

# Structural Steel Building

## 3D Structural Analysis and Design

### Introduction

For civil engineers working in oil and gas, power plants, water treatment plants and residential projects, this 3D Structural Analysis and Design of Structural Steel Buildings training course is essential. By attending this course, participants will acquire advanced understanding in structural engineering, including the foundations of steel structure design, the behaviour of materials under load, and the analysis and application of structural principles.

Sample illustrations of actual structures will be provided in this training session to help designers comprehend StaadPro and apply it to various building kinds. We will talk about many approaches to StaadPro data modification. Examples of various systems, such space frames, will be given, ranging from the standard two-dimensional beams and frames to the three-dimensional multistorey frames. To guarantee everyone's complete involvement and understanding, the teacher will begin the course from the beginning.

### **This training session on Course N Carry will emphasise:**

- Three-dimensional modelling for various structural kinds
- Structural Analysis using StaadPro.
- Using loads and load combinations in accordance with ASCE, UBC, and IBC
- Understanding of StaadPro Post Processing Results
- AISC-recommended steel design (ASD/LRFD)
- Making a BOQ list using the StaadPro programme.

### Objectives

- Recognising how structural members behave under load.
- Acquiring knowledge of applying design loads in accordance with American standards
- Examine how members have deformed while under strain.
- Recognise the importance of material qualities in design.
- Perform the fundamental design of steel structures.
- Quantity Survey

### Training Methodology

A range of tried-and-true adult learning strategies will be used in this Civil & Construction Engineering training course to guarantee optimal acquisition, retention, and understanding of the material covered. Case studies and pertinent examples are given to show how each of the subjects is used.

## Organizational impacts

- Recognising best practices
- Appropriate techniques for building analytical three-dimensional models.
- Calculating loading and load combinations and applying them to analytical models
- Results after post-processing and reading.
- Implementing economical design
- Managing alterations in design

## Personal Impact

**Participant will comprehend the following:**

- Designing the ideal geometry for an industry.
- Structural system types
- Applying seismic, wind, and gravity stresses on buildings in accordance with recommended practices.
- Techniques for analysis and their use.
- Utilising load-resistance factor design and permissible stress design techniques.
- Creating the bill of materials for the planned building

## Who should attend?

Professionals in the civil engineering field who are curious in structural design. Since students' backgrounds may differ, the teacher will begin with the fundamentals and progress to more in-depth information and real-world applications.

**Though a broad variety of professions may benefit from this training, the following will be especially noted:**

- Engineers in Structural Design
- Civil engineers employed in the oil and gas industry.
- Civil engineers employed in the energy and power industries.
- Civil engineers in wastewater and water treatment facilities
- Steel Fabricators
- Engineers in Construction.

## Course Outline

# Day 1

## Overview of Principles of Structural Engineering

- Overview of the Finite Element Technique
- An Overview of a Few Multipurpose Finite Element Computer Packages That Are Available and Are Used in the Design Market
- Overview of StaadPro, V8i
- Various Analytical Techniques
- Organisational Structure
- Segmental Properties
- Deformation and Deflection
- Finding the Stress Functions for Shear, Bending, and Direct Stresses

# Day 2

## Structural Analysis

- Using StaadPro, V8i to Create a New File
- Identification of the Menu bar, Tool bar, Title bar, modes, etc. on the StaadPro, V8i, Screen
- Handling an Already-Existing File
- Geometry
- Comprehending StaadPro. V8i Method
- Specifying Beams, Plates, and Nodes
- Organisation of the Input File
- Creating Geometry with the Structure Wizard
- Constructing Geometry using Drafting
- Creating Geometry using Copy / Cut / Paste
- Making Geometry using Spreadsheets
- Creating Geometry using ACAD 3D DXF Importing

# Day 3

## Design Theories

- Examination of Continuous Two-dimensional Beams
- Loads Impacting Elements of Beams
- Example,
- Examining Two-Dimensional Trusses and Frames
- Frames Affected by Loads
- Operational Stress Framework

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### • Design of Limit States

## Day 4

### Following Processing

- Examining Three-Dimensional Trusses and Frames
- Loads Impacting Trusses and Frames
- Plate Elements Analysis (slabs, flat slabs)
- The Impact of Loads on Plate Elements
- Calculating Wind and Seismic Loading using IBC-03 and ASCE7-02
- Manually Assigning Staad Loads
- Staad Tutorial Automatic Loading for Slab, Wind, and Moving Loads
- Structural Analysis of Generations Creating Load

## Day 5

### Steel structure design process and exporting BOQs

- Composition & Qualities
- Beam Design
- Structure of Columns and Struts
- Tension Member Design
- Truss design
- Plan of Constructed Areas
- Design of Limit States
- Results of Post-Processing and Reading
- The entire calculation sheet and MTO for the design of the steel and concrete sections are issued.