The broad and continually widening application spectrum for particle foam components ranges from insulation materials in the construction sector, and packaging and transport containers, through to vehicle and plant construction. Increasingly, tailored material combinations and processing technologies are required in order to meet the high demands placed on the components.

Properties of expanded particle foams

- Very good thermal insulation properties
- High energy absorption per unit weight
- Possibility to achieve low component thicknesses < 20 kg/m³
- High design flexibility in terms of product geometry
  - 3D moldability of the components / components with near net shape
  - Possibility to produce a wide range of wall thicknesses, down to thin ribs
- Homogeneous cell distribution, including at higher wall thicknesses

Material and process development

The Fraunhofer ICT uses modern processing units and machine technologies for the development of particle foams. It covers the entire processing chain on one site, from the production of beads with tailored properties and particle pre-treatment through to the production of the final component.

Researchers are working to optimize and further develop production processes for molded parts in terms of energy consumption, product quality and surface and mold technology. The development of new processing concepts for the production of compounds and hybrid structures continues to be a key activity within the research group for foam technologies.
Particle foam processing

In the area of particle foam processing, beside facilities for the pre-treatment of particles (pressure loading and prefoaming), two highly flexible technologies are available for the production of particle foam components:

Laboratory-scale steam chest molding machine
This technology, which was developed at the Fraunhofer ICT, enables the production of samples (200 x 200 x 50 mm³) with a precisely adjustable density, using even small quantities of material. This allows the weldability and mechanical properties to be investigated.

Freely-programmable steam chest molding machine (Erlenbach GmbH)
Using this modified industrial unit, pre-expanded particle foam beads can be sintered to form molded parts at vapor pressures of 8 bar. The freely-programmable process control enables the processing parameters to be adjusted to the material properties and the geometry of the molded part. Numerous molds are available for the steam chest molding machine, allowing, for example, the cavity to be filled from both sides.

Our offer

In the field of particle foam processing we offer a range of tailored and market-oriented research services.

- Process development for the production of molded parts
- Processing of tailored polymer combinations:
  - Thermoplastic polymers, e.g. polypropylene (PP), polystyrene (PS), polyethylene (PE)
  - Biopolymers, e.g. cellulose aceto-butyrate (CAB), cellulose propionate (CP) and polylactic acid (PLA)
- Multicomponent parts, e.g. expanded polypropylene (EPP) and aluminum particle foam
- Dosing technology for large particles (d = up to 8 mm)
- Investigation of weldability
- Energy-efficient production of molded parts, and measurement of energy consumption
- Integrated components / back-foaming of foils and textiles
- Integral skin technology
- Development of customer-specific mold technologies
- Tailored solutions