SAFER, GREENER, FASTER … and CHEAPER!

NiTech® Solution’s unique crystallisers and reactors are ready to revolutionise the manufacture of chemicals, pharma, food & drink and biotech.

- NiTech’s simple, yet highly innovative, continuous flow technology meets today’s need for safer, greener, faster and cheaper manufacturing processes.
- Portable and scalable units are available as either independent components or as complete manufacturing systems.
- NiTech works with clients (directly and through its partners) to explore how the novel technology could improve their own processes.
- NiTech can tailor the crystallisers/reactors to meet a range of requirements for temperature, pressure and anti-corrosive properties.
- The technology is easily scalable to commercial production. NiTech can license the technology on either an exclusive or non-exclusive basis.
- NiTech also offers continuous filtration and drying technologies, where appropriate, through its engineering partner, Alconbury Weston Ltd.

The NiTech Advantage:
>70% plant footprint reduction
>40% capex reduction
>30% operating cost reduction
>10% yield improvement
Quality more consistent
Process more controllable and repeatable

NiTech DN Ultra – the complete manufacturing system

NiTech’s mobile continuous production platform (MCPP) – the DN Ultra – is a complete manufacturing system developed and manufactured in association with Alconbury Weston Ltd. The platform includes a fully integrated reaction, crystallisation, filtration and drying system for volumes between 200 kg – 6,000 kg per annum (based on 300 days production). It can also be easily scaled up to produce higher volumes by increasing the number of units used.
SAFER, GREENER, FASTER … and CHEAPER!

SAFER
- Easy monitoring and recording of process variables
- Inventories of hazardous materials are reduced

GREENER
- Minimised energy input
- Reduced waste generation
- Reduced solvent use

FASTER
- Consistent product quality
- Handles liquids, solids and gases
- Effective with a wide range of chemistries
- Higher yields from better conversion efficiency
- >10% improvement
- Simplified product change-over and maintenance
  - enables lower inventories and large or small runs
  - with no major cost penalties

CHEAPER
- Lower capital and maintenance costs
  - >40% capex reduction; >30% operating cost reduction
- Lower spares inventory cost
- Increased uptime
- Modular/portable manufacturing configuration
- Enables distributed manufacturing at affordable cost
- Simplifies expansion opportunities
  - linear scale up
  - reduced investment risk
  - low-cost options available

The crystallisers and reactors are available as laboratory, pilot and production units. They can be manufactured in glass, stainless steel, Hastelloy® or other materials to meet specific temperature, pressure and anti-corrosion requirements, as well as to ATEX standards. Small and large runs can be completed quickly and cost-effectively.

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THE DN RANGE

MODELS

DN Ultra
This complete end-to-end mobile continuous production platform (MCPP) includes a reactor and crystalliser of choice plus a filter/dryer from our manufacturing partner Alconbury Weston Ltd. It operates on a plug-and-play system to give capacity from 200 kg to 6,000 kg per annum (based on 300 days production) – ideal for small/medium-scale manufacture in the specialty/pharma sector. It can be easily expanded to meet customers’ requirements.

DN15 Lite 1.25 litres
DN15 Standard 2.5 litres
DN15 Plus 3.5 litres
DN15 High Pressure (HP) 1.25 to 4.5 litres
DN15 Compact 1.25 to 3.5 litres
DN60 Hydrogenator* 3.2 litres

* semi-continuous operation

KEY PROCESS SPECIFICATIONS

All models (excluding DN60 Hydrogenator) have the following operational parameters:

- Temperature range: 0°C to 100°C (150°C optional)
- Oscillator frequency: 0.1 Hz to 3.0 Hz
- Oscillator amplitude: 1 mm to 65 mm
- Operating pressure: vacuum to 25 bar **
- Minimal heat and mass transfer constraints
- Multi-phase operation
- Repeatable process unit
- Plug Flow
- Laminar flow
- Simple temperature control
- Flexible/adaptable configuration
- Wide range of residence times
- Intensified process
- Simple components

** Excluding glass units

OPTIONS

Models in the DN range are available with the following options:

- Extra interfaces to connect process analytical technologies
- Extra feed collars allowing multiple additions of chemicals/materials
- High-temperature jacket options (150°C maximum)

SPECIFICATIONS

DN Ultra
Crystalliser/reactor of choice - see below
Filter/dryer – CFD 20 - provided by engineering partner Alconbury Weston.

DN15 Lite
1.25l volume and 7m long
 Typical residence time is 30 minutes at a nominal flow rate of 40 ml/min
 Straight are jacketed ***
 Size: 1100mm wide x 800mm deep x 1010mm high

DN15 Standard
2.5l volume and 14m long
 Typical residence time is 60 minutes at a nominal flow rate of 40 ml/min
 Both straights and bends are jacketed
 Size: 1110mm wide x 800mm deep x 1010mm high

DN15 Plus
3.5l volume and 20m long
 Typical residence time is 90 minutes at a nominal flow rate of 40 ml/min
 Both straights and bends are jacketed
 Size: 1110mm wide x 800mm deep x 1350mm high

DN15 Compact
Available with the same reactor geometries as the DN15 Lite and DN15 Standard models but occupies a significantly smaller footprint of 930mm wide x 480mm deep x 1010mm high.

Due to the compact size, optional extras such as peristaltic pumps are not available for this unit.

DN15 High Pressure (HP)
Operating pressure: ambient to 10.0 BarG (to 25.0 BarG as a paid option)
HP Pilot: 3.5l volume and 20m long
 2050mm wide x 1000mm deep x 1155mm high
 Typical residence time is 90 minutes at a nominal flow rate of 40 ml/min
 Temperature range of 0°C to 150°C

DN15 HP - ATEX compliant
The control system is housed in a flame-proof enclosure to allow it to be used in an ATEX environment

DN60 Hydrogenator
3.2l volume and 1.2m long reaction vessel
Base 600mm x 600mm x 1950mm
Ambient pressure glass vessel version, 0-10 bar steel vessel versions
Magnetic drive – no dynamic seals
Stand-alone touch screen control panel

*** Bends are not jacketed on the DN15 Lite model. Lagging should be used at strategic points of importance when temperature control is critical for performing crystallisations or reactions. Alternatively, jacketed bends can be purchased to upgrade the unit.
PARTNERS

ENGINEERING PARTNER
ALCONBURY WESTON LTD

NiTech’s engineering partner Alconbury Weston is a leading designer, manufacturer and supplier of continuous processing systems, including reactors/crystallisers, filters and dryers. Alconbury Weston’s products can be used independently or linked together to create a complete system at laboratory, pilot or production scale. Visit www.a-w-l.co.uk.

PARTNER LABORATORIES

Our partner laboratories - RISE in Sweden and MEPI in France - can help you discover the benefits of NiTech’s range of crystallisers and reactors.

Research Institutes of Sweden (RISE, Process and Pharmaceutical Development, Södertälje) can carry out feasibility studies on chemical synthesis and crystallisation processes and provide a proof of concept for a continuous process. The lab is equipped with a NiTech Evaluator and a NiTech DN15 Plus unit. RISE can provide full analytical support during development in terms of chemical analyses and solid-state characterisations. Visit www.ri.se

MEPI (Toulouse, France) is a technology innovation platform promoting green chemistry on an industrial scale. MEPI has successfully developed a significant number of chemical reactions, precipitations, particle size engineering, nanoparticle and grafting generations using NiTech’s continuous oscillatory baffled reactor (COBR). This COBR is available at MEPI for testing your chemistries. Visit www.mepi.fr

PARTNER ORGANISATIONS

CMAC
NiTech’s technology was the inspiration for the UK’s Centre for Innovative Manufacturing in Continuous Manufacturing and Crystallisation (CMAC) funded by the Engineering and Physical Sciences Research Council (EPSRC). CMAC is now a £60m consortium working on scientific projects at UK universities as well as customer specific projects for industry members that include GlaxoSmithKline, AstraZeneca, Novartis, Fujifilm, Croda International, Genzyme and others. Visit www.cmac.ac.uk

CENTRE FOR PROCESS INNOVATION (CPI)
CPI works with universities, small- and medium-sized enterprises (SMEs) and multi-national businesses to help them overcome innovation challenges and bring new products and processes to market. CPI is working with NiTech on the Innovate UK-funded project, Flex-Manu, providing expertise in scale-up and process development using COBR technology for surfactant production. Visit www.uk-cpi.com

SAS PIVERT
SAS PIVERT, a public-private partnership established by leading French agricultural companies and supported by the French government, develops processes and proprietary products from bio-refining. It is leading the GENESYS pre-competitive research programme and building/managing a modular and scalable technological platform at its BIOGIS Centre. PIVERT is using a high-pressure ATEX-compliant DN15 crystalliser/reactor to support its bio-chemistry research and development work. Visit www.institut-pivert.com

PURDUE
Purdue University is located in West Lafayette, Indiana, USA. Purdue’s Davidson School of Chemical Engineering is researching process systems, engineering approaches and tools for product design and optimal operation in the pharmaceutical, fine chemical, biotechnology, food and agrochemical industries. Purdue is currently using a NiTech DN15 unit in its research. Visit www.purdue.edu

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