

Shredding and sorting

Recycling technologies at Fraunhofer ICT

The efficient use of resources is an indicator of responsible planning and action. One part of this is the recycling of materials. Whether this involves mechanical, solvent-based or chemical recycling, waste must be shredded and sorted.

Together with industrial companies, the recycling technology group at the Fraunhofer Institute for Chemical Technology ICT researches and develops the necessary processes and the corresponding plant technology.

The aims are to close material cycles, design sustainable production and achieve a positive life-cycle assessment.

The material flows are characterized with a view to the highest possible recyclability, and

methods for preparing and processing the materials are developed, tested, optimized and demonstrated on a pilot scale for specific applications. The technical equipment at Fraunhofer ICT enables reliable feasibility studies and the transfer of the test setups to industrial applications in an operational environment (TRL5).

The wide range of technical possibilities available in the pilot plant on the Fraunhofer ICT campus in Pfinztal enable research on almost every aspect of material cycles and life-cycle analysis.

The recycling technology group draws on its own expertise, experience and proven methods, as well as knowledge gained through cooperation with additional partners, to provide customers with ready-to-use processes on an industrial scale.

Contact

Pilot plant

Ansilla Bayha
Phone +49 721 4640-484
ansilla.bayha@
ict.fraunhofer.de

Group leader for recycling technologies

Dr. Ronny Hanich-Spahn
Phone +49 721 4640-586
ronny.hanich-spahn@
ict.fraunhofer.de

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code to find
out more.



www.ict.fraunhofer.de

Technical equipment

Our pilot plant has equipment for crushing viscoelastic, ductile, tough and fiber-reinforced materials and mixtures of plastics, minerals or organic materials such as wood and natural fibers.

- **Jaw crushers** (single-toggle crushers) for crushing brittle material such as minerals and material composites from fist-size down to 1.5 to 30 millimeters
- **Single-shaft shredders** with sieve inserts from 15 to 60 millimeters for (pre-)shredding of plastics; throughputs of up to several kilograms per hour
- **Granulator** with sieve inserts from 6 to 20 millimeters for electronic waste, brittle plastics, textiles and composite materials
- **Cutting mills** with sieve inserts from 1 to 50 millimeters for the dry shredding of viscoelastic, ductile, tough and fiber-reinforced materials and mixtures; throughputs from a few grams up to several kilograms per hour
- **Fine impact mills** with pendulum and pin disk grinding mechanisms and sieve inserts from 0.25 to 30 millimeters for the comminution of plastics and minerals
- **Ultracentrifuge mill** with sieve inserts from 0.08 to 6 millimeters
- **Drum wet mill** with grinding beads in various sizes
- **Agitator bead mill** with grinding beads up to 1.7 millimeters in diameter for the processing of cellulose; mill volume: 0.3 liters
- **Hammer mill** with sieve inserts from 0.25 to 30 millimeters for plastics, wood and composite materials

The pilot plant also contains extensive equipment for the sifting, sorting, classification and comprehensive characterization of materials, and for the thorough preparation of samples.

- **Hydro cyclone** for density separation of plastics and minerals in liquid media; various outlets; storage containers on the liter scale
- **Float-sink tank** for density separation of plastics and minerals in water; capacity approx. 100 liters
- **Zig-zag air separator** for material separation in an air flow based on density and geometry, to separate impurities from ground plastic materials
- **Heavy particle sorter** for material separation in an air flow based on density and geometry, to separate minerals from ground plastic materials
- **Metal separator** to separate magnetic materials, and for pre-sorting for the non-ferrous metal separator
- **Eddy current separator** to separate non-ferrous metals
- **Analytical sieve screening machine** with sieve sizes from 0.04 to 63 millimeters for sample preparation and particle size analysis; throughput approx. 50 to 200 grams per pass in batch operation
- **Pilot plant screening machine** with sieve sizes from 0.15 to 25 millimeters for continuous classification; throughput in the kilogram range
- **Riffle sample separator** for batches up to approx. 20 kilograms
- **Rotation sample separator** for batches up to approx. 1 kilogram



View of our pilot plant.