Prestressed Concrete Design Training Course

Professional Development Training Course Outline

Category	Construction Institute	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Prestressed Concrete Design is an advanced structural engineering discipline that combines high-performance concrete technology, structural optimization, durability engineering, and modern construction techniques to create efficient and resilient infrastructure systems. Prestressed Concrete Design Training Course is designed to equip professionals with practical knowledge of prestressed concrete structures, post-tensioning systems, pre-tensioning methods, structural analysis, design codes, and advanced computational techniques. The program focuses on current industry practices, including bridge engineering, high-rise construction, long-span structures, sustainable infrastructure development, and digital structural design workflows.

With increasing demand for smart infrastructure, sustainable construction, resilient structures, and cost-effective engineering solutions, expertise in prestressed concrete design has become essential for modern civil engineers. This training provides hands-on learning through real-world case studies, design calculations, software applications, and international engineering standards, enabling participants to confidently develop safe, economical, and innovative prestressed concrete solutions for complex engineering projects.

Programme Curriculum

Prestressed Concrete Design Training Course

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Course Objectives

1. Understand the fundamentals of prestressed concrete technology and structural engineering principles.
2. Develop advanced skills in pre-tensioning and post-tensioning system design.
3. Apply international standards including ACI, Eurocode, and AASHTO prestressed concrete design provisions.
4. Perform prestress losses analysis and long-term structural performance evaluation.
5. Design efficient prestressed concrete beams, slabs, bridges, and structural members.
6. Analyze serviceability, strength, fatigue, and durability requirements.
7. Apply advanced concepts in structural optimization and performance-based design.
8. Understand modern post-tensioning materials, anchorage systems, and construction techniques.
9. Develop expertise in finite element modeling and structural analysis software applications.
10. Evaluate crack control, deflection behavior, and stress distribution in prestressed members.
11. Integrate sustainable construction principles and low-carbon concrete technologies.
12. Improve project decision-making through engineering risk assessment and quality control strategies.
13. Gain practical knowledge for delivering innovative infrastructure and next-generation structural solutions.

Target Audience

1. Civil and Structural Engineers
2. Bridge Design Engineers
3. Construction Project Managers
4. Structural Design Consultants
5. Infrastructure Development Professionals
6. Engineering Graduates and Researchers
7. Contractors and Site Engineers
8. Government and Public Infrastructure Authorities

Course Modules

Module 1: Fundamentals of Prestressed Concrete Engineering

- Principles of prestressed concrete behavior and structural mechanics
- Evolution of prestressing technology in modern construction
- Advantages of prestressed systems compared with conventional reinforced concrete
- Types of prestressing methods
- Applications in bridges, buildings, offshore structures, and infrastructure projects

- Case Study: Long-span bridge projects demonstrating the efficiency of prestressed concrete in reducing material usage and improving structural performance.

Module 2: Prestressing Materials and Construction Systems

- Properties of high-strength concrete and prestressing steel
- Tendon systems, ducts, anchors, and grouting technologies
- Modern post-tensioning equipment and installation methods
- Quality assurance and construction monitoring practices
- Latest innovations in smart materials and durable concrete solutions
- Case Study: Application of advanced post-tensioning systems in major transportation infrastructure projects.

Module 3: Prestressed Concrete Analysis and Design Principles

- Structural analysis of prestressed concrete members
- Stress calculations and load balancing concepts
- Design of prestressed beams and slabs
- Serviceability and ultimate limit state evaluation
- Application of international design standards
- **Case Study:** Design evaluation of a prestressed concrete building floor system using performance-based engineering principles.

Module 4: Prestress Losses and Long-Term Performance

- Immediate and time-dependent prestress losses
- Creep, shrinkage, and relaxation effects
- Deflection prediction and structural monitoring
- Durability assessment of prestressed structures
- Life-cycle performance optimization
- **Case Study:** Investigation of long-term behavior of prestressed bridge girders exposed to environmental conditions.

Module 5: Prestressed Concrete Bridge Design

- Bridge girder systems and structural configurations
- Design concepts for box girders and segmental bridges
- Load analysis and construction sequence planning
- Bridge deck design and durability considerations
- Advanced bridge engineering techniques
- **Case Study:** Segmental prestressed concrete bridge construction using balanced cantilever methods.

Module 6: Advanced Computational Design and Software Applications

- Structural modeling using modern engineering software
- Finite element analysis of prestressed structures
- Digital workflows and BIM integration
- Automated design optimization techniques
- Interpretation of software-generated structural results
- **Case Study:** Computer-based analysis of a prestressed concrete structure using advanced simulation methods.

Module 7: Construction Management, Safety, and Quality Control

- Prestressing execution procedures and site practices
- Inspection methods for tendons and anchorages
- Construction risk management strategies
- Safety requirements during stressing operations
- Quality assurance for long-term structural reliability
- **Case Study:** Quality control challenges and solutions during large-scale prestressed concrete construction.

Module 8: Future Trends in Prestressed Concrete Engineering

- Sustainable and low-carbon prestressed concrete technologies
- Artificial intelligence applications in structural design
- Smart sensors and structural health monitoring systems
- Advanced composite materials and hybrid structures
- Future developments in resilient infrastructure
- **Case Study:** Smart bridge monitoring systems using digital technologies for predictive maintenance.

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

Ready to enroll or request a customized program? Book online or contact us:

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