LINZHOU DRYER

Drying solutions for a better world.

Wuxi Linzhou Drying Equipment Co., Ltd.
Wuxi, Jiangsu, China
www.lzdryer.com (International)
www.linzhou.com (China Mainland)

Contents

LINZHOU DRYER Overview

Wuxi Linzhou Drying Equipment Co., Ltd. has been a pioneer in spray drying technology since 1980. We have been at the forefront of innovation, integrating science, technology, and production to redefine drying solutions. Our spray drying equipment holds a remarkable 30% market share in China and has been expanding into international markets since 1994.

Currently, we offer three distinct series: high-speed centrifugal spray dryer, pressure spray dryer, and airflow spray dryer, positioning us as a one-stop solution provider in the drying industry.

With over four decades of dedicated service, Wuxi Linzhou Drying Equipment has solidified its reputation as a leading brand in the field. Our journey is defined by innovation, quality, and an unwavering commitment to exceeding customer expectations.

45 Years of technical expertise

Key Industries:

- Pharmaceutical
- Chemical
- Bio-fermentation
- Food additives
- Petrochemical
- Construction raw materials

3 Equipment series, dozens of varieties

Advanced product development, processing and testing equipment in our Research Institute

Experienced technical and service team ensuring superior after-sales support

Highly praised by clients domestically and internationally

Factory certification (See page 41)

ISO 9001:2015

EX Explosion Proof Standard

IAF Multilateral Recognition Arrangement (MLA)

CE certification

LINZHOU Core Philosophy

Enterprise Spirit

Strive for excellence and continually surpass our previous achievements.

Quality Policy

Prioritize quality above all with advanced technology to deliver world-class products.

Service Commitment

Deliver outstanding service that exceed our competitors and customer expectations.

Operational Principles

People-centric, customer-oriented approach, continuous innovation and market-driven.

Management Principles

Emphasize quality, efficiency, and effectiveness in every aspect of our management.

LINZHOU DRYER

Industry Collaboration

- Chinese Academy of Sciences
- Chinese Academy of Forestry
- Institute of Chemical Industry of Forest Products, CAF
- Nanjing University of Science and Technology
- Dalian University of Technology
- Jiangnan University

LINZHOU History & Honors

Established

Wuxi Linzhou Drying Equipment Co., Ltd. Located in Wuxi, Jiangsu Province.

Developed

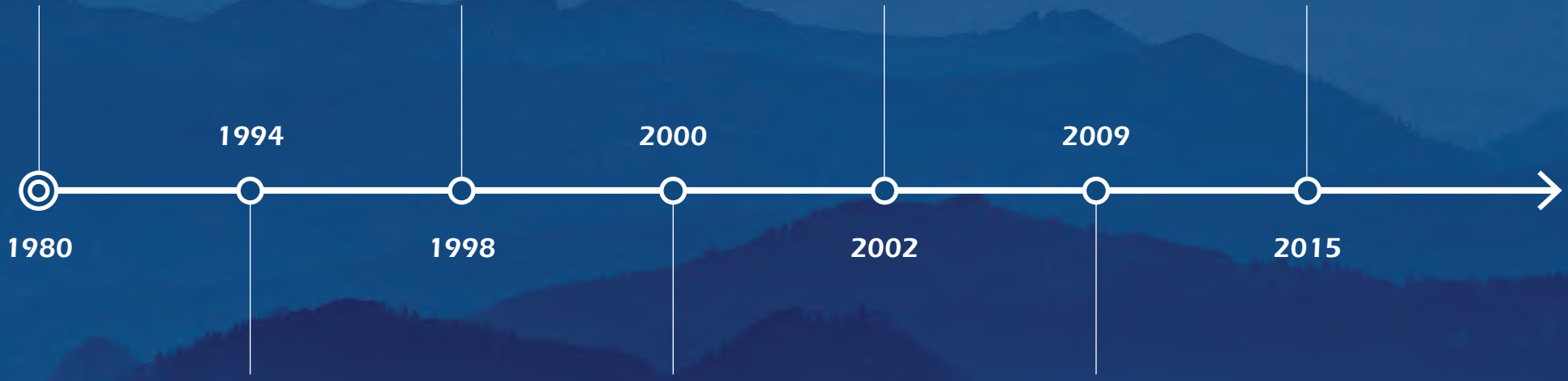
National Industry Standards for high-speed centrifugal spray dryers.

National Project

Undertaking a National Project for a 45-ton/hour high-speed centrifugal atomizer, the first in the country.

Awarded

"Qualified Supplier" by the China Petroleum and Chemical Industry Federation.



National Spark Program

Included in the Program organized by the Ministry of Science and Technology (MOST) of China.

Certified

By the British Moody Company for ISO9001 quality system.

Recognized

As a high-tech enterprise by the Jiangsu Provincial Science and Technology Commission. Awarded the Gold Prize at the 2nd China International Exhibition on Drying Equipment and Technology.

LINZHOU Organizational Structure

Wuxi Linzhou Drying Equipment Co.,Ltd.

Responsible for the production, installation, commissioning, and after-sales service of drying equipment.

Wuxi Xuzhou Electric Co., Ltd.

Specializes in the production and commissioning of electrical automation control systems.

Wuxi Linzhou Drying Technology Research Institute

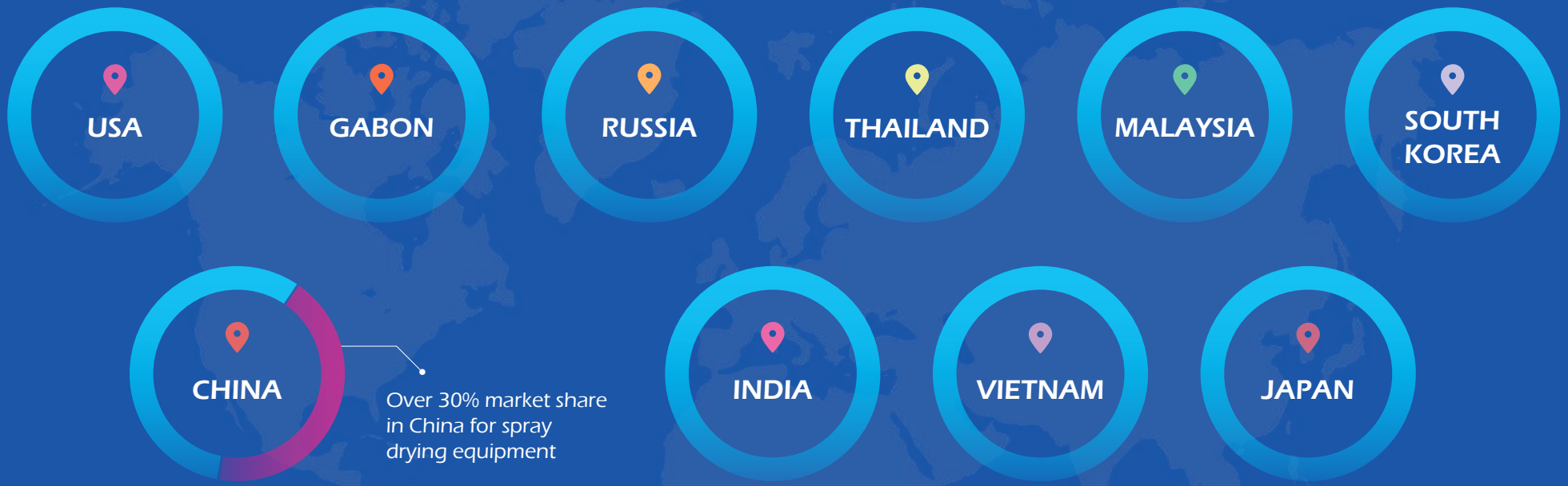
Focuses on researching new materials and drying mechanisms to develop innovative technologies and equipment.

Professional Team

LINZHOU DRYER has its own professional R&D team, composed of highly skilled and dynamic experts in the chemical industry, machinery, and automation control. The team is led by a senior engineer with over 40 years of experience in R&D and design.

As a team, we actively engage with our clients to understand their requirements and objectives. Together, we explore solutions, conduct tests in our laboratory, and evaluate product quality. By building strong relationships and collaborating closely with our clients, we strive to deliver the best possible results to meet their needs.

Sales Region



CUSTOMERS

BOSSON CHEMICAL
Hwa 恩华
广济药业 GUANGJI PHARM.
YOUNGWOO MIRES
Tairui TAIRUI PHARMACEUTICAL
HISUN 海正药业
NHU
龍力 LONGLIVE
WINDSON
诺金制药 KNOCKIM

OUR TECHNICAL TALENTS

Talent is the foundation of a company's long-term development, and human resources are key to sustaining stable growth. A well-crafted talent strategy has attracted a core team of dedicated professionals, including researchers, professors, and top management elites, all with a strong sense of commitment.

Specially-engaged Technical Adviser

Prof. Arun S. Mujumdar

President of the International Drying Association
Professor of Mechanical Engineering at National University of Singapore; Professor of Chemical Engineering at McGill University

Chairman & Senior Engineer

Mr. Ruijun Zhou

Vice Chairman of the National Drying Association and Member of the Professional Group of the National Drying Society

Technical Director - Engineering

Dr. Lixin Huang

Ph.D. in Mechanical Engineering from National University of Singapore and Former Editor of an International Drying Technology Journal

LINZHOU DRYER
Service Process

Average **60** Days
Equipment Delivery Time

Testing & Sampling

Based on the specific material requirements of our clients, we conduct advanced and meticulous test sampling.

Custom Design

We design customized spray drying equipment to minimize project risks and maximize client benefits.

Raw Material Procurement

We strictly adheres to the detailed requirements of the ISO 9001 quality management system.

Organize Production

Orderly workshop production management ensures the safe operation of the production process in the workshop.

Final Product Inspection

We conduct meticulous final inspection before shipment to ensure the stability and reliability of our products.

Product Delivery

We select appropriately sized shipping containers and carefully package the equipment to ensure safe delivery.

On-site Installation & Commissioning

Our professional installation service team, covering electrical, mechanical, on-site construction, and site management.

After-sales Service

We are committed to providing comprehensive after-sales services for our clients to ensure optimal equipment performance.

LINZHOU Technology

45 years of technical precipitation

LINZHOU DRYER has a well-equipped drying technology experiment center, covering feasibility experiments for all materials that can be spray-dried. The center continuously develops new products to meet both current and future demands.

Atomizer Series

High-speed Centrifugal Atomization

Two-fluid Nozzle Atomization

Pressure Nozzle Atomization

Atomization Disks

Pressure Nozzle Atomizer

Model 3000-6000 Atomizer

Model 150-500 Atomizer

Model 25-100 Atomizer

High-speed centrifugal atomization unit

Independently developed and manufactured, our centrifugal atomizers offer a spray capacity ranging from 5 to 60,000 kg/h, with over a dozen models available. Our high-capacity units, exceeding 30 tonnes per hour, fill a gap in the domestic market while delivering reliable performance and high quality, comparable to GEA and other leading international models. These atomizers are primarily used in large-scale chemical industries, flue gas desulfurization, waste gas treatment, and other related fields.

Centrifugal Atomizer
Compressed air transmission centrifugal atomizer
Mechanical transmission high-speed centrifugal atomizer
High-speed motor-driven centrifugal atomizer

Pressure Atomizer
Pressure nozzle atomizer

Pressure atomization unit

The particle size distribution of atomized droplets it produced is narrower and more uniform, and the resulting powder has a higher bulk density, which is more suitable for materials with high fat content, coarse particles, and good flowability atomization. These products include: dairy products, coffee, laundry detergent, soap powder, ceramics, catalysts, and many inorganic salts.

45 Tonne/hour High-speed Centrifugal Atomizer

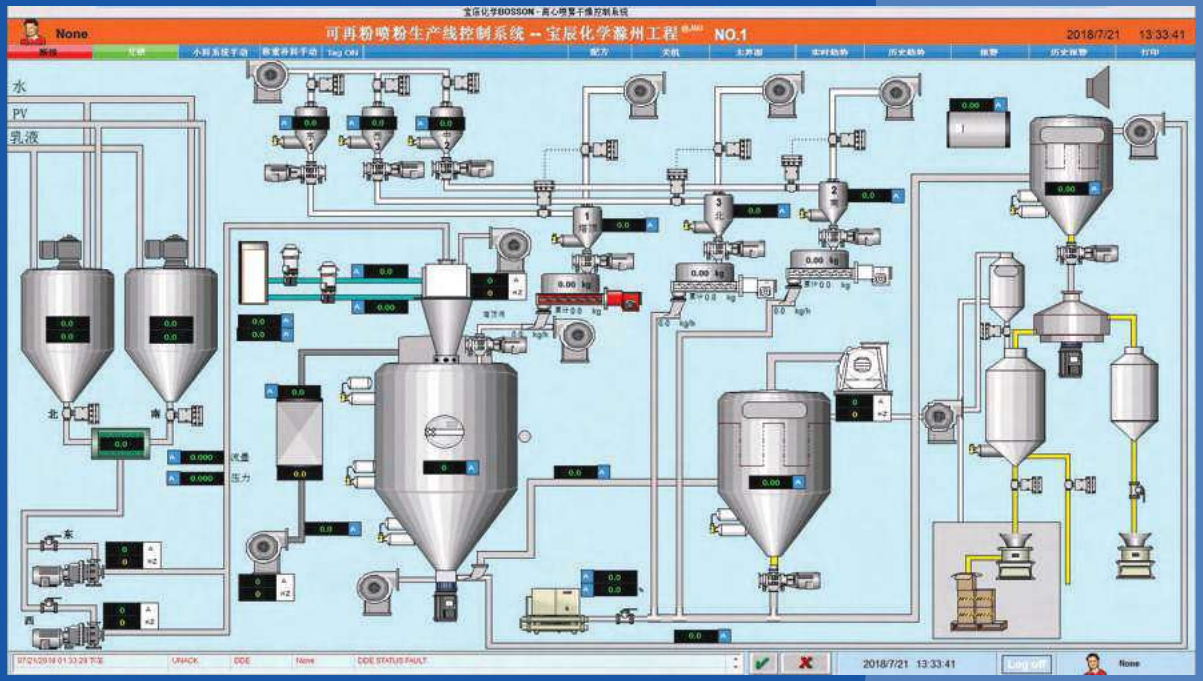
The state-level project of a 45-tonne/hour high-speed centrifugal atomizer fills the gap in the domestic industry and is the first of its kind in China. As a result, the related product development concept, technical theory, and production practices have reached an advanced level in the industry.

PLC Control System Solutions

The electrical control system for an ordinary spray dryer adopts a PLC, which consists of a high-performance PLC, process control instruments, adjusting devices, and actuators.

The control system can either be automatically controlled by the PLC or manually operated. Linear adjustment of inlet and outlet temperatures, as well as feed capacity in spray drying, ensures the stability of operating parameters and dried powder quality.

On the other hand, we can also design an automatic control system with higher automation requirements as specified by customers, such as industrial-grade touch screen control, DOS full computer control, etc.



All control software operation interfaces can be designed to support multiple languages.

BOSSON CHEMICAL

PLC control system designed for Bosson Chemical

Production Line Control System For An Annual Output Of 20,000 Tonnes Of Redispersible Polymer Powder (RDP)

The integrated interface, feeding and discharging, and adding auxiliary materials all achieve unmanned, precise operation.

Traditional Applications

Spray drying offers a versatile and efficient solution across **a wide range of industries** by converting liquid formulations into high-quality, uniform powders. It is especially valued for its gentle processing, which preserves the integrity of heat-sensitive ingredients such as enzymes, vitamins, and probiotics, while its scalability makes it suitable from **lab-scale trials** to **full industrial production**.

What are the advantages?

In the food industry, it is used to create products like milk powders, instant beverages, and functional ingredients, **ensuring consistency in texture and flavor** while enabling extended shelf life.

In pharmaceuticals, the process is critical for producing precise, stable powders for active ingredients, vaccines, and inhalable medications, **supporting accurate dosing and efficacy.**

Within the chemical industry, centrifugal spray drying is employed to manufacture specialty powders such as catalysts, pigments, and advanced composite materials, **enhancing product performance and reducing production costs.**

Moreover, in environmental applications, it plays a key role in waste treatment and resource recovery, transforming by-products and sludge into valuable, stable powders that **minimize environmental impact.**

Food Industry

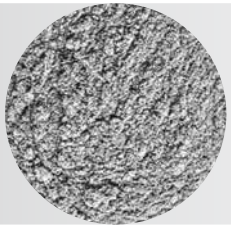

Milk Powder


Coffee Powder


Tea Extracts


Flavorings

Pharmaceutical Industry

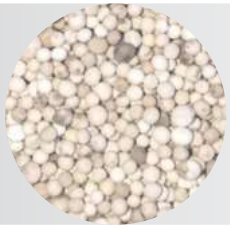

Excipients


Antibiotics

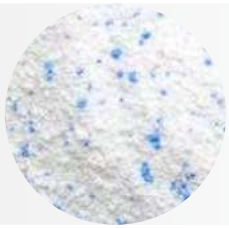

Vitamins


Probiotics

Chemical Industry


Catalysts


Ceramic Powders


Detergent powders


Silica Aerogels

Environmental Applications


Meat Processing Effluent


Spent Grain Wastewater


Mining Effluent


Flue Gas Desulfurization

Centrifugal Atomizer:

When the liquid feed is delivered onto a **high-speed rotating disc**, the **strong centrifugal force** causes the liquid to spread into a thin film on the disc's surface. As the film accelerates toward the disc's edge and leaves it, the liquid is atomized into a spray of droplets.

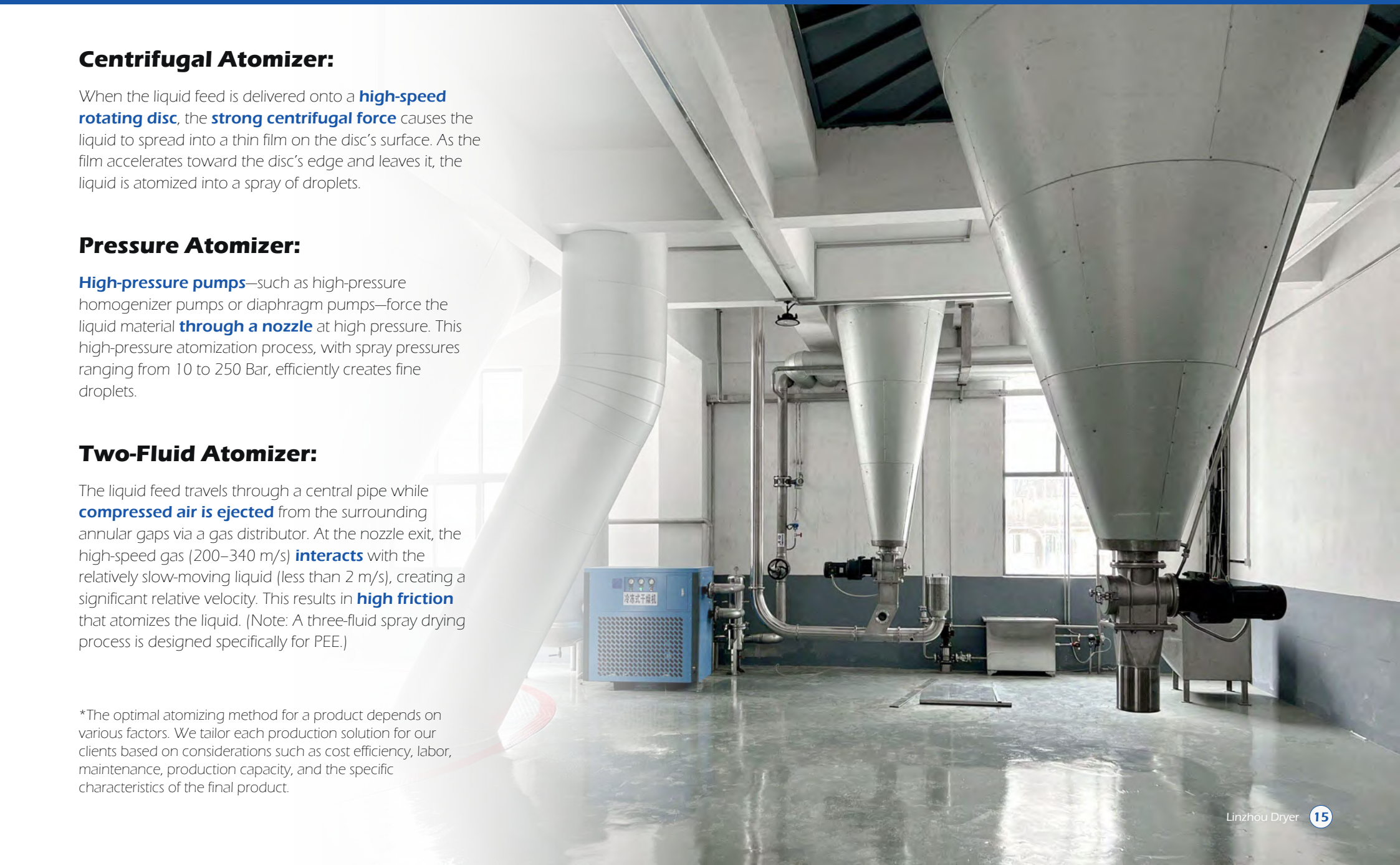
Pressure Atomizer:

High-pressure pumps—such as high-pressure homogenizer pumps or diaphragm pumps—force the liquid material **through a nozzle** at high pressure. This high-pressure atomization process, with spray pressures ranging from 10 to 250 Bar, efficiently creates fine droplets.

Two-Fluid Atomizer:

The liquid feed travels through a central pipe while **compressed air is ejected** from the surrounding annular gaps via a gas distributor. At the nozzle exit, the high-speed gas (200–340 m/s) **interacts** with the relatively slow-moving liquid (less than 2 m/s), creating a significant relative velocity. This results in **high friction** that atomizes the liquid. (Note: A three-fluid spray drying process is designed specifically for PEE.)

*The optimal atomizing method for a product depends on various factors. We tailor each production solution for our clients based on considerations such as cost efficiency, labor, maintenance, production capacity, and the specific characteristics of the final product.



	Centrifugal Spray Dryer	Pressure Spray Dryer	Two-Fluid Spray Dryer
Energy Consumption	**Lowest** energy consumption.	Larger heat dissipation area and larger droplets, consumes approximately **1.2 times more** energy than a centrifugal atomizer.	Typical gas (L/min) to liquid (L/h) ratio of 3:1 with power consumption being **5 to 8 times more** than a centrifugal atomizer.
Structure	Relatively **complex structure** that requires regular bearing replacement but has a **straightforward operation**.	**Simple structure** and **easy maintenance** but operators must **continually monitor for blockages** due to small spray holes.	Similarly **simple and easy to maintain** with **constant monitoring** on blockage required during production.
Material Viscosity	**Difficult** to handle high-viscosity materials.	**Good on both** low-viscosity and high-viscosity materials.	**Good on both** low-viscosity and high-viscosity materials.
Atomization Capacity	A single atomizer in the tower can handle production tasks, with a spray liquid rate ranging from **2 kg/h to 60 t/h**.	A single nozzle can reach up to **1000 L/h**; multiple spray guns are required for higher throughput.	A single nozzle can reach up to **1000 L/h**; multiple spray guns are required for higher throughput.
Cleanliness	If oil seals fail, **grease might enter** the atomization disc. **Food-grade grease** is used in food/pharm applications.	Nozzle is metal assembly, **no impurities**.	Simple and clean design, suitable for **sterile environments**.
Partical Size	Particles range between **25-80 μm** with a relatively **narrow** distribution.	Particle sizes range from **48 to 250 μm** with a **wider** distribution.	As fine as **5 to 50 μm** but with a relatively **wider** distribution.
Drying Tower Size	Drying tower's diameter tends to be larger, with a diameter-to-height **ratio of 1:1**.	Spray distance of 2–4 meters, cylindrical section is generally **over 10 meters tall**, requiring a taller factory.	Diameter-to-height ratio **1:1.2 to 1:1.5**, requiring a taller factory.

Protein Powder Application

Both centrifugal and pressure nozzle spray dryers are widely used in the food industry to convert liquid formulations into free-flowing powders, offering **precise control over particle size and product quality**. These advanced systems enable rapid and uniform drying that **preserves the nutritional integrity** and flavor of heat-sensitive ingredients.

Their flexibility to handle a **variety of formulations**—from protein concentrates to dairy and nutritional supplements—makes them essential for both small-scale and industrial production.

Protein Powder

1. Dairy-Based Protein Powders
Whey Protein Concentrate (WPC)
Whey Protein Isolate (WPI)
Casein Protein Powder
2. Plant-Based Protein Powders
Soy / Pea / Rice / Hemp Protein Powder
3. Specialty Proteins
Bone Broth / Egg White Protein Powder
4. Functional Protein Powders
High-Protein Meal Replacement
Customized Protein Formulations

Collagen Peptides

1. Food & Nutrition
Collagen Peptide Powder
Hydrolyzed Collagen
Instant Collagen Peptides
Collagen Nutrition Powder
Collagen Protein Bar Base
2. Medical & Pharmaceutical
Medical-Grade Collagen Peptides
Bio-active Collagen Peptides
3. Cosmetics & Skincare
Beauty Collagen Peptides
Nano Collagen Powder

Guangzhou Hairui Pharmaceutical Co., Ltd., QZR-50 Series

Typical Process Parameters

Feed Solid Content: 35%
Moisture Evaporation Rate: 200kg/h
Liquid Spray Volume: 308kg/h

Inlet Air Temperature of Drying Tower: 180°C-190°C
(Calculated at 180°C)
Outlet Air Temperature of Drying Tower: 90°C

Final Product Moisture Content: ≤5%
Production Capacity: 108kg/h
Final Product Granularity: 180-250μm (majority)

Electrical Control Requirements: PLC touch screen control
Drying Method: Pressure type
Waste Gas Treatment: Two-Stage efficient cyclone + water film dust removal
Heat Source: Steam heat exchanger + electric heating
Drying Air Volume: 6864kg/h
Drying Heat: 30×10^4 Kcal/h

Electrical Capacity: Approximately 110kW (Including cleaning system approx. 30kW)
Compressed Air Consumption: 1m^3/min (Suggest using oil-free screw air compressor)
Steam Consumption: 500kg/h (Steam source: 0.6Mpa)

*The figures above only represent typical processing capacities;
*Our pressure nozzle spray dryer has a maximum processing capacity of **20 tons/hour**. So far, the maximum evaporation achieved by our spray drying equipment is **10-15 tons/hour**; the diameter of the drying tower is **12 meters**.

Dual cleaning tanks (one alkaline tank)

Why Use Pressure Spray Dryer for Protein Powder?

Larger Product Particles

Larger particles (100–300 μm), lower specific surface area reduces surface tension, enabling faster water penetration and minimizing floating or clumping. Contrast with centrifugal spray drying's finer particles (50–150 μm), which trap air bubbles and require vigorous stirring to dissolve.

Shorter Drying Times

Shorter drying times reduce the risk of protein denaturation, preserving functional properties like solubility and bioactivity. Rapid drying prevents overheating or case hardening. Also reduce the energy consumption of the system, as the heater and fan operate for a shorter duration.

Lower Costs (Equipment & Maintenance)

Pressure nozzle systems rely on a straightforward setup: high-pressure pump, nozzle and drying chamber. They are mainly modular and easier to replace and have minimal moving components make the maintenance a lot easier than the centrifugal dryers.

Easier Formulation Controls

The atomization pressure (typically 10–50 MPa) can be adjusted to fine-tune droplet size and drying behavior. Anti-caking agents like silica and maltodextrin can be easily mixed into the liquid feed before atomization to prevent powder clumping and improve flowability.

Food Additive

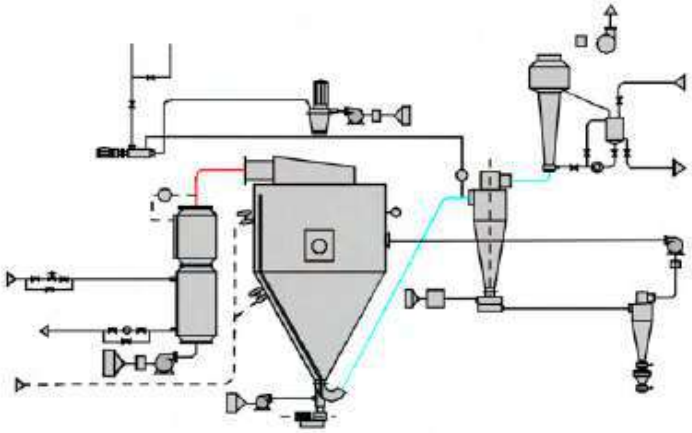
Food additive high-speed centrifugal spray device uses **high-speed centrifugal atomizers** to disperse the materials into a mist, fully contact with hot air, the material is rapidly solidified in an instant, allowing it to be forcefully separated from the tower walls. This **prevents wall adhesion and repeated reheating**, **avoiding the volatilization and decomposition** of the material's active components due to heat.

Emulsifiers (Lecithin, Mono-/diglycerides)
Acidulants (Citric acid, Malic acid)
Natural Colorants (Beetroot extract, Turmeric powder)

CIP Cleaning System:

A CIP fully automatic cleaning system is equipped to achieve more efficient cleaning. **Automatic telescopic cleaning heads** are installed on various parts of the drying equipment, enabling online cleaning without disassembling the piping.

Moreover, the cleaning water can be recycled, making the process **more energy-efficient, effective, and environmentally friendly**. The control system is a DCS intelligent control system that enables one-touch cleaning. The CIP fully automatic cleaning system ensures that the spray drying tower system has no inaccessible areas that might harbor contamination, and that the cleaning results **meet the new GMP standards and are verifiable.**



Typical process flow chart of spray drying for heat-sensitive materials

Atomizer top

CIP cleaning system connections

Typical Parameters & Configurations

Dry materials: Xylooligosaccharides (XOS), flavors, spices, etc.
Inlet Air Temperature of Drying Tower: 160°C-180°C (Calculated at 160°C)
Outlet Air Temperature of Drying Tower: 80°C-90°C

Dried Powder Output: 5kg—500kg/h
Final Product Moisture Content: 4%-7%

Heating method: 6kg/cm^2 Saturated steam + Electric heater
or Indirect natural gas combustion furnace

Spray method: High-speed centrifugal co-current drying or
High-speed centrifugal atomizer

Product receiving method: Stage-one cyclone separator, stage-two high-efficiency cyclone, stage-three spray dust removal, the product is dehumidified and sent to the clean room for cooling

Electrical Control Requirements: PLC touch screen control

All parts that come into contact with materials are made of 304 or 316L stainless steel plates, with the inner wall of the drying tower polished to a mirror finish

The atomizer is equipped with a secondary air inlet.

This equipment meets GMP requirements and equips with:
Air sweeping system, conical air-cooling jacket, air hammer vibration system and dry powder dehumidification and air-cooling system

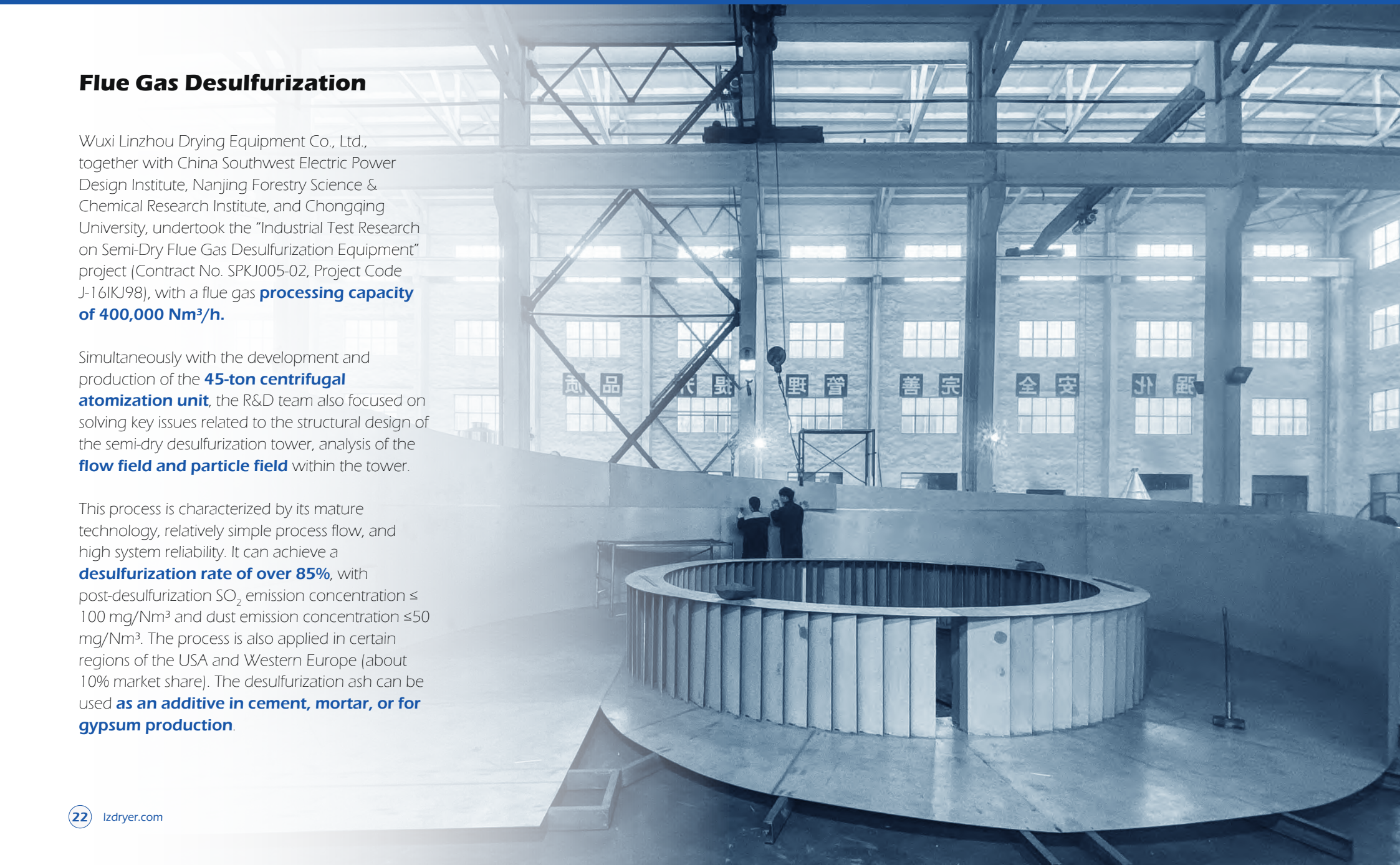
Daepyung Co., Ltd, South Korea, Stevia, Baijiu Additive

Flue Gas Desulfurization

Wuxi Linzhou Drying Equipment Co., Ltd., together with China Southwest Electric Power Design Institute, Nanjing Forestry Science & Chemical Research Institute, and Chongqing University, undertook the "Industrial Test Research on Semi-Dry Flue Gas Desulfurization Equipment" project (Contract No. SPKJ005-02, Project Code J-16IKJ98), with a flue gas **processing capacity of 400,000 Nm³/h.**

Simultaneously with the development and production of the **45-ton centrifugal atomization unit**, the R&D team also focused on solving key issues related to the structural design of the semi-dry desulfurization tower, analysis of the **flow field and particle field** within the tower.

This process is characterized by its mature technology, relatively simple process flow, and high system reliability. It can achieve a **desulfurization rate of over 85%**, with post-desulfurization SO_2 emission concentration ≤ 100 mg/Nm³ and dust emission concentration ≤50 mg/Nm³. The process is also applied in certain regions of the USA and Western Europe (about 10% market share). The desulfurization ash can be used **as an additive in cement, mortar, or for gypsum production**.



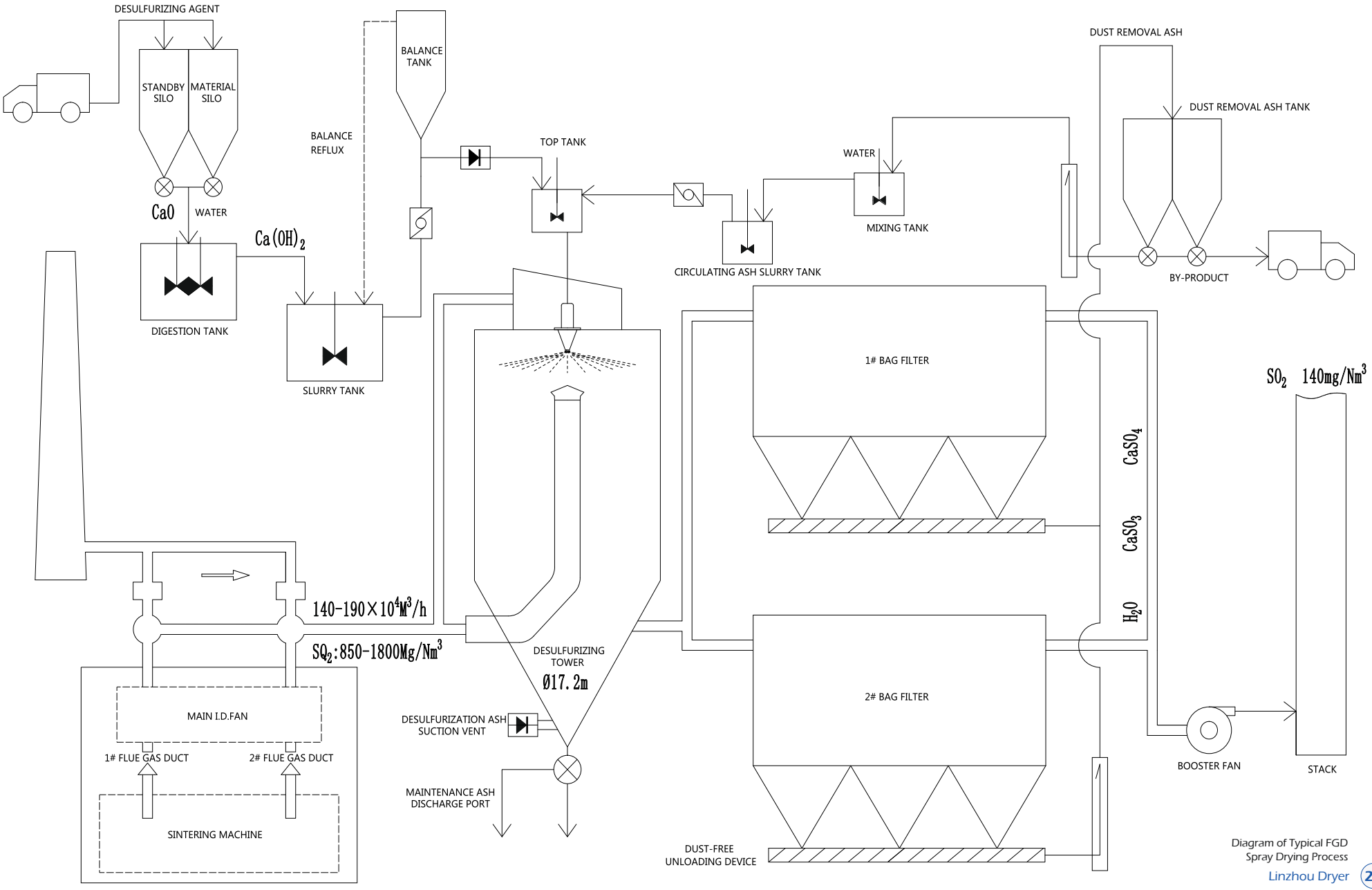


Diagram of Typical FGD Spray Drying Process

Alumina Ceramic

Alumina ceramic is prized for its wear resistance, corrosion resistance, and high strength, making it the most widely used **high-temperature structural ceramic.** For mass production—especially for applications requiring a uniform product appearance, minimal grinding, and ease of fine grinding—dry pressing is essential. This process demands a powder with a **specific particle gradation, low moisture, and minimal binder.** To meet these requirements, the alumina ceramic slurry (post ball-milling and fine crushing) must be dried and granulated to improve its fluidity and bulk density. Spray drying granulation has become the fundamental method for producing powders for both traditional building ceramics and advanced ceramics.

Puji Biotechnology (Taizhou) Co., Ltd., cyclone separators (2013)

Working Principle:

Feeding System

Preparation:
- The alumina slurry is first pulped using a beater and filtered to remove impurities.

Transportation:
- A high-pressure hose diaphragm pump then delivers the slurry to the atomization unit.

Atomization:
- Converting it into fine droplets by a pressure spray gun or a centrifugal atomizer.

Hot Air System

Air Preparation:
- Ambient air is drawn through an air filter into the jacket of a direct-fired hot air furnace.

Heating:
- This air is heated by a natural gas burner and then channeled through a hot air distributor, ensuring an even distribution of hot air.

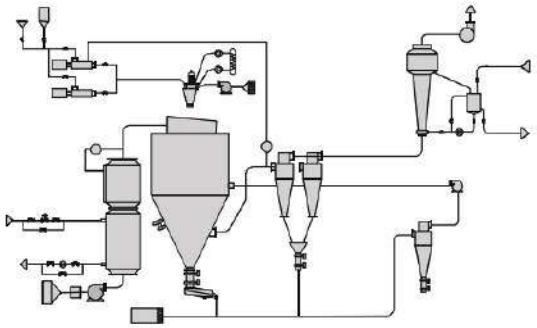
Integration:
- The uniformly heated air is then delivered to the drying tower to facilitate rapid moisture evaporation.

Drying & Material Collection System

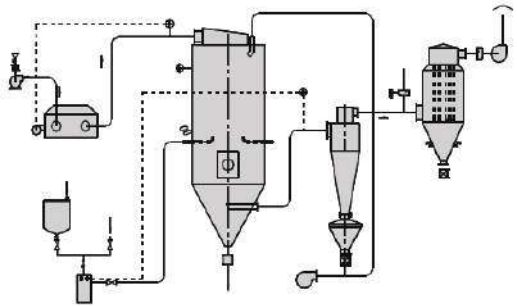
Drying:
- The intense heat instantly solidifying the droplets into granules in the drying tower.

Tail Gas and Dust Removal:
- The residual tail gas is directed to a bag-type filter to remove dust before the cleaned gas is exhausted.

Product Collection:
- Discharged from the bottom of the drying tower. Any fine powder entrained with the tail gas is separated in a secondary bag filter and collected.



Typical process flow chart of large-scale spray drying system



Typical process flow chart of large-scale spray drying system

CIP chamber cleaning hose reel on top of drying tower

Wastewater Spray Drying

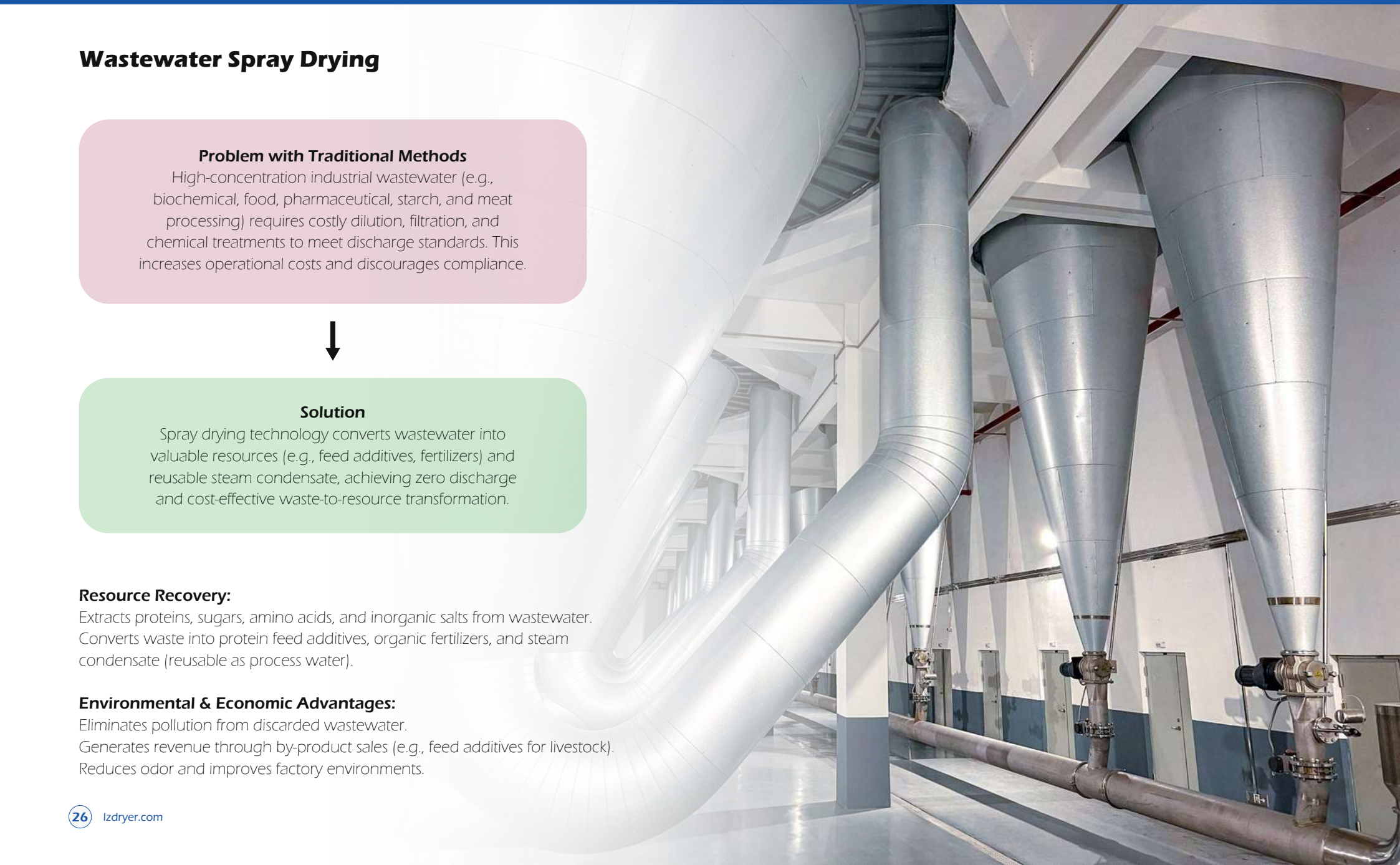
Problem with Traditional Methods

High-concentration industrial wastewater (e.g., biochemical, food, pharmaceutical, starch, and meat processing) requires costly dilution, filtration, and chemical treatments to meet discharge standards. This increases operational costs and discourages compliance.

↓

Solution

Spray drying technology converts wastewater into valuable resources (e.g., feed additives, fertilizers) and reusable steam condensate, achieving zero discharge and cost-effective waste-to-resource transformation.



Resource Recovery:

Extracts proteins, sugars, amino acids, and inorganic salts from wastewater.
Converts waste into protein feed additives, organic fertilizers, and steam condensate (reusable as process water).

Environmental & Economic Advantages:

Eliminates pollution from discarded wastewater.
Generates revenue through by-product sales (e.g., feed additives for livestock).
Reduces odor and improves factory environments.

Case Studies & Applications

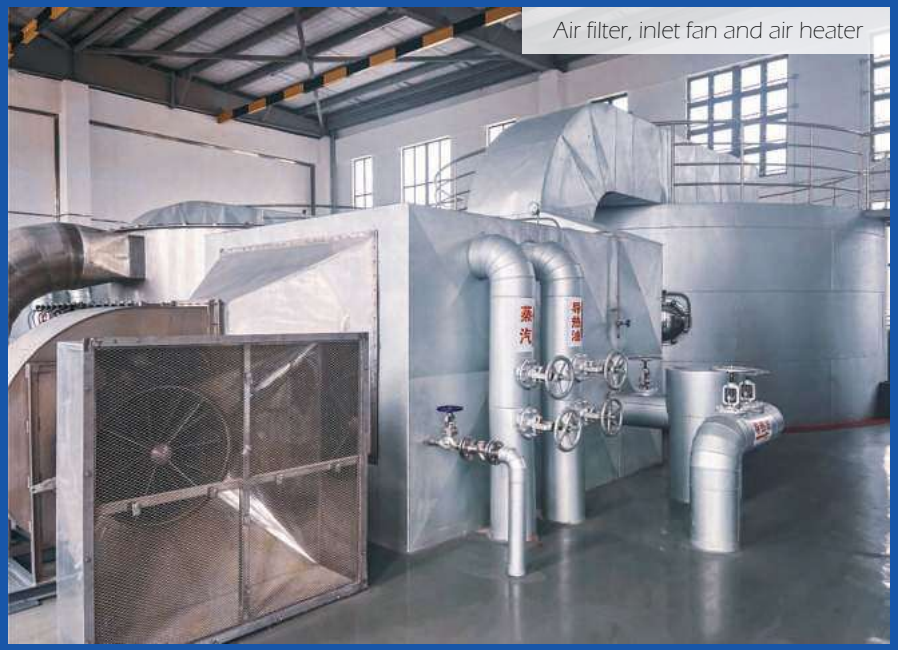
Wastewater Type	Spray Drying Output	Applications
Monosodium Glutamate	Corn pulp, tail concentrate	Protein feed additives, compound fertilizer
Biopharmaceutical	Vitamin B2, cephalosporin residues	Feed additives
Yeast/Alcohol	Yeast protein peptides, organic compounds	High-value protein peptides, fertilizer
Meat Processing	Blood protein	Feed additives (sold to feed mills)
Starch Industry	Starch/protein concentrates	Feed additives, recycled process water

Production Capacity: 50–4,000 kg/h.

Automation:

PLC/DCS controls for temperature, pressure, and system monitoring.

Real-time alerts for oil temperature and pressure and tower pressure.



Air filter, inlet fan and air heater

Parameters of Sodium Heparin Wastewater

Sodium Heparin Wastewater from Sausage Factory

Inlet Air Temperature: 200–220°C (adjustable, designed at 200°C)
Outlet Air Temperature: 80–90°C

Moisture Evaporation Rate: 500 kg/h
Solid Content: 20% (yield: 125 kg/h)
Spray Liquid Rate: 625 kg/h
Final Product Moisture Content: ≤5%

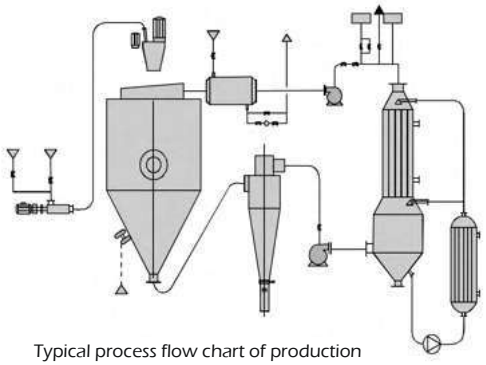
Heat Source: Thermal oil heat exchanger
Electrical Control: Automatic control of inlet and outlet air temperatures

Seletions and Configurations

Drying Air Volume: 14,100 m³/h
Drying Heat: 63×10^4 kcal/h

Tower Type: φ5500×5500 (inner cylinder diameter × inner cylinder straight section height) with a cone angle of 50°
Atomization Method: High-speed centrifugal atomization, RW2T type, 11 kW
Hot Air Distributor: DAR160
Cyclone Separator: φ1600
High-Efficiency Cyclone Separator: φ1600
Spray Dust Collector: φ1800

Power Consumption: Approximately 70 kW
Water Consumption: 2 tons/hour



Typical process flow chart of production equipment of closed-circuit spray drying

Drying Process

(Sodium Heparin Wastewater)

1.Heating & Air Distribution

The ambient air is heated and balanced to the required temperature using a thermal oil heat exchanger.
This heated air is then directed to a hot air distributor to ensure even distribution before entering the drying tower.

2.Atomization

Simultaneously, the material (waste liquid) is pumped by a feed pump to a centrifugal atomizer located at the top of the drying tower.
The atomizer converts the liquid into fine droplets of the desired size.

3.Initial Drying

The fine droplets are uniformly sprayed into the drying tower where they come into extensive convective contact with the evenly distributed hot air.
This rapid contact initiates the first stage of drying and granulation, forming particles almost instantly.

4.Further Drying & Moisture Removal

As the particles settle naturally, any residual moisture inside continues to evaporate until the product reaches the final moisture content requirement.
The dried product, along with the tail gas, exits the drying tower.

5.Product Separation

The exiting gas stream first passes through a primary cyclone separator, which removes the majority of the dry powder.
It then flows through a high-efficiency cyclone separator that further separates and collects the dry powder.

6.Exhaust & Recovery

The cleaned tail gas is discharged by the main induced draft fan after being processed through a spray dust collector.
The system achieves an overall recovery efficiency of 99%.

Experimental Spray Dryer

Our company supplies small experimental spray drying equipment designed for R&D in laboratories and industrial process research departments. The equipment is available in three types based on the spray method:

Centrifugal Spray Dryer
Pressure Spray Dryer
Dual-use (Pressure/Centrifugal) Spray Dryer

The equipment models are configured according to moisture evaporation capacity: **5kg/h, 8kg/h, 10kg/h, 15kg/h, and 20kg/h.**

Technical Specifications:

Material: Suitable for a variety of materials, including organic solvents.
Air Inlet Temperature: 120°C ~ 400°C.
Air Outlet Temperature: 60°C ~ 300°C.
Dry Powder Output: 1 kg/h ~ 10 kg/h.
Solid Content: 5% ~ 50%.

Heat Source: Electric heating.
Atomization Method: High-speed centrifugal atomizer and pressure spray gun.

Material Collection:
a. Primary cyclone dust removal (97% recovery).
b. Primary cyclone dust removal combined with water film dust removal (97% recovery, zero emissions).
c. Primary cyclone dust removal combined with bag filter (99.8% recovery, zero emissions).

Automatic control of inlet/outlet air temperature.
Atomizer oil temperature and oil pressure alarms.
Negative pressure display in the drying tower.
PLC program control, full computer DCS control, and electrical cabinet button control.

Powdery emulsion explosive (PEE)

The spray drying equipment of powdery emulsion explosive is prepared by **three-fluid spray** and **cold-air molding**, which has high explosion-proof requirement.

Three-fluid Spray Drying

A liquid feed is simultaneously mixed with a high-velocity gas (usually air) in the spray nozzle. This interaction creates fine, uniform droplets due to the shear forces of the gas, resulting in a controlled particle size distribution. Three-fluid spray drying is particularly beneficial in PEE production because it ensures **rapid drying and solidification** when combined with a cold-air molding process. This rapid cooling not only improves product consistency but also meets stringent explosion-proof requirements by **minimizing the risk of overheating or pressure buildup**.

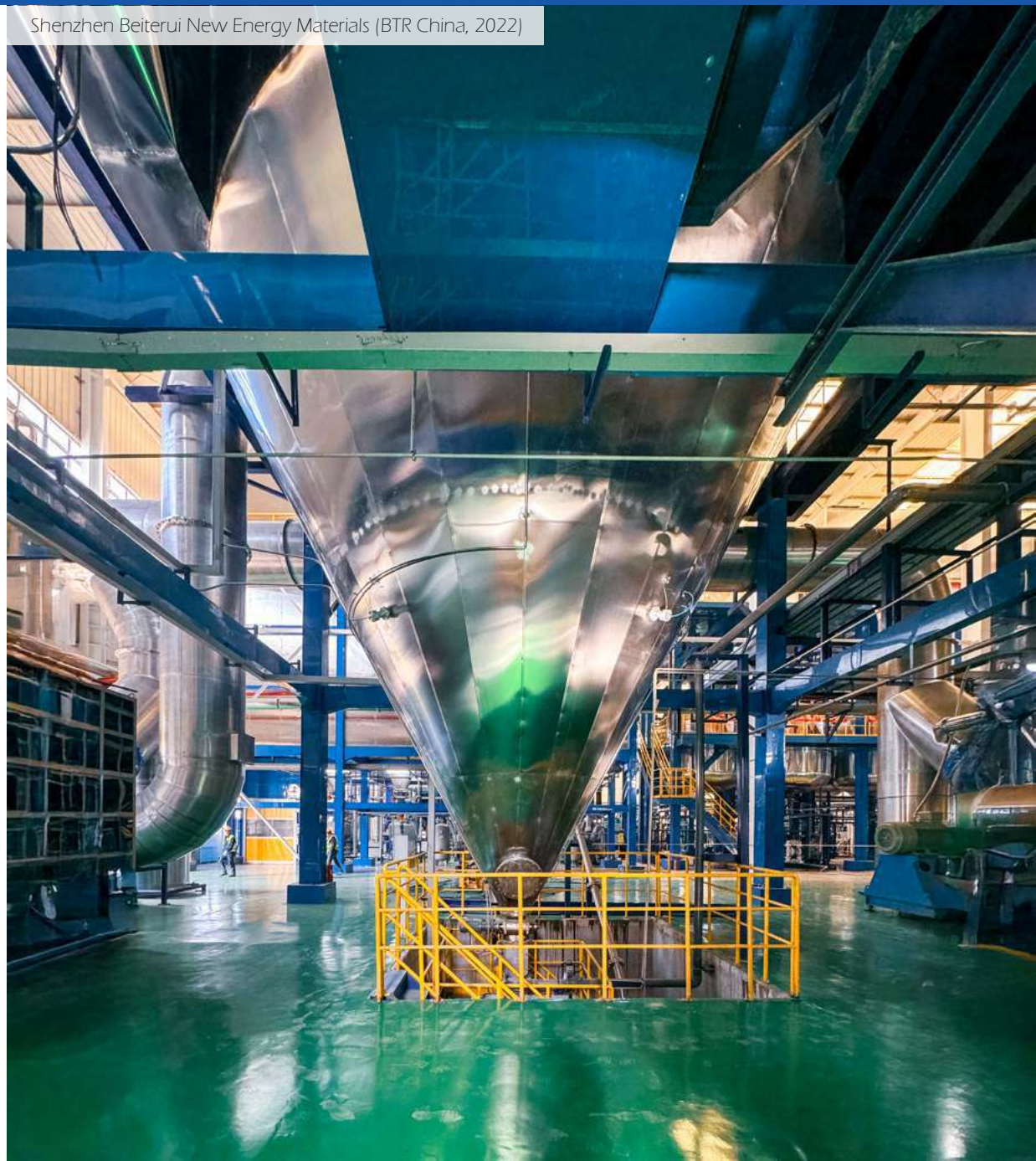
Lithium Battery (Lithium Iron Phosphate Positive Electrode)

Application & Process Technology:
QZR high-speed centrifugal spray dryer is designed for the dry production of **water-soluble liquid materials** used in **lithium battery lithium iron phosphate positive electrodes**. It utilizes high-speed centrifugal spray atomization technology to atomize the slurry into fine droplets, achieving a drying time of only tens of seconds. This rapid process enables continuous production while ensuring uniform particle size.

Product Quality & Material Purity:
The high-speed centrifugal atomization not only produces **micro-spherical particles** with a compact structure and excellent fluidity, but also significantly **increases the bulk density** of lithium iron phosphate cathode material. The technology enables the monomer particles to reach **3 to 5 μm** in size, with the finished product meeting a strict moisture content requirement of **0.3–0.5%**. Additionally, magnetic filtering is employed to prevent the incorporation of iron ion impurities, thereby ensuring material purity and maintaining the conductivity of the positive electrode material.

Energy Efficiency & Environmental Benefits:
With exhaust gas temperatures above 120°C, direct emissions would be wasteful. Instead, the system **recycles the waste heat gas**, achieving **energy saving** and **emission reduction** in line with state-promoted low-carbon production methods. The comprehensive integration of these innovative technologies provides the basic equipment and technical support necessary for the industrial production of new energy lithium battery cathode materials in China, making it an ideal drying solution for new material production.

Shenzhen Beiterui New Energy Materials (BTR China, 2022)



Parameters of Special Spray Drying Unit

(Lithium Battery Materials)

1. Liquid Conditions:

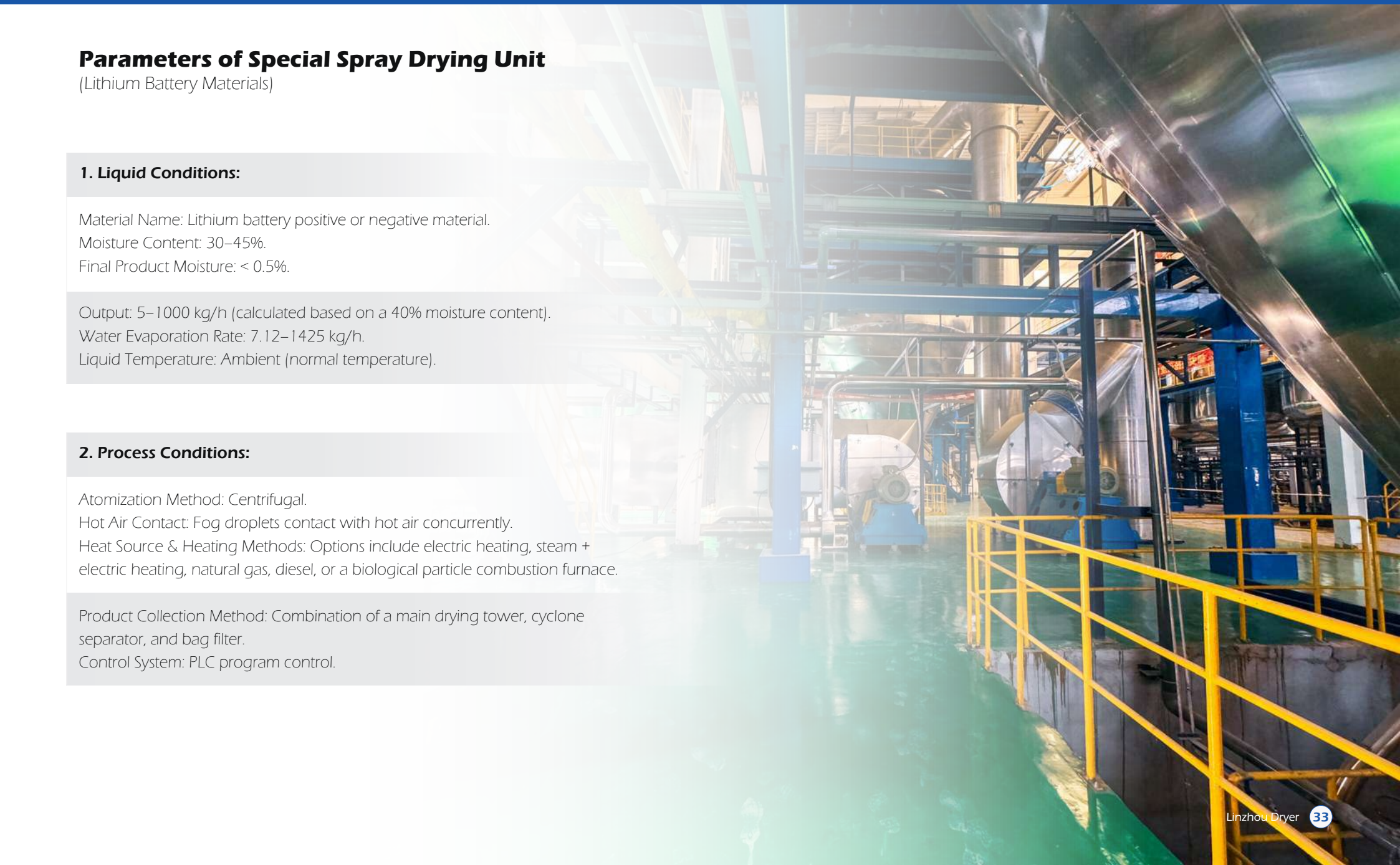
Material Name: Lithium battery positive or negative material.
Moisture Content: 30–45%.
Final Product Moisture: < 0.5%.

Output: 5–1000 kg/h (calculated based on a 40% moisture content).
Water Evaporation Rate: 7.12–1425 kg/h.
Liquid Temperature: Ambient (normal temperature).

2. Process Conditions:

Atomization Method: Centrifugal.
Hot Air Contact: Fog droplets contact with hot air concurrently.
Heat Source & Heating Methods: Options include electric heating, steam + electric heating, natural gas, diesel, or a biological particle combustion furnace.

Product Collection Method: Combination of a main drying tower, cyclone separator, and bag filter.
Control System: PLC program control.



Drying tower behind (BTR China, 2022)

Bag filter (BTR China, 2022)

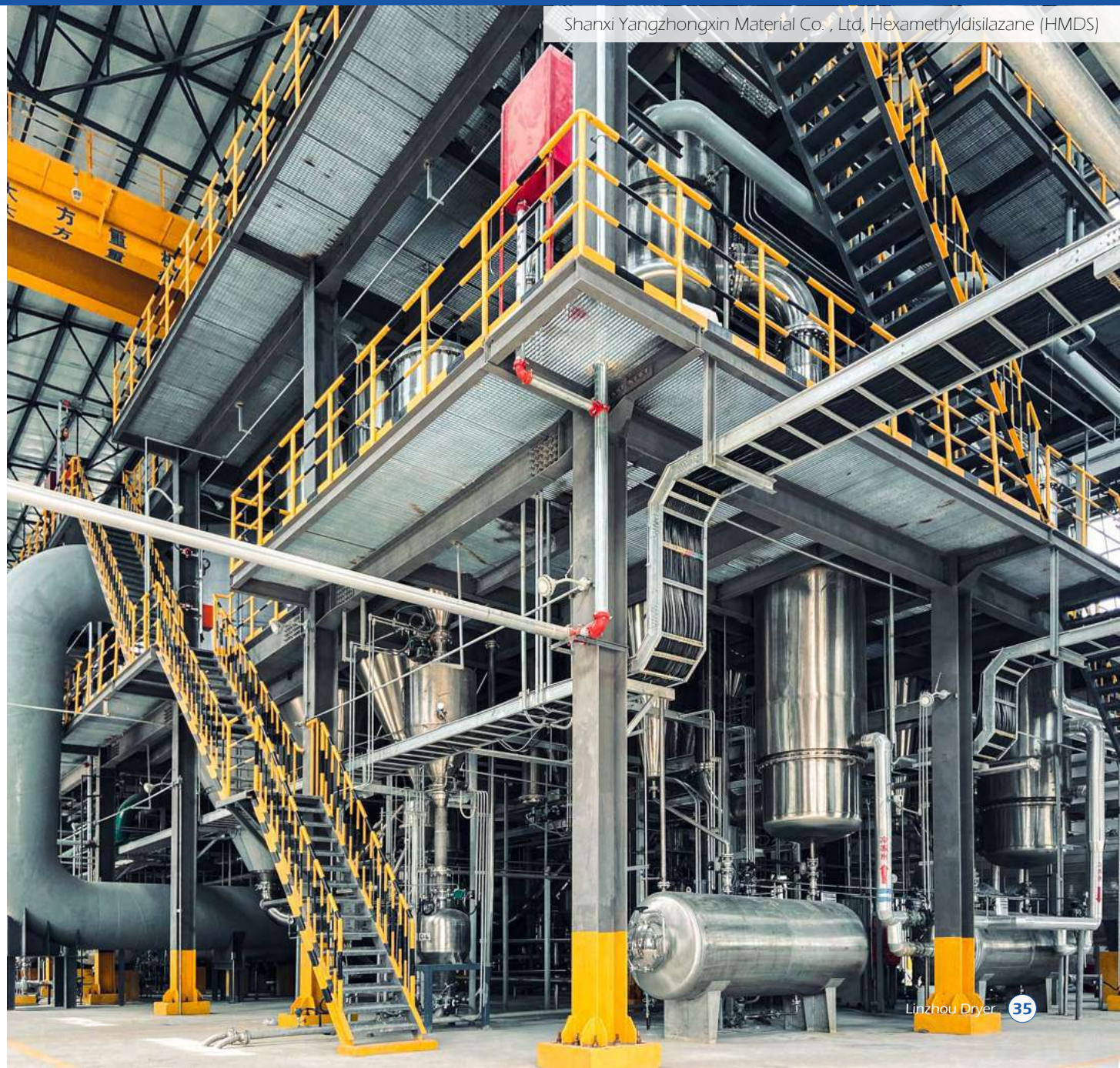
Organic Solvent Recovery

The closed-cycle organic solvent recovery spray dryer is designed for recovering solvents such as methanol, ethanol, isopropyl acetate, ethyl acetate, dichloromethane, acetone, and hexane from liquid suspensions or solutions. By using **inert nitrogen** as the drying medium in a sealed, recirculating system, this dryer prevents oxidation, allows for solvent recovery, and meets strict explosion-proof and GMP standards. It is widely used in industries requiring high purity and safety, such as **new materials, precision ceramics, pharmaceuticals, battery materials, and carbide powders.**

Key Features:

- Sealed, closed-loop system with recyclable nitrogen.
- Prevents oxidation and maintains solvent integrity.
- High explosion-proof control and rigorous GMP compliance.
- Energy efficient through waste heat recovery and minimal emissions.

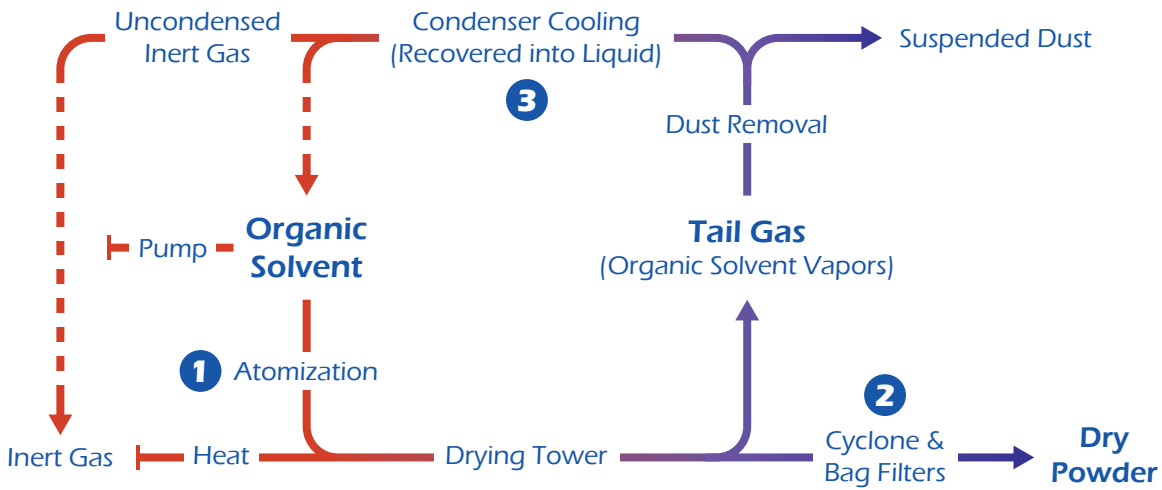
The system operates entirely in a **closed environment**, using inert gas to protect sensitive materials. The nitrogen is heated and circulated through the drying tower, where the liquid feed is atomized into fine droplets. These droplets rapidly lose moisture upon contact with the hot, uniformly distributed gas. The evaporated solvent is then recovered through condensation, while the non-condensable gas is reheated and recirculated, ensuring continuous operation and efficiency.



Shanxi Yangzhongxin Material Co. , Ltd, Hexamethyldisilazane (HMDS)

Explosion-proof sensors control unit (Yangzhongxin Material, 2014)

Central collection bag filter, Yangzhongxin Material, 2014)



Process Steps:

Heating: Inert gas (nitrogen) is heated by a dedicated heater.
Atomization: Liquid material is pumped to a centrifugal nozzle, forming fine droplets.
Drying: Droplets are dried rapidly in the drying tower.
Solvent Recovery: Evaporated solvent is separated and condensed.
Gas Recirculation: The inert gas is reheated and reused as the drying medium.

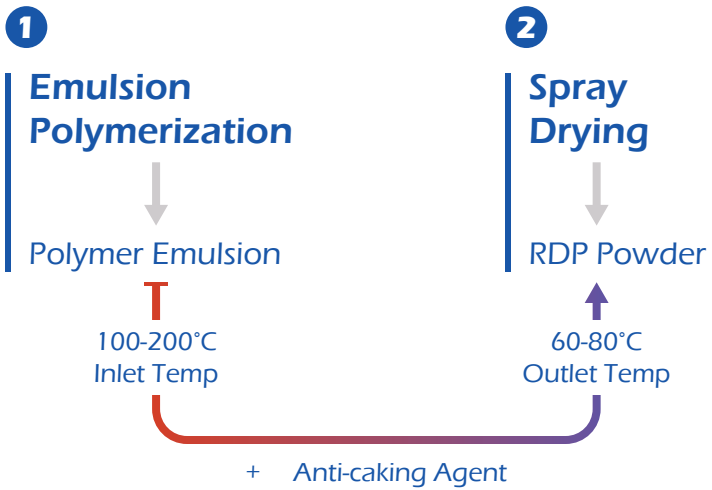
This innovative system delivers **high recovery efficiency** and environmental performance while ensuring safety in the processing of oxidizable, flammable, or explosive organic solvents. Its design **minimizes waste and energy consumption**, making it a critical technology for modern industrial applications.

Advantages:

- Oxidation-free process that preserves solvent quality.
- High solvent recovery rates, reducing waste and cost.
- Energy-efficient through continuous gas recycling and waste heat utilization.
- Complies with strict explosion-proof and environmental standards.

RDP Powder Spray Drying

Redispersible polymer powder is a **thermoplastic resin** produced by spray drying **polymer emulsions** followed by further processing. It typically appears as a white powder (although it can also come in other colors) and is primarily used in **construction applications**. Its main benefits include improving the cohesion, adhesion, and flexibility of dry-mixed mortar.



Process Details:
During the drying process, the polymer emulsion is conveyed by a screw pump into a spray dryer. Because the spray drying occurs within a few seconds, the droplet distribution is "frozen," and the **protective colloid** present in the emulsion acts as a spacer to **prevent irreversible coalescence of the polymer particles**. To prevent caking during storage and transportation, an **anti-caking agent** is added during or after the drying process.

Cyclone separators & bag filters (Oriental Yuhong, 2017)

Key Equipment Parameters & Features:

Material (Feed): Polymer emulsion
Dry Powder Output: 100 kg/h to 700 kg/h
Solid Content: 30% to 42%
Heat Source Options: Natural gas burner, diesel burner, superheated steam, or biological particle burner (customizable based on customer requirements)

Atomization Method: **High-speed centrifugal atomizer**

Material Recovery:
Two-stage bag dust removal system with a recovery rate of 99.8%, complying with national emission standards

Material Collection System:
Centralized collection where the dry powder is conveyed from the drying tower bottom to a bag filter, then to a receiving small bag via an air conveying system, followed by screening on a vibrating screen before being directed to the silo and automatically packaged after iron removal

Auxiliary Material Addition:
Two **automatic feeding machines**, equipped with a weighing system, provide precise dosing at two designated points at the tower top

Electrical Control:
Equipped with **PLC program control** (featuring automatic control of inlet/outlet air temperature, atomizer oil temperature and oil pressure alarms, and negative pressure display in the tower) or full computer DCS control

Pump station (Oriental Yuhong, 2017)

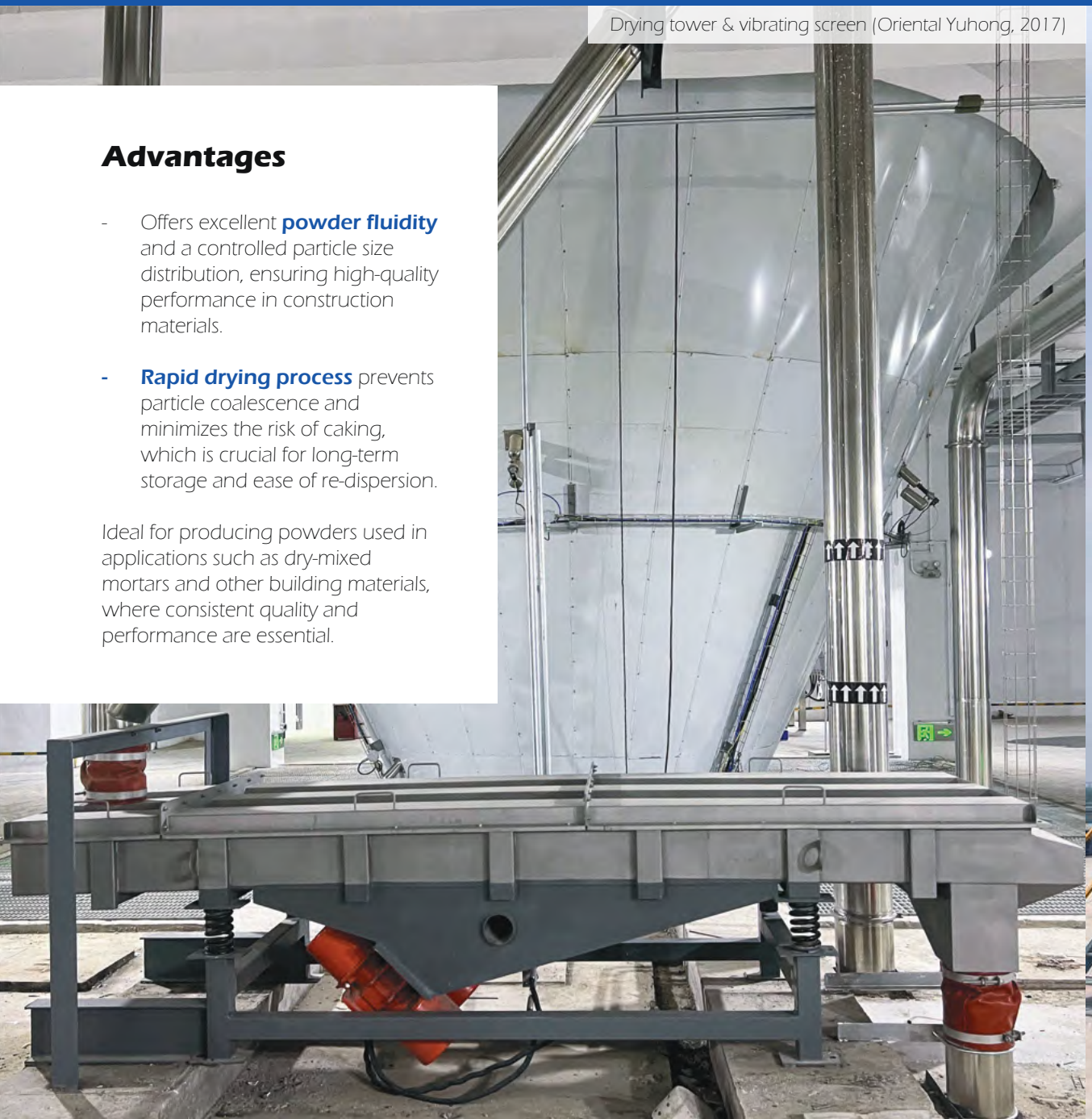
Packaging area (Oriental Yuhong, 2017)

Advantages

- Offers excellent **powder fluidity** and a controlled particle size distribution, ensuring high-quality performance in construction materials.

- **Rapid drying process** prevents particle coalescence and minimizes the risk of caking, which is crucial for long-term storage and ease of re-dispersion.

Ideal for producing powders used in applications such as dry-mixed mortars and other building materials, where consistent quality and performance are essential.



Drying tower & vibrating screen (Oriental Yuhong, 2017)

Tower top working area (Oriental Yuhong, 2017)

LINZHOU Future

Pioneering a Sustainable Future: Innovation and Excellence

Looking to the future, we are committed to pioneering sustainable, innovative manufacturing. By investing in advanced R&D and cutting-edge technology, our factory will integrate eco-friendly, automated processes that enhance product quality and efficiency while reducing environmental impact. We are determined to build a cleaner, smarter, brighter tomorrow for lasting excellence.

2025

Laying the Foundation for Innovation

By 2025, we will invest 1.5 million USD in our R&D department and laboratory upgrades, enhancing our capabilities in precision engineering and material science. Our goal is to accelerate product development and bring cutting-edge solutions to the market.

2030

Advancing Sustainable Manufacturing

By 2030, we aim to integrate state-of-the-art automation and smart manufacturing into our production lines, reducing waste and improving efficiency. We will adopt clean energy solutions and implement environmentally friendly processes to minimize our carbon footprint.

2035

A Global Leader in Green Technology

By 2035, we envision our factory as one of the global benchmark for sustainable manufacturing, utilizing next-generation green technologies and pioneering eco-friendly industrial solutions. Our ultimate mission is to create a cleaner environment for future generations.

Certifications

CE Certification (Pressure)

CE Certification (Centrifugal)

ISO 9001:2015 Certification

ISO 14001:2015 Certification

ISO 45001:2018 Certification

LINZHOU DRYER

Drying solutions for a better world.

Tel: +61 0450-087-884
Email: info@lzdryer.com

Wuxi Linzhou Drying Equipment Co., Ltd
Wuxi, Jiangsu, China
www.lzdryer.com (International)
www.linzhou.com (China Mainland)

Factory Address:
NO.3-1 Wanshou Road, Qianzhou Industrial Park, Huishan District, Wuxi, Jiangsu Province 214182, CN