



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:

- Drafting, design, or engineering experience is required.
- Basic Plant design/ engineering knowledge is required.
- Working knowledge of AutoCAD.
- It is also recommended that you have a working knowledge of Microsoft® Windows® XP, Microsoft® Windows® 2000, or Windows NT® 4.0.

Curriculum

Day 1

- ❖ **Role of the stress analyst**
- ❖ **When to perform stress analysis**
- ❖ **Piping Code History**
- ❖ **Stress theory; evaluating stresses on piping & knowing which ones matter**
- ❖ **Load types, Failure criteria; primary & fatigue failures**
- ❖ **Code equations, Stress Intensification (SIFs)**
- ❖ **Overview of CAESAR II functions and how to use the program**
- ❖ **Detailed, important modelling issues – bends, reducers, valves, rigid elements, control parameters, non-linearity of restraints, connecting nodes, built-in databases and assorted modelling issues.**
- ❖ **The mathematics behind CAESAR II – Stiffness matrices and related issues**
- ❖ **Practical examples using CAESAR II; input, analysis & redesign**

Day 2

- ❖ **Theory - Designing for sustained loads; support configuration issues, spring hanger design, optimization of sustained loads.**
- ❖ **Practical example**
- ❖ **Theory - Designing for expansion loads; flexibility**
- ❖ **Practical Examples**





Day 3

- ❖ Detailed problem solving of a complex model, including:
- ❖ Imposed thermal displacements
- ❖ Expansion joint modelling & evaluation
- ❖ Structural steel modelling
- ❖ Spring hanger design
- ❖ 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.
- ❖ Buried pipe modelling.

Days 4 & 5

- ❖ 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
- ❖ Slug flow
- ❖ 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

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