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楚天华通医药设备有限公司

TRUKING WATERTOWN PHARMACEUTICAL EQUIPMENT CO.,LTD.

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May 2023 Edition



Truking Watertown Products Manual

楚天华通产品手册

楚天华通医药设备有限公司

TRUKING WATERTOWN PHARMACEUTICAL EQUIPMENT CO.,LTD.

让世界制药工业插上智慧的翅膀

Equip global pharmaceutical manufacturing industry with intelligent wings.

TRUKING

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TRUKING

公司简介 Company profile



楚天华通医药设备有限公司系楚天科技股份有限公司全资子公司，始建于1993年，是目前亚洲领军制药用水系统（制备、储存和分配）、配液系统、不锈钢压力容器、污水处理、蒸发浓缩结晶、换热器研发制造基地，装备及制造工艺处于行业先进水平，员工总数1300余人，资产总额20亿元，服务于全球1000余家制药企业。

公司位于长春九台经济开发区，是中国制药装备行业协会理事单位，中国医药设备工程协会、中国膜工业协会会员单位，获评国家级高新技术企业、吉林省专精特新企业、吉林省级企业技术中心，获得省级创新型科技企业、长春市百强民营企业、长春市科技型小巨人企业等荣誉。公司拥有中国特种设备压力容器D级（10MPa以下的一类、二类、三类压力容器）设计与制造资质、压力管道（GC2）安装许可证、建筑机电安装工程专业承包贰级资质、环保工程专业承包贰级、环境工程设计专项（水污染防治工程）乙级、美国ASME（U）钢印设计与制造资质、欧盟CE（PED、MD）认证资质。截至2023年4月，公司共提出中国专利申请320项，有效专利180项，另提出1件PCT国际专利申请。产品已出口美国、意大利、比利时、希腊、土耳其、俄罗斯、韩国、泰国、越南、印尼、印度、埃及、沙特、摩洛哥、秘鲁等30多个国家和地区，国际市场占有率正逐年快速提升。

公司拥有经验丰富的研发技术团队，覆盖工程设计、项目管理、测试调试、验证与咨询服务，联合楚天科技、德国ROMACO集团、四川省医药设计院共同承接制药企业EPCM总包服务，为制药企业提供工程工艺优化、产品的全生命周期管理与服务。

2021年公司确认新建楚天华通医药装备智能制造产业园项目，位于长春市九台经济技术开发区中古医药产业园。项目新购地36.1117万平方米，计划在5年内分三期完成项目整体建设任务，项目建成后，将崛起楚天华通研发中心大楼、智能车间、员工公寓以及商务接待中心等现代化智能配套公用工程。一期工程建筑面积6万平米，预计2023年7月投产。作为楚天华通年产5000台套医药装备的智能制造基地，楚天华通医药装备智能制造产业园项目完成后将大幅提升企业产能，将进一步推动企业战略目标的实现。

公司坚持“做受尊敬的人、造受尊敬的产品、办受尊敬的企业”的核心价值观，秉承“要么唯一，要么第一”的理念，弘扬“因为执着，所以卓越”的精神，将楚天华通打造成全球制药用水系统领军企业之一。

Truking Watertown Pharmaceutical Equipment Co., LTD., a wholly-owned subsidiary of Truking Technology Limited, was founded in 1993. It is the leading R&D and manufacturing base of pharmaceutical water system (preparation, storage and distribution), liquid preparation system, stainless steel pressure vessel, sewage treatment, evaporation, crystallization and heat exchanger in Asia. With more than 1300 employees and 2 billion yuan of assets, the company serves more than 1000 pharmaceutical enterprises around the world.

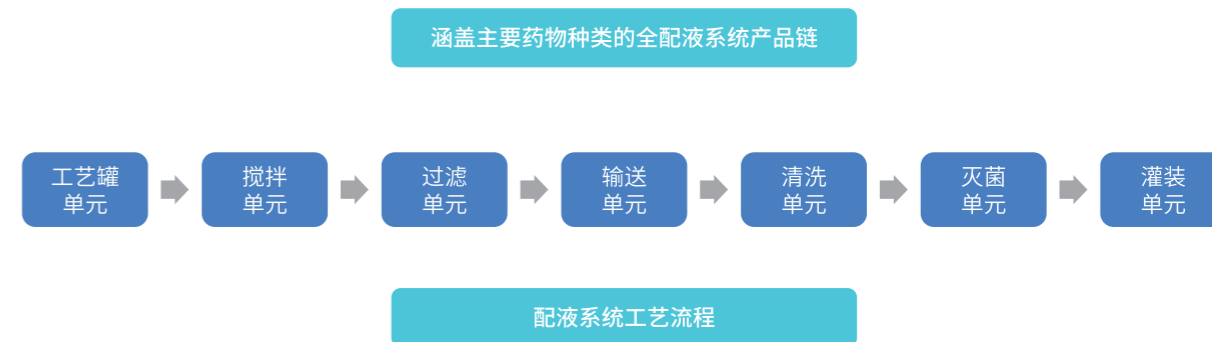
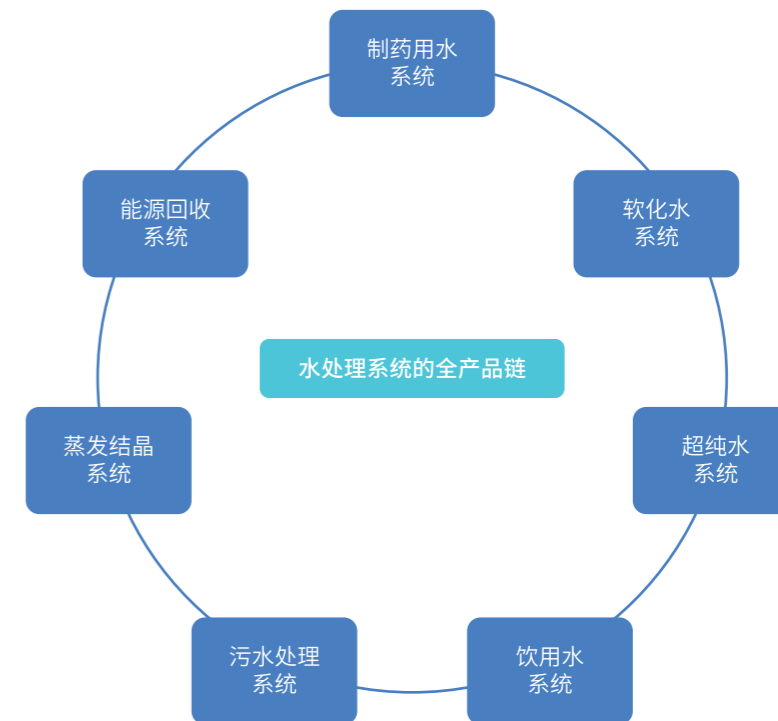
Truking Watertown is located in Jiutai Economic Development Zone, Changchun. It is a member of China Pharmaceutical Equipment Industry Association, China Pharmaceutical Equipment Engineering Association and China Membrane Industry Association. It has been rated as a national high-tech enterprise, Provincial Specialized and Sophisticated Enterprise, Provincial Enterprise Technology Center. It has been honored as provincial innovative technology Enterprise, Changchun Top 100 Private Enterprise, and Changchun Small Giant Technology Enterprise. Truking Watertown has Chinese special equipment Class D (Class I, Class II and Class III below 10MPa) pressure vessel design and manufacturing license, Pressure pipeline (GC2) installation license, construction mechanical and electrical installation engineering contracting Class II, environmental engineering contracting Class II, environmental engineering design special (water pollution control engineering) Class B, ASME(U) steel seal design and design manufacturing qualification, EU CE(PED, MD) certification qualification. Truking Watertown has applied for 320 patents, 180 patents of which have been authorized until April 2023, and one PCT international patent application. Products have been exported to the United States, Italy, Belgium, Greece, Turkey, Russia, South Korea, Thailand, Vietnam, Indonesia, India, Egypt, Saudi Arabia, Morocco, Peru and other 30 countries and regions, the international market share is rapidly increasing year by year.

Truking Watertown has an experienced R&D technical team, covering engineering design, project management, testing and commissioning, validation and consulting services. Together with Truking Technology, Germany ROMACO Group and Sichuan Pharmaceutical Design Institute, the company jointly undertakes EPCM general contract services for pharmaceutical enterprises, providing engineering process optimization and product lifecycle management and services for pharmaceutical enterprises.

In 2021, Truking Watertown pharmaceutical equipment Intelligent Manufacturing Industrial Park project started, located in Jiutai Economic and Technological Development Zone of Changchun Medicine Industrial Park. The new plant occupies 361,117 square meters. It is planned to complete the overall construction in three phases within 5 years. After the completion of the construction, Truking Watertown R&D Center building, intelligent workshop, employee apartment and business reception center and other modern intelligent supporting utilities will be used. The first phase of the project covers a construction area of 60,000 square meters and is expected to be put into operation in July 2023. As base of Truking Watertown with an annual output of 5,000 sets, pharmaceutical equipment intelligent manufacturing Industrial Park will greatly improve the enterprise's production capacity after the completion of the project, which will further promote the realization of the strategic objectives of the enterprise.

We insist on the core value of being respected person, making respected product and running respected enterprise and adhere to the philosophy to be the unique or to be the first and promote the spirit of Because of persistence, we are superexcellent to make Truking Watertown be one of the leading pharmaceutical water system enterprises all over the world.

产业布局 Industrial Layout



楚天华通集设计、工程、设备、自动化、信息化、验证、配套工艺、咨询、服务于一体。为客户提供全剂型药品药物工业生产解决方案。

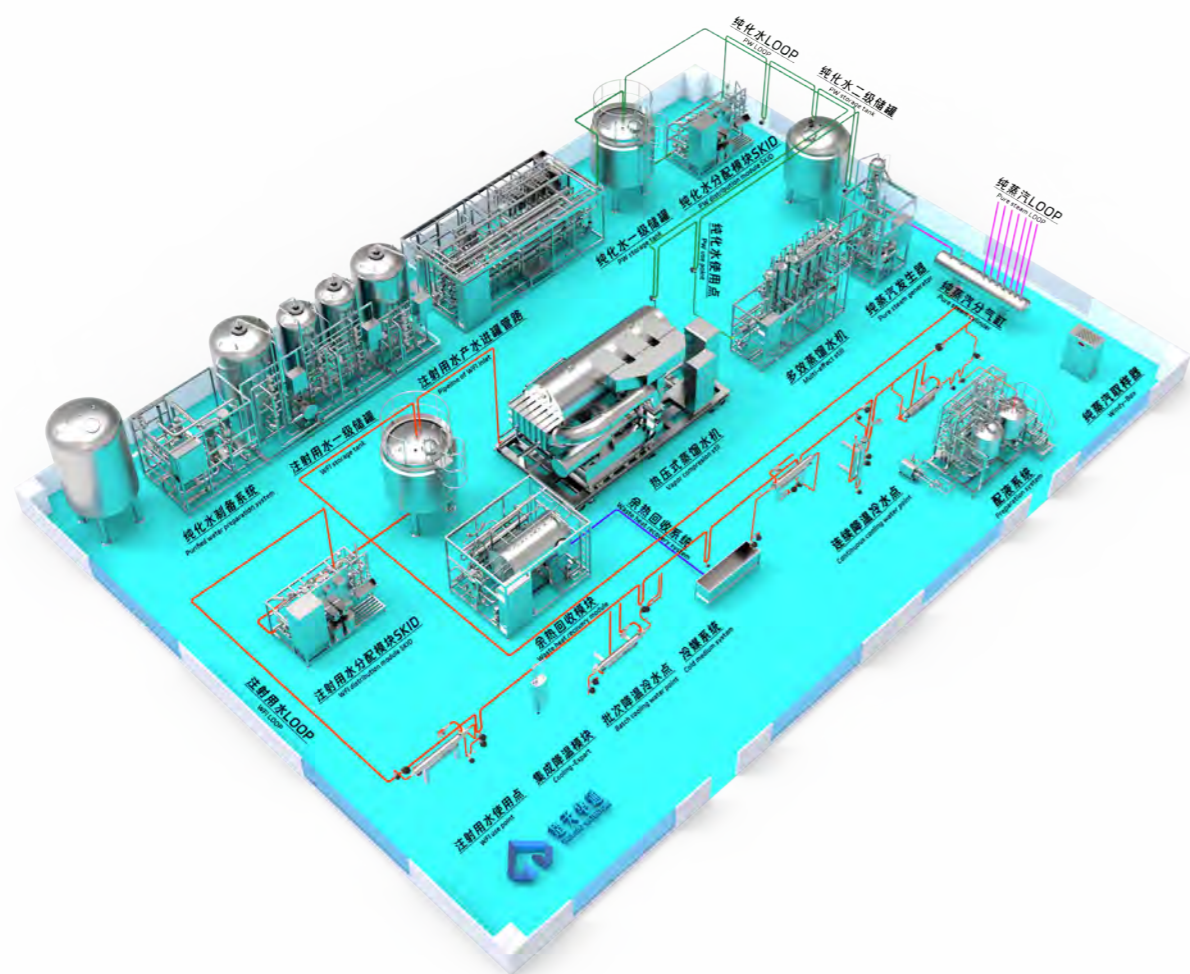
Truking Watertown can provide design, engineering, equipment, automation, information, validation, supporting technology, consulting, and service. Provide customers with full dosage pharmaceutical production solutions.

技术与产品 Technology and Products

制药用水系统整体解决方案 / Pharmaceutical Water System Overall Solution

楚天华通致力于为制药企业提供智慧水务整体解决方案，以前端原水、药典水、非药典水，至后端污水处理为水循环主线；以能源回收、能源储存、能源再利用为能源循环主线，双线并行创立循环经济模式，合力推进制药企业绿色双碳高效发展。

Truking Watertown is committed to providing water overall solutions for pharmaceutical enterprises. Raw water, pharmacopoeia water, non-pharmacopoeia water, sewage treatment as the main cycle. With energy recovery, energy storage and energy reuse as the main energy cycle, the two lines are parallel to create a circular economy model, and promote the green and double carbon efficient development of pharmaceutical enterprises.



制药用水系统生产装备的全产品链示意图
Pharmaceutical water system Complete product chain of equipment
Schematic diagram

■ 纯化水制备系统 / Purified Water Preparation System

用于制备符合药典定义及要求的纯化水设备。

It is used to prepare purified water equipment conforming to the definition and requirements of pharmacopoeia.



性能特点 / Performance Characteristics

具备模块化设计理念，便于操作及后期维护；独特的多通道阀门设计，满足工艺零死角要求，提高系统的无菌保障；双路供水设计，保证设备在供水和内循环状态下都无死水；系统内部部分浓水回收：提高系统整体回收率至 80% 以上，改良工艺可使系统的回收率达 95% 以上等特点。

With modular design concept, easy to operate and maintain. Unique multi-channel valve design, meet the process zero dead leg requirements, improve the asepsis of system. Dual water supply design, ensure that the equipment in the water supply and internal circulation state are no residual water. Recovery of concentrated water inside the system: the overall recovery rate of the system can be improved to more than 80%, and the improved process can make the recovery rate of the system reach more than 95%.

■ 纯蒸汽发生器 / Pure Steam Generator

利用纯化水为原料，通过加热相变方式制备纯蒸汽的设备。

Using purified water as raw material, by heating phase change method to prepare pure steam.



性能特点 / Performance Characteristics

具备纯蒸汽产能需求快速响应；精确的纯蒸汽输出压力、温度控制；纯蒸汽品质符合 HTM2010 (EN285) 标准所定义的不凝气体含量、干燥度、过热度要求等特点。

Meet requirement of pure steam capacity. Precise pure steam output pressure and temperature control. Pure steam quality conforms to the non-condensable gas content, dryness and superheat requirements defined by HTM2010 (EN285) standard.

■ 多效蒸馏水机 / Multi-effect Still

利用水的相变原理，通过物理分离方式去除水中热源与内毒素的注射用水制备设备。

Using the principle of phase transition of water, the preparation equipment of water for injection is designed to remove heat source and endotoxin in water through physical separation.



性能特点 / Performance Characteristics

具备设备可靠运行，产水水质稳定；根据储罐液位，自调节变压产水；独特三级分离方式，充分保证产水水质；电解抛光提高抗腐蚀能力，降低红锈风险；设备自消毒、自灭菌理念，充分满足 GMP 要求等特点。

With reliable operation of equipment, water quality stability. According to the level of the storage tank, self-adjust variable pressure to produce water. Unique three-stage separation, fully ensure the water quality. Electro polishing improves corrosion resistance and reduces the risk of rouge. Equipment self-sanitization, self-sterilization concept, fully meet the requirements of GMP characteristics.

■ 热压蒸馏水机 / Vapor Compression Still

以输入压缩机的电能为主要能源，通过高效能蒸汽压缩机对原料水蒸发产生的二次蒸汽进行压缩，从而提高二次蒸汽热焓值，使其升温后返回蒸发器内循环换热的注射用水制备设备。

With the electric energy input compressor as the main energy, the secondary steam generated by the evaporation of raw material water is compressed by the high efficiency steam compressor, so as to improve the enthalpy value of the secondary steam, and make it return to the evaporator after heating up the circulating heat transfer equipment of water for injection.



性能特点 / Performance Characteristics

具备产水水质优异；不受容规和 ASME 压力容器监检；原水利用率高达 92% 以上；结构设计符合 FDA 和 cGMP 要求；无冷却水消耗，产水阶段整机实现 40°C 冷排放；配置能源分析模块，便于精细化管理等特点。

With excellent water quality. Not subject to volume regulation and ASME pressure vessel inspection. The utilization rate of raw water is more than 92%. Structural design meets FDA and cGMP requirement. No cooling water consumption, water production stage of the whole machine to achieve 40°C cold drainage. Configuration of energy analysis module, easy to management and other features.

■ 洁净换热器 / Clean Heat Exchanger

换热器作为物料之间进行热量传递的过程的设备，主要作用为保证工艺过程对介质所要求的特定温度，包括升温、降温。

Heat exchanger as a process of heat transfer equipment between materials, the main role is to ensure that the process of the medium required for the specific temperature, including heating, cooling.



◎ 双管板换热器 -- 性能特点 / Performance Characteristics of Double Tube Sheet Heat Exchanger

具备整体式双管板设计，避免管壳程交叉污染；管束与管板采用无缝管双胀机械胀接技术；倾角设计有效保证自排净；密封材质符合 FDA 声明等特点。

With integral double tube sheet design, avoid cross contamination of tube and shell process. Tube bundle and tube plate adopt double seamless tube expansion mechanical expansion technology. Dip Angle design effectively guarantees self-drainage. Seal material in accordance with FDA claims and other features.



◎ 毛细管换热器 -- 性能特点 / Performance Characteristics of Capillary Heat Exchanger

具备双管板结构设置，避免管壳程的交叉污染；体积小；换热管细，管壁薄，换热均匀，传热系数高，单位面积上可提供更大的热负荷等特点。

Double tube sheet structure to avoid cross contamination of tube and shell, small size. The heat exchange tube is thin, the tube wall is thin, the heat transfer is uniform, the heat transfer coefficient is high, the unit area can provide greater heat load and so on.

■ 储存单元 / Storage Unit



- ◎ 设计与制造遵循 GB150、ASME BPE、EU PED、EU CE、FDA 等标准，参与行业标准的起草与制定
- ◎ 制药装备行业最大的电解抛光车间，满足电解抛光 $Ra \leq 0.28\mu m$
- ◎ 具备强大的常规计算与分析计算能力
- ◎ 罐体开孔采用冷精密切割工艺
- ◎ 采用进口卷板机、自动焊机、抛磨机等加工设备
- ◎ 采用进口数字成像探伤设备，对罐体焊缝进行 100% 射线探伤

- Design and manufacturing in accordance with GB150, ASME BPE, EU PED, EU CE, FDA and other standards, participate in the drafting and setting of industry standards
- The largest electro polishing workshop in pharmaceutical equipment industry, meeting electro polishing $Ra \leq 0.28\mu m$
- Strong ability of general calculation and analytical calculation
- Tank opening adopts cold precision cutting technology
- Imported plate rolling machine, automatic welding machine, polishing machine and other processing equipment
- The imported digital imaging inspection equipment is used to carry out 100% ray inspection on the tank welding seam

■ 分配模块 / SKID



- ◎ 基于风险分析的详细工艺计算
- ◎ 符合 cFDA、cGMP、EU GMP、WHO GMP、SFDA GMP 规范和指南
- ◎ 基于 PLM 产品数据管理的模块化、标准化、归一化设计，高可靠性和质量一致性
- ◎ 节能降耗、超低排放率
- ◎ 应用 BIM 空间管理，项目可视化且易维护
- ◎ 智能运行与维护系统，关键组件自动监控运行状态
- ◎ 支持微信推送报警，可提供远程故障诊断

- Detailed process calculations based on risk analysis
- Comply with cFDA, cGMP, EU GMP, WHO GMP, SFDA GMP specifications and guidelines
- Based on PLM product data management modular, standardized, normalized design, high reliability and quality consistency
- Energy saving, low emission rate
- Using BIM space management, the project is visualized and easy to maintain
- Intelligent operation and maintenance system, critical components automatically monitor the running status
- Support Wechat alarm receiving, can provide remote fault diagnosis

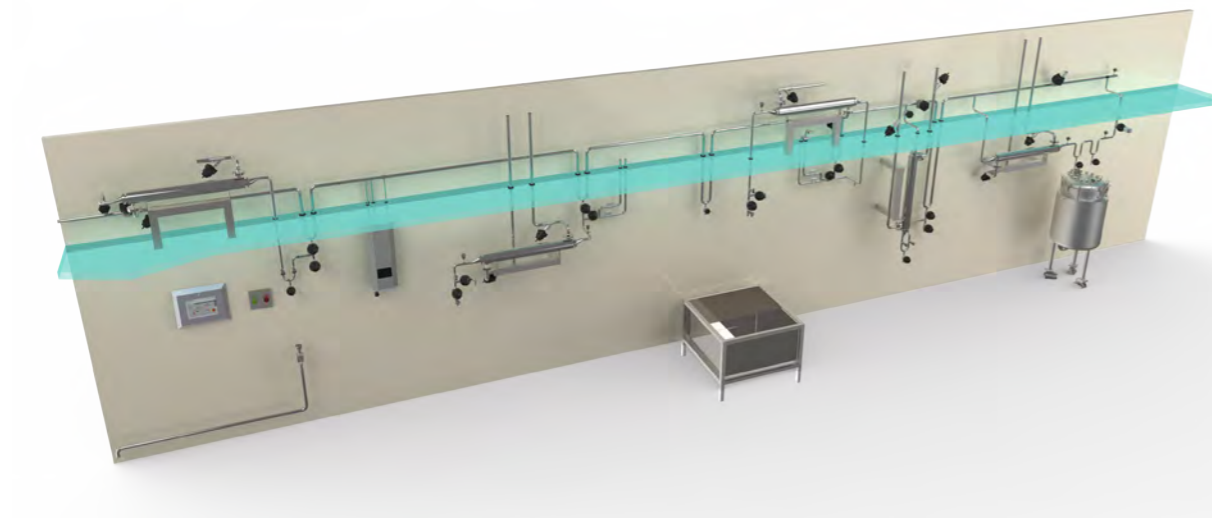
■ 制药用水（气）分配管网系统 / Pharmaceutical Water (gas) Distribution Pipe Network System

制药用水系统作为制药企业生产过程中的关键要素，其建造、运行等环节与药品质量息息相关。

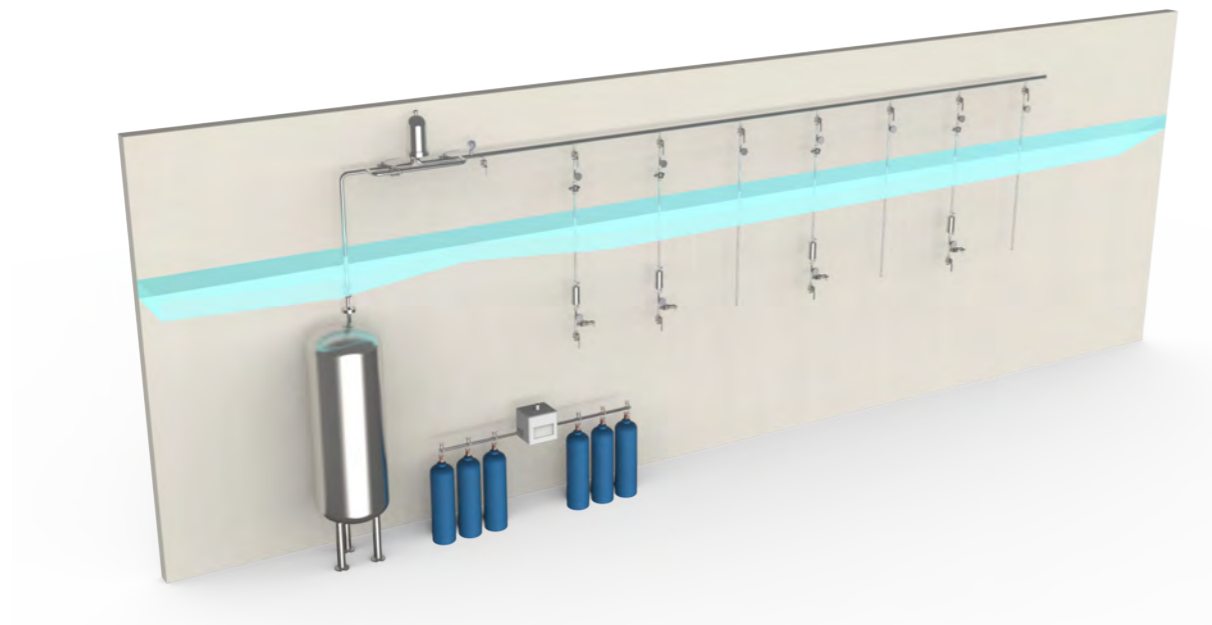
楚天华通作为中国制药用水整体解决方案领导者，倡导为用户提供全生命周期的项目管理服务。

As a key factor in the production process of pharmaceutical enterprises, the construction and operation of pharmaceutical water system are closely related to the quality of drugs.

Truking Watertown, as the leader of pharmaceutical water solutions in China, advocates to provide users with full life cycle project management services.



制药用水分配管网系统

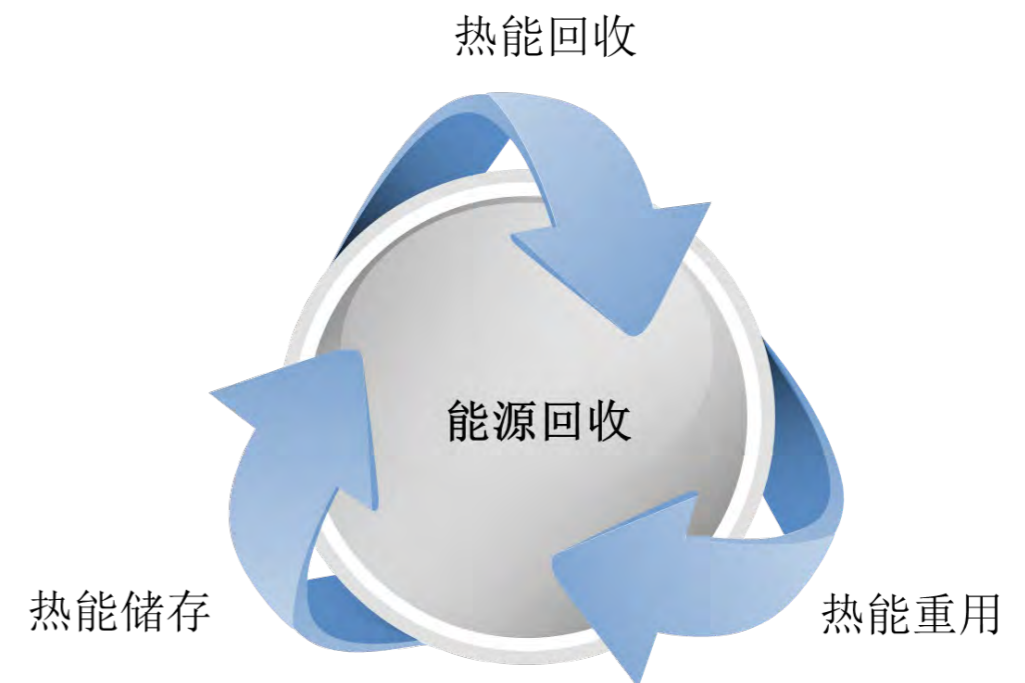


制药用气（汽）分配管网系统

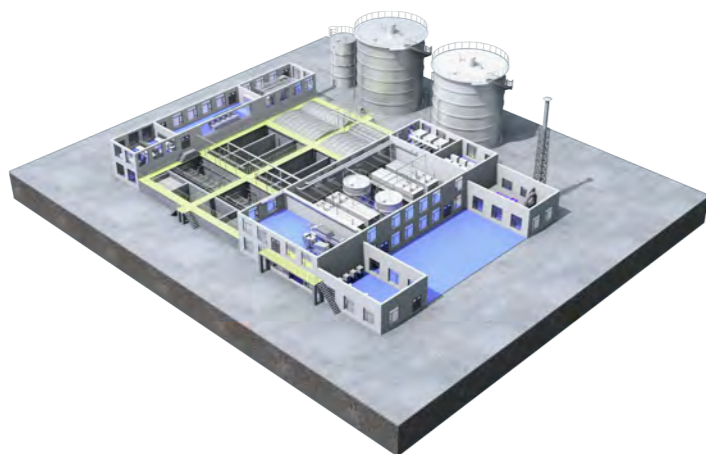
● 环保工程整体解决方案 / Overall Solution of Environmental Protection Project

楚天华通致力于为制药企业提供合规、高效、可靠的废水、废气处理解决方案，可满足包括实验室、小试中试、大生产在内的多种生产模式需要；将制药过程用水、生产过程原料回收、末端环保治理及能源利用等环节综合布局，为制药行业废水、废气达标排放、中水回用或零排放、超低排放等需求提供可靠支持，推动制药行业向绿色循环能源经济模式健康发展。

Truking Watertown is committed to providing compliant, efficient and reliable wastewater and waste gas treatment solutions for pharmaceutical enterprises, which can meet the needs of a variety of production modes including laboratory, pilot trial and large-scale production. The pharmaceutical process water, production process raw material recycling, terminal environmental protection and energy utilization and other links are integrated layout, to provide reliable support for the pharmaceutical industry wastewater, waste gas discharge standards, intermediate water reuse or zero emissions, ultra-low emissions and other needs, promote the pharmaceutical industry to develop healthily to the green circular energy economic model.



■ 污水处理系统 / Sewage Treatment System



污水分质分级进入水处理中心，根据 MIC 检测指标，进行针对性预处理。

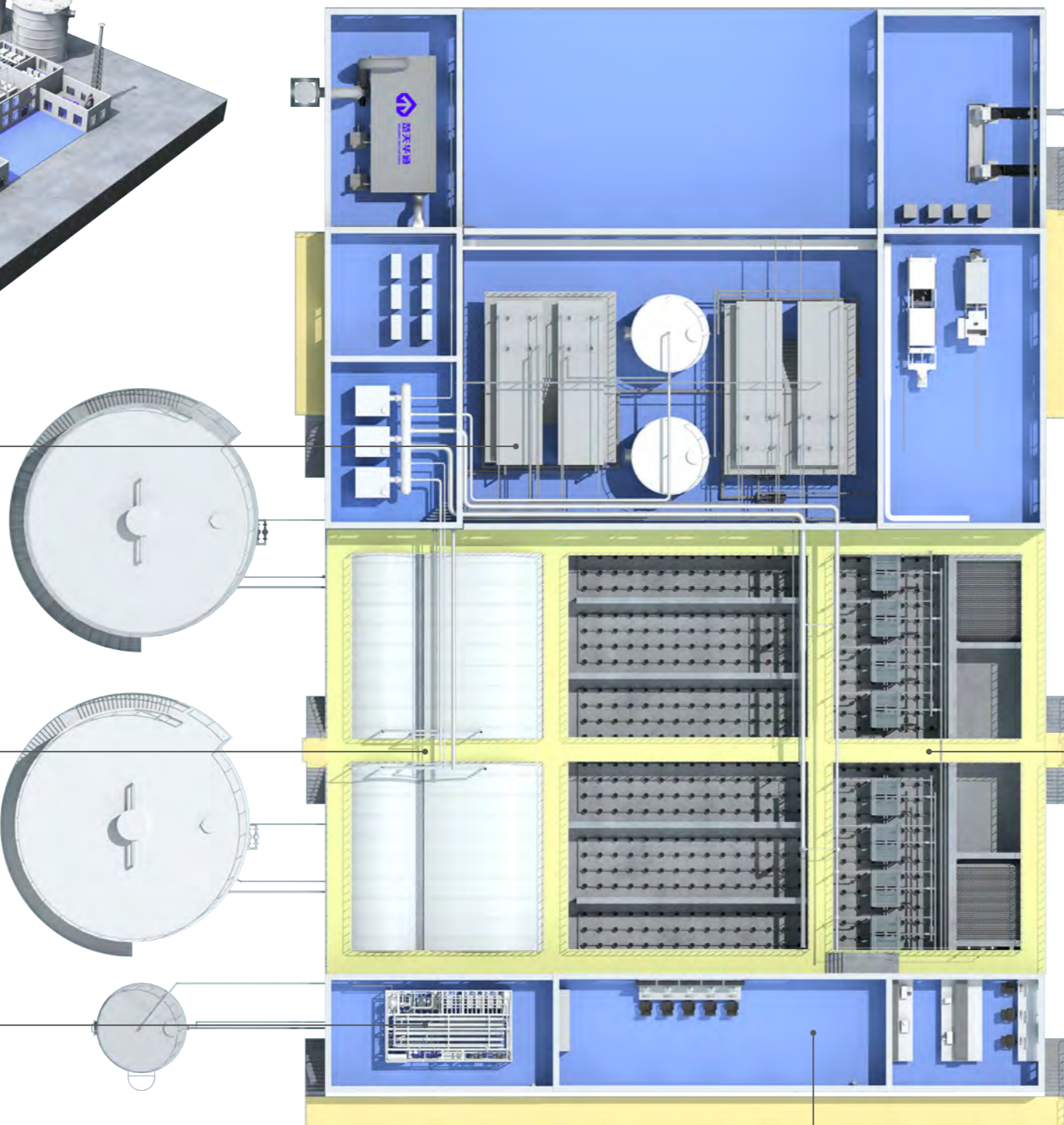
The sewage is entered into the water treatment center by quality classification, and targeted pretreatment is carried out according to the MIC detection index.

经生化处理系统后可进行回用或达标排放

After the biochemical treatment system can be reused or drained to the standard

经深度处理后达饮用水标准可作为生产回用水，极大降低厂区原水消耗实现近零排放目标

After advanced treatment, it can be used as the reuse water for production, greatly reducing the raw water consumption in the factory to achieve the goal of near-zero discharge



◎ 预处理 / Pretreatment

废水中含有某些对微生物有抑制、有毒害的有机物质，因此废水在进入生化池之前必须进行必要的预处理，将废水中对微生物有毒害、有抑制作用的物质尽可能地消减和去除或转化为对微生物无害或有利的物质，以保证生化池中的微生物能正常运行，且在预处理过程中削减 COD 负荷，以减轻生化池的运行负担。

Wastewater contains some organic substances that are toxic to microorganisms, so necessary pretreatment must be carried out before the wastewater enters the biochemical tank. Substances that are toxic and toxic to microorganisms in the wastewater must be reduced and removed as far as possible or converted into substances that are harmless or favorable to microorganisms, so as to ensure the normal operation of microorganisms in the biochemical tank. In addition, the COD load is reduced in the pretreatment process to reduce the operating burden of the biochemical tank.

系统 / System

多相混凝设备，电解电絮凝设备，铁碳微电解设备，臭氧催化氧化设备。

Polyphase coagulation equipment, electro flocculation equipment, iron carbon micro electrolysis equipment, ozone catalytic oxidation equipment.

◎ 生化处理 / Biochemical Treatment

废水的生物化学处理是废水处理系统中最重要的过程之一，简称生化处理。生化处理是利用微生物的生命活动过程将废水中的可溶性的有机物及部分不溶性的有机物有效地去除，使水得到净化。

Biochemical treatment of wastewater is one of the most important processes in wastewater treatment system. Biochemical treatment is to effectively remove soluble organic matter and some insoluble organic matter in wastewater by using microbial life process, so that the water can be purified.

系统 / System

高效厌氧反应器（IC，UASB，EGSB），WTBF 生化处理系统。

High efficiency anaerobic reactor (IC, UASB, EGSB), WTBF biochemical treatment system.

◎ 深度处理 / Deep Processing

污水深度处理是指城市污水或工业废水经一级、二级处理后，为了达到一定的回用水标准使污水作为水资源回用于生产或生活的进一步水处理过程。

Advanced sewage treatment refers to the further water treatment process of municipal sewage or industrial wastewater after primary and secondary treatment, in order to achieve a certain reuse water standard to make sewage as water resources for production or living.

系统 / System

高耐污膜过滤系统（MBR，MBBR，BAF），高耐污膜浓缩系统（STRO，DTRO），中水回用系统。

High stain resistance film filtration system (MBR, MBBR, BAF), high stain resistance film concentration system (STRO, DTRO), reclaimed water reuse system.

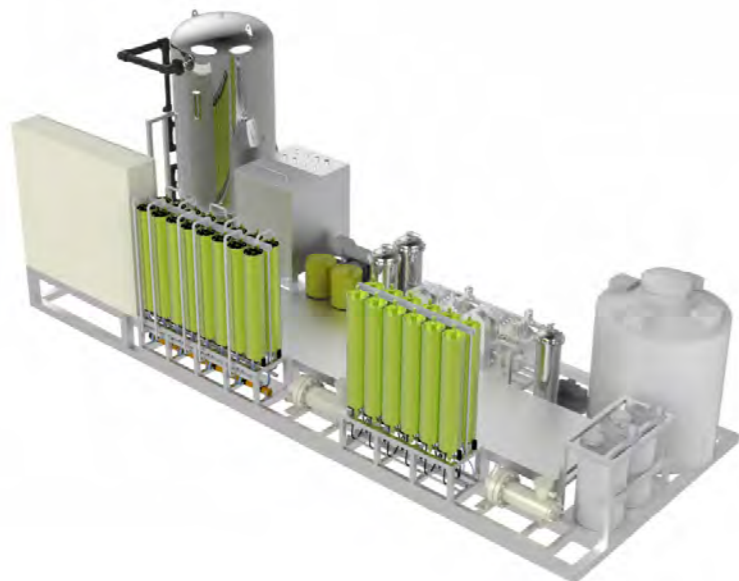
水质分析检测区实现水质在线监测，充分保障处理中心产水指标合规达标

Water quality analysis and testing area to achieve online monitoring of water quality, fully ensure the treatment center water production index compliance

水处理中心采用全生命周期智慧运维体系集多种系统于一身精细管控污水资源化利用过程，从参数收集、数据分析到应急预警、快捷响应全方位高效运行

The water treatment center adopts the whole life cycle intelligent operation and maintenance system and integrates various systems to control the process of sewage resource utilization in a fine manner, from parameter collection and data analysis to emergency warning and quick response

■ 撬装式一体化污水处理系统 / Skid Integrated Sewage Treatment System



采用撬装式模块化设计，便于工程运输及地上、地理、集装箱等各种落位方式。

国际先进的生化处理组合技术，集成楚天华通优化工艺包，具有性能稳定可靠，处理效果好，维护方便等优点。

It adopts the skid mounted modular design, which is convenient for engineering transportation and all kinds of landing modes such as ground, buried and container.

International advanced biochemical treatment combination technology, integrated Truking Watertown optimization process package, stable and reliable performance, good treatment effect, easy maintenance and other advantages.

■ 废气治理系统 / Waste Gas Treatment System

制药工业 VOCs 及恶臭废气总体的处理思路：

做好清洁生产和智能化生产的技术革新工作，选用环境友好型的原材料，优化生产工艺，减少生产和物料储运环节的气体散逸，从源头上减少废气排放。

做好散逸气体的收集，选择合理有效的废气处理工艺，满足各项废气排放标准的要求，最大限度减少对企业内部和周边环境的影响。

The overall treatment idea of VOCs and odor waste gas in pharmaceutical industry:

We should do a good job in technological innovation of clean production and intelligent production, choose environment-friendly raw materials, optimize production process, reduce gas escape in production and material storage and transportation, and reduce waste gas emissions from the source.

Do a good job in the collection of fugitive gas, select reasonable and effective waste gas treatment process, meet the requirements of various waste gas emission standards, and minimize the impact on the internal and surrounding environment of the enterprise.

系统 / System

高效喷淋系统，生物除臭滤池设备，VOCs 处理系统（RCO，RTO），活性炭吸附系统。

High efficiency spray system, biological deodorant filter equipment, VOCs treatment system (RCO, RTO), activated carbon adsorption system.



■ 废液灭活系统 / Waste Liquid Inactivation System Introduction

通过热力或者化学方式使病毒及细菌失去其生物学活性的工艺系统。

A process system that thermally or chemically inactivates viruses and bacteria.

◎ TC 热力连续废液灭活系统 / TC Thermal Continuous Waste Liquid Inactivation System

使用热力方式高效连续进行废液灭活处理，不受上游生产模式限制，相同处理能力下系统能耗表现优异。

The thermal method is used to efficiently and continuously inactivate the waste liquid, which is not restricted by the upstream production mode. Under the same processing capacity, the system has excellent energy consumption performance.

性能特点 / Performance Characteristics

具备节能降耗；加热均匀；设备体积小；应变能力强；可自动清洁；灵活灭菌；安全性高等特点。

With energy saving and consumption reduction, heating evenly, small size of equipment, strong strain capacity, self-cleaning, flexible sterilization, high security features.



◎ TB 热力批次废液灭活系统 / TB Thermal Batch Waste Liquid Inactivation System

使用热力方式分批次处理废液，与上游生产模式关联，可同步进行批量处理。适用于上游批次生产、小批量非连续生产、废液不同批次成分不同工况条件，适用于废液含有较高固体含量的工况条件。

Batch treatment of waste liquid using thermal mode, associated with upstream production mode, can be synchronized batch treatment. Suitable for upstream batch production, small batch non-continuous production, different batch components of waste liquid under different working conditions, suitable for working condition that waste liquid containing high solid.

性能特点 / Performance Characteristics

具备系统工艺流程简单；热效率及热利用率高；加热均一性强；安全性高等特点。

With simple system process, high thermal efficiency and utilization rate, strong heating uniformity, high security features.



■ 蒸发结晶系统 / Evaporative Crystallization System

◎ MVR 蒸发浓缩、结晶设备 / MVR Evaporative Concentration and Crystallization Equipment



MVR 蒸发器是一种新型高效节能蒸发设备，适用于化工、制药、高浓废水零排、海水淡化等行业，系统利用高效能蒸汽压缩机完成电能至热能转换实现低品位热能的循环利用，大大降低工业蒸汽消耗，综合运行成本降低 50%，降低能耗绿色生产。

MVR evaporator is a new type of high efficiency and energy saving evaporation equipment, suitable for chemical, pharmaceutical, high concentration wastewater zero drainage, seawater desalination and other industries, the system uses high efficiency steam compressor to complete the conversion of electric energy to heat energy to achieve the recycling of low grade heat energy, greatly reducing industrial steam consumption, comprehensive operation costs reduce 50%, reduce energy consumption, green production.

性能特点 / Performance Characteristics

具备运行费用低；占地面积小；公用工程配套少；无需冷却水；在线 CIP 等特点。

With low operating costs, small footprint, few utilities used, no cooling water needed, online CIP and other features.

◎ 刮板干燥结晶设备 / Scraper Drying Crystallization Equipment

利用蒸汽、热水、废热作为能源为沸腾室内的废水蒸馏提供热能。将废水在 45°C 的低温下蒸馏干燥，刮板持续对罐壁及废液搅拌，阻止结晶物凝结在罐壁，最终使废水处理成干燥的粉末状固体，并自动排出，最终使浓缩液体可以处理成干燥的粉末状固体，含水率 ≤ 20%。

Steam, hot water and waste heat are used as energy sources to provide heat energy for the distillation of wastewater in the boiling room. The waste water is distilled and dried at a low temperature of 45 °C, the scraper continues to stir the tank and the waste liquid, prevent the condensation of the crystal in the tank wall, and finally make the waste water treatment into dry powder solid, and automatic drainage, finally make the concentrated liquid can be treated into dry powder solid, water content ≤ 20%.

性能特点 / Performance Characteristics

具备模块化设计、结构紧凑、占地面积小、组装运行快速方便等特点。

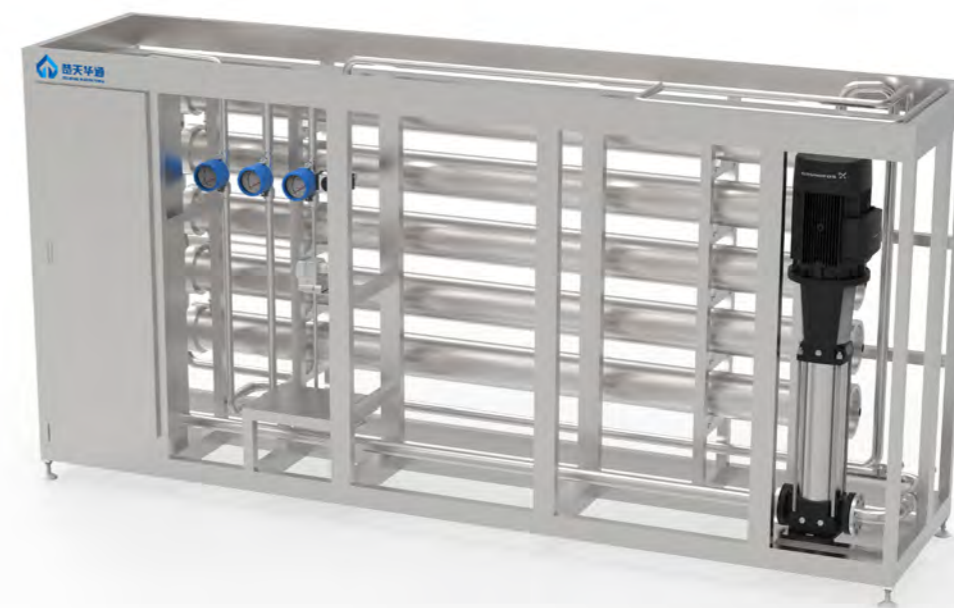
It has the characteristics of modular design, compact structure, small footprint, fast and convenient assembly operation.

■ 资源回收与能源回用模块 / Resource Recovery and Energy Reuse Module

◎ 浓水回收模块 / Concentrated Water Recovery Module

浓水回收模块与纯化水制备设备配套使用，进一步回收处理系统排放浓水，提升系统整体回收率，可单独作为高盐废水处理后续工艺模块。

The concentrated water recovery module is used in combination with the purified water preparation equipment to further recycle the concentrated water discharged by the treatment system and improve the overall recovery rate of the system. It can be used as a separate process module for the post-treatment of high salt wastewater.



性能特点 / Performance Characteristics

具备模块化结构设计，整体撬装，现场快速安装调试等特点。

It has the characteristics of modular structure design, overall skid installation, quick installation and commissioning on site.

◎ 余热回收模块 / Waste Heat Recovery Module

余热回收模块通过回收系统排放热能，进一步提升配套设备能源利用效率，可单独作为车间或厂区排放热能回收。

The waste heat recovery module can discharge heat energy through the recovery system to further improve the energy utilization efficiency of supporting equipment. It can be used as a separate workshop or factory area to discharge heat energy recovery.

性能特点 / Performance Characteristics

具备模块化结构设计，整体撬装，现场快速安装调试等特点。

It has the characteristics of modular structure design, overall skid installation, quick installation and commissioning on site.



◎ 制药水务热回收模块 / Pharmaceutical Water Heat Recovery Module

热回收模块是一种充分利用低品位热能的高效节能装置，通过逆卡诺循环方式迫使热量从低温物体流向高温物体的机械装置，消耗少量循环功获得较大热能，为实现能源资源化利用提供整体解决方案，充分利用废弃热量，实现节能减排。

Heat recovery module is a high-efficiency energy-saving device that makes full use of low-grade heat energy. It forces heat to flow from low temperature objects to high temperature objects through reverse Carnot cycle, consumes a small amount of cycle work to obtain large heat energy, provides an overall solution for realizing energy resource utilization, makes full use of waste heat, and realizes energy saving and emission reduction.



性能特点 / Performance Characteristics

具备模块化设计；洁净应用；废能回收；操作简单特点。

With modular design, clean application, waste energy recovery, simple operation features.

◎ 生物药工艺系统解决方案 / Biological Drug Process System Solutions

生物药工艺系统解决方案是按照客户的个性化要求进行设计，由理念先进的团队和专业的制造、现场施工、验证团队来实施，符合中国新版 GMP、EUGMP、FDA、cGMP 等的要求，国际项目设备容器按需求遵循美国 ASME、欧盟 PED、等相关要求。可提供生物药领域整体解决方案。

具有前瞻性的设计理念；一流的选型与制造；丰富的项目经验总结；高度集中的可人工干预的稳定的全自动控制系统。

Biological drug process system solutions are designed according to customers' individual requirements, implemented by advanced concept team and professional manufacturing, field construction, validation team, in line with the requirements of China's new version of GMP, EUGMP, FDA, cGMP, etc. International project equipment vessel in accordance with ASME, EU PED, and other relevant requirements. It can provide the overall solution in the field of biological medicine.

Forward-looking design concept, high standard selection and manufacturing, rich project experience summary, highly centralized, stable, automatic control system that can be manually intervened.

工艺系统功能模块

- 1、培养基缓冲液配制系统
- 2、发酵系统
- 3、离心系统
- 4、提取系统（重悬、裂解、变性 / 复性、酶切等）
- 5、纯化系统（超滤、层析、结晶等）
- 6、精制系统（重结晶、压滤、除菌过滤等）
- 7、CIP/SIP 系统

Process system function module

1. Preparation system of medium buffer
2. Fermentation system
3. Centrifugal system
4. Extraction system (recsuspension, cleavage, denaturation/renaturation, enzyme digestion, etc.)
5. Purification system (ultrafiltration, chromatography, crystallization, etc.)
6. Refining system (recrystallization, pressure filtration, sterilization filtration, etc.)
7. CIP/SIP system

搅拌系统：实现工艺罐内部物料进行混合工序。

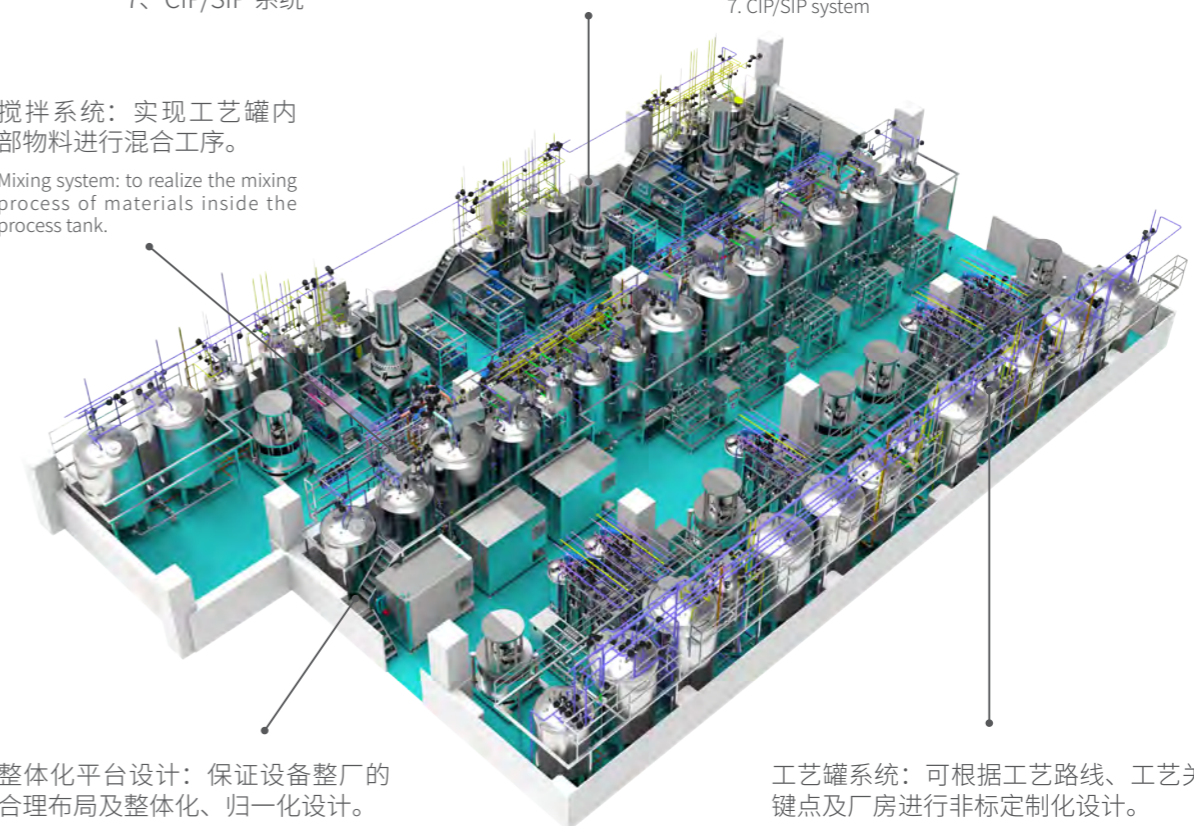
Mixing system: to realize the mixing process of materials inside the process tank.

整体化平台设计：保证设备整厂的合理布局及整体化、归一化设计。

Integrated platform design: ensure the reasonable layout and integrated and normalized design of the whole plant.

工艺罐系统：可根据工艺路线、工艺关键点及厂房进行非标定制化设计。

Process tank system: can be customized according to the process route, key points of process and plant non-standard design.



化学药工艺系统解决方案 / Chemical Process System Solutions

化学药工艺系统解决方案，依托前瞻性的设计理念、一流的选型与制造以及高度集中的可人工干预的稳定的全自动控制系统，将化学原料药经过配制单元、过滤单元、灌装单元处理后，加工成符合中国新版GMP、EUGMP、FDA、cGMP等要求的药品成品。

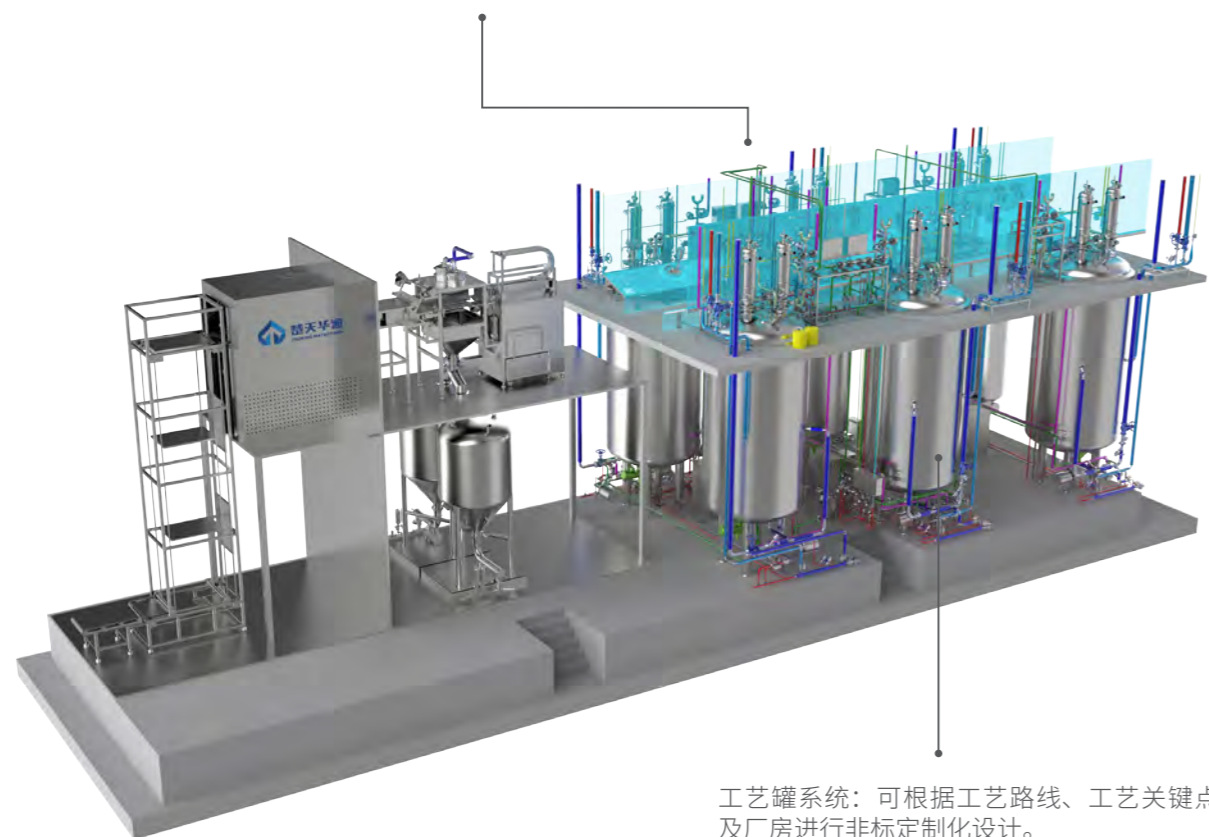
Chemical drug process system solution, relying on the forward-looking design concept, high standard selection and manufacturing and highly centralized manual intervention of stable automatic control system, the chemical API through the preparation unit, filtration unit, filling unit processing, processing into the new Chinese GMP, EUGMP, FDA, cGMP and other requirements of drug products.

工艺系统功能模块

- 1、全自动粉体输送投料系统
- 2、配制系统（稀配）
- 3、配制系统（浓配+稀配）
- 4、配制系统（浓配+稀配+暂存）
- 5、黑白分区系统
- 6、CIP、SIP系统
- 7、无菌投料系统

Process system function module

1. Automatic powder conveying feeding system
2. Preparation system (dilute distribution)
3. Preparation system (concentrated + dilute)
4. Preparation system (concentrated + dilute + temporary storage)
5. Black and white partition system
6. CIP and SIP system
7. Aseptic feeding system



工艺罐系统：可根据工艺路线、工艺关键点及厂房进行非标定制化设计。

Process tank system: can be customized according to the process route, key points of process and plant non-standard design.

复杂注射剂工艺系统解决方案 / Complex Injection Process System Solutions

复杂注射剂工艺系统解决方案是按照客户的个性化要求进行设计，在制剂制备工艺中融入了微球、脂质体、纳米粒等较先进药物递送技术，使得药物制剂形式多样化，且增加药物的生物利用度、控制药物的释放速度、具有靶向性、减少副反应、改善患者用药顺应性。

药品剂型涵盖缓控释制剂、靶向制剂、微球制剂、脂质体制剂、脂肪乳制剂等。

The complex injection process system solution is designed according to the personalized requirements of customers, and integrates more advanced drug delivery technologies such as microspheres, liposomes and nanoparticles into the preparation process to diversify the forms of drug preparations, increase drug bioavailability, control drug release speed, have targeting, reduce side effects, and improve patient medication compliance.

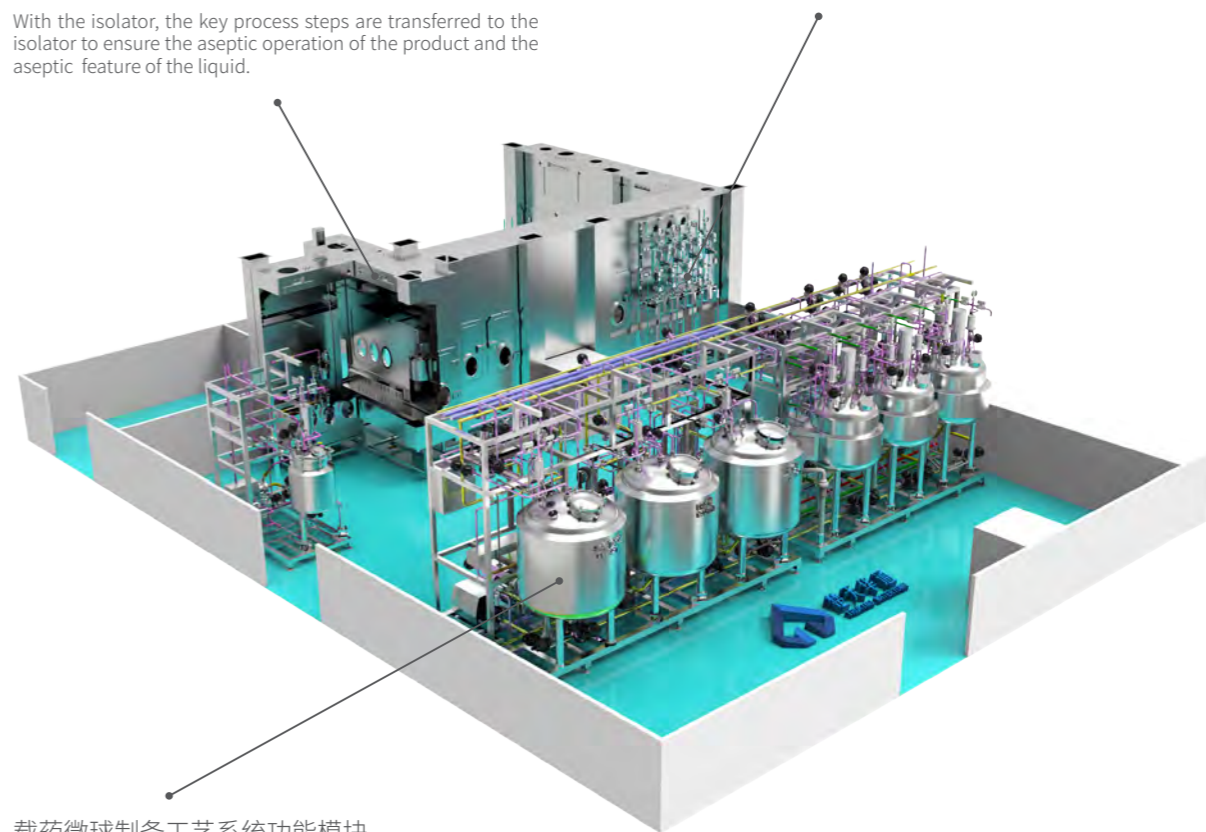
Drug dosage forms include slow and controlled release preparation, targeted preparation, microsphere preparation, liposome preparation, fat milk preparation, etc.

配合隔离器，将关键工艺步骤转移至隔离器内部进行，保证产品的无菌操作及药液的无菌性。

With the isolator, the key process steps are transferred to the isolator to ensure the aseptic operation of the product and the aseptic feature of the liquid.

2.5L小容量搅拌罐，进行PLGA、API及关键组相溶液的配制。

2.5L small capacity stirring tank for PLGA, API and key phase composition solution preparation.



载药微球制备工艺系统功能模块

- 1、配制系统
- 2、水相、油相配制系统
- 3、混合系统
- 4、微球制备系统
- 5、离心收获系统
- 6、CIP、SIP系统
- 7、...

Functional module of preparation process system for drug-carrying microspheres

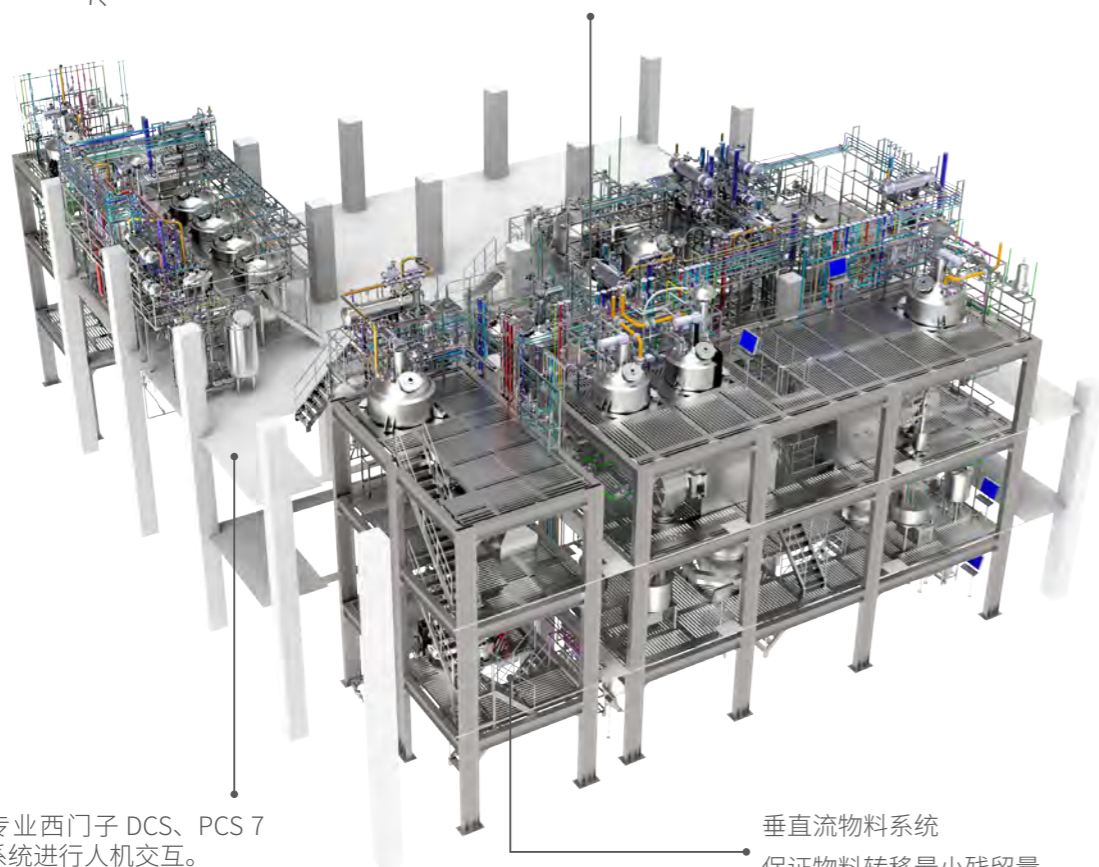
1. Preparation system
2. Water phase, oil phase preparation system
3. Hybrid system
4. Microsphere preparation system
5. Centrifugal harvesting system
6. CIP and SIP system
7. ...

化学原料药工艺系统解决方案 / Chemical API Process System Solutions

化学原料药工艺系统解决方案是按照客户的个性化要求进行设计，将起始物料与其他化合物通过一定步骤的化学反应（缩合、取代、酰化、氧化还原）还原得到的目标产物，从工艺设计阶段开始注重产品的无菌保证，保证符合产品杂质、理化特性等化学质量指标的要求。

The solution of chemical API process system is designed in accordance with customers' individual requirements, and the target product is reduced by chemical reaction (condensation, substitution, acylation, REDOX) between the starting material and other compounds in certain steps. From the process design stage, attention is paid to the sterility assurance of the product to ensure that it meets the requirements of chemical quality indicators such as impurities and physical and chemical properties of the product.

- | | |
|--------------|--|
| 精制反应工艺系统功能模块 | Refining reaction process system function module |
| 1、溶解配制系统 | 1.Dissolution preparation system |
| 2、浓缩结晶系统 | 2.Concentrated crystallization system |
| 3、离心干燥系统 | 3.Centrifugal drying system |
| 4、粉体干、湿料输送系统 | 4.Dry and wet powder conveying system |
| 5、反应精制系统 | 5.Reaction refining system |
| 6、CIP 系统 | 6.CIP system |
| 7、…… | 7. ... |



使用专业西门子 DCS、PCS 7 控制系统进行人机交互。

Professional Siemens DCS and PCS 7 control systems are used for human-computer interaction.

垂直物料系统
保证物料转移最小残留量
Vertical material system
Ensure minimum material transfer residue

口服药工艺系统解决方案 / Oral Medicine Process System Solutions

口服药工艺系统解决方案是以口服用药生产工艺流程为导向，整线设计涵盖了前处理单元、配制单元、混合单元、气力输送单元、过滤单元、清洗单元、消毒单元等完整的工艺系统。结合华通的技术、加工、生产、质量管控体系、服务体系等综合实力，为客户提供产品先进、技术领先的口服药工艺系统解决方案。

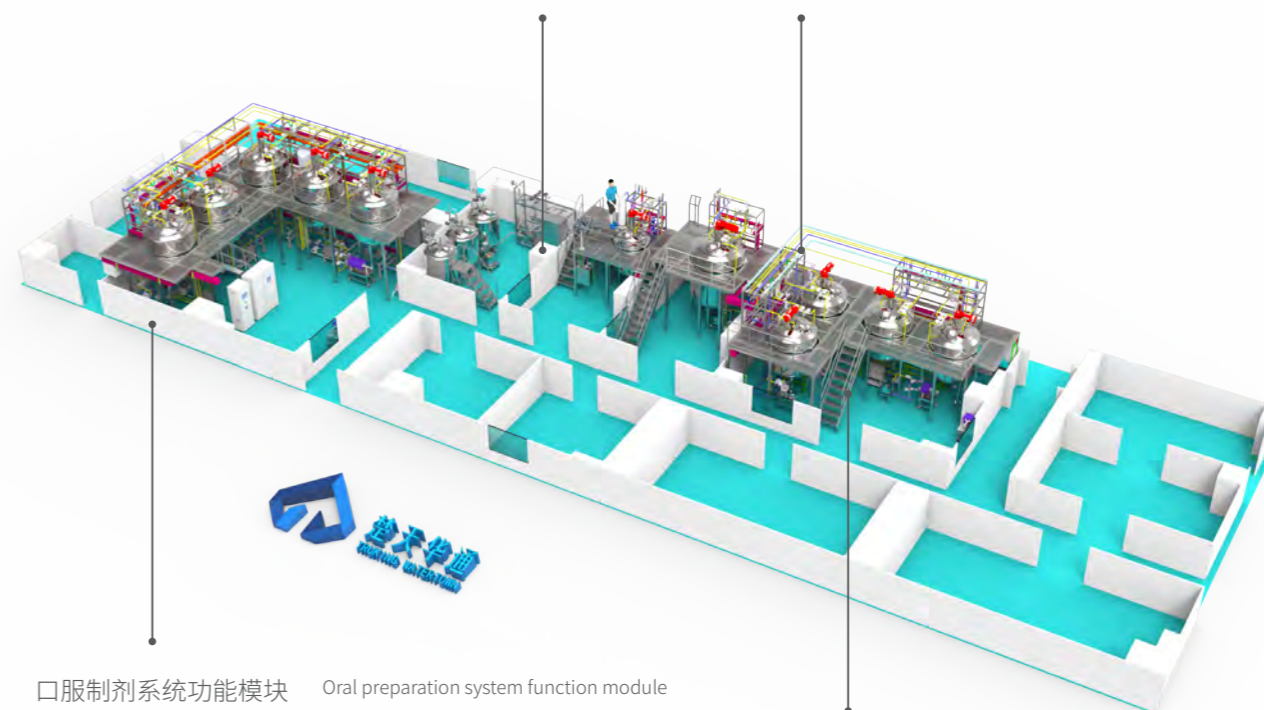
The solution of oral medicine process system is based on oral medicine production process flow. The whole line design covers the complete process system of pre-treatment unit, preparation unit, mixing unit, pneumatic conveying unit, filtration unit, cleaning unit, sanitization unit, etc. Combined with Watertown's comprehensive strength of technology, processing, production, quality control system, service system and so on, we provide customers with advanced products and technology leading oral medicine process system solutions.

CIP 清洗站：用于各配制系统、过滤系统，各类工艺罐的罐体、管道清洗。

CIP cleaning station: Used for the preparation system, filtration system, all kinds of process tank column, pipeline cleaning.

管路系统保温处理，保证冷物料热影响低。

The pipe system is insulated to ensure low thermal impact on cold materials.



- | | |
|-------------|---|
| 口服制剂系统功能模块 | Oral preparation system function module |
| 1、真空上料系统 | 1.Vacuum feeding system |
| 2、烺糖 / 化糖系统 | 2.Closing sugar/saccharifying system |
| 3、冷沉系统（中药） | 3.Cold sink system (Chinese medicine) |
| 4、配制系统 | 4.Preparation system |
| 5、成品过滤系统 | 5.Finished product filtration system |
| 6、… | 6. ... |

搅拌系统：对工艺罐内部物料进行混合工序
Mixing system: mixing process of materials inside the process tank

中药注射剂工艺系统解决方案 / Traditional Chinese Medicine Injection Process System Solution

中药工艺系统解决方案是按照客户的个性化要求进行设计，由理念先进的团队和专业的制造、现场施工、验证团队来实施，通过对中药厂区“药材前处理车间”、“提取车间”、“发酵车间”及“制剂车间”内工艺工程的设计、相关设备设计制造、配套设备选型及采购、自动化控制系统设计，以及配液系统工程安装及项目管理、以及系统工程的调试及验证，保证整体设备的稳定性及符合中国新版 GMP、EUGMP、FDA、cGMP 等的要求。

Traditional Chinese medicine process system solutions are designed according to customers' personalized requirements and implemented by advanced concept team and professional manufacturing, site construction and validation team. Through the design of process engineering, related equipment design and manufacturing, selection and purchase of supporting equipment, design of automatic control system, installation and project management of liquid dispensing system, as well as commissioning and validation of system engineering in the "medicinal materials pretreatment workshop", "extraction workshop", "fermentation workshop" and "preparation workshop" in the traditional Chinese medicine factory. Ensure the stability of the whole equipment and meet the requirements of new Chinese GMP, EUGMP, FDA, cGMP, etc.

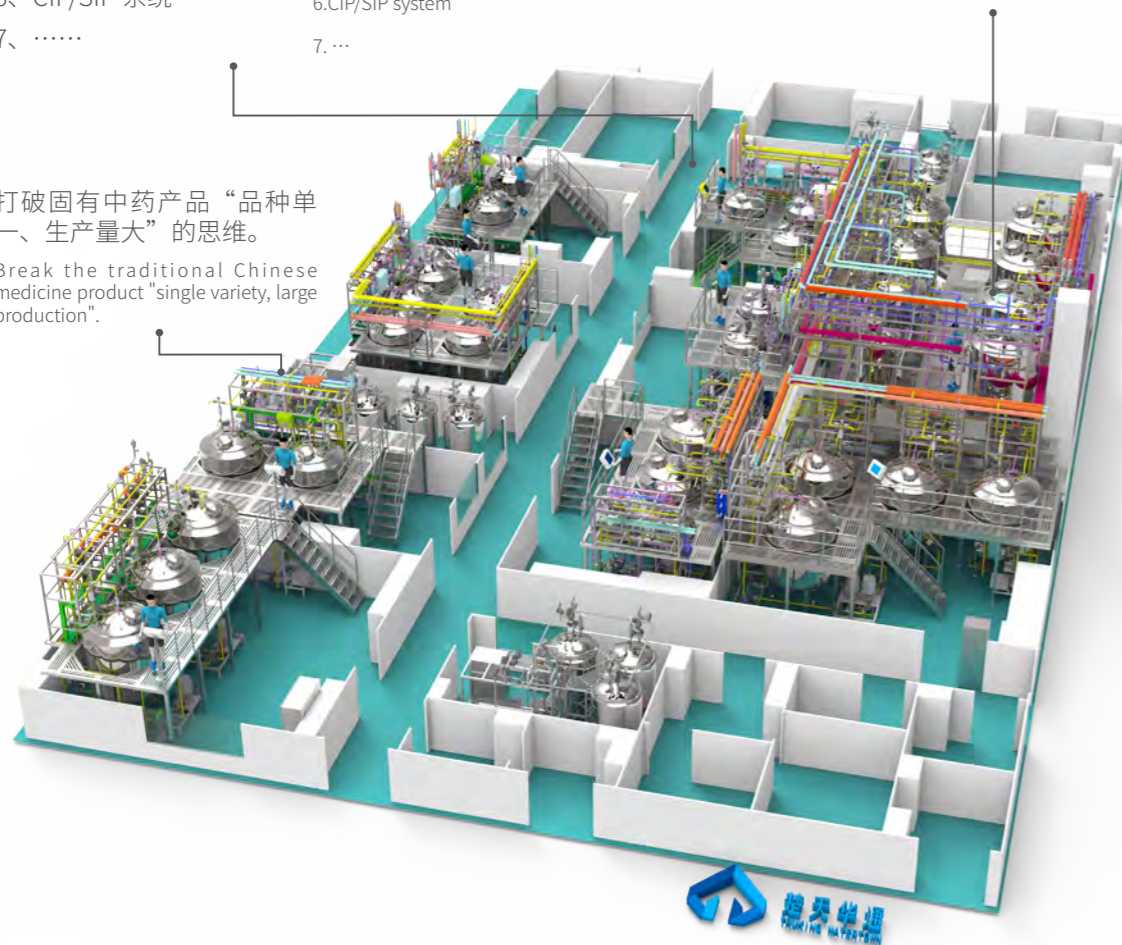
中药注射剂系统功能模块 Function module of TCM injection system

- | | |
|--------------|---------------------------------------|
| 1、提取、浓缩系统 | 1.Extraction and concentration system |
| 2、冷沉系统 | 2. Cold sink system |
| 3、浓配系统 | 3.Concentration system |
| 4、稀配系统 | 4.Dilute system |
| 5、成品过滤系统 | 5.Finished product filtration system |
| 6、CIP/SIP 系统 | 6.CIP/SIP system |
| 7、…… | 7. ... |

三维定制化设计，保证人员可操作性、
房间合理布局性及易操作维护性。

打破固有中药产品“品种单一、生产量大”的思维。

Break the traditional Chinese medicine product "single variety, large production".



自动化控制系统 / Automatic Control System

- ◎ 高集成化控制系统，采用西门子 S7-1500PLC 和西门子最新博途人机界面，操作简单，故障率低，控制界面清晰，具有一键启停设备的功能。
- ◎ 控制操作界面多级用户登录，满足客户的不同级别登录要求，以保证操作的可靠性，防止误操作。
- ◎ 控制系统远程维护，检修，检测，通过记录的数据判断系统运行一定时期后存在的潜在问题，如膜的运行状况，某些部件和传感器的准确度等。
- ◎ 电子记录符合 FDA 21CFR Part11 要求。
- ◎ 根据客户特定要求进行设计和建造。

- Highly integrated control system, using Siemens S7-1500PLC and Siemens latest Boto man-machine interface, simple operation, low failure rate, clear control interface, with one-button start-stop device function.
- Control operation interface Multiple levels of user login meet customer login requirements to ensure operation reliability and prevent mis-operations.
- Control system remote maintenance, overhaul, detection, through the recorded data to determine the system after a certain period of operation of the potential problems, such as film running status, the accuracy of some components and sensors, etc.
- Electronic records meet FDA 21CFR Part11 requirements.
- Design and build according to customer specific requirements.



纯化水机自动控制界面



热压式蒸馏水机自动控制界面

配液系统自动控制界面

验证与文件系统 / Validation and Document

楚天华通拥有一整套规范的产品验收相关文件及实施能力，包括 FAT、SAT、IQ、OQ 并根据我们的经验提供给客户 PQ 相关的行业经验和做法。文件符合现行 GMP 等法规要求，现以纯化水制备系统为例。

Truking Watertown have a set of normative product acceptance documentation and implementation ability including FAT, SAT, IQ, OQ and provide the customer the line practices related to PQ on the basis of our rich experiences. And the documents comply with the GMP rules and we take the PWG for example and the documentation consists of that following below:

功能设计说明 / Function Design Description

- 质量标准和工艺描述
- 系统及设备构建，模块划分
- + Quality standard & process description
- + System & Equipment structure, modularization division

详细设计说明 / Design Specification

- 平面布局图
- P&ID 图
- 材料清单
- 设备和组件设计图和参数表
- HMI 结构图
- PLC 控制逻辑图
- 电气图
- IO 清单
- 报警清单
- 控制系统设计文件
- + Layout
- + P&ID
- + Component List
- + Equipment and component design drawing& parameter list
- + HMI
- + PLC Logistic Flow Chart
- + Electrical Drawing
- + I/O List
- + Alarm List
- + Control System Control Document

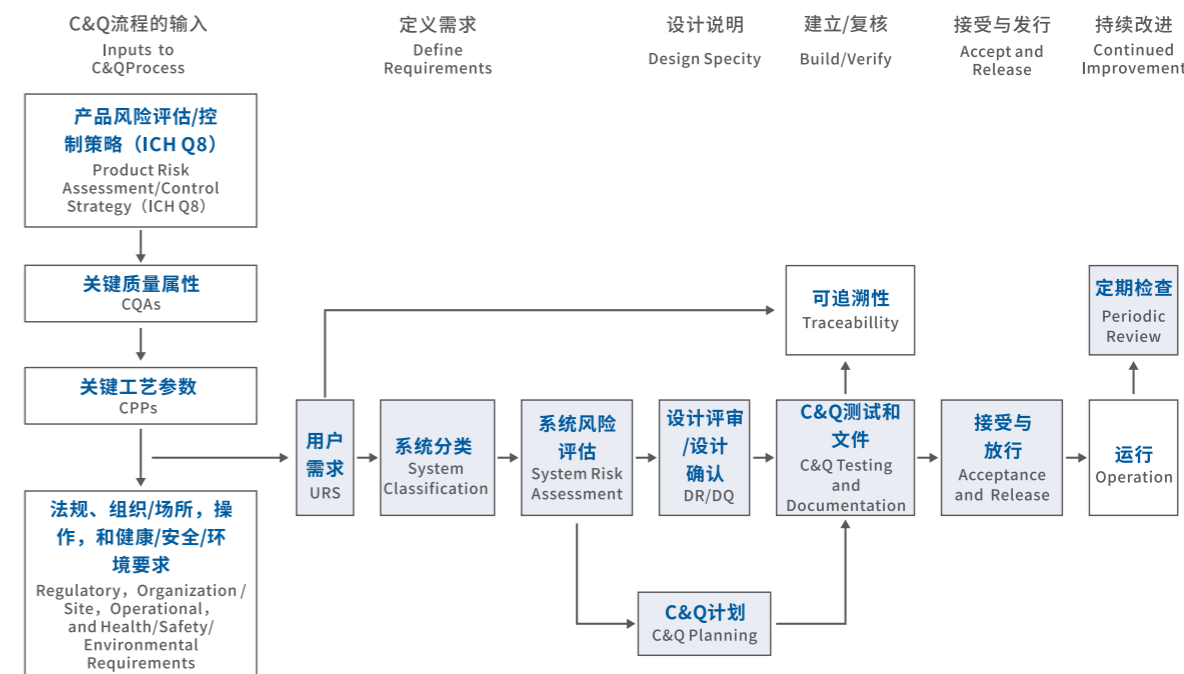
生产过程文件 / Fabrication Documentation

- 焊点图
- 焊接记录
- 焊工证书
- 自动焊机打印条
- 电抛光 & 酸洗钝化 - 检验记录
- 内窥镜照片
- 射线检测报告
- 仪表校准报告
- 表面粗糙度检测报告
- 材质单
- 产品合格证
- + Welding Seam Diagram
- + Welding Record
- + Welder certificate
- + Welding machine printouts
- + Electro polishing, pickling& passivation record
- + Boroscope pictures
- + Radiographic Inspection Report
- + Calibration Report
- + Surface Roughness Report
- + Material certificate
- + Product Compliance Certificate

验证文件 / Validation Documentation

- FAT SAT IQ OQ PQ(草案)

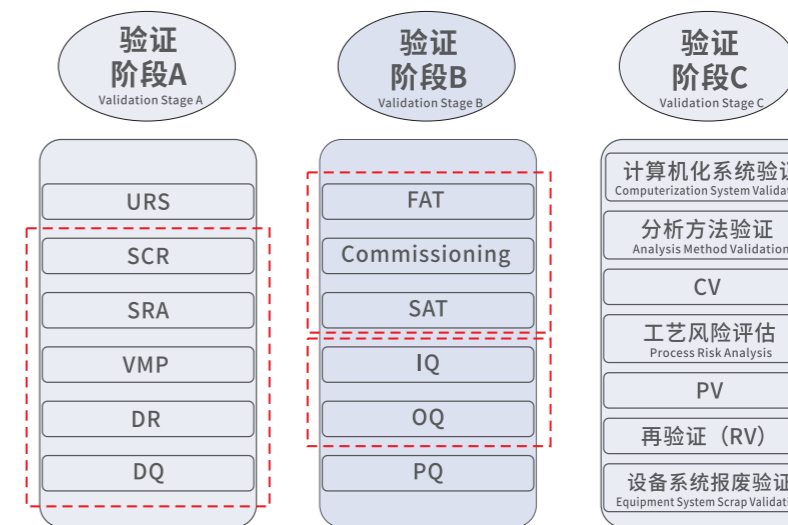
基于科学和风险的 C&Q 的流程图 / C&Q Process Flow based on Science and Risk



验证工作分属 / Validation Allocation

根据新版 GMP 验证文件体系如下：红色虚线是需要楚天华通与客户共同完成的部分，其他部分是以客户为主楚天华通可以提供相应的协助工作。（具体如下图）

The validation documentation system is following below according to the latest GMP: the part work in red color dot line is done by Truking Watertown with cooperation with the customer; the rest part work is done by the customer with support from Truking Watertown. (the details as following below)



服务理念

0431-81989135



秉承“一切为客户着想，为一切客户着想，为客户着想一切”的理念，以“为客户创造价值”为己任，楚天专注于打造一流的研发、设计、销售、制造、服务团队及服务管理体系，为客户提供高效、优质的产品与服务。



Service Concept

0431-81989135



Adhering to concept of “all for customers, for all customers”, and with the mission of “creating value for customers”, TRUKING focuses on building first-class R&D, design, sales, manufacturing, service teams and service management system to offer high-efficient and high-quality products and services for the customers.



◦ **项目规划支持**

楚天拥有系列专业医药设计院、产品研究院，一批行业资深科研技术人员，无菌制药工艺的验证专家、教授等，为客户的项目提供科学、有效的技术规划支持。



◦ **过程保障服务**

楚天推出的医药装备整体解决方案，实现药品生产过程的全自动化、无菌化，智能检测、分选，以及计算机验证保障，生产出市场“放心”的产品。



◦ **走进园区服务**

楚天作为设备供应商，不仅仅将行业法规标准融入到产品设计、制造中，还让法规标准以讲座、交流的形式走进园区，与药企的工艺、生产形成互动与融合。



◦ **设备管理咨询服务**

楚天致力于满足客户效益最大化需求，提供一揽子的设备管理模式，协同药厂实现投入最小化，产出最大化。

◦ **Project Planning Support**

TRUKING has a series of professional medical and pharmaceutical design institutes, product research institutes, a group of senior scientific research and technical personnel, aseptic pharmaceutical process verification experts, professors, etc., to provide scientific and effective technical planning support for customers' projects.

◦ **Process Assurance Service**

TRUKING launched the overall solution for medical & pharmaceutical equipment realizing the full automation and aseptic production process, intelligent detection and sorting of the drug, as well as computer verification assurance so as to produce assured products for market.

◦ **Service In The Park**

As an equipment supplier, TRUKING not only integrates industrial regulations and standards into product design and manufacturing, but also introduces the industrial regulations and standards into Truking industrial park in the form of lectures and exchanges to interact and integrate with the technology and production of pharmaceutical enterprises.

◦ **Equipment Management Consultation Service**

TRUKING aims to satisfy the maximum benefited demands of the customer and to provide a package of equipment management services to realize minimization investment and maximization production output together with pharmaceutical factories.

◦ 坚持“以客户为中心”，以匠人之心打造极致服务体验，为客户创造更多价值

34 全国 34 个省（市）

365 全年 365 天

7x24 7X24 小时服务时间

◦ 我们随时待命为客户单位设备正常运行保驾护航

- + 现场安装、调试、验收
- + 设备工艺、操作、维护等相关培训
- + 周期性的定期上门维护与回访
- + 设备各部件性能的检测与保养
- + 备品备件的及时供应
- + 产品技术升级与技术二次开发
- + 设备大修

◦ Adhere to the philosophy of "customer-centric", TRUKING creates the extraordinary service experience with the spirit of the craftsman, to create more value for customers.

◦ We are always ready to escort the normal operation of the customer's equipment.

- + Onsite equipment installation, commissioning, acceptance
- + Training for equipment process, operation and maintenance
- + Periodic door-to-door maintenance and return visit
- + Performance test and maintenance for machinery parts
- + Timely supply of spare parts
- + Product technology upgrading and secondary development
- + Equipment overhaul