SPRAY MICRONIZATION

Micronized waxes are used in a lot of technical products, such as paints and varnishes, ceramics, cosmetics and in powder metallurgy. As additives micronized waxes are used to improve the surface properties and the feel, the scratch and abrasion resistance, the water and chemicals resistance and for gloss control.

TECHNICAL FEATURES

Micronisates are made by grinding in a jet mill or by way of spray micronization. The relevant production method has a major impact on the surface structure of the particles and thus the application properties. Spray micronization produces round particles (Fig. 1) whereas grinding produces broken irregular particles.

Advantages of round particles are a better dispersibility, a constant and uniform colour effect and a less tendency to crack in surface coatings.

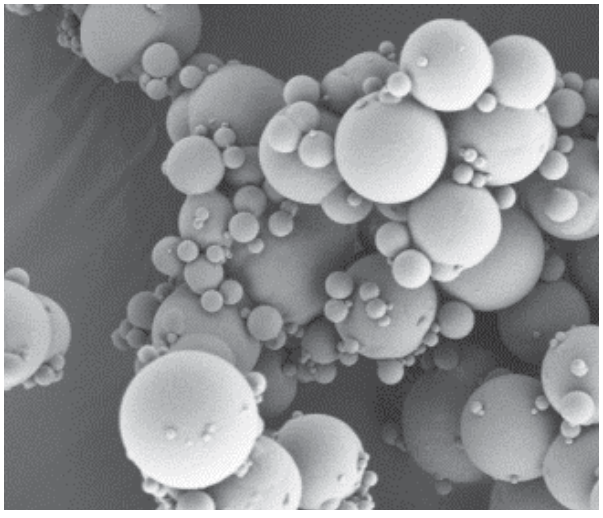

Fig. 1: Wax micronisate under the raster electron microscope (REM)

Depending on the material properties (density, viscosity and surface tension) the liquid wax is heated to process temperature, pressurized and propellant gas added before it is fed to the spray nozzles in the spray tower.

To cool down and solidify the sprayed wax particles, the spray tower is filled with cooling gas through a distributor plate. The solid wax particles are separated from the gas at the exit of the spray tower in bag filter elements and then packed and made ready for dispatch (Fig. 2).

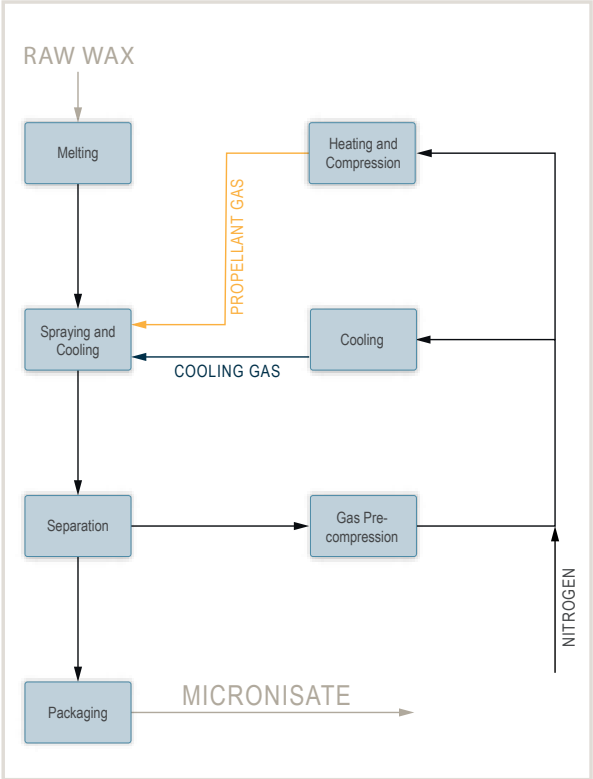

Fig. 2: Block diagram of spray micronization

To avoid any explosion hazard, nitrogen is used as fuel and cooling gas. It also prevents the waxes from changing accidentally due to oxidation.

Major steps of design are:

- Verify at lab that wax is suitable for micronization.
- Prepare an application sample for customer for the relevant waxes and determine the spectrum of grains.
- Prepare a mass and heat balance.
- CFD calculation of temperature and velocity profiles for spray tower dimensioning (Fig. 3).
- Compare calculations with test results of the pilot plant.
- Prepare a process design package and engineer and build the production plant respectively.

FEEDSTOCK

- Synthetic waxes (PE, PP, FT, stearamide wax)
- Montan waxes
- Natural waxes with softening point > 60 °C

PRODUCTS AND YIELDS

- Wax micronisates up to a d99 < 30 µm, coarser fractions possible on request
- Product yields min. 99 %

ECONOMIC EFFICIENCY

The power and consumable needs of a plant that has a performance of 300 kg/hr is:

Nitrogen (make-up), kg/kg	0.25
Compressed air, kg/kg	2.3
Electric power, kWh/kg	3.0

Commercial effects become obvious when the prices of different product qualities are compared.

The price of micronisates of PE wax made by grinding, for example, is about 138 % compared to the price of the wax used and rises to 156 % for products obtained by spray micronization.

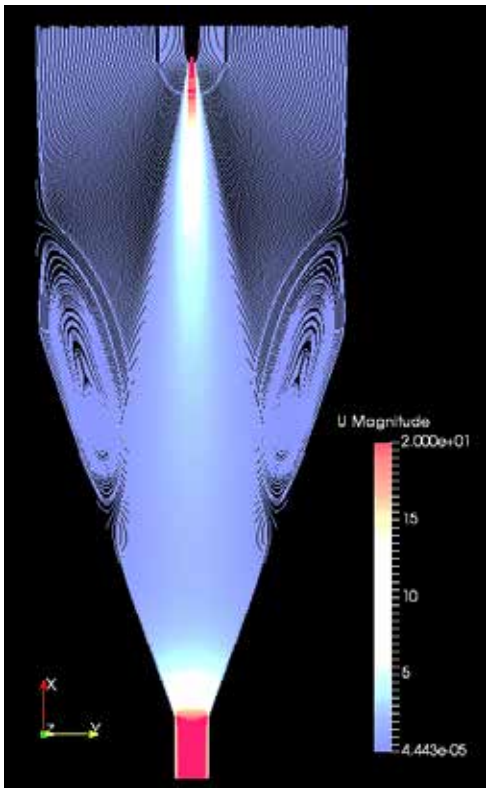

Fig. 3 Velocity profile in spray tower

BENEFITS FOR CUSTOMERS

With the labs and pilot plants available we can provide the customer during the necessary preliminary study with reference products for application tests and marketing purposes.

By comparing calculations with test results we ensure a high design security when it comes to the dimensioning of the production plant.

REFERENCES

Our solutions meet all customer requirements from precisely accurate design for the selected feedstock through to the design with high flexibility in terms of feedstock and target products.

Apart from waxes, our technology is also suitable for other feedstock with solidification points above 60 °C.

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