

# PRODUCT DESIGN



**INNOVATION**

**ENGINEERING**

**OPTIMIZATION**

## Size and shape matter! Obtaining the right product properties

### Our service ...

Product design stands for the development and optimization of a sales product. Building on the basic product recipe, product design focuses on the formulation and the manufacturing process to establish defined product properties such as mechanical properties, handling properties, stability and mechanism of action.

As part of our product design services, we develop and optimize your goods and products to enhance your added value of the product. The primary objective is a product which embodies customer-specific market requirements.

Your product's profile is determined by its physical properties, e. g. particle size distribution, apparent density and viscosity. We provide the process steps to optimize these properties.

Another aspect important to your customers is the shaping of the product for a specific application. We develop process strategies for optimization of characteristics such as redispersibility, dust content and flow behavior. Your chemical, your active substance, your flavoring must retain its full effectiveness even after months or years of storage. The stabilization of compounds and aroma chemicals is at the center of our efforts to develop solutions to problems such as retention behavior, oxidation resistance, storage stability and sterility.

Establishing the optimal mechanisms of action is an extremely complex undertaking. We work with you to develop new and innovative process strategies and adapted and optimized formulations to establish properties such as controlled release, bioavailability and taste masking.

The work of our engineers, physicists, biologists and chemists is based on interdisciplinary cooperation. This puts a team having an outstanding knowledge base and working in an excellent development environment at your disposal.

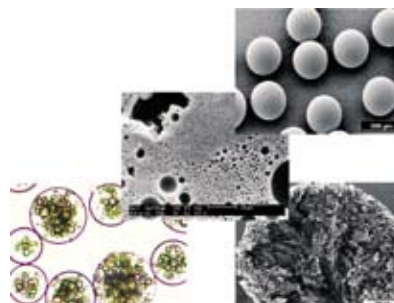
Using a few grams of your product, our trained specialists in laboratories and pilot plants optimize the desired properties or produce sample quantities ranging from a few kilograms to several tons.

### ... is your gain

Taking advantage of your product know-how, we optimize the products you currently have on the market. We work with you to develop new and innovative products to enhance your added value.

Your benefits include the:

- opening up of new areas of application for your product;
- expansion of the scope of application of your products;
- lengthening of the life cycle of your product;
- development of new and innovative products with the properties demanded by the customer;
- opening of new markets for your products.



Microscopic images of some sample products



**Bayer Technology Services**  
Powering Your Performance

We do not specialize in one single process, nor are we tied to one equipment manufacturer or one formulating concept. We draw from a broad assortment of diverse methods, analyses, processes and equipment. We stage, combine or refine these resources as necessary to best meet the requirements of our customers. Alternatively, we can develop a new and innovative process for you.

## Our approach

The starting point of any new product design is a discussion between you and our experts. Together, we explore the exact boundary conditions and requirements for the product and weight them according to importance. Depending on the task, this is followed by work in the lab or the pilot plant, or in both stages.

In the lab, we work on recipe development with very small amounts of your product, leveraging our broad practical and technical expertise. We also look at the colloid chemistry and interfacial physics parameters on which the production of a stable formulation is based. If need be, we can determine these parameters and optimize them using specific laboratory tests.

Our colloid chemistry, interfacial physics and particle measurement laboratories have at their disposal a large assortment of methods for obtaining insights into the structure, mechanism of action and the physicochemical basis of formulation stability. Some examples are:

- particle size measurement, electron microscopy;
- chromatographic and spectroscopic analysis (e. g. determination of release kinetics);
- electrophoresis, acoustophoresis, conductimetry;
- methods of measuring interface energy, wetting behavior, and tenside adsorption;
- rheology;
- analytical centrifuging.

This equipment enables us to perform targeted recipe and process optimizations.

In the pilot plant, we transfer processes and recipes to a technical scale and produce the first samples and pilot-scale quantities of your product.

A sampling of our technologies shows you our wide range of possibilities for solving your problems. We work with the following solid processes:

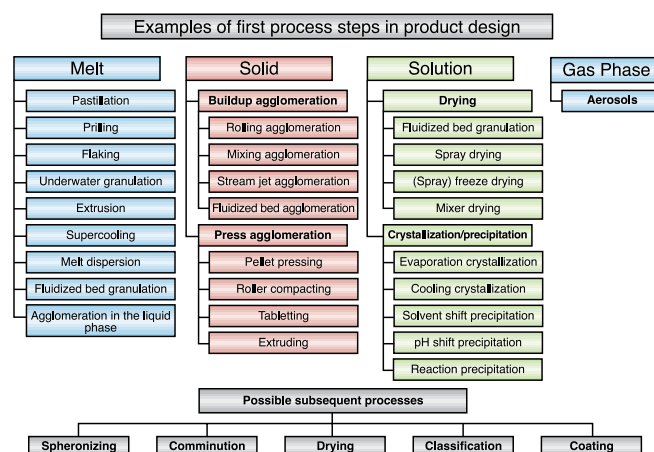
- spray drying and solidification;
- fluidized bed spray granulation;
- prilling;
- coating;
- agglomeration.

We also have a number of special processes available, including:

- supercritical processes;
- melt dispersion;
- high pressure extrusion;
- freeze drying;
- polyelectrolyte multilayer coating.

We are also your source for:

- coacervation;
- compacting;
- low pressure extrusion;
- mixing agglomeration at various intensities.



A selection of product design processes

## References

- Alcohol-containing granules
- Gel-like particles
- Iron oxide