

# WORKSHOP ON CORROSION OF STEEL IN CONCRETE

17-18, September 2018

University of Aveiro, Portugal

Monday, September 17

Corrosion of steel rebars is a major cause of the deterioration and limited service life of reinforced concrete structures. The high alkalinity of concrete provides the ideal environment for protecting embedded steel, by passivating it. However, carbonation and chloride ingress disrupt the passive layer on steel, triggering its corrosion. The voluminous corrosion products generate internal stresses, leading to cracking and spalling of concrete and, ultimately, to the early failure of the structure.

This Workshop is organized in the frame of the European project LORCENIS. It is intended to be an open forum to discuss corrosion of steel in concrete from the basic concepts to the state-of-the-art measurement and prevention techniques. It is also an opportunity to partners present the results obtained in the ambit of the project.

8h30 - Registration.

9h00 - Welcome and introduction.

9h10 - **Corrosion of steel.** (Alexandre Bastos, University of Aveiro).

Thermodynamics, electrochemical reactions, kinetics, corrosion environments, passivity, methods of corrosion control.

9h55 - **Corrosion of steel reinforcement in concrete.** (Maria Cruz Alonso, CSIC).

Physics and chemistry of concrete, passivation of steel in concrete, transport in concrete, corrosion in presence of chloride and carbonated concrete, stress corrosion cracking.

10h40 - Coffee-break.

11h00 - **Corrosion testing in reinforced concrete.** (Alexandre Bastos and Maria Cruz Alonso).

Theoretical introduction to the practical labs in the afternoon, requirements for suitable tests.

12h30 - Lunch.

14h00 - **Laboratory and field testing methods for reinforcing steel.**

Methods to assess the corrosion of steel in concrete. In laboratory (UAVR, CSIC) and in the field (CSIC, RISE). Electrochemical techniques and methods to test steel in solution and in concrete.

15h30 - Coffee-break.

16h00 - **Laboratory and field measurement of transport in mortar and concrete.**

Methods to characterise concrete: Cl<sup>-</sup> content, pH, dissolved O<sub>2</sub>, conductivity, permeability, in the lab and in the field (RISE). Electrochemical and optical sensors (UAVR).

Tuesday, September 18

9h00 - **Influence of supplementary cementitious materials (SCMs) on corrosion of rebars in concrete.** (Harald Justnes, SINTEF).

9h30 - **Corrosion protection of reinforcements in concrete by corrosion inhibitors.** (Maria Cruz Alonso, CSIC).

10h00 - **Corrosion inhibition in LORCENIS.** (Frederico Maia, Smallmatek).

10h30 - Coffee-break.

11h00 - **Chloride transport in concrete: test methods and threshold values.** (Nelson Silva, RISE).

12h00 - **Field measurements of corrosion rates.** (Dimitrios Boubitsas, RISE).

13h00 - Lunch.

14h00 - **Modelling corrosion of steel in concrete. Past, present and future.** (Josko Ozbolt, University of Stuttgart).

15h00 - **The modelling approach in LORCENIS. Chloride ingress as a multiscale problem.** (Daniel Hoeche and Zahid Mir, HZG).

15h45 - Coffee-break.

16h15 - **Assessment of corrosion-damaged structures. Uncertainties and service life considerations.** (Miguel Prieto, RISE).

17h15 - **Steel reinforced concrete in perspective.** (Urs Mueller, RISE).

18h00 - Closure.

LORCENIS Consortium



## Registration

To register send an e-mail to Alexandre Bastos (acbastos@ua.pt) with your name, Institution and stating which days you wish to attend: day 1, day 2 or days 1+2. (Labs of first day afternoon limited to 20).