

- 1 Extruder in the pilot plant.
- 2 Simulation of a screw section.

SIMULATION OF CO-ROTATING TWIN-SCREW EXTRUSION PROCESSES

PROCESS OPTIMIZATION, RESOURCE EFFICIENCY, ENERGY
BALANCE, TREND ANALYSES, PROBLEM AND FAILURE ANALYSIS

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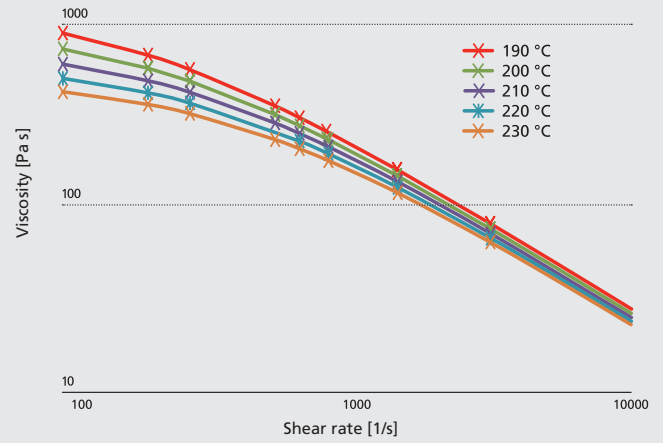
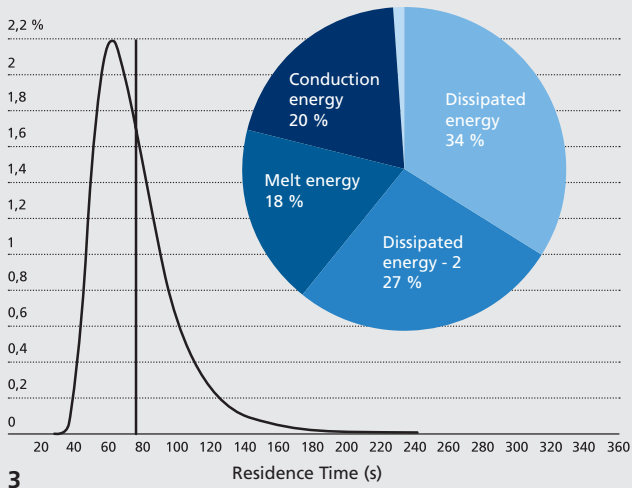
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Simulation of the extrusion process

Simulation of the extrusion process offers a range of interesting possibilities, particularly where synergies are created through real-life trials and long-standing practical experience. Simulation helps to meet current demands for continued efficiency increases while at the same time saving resources. It is consequently a key factor in reducing costs.

Process

The first stage in a successful simulation is the transfer of the entire process into a model, based on the relevant equipment geometries, extrusion parameters and the physical, thermal and rheological properties of the material used. Where all the necessary framework conditions have been defined, the model is calculated. The results generated by the simulation are then evaluated and modified until a sufficiently accurate version of the real system is created.



Application

With our know-how in the field of simulation we provide support in individual optimization tasks. Our service portfolio extends from wide-ranging trend analyses to tailored screw concepts. We provide support in the pre-optimization of twin-screw extrusion processes and can subsequently offer problem and failure analyses or energy evaluation. Where requested, the simulation results can also be compared with the results from real trials in our pilot plants. Based on the input parameters identified above, for example, the following output parameters can be determined:

- Temperature profile
- Pressure profile
- Residence time
- Viscosity profile
- Shear intensity profile
- Filling degree of each segment

Advantages of the simulation

- Deeper process understanding
- Rapid and cost-effective calculation
- Fewer trials required
- Resource and cost savings

Software and equipment

The Fraunhofer ICT uses the "Ludovic" software. This software is continuously adapted and further developed by the French institute CEMEF (MinesParis Tech) and the INRA Institute, in cooperation with Science Computer Consultants. To validate the simulation results, a modern pilot plant is available at the Fraunhofer ICT with twin-screw extruders (16-43 mm) and numerous dosing possibilities.

3 Calculated residence time and energy input.

4 Temperature-dependent viscosity profile.

