Indian Institute of Technology, Bombay

In association with

Pinnacle Knowledge Group, Dubai

4th International Edition of Continuing Education Program

Certificate Course on Piping Engineering

2nd Jan – 9th Jan, 2009

Dubai

Introduction

IIT Bombay is recognised as one of the top centres of academic excellence in India. Over the years, there has been dynamic progress at IIT Bombay in all academic and research activities, and a parallel improvement in facilities and infrastructure, to keep it on par with the best institutions in the world. It has active teaching and research programmes in basic sciences, engineering, humanities and management disciplines. The institute was ranked 3rd by THES 06, UK.

Apart from its academic programmes offering degree courses, IIT Bombay offers over 150 programmes under the banner of its Continuing Education and Quality Improvement Programmes (CE & QIP) for working professionals and teachers.

IIT Bombay's Certificate Course on Piping Engineering is well known for the impact it has made over the last 15 years. After the overwhelming success of the 5 days rigorous course in November 2007 in Sharjah and 12 days program in February 2008 and June 2008 in Dubai, we are pleased to announce the 4th International Edition of the program from **2nd Jan to 9th Jan, 2009 in Dubai**. This course covers all topics important to in-plant piping engineering. The course has completed 49 editions and has trained over 4600 engineers in India and UAE.

About the Course

Piping Engineering is a truly multidisciplinary subject. It draws its knowledge base from chemical, mechanical, civil, electrical, metallurgical, instrumentation, control engineering, to name a few. Traditionally, chemical or mechanical engineers have taken to this profession and it is believed that about 10 years on job experience and exposure can make a few gifted ones 'piping engineers' in real sense. Design/engineering sector as well as operating companies has always yearned for a formal training programme in piping engineering so that this slow self training approach could be replaced by a fast track. Against this background the present course emerged. The course has undergone continuous revisions, helped to a large extent by the feedback given by the participants and the industry. It is now an optimal mixture of theory and practice. The instruction hours are shared by IIT faculty and speakers from industry, the latter playing a significant role.
The activity was institutionalized through the formation of a Piping Engineering Cell in CAD Centre, which now conducts this course. The acceptance of the course by the industry has virtually forced the hands of various software houses and the Piping Engineering Cell has now a collection of most state of the art piping engineering software. These are extensively used during the course.

Course Content

Codes:

- Introduction to ANSI, ASTM, ASME, API standards, AWS standards, MSS-SP standards
- ASME B31.3, B31.1, ASME sec IX

Piping Elements:

- Material Selection for Piping Components
- Pipe Joints, Pipe ends, type of pipes, pipe materials
- Pipe fitting standards, types of fittings
- Flanges
- Gaskets
- Bolting
- Non-Ferrous Piping, Non-Metallic and Lined Piping

Mechanical design fundamentals:

- Failure
- Modulus of Elasticity
- Yield Strength and Ultimate Tensile strength
- Fatigue Behaviour

Pipe Hydraulics and Sizing

- Importance of Piping Sizing
- Pipe sizing Procedures
- Types of flows
- Single phase and two phase Pressure drop calculation
- Baker's method, Lockhart Martinelli method
- Economic pipe sizing: least annual cost approach

Piping Drawing Basics

- Orthographic – plans and elevations
- Pictorial – Isometric views
- Development piping general arrangement drawing
- Checking of piping drawings

Development of Plot plan

- Data
- Pipe routing onsite

Equipment and Piping layout

- Conceptual, equipment and piping layout design
- Guidelines and standards (PIP, SABIC and OSHA standards)
- Yard Piping
- Piping Arrangement, valves location
- Pumps and compressors and heat exchangers- types, layout arrangement
- Process and storage vessels- nozzles and gauges
- Distillation units

Process Piping & Utility Piping Layout

Pipe under Stress

- Classification of loads and failure modes
- Stress
  - Normal and shear stresses from applied load
  - Internal and externals pressure
- Theories of failure
  - Maximum shear theory
  - Octahedral shear theory

Stress Analysis

- Classification of piping systems
- Code compliance
- Magnitude of thermal load
- Effect of fatigue on piping
- Time independent stress as per ASME B31.1 and ASME B31.3
- Time dependent strength
- Allowable stress range
- Limiting values of terminal forces and momentum – centrifugal pumps, compressors, positive displacement pumps, reciprocating compressors, steam turbines, air cooled heat exchangers, shell and tube type heat exchangers, fired heaters
- Methods of flexibility analysis
  - Clause 119.7.1/ 319.4.1 of code
  - Guided cantilever method
- Piping elements- their individual effects
  - Straight pipe, Elbows, Tees, flanges, valves, reducers
- ASME B31.1 and B 31.3
- Stress due to occasional loads
- Means of increasing flexibility
- Cold spring

Dynamic Analysis of piping systems

Transient fluid flow analysis:

- Unsteady flow analysis

- Water Hammer
- Finite Liquid Compressibility - Rigid Pipe and Elastic Pipe
- Multi section pipes, 2D, 3D pipe routes
- Pumps and control valves

Leak detection

- Hands on training on PANORAMA - Leak Detection Software

Steam engineering
Process Insulation
Instrumentation and control

Faculty Profile

Prof. Arun S Moharir

Professor, Chemical Engineering Department, IIT Bombay
Professor-in-Charge, Continuing Education and Quality Improvement Programmes, IIT Bombay

Professional Qualification

Ph.D. (1981) in Chemical Engineering from Indian Institute of Technology, Kanpur, India

Areas of Active Interest

Mathematical Modelling, Simulation, Optimization and Control of Chemical Processes, Flowsheet Simulation, Reactor Modelling, Adsorptive Separation Processes, Computer Aided Design and Engineering, Process Plant Engineering, Piping Engineering, IT-based knowledge management in manufacturing sector, Model based design of integrated and complex systems

Recent Projects (2000 onwards)

Project	Organization
Generalized Reactor Model	UOP, USA
Parex and Molex Process Simulation	Reliance Industries Limited, Indian Petrochemicals Corporation Limited
Generalized SMB Process Simulation	UOP, USA
Catalyst Manufacturing Unit Operations Modelling	UOP, USA
Distillation Column Hydraulics Modelling (Legacy S/w Conversion)	UOP, USA
Flowsheet Simulation	UOP, USA
Hydrogen PSA Technology Development	Engineers India Limited, India
PSA Technology for Carbon dioxide capture from flue gases	NTPC, India
Pipeline Leak Detection Software	Aditya Internet Services Limited, India
PSA Pilot Plant	Amines and Plasticizers, India
Training Programmes in CAD, CAE, CAPE	Several Organizations

Courses for Working Professionals

- Certificate Course on Piping Engineering
- Process Plant Design & Engineering
- Advanced Flexibility Analysis (CAEPIPE, CAESAR-II)
- Management of Designs (For Engineering Designs and Contractors)

Prof. T. N. Gopinath

Technical Advisor -Piping M/s UHDE India Ltd.
Course Designer and Faculty for the Certificate Course in Piping Engineering, IIT Bombay

Experience

39 Years in Project Consultancy as Design Engineer , Chief of Design General Manager, and Technical Advisor in Piping Design & Engineering

Attendee Profile

The course is most suited for Mechanical and Chemical Engineering Graduates. However, production engineers, instrumentation engineers and civil engineers with piping engineering related job profile can also benefit, with some extra efforts on their part.
It is an exposure level course and the participant profile is young. Experienced working engineers from operating companies and design organizations also attend in significant numbers and have found the course a horizon widening experience.

Eligibility

The candidate must be the holder of a graduate degree (B.Tech/B.E) in any stream of science and engineering. In exceptional cases, diploma holders with considerable relevant experience (at least 3 Years) can be admitted.

In-house Programmes (Short & Long Term)

Courses are also run exclusively for a specific company or organization. The course proposals may be made by specific industries and after initial interaction, the courses would be tailor-made and conducted to their requirement.

Companies benefited by our programs

UAE:

- DEWA
- Dubai Petroleum
- Du Gas
- Dubai Festival City
- Drake & Scull
- Lamprell
- W S Atkins
- Aries Marine
- Dodsal
- Petrofac
- Maersk Oil Qatar
- Belleli Energy SpA
- Parsons
- Tebodin
- Grundfos
- Unique Wellube FZC
- Universal Tubes & Plastic Industries
- Petroleum Development Oman

Admission Procedure

The seats in the course are limited. Admission is on first-come-first-served basis and will close as soon as the seats are filled. For further queries regarding the course:

Pinnacle Knowledge Group
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Dubai, UAE
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Registration Desk: +971 4 3755526
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Email: cep@pinnacleknowledge.com
Website: www.pinnacleknowledge.com, www.iitb.ac.in/~cep

What do the Participants say?

This course is very good. Interaction with renowned Professors and the precise notes made me more competitive and confident to perform in the booming economy of UAE. After a hiatus of nearly 15 years, I could learn the latest techniques from the academicians and an institution of high repute. Thank you for giving me this opportunity.

Pravin Shelgaonkar, Parsons

It was a very good experience. It gave the opportunity to learn from people who have the scientific knowledge and confidence in the subject. It was also an opportunity to discuss and verify the things we had been doing for the past several years and clear our doubts.

Shiny Mathew, Belleli Energy SpA

I am thankful to PKG Dubai for bringing IITB to UAE, our work place, and arranging for us to attend the Piping Engg. Course conveniently, which is helping me to serve the end users better.

R. Venkatesh Raju, Universal Tubes and Plastic Industries

Being a novice in field of piping, the IIT certificate course on piping engineering introduced me to the various aspects of piping and helped me gain valuable insights in a short span of 2 weeks. Further, the course notes of the same, updated with latest editions of the codes and standards serves as a very useful and quick reference guide. Above all, the course helped me in making a very smooth and successful transition from the HVAC dept to the Oil and gas department as a Piping Designer in a leading UK MNC consultancy (ATKINS).

Dattatray Vasant Gore, *Atkins Global*

The piping engineering course was very useful from the practical point of view. I would say upon completion of the course the level of confident to work as a piping engineer is very high. The course content is designed in such a way to familiarize ourselves as a piping engineer to understand their

responsibilities and areas to be taken care in terms of design, construction, Quality and safety point of view which was very well addressed. I would also take the opportunity to thank both the professors who shared lot of their experiences which was awesome.

Ananthakrishnan, *Dubai Petroleum*

Very well put together course with excellent content. Was really impressed with how much I learned in such a short time.

Saju Parameswaran, *Grayloc*

The piping course organized by Pinnacle knowledge group provided a comprehensive overview of the piping activities being performed in the industry. Also, it highlighted the finer aspects to be taken into account during execution of the piping activities. The course also provided valuable guidelines and good engineering practices commonly followed in the industry by piping engineers.

Manish Sachdev, *Petrofac*

A very good course with nicely structured content, suited for the industry needs. Experienced professors with helping nature. Flexible enough but unique in nature

Shakir Ahmed, *Al Tayer Engineering*

I would like to thanks to Management of Pinnacle Knowledge Group for arranging Piping Engineering Certificate Course in Dubai by senior professors of IITB, Which helped me to update my profession. This course is perfect mix of industry and academia. I suggests to every engineer of UAE to take benefit of this course and obtain a rapid success in their profession.

Haider Jaffry, *Parsons*

This course has reshaped my career. Earlier I was working with MARS GCC, a chocolates manufacturer & was found it very difficult to change my career. But after this short course, Piping industry has opened the new doors for growth in my stagnant career. Now I am looking forward to bright future in the field of piping engineering, I have been selected as a piping engineer at a MNC.

Haridas A. Nair, *Mars GCC*

This Piping Engineering Course developed by IIT Mumbai, keeping in mind the current trend in industry and the basic of piping engineering. It is been taught by most experience and friendly professors of IIT. This course has boosted my professional Career. It is very helpful tool for designing as well as resolving problem on the field. It has made life much easier, Thanks to pinnacle for giving this opportunity here in Dubai.

Haris Kazmi, *Energy Engineering Systems*