COURSE OVERVIEW ME0731-4D
ASME Section II: Boiler & Pressure Vessel Materials

Course Title
ASME Section II: Boiler & Pressure Vessel Materials

Course Reference
ME0731-4D

Course Duration/Credits
Four days/2.4 CEUs/24 PDHs

Course Date/Venue

Session(s)	Date	Venue
1	July 08-11, 2024	Al Aziziya Hall, The Proud Hotel Al Khobar, Al Khobar, KSA
2	October 07-10, 2024	Plaza 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

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 is designed to provide participants with a detailed and up-to-date overview of boiler and pressure vessel materials in accordance with ASME section II. It covers the ferrous and non-ferrous material specifications; the rolled structural steels, carbon, alloy, ferritic malleable iron castings, electric resistance-welded steel pipe, alloy steel and stainless steel; the nickel, molybdenum, carbon-molybdenum alloy steel, martensitic stainless, manganese-vanadium-nickel, chromium-vanadium alloy steel, welded austenitic steel and gray iron castings; and the manganese-molybdenum-nickel, ferritic ductile iron pressure-retaining castings, forged or rolled 8 and 9% nickel alloy steel, high-temperature service and annealed or cold-worked austhenitic stainless steel.

Further, the course will also discuss the age-hardening stainless-steel forgings including the test methods, practices and terminology for chemical analysis of steel products; the carbon steel and low-alloy steel pressure-vessel-component forgings with mandatory toughness requirements; the common requirements of castings, steel and alloy for general industrial use; and the titanium-stabilized carbon steel forgings, ferritic ductile iron castings suitable for low-temperature service, structural quality steels and hot rolled products for structural steels.

During this interactive course, participants will learn the flat products made of steels and steel forgings for pressure purposes; the aluminum-alloy sand castings, composition bronze or ounce metal castings, copper-silicon alloy, aluminum-alloy permanent mold castings, nickel-copper alloy, aluminum-bronze sand castings, copper-nickel-zinc alloy, etc.; the specifications for welding rods, electrodes and filler metals; the stress tables, physical properties tables and charts and tables for determining shell thickness of components under external pressure; the basis for establishing design stress intensity values, pressure charts and stress values; the guidelines on multiple marking of materials and standard units for use in equations; nominal composition designations for ASME code materials and the guidance for the use of U.S. customary and SI units in the ASME boiler and pressure vessel code; the guidelines for rounding minimum specified tensile and yield strength values, establish anchor points for tensile and yield strength trend curves.

Course Objectives

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

- Apply and gain a comprehensive knowledge on boiler and pressure vessel materials in accordance with ASME section II
- Differentiate ferrous and non-ferrous material specifications
- Identify rolled structural steels, carbon, alloy, ferritic malleable iron castings, electric resistance-welded steel pipe, alloy steel and stainless steel
- Determine nickel, molybdenum, carbon-molybdenum alloy steel, martensitic stainless, manganese-vanadium-nickel, chromium-vanadium alloy steel, welded austenitic steel and gray iron castings
- Recognize manganese-molybdenum-nickel, ferritic ductile iron pressure-retaining castings, forged or rolled 8 and 9% nickel alloy steel, high-temperature service and annealed or cold-worked austhenitic stainless steel
- Describe age-hardening stainless-steel forgings including the test methods, practices and terminology for chemical analysis of steel products
- Identify the carbon steel and low-alloy steel pressure-vessel-component forgings with mandatory toughness requirements
- List the common requirements of castings, steel and alloy for general industrial use
- Discuss the titanium-stabilized carbon steel forgings, ferritic ductile iron castings suitable for low-temperature service, structural quality steels and hot rolled products for structural steels
- Recognize the flat products made of steels and steel forgings for pressure purposes
- Determine aluminum-alloy sand castings, composition bronze or ounce metal castings, copper-silicon alloy, aluminum-alloy permanent mold castings, nickel-copper alloy, aluminum-bronze sand castings, copper-nickel-zinc alloy, etc
- Explain the specifications for welding rods, electrodes and filler metals
- Identify stress tables, physical properties tables and charts and tables for determining shell thickness of components under external pressure
- Discuss the basis for establishing design stress intensity values, pressure charts and stress values

- Review the guidelines on multiple marking of materials and standard units for use in equations
- Develop nominal composition designations for ASME code materials and explain the guidance for the use of U.S. customary and SI units in the ASME boiler and pressure vessel code
- Discuss the guidelines for rounding minimum specified tensile and yield strength values and establish anchor points for tensile and yield strength trend curves

Who Should Attend

This course provides an overview of all significant aspects and considerations of ASME section II for boilers and pressure vessel materials for boiler and fired pressure equipment engineers and operators, mechanical engineers, maintenance engineer, plant engineers, process engineers, boiler and fired pressure equipment consultants, contractors and plant supervisors and managers.

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$ 4,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation

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

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 **2.4 CEUs** (Continuing Education Units) or **24 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.

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:

Mr. Dimitry Rovas, CEng, MSc, PMI-PMP, SMRP-CMRP is a **Senior Mechanical & Maintenance Engineer** with extensive industrial experience in **Oil**, **Gas**, **Power** and **Utilities** industries. His expertise includes **Boiler** Inspection & Maintenance, **Boiler** Systems, **Boiler** instrumentation & Controls, **Boiler** Start-up & Shutdown, **Boiler** Operation & Steam System Management, **Boiler** Water Chemistry & Treatment, **Boiler** Efficiency & Waste Heat Recovery, **Boiler** Inspection & Testing, **Boiler** Maintenance, **Boiler** Troubleshooting & Safety, **Boiler** Emissions & Pollution Control, **Combustion** Analysis & Tuning Procedures, **Water Treatment** Technology, Heat Recovery Steam Generating (**HRSG**), **Impulse Tube** Installation & Inspection, **Parker Compression Fittings**, **Pipes & Fittings**, **PSV Inspection**, **Root Cause Failure Analysis**, **Tank** Design & Engineering, **Tank Shell**, **Tanks & Tank Farms**, **Vacuum Tanks**, **Gas Turbine** Operating & Maintenance, **Diesel Engine**, **Engine Cycles**, **Governors & Maintenance**, **Crankshafts** & Maintenance, **Lubrication** System Troubleshooting & Maintenance, **Engines/Drivers**, **Motor** Failure Analysis & Testing, **Motor** Predictive Maintenance, **Engine** Construction & Maintenance, **HP Fuel Pumps & Maintenance**, **Fired Equipment** Maintenance, Combustion **Techniques**, **Process Heaters**, Glass Reinforced Epoxy (**GRE**), Glass Reinforced Pipes (**GRP**), Glass Reinforced Vent (**GRV**), **Mechanical Pipe Fittings**, **Flange Joint Assembly**, Adhesive Bond Lamination, **Butt Jointing**, **Joint & Spool Production**, **Isometric Drawings**, **Flange Assembly** Method, **Fabrication & Jointing**, Jointing & Spool Fabrication, **CAESAR**, **Pipe Stress Analysis**, **Pipe Cuttings**, **Flange Bolt Tightening** Sequence, **Hydro Testing**, **Pump** Technology, Fundamentals of **Pumps**, **Pump** Selection & Installation, **Centrifugal Pumps & Troubleshooting**, **Reciprocating & Centrifugal Compressors**, **Screw Compressor**, **Compressor** Control & Protection, **Gas & Steam Turbines**, **Turbine** Operations, **Gas Turbine** Technology, **Valves**, **Process Control Valves**, **Bearings & Lubrication**, Advanced **Machinery Dynamics**, **Rubber Compounding**, **Elastomers**, **Thermoplastic**, **Industrial Rubber Products**, **Rubber** Manufacturing Systems, **Heat Transfer**, **Vulcanization Methods**, **Process Plant Shutdown & Turnaround**, **Professional Maintenance Planner**, Advanced **Maintenance Management**, **Maintenance Optimization & Best Practices**, **Maintenance Auditing & Benchmarking**, **Material Cataloguing**, **Reliability** Management, **Rotating Equipment**, **Energy Conservation**, **Energy Loss Management** in Electricity Distribution Systems, **Energy Saving**, **Thermal Power Plant** Management, **Thermal Power Plant** Operation & Maintenance, **Heat Transfer**, **Machine Design**, **Fluid Mechanics**, **Heating & Cooling Systems**, **Heat Insulation Systems**, **Heat Exchanger & Cooling Towers**, **Mechanical Erection**, **Heavy Rotating Equipment**, Material Unloading & Storage, Commissioning & Start-Up. He is currently the **Project Manager** wherein he is managing, directing and controlling all activities and functions associated with the domestic heating/cooling facilities projects.

During his life career, Mr. Rovas has gained his practical and field experience through his various significant positions and dedication as the **EPC Project Manager**, **Maintenance Manager**, **Mechanical Engineer**, **Field Engineer**, **Preventive Maintenance Engineer**, **Lead Rotating Equipment Commissioning Engineer**, **Construction Commissioning Engineer**, **Offshore Lead Maintenance Engineer**, **Researcher**, **Instructor/Trainer**, **Telecom Consultant** and **Consultant** from various companies such as the Mytilineos Aluminium Group, Podaras Engineering Studies, Metka and Diadikasia, S.A., **Hellenic Petroleum Oil Refinery** and COSMOTE.

Mr. Rovas has **Master's** degrees in **Energy Production & Management** and **Mechanical Engineering** from the **National Technical University of Athens** (**NTUA**), **Greece**. Further, he is a **Certified Instructor/Trainer**, a **Certified Maintenance and Reliability Professional** (**CMRP**) from the Society of Maintenance & Reliability Professionals (**SMRP**), **Certified Project Management Professional** (**PMI-PMP**), **Certified Six Sigma Black Belt**, **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**), **Certified Construction Projects Contractor**, **Certified Energy Auditor** and a **Chartered Engineer**. Moreover, he is an active member of **American Society for Quality**, Project Management Institute (**PMI**), **Body of Certified Energy Auditors** and **Technical Chamber of Greece**. He has further received various recognition and awards and delivered numerous trainings, seminars, courses, workshops and conferences internationally.

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	***Ferrous Material Specifications*** *Rolled Structural Steel • Carbon & Alloy • Carbon Structural Steel • Ferritic Malleable Iron Castings • Electric Resistance-Welded Steel • Alloy Steel & Stainless Steel • Alloy Steel, Nickel • Alloy Steel, Molybdenum • Carbon-Molybdenum Alloy Steel • Martensitic Stainless & Alloy*
0930 – 0945	*Break*
0945 – 1100	***Ferrous Material Specifications (cont'd)*** *Alloy Steel, Manganese-Vanadium Nickel • Chromium-Vanadium Alloy Steel • Chromium & Chromium-Nickel Stainless Steel • Welded Austenitic Steel • Gray Iron Castings • Alloy Steel, Manganese-Molybdenum & Manganese-Molybdenum-Nickel • Steel Castings, Ferritic & Martensitic • Electric-Fusion-Welded Austenitic Chromium-Nickel Stainless Steel • Ferritic Ductile Iron Pressure-Retaining Castings • Forged or Rolled 8 & 9% Nickel Alloy Steel • Alloy Steel, Quenched & Tempered, Manganese-Molybdenum & Manganese-Molybdenum-Nickel*
1100 – 1200	***Ferrous Material Specifications (cont'd)*** *Alloy Steel, Quenched & Tempered, Chromium Molybdenum & Chromium-Molybdenum-Vanadium • Alloy Steel, Quenched & Tempered, Nickel-Chromium-Molybdenum • High-Temperature Service • Annealed or Cold-Worked Austenitic Stainless Steel • Age-Hardening Stainless Steel Forgings • Test Methods, Practices & Terminology for Chemical Analysis of Steel Products • Carbon Steel & Low-Alloy Steel Pressure-Vessel-Component Forgings with Mandatory Toughness Requirements • Casting, Steel & Alloy, Common Requirements for General Industrial Use • Titanium-Stabilized Carbon Steel Forgings • Ferritic Ductile Iron Castings Suitable for Low-Temperature Service*
1200 – 1215	*Break*
1215 – 1420	***Ferrous Material Specifications (cont'd)*** *Structural Quality Steels • Hot Rolled Products of Structural Steels • Flat Products Made of Steels for Pressure Purposes • Stainless Steels • Steel Forgings for Pressure Purposes • Hot Rolled Medium & High Tensile Structural Steel • Carbon Steel Plates for Pressure Vessels for Intermediate & Moderate Temperature Service • Heavy-Walled Ferritic Spheroidal Graphite Iron Castings for Low Temperature Service*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Nonferrous Material Specifications*** *Aluminum-Alloy Sand Castings • Composition Bronze or Ounce Metal Castings • Copper-Silicon Alloy • Aluminum-Alloy Permanent Mold Castings • Nickel-Copper Alloy • Aluminum-Bronze Sand Castings • Copper-Nickel-Zinc Alloy*
0930 – 0945	*Break*
0945 – 1100	***Nonferrous Material Specifications (cont'd)*** *Nickel-Chromium-Iron Alloys • Nickel-Chromium-Cobalt-Molybdenum Alloy • Nickel-Iron-Chromium-Tungsten Alloy • Aluminum Bronze • Aluminum & Aluminum-Alloy Die Forgings, Hand Forgings & Rolled Ring Forgings • Copper-Base Alloy Centrifugal Castings • Copper & Copper-Alloy Die Forgings (Hot-Pressed)*
1100 – 1200	***Nonferrous Material Specifications (cont'd)*** *Titanium & Titanium Alloy • Copper-Nickel Alloy Castings • Titanium & Titanium Alloy Forgings • Nickel-Iron-Chromium-Molybdenum-Copper Alloy • Zirconium & Zirconium Alloy Forgings • Castings, Nickel & Nickel Alloy*
1200 – 1215	*Break*
1215 – 1420	***Nonferrous Material Specifications (cont'd)*** *Copper Alloy Continuous Castings • Nickel Alloy Forgings • Nickel-Iron-Chromium-Molybdenum Alloy • Nickel-Iron-Chromium-Silicon Alloy • Castings, Zirconium-Base, Corrosion Resistant for General Application • General Requirements for Copper Alloy Castings*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***Specifications for Welding Rods, Electrodes & Filler Metals*** *Welding & Brazing Consumables – Procurement of Filler Materials & Fluxes • Filler Metal Standard Sizes, Packaging & Physical Attributes • Carbon Steel Electrodes for Shielded Metal Arc Welding • Carbon & Low-Alloy Steel Rods for Oxyfuel Gas Welding • Aluminum & Aluminum-Alloy Electrodes for Shielded Metal Arc Welding • Stainless Steel Electrodes for Shielded Metal Arc Welding • Low-Alloy Steel Electrodes for Shielded Metal Arc Welding • Copper & Copper-Alloy Electrodes for Shielded Metal Arc Welding • Copper & Copper-Alloy Bare Welding Rods & Electrodes • Filler Metals for Brazing & Braze Welding*
0930 – 0945	*Break*
0945 – 1100	***Specifications for Welding Rods, Electrodes & Filler Metals (cont'd)*** *Bare Stainless Steel Welding Electrodes & Rods • Welding Consumables – Wire Electrodes, Wires & Rods for Welding of Aluminum & Aluminum Alloys – Classification • Nickel & Nickel-Alloy Welding Electrodes for Shielded Metal Arc Welding • Tungsten & Oxide Dispersed Tungsten Electrodes for Arc Welding & Cutting • Surfacing Electrodes for Shielded Metal Arc Welding • Nickel & Nickel-Alloy Bare Welding Electrodes & Rods • Welding Electrodes & Rods for Cast Iron • Titanium & Titanium-Alloy Welding Electrodes & Rods • Carbon Steel Electrodes & Fluxes for Submerged Arc Welding*

1100 – 1200	***Specifications for Welding Rods, Electrodes & Filler Metals (cont'd)*** *Carbon Steel Electrodes & Rods for Gas Shielded Arc Welding • Carbon Steel Electrodes for Flux Cored Arc Welding • Bare Electrodes & Rods for Surfacing • Stainless Steel Flux Cored & Metal Cored Welding Electrodes & Rods • Low-Alloy Steel Electrodes & Fluxes for Submerged Arc Welding • Zirconium & Zirconium-Alloy Welding Electrodes & Rods • Carbon & Low-Alloy Steel Electrodes & Fluxes for Electroslag Welding • Carbon & Low-Alloy Steel Electrodes for Electrogas Welding • Low-Alloy Steel Electrodes & Rods for Gas Shielded Arc Welding*
1200 – 1215	*Break*
1215 – 1420	***Specifications for Welding Rods, Electrodes & Filler Metals (cont'd)*** *Low-Alloy Steel Electrodes for Flux Cored Arc Welding • Consumable Inserts • Fluxes for Brazing and Braze Welding • Welding Shielding Gases • Nickel-Alloy Flux Cored and Metal Cored Welding Electrodes • Covered Electrodes for Underwater Wet Shielded Metal Arc Welding • Carbon & Low-Alloy Steel Flux Cored Electrodes for Flux Cored Arc Welding & Metal Cored Electrodes for Gas Metal Arc Welding • Flux & Electrode Combinations for Submerged Arc & Electroslag Joining & Surfacing of Stainless Steel & Nickel Alloys*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

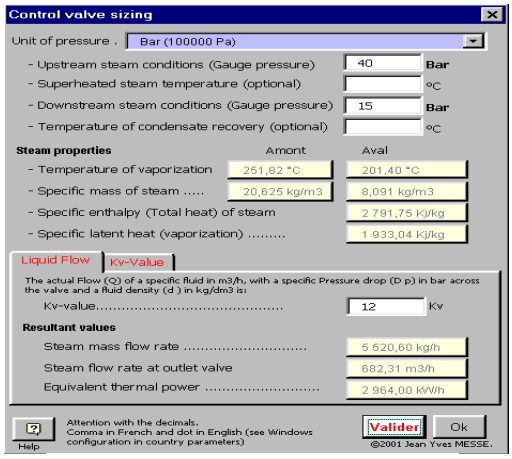
Day 4

0730 – 0930	***Properties*** *Stress Tables • Physical Properties Tables • Charts & Tables for Determining Shell Thickness of Components Under External Pressure • Basis for Establishing Stress Values in Tables 1A and 1B*
0930 – 0945	*Break*
0945 – 1100	***Properties (cont'd)*** *Basis for Establishing Design Stress Intensity Values for Tables 2A, 2B, & 4, and Allowable Stress Values for Table 3 • Basis for Establishing External Pressure Charts • Guidelines on the Approval of New Materials Under the ASME Boiler & Pressure Vessel Code • Basis for Establishing Stress Values in Tables 6A, 6B, 6C, and 6D*
1100 – 1200	***Properties (cont'd)*** *Guidelines on Multiple Marking of Materials • Standard Units for Use in Equations • Basis for Establishing Maximum Allowable Stress Values for Tables 5A & 5B • Issues Associated With Materials Used in ASME Code Construction*
1200 – 1215	*Break*

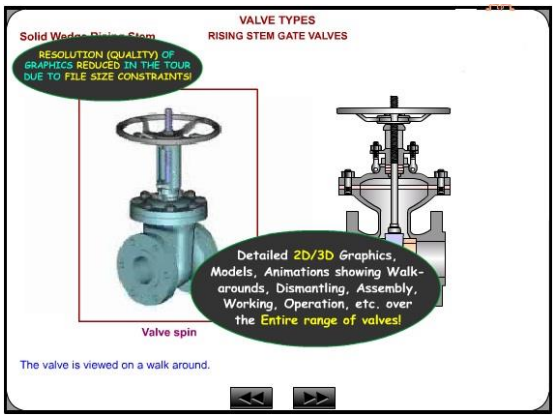
1215 – 1345	***Properties (cont'd)*** *Developing Nominal Composition Designations for ASME Code Materials • Guidance for the Use of U.S. Customary and SI Units in the ASME Boiler & Pressure Vessel Code • Guidelines for Rounding Minimum Specified Tensile and Yield Strength Values & for Establishing Anchor Points for Tensile & Yield Strength Trend Curves in Tables 1A, 1B, 2A, 2B, 3, 4, 5A, 5B, U, & Y-1 • Material Data for Stress Analysis in the Time-Dependent Regime*
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)

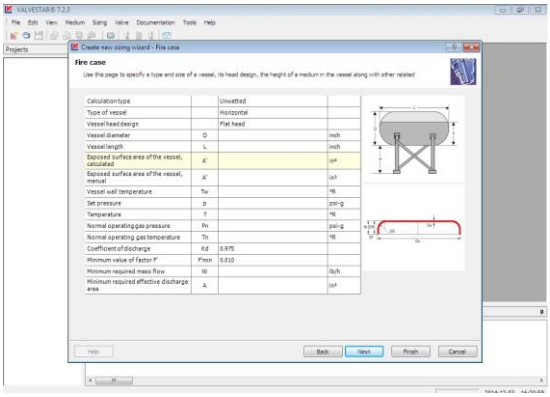
Practical session will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the simulator "Win Boiler Sim", "Valve Sizing Software", "Valve Software 3.0", "Valvestar 7.2 Software" and "PRV²SIZE Software".



Valve Sizing Software

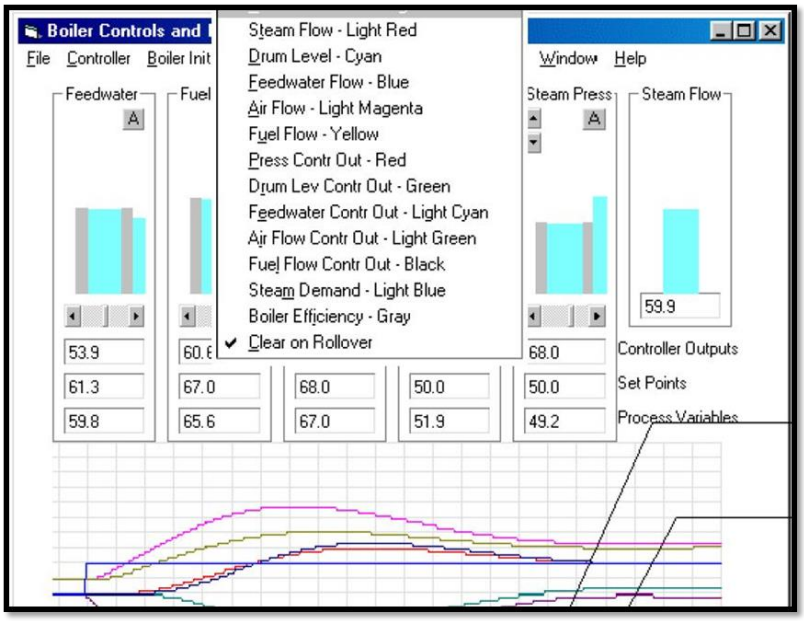


Valve Software 3.0



Valvestar 7.2 Software

PRV²SIZE Software



Win Boiler Sim

Course Coordinator

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org