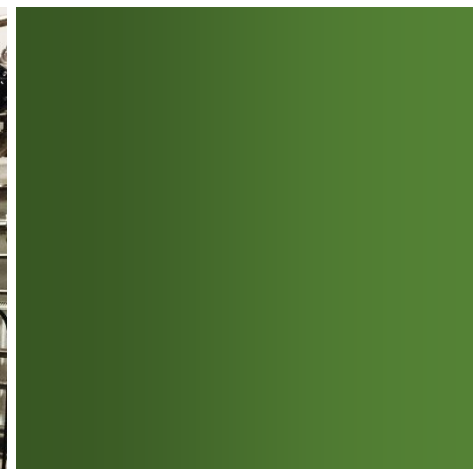


# Granulation Processing Service Abstract

*Granulation services provided by ensymm for pharma, food processing and chemical industries based on amongst others a fluidized bed dryer (FBD) approach*



# WHAT IS GRANULATION?

Granulation is the act or process of forming or crystallizing into grains. Granulation processes include the use of extrusion, high shear mixing and fluidized beds. The equipment used for granulation also determines the type of granulate generated in the process with respect to shape, chemical composition and structure.

Granulation is carried out for various reasons:

- Granules prevent segregation of constituents
- Granules have improved flow properties
- Granules emit less amount of dust

Several industries like the detergent industry are using enzymes. Those proteins in heavy-duty detergents degrade, and thereby help solubilize

substrate soils attached to fabrics or hard surfaces (e.g., dishes).

The enzyme rich ultra filtrate can be sprayed dried and introduced into the detergent in powdered form. The dust in the environment has high protease concentration and can cause allergenic reactions. Hence the proteases are an environment hazard in the powdered form and have to be granulated for a secure application.

To protect both detergent plant operators and end users, the enzyme particles have to be coated in such a way that no active enzyme dust is present or released during handling. In all cases, one or several coating layers ensure that granulates have low dusting properties.



# APPROACHES OF GRANULATION

## Extrusion Process

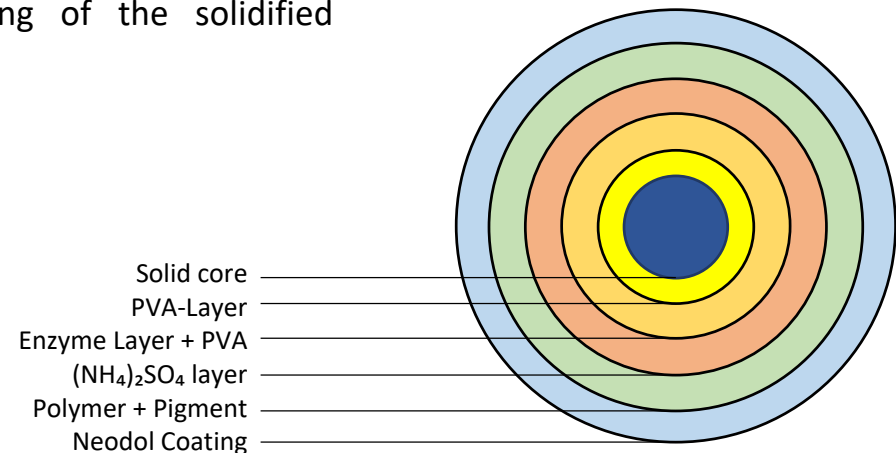
After mixing the dry ingredients, the dry premixture and the liquid enzyme concentrate are fed batchwise in a mixing system to obtain a moist dough-like mixture. This mass is fed into a twin-screw screen type extruder and pressed through thin perforated metal sheets with holes that are the diameter of desired particle size. The extruded “noodles” fall by batchwise feeding into a spheronizer. This machine, equipped with a fast-rotating disk, breaks the noodles down to cylindrical particles.

## Prilling Process

The total mixture of ingredients is transferred into a molten mass of low viscosity in which insoluble ingredients have to be homogeneously distributed. The melt is pumped through insulated tubes of the top of a tower where it is sprayed by nozzles or a rotating disk. The final steps are cooling in continuous fluid beds and sieving of the solidified prills.

## Fast-Mixer-Systems

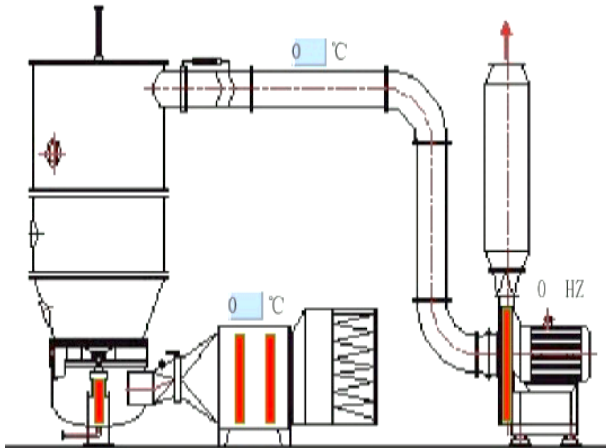
With fast-rotating mixing systems of „ploughshare“ type or Schigi type mixers with horizontal or vertical shafts, equipped with blenders, the high turbulence in the rotating mixture of ingredients determines the particle size.



# APPROACHES OF GRANULATION CONT.

## Spray Coating of Core Particles

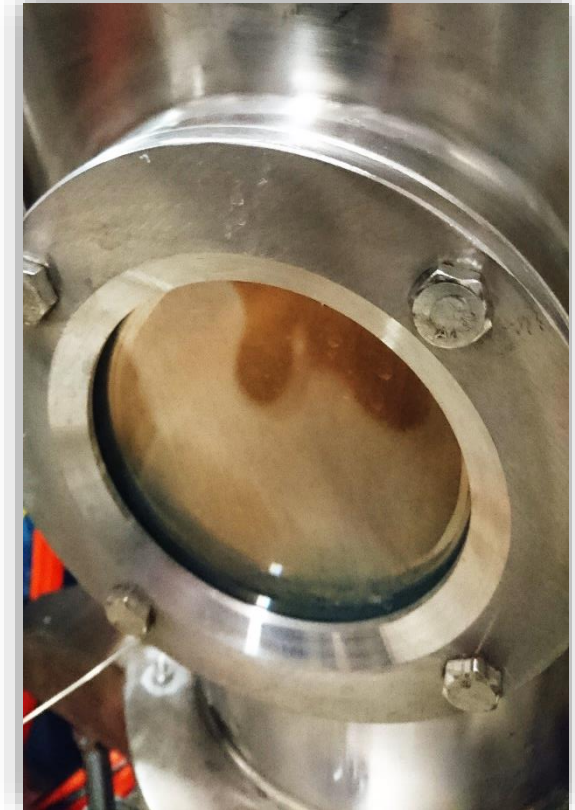
Granulation by spray coating generally refers to producing a particle by fluidizing a core material in a heated airstream to pass through an area of atomized liquid. This approach is also known as the fluidized bed dryer approach.



Granulation process based on the FBD approach

The atomized liquid droplets, which contain dissolved or suspended solids, form a film on the surface of the core material. The coated core material is then transferred from the spray zone into a drying zone. The solvent in the liquid is dried, leaving the dissolved or suspended solids as a film on the core material. This process is continued until the desired amount of film is formed.

Finally, the coated particles, which have an onion-like structure, may be screened to obtain the desired range of particles.





# APPLICATION OF GRANULATION

Granulation is used in many industrial sectors



- **Food industries:**  
Granulation of sugar, fat or oil, granules for instant-drinks, animal feed and many more
- **Chemical industries**  
Granulation of enzymes as detergents, surfactants and others
- **Pharma industries:**  
Granulation and coating of active substances and for food supplements, e.g., minerals, vitamins, amino acids and others

# APPLICATION OF GRANULATION CONT.

Granulation is a well established and far-reaching process for many industries. Although the process parameters have to be adapted to the respective application, nearly everything can be granulated.

Ensymm offers the granulation process adjusted to your industry. We can help you to granulate your product with all services you need.

## What ensymm can do for you

- **Formulation** for your specific granules
- **Analytics** concerning your product
- **Technical support** for handling and installation of your FBD
- **FBD supplier** at new acquisition



ensymm is a German based premier project consulting company for Life Sciences, serving biotech companies, pharmaceutical industry and food ingredient companies. We provide clients with a variety of business and technology consulting services as well as with specialized teams in various areas of our competence.



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