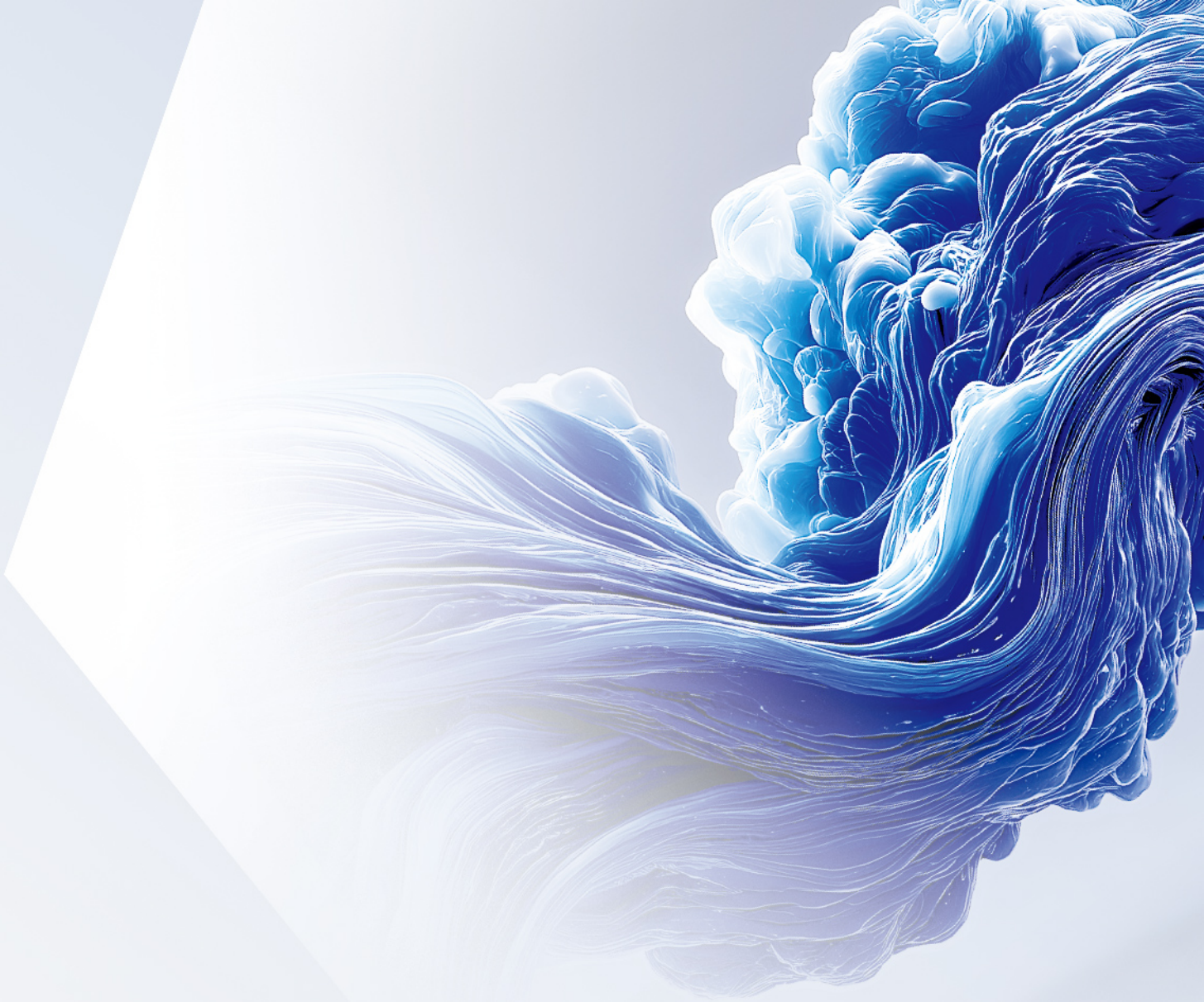


CONTINUOUS MANUFACTURING

www.asymchem.com

Stock Code:002821.SZ / 6821.HK

Asymchem Group (Stock Code: 002821.SZ/6821.HK), as one of the world's first CDMOs to successfully implement continuous flow technology at commercial scale, has established itself as a global leader in advanced pharmaceutical manufacturing. With a team of world-class process development scientists and chemical engineers, we bring over 17 years of demonstrated expertise in continuous flow applications.

Recently expanding our service model, we now provides comprehensive technical packages - from custom equipment development to turnkey installation - empowering partners across pharmaceuticals, agrochemicals and fine chemicals industries to adopt next-generation manufacturing solutions.

Continuous Flow Technology Overview

17	300+	75	91	9
Years of Expertise in Continuous Flow Technology	Experienced Scientists and Engineers	Invention Patents	Utility Models Patents	Design Patents



Industrial-Grade Continuous Solutions, Powered by Decades of Process Excellence

2008 — R&D Initiated

2010 — First kg-Scale

2012 — Ton-Scale Production for Flow Ozone Oxidation

2021 — Hundred-Ton Scale

2022 — 500 MT Low-Temp Alkylation
First Recipient of the ACS CMO Green Chemistry Award (2022)

2024 — The 1st Validation of Metformin's Continuous Manufacturing

Chemical Process Research and Development

- Process evaluation and development
- Lab-scale and kilogram-scale testing
- Kinetic, thermodynamic studies

Process Package Design

- Material/energy accounting
- Process simulation
- Process package documentation

Pilot-Scale Testing

- Design verification
- Process validation
- Data collection

Filing Services

- Initial process validation
- Collaboration with EHSA (Environmental Health and Safety Assessment)
- GMP validation

Design and Manufacture of System and Equipment

- CFD simulation
- Equipment design / development
- Equipment manufacturing
- FAT(Factory Acceptance Test)

Assistance in Installation and Commissioning of Production Equipment

- SAT(Site Acceptance Test)
- Startup support
- Technical training

Continuous Flow Technology Platform

Liquid-Liquid Reaction

- Nitration
- High/Low-Temperature Ammonolysis
- Diazotization
- Curtius Rearrangement
- Bromination/Iodination /Chlorination
- Esterification

Gas-Liquid Reaction

- Ozonolysis
- Diazomethane Preparation
- Hydrogen Peroxide Oxidation
- Homogeneous Catalytic Hydrogenation
- Peroxidation
- High-Temperature Oxidation
- Phosgenation

Solid-Liquid Reaction

- Grignard Reagent Preparation
- Zinc Reagent Preparation
- Nitration
- Enzyme Immobilization

Gas-Liquid-Solid Reaction

- Catalytic Hydrogenation and Oxidation
- Immobilized Enzymatic Oxidation
- Polymerization
- Powder Catalysis

Special Reaction

- Photochemical Reactions
- Laser-induced Reactions
- Electrochemical Reactions
- Microwave-assisted Reactions
- Sonochemical Reactions

Strong Research and Development Capabilities

Leveraging state-of-the-art continuous flow technology platform and cutting-edge analytical systems, we empower fine chemical partners to achieve tailored solutions that streamline R&D timelines, optimize capital allocation, and significantly mitigate operational risks.



Professional testing platform for continuous flow reaction experiments



Comprehensive analytical testing platform



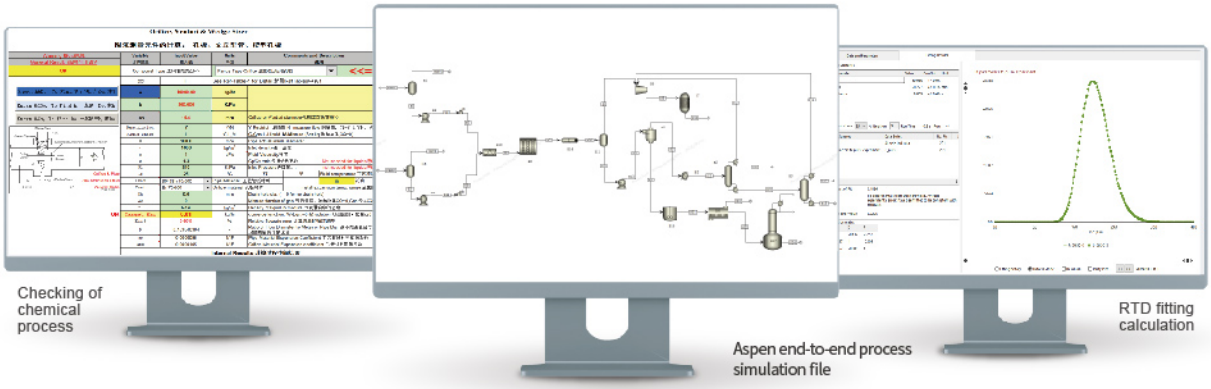
Advanced screening platform for continuous flow reaction experiments

Comprehensive Analytical Testing Platform

Our CNAS-certified analysis and testing center is equipped with comprehensive calorimetric reaction and thermal stability testing instrumentation, enabling the development of effective control strategies to ensure process safety.

Calculation and Simulation of Professional Chemical Engineering

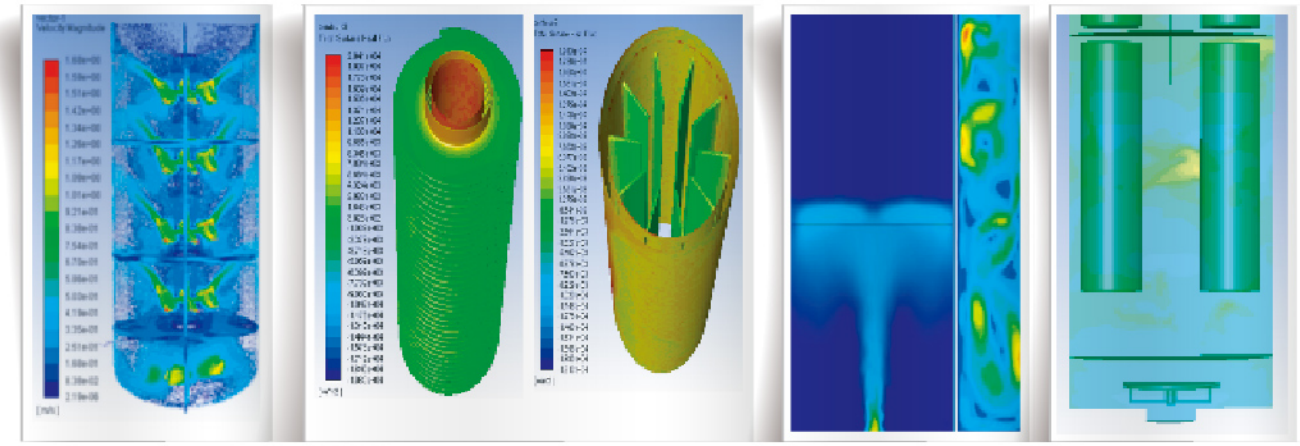
Through integrated application of computational tools, such as computational fluid dynamics (CFD) and specialized chemical engineering software, we enable simulation of design route and provide robust support for process and equipment development.



Checking of chemical process

Aspen end-to-end process simulation file

RTD fitting calculation



Mixing of multi-phase flow

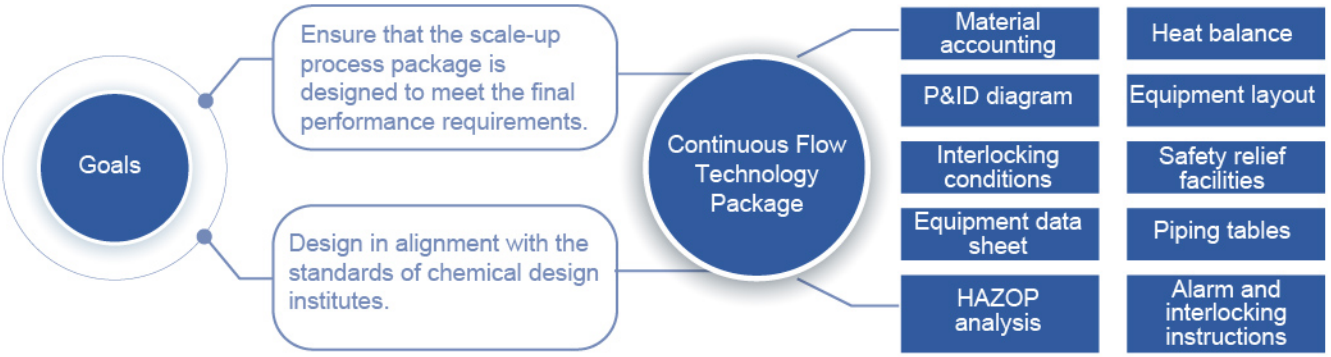
Thermal analysis

Gas-liquid-solid three-phase transformation

Pressure loss

Process and In-depth Equipment Design

Experienced designers conduct standardized process flow design and customized equipment development, covering structural design, 3D skid design, and installation planning. For hazardous processes, safety configurations are enhanced through HAZOP analysis. A standardized and well-established design documents will be provided.



Continuous Manufacturing Pilot Test Platform

A dedicated pilot-scale testing platform is available for continuous reaction process validation, supporting production capacities ranging from 10mt-200mt/a. The platform enables pilot testing of various continuous flow reaction processes, including oxidation, nitration, chlorination, hydrogenation, Grignard reagent preparation, and other Grignard reactions.









Complete utility infrastructure and supporting facilities/equipement	Robust test verification execution system	Professional implementation team

Rapid Process and Design Verification from Lab-Scale to Pilot-Scale

High-Efficiency Automation Control

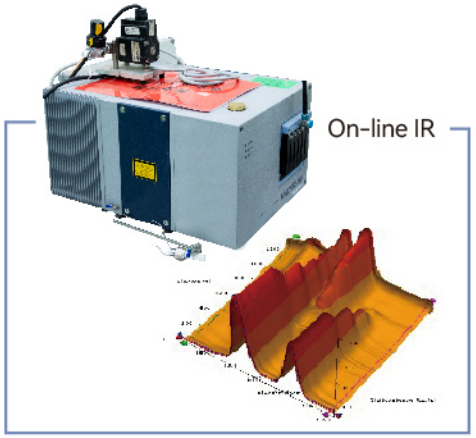
- Proprietary automation control system with core algorithms (PLC & SCADA), compliant with cGMP and FDA audit requirements.
- Successfully applied in over 500 continuous manufacturing projects.
- Integration with plant DCS/SIS systems.

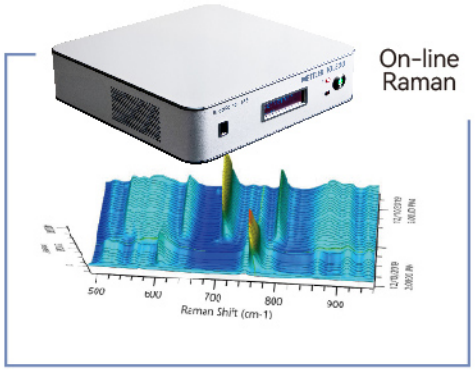
Audit Trail | Data Recording | Operations | Alerts | Permissions | Reports



Advanced Quality Control

Process Analytical Technology (PAT) is integrated with software and automation control systems, enabling real-time monitoring and adjustment of critical process parameters in production.









Laboratory Continuous Gas-Liquid Reactor



Experimental High Efficiency Mixing Reactor



Production-grade High Efficiency Mixing Reactor



Laboratory Intelligent Continuous Reaction System and Educational Platform



Laboratory Continuous Gas-Liquid-Solid Reactor



Laboratory Continuous Solid-Liquid Reactor









Production Systems of Flow Chemistry Reaction

ASYMCHEM

CHINA

Asymchem Laboratories (Tianjin) Co., Ltd Headquarters

USA

ASYMCHEM INC.

UK

ASYMCHEM LIMITED

JAPAN

Asymchem Japan K.K.

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