TECHNISCHE UNIVERSITÄT DRESDEN

Endowed Chair of Construction Machinery

Faculty of Mechanical Science and Engineering Institute of Mechatronic Engineering

EIT for building construction

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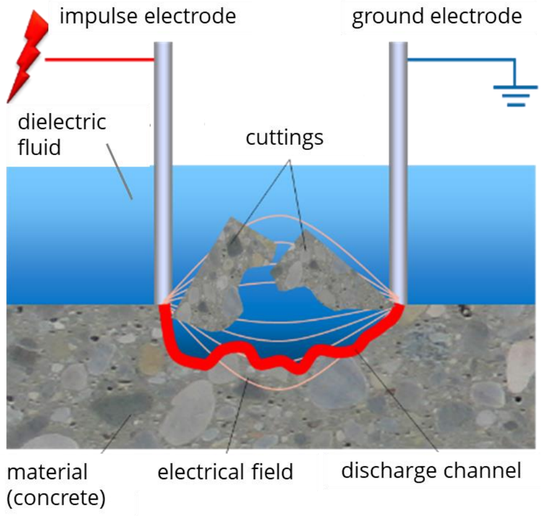
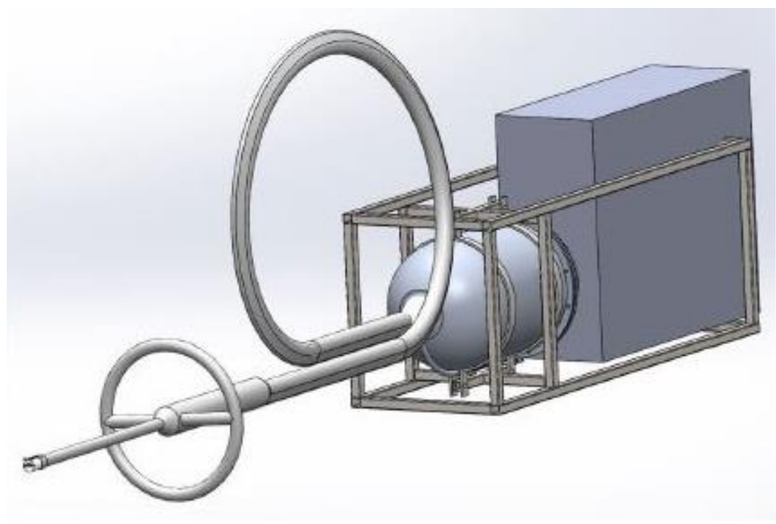
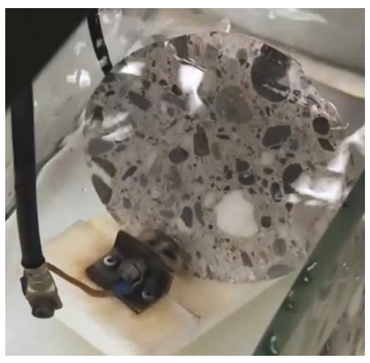
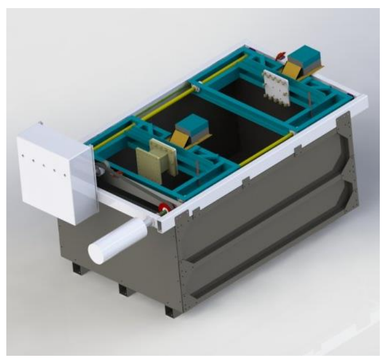




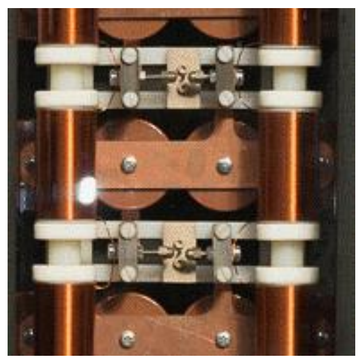


single test with concrete

long time test with concrete



experimental setup



technology development

Motivation

Construction work on existing buildings has a considerable share of the total construction volume of 60 % and continues to gain in importance. Incorrect planning, rescheduling or construction defects also result in a considerable amount of subsequent work in the new building.
The dismantling processes used today are characterized by high emissions (noise, vibration, dust), large amounts of blasting abrasives, slow performance or considerable physical effort. Occurring vibrations damage the building structure to be preserved. Health problems for construction workers and occupational safety issues are a challenge.
The Electric Impulse Technology (EIT) is an alternative to the conventional processes. This enables the material to be demolished almost without emissions.

Methods

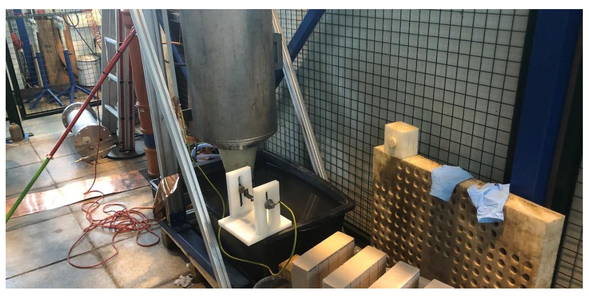
The EIT is based on the destruction of solid mineral, mostly heterogeneous materials by high voltage impulses. The impulses generate high tensile stresses in the structure. The tensile strength of concrete is ten times less than its compressive strength. So, it can be removed with significantly less energy.
Since previous research has mainly dealt with hard stone, such as granite, the EIT should initially be adapted to building materials such as concrete. Due to the lower strength, lower energies are required to loosen the building material.
This adjustment takes place after a large number of individual tests in which various parameters, such as electrode spacing or geometry, are varied. The goal is to find a parameter combination suitable for building materials.

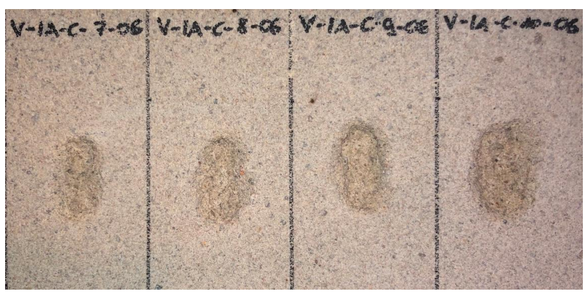
Goals

On the basis of the individual tests mentioned, the basics for the gradual transfer of the EIT from deep drilling technology to building construction, civil engineering are laid. These are:

- defining the requirements from a construction perspective,
- analyzing the economic potential of the technology and its specific boundary conditions,
- Investigating the electrical material characteristics of common building materials for generator design
- set up a demonstrator for construction-equivalent processes of tool guidance and demonstrating the necessary execution quality and performance,
- analyzing the EIT technology from the perspective of occupational physiology and safety,

All results are merged and concepts for EIT rebuilding devices will be developed.





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