INTERGRAPH CAESAR II TRAINING SYLLABUS

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SECTION: 1

Introduction to Pipe Stress Analysis

- Need for stress analysis.
- Consequences of overstress.
- Physical Quantities and Units used in pipe stress analysis.

Piping Materials

- Introduction
- Material Classification Systems and Specifications.
- Common ASTM Piping Materials.
- Material Requirements of Codes.
- Selection Criteria for Materials.
- Piping Specifications (Piping Classes).
- Material Testing and Certificates.

Codes Governing Piping Design and Stress Analysis

- ASME B31.3, ASME B31.4, and ASME B31.8.
- Other codes including applicable local codes.
- Role and scope of codes.
- Information available from codes.
- Typical organization of code material.

Principal Stresses and Failure Theories

- Longitudinal, Circumferential and Radial Stresses.
- Principal Axes and Principal Stresses.
- Failure Theories:
- Maximum Principal Stress Failure Theory.
- Maximum Shear Stress Failure Theory.

Design Pressure, Design Temperature and Allowable Stress

- Definition of Design Pressure and Design Temperature.
- Basis for Allowable Stress.

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- Allowable Stresses at “hot” and “cold” conditions, that is, Sh and Sc.
- Code Tables for Allowable Stresses.

SECTION: 2

Design of Pipe Wall Thickness for Internal Pressure

- Wall Thickness Design Equations – ASME B31.3, ASME B31.4, and ASME B31.8.
- Calculation of Maximum Allowable Working Pressure (MAWP).
- Pressure – Temperature Class Ratings for Flanges.
- Determining Appropriate Flange Pressure Class.

Loads on Piping Systems

- Primary and Secondary Loads.
- Self – Limiting and Non-Self – Limiting Characteristics of Loads.
- Sustained and Occasional Loads.
- Static and Dynamic Loads.
- Bending Stresses in Pipes.
- Longitudinal Stress and Torsional Stress.
- Code Criteria for Design.

Thermal Stresses in Piping Systems

- Thermal Expansion / Contraction of Materials.
- Stresses Due to Thermal Expansion / Contraction.
- Thermal Fatigue and Cyclic Stress Reduction Factor.
- Design Criteria for Thermal Stresses:
- Stress Intensification Factors (SIFs).
- Allowable Stress Range for Thermal Expansion.
- Calculation of Expansion Stress Range

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Pipe Stress Analysis Software

- Introduction to CAESAR II Stress Analysis Software:
- Overview of CAESAR II software.
- Piping Input and Creation of Model.
- Navigation and Toolbars.
- Static Analysis and Output.
- Checking for Code Compliance.

CAESAR II Practical Exercises

- Piping Input – Creating the Model.
- Running the Analysis.
- Output and Interpretation of the Results.
- CAESAR II Practical Exercises I and II.

COURSE DURATION: 45 DAYS

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