DEMOSITE

Demonstrators will be tested in exposure sites of tunnels, ports, and offshore structures, in order to prove the enhanced durability and decreased cost of the new concrete systems in such critical applications. To bring these innovations to the market, aspects such as standardization, life cycle assessments, health and safety and training activities will be addressed.

1 / Port of Gijón “El Musel” in Spain

2 / Mining tunnel facility in Leon, Spain

3 / Ship Yard in Norway

4 / Krk Bridge in Croatia

PARTNERS

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endurcrete

New **En**vironmental friendly and **Dur**able con**Crete**, integrating industrial by-products and hybrid systems, for civil, industrial and offshore applications

The main goal of EnDurCrete Project is to develop a new cost-effective sustainable reinforced concrete for long lasting and added value applications.

CONCEPT

The concept is based on the integration of novel low-clinker cement including high-value industrial by-products, new nano-technologies and hybrid systems ensuring enhanced durability of sustainable concrete structures with high mechanical properties, self-healing and self-monitoring capacities.

ENDURCRETE CONCEPT IS BASED ON THE FOLLOWING NOVEL TECHNOLOGIES AND TOOLS:

→ Novel cement, by including sustainable, high-quality supplementary cementitious materials.

→ New multifunctional coatings enabling concrete **self-healing properties** based on resin microencapsulation and protecting both concrete and rebar from aggressive agents.

→ New smart fillers based on nano-modified clays, for **anti-corrosion** properties and based on micro carbon-based materials for **mechanical and self-sensing properties**. The structural self-sensing properties will be complemented with environmental sensors casted in concrete.

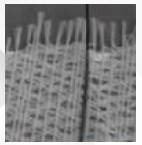
→ Concrete non-metallic multifunctional reinforcing systems, based on technical textiles integrated with optical-fibre sensors, enabling both **structural reinforcement** and continuous **structural health monitoring**. The systems will be optimised aiming at a proper trade-off between productivity, robustness, and concrete reinforcement adhesion.

→ Advanced non-destructive continuous monitoring and testing tools and procedures, including technologies tuned for the self-sensing concrete systems and innovative nonintrusive inspection methods (e.g. vision-based).

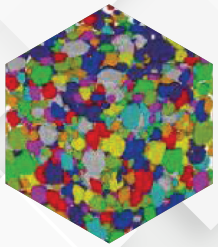
→ Coupled experimental and computational approach for theoretical and experimental understanding of **factors affecting durability** including modelling and simulations. The combined experimental and computational approach will enable **long-term durability assessment** and resulting service life prediction of the target infrastructures exposed to severe environment.

Sustainable durable cement

Self-healing and self-monitoring fillers and coatings

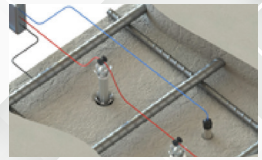


Sensorized non-metallic reinforcing system



Durability modelling, testing, monitoring and standardization

Demonstration of pre-cast and ready-mix concrete prototypes in hash environments



OVERALL APPROACH

→ Test functionality of new concrete technologies under severe operating conditions (4 demo-sites)

→ Develop experimental and numerical tools to understand factors affecting the durability and to capture the multiscale evolution of damage

→ Develop models for service life prediction

EXPECTED IMPACT

→ Positive LCA balance

→ Strengthening competitiveness of the European industry, including in the field of “green” technologies

→ At least 30% improved durability

→ At least 30% lower cost