



Prestressed and Post-Tensioned Concrete

Course: PT Slab Design, Stressing and Grouting



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Introduction:

Prestressed and post-tensioned concrete, covering PT slab design, stressing and grouting, is the subject of this 5-day course for structural design, site engineering and inspection staff, ending with a PT Slab Design Check and Stressing Plan. Organisations that build with tendons often lose margin through underestimated prestress losses, congested anchorage zones, unexplained elongation variances, voided ducts and strands cut during later drilling. Nominees already design, supervise or inspect concrete structures, and the course is taught through a modelling build of tendon forces, losses and stressing records. CoreConcept Training Center delivers this prestressed and post-tensioned concrete course.

Course Objectives:

- Select strand, anchorage, duct and concrete transfer strength requirements for pretensioned and post-tensioned elements
- Calculate immediate and time-dependent prestress losses and set effective tendon forces for design
- Design PT flat slabs and transfer beams by load balancing, with serviceability stress and ultimate strength checks to ACI 318 and Eurocode 2
- Detail tendon profiles, layout drawings and anchorage zone reinforcement that can be installed and stressed on site
- Supervise stressing, elongation recording, duct grouting and unbonded tendon protection, and investigate out-of-tolerance results
- Assess tendon defects and control drilling and repair work in existing post-tensioned slabs

Target Audience:

- Structural design staff responsible for prestressed and post-tensioned floor slabs, beams and transfer structures
 - Site engineering staff who supervise tendon installation, stressing and grouting on building and infrastructure projects
 - Inspection and quality staff who witness stressing, review elongation records and accept grouted ducts
 - Checking engineers who review PT shop drawings, calculations and stressing submittals
 - Facility engineering staff who plan alterations, coring and drilling in existing post-tensioned slabs
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Course Outline:

Day 1: Prestressing Principles, Materials and System Selection

- Prestressing Force Eccentricity and Stress Distribution Fundamentals
- Seven-Wire Strand Relaxation Class and Tensile Properties
- Anchorage Hardware Wedge Plates, Live Ends and Dead Ends
- Duct and Sheathing Types for Bonded and Unbonded Tendons
- Pretensioned Versus Post-Tensioned Systems and Concrete Transfer Strength

Day 2: Design Basis, Prestress Losses and Load Balancing

- ACI 318 and Eurocode 2 Prestressed Member Design Provisions
- Immediate Losses From Friction, Wobble, Anchor Set and Elastic Shortening
- Time-Dependent Losses From Creep, Shrinkage and Strand Relaxation
- Load Balancing Method and Equivalent Upward Tendon Forces
- Allowable Concrete Stresses at Transfer and Service Stages

Day 3: PT Flat Slab and Transfer Beam Design and Tendon Layout

- Equivalent Frame Strips for Two-Way PT Flat Slab Analysis
- Parabolic Tendon Profile Geometry, Drape and Inflection Points
- Banded and Distributed Tendon Layout Drawings With Chair Heights
- Ultimate Flexure, Punching Shear and Minimum Bonded Reinforcement Checks
- Transfer Beam Staged Prestressing Under Progressive Column Loads

Day 4: Anchorage Zones, Precast Pretensioning, Site Stressing and Tendon Defects

- Anchorage Zone Bursting and Spalling Reinforcement Design
- Pretensioned Hollowcore Planks and Precast Beam Transfer Length Checks
- Stressing Records With Jack Calibration and Elongation Tolerance Review
- Duct Grouting Vents, Void Prevention and Unbonded Sheathing Protection
- Tendon Defects, Slab Drilling Scans and Cut Strand Repair

Day 5: Modelling Build of a Case PT Slab Design Check and Stressing Plan

- Case PT Car Park Slab Brief and Loading Data Review
 - Modelling Build of Prestress Losses and Balanced Load Spreadsheet
 - Serviceability Stress and Punching Shear Verification for Case Slab
 - Stressing Sequence, Target Elongations and Grouting Hold Point Schedule
 - PT Slab Design Check and Stressing Plan Completion
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Skills You Will Gain:

- Prestress Loss Estimation
- Load Balancing Analysis
- PT Slab Punching Shear Verification
- Tendon Profile Detailing
- Anchorage Zone Reinforcement
- Elongation Variance Investigation
- Duct Grouting Supervision
- Tendon Location Scanning

Why Attend This Course:

- Deliver a PT Slab Design Check and Stressing Plan to the project structural lead or engineer of record for approval
- Decide whether a measured elongation variance is acceptable, needs re-stressing or requires a design review
- Avoid cut tendons, voided ducts and anchorage zone cracking that delay handover and trigger remedial work
- Share stressing record templates, drilling permit checks and tendon layout review lists with site and design colleagues

Conclusion:

Once back at work, the participant gives the structural lead and site team a PT Slab Design Check and Stressing Plan that records effective tendon forces, balanced loads, serviceability and ultimate checks, tendon layout, stressing sequence, target elongations and grouting hold points. Designers use it to confirm a slab before shop drawings are released, and site staff use it to accept or query each stressing record. After the first pour is stressed, the team should compare measured elongations and losses with the assumptions recorded in the plan.

Frequently Asked Questions FAQ:

What should participants know before the prestressed and post-tensioned concrete course?

Participants should already design, supervise or inspect reinforced concrete work and read structural drawings. Familiarity with limit state design and spreadsheet calculations helps. Prior hands-on stressing experience is useful but not required, because tendon force, loss and elongation calculations are built step by step.

How does the prestressed and post-tensioned concrete course differ from a reinforced concrete design course?

It centres on tendon forces: prestress losses, load balancing, tendon profiles, anchorage zones, stressing and grouting. A general reinforced concrete design course covers beams, columns, foundations and detailing with passive reinforcement, which this course revisits only where bonded bars supplement tendons.

When do designers choose post-tensioned slabs in prestressed and post-tensioned concrete construction?

Designers choose post-tensioned slabs when long spans, thin floors, reduced deflection or crack control matter, as in car parks, offices and transfer levels. Tendons balance part of the load, cutting slab depth and reinforcement, but later openings and drilling need more planning.

What does a participant take back from the prestressed and post-tensioned concrete course?

Each participant takes back a PT Slab Design Check and Stressing Plan for a case slab, with loss calculations, balanced load checks, serviceability and punching verification, tendon layout notes, a stressing sequence, target elongations and grouting hold points.
