

# 3D Structural Analysis and Design for Structural Steel Building

## INTRODUCTION

- This 3D Structural Analysis and Design of Structural Steel Buildings Training Seminar is a must for civil engineers working in Oil & Gas, Power plants, water treatment plants and residential projects. Participants of this workshop will gain advanced knowledge of structural engineering that includes principles of structures analysis and their application, behavior of materials under loading, selection of construction materials and design fundamentals for steel structures.
- This training course will provide sample illustration of real structures that will assist the designer to understand StaadPro and apply it on different types of buildings. Different types of editing data to StaadPro will be discussed. The examples to be used would vary from the typical two-dimensional beams and frames to the three-dimensional multistory frames to special systems such as space frames. Throughout the course, the instructor shall start from the basics to ensure the full participation and comprehension of all attendants.

This training seminar will highlight:

- Three-dimensional modelling for different types of structures
- StaadPro Structural Analysis
- Applying Loads & Load combinations as per IBC / UBC / ASCE
- StaadPro Post processing results understanding
- Steel design as per AISC [ASD / LRFD]
- Creating BOQ list from StaadPro software

## OBJECTIVES

- Understanding the behavior of structural members under loading
- Learning how to apply design loads as per American codes of standard
- Analyze deformation of members under loading
- Understand the significance of material properties in design
- Undertake basic design of Steel Structures
- Quantity Survey

## **TRAINING METHODOLOGY**

- This Civil & Construction Engineering training seminar will utilize a variety of proven adult learning techniques to ensure maximum understanding, comprehension and retention of the information presented. Relevant examples and case studies are provided to illustrate the application of each of the topics covered.

## **ORGANISATIONAL IMPACT**

- Understanding codes of practice
- Correct methods to create analytical three-dimensional models
- Loading and load combinations calculations & application on analytical models
- Post processing and reading results
- Doing cost-effective design
- Handling design changes

## **PERSONAL IMPACT**

Participant will have an understanding on:

- Creating optimum geometry to suit industry purpose
- Types of structural systems
- Applying gravity, wind and seismic loads to structures as per codes of practice
- Analysis methods and application
- Design using allowable stress design and load-resistance factor design methods
- Preparing bill of quantities for the designed structure

## **WHO SHOULD ATTEND?**

- Civil engineers with interest in learning about structural design. As backgrounds may vary the instructor will start from the basics and work his way towards more details and to practical applications.

This training course is suitable to a wide range of professionals but will greatly benefit:

- Design Structural Engineers
- Civil Engineers working in Oil & Gas field
- Civil Engineers working in Power plants & Energy field
- Civil Engineers working in Water / Waste water treatment plants
- Steel Fabricators
- Construction Engineers

## Course Outline

### Introduction to Structural Engineering Principles

- Introduction to Finite Element Method
- Presentation of Some Available Multi-purpose Finite Element Computer Packages Used in Design Market
- Introduction to StaadPro, V8i
- Different Methods of Analysis
- Structural Layout
- Sectional Properties
- Deflection & Deformation
- Determination of Stress Functions (direct, bending & shear stresses)

### Structural Analysis

- Creating a New File with StaadPro, V8i
- Recognizing StaadPro, V8i, Screen (Menu bar, tool bar, title bar, modes, etc.)
- Dealing with an Existing File
- Geometry
- Understanding StaadPro. V8i Way
- Defining Nodes, Beams, and Plates
- Arrangement of Input File
- Using Structure Wizard to Create Geometry
- Using Drafting to Create Geometry
- Using Copy / Cut with Paste to Create Geometry
- Using Spreadsheet to Create Geometry
- Using ACAD 3D DXF Importing to Create Geometry

### Design Philosophies

- Analysis of Two-dimensional Continuous Beams
- Loads Affecting Beam Elements
- Examples
- Analysis of Two-dimensional Frames and Trusses
- Loads Affecting Frames
- Working Stress Design
- Limit State Design

### Post-Processing

- Analysis of Three-dimensional Frames and Trusses
- Loads Affecting Frames and Trusses
- Analysis of Plate Elements (slabs, flat slabs)
- Loads Affecting Plate Elements
- Wind and Seismic Loading Calculations using IBC-03 and ASCE7-02

## Design Procedure of Steel Structures & Exporting BOQs

- Materials & Properties
- Design of Beams
- Design of Columns & Struts
- Design of Tension Members
- Design of Trusses
- Design of Built-up Sections
- Limit State Design
- Post Processing and Reading Results
- Design of Steel and Concrete Sections - issuing complete calculation sheet and MTO