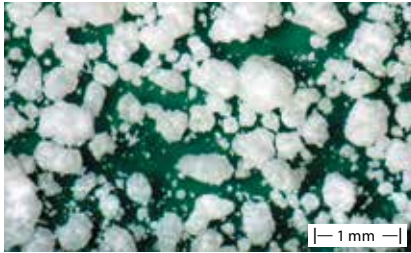




PROCELL LABSYSTEM

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



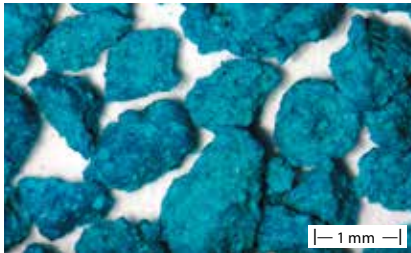
micro organisms, spray granulation, ProCell



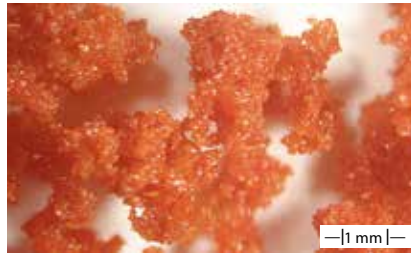
fertilizer, coating, ProCell



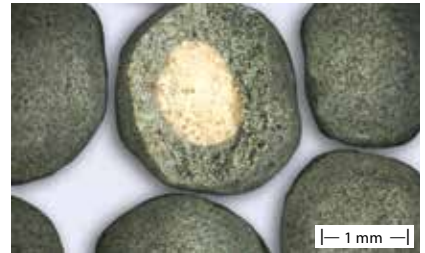
plastic foam, powder layering, ProCell



fungicide, spray granulation, AGT



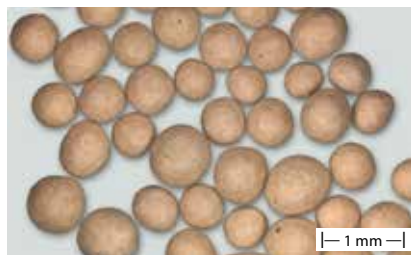
tomato, agglomeration, Vario



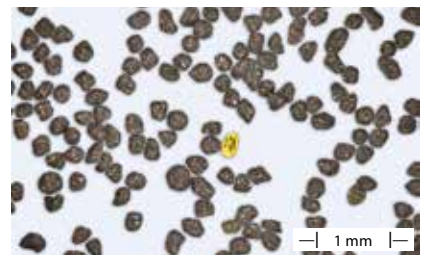
catalyst, coating, ProCell



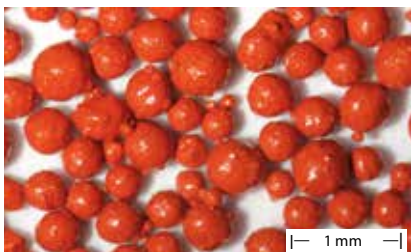
proteine, spray granulation, ProCell



ceramic, spray granulation, AGT



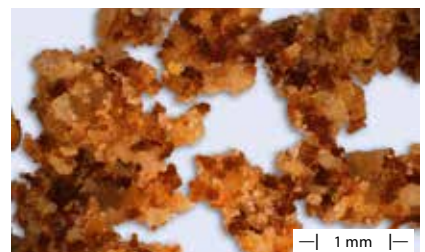
diamonds, coating, AGT



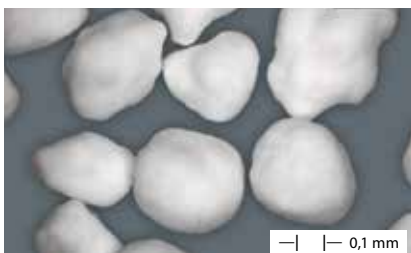
vitamin, spray granulation, ProCell



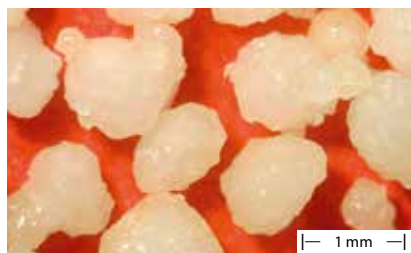
lavender oil, encapsulation, ProCell



sauce powder, agglomeration, GF



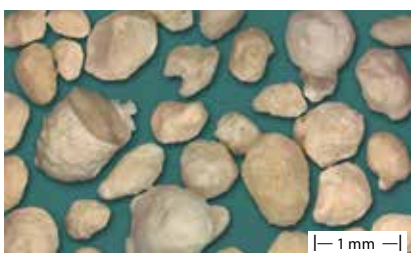
zeolite, direct pelletization, shovel rotor



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

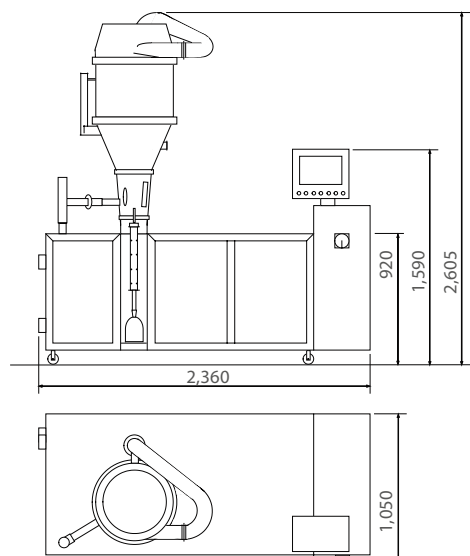
- » standard: max. 250 m³/h at max. 200 °C
- » option: max. 250 m³/h at max. 300 °C
- » option: max. 500 m³/h at max. 200 °C with external fan

utility requirements

- » compressed air: 6 bar (g)
- » power: 31 kW (at 250 m³/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

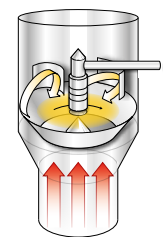


AGT 2 - insert
working volume: 1.4 – 5.8 l
capacity: 0.2 – 2 kg/h



AGT System

- » continuous fluid bed:
spray granulation and encapsulation



Rotor 7 - insert
working volume: 1 – 5 l



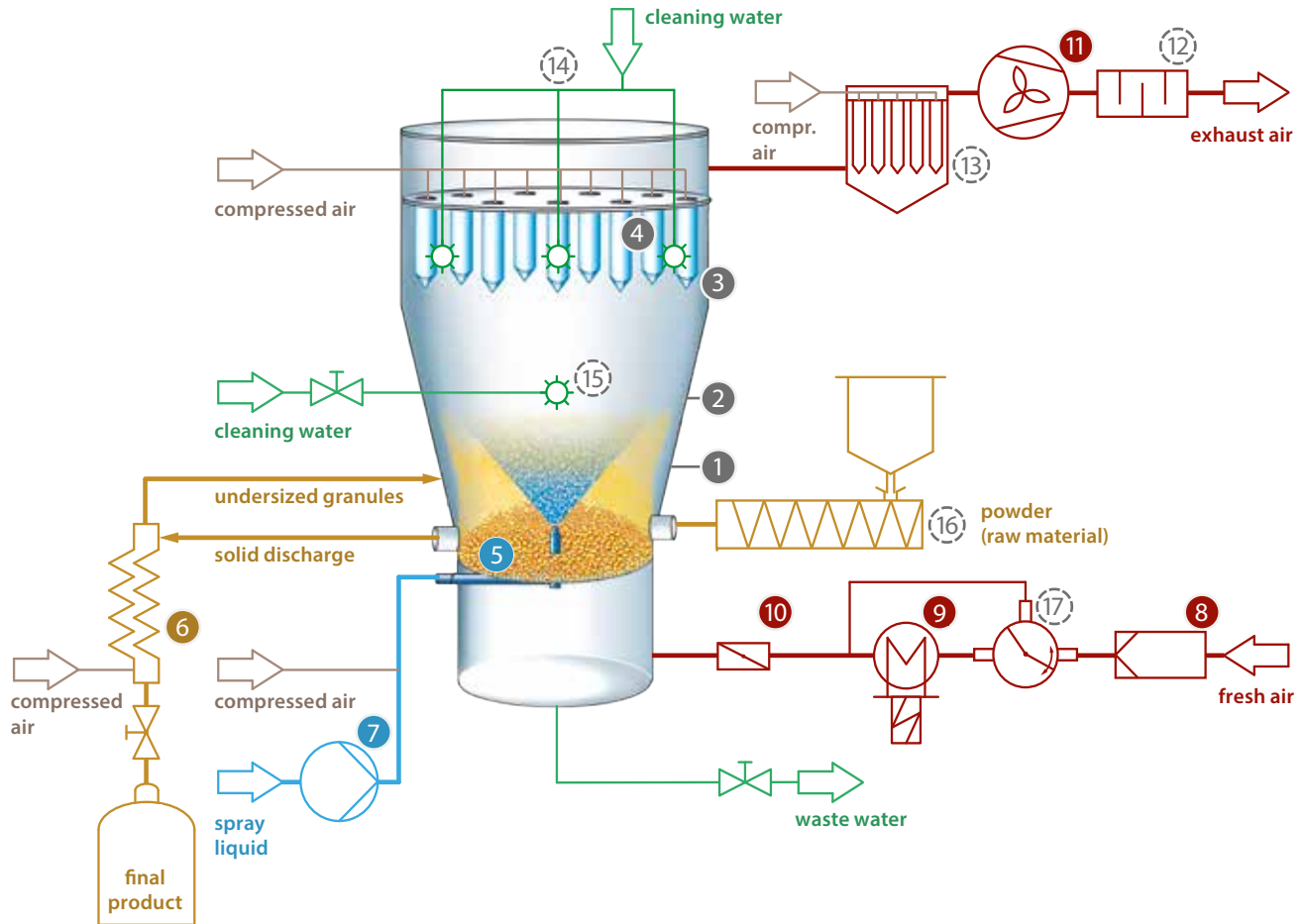
Shovel rotor 7 - insert
working volume: 1 – 5 l

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 m³/h
- GlattView Evo control system

Options

- | | |
|---|--|
| 12 silencer | cyclone with dust recycling (incl. rotary valve) |
| 13 external filter in lower part | continuous discharge double-valve system |
| 14 WIP system for internal process filter | increased process air volume 500 m³/h |
| 15 WIP cleaning nozzle | increased inlet air temperature 300 °C, 250 m³/h |
| 16 continuous volumetric powder feed | inlet air dehumidification |
| 17 bypass inlet air heater | closed loop process gas with condensation |
| hot-melt-device | data acquisition system DataStoring PC |
| top-spray nozzle | recipe creation software |
| three-way nozzle | spray rate control |
| media adapter for nitrogen operation | inlet air moisture measurement |
| HEPA filter | exhaust air moisture measurement |
| bag filter | qualification DQ, IQ and OQ |
| additional oblong sight-glass | |
| LED lamp | |

Please ask for more options!

MODULAR CONFIGURATION OPTIONS: TAKE YOUR CHOICE



external filter in lower part



cartridge filter, internal process filter



cyclone with rotary valve and dust recycling



top spray two-way-nozzle



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

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^{PRO}. 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



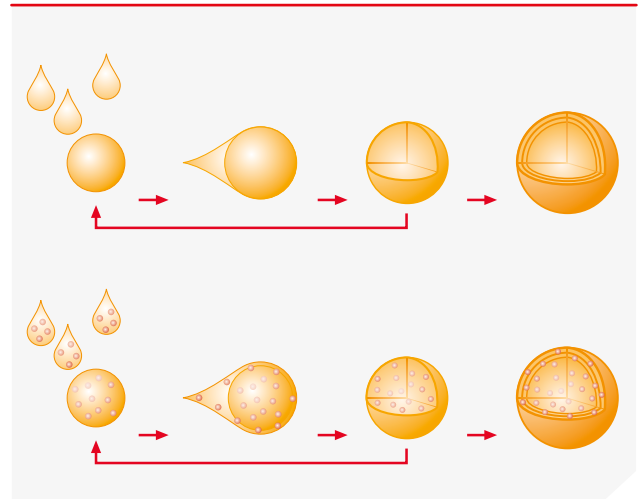
product vessel in PRO-design

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

PROCESSES

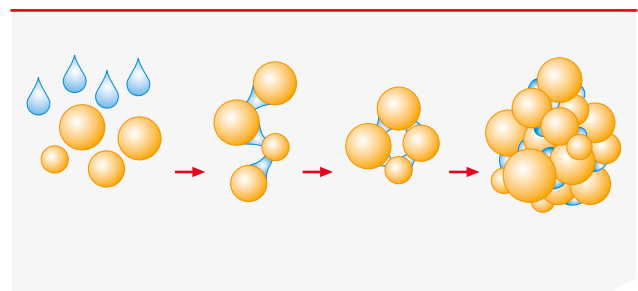
Spray granulation

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.



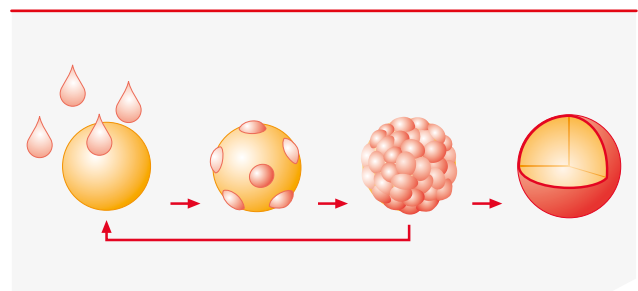
Spray encapsulation

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



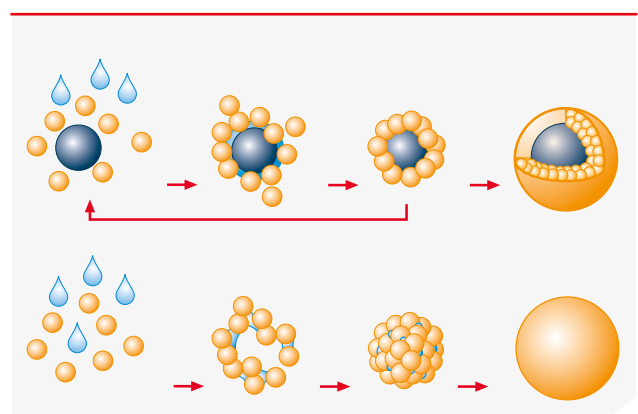
Spray agglomeration

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 .



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.



ProCell LabSystem, standard configuration, with Vario 3 insert

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



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