Global Horizon
TRAINING CENTER

Training Course:
Fundamentals of Stress in Materials for Mechanical and Structural Design

17 - 21 August 2025
Cairo (Egypt)
Holiday Inn & Suites Cairo Maadi, an IHG Hotel

Training Course:
Fundamentals of Stress in Materials for Mechanical and Structural Design

Training Course code: EN236140 From: 17 - 21 August 2025 Venue: Cairo (Egypt) - Holiday Inn & Suites Cairo Maadi, an IHG Hotel Training Course Fees: 4200 Euro

Introduction

Understanding how materials respond to external forces is fundamental to safe and efficient engineering design. The study of material stress behavior provides engineers with essential tools to evaluate the strength, stability, and reliability of components and structures under real-world loading conditions.

This 5-day training program focuses on the core principles of stress in materials, including stress-strain relationships, axial and shear loads, torsion, bending, and combined stresses. Participants will gain both analytical skills and engineering intuition to evaluate material response, ensure safety, and support design optimization across structural and mechanical applications.

Course Objectives

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

- Understand key mechanical properties of engineering materials.
- Analyze how materials behave under axial, shear, torsional, and bending stresses.
- Apply stress-strain relationships to real-world engineering problems.
- Solve statically determinate problems involving bars, shafts, and beams.
- Assess failure modes and safety considerations in material design.

Target Audience

This course is suitable for:

- Mechanical and Structural Engineers
- Civil Engineers involved in design and analysis
- Manufacturing and Industrial Engineers
- Technical Designers and Product Developers
- Engineering graduates or students seeking solid foundations in material mechanics

Outlines

Day 1: Introduction to Stress and Strain in Materials

- What is stress? Normal and shear stress
- Definitions: axial load, stress distribution, deformation
- Strain: linear, lateral, volumetric
- Hooke's Law and elastic behavior
- Workshop: Calculating stress and strain for axial loading

Day 2: Mechanical Properties and Stress-Strain Diagrams

- Material properties: modulus of elasticity, yield strength, ultimate strength
- Stress-strain curves for metals, polymers, and composites
- Elastic and plastic deformation
- True vs. engineering stress
- Hands-on exercise: Interpreting and using test data

Day 3: Torsion and Shear in Circular Shafts

- Torsional stress and angle of twist
- Power transmission in solid and hollow shafts
- Shear stresses in fasteners and connectors
- Application examples: drive shafts, couplings, bolts
- Workshop: Design and analysis of shaft systems

Day 4: Bending Stresses in Beams

- Bending moment and shear force diagrams
- Beam stress distribution and neutral axis
- Moment of inertia and flexural formula

- Deflection analysis introductory level
- Case study: Analysis of a structural beam under loading

Day 5: Combined Stresses and Design Safety

- Superposition of axial, torsional, and bending stresses
- Principal stresses and Mohr's circle basic intro
- Safety factors and design margin
- Failure theories: overview and application
- Final project: Complete analysis of a component under combined loading

Registration form on the Training Course: Fundamentals of Stress in Materials for Mechanical and Structural Design

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Complete & Mail or fax to Global Horizon Training Center (GHTC) at the address given below

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Payment Method

☐ Please find enclosed a cheque made payable to Global Horizon

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