



- 1 *Comminuted compound material.*
- 2 *Annular gap ball mill.*
- 3 *Plastic railway sleeper made from secondary raw materials.*

## WASTE MANAGEMENT AND RESOURCE EFFICIENCY

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The main research focus of the project group for recycling and resource efficiency management of the Environmental Engineering Department is to develop responsible approaches in recycling. The researchers in this group have been working in the fields of recycling, sustainable production and environmental evaluation for many years. In collaboration with our partners we characterize material flows, analyze their potential highest-quality applications and identify pre-treatment and processing methods, through to their further development and the application of the results on a pilot scale. In our pilot plants we conduct feasibility studies and develop possibilities for industrial-scale implementation.

We conduct tests in the framework of research projects, but also offer our customers services at their direct request. Please feel free to contact us!

#### Pilot plant equipment

In our pilot plant we have various options for the comminution, sorting and classification of materials. With our various cutting, impact, hammer and ball mills we can comminute a wide range of materials. This can also be carried out in suspensions using stirring and annular gap ball mills. Air separators, metal separators, (hydro) cyclones, a static air oven, and sieving methods are available for classification. Our high flexibility is a major benefit, especially for initial testing or small batch sizes. Our portfolio is completed by software-assisted sieve, particle and fiber length analyses.

The following overview lists some of our technical equipment with the corresponding performance characteristics.



### Pre-comminution

- Single shaft shredder Erdwich EWZ 550
  - Comminution of non-hard material, such as plastics and wood
  - Sieve inserts: 15 – 60 mm

### Cutting mills

- Alpine Hosokawa 28/40 ROTOPLEX
  - Dry milling of viscoelastic, ductile, tough and fiber-reinforced materials and mixtures
  - Sieve inserts: 2 – 50 mm
- Alpine Hosokawa 20/12 ROTOPLEX
  - Dry milling of viscoelastic, ductile, tough and fiber-reinforced materials and mixtures
  - Sieve inserts: 2 – 20 mm
- Retsch SM 2000
  - Dry milling of viscoelastic, ductile, tough and fiber-reinforced materials and mixtures
  - Sieve inserts: 1 – 10 mm
  - Various rotors

### Impact mills

- Alpine Hosokawa 160 UPZ
  - Dry milling of brittle, tough, tough and elastic, viscoelastic and heterogeneous materials
  - Hammer shredder and pin grinder
  - Sieve inserts: 0.1 – 3 mm
- Retsch UZM 100
  - Ultracentrifuge mill for the milling of soft and semi-hard materials
  - Sieve inserts: 0.2 – 6 mm

### Hammer mill

- Alpine Hosokawa 25 MZ
  - Dry milling of brittle, tough, tough and elastic, viscoelastic and heterogeneous materials
  - Sieve inserts: 0.25 – 30 mm

### Ball mills

- Welte drum wet mill WN30D
  - Dry and wet milling of brittle, tough, and tough and elastic materials
- Annular gap ball mill COSMO II
  - Comminution / dispersion of very small particles and production of nanoparticle suspensions

### Sorting

- Hydro cyclone
  - Density separation in fluids
  - Adjustable setup, including flat-floor geometry for the separation of emulsions and solid particles in suspensions
- Bückmann Zig Zag air separator ZN 15 / 80 x 120
  - Density separation / drying process
- TrennSo static air oven TTS 200
  - Density separation / drying process
- Quicktron metal separator O3 R
  - Separation of magnetic metals
- S+S non-ferrous metal separator SNF
  - Separation of non-magnetic metals from mixtures of substances by using induction

### Classification

- Mogensen screening machine SZ 0254
  - Sieve inserts: 0.15 – 25 mm
- Retsch analysis screening machine type AS 200 control 'g'
  - Sieve sizes: 0.063 – 22.4 mm
  - Evaluation software EasySieve

### Sample preparation

- Riffle sample separator for the separation of larger sample quantities
- Rotation sample separator Retsch PT 100 for smaller sample quantities

### Photo-optical particle analysis

- HAVER CPA 2 Conveyor
  - Particle analysis, especially for elongated particles
  - Measurement range: 36 µm – 45 mm
- Sympatec QICPIC
  - Particle size and shape analysis
  - Measurement range: 1 µm – 30 mm
  - Various dispersion systems

### Further measurement and testing devices

- Trickle hopper
  - Measurement of the pourability of plastics in powder or pellet form
- Settlement test stand
  - Testing of the settlement behavior of loose insulation material
- Tamping volumeter
  - Measurement of the volumes before and after tamping; measurement of compression and compacted bulk density