
Steel Building Frame Design Course: Computer Models, Member Checks and Details

19 – 23 July 2027
Cape town





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Programme Summary

Steel building frame design is the subject of this one-week training course for senior structural engineers, design managers and engineering leads, ending in a frame design review pack for one steel-framed building. Errors in a 3D analysis model travel quietly into member sizes and joint details. The programme works from load paths to computer models, member checks, stability and connection details, using the participant's own building as test material. Mars Training Centre UK delivers this programme on steel building frame design to mixed-organisation cohorts.

The Business Case

In steel building design, a wrong support condition, a missing load combination or an unchecked joint can pass through several hands before anyone questions it. Engineering leads who verify the model, read utilisation results critically and review joint details before drawings are issued can catch faults while a change is still cheap.

- Design Error Exposure: Falls as models are verified and results are checked against simple hand calculations.
- Rework After Issue: Falls as stability and connection details are reviewed before fabrication drawings are released.
- Material Efficiency: Improves as member utilisation is read and tuned instead of defaulted.

Principles and Evidence Base

- Eurocode 3: The programme applies its approach to member resistance, stability and steel connections in the design checks of Sessions 3 and 4.
- AISC specification: The programme compares its check logic with Eurocode 3 so reviewers can read designs prepared to either basis in Session 3.
- 3D structural analysis model: Idealising supports, releases and loads and then verifying equilibrium structures the model work in Session 2.
- Load combinations and design checks: Combining actions and checking resistance and serviceability, as the code courses teach, frames the load path work in Session 1.



Intended Participants

- Senior structural engineers who sign off analysis models and design calculations.
- Design managers who review structural packages before issue to fabricators.
- Contractor engineers who assess the buildability of frame designs.
- Owner-side engineers who must challenge consultants on steel frame design.
- Technical authority holders who set modelling and checking standards.

Typical functions include building design consultancies, steel fabrication and erection contractors, industrial facilities owners and infrastructure authorities.

Learning Outcomes

1. Participants will be able to construct a design basis and load combination table for a steel-framed building.
2. Participants will be able to diagnose errors in a 3D analysis model using equilibrium and reaction checks.
3. Participants will be able to evaluate beam, column and bracing results against stability and deflection limits.
4. Participants will be able to prioritise connection types and checks for bolted and welded joints.
5. Participants will be able to design a review routine that finds faults before drawings are issued.
6. Participants will be able to justify frame design decisions to clients, checkers and contractors.

Programme Structure

Day 1: Steel Building Frame Design and Load Paths

How do loads travel through a steel frame, and what must the model represent?

- Load Path Diagram
- Load Combination Table
- Structural System Selection Matrix
- Design Basis Statement
- Model Idealisation Checklist

Day 2: Computer Models and Analysis Verification

How is a 3D analysis model proved sound before its results are used?

- 3D Model Set-Up Sheet
- Support and Release Check
- Equilibrium and Reaction Check
- Member Division Review
- Hand Calculation Cross-Check



Day 3: Member Checks, Stability and Serviceability

Which checks decide the size of beams, columns and bracing?

- Beam Bending and Shear Check
- Column Buckling Check
- Bracing and Stability Review
- Deflection and Vibration Limits Table
- Member Utilisation Plot

Day 4: Connection Details and Design Review

How are joints designed, detailed and challenged before drawings are issued?

- Connection Type Selection Chart
- Bolted Joint Check Sheet
- Welded Joint Check Sheet
- Base Plate and Anchor Review
- Design Review Comment Log

Day 5: Applying the Tools to One Frame Design Review Pack

Do the load, model, member and joint tools form one working design review?

- Applying the Session 1 Load Combination Table
- Using the Session 2 Hand Calculation Cross-Check
- Testing the Session 3 Member Utilisation Plot
- Checking the Session 4 Connection Type Selection Chart
- Completing the Frame Design Review Pack

Methodology

The programme uses a structured exercise method built on anonymised analysis models, calculation extracts, utilisation plots and connection sketches from industrial, commercial and public buildings. Participants work in peer groups on a shared frame and receive written facilitator feedback on every exercise set.

- Suggested activity: Finding the deliberate error in a model that looks plausible.
- Suggested activity: Comparing a utilisation plot with a hand calculation for one column.
- Suggested activity: Reviewing a joint sketch and listing the checks it still needs.



Capstone Output

Each participant completes a frame design review pack for one steel-framed building. It holds a design basis statement, a load combination table, a model verification record, a member utilisation plot and a connection check summary. The pack is used at work to brief the design team, challenge a consultant's package and release drawings with open points closed.

Frequently Asked Questions

Is steel building frame design suitable for engineers who rely on software output?

Yes. Steel building frame design assumes structural training and some design experience, and shows how to verify software results step by step.

Which standards does steel building frame design rest on?

Steel building frame design here rests on Eurocode 3 and the AISC specification, with load combinations, member checks and joint design applied to your own building.

How is the review pack from steel building frame design used at work?

You use the frame design review pack to brief the design team, challenge consultant calculations, agree open points and release drawings with confidence.

How does steel building frame design differ from reinforced concrete design training?

Steel building frame design centres on steel members, stability and bolted or welded joints. Reinforced concrete design training centres on reinforcement, cracking and concrete sections.