Empowering Flow Chemistry

Transforming Manufacturing Through Integrated Flow Technologies at Asymchem

Leading the Shift to Greener Processes
Pharmaceutical manufacturing is entering a new era of transformation. Globally, regulatory expectations are rising and the demand for safer, cleaner and more efficient manufacturing practices is becoming increasingly urgent. Sustainability is no longer optional; it is now a driving force that is pushing the industry to rethink long-established approaches. Flow chemistry is emerging as a key solution, but its full impact depends on more than just technology. Meaningful progress happens when process expertise, equipment design and engineering integration come together. At Asymchem, they bring these capabilities under one roof. With deep expertise and a proven track record in flow chemistry, they help clients improve efficiency, reduce environmental impact and scale the production of RSMs, intermediates and APIs with confidence.

Scope and Capabilities

Asymchem was among the first CDMOs to implement continuous manufacturing for pharmaceuticals and fine chemicals, beginning in 2008. Since then, they have delivered more than 500 flow projects over kilo-scale and enabled technology transfer projects at scales up to 10,000 MT. With nearly two decades of experience and fully integrated capabilities, Asymchem is equipped to address some of the most complex challenges in pharmaceutical manufacturing. They have established capabilities to perform virtually all reactions in flow mode, encompassing liquid-liquid, gas–liquid, solid-liquid, gas-liquid-solid and other multiphase reactions, with demonstrated excellence in hydrogenation, nitration and lithiation, etc. These technologies enable the precise, scalable and efficient production of pharmaceutical intermediates and APIs.

At Asymchem, innovation is core to how they solve complex manufacturing challenges. To address the difficulties of continuous solid-liquid reactions, they developed and built their own proprietary flow reactor, using metformin synthesis as the test platform throughout its design and optimisation. This breakthrough led to multiple patents for continuous metformin production and resulted in China's first API continuous manufacturing verification under the ICH Q13 guidelines. By leading this effort, Asymchem is helping to drive broader adoption of continuous manufacturing across the industry.

Pioneering in Green Innovations

Sustainability is a cornerstone of Asymchem's philosophy. Flow processes inherently minimise solvent and energy use, reduce waste and enhance safety. This commitment was recognised when Asymchem became the first recipient of the ACS CMO Excellence in Green Chemistry Award in 2022. The award was granted for the development of a custom photochemical flow reactor designed to perform a challenging [2+2] cycloaddition. This innovation replaced a six-step batch synthesis with a single-step continuous process, reduced waste by 72 per cent and enabled production at the 250-kg scale. The success of this project established a new benchmark for green chemistry within the industry and reflects Asymchem's continued investment in developing sustainable and high-performance manufacturing technologies.

In-House Equipment Fabrication

In modern flow chemistry, process innovation must be supported by advanced engineering capabilities. While many CDMOs rely on third-party equipment with long lead times and limited flexibility, Asymchem has established a fully integrated system that combines proprietary design, precision machining and comprehensive equipment lifecycle support. This system is anchored by a dedicated engineering team and a 10,000 m^2 manufacturing centre. The facility is equipped with advanced technologies, including metal laser 3D printers, five-axis CNC machining centres and robust simulation and modelling tools. Through this in-house fabrication capability, Asymchem delivers client-centric, end-to-end solutions that address process, regulatory and scale-up requirements. Customised flow reactors can move from initial design to delivery in as little as one to two weeks, enabling seamless integration and significantly accelerating project timelines.

Global Expansion: The Sandwich Site

Asymchem's integrated approach to flow chemistry is exemplified by their UK site in Sandwich. The facility features CE-certified proprietary flow equipment, including plug flow reactors, heterogeneous hydrogenation systems, biocatalysis platforms and Grignard capabilities. This installation has created a flexible, fully integrated environment for rapid process development and scale-up, representing a key step in Asymchem's broader expansion into Western markets. With these capabilities in place, their Sandwich site serves as an innovation hub for flow chemistry. Client projects can be rapidly developed and tested in a controlled laboratory setting, allowing for efficient process optimisation. Once a process meets performance and quality requirements, they provide tailored equipment solutions ready for direct deployment at the client's site.

Linglong Yi

Linglong Yi, Chief Engineer of CFCT, has built his career around the development, technology transfer and commercial-scale production of small-molecule drugs. He is particularly recognised for his extensive expertise in continuous manufacturing, having led multiple projects from concept to successful commercialisation. As the Chief Engineer of Asymchem's Center of Continuous Flow Technology (CFCT), he oversees the development, validation and implementation of flow continuous technologies across the organisation and in external collaborations.