Design of Anchorages in Concrete Construction and their Role in Structural Strengthening

July 22nd to Aug 1st, 2019

Overview

Anchorages using embedded plates with the cast in headed studs, anchor channels or post-installed mechanical or adhesive anchors are extensively used in the construction industry to connect non-structural or structural components to the parent concrete structures. The typical usage of such anchorages includes connecting the equipment, piping, and machinery, structural bracing, structural strengthening, facades, etc. The fulfillment of the desired objectives of the systems connected using such anchorage is largely dependent on the behavior of anchors. A good fastening includes the right selection of anchor type for given loading scenario, proper design, and correct installation. Using an anchor not suitable for an application not only might render the anchorage useless but also may lead to devastating results due to anchorage failure. Specifically, the designer must consider the behavior of anchorages in conditions of cracked concrete as well as under demanding loading scenarios such as seismic loads, high temperature, long term loads, etc. Therefore, a designer must be equipped with the appropriate knowledge about the selection, design methods and installation procedure for the anchors to produce safe and reliable connections. Over the past few decades, a significant amount of research work has been done on the behavior of anchorages which has led to the development of the international codes and standards for the design of anchorages. A big majority of this work has been performed at the Institute of Construction Materials, University of Stuttgart.

This course will provide a detailed coverage on the type of anchors available and their behavior under different conditions, qualification and assessment criteria for the anchors, design rules for anchorages according to international standards, behavior and design of post-installed reinforcing bars, seismic behavior and design of anchorages as well as application of anchorages in strengthening of existing structures. It will also cover the recent advances in the field of anchorages such as anchorages with supplementary reinforcement, anchorages in special concrete (e.g., steel fiber reinforced concrete), anchorages under impact loads, as well as advanced numerical modeling concepts for anchorages. It also aims to demonstrate the correct installation procedure for different types of anchorages and train the practitioners on the right selection and design of anchorages for different loading conditions. The fundamentals taught in this course will be augmented by the laboratory experiments on anchorages to give hands-on experience to the designers and practitioners about the real behavior of anchorages. This course will be taught by internationally acclaimed academics, researchers and fastening industry specialists. The course will be planned and offered as per the norms set by IIT Hyderabad.

Dr. Akanshu Sharma, Professor, University of Stuttgart, Germany

Dr. Akanshu Sharma is currently working as a Junior Professor at the Institute of Construction Materials, University of Stuttgart. University of Stuttgart is the world leader in the field of anchorage technology, and Prof. Sharma is working extensively on the field of innovative strengthening solutions with fastenings. His research interests include Seismic assessment and strengthening of RC frame structures; Anchorage in concrete construction; Fire performance of RC structures; Impact behavior of RC structures etc. He has authored more than 120 research papers. He is the technical secretary for the fib TG 2.9 (Fastenings to structural concrete and masonry) committee, a member of fib TG 2.5 (Bond and material models) and a member of the German national committee for the design of concrete structures under fire loads. He is a reviewer for several international journals. Earlier, he worked as a Scientific officer at Bhabha Atomic Research Centre, Mumbai from 2004 to 2013. During this time, he received the fellowship for Indo-German collaborative project through which he pursued his Ph.D. at the University of Stuttgart and was awarded the doctorate with honors.
**Course Dates**

July 22nd to Aug 1st, 2019, Number of participants for the course will be limited to fifty.

### Modules

- Module 1: Introduction to anchorage in concrete construction
- Module 2: Behavior and design of anchors under tension loads
- Module 3: Behavior and design of anchors under shear loads
- Module 4: Anchorages with supplementary reinforcement
- Module 5: Behavior and design of anchors under inclined loads
- Module 6: Seismic behavior, qualification, and design of anchors
- Module 7: Design of anchorages for the strengthening of structures
- Module 8: Anchorages in special concretes and under special loads
- Module 9: Examination, Certificate Distribution, and Feed-Back Session

### You Should Attend If...

- Executives, engineers, and researchers from the construction industry such as design offices, contractors, engineers from various state and central government laboratories.
- Student students at all levels (BTech/MSc/MTech/Ph.D.), research scholars, faculty from reputed academic institutions and technical institutions.

### Fees

The participation fees for taking the course is as follows:

- Participants from abroad: US $500
- Industry/ Research Organizations: Rs. 20,000 (Including 18%GST)
- Academic Institutions: Rs. 16,000 (Including 18%GST)
- Graduate Students/ Research Scholars: Rs. 2000
- Students from India belonging to the reservation category (SC/ST): 1000 INR
- No fee for IIT Hyderabad Students

The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges. The participants will be provided with accommodation on payment basis. Additional fee of Rs. 5000 shall be paid for lunch and refreshments offered during the course.

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**Course Coordinator:**

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Course link: [https://www.iith.ac.in/~gian/GIAN-CIVIL_ACCS/index.html](https://www.iith.ac.in/~gian/GIAN-CIVIL_ACCS/index.html)