technische universität dortmund

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Design of long term performance of fastening systems

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Abstract

The necessity of connecting different structural elements, the assemblage of precast elements, and the attachment of non-load bearing components, makes fastening technology a key technology in modern construction. The safe design of fastening systems requires an accurate understanding of all time-dependent phenomena that may lead to damage or even failure during its service life of typically 50 years. Generally, safety and serviceability requirements are ensured through rigorous experimental testing during the approval phase. In the case of time-dependent phenomena or, more specifically, the behavior under sustained load the common practice of directly testing all critical service conditions is not feasible. The long-term response can only be approximated e.g. by short-term structural system tests that are extrapolated to the full life-time utilizing empirical models as required by current guidelines.

This lecture focuses on the design of fastening systems in concrete structures with regard to sustained load. An overview of the common approach, provided by the standards, of the long term performance assessment of the fasteners is given. Advantages and disadvantages of this approach are discussed. Furthermore, alternative approaches regarding the long term design of fastening systems under sustained load are provided. These include, both numerical and testing methods, and additionally consistent methods of analyzing the test results. The advantages and the limitations of the aforementioned methods are also discussed.

Ioannis Boumakis is research associate in Christian Doppler Laboratory (CDL), in University of Natural Resources and Life Sciences (BOKU) of Vienna. His education includes a master degree in Computational Physics from AUTH University of Thessaloniki, and he is currently completing his Phd research with main focus the long-term behaviour of fastening systems under sustained loads. He is an experienced researcher for durability and service life design of fastening systems. His main research areas cover multi-physics and multi-scale numerical simulation of time dependent deformation and fracture of fastening systems, both in material and in structural system level, testing of time dependent failure and deformability of fastening systems under sustained loads, and develop optimal testing methods and analyses for the assessment of the life-cycle of fastening systems.

Friday 24.01.2020

17.00 – 20.00

Fakultätsraum GB II

Campus Süd

Information:

Chair of Fastening Engineering / Befestigungstechnik

Faculty of Architecture and Civil Engineering

Jun.-Prof. Dr. Dipl. Dipl. Ing. Panagiotis Spyridis