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COURSE BROCHURE

# Advanced Structural Steelwork Design and Inspection Training Course

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Registered in the United Kingdom and Saudi Arabia

# Advanced Structural Steelwork Design and Inspection Training Course

Structural Steelwork Design and Inspection is a 2-week advanced training course for structural engineers, steel fabrication inspectors and site QA/QC engineers, who leave with a Steelwork Inspection and Test Plan for a live building or industrial structure. Fast-track schedules, globally sourced fabrication and heavier plant loads now leave little room for weld defects, misaligned bolts or poor coatings. Jupiter Prime Training offers this course on structural steelwork design and inspection.

## Why Structural Steelwork Design and Inspection Matters Now

Three forces shape steelwork today: fabrication spread across shops and suppliers far from site, industrial structures carrying vibrating equipment, pipe racks and cranes, and owners expecting long coating life with little maintenance. A project that checks design intent, fabrication tolerances and connection quality before erection avoids costly field rework and unsafe structures; one that inspects late finds cracked welds, slack bolts and coating failures after steel is in the air. The course rests on the American Institute of Steel Construction Specification for Structural Steel Buildings AISC 360 and the American Welding Society Structural Welding Code, Steel AWS D1.1, alongside fabrication and erection tolerance practice.

## Who Gains Most from Structural Steelwork Design and Inspection

- Engineers who size members and connections and approve shop drawings for buildings and plant structures
- Fabrication inspectors who verify material certificates, cutting, fit-up and welding in the shop
- Site quality engineers who control bolting, alignment and touch-up coating during erection
- Owner's representatives who accept steel packages and judge non-conformance reports
- Coating specialists who check surface preparation, film thickness and adhesion on structural steel

A project team that sends its design engineer, shop inspector and site quality lead together gains most, because design intent, fabrication checks and erection control then use the same acceptance criteria.

## Structural Steelwork Design and Inspection Capabilities

Participants learn to read steel from calculation to bolted joint, and to decide in shop or on site whether a member, weld or coating meets its specified requirement.

- Check member design for tension, compression, bending and stability against AISC 360 provisions — supporting design approval
- Review bolted and welded connection designs and shop drawings — informing fabricators before release
- Specify weld procedure, welder qualification and inspection requirements to AWS D1.1 — guiding fabrication inspectors
- Apply visual, magnetic particle and ultrasonic testing results to weld acceptance — serving quality managers
- Verify bolt tightening, alignment and plumbness during erection — protecting site safety and fit-up
- Build an inspection and test plan with hold points and records — equipping owners and contractors

## Key Structural Steelwork Design and Inspection Terms

- Shop Drawing — a fabricator's detailed drawing of each member and connection, prepared from design drawings and approved before cutting.
- Slip-Critical Connection — a bolted joint designed so that friction between clamped surfaces, not bolt shear, resists load under service.
- Weld Procedure Specification WPS — a written document setting the variables of a qualified welding process for a given joint.
- Pretensioned Bolt — a high-strength bolt tightened to a minimum tension by turn-of-nut, calibrated wrench or direct tension indicator.
- Non-Destructive Testing NDT — inspection methods such as ultrasonic or magnetic particle testing that find defects without damaging the part.
- Erection Tolerance — the permitted deviation of steel position, level and plumb after erection, set by specification.

## Structural Steelwork Design and Inspection Day by Day

## Day 1: Steelwork in Buildings and Industrial Plant

- Steel Frame Systems — Choosing Braced, Moment and Portal Frames
- Load Paths and Load Combinations — Linking Design Loads to Members
- Material Grades and Mill Certificates — Confirming Steel Traceability
- Warehouse and Pipe Rack Case Studies — Comparing Building and Plant Demands
- Design Basis Report — Setting Criteria Before Detailed Checks

## Day 2: Member Design Checks

- Tension and Compression Members — Checking Slenderness and Buckling
- Beam Design for Bending and Shear — Controlling Lateral-Torsional Buckling
- Combined Axial and Bending Interaction — Sizing Columns and Rafters
- Serviceability Checks — Limiting Deflection, Drift and Vibration
- AISC 360 Design Provisions — Applying Resistance Factors Consistently

## Day 3: Connection Design

- Shear and Moment Connections — Matching Joint Type to Frame Behaviour
- Bolted Connection Design — Checking Bearing, Slip and Block Shear
- Welded Connection Design — Sizing Fillet and Groove Welds
- Base Plates and Anchor Bolts — Transferring Loads to Foundations
- Bracing and Gusset Plate Details — Avoiding Common Detailing Errors

## Day 4: Shop Drawings and Fabrication Planning

- Shop Drawing Review — Catching Dimension and Connection Errors
- Fabrication Tolerances — Setting Limits for Camber, Sweep and Length
- Cutting, Drilling and Fit-Up Control — Preparing Members for Welding
- Fabrication Inspection and Test Plan — Defining Shop Hold Points
- Material Receipt Inspection — Matching Plates and Sections to Certificates

## Day 5: Welding Procedures and Weld Quality

- AWS D1.1 Structural Welding Code — Framing Shop and Field Welding
- Weld Procedure Specifications and Qualification Records — Proving Process Capability
- Welder Performance Qualification — Confirming Individual Competence
- Preheat, Interpass and Distortion Control — Preventing Cracking and Warping
- Visual Weld Inspection — Judging Profile, Size and Surface Defects

## Day 6: Non-Destructive Testing and Acceptance

- Magnetic Particle and Dye Penetrant Testing — Finding Surface Cracks
- Ultrasonic Testing of Groove Welds — Detecting Internal Flaws
- Radiographic Testing Uses and Limits — Selecting the Right Method
- NDT Sampling Plans — Setting Test Frequency by Joint Criticality
- Weld Repair Procedures — Approving Excavation and Re-Welding

## Day 7: Bolting and Coatings

- High-Strength Bolt Installation — Applying Turn-of-Nut and Calibrated Wrench
- Direct Tension Indicators — Verifying Pretension in the Field
- Surface Preparation Grades — Specifying Blast Cleaning Before Coating
- Coating Systems and Galvanising — Matching Protection to Exposure
- Dry Film Thickness and Adhesion Tests — Accepting Protective Coatings

## Day 8: Erection Planning and Site Control

- Erection Method Statements — Sequencing Lifts and Temporary Bracing
- Crane Selection and Lift Plans — Controlling Heavy and Tandem Lifts
- Erection Tolerances and Surveys — Checking Plumb, Level and Alignment
- Stability During Erection — Preventing Partial Frame Collapse
- Field Modifications Control — Approving Holes, Cuts and Additions

## Day 9: Non-Conformance and Handover

- Non-Conformance Reports — Recording and Classifying Defects
- Disposition Decisions — Choosing Repair, Accept-as-Is or Reject
- Root Cause Review — Preventing Repeat Fabrication Errors
- Quality Dossier Compilation — Assembling Certificates and Test Records
- Steel Package Handover — Confirming Completion Before Cladding

## Day 10: Practising the Steelwork Inspection and Test Plan

- Design Review Exercise — Applying Member and Connection Checks to a Pipe Rack
- Shop Inspection Simulation — Judging Welds and Fit-Up From Photographs
- Bolting Verification Drill — Testing Pretension Records Against Requirements
- Peer Review of Non-Conformance Decisions — Strengthening Disposition Logic
- Steelwork Inspection and Test Plan — Completing Hold Points, Methods and Acceptance Criteria

## Applying Structural Steelwork Design and Inspection After the Course

- Review the shop drawings and weld procedures for one current steel package against design and AWS D1.1 requirements.
- Introduce a bolting verification checklist on site and audit one erected bay against erection tolerances.

## Structural Steelwork Design and Inspection Questions FAQ

### What is structural steelwork design and inspection, and why does it matter now?

It is the checking of steel members and connections in design and the verification of fabrication, welding, bolting, coating and erection. It matters now because remote fabrication and tight schedules make late-found defects expensive and unsafe.

### Which roles gain most from structural steelwork design and inspection training?

Structural engineers, fabrication inspectors and site quality engineers gain most. They approve designs, accept welds and bolts and judge non-conformances, so connection design, testing methods and tolerances shape their daily decisions.

### How does structural steelwork design and inspection differ from a general welding inspection course?

It links design intent to inspection rather than covering welding alone. A welding inspection course focuses on processes and defects, while this subject also covers member and connection design, bolting, coatings, erection and non-conformance decisions.

## What do you bring back from structural steelwork design and inspection training?

You bring back a Steelwork Inspection and Test Plan for a structure you work on. It sets hold points, test methods, sampling, acceptance criteria and records from design review through fabrication to erection.

## Structural Steelwork Design and Inspection: The Way Forward

The Steelwork Inspection and Test Plan first informs which hold points the fabricator must respect before steel leaves the shop. Design engineers, inspectors and site quality leads use it to share one set of acceptance criteria. After the first package is erected it is worth revisiting the NDT sampling rate, since early results show whether testing can be reduced or must increase.