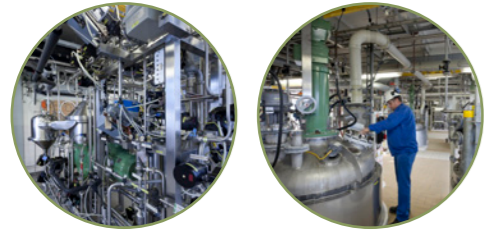


Bioprocess Pilot Facility for innovations in Sustainable Bioprocesses

The Bioprocess Pilot Facility B.V. (BPF), situated at the Biotech Campus Delft, the Netherlands, is a unique open access facility where companies and knowledge institutions can develop new sustainable production processes. These processes serve many purposes, such as converting bio-based residues into useful chemicals or fuels. The facility has been specifically designed to enable the transition from laboratory to industrial scale. BPF allows users to construct complex operations by linking separate process modules like: Pretreatment, Hydrolysis, Fermentation and/or Downstream Processing.



Pretreatment and Hydrolysis

In this module, dry and wet residues can be pretreated, hydrolysed and prepared for the fermentation phase.



Training

The facility is also a centre of expertise where operators, students, researchers and technologists can be trained.

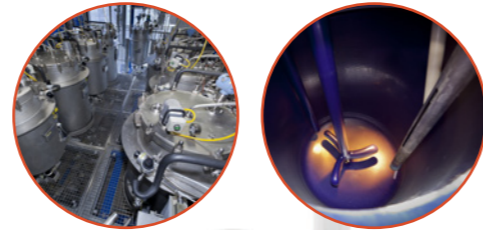


Downstream Processing

In this module, products are extracted, purified and isolated from the (fermentation) process stream. The unit operations can be combined at the client's request to create the desired product.

Experienced Crew

The facility has a skilled crew, working in a continuous mode, with a long track record in the scale-up/scale-down of bioprocesses. Operations are performed using a GMP mind-set.



Fermentation

In the Fermentation module, bioconversions are executed by means of micro-organisms (bacteria, yeasts or fungi) or enzymes to obtain the intended product.

Food

Processes and products requiring a food-grade quality are prepared in a dedicated area.



Pretreatment* and Hydrolysis

After a physical size reduction of the dry residues, the pretreatment of feedstock process can be researched using different experimental set-ups including mechanical, thermal and chemical methods. These processes include steam explosion and acidic or alkaline treatment, offering the client the opportunity to test a broad range of alternatives for pretreatment. A flexible one-stage and/or two-stage pilot scale installation, followed by hydrolysis and concentration, enables the production of sufficient starting material for a 4 m³ or 8 m³ fermentation. In addition, an even more flexible bench scale installation is available, providing a broader choice of pretreatment methods, including solvent handling. After the pretreatment at bench scale, the biomass can be hydrolysed and fermented in 10 l fermentors.

Fermentation

Our equipment includes 100 l, 300 l, 1 m³ and 4 m³ stirred fermentors in which batch or fed-batch processes can be executed. Sterility is achieved by means of steam treatment and/or filtration. The BPF has a licence to work with GMO's. The 300 l and 4 m³ fermentors are located in an ATEX environment, enabling the addition and/or production of flammable gases and/or liquids. The capacity will soon be increased to 8 m³ with a bubble column fermentor.*

Downstream Processing

The Downstream Processing (DSP) unit operations can be combined at the client's request to create the desired product. The BPF can handle biofuels and (bio)chemicals. In addition, we are also experienced in handling, producing and testing products from the food and pharmaceutical industries. Our technical range includes (membrane) filtration, centrifugation, homogenization, (bio)chemical conversions, chromatography, crystallization, electrodialysis, extraction, evaporation, distillation* and several drying methods. There are numerous vessels (ranging from 60 l to 4 m³, with different material properties and capabilities) available for a variety of process steps. The DSP module is located in an ATEX environment, allowing the use of flammable solvents.

Food*

In a separate building, with dedicated equipment, processes can be tested for the food industry. In fermentors up to 2 m³ and various downstream processing units, products can be prepared, for instance, as market samples. The Food pilot plant complies with the HACCP quality regime.

* Available in 2014