

The Nano Reactor Unit is designed to test industrial catalysts (no grinding, no crushing) at high liquid velocities in order to minimize external diffusion limitations. Catalyst performances can hence be compared avoiding buffering effects of external mass and heat transfers.

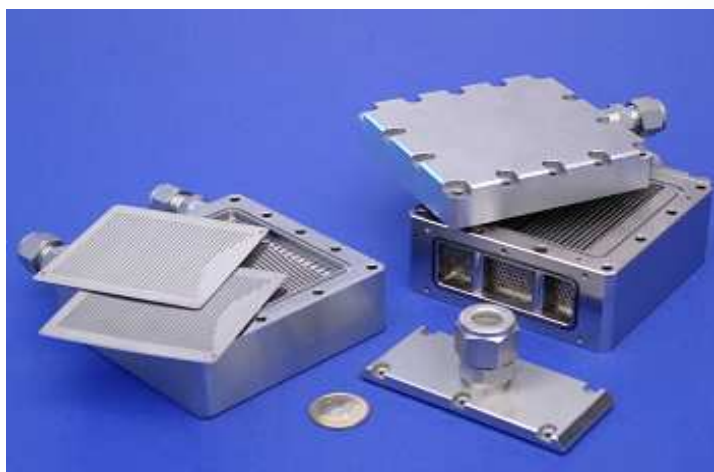
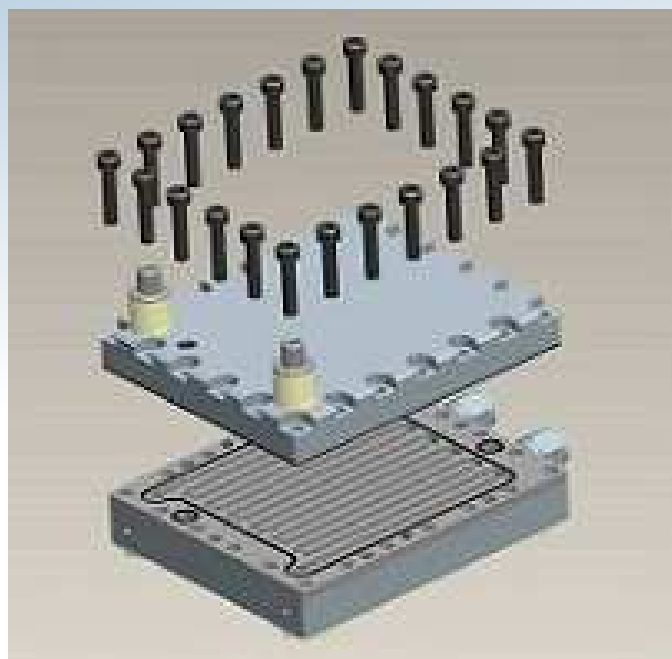
NRU – Main features

The Vinci-Technologies NRU pilot plant has been designed to study, on a turn key basis, catalyst evaluation, product development and process variables at high velocities conditions. It allows to perform :

- Catalyst performance studies
- Stability test

The reactor is a exchanger-reactor consisting of a horizontally meandering channel of 4 x 4 mm in cross section and about 9000 mm total length with a thermal fluid passing between the channels. This isothermal reactor is designed for ensuring an optimal control of the reaction temperature inside the channels.

The reactor length can be selected by the operator before the test along with the sampling points.



NRU – Advantages

Vinci-Technologies design is the fruit of extensive world wide operation and major key points of the equipment are :

- Highly reliable, robust and fully modular design
- Accurate thermal control
- μ -Reactors designed for high velocities investigations
- Modular design allowing a lot of sampling points
- Fully automatic system for unattended operation 24/24h

NRU – Advantages

Catalyst capacity	5 beds of 10ml each		
Reactor capacity	140ml		
Max. operating pressure	100 barg		
Max. operating temperature	150°C		
Nitrogen flowrate	between 20 & 200l/h		
Two parts : mechanical skid+ control/electrical cabinet			
Dimensions Skid	Lxlxh : 1.1m x 1m x 1.6m	Cabinet	Lxlxh : 1.2m x 0.8m x 0.4m
Design for general purpose area	Supply	Nitrogen	300l/h @ 180 bars
	Power	Cooling water	@ 25°C max
			50-60Hz

NRU – Key features

The reactor devices are arranged on A3 base plates having a rectangular grid pattern with a reference dimension of 25mm for a grid cell. 1mm thick sealing plates ensure the tightness of the mounted devices.



The modular concept allows the build-up of several different plant configurations, reactor lengths and sampling points depending on the selected reaction process. For example, a reaction section can be build up with two A3 plates in series in order to get a total reactor available length of 9 m (with 4 x 4 mm² channel cross section) consisting of six horizontal 'meander reactors' (three reactors by plate) in series.

Before the test, the operator may select reactor length among 1.5m, 3m, 4.5m, 6m, 7.5m, 9m, by adding or removing one or more meander reactors. Micro-element handling, mounting and dismounting is very easy.

Each meander reactor consists of meander-shaped reactor channels characterized by a reactor length of 1.5m and a low flow resistance. Further channels closely adjacent to the reaction channel are operated by a heat transfer medium (oil or water) which enables an efficient heat exchange and precise temperature control. The maximum operating pressure is 30b.

NRU – Technical description

The μ HV pilot can be described as a four sections unit :

- Gas & Liquid feed section
- Reaction section: Vinci Technologies know-how in reactor design guarantees the best configuration for the process.
- Separation section
- Product recovery section

This bench-scale continuous unit is fully automated for complete process control.

Standard equipment includes:

- Gas injection lines (Primary and secondary nitrogen) with mass flow controller
- Hg saturator designed with high thermal control
- High precision pollutant injection system
- Reactor – Vinci Technologies design
- Unit pressure control
- Electrical/Control cabinet : the unit offers a user-friendly, safe and reliable control, providing process parameter monitoring and real time display (Gas Flowrate, Pressure, Temperature ...), as well as process alarms and security switches.

NRU – Reaction module overview

