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1 *Fraunhofer expertise for sorting the heterogeneous building rubble in order to produce homogeneous construction products and secondary raw materials.*

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2 *Small heterogeneous particle mixture before sorting.*

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BAUCYCLE FROM FINE-GRAINED DEMOLITION RUBBLE TO FUNCTIONAL BUILDING MATERIALS AND COMPONENTS

The construction industry is one of the most resource-intensive economic sectors in Germany due to the production and processing of mineral products. No other industry causes a higher waste volume. At the same time, only about 5 percent of the material is suitable for high-quality recycling on the product level. Most of the construction demolition is partly reused as subgrade in the field of road and dump construction or goes directly to landfills as a result of the downcycling. Due to the ongoing discussions on the framework ordinance of the German Government, which regulates the use of mineral replacement construction materials in technical buildings, the situation is becoming increasingly topical. The ordinance already has noticeable consequences: mineral waste, which has been used to date as a replacement construction material, is increasingly being deposited in landfills. In particular for the fine fraction (i.e. <2 mm), there are no high-quality processing paths.

Our goals

The Fraunhofer in-house research project "BauCycle" aims at converting heterogeneous building rubble back into homogeneous construction products. Within the project, potential economic applications are being developed for the non-usable fine fractions of mineral construction waste in combination with an innovative logistics approach. The Fraunhofer institutes involved therefore set themselves the following goals in the business areas of "Product Development", "Marketing" and "Sorting Technology":

- Development of recyclates and secondary raw materials for building construction from the fine fraction of demolition rubble
- Development of a new sorting technology based on optical computing for material separation according to chemism and color for an optimal material separation
- Creation of genuine raw material cycles through an innovative logistical platform

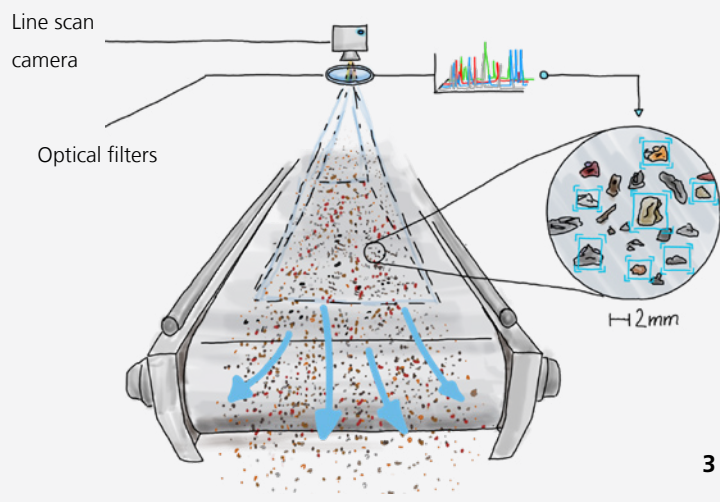
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Our challenges

The challenges lie both in the field of processing and analysis, as well as in the marketing and production of recycled products. Due to the heterogeneity of the materials and the technical and safety-related challenges associated with the fine-grained material flow, the industry requires novel sorting procedures, logistics concepts and product innovations which go far beyond the current technological level.

- Which components of the fine fraction can be reused as raw materials in which processes and products?
- How accurate is the sorting technology required for the material separation?
- Can the fine fraction be recycled as secondary raw material under economic and environmental requirements?
- Can quantity and quality be secured?

Our approach

For the first time, the BauCycle approach takes into account all elements of value creation in order to establish genuine raw material cycles. The Fraunhofer project consortium wants to produce high-quality, quality-assured and certified products from material, which now have virtually no negative market value and in the future possibly even a negative market value.

- Three following tasks have to be solved concurrently, since this is the only way for the system to function economically:
- Development of a sorting process which is able to sort the demolition rubble according to chemical criteria, e.g. "sulphatic", "siliceous" or "calclitic" rubble
 - Manufacturing of aggregates, granulates, bonding agents, and functional components made of fine-grained demolition materials
 - IT-supported systems solutions for controlling the material flow in a prospective dynamic network

Your benefit

This project aims at developing a holistic technological and logistical solution for the circular economy in the building industry. In cooperation with the industry, we are striving to establish new routes for the recycling of building materials in the construction sector. No matter for which stakeholder of the construction industry – BauCycle provides added value for every business area:

- Increased value-adding capacity from the Germany's largest waste stream
- Reduction of the amounts of waste
- Increasing the resource efficiency of building products
- Optimization of the building logistics
- Conservation of primary raw materials
- New sales markets for construction products and services

3 Optical Computing for sorting the building rubble fraction.

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4 Planting substrates for facade greening from 80 percent building rubble

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5 Autoclave aerated concrete made of brick (rear); autoclave aerated concrete made of sand-lime stones (front).

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Please contact us if you want to benefit from our Fraunhofer know-how in the future!

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