

Master thesis

Applicability of fastenings in modern sustainable concretes



With about 10 billion tons of concrete produced every year, it is the most consumed substance in the world, second only to water. It is also the world's most widely used material for construction - from bridges to dams and buildings, concrete forms the very foundation of our built environment: more than 70% of the world's population lives in a concrete structure. However, concrete requires the consumption of vital natural resources and it is one of the most active contributors to greenhouse gas emissions. This leads to an urgent need for the construction industry to adopt and introduce environmentally friendly materials, in order to fulfil national, European, and global requirements to decelerate and if possible revert the climate change.

For this objective, engineering science and the cement and concrete production industry are developing sustainable solutions to deliver concrete materials requiring fewer resources, lower processing temperatures, lower emissions and an overall improved carbon footprint. However, it is so far not clear, if and how new concrete types can reflect the structural assessments by current design codes and standards, or if these also need to be modified.

This thesis will address the design and overall performance of fastenings in advanced and sustainable concrete materials produced with various recipes. Besides a literature-based analysis, laboratory tests will be carried out in order to produce the knowledge required to respond to this acute problem.