COURSE OVERVIEW ME0630
The Layout of Piping Systems & Process Equipment

Course Title
The Layout of Piping Systems & Process Equipment

Course Reference
ME0630

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Date/Venue

Session(s)	Date	Venue
1	September 22-26, 2024	Horus Meeting Room, Holiday Inn & Suites Maadi, Cairo, Egypt
2	November 24-28, 2024	
3	January 26-30, 2025	

Course Description

This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

This course will familiarize engineers, designers and construction personnel with layout, design procedures and practices involved in the location of equipment and layout of piping systems. Traditionally there has been little formal training in this area and design decisions have to be made based on practical considerations without formulae or code reinforcement.

Completing piping arrangements take up the majority of manhours in the design of a process plant and the designer is required to apply acceptable layout procedures. This is an intensive five-day course that will give attendees the background required to complete a typical equipment layout and piping arrangement.

The course will also highlight the equipment layout and plot plans; civil, structural, electrical, instrumentation and maintenance considerations; distribution systems; pipe racks; pumps and piping, layout at horizontal centrifugal, vertical inline, double suction, positive displacement, performance characteristics, maintenance, cavitation, suction piping considerations, strainers, valving, parallel layouts, series layouts, supports, loads at nozzles.

During this interactive course, participants will learn the heat exchanger piping, maintenance requirements, shell and tube, plate, fin fan, valving, T.E.M.A. standards; horizontal and vertical vessels, placement, nozzle orientation, internals, platforms, ladders, manholes, maintenance requirements, valving, instrumentation, process considerations; and the process and utility piping.

Course Objectives

Upon the successful completion of this course, each participant will be able to: -

- Apply systematic techniques in the layout of piping systems and process equipment including design procedures and good international practices
- Implement the correct procedures involved in the layout of process equipment and piping system for a typical process unit containing pumps, valves, hangers, tanks, exchangers, horizontal drums and vertical towers
- Employ the requirements for the design and layout of piping system in order to achieve a well-structured installation of piping systems and process equipment
- Identify the factors that should be considered in the layout of equipment and plotting of plans including civil, structural, electrical and instrumentation aspects and other maintenance considerations
- Practice the various types of design and layout of piping system through workshops including process & utility piping, pump piping, storage tank piping, steam and condensate piping
- Implement nozzle orientation procedures in horizontal and vertical vessels
- Apply proper CAD techniques used in piping layout and piping stress analysis
- Perform the proper methodology for stress analysis using stress analysis programs and build flexible layouts

Who Should Attend

This course provides an overview of all significant aspects of the layout of piping systems & process equipment for piping, process and design engineers and designers entering the plant design field, senior draftsmen, piping and process draftsmen and practicing engineers requiring to expand their understanding of layout procedures. Further, it is suitable for piping fabricators, contractors and suppliers wishing to understand the relationship of manufacture and fabrication to the design, layout and construction of piping systems and piping design as well as analysis personnel wishing to expand their knowledge through this program which will offer practical solutions to design problems.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Dr. Ahmed El-Sayed, PhD, MSc, BSc, is a **Senior Electromechanical Engineer** with over **30 years** of extensive experience in **Oil**, **Gas**, **Refinery**, **Petrochemical**, **Power** and **Utilities** industries. He specializes in **Pumps**, **Valves**, **Boilers**, **Pressure Vessels**, **Heat Recovery Steam Generators** (**HRSG**), **Bearings**, **Compressors**, **Motors**, **Turbines**, **Actuators**, **Carbon Footprint**, **Energy Efficiency**, **Power Plant Performance & Efficiency**, **P&ID**, **Engineering Drawing**, **Codes & Standards** and **Hydraulic Systems**. He is currently the **Systems Control Manager** of **Siemens** where he is in-charge of Security & Control of power generation systems and he further takes part in the DCS implementation and commissioning.

During his career life, Dr. Ahmed has been actively involved in a variety of industrial activities including **Maintenance Planning & Scheduling**, **Reliability & Maintenance Management** and **Plant Shutdown & Turnarounds**. Moreover, he is an **authority** in vibration analysis, mechanical failure analysis, accident reconstruction, shock testing, measurement, analysis, calibration, ESS, HALT and HASS.

Dr. Ahmed is well-versed and conversant in the designed and applied automatic control systems using analogy instrumentation and computer-based control systems for a variety of industries with both analogue and discreet logic automatic control and implementation. Likewise, he is in-charge with troubleshooting and PID loop tuning of simple to complex systems installed and is involved in the design, implementation and documentation of emergency shut-down and safety instrumentation systems for a various processes especially for **hydraulics**, **steam turbines**, **gas turbines**, **boilers**, **heat recovery steam generators** and **large pumping systems**.

Dr. Ahmed has **PhD**, **Master** & **Bachelor** degrees in **Electromechanical and Instrumentation Engineering** from the **University of Wisconsin** (**USA**). Further, he is a **Certified Instructor/Trainer** and has **numerous papers** published internationally in the areas of **superconductive magnetic energy storage** (SMES), SMES role in power systems, power system blackout analysis, intelligent load shedding techniques for preventing power system blackouts and intelligent control of **boilers**, **heat exchangers** and **pumping systems**.

Dr. Ahmed has **PhD**, **Master's** & **Bachelor's** degree in **Electromechanical and Instrumentation Engineering** from the **University of Wisconsin** (**USA**). Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership and Management** (**ILM**) and has **numerous papers** published internationally in the areas of **superconductive magnetic energy storage** (SMES), SMES role in power systems, power system blackout analysis, intelligent load shedding techniques for preventing power system blackouts and intelligent control of **boilers**, **heat exchangers** and **pumping systems**.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours: -

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Fee

US$ 5,500 per Delegate + **VAT**. This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to Piping Layout*** *P&ID's ● Piping Arrangements ● Isometrics ● B.O.M.'s ● Piping Specifications*
0930 – 0945	*Break*
0945 – 1100	***Piping Components & Valves*** *Fittings – Butt Weld ● Socket Weld ● Threaded, Valve Types & Application*
1100 – 1215	***Equipment Layout & Plot Plans*** *Civil, Structural, Electrical, Instrumentation, Maintenance Considerations*
1215 – 1230	*Break*
1230 – 1420	***Workshop (1)*** *Problem Set*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0830	***Workshop (1) Review***
0830 – 0930	***Process & Utility Piping*** *Design & Layout of Piping Containing Liquid ● Vapour ● Steam ● Condensate ● Slurries ● Etc.*
0930 – 0945	*Break*
0945 – 1100	***Distribution Systems*** *Plot Plans ● Pipe Racks – Line Spacing ● Pipe Spans ● Alloy Lines ● Vibrating Lines ● Expansion Loops*

1100 – 1215	***Pipe Supports & Hangers*** *Selection & Location ● Anchors ● Guides ● Restraints ● Variable Springs ● Constant Load Springs*
1215 – 1230	*Break*
1230 – 1420	***Horizontal Vessels*** *Placement ● Nozzle Orientation ● Internals ● Platforms ●Ladders*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0830	***Workshop (2)*** *Review*
0830 – 0930	***Pumps & Piping*** *Layout at Horizontal Centrifugal ● Vertical Inline ● Double Suction ● Positive Displacement ● Performance Characteristics ● Maintenance*
0930 – 0945	*Break*
0945 – 1100	***Pumps & Piping (cont'd)*** *Cavitation ● Suction Piping Considerations ● Strainers ● Valving ● Parallel Layouts ● Series Layouts ● Supports ● API 610 Loads at Nozzles*
1100 – 1215	***Heat Exchangers*** *Shell & Tube ● Fin-Tube ● Plate ● Piping Layout Considerations ● Nozzle Loading*
1215 – 1230	*Break*
1230 – 1420	***Fin Fans*** *Locations ● Types ● Piping Arrangements*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

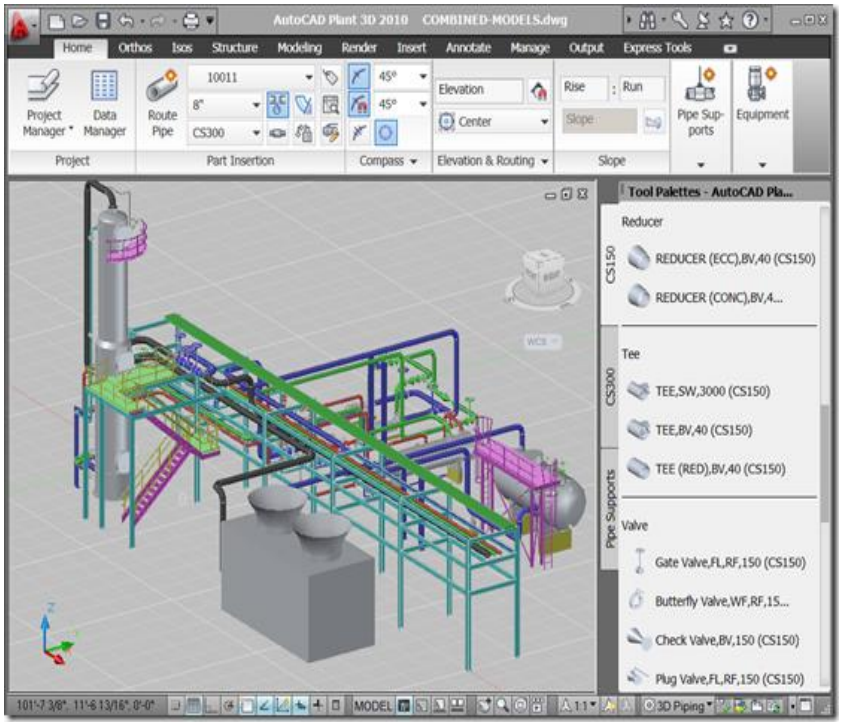
0730 – 0830	***Workshop (3)*** *Review*
0830 – 0930	***Storage Tanks*** *Tank Types ● Fixed & Floating Roofs ● Dyked Area Design ● Fire Protection ● Off Site Piping*
0930 – 0945	*Break*
0945 – 1100	***Instrumentation*** *Level, Flow, Pressure & Temperature Variables ● Control Valves & Sets ● Relief Valves*
1100 – 1215	***Steam & Condensate Piping*** *Steam Traps ● Condensate Collection Systems ●Drip Legs ● Steam Tracing Manifolds*
1215 – 1230	*Break*
1230 – 1420	***Workshop (4)*** *Problem Set*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

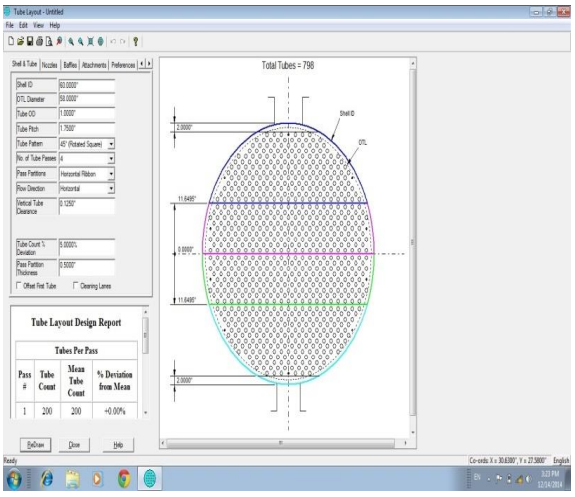
0730 – 0830	***Towers & Vertical Vessels*** *Distillation Columns ● Tower Internals ● Trays ● Packings ● Reboilers ● Nozzle Orientation ● Piping at Towers ● Supports*
0830 – 0930	***Towers & Vertical Vessels (cont'd)*** *Platforms & Ladders ● Piping Layout*
0930 – 0945	*Break*
0945 – 1115	***Compressors*** *Reciprocating ● Centrifugal ● Piping at Compressors ● Vibration Considerations*
1115 – 1215	***Purposes of Stress Analysis*** *Methodology ● Static Analysis ● Using Stress Analysis Programs*
1215 – 1230	*Break*
1230 – 1315	***Stress Analysis*** *Building Flexible Layouts*
1315 – 1345	***Static Stress Analysis*** *Problem Set*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulator (Hands-on Practical Sessions)

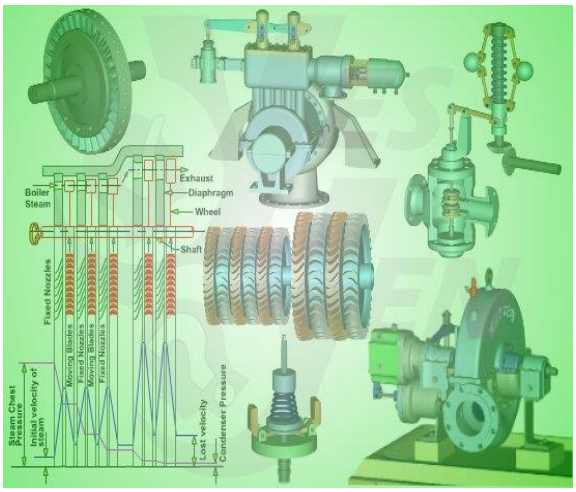
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art simulators "Autocad Piping Software", "Heat Exchanger Tube Layout Simulator", "Steam Turbines & Governing System CBT", "Single Shaft Gas Turbine Simulator" and "Two Shaft Gas Turbine Simulator".



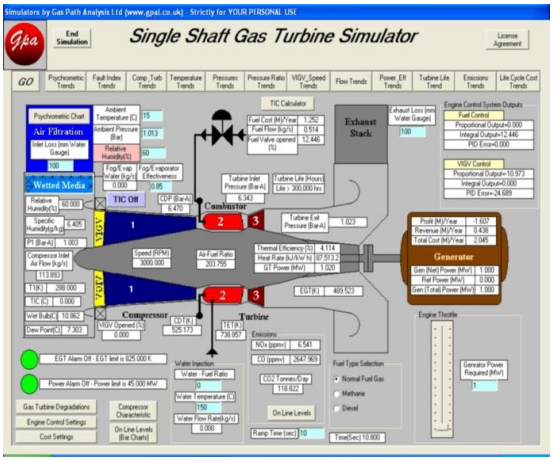
Autocad Piping Software



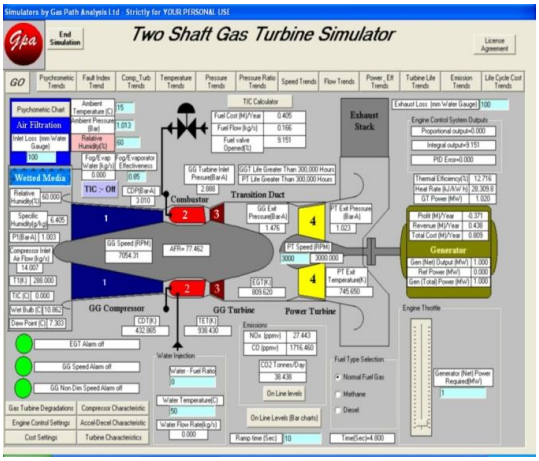
Heat Exchanger Tube Layout Simulator



Steam Turbines & Governing System CBT



Single Shaft Gas Turbine Simulator



Two Shaft Gas Turbine Simulator

Course Coordinator

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