PROTTON SYNERGY announces

A Professional Training Course on "**ADVANCE PIPE STRESS ANALYSIS**"

The Stress Analysis is an Integral part of Safety requirements of Piping and Pipelines. If you are working in Design or Operations domain, don't you think the knowledge of **Stress Analysis** will give a big leap in your career?

Most of us know '***What to do'*** in design but very few know '***Why to do*** **it'**. To get the answer of **'Why'**; Protton Synergy is announcing courses in Piping & Pipeline Stress Analysis.

Would you be interested knowing the answers of questions like

'What does exactly 'Stress' mean: A scalar or vector or more?'

'What exactly should I read from ASME B31.3 code and other standards like API 610, API 650 etc.?'

'Why the spring is provided in piping and how to select it'

'Why Flange leaks, nozzle cracks, line deforms, pipe to pipe fitting cracks and how to calculate it?'

'How CAESAR II calculates the stresses? How to read stress report?

'How stress analysis used to be performed in early stage when there were no computers'

…… And answers to many more ADVANCED questions along with Practical problems.

To enhance our mechanical design engineers' skills in analyzing, studying, and solving different engineering problems.

The course starts with the fundamentals required to perform Pipe Stress Analysis. It also talks about the International code requirements, best industry practices and then ends with Practical application of Pipe Stress Analysis using "CEASAR II" software to build piping system models and to analyze the output.

The piping Engineer with knowledge of "Pipe Stress Analysis" can work in all core engineering industries (viz. Refineries, Oil and Gas, Petroleum sector). He / She will able to deliver independently in areas of Piping Design, Layout and Analysis**.**

WHO SHOULD ATTEND?

Quality Assurance Staff, Piping Design engineers, stress engineers, designers

Any aspiring engineer, he/she can be a trainee engineer, designer, Sr. Engineer, Plant Operating engineer, Project engineer or a Manager, who wants to clear his/her fundamentals clear and wants to know more about this subject and software can attend this course

TRAINING METHODOLOGY

A highly interactive combination of lectures and discussion sessions will be managed to maximize the amount and quality of information and knowledge transfer. The sessions will start by raising the most relevant questions, and motivate everybody find the right answers. You will also be encouraged to raise your own questions and to share in the development of the right answers using your own analysis and experiences. Tests of multiple-choice type will be made available on daily basis to examine the effectiveness of delivering the course.

All presentations are made in excellent colorful power point. Very useful Course Materials will be given.

40% time Lectures
40% time Workshops and work presentation
20% time Videos& General Discussions
Material Language: English
Presentation Language: English

TOPICS COVERED

- Stress Analysis.
- Piping Flexibility analysis.
- Pipe support.
- Modeling-input pipe data in CAESAR II.
- Vibration, seismic, wind load and general loads analysis.
- Equipment (rotary/static) nozzle evaluation.

ELIGIBILITY:	Fresh / Experienced - B.E. (Mech / Prod / Chemical), Diploma (Mech)
COURSE DURATION:	
TIMINGS:	Sat, Sun: 9 a.m. to 5.30 p.m., Mon to Fri: 5:30 p.m. to 9.30 p.m.
Venue:	Thane (address will be provided later)
FACULTY:	Mr. Gaurav Bhende

SYLLABUS (Day wise schedule is provided at the end):

A. Theory:

1. Introduction to Stress Analysis and Role of Stress Engineer.
2. Basic Stress concepts applicable in Stress Analysis.
3. Theories of Failure
4. Interpreting International Piping code equations, ASME B31.1, B31.3
5. Theory behind load case formation.
6. Support types and their application. Special supports like snubbers, struts, sway Braces
7. Manual Spring Selection and theory behind it
8. Pipe Span Calculation
9. Nomograph, Thumb Rules for flexibility
10. Criteria to identify stress critical lines and system Formation
11. Slug force, PSV Thrust force, Rupture Disk Calculations and load cases
12. Piping flexibility and Stress Intensification factor
13. Flange leakage analysis calculations
14. Expansion loop manual calculations
15. WRC107 and WRC297 comparison

B. Practical:

1. Introduction to CAESAR II software and its Configuration file etc.
2. Colum to Pump Piping
3. PSV piping
4. Heat Exchanger Piping
5. WRC 107 / 297 Nozzle flexibilities
6. API610 calculations in CAESAR II
7. Practical on occasional forces like slug, PSV pop up.
8. Modelling of Special Equipment piping like Turbine, AirFin Coolers : Overview
9. Expansion Joints (Bellow)
10. Spring selection using CAESAR II.

About Faculty:

Name: **Gaurav Bhende**
Qualification: **M. Tech**.

The faculty has more than 19 year of experience in Pipe Stress Analysis and conducted several Professional Training Courses on Stress Analysis using CAESAR II software in numerous international engineering companies and Institutes as a freelance Trainer since 2009. Gaurav has won the First Prize in a Global competition called "Driver of Success" where case your excellence in CAESAR II usage in Pipe Stress Analysis is to be demonstrated.

Gaurav was also invited to participate as a speaker in International conferences held in USA, India and UAE.
Gaurav has presented numerous Whitepapers on various topics of Pipe Stress Analysis like Buried Pipe Analysis, Seismic Analysis, stress Intensification Factors, surge analysis in International Journals and Conferences including ASME conference.

Day-wise schedule is present on the next page.

STRESS ANAYSIS TRAINING CONTENTS

SR.NO.	LECTURE TOPIC	DURATION
First Day	• **Introduction to Stress Analysis and Role of Stress Engineer:** This session covers what is stress, strain, its basic concepts, the importance of stress analysis in plant design. • **Basic Stress concepts applicable in Stress Analysis:** This topic covers the revision of engineering basics which are extremely useful to understand code equations and software results.	9. 00 am To 10.30 am
	TEA BREAK	**10.30 am To 11.00 am**
	• **Basic Stress concepts applicable in Stress Analysis….** continue	11.00 am To 1.00 am
	LUNCH BREAK	**1.00 pm To 2.00 pm**
	• **Theories of Failure:** This topic covers the main theories of failure like Maximum shear stress theory which have been addressed by the code. • **Interpreting International Piping code equations, ASME B31.1, B31.3:** This session is the heart of this course as it explains how the code equations have been derived and theory behind it.	2.00 pm To 3.30 pm
	TEA BREAK	3.30 pm To 4.00 pm
	• **Interpreting International Piping code equations, ASME B31.1, B31.3 : continue….** • **Theory behind load case formation:** this session explains about the theory behind the loads cases to be formed in the software and significance of each load case. Its relation with the code.	4.00 pm To 5.30 pm

STRESS ANAYSIS TRAINING CONTENTS

SR.NO.	LECTURE TOPIC	DURATION
Second Day	• **Introduction to CAESAR II software and its configuration file etc.:** This session explains the engineering settings in the software. Further it talks about the advantages and limitations of the software along with salient features.	9. 00 am To 10.30 am
	TEA BREAK	**10.30 am To 11.00 am**
	• Colum to Pump Piping • API 610 analysis This session covers model and basic analysis of column to oump piping and its co-relation with the theory learned so far.	11.00 am To 1.00 am
	LUNCH BREAK	**1.00 pm To 2.00 pm**
	• Practical on load case formation	2.00 pm To 3.30 pm
	TEA BREAK	3.30 pm To 4.00 pm
	• **Interpreting software results** Here we try to read the software output, check points, result signs and co-relation of results with theory.	4.00 pm To 5.30 pm

STRESS ANAYSIS TRAINING CONTENTS

SR.NO.	LECTURE TOPIC	DURATION
Third Day	• **Support types and their application. Special supports like snubbers, struts, sway Braces** : Supporting is one of the most important activity. This session talks about various types of supports and their applications.	9. 00 am To 10.30 am
	TEA BREAK	**10.30 am To 11.00 am**
	• **Manual Spring Selection and theory behind it** : This is a very useful topic which describes engineer how to select a particular spring support without using software, then comparing manual spring selection with software selection, how to read spring catalogue etc.	11.00 am To 1.00 am
	LUNCH BREAK	**1.00 pm To 2.00 pm**
	• Practical: **Spring selection using CAESAR II.** • **Other supports:** Practical on how to model various types of supports in CAESAR II.	2.00 pm To 3.30 pm
	TEA BREAK	3.30 pm To 4.00 pm
	• **Pipe Span Calculation:** A manual calculation to decide the safe distance between two supports.	4.00 pm To 5.30 pm

STRESS ANAYSIS TRAINING CONTENTS

SR.NO.	LECTURE TOPIC	DURATION
Fourth Day	• **Criteria to identify stress critical lines and system**: Talks about various criteria to identify stress critical lines and how to make critical line list. • **System Formation:** how to for a stress system and what are the various input required for it.	9. 00 am To 10.30 am
	TEA BREAK	**10.30 am To 11.00 am**
	• **Nomograph, Thumb Rules for flexibility:** This session covers the graphical methods to find out the necessary flexibility based on guided cantilever method. An useful tool for quick manual calculation.	11.00 am To 1.00 am
	LUNCH BREAK	**1.00 pm To 2.00 pm**
	• **WRC 107 Nozzle flexibilities & Practical based on that:** When nozzle loads exceed the allowable loads then WRC 107 can be used as an additional tool to accept the nozzle loads. This session talks about its various features and how to perform this check in software.	2.00 pm To 3.30 pm
	TEA BREAK	3.30 pm To 4.00 pm
	• **Piping flexibility and Stress Intensification factor**: This session discuss on the white Paper published by the trainer which explains the concept of SIF and the various factors affecting it.	4.00 pm To 5.30 pm

STRESS ANAYSIS TRAINING CONTENTS

SR.NO.	LECTURE TOPIC	DURATION
Fifth Day	• **Flange leakage analysis calculations & Practical:** It explains the theory about why flange leaks, it cover flange leakage analysis by Equivalent pressure method and how to perform this using software.	9. 00 am To 10.30 am
	TEA BREAK	**10.30 am To 11.00 am**
	• **Bellows & Practical based on it:** Expansion joints are the weakest link in the piping. This session covers various types of expansion joints, their usage, advantages /limitations and how to model using software.	11.00 am To 1.00 am
	LUNCH BREAK	**1.00 pm To 2.00 pm**
	• **Expansion loop manual calculations:** In the pipe rack analysis how to decide the expansion loop size using graphical method is discussed along with the ready feature in the software to do it. • Overview of critical systems: The trainer will show few critical systems which he had analysed and will talk in general “Do’s and Don’ts”	2.00 pm To 3.30 pm
	TEA BREAK	3.30 pm To 4.00 pm
	Revision and Doubt solving	4.00 pm To 5.30 pm