

# Pulverising High Performance Polymers

## Efficient Procedure for Producing Powders

High performance plastics are used more and more often as powders in processing whereby the particle size distribution is important. Often there are applications only beginning with a certain powder fineness.

The wide temperature range in which modern plastics remain flexible and cold tough makes reducing particle sizes to significantly less than 100 µm a challenge. The particles react to the applied force by deforming rather than by breaking. This applies increasingly with increasing powder fineness.

Siemens Axiva GmbH & Co. KG, Frankfurt/Main, Germany, develops non-standard procedures and also adjusts powder production machines and the operating parameters according to the application and its requirements. Depending on initial conditions one can structure a stepped powder production process flexibly in this way. Finally particle sizes of the order of 10 µm can be achieved.

Figure 1 shows density distribution and cumulative distribution curves for a PEI powder determined by laser diffraction

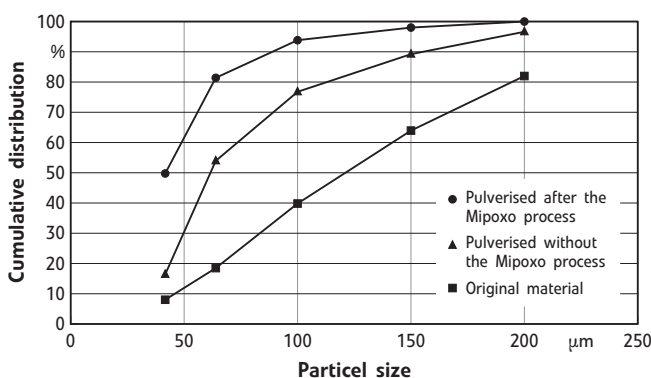
To intensify the grinding and make it more efficient Siemens Axiva developed the Mipoxo procedure (particle micronisation by surface oxidation) and filed a patent application for it. The procedure is based on the fact that the bulk materials to be powdered are treated with oxidising agents on their surfaces before or while treating them. Thus the throughput is increased and the powdering energy is reduced or particle sizes are obtained that cannot be produced without using this procedure. Special handling of the surface ensures that complete oxidation does not occur. Adjustment of the parameters for the surface treatment can be carried out at Siemens Axiva. Appropriate equipment and know-how are available for this purpose.

Particle size distributions are shown in Fig. 2 for the fine powder region up to

procedure reduces the cost of producing the powder and produces very fine materials.

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*Fig. 1. Cumulative distribution (Q3) and density distribution (q3) for finely ground polyether imides (PEI)*



*Fig. 2. Particle size distributions for UHMW-PE: Raw material, untreated, ground material or treated, ground material*

as an example of a finely ground high performance plastic. The  $x_{50,3}$ -value of 3,8 µm is clearly under 10 µm and the proportion of particles larger than 30 µm is clearly smaller than 3%.

200 µm as examples of the success of the procedure. Using the powder production procedure the proportion of powder below 100 µm could be increased from 76,8% to 93,5% and the proportion below 40 µm almost trebled from 17,1% to 49,5%.

In summary, production of fine plastic powders is possible also when it comes to high performance materials. The new

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