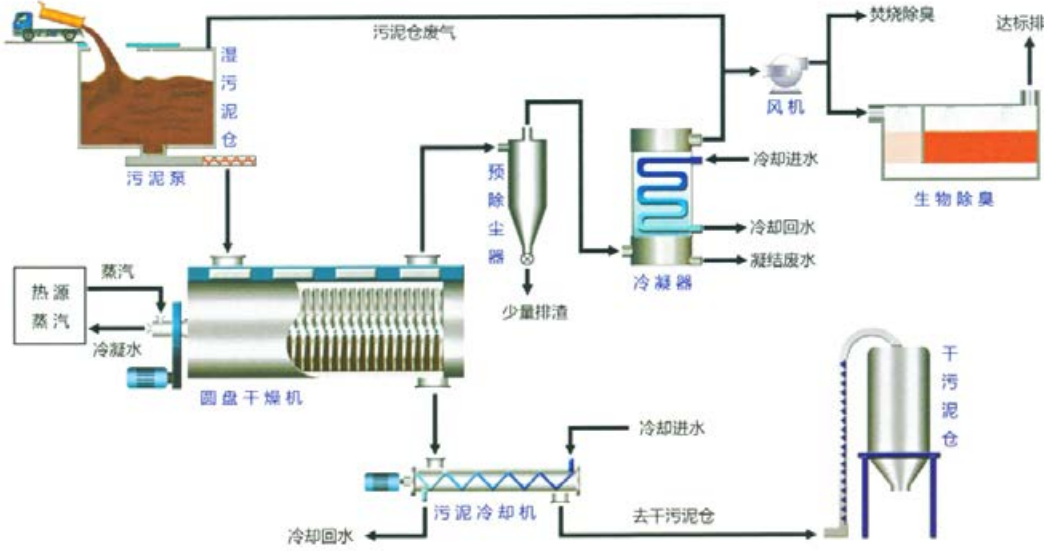
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WANJIA DRYING

一站式污泥解决方案服务商
THE SEWAGE SLUDGE ONE-STOP SOLUTION PROVIDERS

常州万佳干燥设备有限公司
CHANGZHOU WANJIA DRYING EQUIPMENT CO.,LTD.

污泥解决方案
Sludge solution

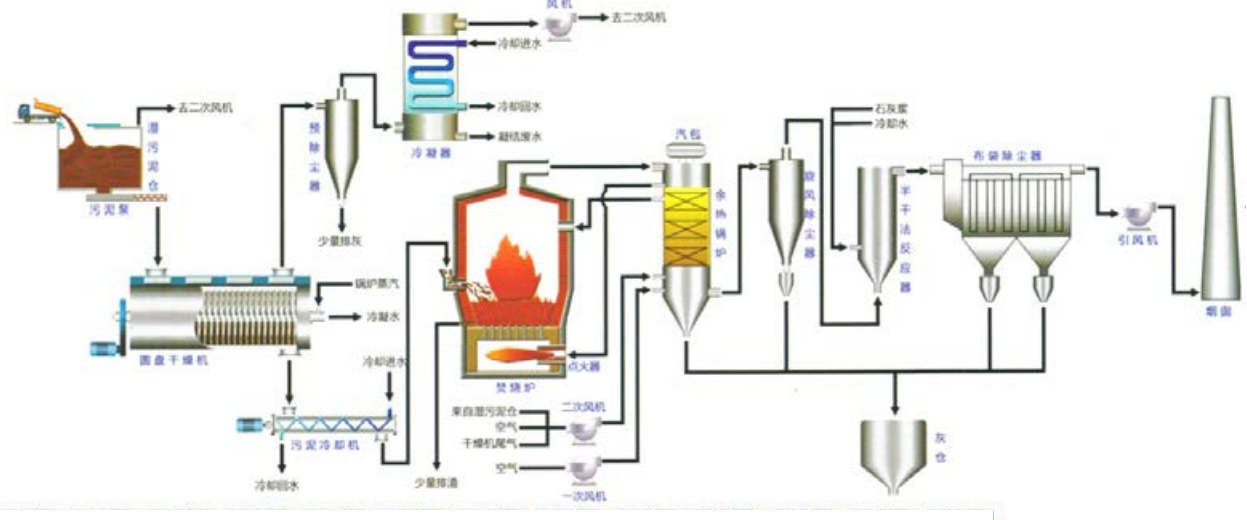
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干化系统

干化是污泥处置的关键环节，干化后的污泥可结合周边情况，协同发电厂、水泥厂、垃圾焚烧厂等实现污泥的最终处置(如肥料、土壤改良剂、替代能源、建材综合利用等)。

圆盘式污泥干化工艺系统流程短，既可全干化，也可半干化，无需返混，可靠性高，系统含氧量低，安全性高。



污泥干化（气化）焚烧方案

在大中型城市且经济发达的地区、大型城镇污水处理厂或部分污泥中有毒有害物质含量较高的城镇污水处理厂，可采用污泥干化焚烧技术处置污泥。

流化床焚烧污泥是一种较好的解决方案。由于具有强烈的湍流、较长的气体湍流时间、均匀的温度分布，能在相对较低的温度和较少过剩空气下高效焚烧，获得较高的有害物质的破坏和去除率。通过分级燃烧、加入碱性物质、可大幅降低烟气中酸性物质(SOX和HCL)的含量，由于流化床焚烧炉属于高热负荷技术，易于大型化，没有高温设备，寿命长，运行维护费用低，已在国内外获得广泛的应用，也是国家重点推荐的主流技术。

污泥干化焚烧的综合体系的关键技术是降低污泥的水分，污泥热干化是降低污泥水分的较好办法，在日本、欧美等国已有相当多的实用例证，主要设备均有工程应用。焚烧系统主要包括以下操作单元组成：污泥输送系统、污泥干化系统、焚烧炉、余热蒸汽锅炉、烟气处理系统，灰分收集及输送系统等组成。

最新的污泥干化(气化)焚烧方案能够带来更洁净的环保效果。

■ 概述 Descriptions

本公司在吸收国内外先进技术的基础上，进行改进、优化设计的模型空心桨叶干燥机，可对膏状、颗粒状、粉状、浆状物料间接加热或冷却，可完成干燥、冷却、加热、灭菌、反应、低温煅烧等单元操作。设备中特殊的模型搅拌传热桨叶，具有较高的传热效率和传热面自清洁功能。

空心轴上密集排列着模型中空桨叶，热介质经空心轴流经桨叶。单位有效容积内传热面积很大，热介质温度从-40℃到320℃，可以是水蒸汽，也可以是液体型：如热水、导热油等。间接传导加热，没有携带空气带走热量，热量均用来加热物料。热量损失仅为通过器体保温层向环境的散热。模型桨叶传热面具有自清洁功能。物料颗粒与模型面的相对运动产生洗刷作用，能够洗刷掉模型面上附着物料，使运转中一直保持着清洁的传热面。桨叶干燥机的壳体为W型，壳体内一般安排二到四根空心搅拌轴。壳体有密封端盖与上盖，防止物料粉尘外泄及收集物料溶剂蒸汽。出料口处设置一挡板，保证料位高度，使传热面被物料覆盖而充分发挥作用。热介质通过旋转接头，流经壳体夹套及空心搅拌轴，空心搅拌轴依据热介质的类型而具有不同的内部结构，以保证最佳的传热效果。



we absorbing foreign advanced technology, based on to improve and optimize the design of the wedge-shaped hollow paddle dryer can treat paste, granular, powder, paste material through indirect heating or cooling ,to achieve drying, cooling, heating, sterilization, reaction, low temperature calcination and other unit operations. Wedge-shaped mixing device in a special heat transfer blade, has a high heat transfer efficiency and heat transfer surface self-cleaning function. Densely lined with wedge-shaped hollow shaft hollow blades, heat medium through the hollow axial flow through blades. Unit effective volume of a very large area of heat transfer, heat medium temperature from -40 ℃ to 320 ℃, can be water vapor, may also be liquid-type: such as water, oil and so on. Indirect conduction heating, the air does not carry away the heat, the heat are used to heat materials. Only through the device body heat loss to the environment, heat insulation layer. Wedge-shaped blades with self-cleaning heat transfer surfaces. Wedge-shaped surface material particles and scrubbing effect relative movement, to wash away the wedge surface material attachments, so in operation have maintained a clean heat transfer surfaces. Blade dryer for the W-type shell, the shell of the general arrangements for 2-4 hollow stirring shaft. Shell with a sealed cover with the cover to prevent dust leakage and collection of materials, solvent vapor materials. Set out and exit pull a block, to ensure a high degree of material level, so that heat transfer surface is covered with fully materials. Heat medium through the rotary joint, passing through the shell jacket and the hollow stirring shaft, hollow shaft stirring according to the type of thermal media have different internal structures to ensure the best heat transfer.

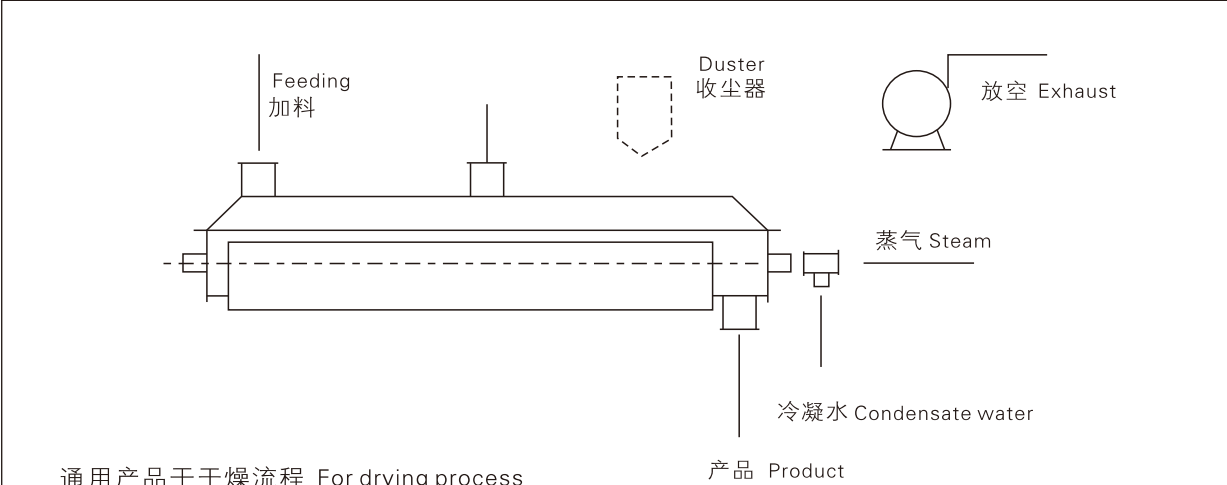


■ 特点 Features

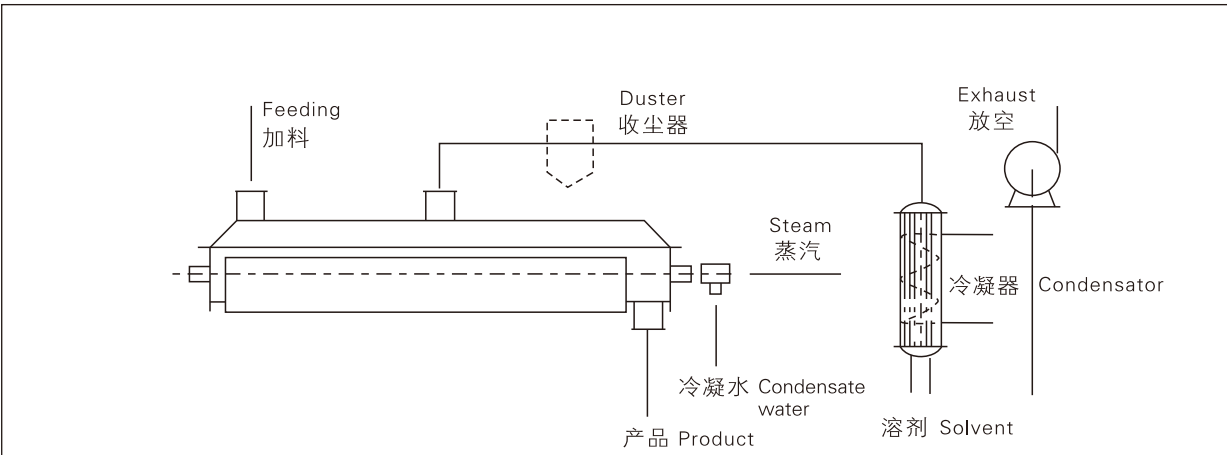
- 桨叶干燥机能耗低：由于间接加热，没有大量携带空气带走热量，干燥器外壁又设置保温层，对浆状物料，蒸发1kg水仅需1.22kg蒸汽。
- 桨叶干燥机系统造价低：单位有效容积内拥有巨大的传热面，就缩短了处理时间，设备尺寸变小。就极大地减少了建筑面积及建筑空间。
- 处理物料范围广：使用不同热介质，既可处理热敏性物料，又可处理需高温处理的物料。常用介质有：蒸汽、导热油、热水、冷却水等。既可连续操作也可间歇操作，可在很多领域应用。
- 环境污染小：不使用携带空气，粉尘物料夹带很少，便于处理。对有污染的物料或需回收溶剂的工况，可采用闭路循环。
- 操作费用低：该设备正常操作，仅1-2人/天。低速搅拌及合理的结构。磨损量小，维修费用很低。
- 操作稳定：由于模型桨叶特殊的压缩—膨胀搅拌作用，使物料颗粒充分与传热面接触，在轴向区间内，物料的温度、湿度、混合度梯度很小，从而保证了工艺的稳定性。

- Blade dryer energy consumption is low: as indirect heating, the air does not carry away a lot of heat insulation of dryer wall has, on the slurry material, evaporation of 1kg of water vapor only 1.22kg of steam.
- Blade dryer system costs low: within the effective volume of units have a large heat transfer surface, the reduced processing time, equipment size becomes smaller. Would greatly reduce the building area and building space.
- Dealing with a wide range of materials: using a different hot medium, able to deal with heat-sensitive materials can be heat-treated materials handling. Commonly used media are: water, steam, oil, hot water, cooling water. Continuous operation can also be intermittent operation can be applied in many fields.
- Environmental pollution: do not carry air, dust entrainment few materials. Solvent evaporation of material is very small, easy to handle. To have contaminated materials or be recycled solvent conditions, can be used closed circuit.
- Low operating cost: the equipment normal operation, 1-2 persons/day. Low speed and reasonable structure. Wear a small, very low maintenance costs.
- Operation stability: As the wedge-shaped blades of special compression - expansion of stirring, so that material particles sufficient surface contact with the heat transfer in the axial zone, the material temperature, humidity, mixed density gradient is very small, thus ensuring the process stability.

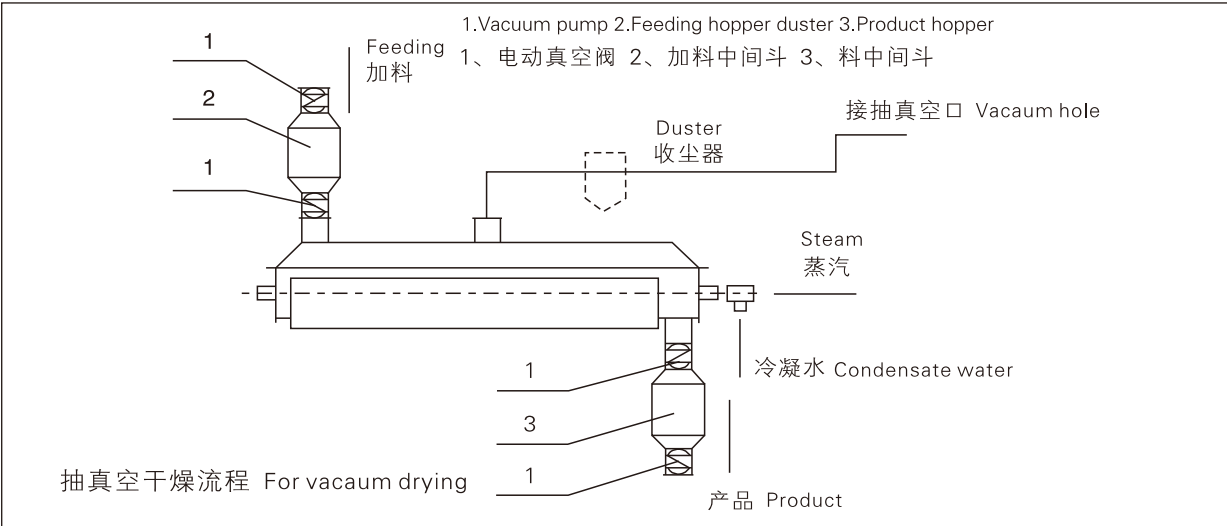
■ 工艺流程 Technological process



通用产品干燥流程 For drying process



回收溶剂干燥流程 For retrieve solvent product

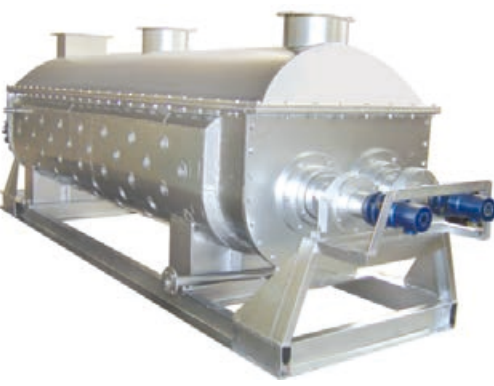


抽真空干燥流程 For vacuum drying

■ 应用 Applications

桨叶干燥机已成功用于食品、化工、石化、染料、工业污泥等领域。设备传热、冷却、搅拌的特性使之可以完成以下单元操作：煅烧（低温）、冷却、干燥（溶剂回收）、加热（融化）、反应和灭菌。搅拌桨叶同时又是传热面，使单位有效容积内传热面积增大，缩短了处理时间。模型桨叶传热面又具有自清洁功能。压缩—膨胀搅拌功能使物料混和均匀。物料沿轴向成“活塞流”运动，在轴向区间内，物料的温度、湿度、混合度梯度很小。

- 用导热油做热介质，桨叶干燥机可完成低温煅烧工作。如：二水硫酸钙（CaSO₄·2H₂O）煅烧转化为半水硫酸钙（CaSO₄·1/2H₂O）。碳酸氢钠（NaHCO₃）经煅烧转化为纯碱（Na₂CO₃）等。
- 通入冷却介质，如水、冷却盐水等即可用来冷却。如：使用于纯碱行业的桨叶式凉碱机，取代老式的空气冷却凉碱机，节省了能源及尾气处理设备，降低了操作费用，还可用于钛白粉、镍铁合金粉及各种粉粒状物料的冷却。在单台机里可以将物料从1000℃冷却到小于40℃。
- 干燥，设备最主要的功能，不使用热空气，使溶剂回收、能源消耗、环境控制处于易处理的理想状态。对需回收溶剂、易燃易爆氧化热敏性物料尤为适应。已广泛用于精细化工、石化、染料行业。
- 轴向区间内，温度、湿度、混合度的均匀性，使得设备可用来加热或融化，或进行一些固体物料反应。在复合肥及变性淀粉行业均已成功使用。桨叶干燥机可用于对食物和面粉进行灭菌处理。单位有效容积内大的加热面积，很快就将物料加热到灭菌温度，避免了长时间加热而改变物料品质。



适应物料

- 石化行业：聚烯烃粉体、聚碳酸酯树脂、高、低密度聚乙烯、线型低密度聚乙烯、聚烯烃颗粒、尼龙6、尼龙66、尼龙12、醋酸纤维、聚苯硫醚、丙烯酸树脂、工程塑料、聚氨酯、聚乙二醇、聚苯乙烯、聚丙烯、聚甲基丙烯酸酯、聚丙酮、聚丙酮共聚酯、乙烯-丙烯共聚酯。
- 环保行业：PTA污泥、电镀下水污泥、锅炉灰渣、制药厂废渣、糖厂废渣、味精厂废渣、煤灰。
- 饲料行业：酱油渣、骨基饲料、酒糟、食品下角料、苹果渣、橘子皮、豆粕、鸡骨饲料、鱼粉、饲料添加剂、生物渣泥
- 食品行业：淀粉、可可豆、玉米粒、食盐、变性淀粉、药品。
- 化工行业：纯碱、氮磷钾复合肥、高岭土、膨润土、白炭黑、炭黑、磷石膏、氧化氟化钠、硝酸钙、碳酸镁、氟化钠、氢氧化铝、硫酸钡、硫酸钙、碳酸钾、染料、分子筛、皂素。

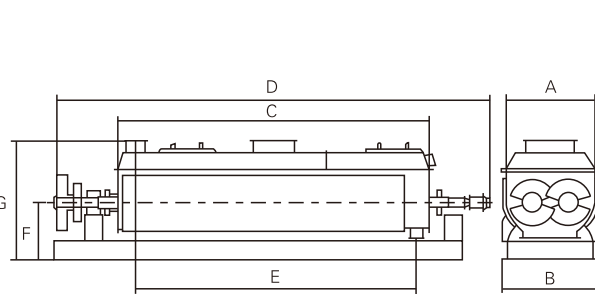
Blade dryer has been successfully used in food, chemical, petrochemical, dye, industrial sludge and other fields. Heating, cooling, mixing features make it to complete the following unit operations: calcination (low temperature), cooling, drying (solvent recovery), heating (melting), response and sterilization. Mixing blades at the same time the heat transfer surface, the effective volume per unit area of heat transfer increases, reducing the processing time. Heat transfer surfaces in wedge-shaped blades with self-cleaning function. Compression - Expansion mixing features make the material mixed uniformly. Material along the axis into a "plug flow" movement, in the axial zone, the material temperature, humidity, mixing a very small degree of gradient.

- Conducting oil to do with the heat medium, blade dryer to complete the work of low-temperature calcination. Such as: calcium sulfate dehydrate (CaSO₄·2H₂O) calcined into calcium sulfate hemihydrate (CaSO₄·1/2H₂O). Sodium bicarbonate (NaHCO₃) into calcined soda (Na₂CO₃) and so on.
- Pass into the cooling medium, such as water, salt, etc. can be used to cooling. Such as: use of soda ash industry in blade-type cooler base machine to replace the old air-cooled cooler base machine, saving energy and exhaust gas processing equipment, lower operating costs, but also for titanium, nickel alloy powder and all kinds of powder granular materials cooling. On a single machine where the material can be cooled from 1000 ℃ to less than 40 ℃.
- Dry, the main function of equipment, do not use hot air to solvent recovery, energy consumption, environmental control is easy to deal with the ideal state. On the need to recover solvents, heat-sensitive materials, particularly flammable adapt easily oxidized. Has been widely used in fine chemical, petrochemical, dye industry.
- Axial range, temperature, humidity, mixing degree of uniformity, so equipment can be used to heating or melting, or some solid material response. In the compound and modified starch industries have been successfully used. Blade dryer can be used to carry out sterilization of food and flour. Unit effective volume with a large heating area, will heat the material to sterilization temperature, to avoid prolonged heating change the quality of materials.

Adaptation of materials

- Petrochemical industry: polyolefin powder, polycarbonate resin, high and low density polyethylene, linear low density polyethylene, polyacetal particles, nylon 6, nylon 66, nylon 12, cellulose acetate, polyphenylene sulfide, propylene base resin, engineering plastics, polyvinyl chloride, polyvinyl alcohol, polystyrene, polypropylene, polyester, polyoxymethylene, styrene - Acrylonitrile, ethylene propylene copolymer -.
- Environmental protection industry: PTA sludge, electroplating sludge into the water, boiler ash, pharmaceutical waste, sugar residue, glutamate factory waste, coal ash. Feed Industry: soy sauce residue, bone-based feed, grains, food Scraps, apple, orange peel, soybean meal, chicken feed, fish meal, feed additives, bio-sludge
- Food industry: starch, cocoa beans, corn kernels, salt, modified starch, pharmaceuticals.
- Chemical industry: soda ash, NPK fertilizer, kaolin, bentonite, white carbon black, carbon black, phosphorus gypsum, oxidation of sodium fluoride, calcium nitrate, magnesium carbonate, sodium cyanide, aluminum hydroxide, barium sulfate, sulfuric acid, calcium carbonate, dyes, molecular sieve, saponin.

■ 结构示意图 Sketch of structure



■ 技术参数 Technical parameters

型 号	KJG-2.7	KJG-9	KJG-13	KJG-18	KJG-24	KJG-29	KJG-36	KJG-41
传热面积m ² heat transfer area	2.7	9	13	18	24	29	36	41
有效容积m ³ effective volume	0.06	0.32	0.59	1.09	1.53	1.85	2.42	2.8
转速范围r.p.m revolution	15-30	10-25	10-25	10-20	10-20	10-20	10-20	10-20
功 率kw power	2.2	3.8	5.5	7.5	11	11	15	15
器体宽A mm width of dryer body	306	584	762	940	1118	1118	1296	1296
总宽B mm total width	736	841	1066	1320	1474	1474	1676	1676
器体长C mm length of dryer body	1956	2820	3048	3328	3454	4114	4115	4724
总长D mm total length	2972	4876	5496	5918	6147	6808	6960	7570
进出料距E mm Distance between feeding and discharging	1752	2540	2768	3048	3150	3810	3810	4420
中心高F mm height in center	380	380	534	610	762	762	915	915
总高G mm total height	762	838	1092	1270	1524	1524	1778	1778
进汽口N steam inlet	(2)3/4	(2)3/4	(2) 1	(2) 1	(2) 1	(2) 1	(2) 1	(2) 1
出水口O water outlet	(2)3/4	(2)3/4	(2) 1	(2) 1	(2) 1	(2) 1	(2) 1	(2) 1

型 号	KJG-48	KJG-52	KJG-62	KJG-68	KJG-73	KJG-81	KJG-87	KJG-95	KJG-110
传热面积m ² heat transfer area	48	52	62	68	73	81	87	95	110
有效容积m ³ effective volume	3.54	3.96	4.79	5.21	5.78	6.43	7.39	8.07	9.46
转速范围r.p.m revolution	10-20	10-20	10-20	10-20	5-15	5-15	5-15	5-15	5-10
功 率kw power	30	30	45	45	55	55	75	75	95
器体宽A mm width of dryer body	1474	1474	1651	1652	1828	1828	2032	2032	2210
总宽B mm total width	1854	1854	2134	2134	2286	2286	2438	2438	2668
器体长C mm length of dryer body	4724	5258	5410	5842	5461	6020	5537	6124	6122
总长D mm total length	7772	8306	8865	9296	9119	9678	9119	9704	9880
进出料距E mm Distance between feeding and discharging	4420	4954	4953	5384	5004	5562	5080	5664	5664
中心高F mm height in center	1066	1066	1220	1220	1220	1220	1220	1220	1220
总高G mm total height	2032	2032	2362	2362	2464	2464	2566	2566	2668
进汽口N steam inlet	(2)11/2	(2)11/2	(2)11/2	(2)11/2	(2)11/2	(2)11/2	(2)2	(2)2	(2)2
出水口O water outlet	(2)11/2	(2)11/2	(2)11/2	(2)11/2	(2)11/2	(2)11/2	(2)2	(2)2	(2)2

注：部分参数设计时视不同物料有所调整，以设计为准。