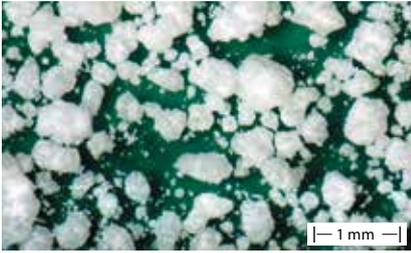




## **PROCELL LABSYSTEM**

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**SPRAY GRANULATION  
SPRAY AGGLOMERATION  
SPRAY COATING  
SPRAY ENCAPSULATION  
POWDER LAYERING  
DIRECT PELLETIZATION**



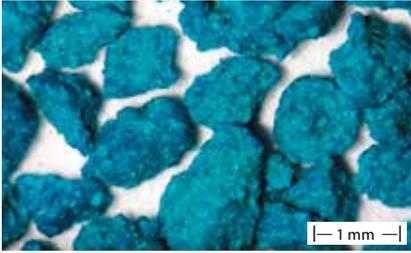
micro organisms, spray granulation, ProCell



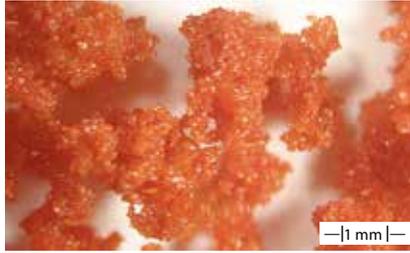
fertilizer, coating, ProCell



plastic foam, powder layering, ProCell



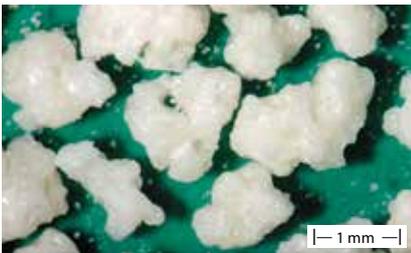
fungicide, spray granulation, AGT



tomato, agglomeration, Vario



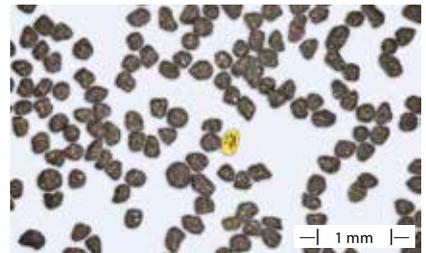
catalyst, coating, ProCell



proteine, spray granulation, ProCell



ceramic, spray granulation, AGT



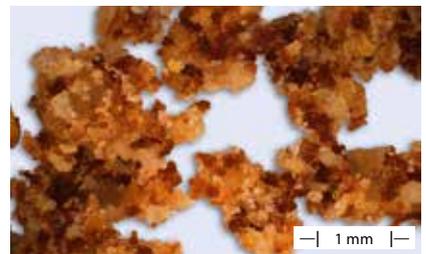
diamonds, coating, AGT



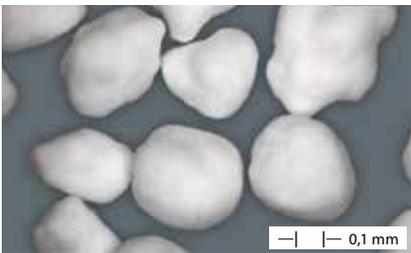
vitamin, spray granulation, ProCell



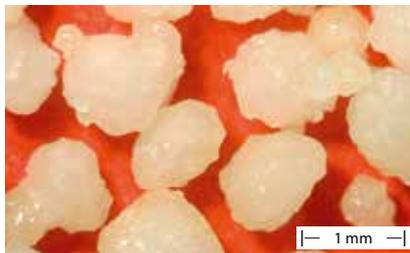
lavender oil, encapsulation, ProCell



sauce powder, agglomeration, GF



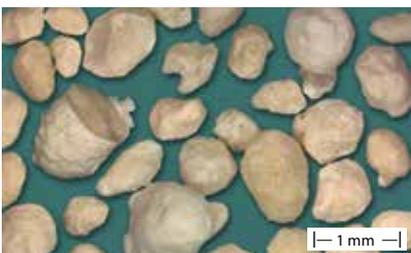
zeolite, direct pelletization, shovel rotor



PUFA, encapsulation, ProCell



hollow spheres, powder layering, shovel rotor



enzyme, coating, Vario



sugar and starch, powder layering, Rotor



lysine, spray granulation, Vario

## TECHNOLOGIES

### *Solutions for your product ideas*

Glatt Process Technology Food, Feed & Fine Chemicals offers innovative technologies for a variety of applications such as for the food, animal feed, cosmetic, chemical or fine chemical industries.

Our focus: development, optimization and processing of bulk materials such as powder, granulates and pellets.

### *Spouted bed technology*

Using the unique and patented spouted bed technology the particles within the ProCell are fluidized without a bottom screen and directed to the spraying nozzle. By this means it is possible to work with very low product temperatures and short residence times. As a result temperature sensitive materials are treated very gently. Proteins, enzymes and micro-organisms are dried in the ProCell with very little loss of activity. The process air velocity declines rapidly in the process chamber of the ProCell and allows the production of very fine particles. On the other hand large particles, like catalyst carrier rings can be fluidized without using prohibitive quantities of process air. The high air velocities in the slot ensure a very robust process, especially when processing sticky materials. Lumps that may have formed are still moved, break down again or are carried out of the process chamber.

### *Fluid bed technology*

Using different process chambers – AGT, Vario and GF – allows the evaluation of fluid bed processes. Inlet air chamber and process chamber are separated by a bottom screen and the product is homogeneously fluidized.

The cylindrical AGT insert allows high fluidizing velocities.

The conical Vario insert is designed for the production of agglomerates and for coating processes, also with the option Wurster-process.

The GF – insert is divided into four sections. The first three can be equipped with nozzles. The solid raw material is continuously supplied and moves in a circle through the process chamber.

### **ProCell LabSystem**

The laboratory unit ProCell LabSystem is designed for testing of spouted bed and fluid bed processes in the single kg-scale:

- » **Spray granulation:** granules and pellets from liquids
- » **Spray agglomeration:** granules from powder
- » **Spray coating:** coating of particles with liquids
- » **Spray encapsulation:** encapsulation of liquids
- » **Powder layering:** coating of particles with powder
- » **Direct pelletization:** pellets from powder

### *Rotor and shovel rotor technologies*

In this process inlet air chamber and process chamber are separated by a moving rotor plate. The particles in the process are spheronized by the rotating movement. Simultaneously liquid and powder can be introduced by means of a tangential spray nozzle to coat particles with powder. Static shovels on the wall of the shovel rotor support the rolling movement of the particles. With this insert pellets can be generated from powder without starting core.

### *Maximum process flexibility*

By means of the side discharge and the zig-zag sifter all processes can be run continuously. All particles below the desired particle size are returned to the process chamber. Alternatively the discharge can be closed and all processes can be run in batch mode.

In all process chambers liquid can be sprayed either from top or from bottom. The capacities depend on the size of the process chambers, the inlet air volume and inlet air temperature.



standard system with Vario 3 insert

## TECHNICAL DATA

### spraying rate

- » 0.2 –18 l/h (depending on product)

### air flow/inlet air temperature

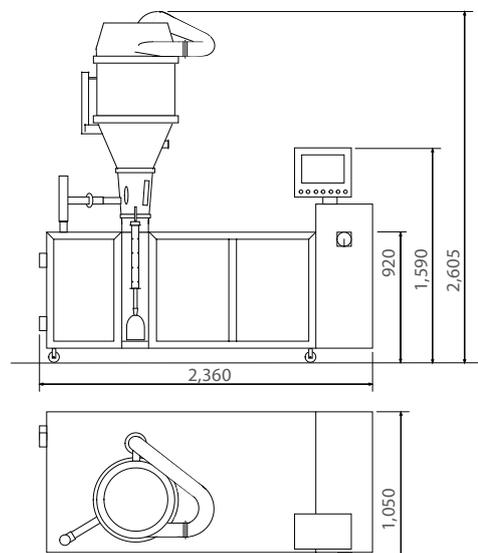
- » standard: max. 250 m<sup>3</sup>/h at max. 200 °C
- » option: max. 250 m<sup>3</sup>/h at max. 300 °C
- » option: max. 500 m<sup>3</sup>/h at max. 200 °C with external fan

### utility requirements

- » compressed air: 6 bar (g)
- » power: 31 kW (at 250 m<sup>3</sup>/h and max. 200 °C)

- » weight: 1,300 kg

- » main measurements refer to drawing



# FLEXIBLE UNIT: PROCELL – VARIO – GF – AGT – ROTOR



**ProCell 5 - insert**  
working volume: 0.4 – 4 l  
capacity: 0.2 – 2 kg/h



**ProCell 10 - insert**  
working volume: 0.8 – 8 l  
capacity: 0.4 – 4 kg/h

## ProCell System

- » continuous spouted bed:  
spray granulation and encapsulation
- » batch spouted bed:  
agglomeration and coating



**Vario 3 - insert**  
working volume: 2.5 – 10 l  
capacity: 0.4 – 4 kg/h



**Vario 7 - insert**  
working volume: 10 – 38 l  
capacity: 1 – 10 kg/h

## Vario System

- » continuous fluid bed:  
spray granulation and encapsulation
- » batch fluid bed:  
agglomeration, coating and  
Wurster coating



**GF 5 - insert**  
working volume: 5 – 23 l  
capacity: 0.5 – 15 kg/h

## GF System

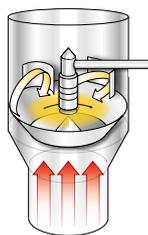
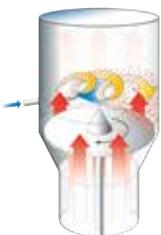
- » continuous fluid bed:  
spray granulation, encapsulation,  
agglomeration, coating  
and drying



**AGT 2 - insert**  
working volume: 1.4 – 5.8 l  
capacity: 0.2 – 2 kg/h

## AGT System

- » continuous fluid bed:  
spray granulation and encapsulation



**Rotor 7 - insert**  
working volume: 1 – 5 l



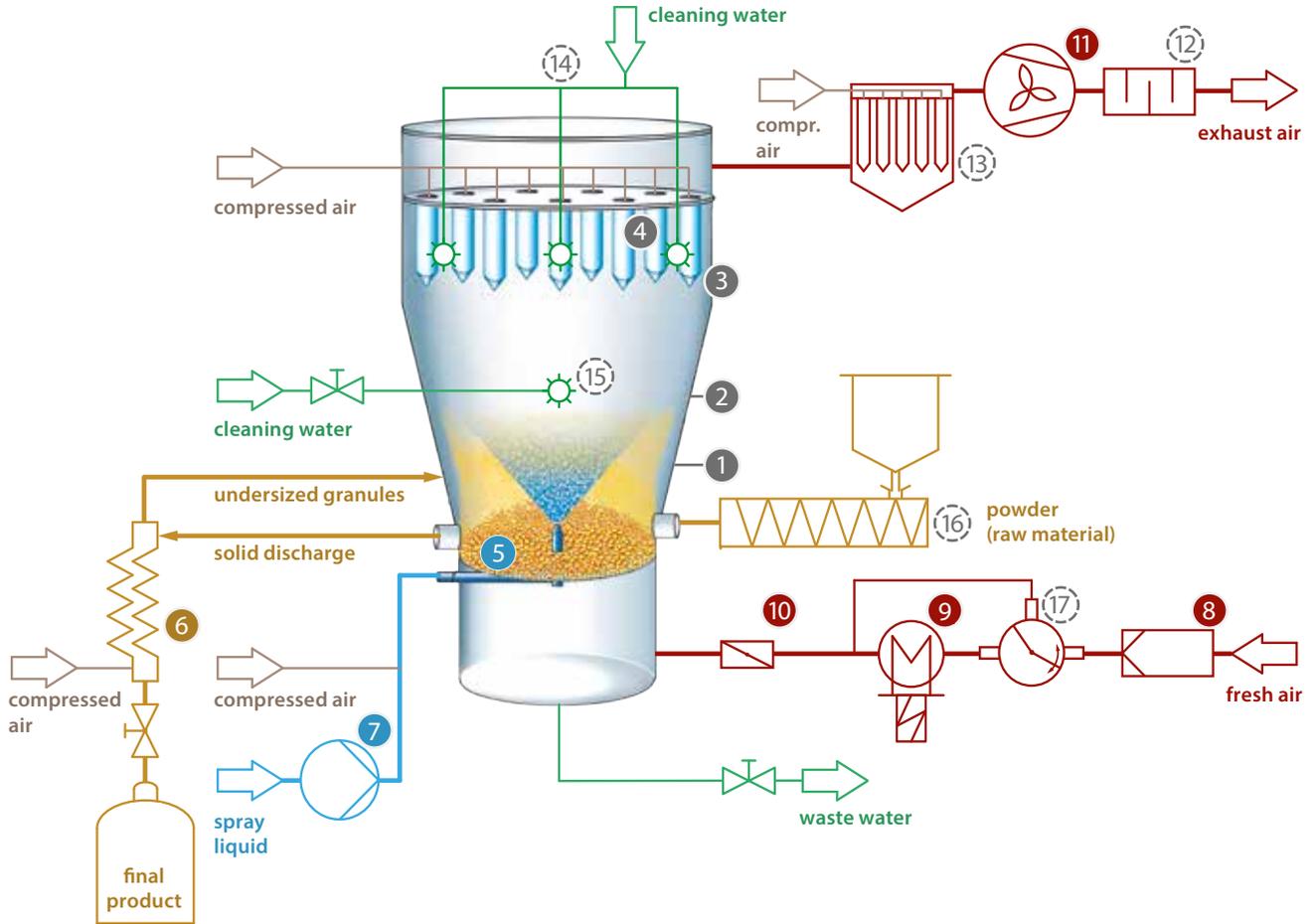
**Shovel rotor 7 - insert**  
working volume: 1 – 5 l

## Rotor System

- » batch process:  
powder layering, spheronization  
and direct pelletization

please note: capacity is depending on product

## PRODUCT FLOW IN THE PROCELL LABSYSTEM



### Standard configuration

- 1 process chamber
- 2 expansion chamber
- 3 filter housing
- 4 internal process filter
- 5 spray nozzle (bottom-spray)
- 6 continuous discharge zig-zag-sifter
- 7 spray pump
- 8 inlet air filter
- 9 inlet air heater 20 °C - 200 °C
- 10 WIP valve
- 11 process air fan 250 m<sup>3</sup>/h  
GlattView Evo control system

### Options

- 12 silencer
  - 13 external filter in lower part
  - 14 WIP system for internal process filter
  - 15 WIP cleaning nozzle
  - 16 continuous volumetric powder feed
  - 17 bypass inlet air heater
- hot-melt-device  
 top-spray nozzle  
 three-way nozzle  
 media adapter for nitrogen operation  
 HEPA filter  
 bag filter  
 additional oblong sight-glass  
 LED lamp
- cyclone with dust recycling (incl. rotary valve)  
 continuous discharge double-valve system  
 increased process air volume 500 m<sup>3</sup>/h  
 increased inlet air temperature 300 °C, 250 m<sup>3</sup>/h  
 inlet air dehumidification  
 closed loop process gas with condensation  
 data acquisition system DataStoring PC  
 recipe creation software  
 spray rate control  
 inlet air moisture measurement  
 exhaust air moisture measurement  
 qualification DQ, IQ and OQ
- Please ask for more options!

## MODULAR CONFIGURATION OPTIONS: TAKE YOUR CHOICE



external filter in lower part



cyclone with rotary valve and dust recycling



top spray two-way-nozzle



cartridge filter, internal process filter



top spray two-way-nozzle, insulated (hot-melt)



bag filter, internal process filter



condenser, closed loop process



top spray three-way nozzle



atomization air heater



continuous product discharge/zig-zag-sifter



nozzle with (left) /without (right) needle



volumetric powder feed



spray pump

## PRODUCT FLOW IN THE PROCELL LABSYSTEM

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### *Maximum operator flexibility*

The ProCell LabSystem made by Glatt is the most flexible laboratory fluid bed unit on the market. Integrated in a mobile base unit, this modular lab all-rounder allows the use of all process options for batch and continuous fluid bed, spouted bed or rotor processes for a great variety of material systems.

### *Closed loop process gas*

In addition to the exhaust gas treatment by internal or external filter or by cyclone and external filter a full closed loop is available. The process gas is dried with a condenser or a desiccant wheel before returning to the process. The desiccant wheel may also be used alone in order to control the inlet gas moisture.

### *Internal bag filter*

You want to work with small product volumes? Use the internal bag filter! The smaller surface of the filter means that less product is collected in the filter. Easy cleanability of the bags, for example in a washing machine, is an additional advantage.

### *WIP-filter*

For improved cleaning the ProCell LabSystem can be equipped with a WIP-filter. WIP nozzles are integrated in the filter plate and clean the filter housing and the filter cartridges or filter bags automatically.

### *Threefold nozzle*

You have a special application and want to spray two liquids in parallel? The ProCell LabSystem can be equipped with a threefold nozzle. Two liquids are pumped separately to the tip of the nozzle and atomized by compressed air.

### *Spraying of melts*

Heated hoses, atomization air heater and insulated nozzles allow spraying of melts which have a melting point of up to 100°C. This process is used for example to coat particles with fat to protect them against moisture.

### *Solid dosing*

When continuous dosing of solid raw material is desired, this can be done by means of a screw feeder.

### *Continuous discharge*

The zig-zag-sifter is not only discharging product from the process. The compressed air, which enters at the bottom of the sifter is also returning all undersized material back to the process. If no sifting is desired, the discharge is accomplished by a twin valve.

### *Safety*

Test your products - even if you don't know the exact explosion characteristics.

The basis of the safety concept is avoiding ignition sources. As an option the unit can be delivered pressure shock resistant – ProCell LabSystem<sup>PRO</sup>. Explosions, e.g. of hybrid mixtures formed by explosive dusts and solvents, are kept inside the equipment.

Alternatively you can use nitrogen as process gas in closed loop - inertization. This means not only highest safety but also allows to recover the solvent.

## SAFETY CONCEPT: STANDARD AND PRO-DESIGN



ProCell LabSystem, PRO-design, Vario 3 - insert



expansion chamber and filter housing in PRO-design



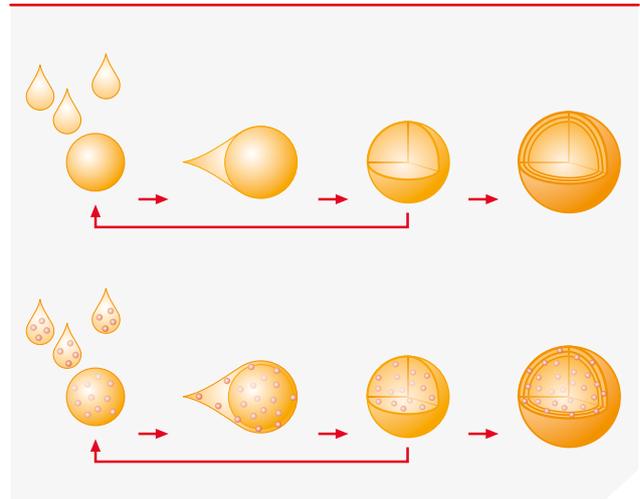
product vessel in PRO-design

ProCell LabSystem designed for ...	Standard	PRO
minimum ignition energy in the dust cloud at 200 °C > 3 mJ	●	●
minimum ignition temperature (MZT) > 300 °C	●	●
glowing temperature (thin layer ignition temperature) > 275 °C	●	●
dusts shall be electrically conducting (specific resistance < 10 <sup>9</sup> Ωm)	●	●
dusts		
maximum explosion overpressure P <sub>max</sub> ≤ 11 bar		●
maximum K <sub>st</sub> value K <sub>max</sub> ≤ 400 bar*m/s		●
hybrid mixtures:		
maximum explosion overpressure of dusts P <sub>max</sub> ≤ 10 bar		●
maximum K <sub>st</sub> value of dusts K <sub>max</sub> ≤ 350 bar *m/s		●
solvents with explosion group IIA or IIB		●

## PROCESSES

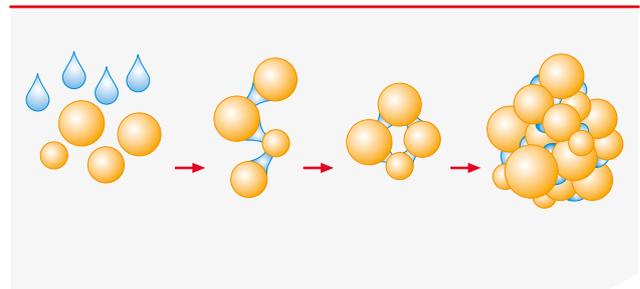
### *Spray granulation*

Liquids (solutions, suspensions, melts) are sprayed into the fluid bed. The process combines the drying respectively solidification of liquids and the granulation in a single step. There is no need for a separate feed of solid raw material. The granules are growing in layers homogeneously. Typical grain sizes: 50 µm - 4 mm.



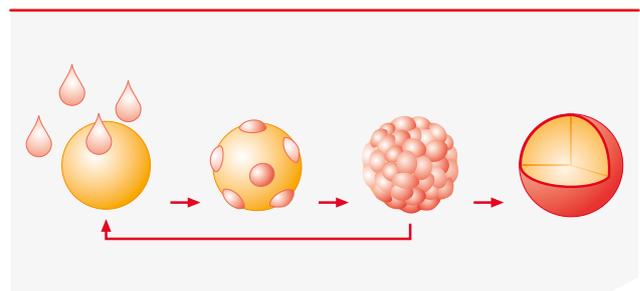
### *Spray encapsulation*

Embedding substances in matrix pellets. The substances to be protected are emulsified and then gently spray-granulated.



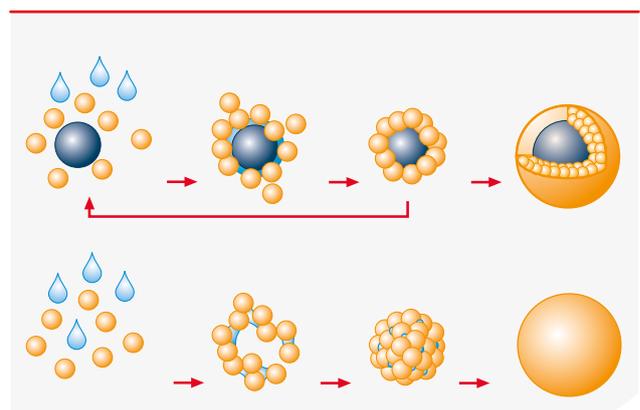
### *Spray agglomeration*

Very small particles are fed to the fluid bed. Binder liquid is sprayed and wets the surface of the particles. The moist particles stick to each other, forming agglomerates - granules with coarse structure and large surface. Agglomerates are very good wettable soluble. Typical grain sizes: 200 µm - 3 mm, raw material may be as small as 5 µm.



### *Spray coating*

Particles of different shape and size are moved in the fluid bed. Liquid is sprayed onto the surface of the particles, the solvent evaporates and the solid forms the coating layer. Typical functions of the coating are: taste masking, protection against moisture or oxygen, controlled release. Typical grain sizes: 100 µm - 3 mm.



### *Powder layering*

For the application of arbitrarily thick coating layers on provided cores, the coating material may be delivered as powder. For this purpose, the powder are fed together with a binder liquid.

### *Direct pelletization*

It is also possible to generate pellets directly from powder – without starter core. Supported by a liquid binder the powder rolls up to spherical particles.

## Overview of operator advantages

- » feasibility tests 500 g/batch - 4 kg/batch (batch mode) and 200 g/h - 4 kg/h (continuous mode)
- » production of samples 1 kg/batch - 30 kg/batch (batch mode) and 1 kg/h - 15 kg/h (continuous mode)
- » maximum flexibility for all processes and operating modes
- » maximum flexibility for all material systems and future products
- » high operator protection
- » high environment protection
- » simplified safety reviews prior to trials and productions
- » mobility



ProCell LabSystem, standard configuration, with Vario 3 insert



[www.glatt.com](http://www.glatt.com)