

Diploma Thesis

Properties

Title: Influence of replacement level of recycled aggregates on concrete properties

Organizational Unit: E207 Institute of Material Technology, Building Physics, and Building Ecology

Main advisor: Ildiko Merta

Co-advisor:

Offered languages: English, German

Keywords: Recycled aggregate, optimization, sustainable concrete

Subject area: Civil Engineering, Materials Sciences

Targeted fields of study: Civil Engineering, Materials Sciences

Description

Background:

At the Faculty of Civil and Environmental Engineering, Institute for Materials Technology, Building Physics and Building Ecology, an opportunity for a Master's thesis topic has been announced. This thesis will contribute to an innovative Austrian industrial research project focusing on recycled aggregate concrete. The Master's thesis is part of the collaborative research project "UP!crete – Performance of Recycled Concrete in Upcycling," involving more than 20 stakeholders from the construction industry (concrete manufacturers, construction waste processors, recycling plant manufacturers, testing institutes, etc.) and significant interest groups (associations, state organizations) within the construction sector.

Master Thesis:

The CO₂ emission levels have been increasing dramatically over the past few decades, with the effects now clearly visible. The construction industry is known to be responsible for a substantial portion of CO₂ emissions. Recently, there has been an investigation into making concrete

production more sustainable through the use of recycled aggregate concrete. Aiming for higher aggregate replacement ratios is essential to enhance positive environmental impacts. The ÖNORM B 4710-1 standard prescribes limits for various types of recycled aggregates at different replacement ratios. However, given the advancements in knowledge and technology related to producing recycled aggregates, these limits may be deemed conservative. This thesis proposes to investigate both the prescribed limits and the potential for exceeding these limits in replacement ratios, thereby scrutinizing the adequacy of current standards. The study will cover an examination of three different classes of concrete (B2, B3, and B7), focusing on determining their fresh and hardened properties. Also, CO₂ emissions for all casted concretes will be determined to explore environmental benefits.

Your Responsibilities:

- Conducting literature reviews.
- Casting concrete with and without recycled aggregate.
- Investigating the impact of various levels of substitution of natural aggregate with recycled aggregate on concrete performance
- Optimizing concrete mixture designs incorporating recycled aggregate.
- Collaborating with PhD students in the laboratory.
- Analyzing findings and sharing results in conferences or journals.

Location & Duration:

The experimental component of the thesis will be conducted at the laboratory in the OC Building, Lilienthalgasse 14, 1030. The expected duration of the thesis is 6 months.

Starting Date:

As soon as possible.

Required Qualifications and Experience:

- Strong enthusiasm for engaging in laboratory investigations.
- Ability to use academic databases for research.
- Basic knowledge of concrete materials.

For more information, please contact: ildiko.merta@tuwien.ac.at