The EnDurCrete project

New Environmental friendly and Durable conCrete, integrating industrial by-products and hybrid systems, for civil, industrial and offshore applications

MAIN GOAL

By integrating industrial by-products and hybrid systems, EnDurCrete will develop a new environmentally-friendly and durable concrete for harsh environmental applications using new typs of eco-friendly Portland composite cements.

Concrete based on ordinary Portland cement has been for many years the principal structural material for building durable construction. Current state-of-the-art concrete types based on Portland cement with very high substitution by supplementary cementitious materials tend to fall behind in terms of performance and durability, which is particularly critical when applied in harsh environmental conditions. Moreover, cement production process is responisbile itself of almost ten percent of the worlds's man made CO_2 emission. Therefore, projects aimed at improving formulations and production methods to reduce CO_2 emissions, energy demand and material consumption from cement and concrete manufacturing represent key topics on the agenda of both the European construction industry and the European Commission. One of such projects is the EnDurCrete project sponsored by the EU Research and Innovation Programme Horizon 2020 and led by HeidelbergCement AG.

The EnDurCrete project aims to develop a new cost-efficient, sustainable reinforced concrete for long-lasting and added-value applications. The concept is based on the integration of novel and optimised low-clinker cement, new nano- and micro-technologies and hybrid systems ensuring enhanced durability of concrete structures with high mechanical properties, self-healing and self-monitoring capacities.

The EnDurCrete project involves 16 European partners, including industry leaders in the fields of cement and concrete production, construction companies, chemical admixture producers, universities and technological research institutes as well as service providers. The research faces several topics, from the development of new ecological low-clinker cements, innovative corrosion inhibitors, conductive fillers/fibers enhancing self-sensing capabilities of concrete, special reinforcement and self-healing solutions to the testing of durability in laboratory and on large-scale demonstrations in real environment conditions. Data collected during the testing will be further used as an input for the modelling of concrete performance and development of service life prediction models. Furthermore, the knowledge and experience gathered by the project is supporting the preparation of novel standards for more eco-friendly cements and concretes.

Following the concrete development stage, full-scale demonstrators will be cast and placed in working sites of tunnels, ports, bridges and offshore structures, to prove the enhanced durability and the improved long-term cost efficiency of the new concrete structures in such critical applications. However, EnDurCrete is not only about developing concrete but also about pushing forward test methods and analysis tools. Advanced non-destructive continuous monitoring and testing tools and procedures will be developed and used, including technologies tuned for providing concrete with self-sensing capabilities. They are intended to complement the conventional durability testing procedures in laboratories.

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