

1 KraussMaffei Berstorff-Schaumtandex ZE30/KE60.

2 SEM image of a foamed plastic.

FOAM EXTRUSION

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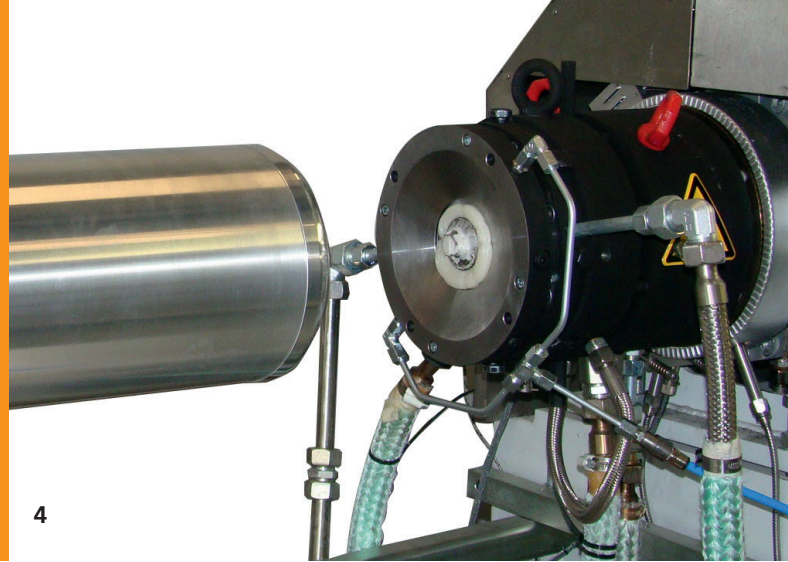
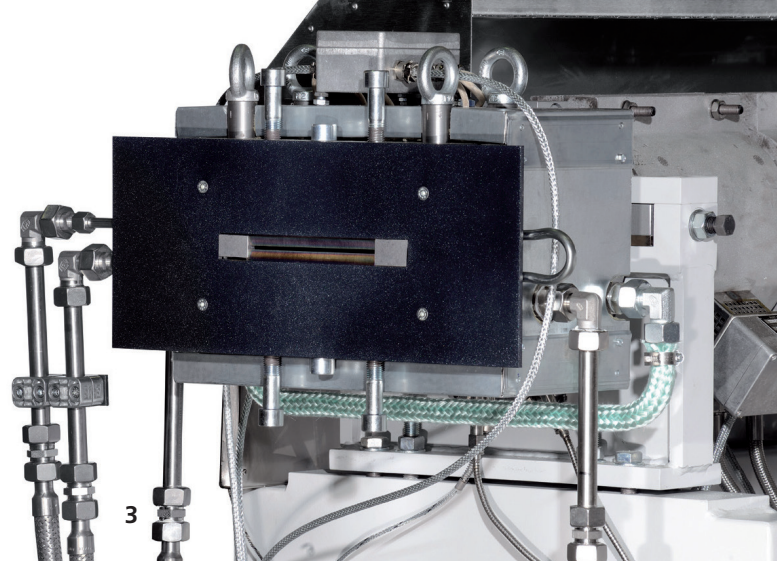
Thermoplastic foams can easily be produced as semi-finished products using a continuous extrusion process. The broad and continually widening application spectrum for parts made of extrusion foams ranges from insulation materials in the construction sector through to packaging and lightweight components.

Properties of direct-foamed semi-finished products

- High specific strength
- Very good thermal insulation properties
- High energy absorption per unit weight
- Low component thicknesses
- Homogeneous cell distribution, including at higher component thickness

Material and process development

In complex polymer foaming processes, foamed plastics often require a tailored property profile to achieve optimum results. The Fraunhofer ICT offers both the know-how and the comprehensive equipment needed for a targeted development. Flexible production technology (extruder and screw configuration) enables the further development of materials and processes in order to achieve the required results.



Processing technology

In the area of foam extrusion a wide range of equipment is available in the Fraunhofer ICT's pilot plants. Beside the Berstorff Schaumtandex ZE30/KE60, the institute has a twin-screw extruder (Leistritz Micro 27-40D) with direct foam die. A wide range of dosing units are also available for material proportioning and introduction of various blowing agents.

Schaumtandex ZE30/KE60

The KraussMaffei Berstorff Schaumtandex laboratory unit ZE30/KE60, which came into operation in 2011, is a flexible machine concept for the production of foamed semi-finished products using physical blowing agents. It comprises a twin-screw extruder as a primary extruder (plastification, additivation and gas nucleation of the polymers) and a secondary single-screw extruder for cooling and homogenizing the melt.

Parameters:

- Throughput: 30 – 60 kg/h
- Temperature: up to 350 °C
- Geometries:
 - different adjustable slit dies for sheet geometry
 - multistrand dies
 - annular die

This laboratory unit enables trials to be carried out on a pilot scale, and the knowledge obtained can be transferred into the production process. The unit also offers significant flexibility in determining suitable processing parameters for new material combinations.

Dosing of the blowing agents

Blowing agents are introduced using one of the two low-pressure dosing stations (e.g. ethanol, pentane and butane) or the high-pressure dosing station (e.g. nitrogen and carbon dioxide).

Twin-screw extruder with a direct foam die

For material and foaming trials a co-rotating twin-screw extruder (Leistritz Micro 27-40D) with a melt pump and direct foam die is available. This can be used to produce a foamed polymer strand for characterization of the foam's properties. By this means it is possible to determine the influencing variables (for example the effect of additives or processing parameters) on the foaming process. With a throughput of 3-30 kg/h the foamability of even small quantities of materials can be investigated.

Our offer

We offer numerous individual and market-oriented research services:

- Development and optimization of foam extrusion processes
- Investigation and variation of key parameters
- Processing of individual polymer combinations
 - Thermoplastic polymers such as polystyrene (PS), polypropylene (PP), polyethylene (PE)
 - Biopolymers, e.g. cellulose acetobutyrate (CAB), cellulose propionate (CP) and polylactic acid (PLA)
- Investigation of different blowing agent combinations
- Pilot-scale trials to optimize the production process
- Characterization of foam samples in terms of their mechanical, thermal and morphological properties
- Development of new production concepts for material compounds
- Individual solutions with tailored properties

3 Slot die for production of foam sheet semi-finished products.

4 Annular gap die for production of foam foils.