



Steel Structure Analysis and Design Foundations Course

29 August – 2 September 2027
Johannesburg

Steel Structure Analysis and Design Foundations Course

Ref: 540_142081 **Date:** 29 August – 2 September 2027 **Location:** Johannesburg **Fees:** 6000 Euro

Overview

Steel Structure Analysis and Design Foundations Course is a five-day foundation course for civil and structural engineers, graduate engineers, design technicians, and project professionals who leave with a preliminary steel frame design file. Participants connect structural systems and load paths with design actions, member stability, tension and compression members, steel beams and columns, steel connections, serviceability, and constructability. Agile Leaders Training Center presents steel structure analysis and design as a traceable sequence from system choice to member and connection review.

Who Should Attend

- Teams responsible for preliminary steel framing and structural calculations
- Personnel who define loads, load paths, and design actions
- Functions that select and check steel beams, columns, and bracing
- Staff who coordinate member design with connections and fabrication needs
- Project professionals who review structural design assumptions and outputs

The course assumes participants can interpret basic engineering drawings and mechanics, and it leaves out software-specific modeling, advanced finite element analysis, seismic specialization, and detailed fabrication design.

Departments and Industries

The course supports departments and industries that analyze, design, coordinate, or review steel structural systems.

- Building design, architecture, and engineering consultancies
- Industrial facilities, energy projects, and process plants
- Transport infrastructure, bridges, terminals, and logistics facilities
- Structural engineering, design assurance, and technical offices
- Fabrication coordination, construction engineering, and project delivery

Learning Objectives

By the end of this course, participants will be able to:



- Analyze structural systems, load paths, and design actions
- Apply strength, stability, and serviceability limit checks
- Evaluate tension and compression member behavior
- Compare steel beam and column design alternatives
- Use connection assumptions in frame analysis
- Build a preliminary steel frame design file

Course Agenda

Day 1: Structural Systems and Design Basis

- Steel Framing System Selection Matrix
- Gravity and Lateral Load Path Diagram
- Design Action and Combination Register
- Strength and Serviceability Limit-State Map
- Structural Design Basis Sheet

Day 2: Member Behavior and Stability

- Section Property and Member Classification Table
- Tension Member Limit-State Checklist
- Compression Member Buckling Assessment Method
- Effective Length and Restraint Evaluation Map
- Combined Force Interaction Review

Day 3: Beams, Columns, and Serviceability

- Steel Beam Flexural Resistance Calculation Sheet
- Shear Resistance and Web Behavior Check
- Lateral-Torsional Buckling Review Method
- Steel Column Capacity Comparison Table
- Deflection and Serviceability Assessment Record

Day 4: Connections and Constructability

- Connection Behavior and Analysis Assumption Matrix
- Bolted and Welded Load Transfer Diagram
- Simple Shear Connection Component Checklist
- Base Plate, Anchor, and Splice Review
- Fabrication and Erection Constructability Register



Day 5: Steel Frame Design Practice

- Exercise: Map a Steel Frame Load Path
- Exercise: Check Tension and Compression Members
- Exercise: Compare Beam and Column Alternatives
- Exercise: Review Connection and Serviceability Assumptions
- Capstone Exercise: Preliminary Steel Frame Design File

Practical Exercises

The course uses suggested activities to turn structural assumptions into traceable preliminary design decisions.

- Suggested activity: map gravity and lateral actions through a steel frame and document load combinations and design assumptions.
- Suggested activity: calculate representative tension, compression, beam, and column checks using section properties and stability conditions.
- Suggested activity: test whether connection behavior, restraint, serviceability, fabrication, and erection assumptions align with the frame model.
- Suggested activity: assemble calculations, comparison tables, sketches, and review notes into a preliminary steel frame design file.

FAQs

Who suits the steel structure analysis and design course and what does it assume?

It suits engineers, technicians, and project professionals beginning steel design work and assumes familiarity with basic structural mechanics, engineering drawings, loads, reactions, and internal forces.

How does steel structure foundation training differ from advanced finite element analysis?

Steel structure foundation training focuses on load paths, member behavior, preliminary calculations, stability, serviceability, and connection assumptions, while advanced finite element analysis addresses specialist element formulations, nonlinear response, and complex numerical modeling.

How are steel member stability checks organized?

Steel member stability checks begin with member classification, restraint conditions, unbraced length, effective length, load effects, and governing buckling modes, followed by comparison of demand with the applicable resistance.



Why do connection assumptions matter in steel frame analysis?

Connection assumptions matter because joint stiffness, releases, restraint, and force-transfer behavior affect the frame model, member forces, deflections, stability system, and the checks required for connection components.

What serviceability checks apply to preliminary steel design?

Preliminary steel design reviews deflection, drift, vibration where relevant, alignment, and effects on finishes or supported systems, using the criteria applicable to the project and structural function.

Conclusion

Participants take back a Preliminary Steel Frame Design File containing the design basis, load paths, actions, member checks, connection assumptions, serviceability review, and constructability notes. The file makes preliminary choices traceable and improves coordination among analysis, detailing, and delivery functions. It provides a disciplined basis for later code-specific calculations and project design development.