3D Structural Analysis and Design for Structural Steel Building Training Course

Professional Development Training Course Outline

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

Course Introduction

This comprehensive training course provides engineers with the essential knowledge and practical skills needed for the **3D structural analysis** and **design of steel buildings**. The curriculum is centered on modern **structural engineering principles**, advanced **finite element analysis (FEA)**, and the application of industry-leading **structural design software** like STAAD.Pro, ETABS, and Tekla. Participants will learn to model complex structures, apply various load conditions, and perform **code-compliant** checks to ensure the **structural integrity**, safety, and **economic viability** of their designs. This program is an indispensable resource for professionals seeking to master the intricacies of steel structures, from **conceptual design** to **detailed engineering**, and to stay competitive in the rapidly evolving **AEC (Architecture, Engineering, and Construction)** industry.

3D Structural Analysis and Design for Structural Steel Building Training Course is meticulously crafted to bridge the gap between theoretical knowledge and real-world application. Through a hands-on, project-based approach, trainees will work on practical exercises and real-life **case studies** covering **multi-story buildings**, industrial sheds, and specialized structures. The focus is on developing a deep understanding of structural behavior, including topics like **seismic analysis**, **wind load design**, and **steel connection design**. By completing this training, professionals will not only gain proficiency in **3D modeling** and analysis but also enhance their ability to create **optimized**, **efficient**, and **sustainable** steel structures that meet international and local **building codes**.

Programme Curriculum

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Course Duration

5 days

Course Objectives

1. Master 3D structural analysis and finite element modeling for steel buildings.
2. Gain proficiency in using structural analysis software
3. Understand load application and load combinations as per international building codes
4. Perform seismic analysis and wind load design for tall and complex structures.
5. Design and verify various steel members, including beams, columns, and trusses.
6. Specialize in steel connection design for both bolted and welded connections.
7. Conduct advanced analysis for stability, buckling, and P-delta effects.
8. Optimize steel designs for material efficiency and cost reduction.
9. Learn to interpret and post-process results from structural analysis.
10. Generate detailed structural reports and documentation.
11. Apply building information modeling (BIM) principles in a structural workflow.
12. Ensure all designs meet safety standards and are code-compliant.
13. Develop a portfolio of real-world case studies and completed projects.

Organizational Benefits

- Reduces design cycles and manual errors through automation and precise 3D modeling.
- Leads to safer, more reliable, and durable structures by identifying potential flaws early.
- Optimizes material usage and minimizes construction rework and delays.
- Ensures designs are aligned with the latest international and local building codes, reducing legal and regulatory risks.
- Builds an expert in-house team capable of handling complex, high-value steel projects.
- Facilitates seamless coordination between structural, architectural, and MEP teams.

Target Audience

- Civil & Structural Engineers
- Graduate Engineers
- Engineering Consultants
- Project Managers
- Design & Drafting Professionals
- Architects
- Construction Professionals
- Academic Researchers

Course Modules

Module 1: Fundamentals of Structural Analysis & Steel Behavior

- Introduction to **structural systems** and **3D modeling**.
- Properties of steel and its behavior under various loads.
- Review of essential **mechanics of materials** concepts.
- Understanding different **load types** (dead, live, wind, seismic).
- **Case Study: Analysis of a Simple Steel Truss Bridge** - This case study will walk participants through the manual calculation of forces and moments in a truss bridge before applying software to validate the results.

Module 2: 3D Structural Modeling with Software

- Navigating the software interface (e.g., STAAD.Pro, ETABS).
- Creating a **structural model** using nodes, beams, and plates.
- Defining member properties, sections, and material assignments.
- Applying supports, boundary conditions, and load cases.
- Introduction to advanced **meshing techniques** for accurate analysis.

Module 3: Code-Compliant Load Generation & Combination

- Applying **gravity loads** (dead and live loads) according to building codes.
- Automated wind load generation based on building geometry.
- Understanding and generating **seismic loads** using static and dynamic methods.
- Creating and managing **load combinations** for various design scenarios.
- **Case Study: Seismic Design of a High-Rise Steel Building** - Participants will apply seismic loads to a multi-story building model, perform dynamic analysis, and interpret results to ensure code compliance.

Module 4: Design of Steel Members

- Design of **compression members** (columns) for axial loads and buckling.
- Design of **flexural members** (beams) for bending and shear.
- Design of **tension members** and their effective areas.
- Verification of member capacity against applied loads and internal forces.
- Introduction to **plate girder design**.

Module 5: Steel Connection Design

- Principles of **bolted connections**, including shear and tension capacity.
- Design of **welded connections** and weld strength calculations.
- Designing beam-to-column and beam-to-beam connections.
- Design of base plates for columns.

- **Case Study: Design of a Complex Moment Connection** - Trainees will design a challenging moment connection between a beam and column, considering eccentric loads and potential failure modes.

Module 6: Advanced Structural Analysis Techniques

- **P-delta analysis** for slender structures.
- Lateral-torsional buckling and bracing design.
- Introduction to **response spectrum analysis** for earthquake loads.
- Performing **buckling analysis** and identifying failure modes.
- Troubleshooting common modeling and analysis errors.

Module 7: Foundations & Detailing

- **Foundation design** principles for steel buildings.
- Interaction between superstructure and substructure.
- Generating **engineering drawings** and detailed plans.
- Principles of **BIM integration** for seamless workflows.
- Understanding fabrication and erection requirements.

Module 8: Final Project & Industry Best Practices

- Comprehensive **design project** covering a complete steel building.
- Optimization for **cost and efficiency**.
- Creating a final report and documentation.
- Review of current industry trends and **emerging technologies**.
- **Case Study: Design of an Industrial Warehouse** - The capstone project involves the complete design, analysis, and detailing of an industrial warehouse, from initial loads to final drawings.

Training Methodology

This course employs a dynamic, blended learning approach to ensure maximum engagement and knowledge retention. The methodology includes:

- Instructor-Led Sessions.
- Hands-On Workshops.
- Real-World Case Studies.
- Project-Based Learning.
- Q&A and Group Discussions.
- Continuous Assessment.

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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