NEW OPTIONS IN PRODUCT DESIGN FOR HIGH PERFORMANCE DETERGENT APPLICATIONS

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Background

Owing to their unique flow characteristic and thermodynamic properties, fluidized bed and spouted bed technologies have become established as important formulation processes to optimize powder properties, as well as the particle-forming procedure, when drying solid-containing liquid solutions.
Additives functionalize detergents. Surfactants and bleaching agents are used for targeted effect on organic substances.

Performance and functionality

Some examples: Additives functionalize detergents. Surfactants and bleaching agents are used for targeted effect on organic substances. Glatt-technologies enable to improve the effect of detergents while at the same time fulfilling the stringent requirements regarding environmentally friendly cleaning processes and complying with the criteria regarding storage, handling and dosing.

Different processing options (Figure 1) can be used to develop new innovative product forms as well as to establish efficient production processes.

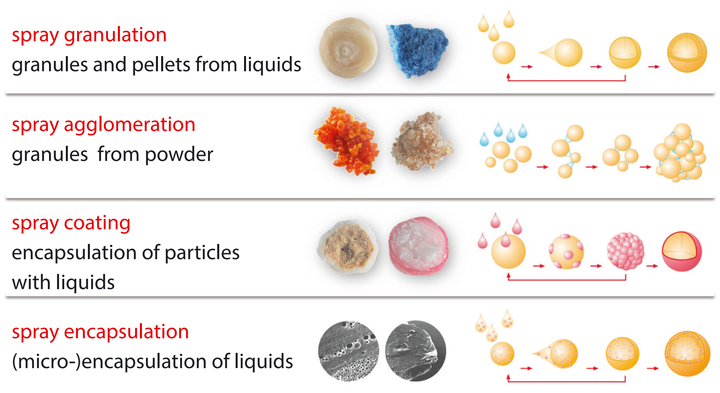


Figure 1: Fluidized and spouted bed processing options

Whether it is spray granulation, spray agglomeration, spray encapsulation or coating – the key to the ideal product is choosing the right process parameters and technical configuration.

Benefits of technology

Depending on current application Glatt technology and equipment support solving typical problems and enabling improved product properties (Figure 2).

- Some examples:
- Safety during handling
- Quick wetting and dispersing/dissolving
- Homogeneous component distribution
- Protection of valuable substances
- Integrated functionality
- Stability increase
- Optimized appearance …

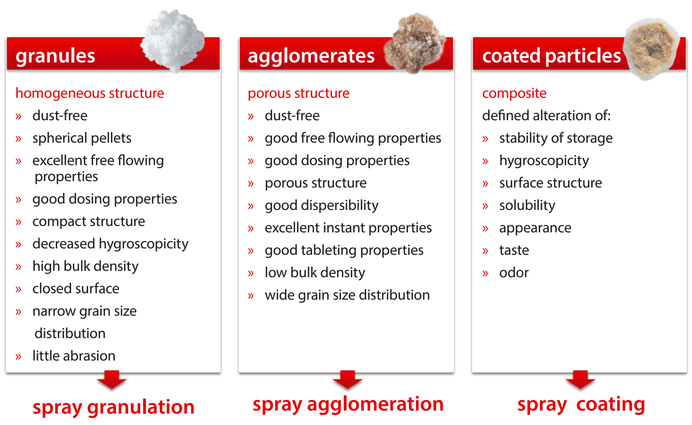


Figure 2: Application - Particle Structures.

Fluidized and spouted bed equipment

All processing options can be carried in different scales and in batch as well as in continuous operation. Figures 3 and 4 show summaries of available types of equipment starting for R&D usage up to full scale production.

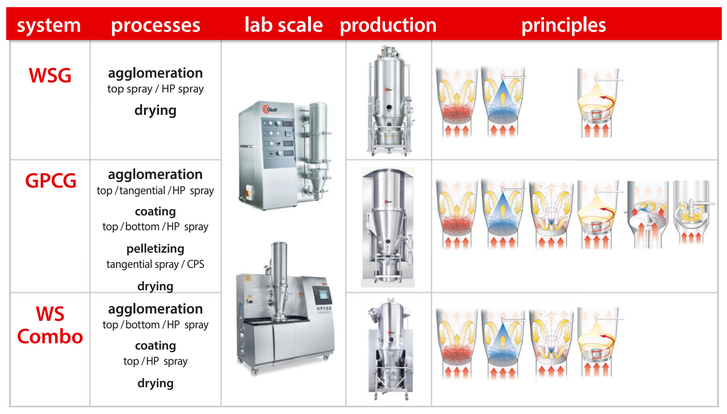


Figure 3: Batch technologies and related equipment

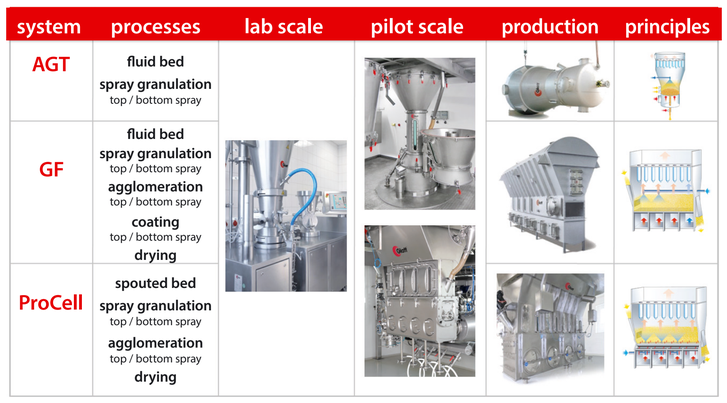


Figure 4: Continuous technologies and related equipment

Strategy for product and process development

When developing or optimizing fluid bed and spouted bed technology based products and processes, all materials to be processed and all structural and procedural aspects are to be considered. Best properties can be obtained only by optimizing all of these parameters (Fig. 5).

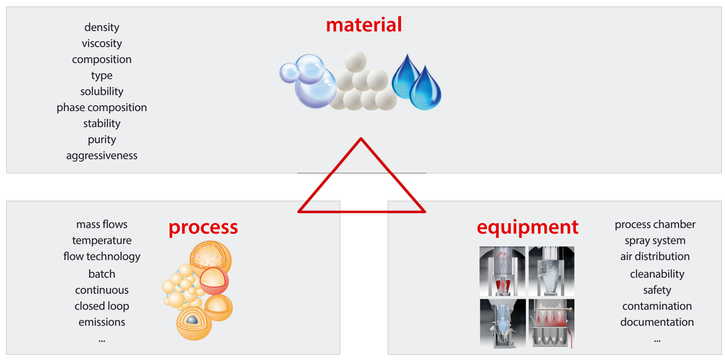


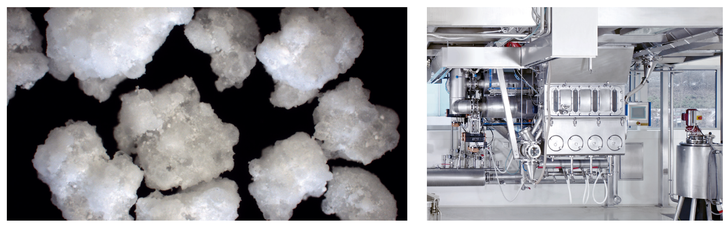
Figure 5: Integrated process development.

Material properties may both influence product properties and offer opportunities for design. Technical options offer additional options for stabilization. The application-specific operating conditions are vitally important and affect explosion protection, operational and product safety, hygiene and more. Some factors to be considered:

- Material properties and behavior of gas, solid and liquid phases (crystallinity, chemistry, pH, particle size and shape, density, temperature, enthalpy ...)
- Technical confiurations (dedusting, explosion protection, classification, spray conditions ...)
- Operating conditions (environmental conditions, emissions, permissions, storage requirements ...)

Case study »Homogeneity of mixture«

Target was to transfer powdery and liquid raw materials into a homogeneous, long-term stable, easy to dose and fast dissolving final product. Powder agglomeration was method of choice. Batch and continuous operation can be applied depending on capacity required and frequency of product changes.



Agglomeration of complete detergent blend

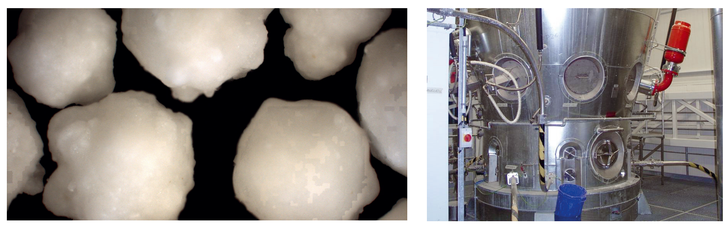
Case study »Chemical reaction and granulation«

A detergent component had to be produced made of two chemical substances in liquid form. Based on spray granulation principle a combined process could be established consisting of chemical reaction of ingredients, drying, particle formation and granulation. Everything integrated in one process step in continuous operation.

Agglomeration of complete detergent blend

Case study »Granulation of polymers or surfactants«

Polymers for detergent applications and surfactants have to meet defined product properties like bulk density, moisture content and storage stability. Continuous spray granulation processes were established for full-scale manufacturing.



Spray granulation of detergent component

Case study »Coated enzyme granules«

Enzymes are widely used in detergents to increase performance. They are produced in liquid form using fermentation processes. Spray granulation is used to produce dry products based on liquid concentrates for easy and safe handling, to adjust activity and to improve storage and stability in application.

Spray granulation and spray coating

Conclusion

Glatt technologies are usable to add value or improve product properties of dry detergent formulations. Liquids or powders can be processed to innovative products.