CAESAR II - Pipe Stress Analysis Training (IGT-PSA)

Course Length:	5 Days

This course is designed for almost anyone involved with piping in the petroleum, chemical, power, gas transmission, and related industries. Through our technical support we learn, every day, what engineers need to know, and we've tailored our seminar to give as much practical knowledge as we can in 5 days. The seminar covers proper system modelling guidelines, methods of static and dynamic analysis of piping systems, evaluation of system designs, and effective approaches to system redesign which helps Piping/Vessel Maintenance Engineers, Piping Designers, New & Experienced CAESAR II Users, Mechanical/Design Engineers, Engineering Managers, Plant Managers, and fresh graduate mechanical engineers who wants to become a piping engineer and who would like to pursue their career in Plant design industry specifically as a PIPE Stress Analyst.

Prerequisites:

- Basic Plant design/ engineering knowledge is required.
- Reading GAD and Isometrics knowledge is required.
- Working knowledge of AutoCAD is preferable
- It is also recommended that you have a working knowledge of Microsoft® Windows® Operating systems

Curriculum

Day 1

- **Introduction to Pipe Stress Analysis**
- **When to perform stress analysis**
- **Role of the stress analyst**
- **Piping Code History**
- **Stress theory; evaluating stresses on piping & knowing which ones matter**
- **Code Compliance**
  - **Load types**
  - **Failure criteria**
  - **primary & fatigue failures**
- **Stress Intensification Factor (SIFs)**
- **Overview of CAESAR II functions how to use the program**
- **CAESAR II Modelling**
  - **important modelling issues – bends, reducers, valves,**
  - **control parameters**
  - **non-linearity of restraints**
  - **connecting nodes**
  - **Built-in databases and assorted modelling issues.**
- **Practical examples using CAESAR II; input, analysis & redesign**

Day 2

- **Static Load Cases**
  - **Theory - Designing for sustained loads**
  - **support configuration issues,**
  - **spring hanger design**
  - **Optimization of Sustained loads.**

- Practical example
- Expansion Loops:
  - Theory - Designing for expansion loads; flexibility
  - Expert Loop Design in CAESAR II
  - Imposed Thermal Displacement
- Designing for Occasional Load Case
  - Wind / Wave Loading
  - Static Seismic Load
  - Uniform Load
- Practical Examples

Day 3

- Modelling Connecting Equipment (Horizontal & Vertical Vessel)
- Underground Piping (Buried Modelling)
- Jacketed Piping
- FRP/GRP Piping Using ISO 14692
- Flange Leakage Modelling & Calculation
- Detailed problem solving of a complex model, including:
- Expansion joint modelling & evaluation
- Structural steel modelling
- Combining steel with piping
- Verification of API 610 pump loads
- Local vessel flexibilities using WRC 297
- Including vessel modelling
- Evaluation of local vessel stresses according to WRC 107
- Problem Solving Workshop – detailed example where each student works Independently, applying what is learned to solve a variety of stress and Equipment load problems.

Days 4 & 5

- Introduction to Dynamic Analysis
  - Dynamic analysis theory
  - Types of loads
  - Evaluation of system responses
- Modes and mode shapes
- Modal analysis
- Spectral Analysis; Impact & Earthquake analysis
- Time History Analysis
- Harmonic loads & harmonic analysis
- Flow induced vibration
- Mechanical vibration
- Impact load types & analysis
- Steam hammer
- Relief valve firing
- Example problems including:
  - Mechanically induced vibration problems & solutions
  - Flow induced vibration problem & solution
  - Time History analysis and evaluation of impact load (steam hammer) with Dynamic restraint (snubber)
  - Spectral analysis of impact load (Relief valve firing)
  - Earthquake analysis