

Post-Tensioning Design and Construction

1 - 3 April 2020

3 April 2020 (Optional hands-on workshop)



Course Director

Dr Bijan O. Aalami

Professor Emeritus of San Francisco State University

Purpose and Background

The course provides the know-how and tools for the efficient and economical design of post-tensioned building structures, using the latest practice and building code provisions. Starting with a brief presentation of the expanded and diverse application of post-tensioning in building construction, the course explains the parameters and means of achieving economical solutions in post-tensioning designs. Step by step design procedures are explained through a long-hand numerical example with code reference at each step. Next, the course provides a thorough review and demonstration of the two prevailing software approaches used to design post-tensioned projects – 2D strip method and 3D Finite Element Method. The pros and cons of each modeling method are discussed and applied to sample single-level and complete building projects.

Emerging trends in Building Information Modeling are presented using a recently constructed case study. The underlying reasons and preference in selection of post-tensioned floors in high seismic or wind regions will be explained in detail. The course will address the vibration evaluation and design of ever more emerging open space floor designs of often thin slabs supported on non-orthogonal supports for aspirational support layouts. Delegates will learn about practical construction detailing considerations such as restraint crack mitigation and practical tendon layout options. Those attending the optional third-day workshop will benefit from hands on training on the latest software tool in design of post-tensioned multi-story or single floors.

Learning Objectives

This programme will include:

- * Current post-tensioning systems and construction practice in buildings and parking structures
- * Means of saving and Economic advantages of post-tensioning in building construction
- * Basic knowledge required for efficient design of post-tensioned floor systems
- * ACI and EC2 codes; interpretation and application to design of post-tensioned buildings
- * Critical comments on immediate and long-term deflection of post-tensioned floors
- * Steps to follow in long-hand design of post-tensioned floors
- * Support restraints to shortening of post-tensioned floors; consequences and mitigation
- * Evaluation of concrete floors for vibration and vibration control
- * Design of post-tensioned floors for wind and earthquake forces
- * Application of 2D strip and 3D Finite Element Method- based software in design of post-tensioned buildings
- * Critical case study of design of a prominent post-tensioned multi-story building
- * Understanding of trends in Building Information Modeling related to post-tensioning
- * Hands on software and design training workshop

Course Benefits

Course attendees will receive comprehensive course notes and reference material including detailed design examples, as well as a copy of the “must have” book on Post-Tensioned Buildings, Design and Construction by Dr Bijan Aalami, valued at 120 Euros.

- * Find out about the latest and inspiring applications of post-tensioning in building construction systems, its construction practice
- * Learn how and where savings can be achieved in design and construction of post-tensioned buildings
- * Understand the complex requirements and application of EC2 and ACI in design of post-tensioned buildings
- * Acquire the basic post-tensioning concepts you need to know for your designs; and have the option to go beyond to excel
- * Evaluate the vibration acceptability and design of ever more emerging large span, thinner and inspirational designs
- * Gain insight into why post-tensioned floors are specifically used in high seismic risk regions and how to design them
- * Identify the causes of cracking and learn the engineering methods used in their mitigation
- * Recognize and mitigate the potential construction problems in tendon layout at construction
- * Attend the workshop to learn the latest software-based design approach for post-tensioned structures



Content

Day 1: 1 April 2020

- * Post-Tensioning Systems and Applications in Building Construction; Novel and Traditional Applications
- * Savings and Economics of Post-Tensioning in Building Construction
- * What you need to know to design a modern post-tensioned floor
- * Applying ACI and EC2 to practical design of post-tensioned buildings
- * The 10-steps to follow in design of post-tensioned floors
- * Expeditious design of post-tensioned floors, using 2D strip method
- * Practical steps in evaluation and design of RC and PT floors for vibration

Day 2: 2 April 2020

- * Shortening of post-tensioned floors and its impact on the floor's response
- * Practical measures for crack control and mitigating the adverse effects of restraints
- * Application of 3D Finite Element Method to design of post-tensioned multi-story buildings
- * Design review of a high profile multistory building – case study
- * Trends in Building Information Modeling related to post-tensioning – case study
- * Design of post-tensioned floor systems for seismic and wind forces
- * Post-tensioning fundamentals to excel beyond the basics
- * Construction detailing; modeling and layout of post-tensioned tendons

Day 3: 3 April 2020 (Optional Hands-On Computer Application)

- * Hands on training in design of post-tensioned buildings
- * Working on your own laptop, using the latest 3D FEM version of ADAPT program
- * Learn tips and tricks for the efficient modeling and design of post-tensioned slabs
- * Starting with architect's drawing, participants will be guided through the design process to conclude with the construction and fabrication drawings
- * Each participant will receive a trial version of ADAPT software

Workshop Benefits:

- * Obtain hands-on experience and exposure to the efficient design of post-tensioned buildings
- * Become closely familiar with the latest design tools and methods
- * Receive detailed information, literature and design examples of common post-tensioned buildings

Who Should Attend?

- * Structural engineers engaged in concrete and/or post-tensioning design
- * Engineers wishing to engage in design or construction of post-tensioning
- * Contractors interested in the economics, design and construction of post-tensioned buildings
- * Engineers responsible for the review of post-tensioned designs
- * Academics and students interested in post-tensioning concepts and design
- * Building officials and city plan checkers
- * Engineers charged with retrofit of post-tensioned buildings
- * Forensic engineers dealing with evaluation and retrofit of post-tensioned buildings



Presenters



DR. BIJAN O. AALAMI

A Life Member of ASCE, is Professor Emeritus of San Francisco State University, Chartered Engineer, Legend, Fellow and Life Member of the Post-Tensioning Institute; and Founder and Principal of ADAPT Corporation - a structural engineering and concrete software development company in California, serving clients in over 70 countries. He is ACI recipient of the Design Award for application of advanced engineering to a notable concrete structure. He has published extensively on analysis and design of post-tensioned structures. A renowned educationalist, he has held courses on design of structural concrete and post-tensioning in over 35 countries worldwide. He is honorary member of the Argentine Structural Engineering Association, former Vice Chancellor and Professor at Arya Mehr (now Sharif) University.



DR. FLORIAN B. AALAMI

CEO of ADAPT Corporation, a structural engineering and software development company, specializing in analysis and design of concrete structures with extensive national and international activities. He is the winner of 2012 ACI Charles S. Whitney Medal for software used to design concrete structures. He received his PhD from Stanford University. He is an active member of the PTI DC-110 Building Information Modeling (BIM) Committee.

Participating Organisations

Organisations that have been represented on previous courses include:

- * Buro Happold * WSP Buildings * Bovis Lend Lease Ltd * ODIN Consulting Engineers Ltd
- * JSA Consulting Engineers * CTT Stronghold * Atkins * Robinson Consulting Ltd
- * FaberMaunsell * Finnmap Consulting * JLE Eng * Halcrow * Campbell Reith
- * Jacobs GIBB Ltd * Nolan Associates * Alan Baxter & Associates * Cameron Taylor Bedford
- * Appleby Group Ltd * Arab Enterprise * Esteyco * Elliott Wood Partnership * Skanska
- * Bunyan Meyer & Partners Ltd * Clarke Nicholls & Marcel * Gyoury Self Partnership * MLM
- * BBR * VSL * Freyssinet * MC4

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