Report on 'A practical engineering guide on adjustable fixing solutions'

by Ir. Chong Chee Meng

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The Civil and Structural Engineering Technical Division (CSETD) organized a webinar talk on 'A practical engineering guide on adjustable fixing solutions' on 9th July 2021 via Go To Webinar platform. The speaker was Mr. Stefan Lammert who studied civil engineering at the Bauhaus University in Weimar, Germany. After working for several years as a design engineer, Stefan joined HALFEN in 2004. Due to his work for HALFEN's engineering support, he has gained a wealth of specialist knowledge in fixing systems, precast concrete (PC) connections as well as PC lifting technologies

This talk, attended by 86 participants, was moderated by Ir. Yasotta Chetty, committee member of CSETD. The participants included engineers from engineering consulting companies, contracting firms, government agencies and local authorities as well as faculty members from local institutions of higher learning.

Mr. Lammert started his talk by introducing 2 types of fasteners i.e. cast-in place systems and post-installed systems. Cast-in place systems consist of anchor channels, weld plates, threaded inserts, etc while post-installed systems consist of power-actuated fasteners, mechanical anchors and bond anchors. Fasteners normally use for structural and non structural connections. The parameters governing the design of fasteners are - applied loading, design life, maintenance intervals, environmental factors, anchoring base, attachment configuration, required adjustability, service temperature and complexity of installation. Mr. Lammert clarified that the environmental factors that affect corrosion are humidity, temperature, salt, contact to other metals, industry pollution and time of exposure.

After the brief introduction on fasteners, Mr. Lammert proceeded to explain on the load transfer mechanism of fasteners. Fasteners can transfer the load by mechanical interlock, friction grip and adhesive bonding. He shared some product examples that transfer load via mechanical interlock, friction grip and adhesive bonding. Mr. Lammert reiterated that when designing fastening, the anchoring base can be cracked or non-cracked concrete and reminded participants cracked concrete always to be anticipated in tension zone of reinforced concrete members. Mr. Lammert further recommended that if the designer is unsure about the condition of concrete, it should be considered cracked. The designer should also check suitability of anchor in assessment and use reduced capacities for all connections that are constructed in cracked concrete.

After that, Mr. Lammert moved on to explain on the overhead fixing of fasteners. The creep behaviour under sustained tension on overhead fasteners is influenced by material, load level, duration of loading, temperature during installation and service and installation method. Mr. Lammert also shared some top reasons why the overhead fasteners fail. They are - incorrect selection of fasteners, incorrect installation, overloading, failure to follow instructions for use (IFU)

modification by other trades, insufficient supervision, structural vibration causing failure and substitution of specified products. He clarified that fasteners have to provide sufficient adjustability to bridge the usual construction tolerances between the components to be connected.

For his last part, Mr. Lammert shared with the participants what needs to be observed for post-installed anchors. Supervisors need to observe the drilling method, drilling equipment, drill hole depth and diameter and drill hole cleaning. At the end of the talk, there were questions raised by the audience to which Mr. Lammert answered and clarified in more details.

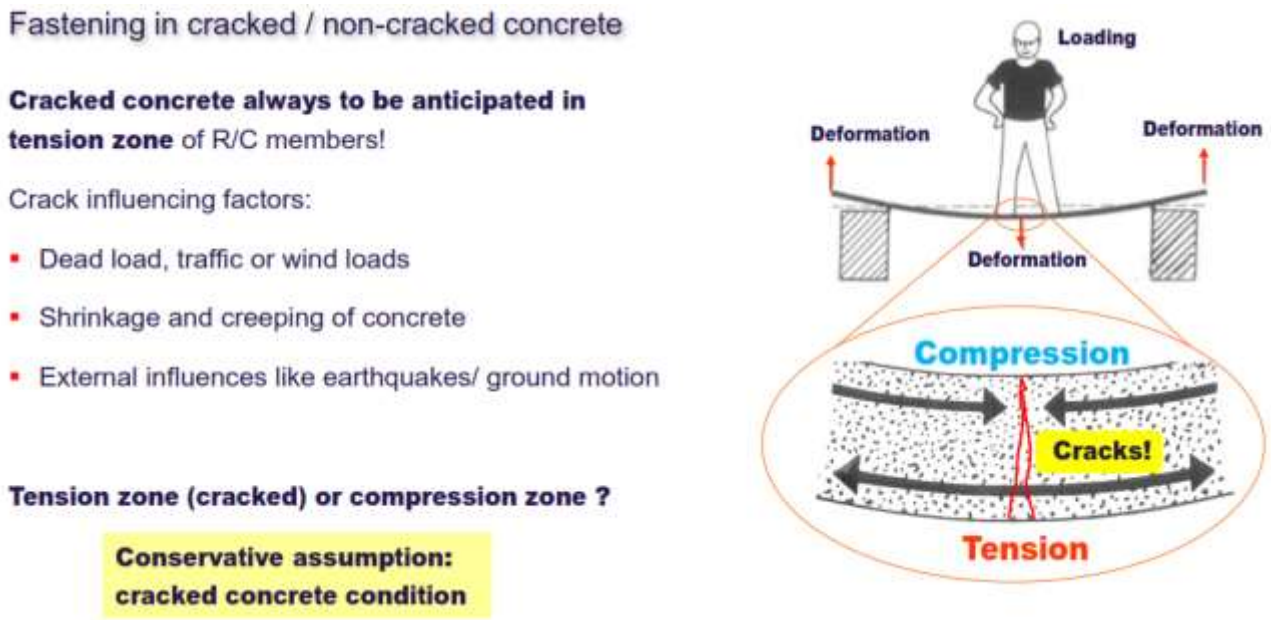

Figure 1 : One of the presentation slides