COURSE OVERVIEW ME1137

Fuel Gas System Operations, Control and Troubleshooting

Course Title

Fuel Gas System Operations, Control and Troubleshooting

Course Date/Venue

Please see page 3

Course Reference

ME1137

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs

Course Description

This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.

This course is designed to provide participants with a detailed and up-to-date overview of Fuel Gas System Operations, Control and Troubleshooting. It covers the fuel gas systems and the principles of gas flow and distribution; the fuel gas system control methods, fuel gas measurement and monitoring and fuel gas purity and quality control; the safety considerations in fuel gas operations and fuel gas storage and handling; the gas compressors, pumps, fuel gas piping, valves and heat exchangers in fuel gas systems; and the gas pressure regulators, control valves and fuel gas burner management systems (BMS).

During this interactive course, participants will learn the automation systems in fuel gas systems, control systems for fuel gas pressure and flow and safety instrumented systems (SIS); the fuel gas system troubleshooting methodology and system optimization for efficiency and reliability; the software tools for fuel gas system management and fuel gas compressor failures; the gas leak detection and prevention, fuel gas pressure and flow issues and fuel gas burner issues; troubleshooting, maintaining and repairing fuel gas system components; the best practices for fuel gas system design and advanced fuel gas system troubleshooting techniques; and the fuel gas system performance monitoring and reporting including fuel gas system safety and compliance.

Course Objectives

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

- Apply and gain a comprehensive knowledge on fuel gas system operations, control and troubleshooting
- Discuss fuel gas systems and the principles of gas flow and distribution
- Carryout fuel gas system control methods, fuel gas measurement and monitoring and fuel gas purity and quality control
- Apply safety considerations in fuel gas operations and fuel gas storage and handling
- Recognize gas compressors, pumps, fuel gas piping, valves and heat exchangers in fuel gas systems
- Identify gas pressure regulators, control valves and fuel gas burner management systems (BMS)
- Discuss automation systems in fuel gas systems, control systems for fuel gas pressure and flow and safety instrumented systems (SIS)
- Carryout fuel gas system troubleshooting methodology and system optimization for efficiency and reliability
- Recognize software tools for fuel gas system management and fuel gas compressor failures
- Apply gas leak detection and prevention, troubleshoot PLC/DCS control system issues, analyze control loop malfunctions and identify the common faults in sensors and transmitters
- Identify fuel gas pressure and flow issues, fuel gas burner issues and troubleshooting and maintain and repair fuel gas system components
- Employ best practices for fuel gas system design and advanced fuel gas system troubleshooting techniques
- Apply fuel gas system performance monitoring and reporting including fuel gas system safety and compliance

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of fuel gas system operations, control and troubleshooting for process engineers, operations and control room personnel, maintenance engineers and technicians, instrumentation and control engineers, supervisors and team leaders, technical consultants and auditors and those who involved in the operation, maintenance, design, and management of fuel gas systems in refinery and petrochemical environments.

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 Date/Venue

Session(s)	Date	Venue
1	May 05-09, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
2	July 13-17,2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE
3	October 06-10, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
4	December 07-11, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE

Accommodation

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

Course Fee

US$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

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: -

- 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.

- 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.

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. Robert Harvey, MSc (Cum Laude), BSc is a **Senior Process & Chemical Engineer** with over **30 years** of in-depth industrial experience within the **Oil & Gas**, **Refinery**, **Petrochemical**, **Mining** and **Power** industries. His expertise widely covers in the areas of **Operations Abnormalities & Plant Upset**, **Fertilizer Manufacturing** Process Technology, **Fertilizer Storage** Management (Ammonia & Urea), **Petrochemical & Fertilizer** Plants, **Nitrogen Fertilizer** Production, **Petroleum Industry Process** Engineering, **Process Equipment** Design & Troubleshooting, **Process Equipment & Piping Systems**, **Fertilizer** Manufacturing Process Technology, **Production** Management, **Process Plant** Optimization & Continuous Improvement, **Production Process** Optimization, **Process Analyzers**, **Process Equipment** Design, Vinyl Chloride Monomer (**VCM**) Manufacturing & Process Troubleshooting, **Cement** Manufacturing Process Technology & Standards, **Process Equipment & Piping** System, **Process Plant** Optimization & Continuous Improvement, **Process Plant** Performance & Efficiency, **Troubleshooting Process Operations**, Modern **Aluminium Production Processes**, **Cement Kiln Process**, **Process Engineer Calculations**, Steel Making Process, **Process Diagrams** Review, Process Hazard Analysis (**PHA**), Process Mapping, Strategical Process Control in Process Industry, **Revamping & Debottlenecking**, **Pressure Vessel** Operation, **Heat Mass Balance**, **Distillation-Column** Operation, & Troubleshooting, **Debottlenecking**, **Unit Performance** Optimization, Real Time Online Optimization, **Operations Planning** Optimization, **Engineering Problem Solving**, **Bag Filters** Operation & Maintenance, Chemical Reaction Engineering Application, **Phosphatic Industry**, **Diammonium Phosphate**, **Monoammonium Phosphate**, **NPK**, Troubleshooting Improvement, **Production** Management, **Distillation-Column** Operation & Troubleshooting, **Monomer** Handling Safety, Complex Operational Troubleshooting, Incident **Root Cause Analysis** & Corrective Action, **Fertilizer** Manufacturing, Continuous Improvement & Benchmarking, **Energy Efficiency** for Process Plants, **Pressure Vessel** Operation, **Reactors & Storage Tanks**, Dehydrating Columns, Heat & Material Balance, **P&ID** Reading & Interpretation, **Detailed Engineering Design**, **HAZOP** Leadership, Project HSE Review (**PHSER**), Safe Handling of **Propylene Oxide & Ethylene Oxide**, Safety in **Process & Industrial Plants**, Environmental Impact Assessment (**EIA**) and Effective **Risk Assessment & HAZOP** Studies. Further, he is also well versed in Feasibility Studies Analysis & Evaluation, Project Gate System Procedures, Change Management Skills, Change Management Strategy, Developing Commercial Contracts, Project Management Skills, Project Scheduling & Cost Control, FIDIC & Other Model Contracts, EPC & EPCM Contracts, Knowledge Management, Job Evaluation, Creative Problems Solving & Innovation Skills, Problem Solving & Decision Making, Strategic Planning & Creative Thinking and Mind Mapping.

During his career life, Mr. Harvey has gained his practical and field experience through his various significant positions and dedication as the **Commercial Director**, **Manufacturing Director**, **Chief Operating Officer**, **Head Projects Division**, **Project Leader**, **Lead Technical Advisor/Consultant** and **Project Consultant** to various international companies such as the Trade and Industrial Policy Strategies (TIPS), PGBI Johannesburg, IDC Green Industries SBU/Arengo 316 Pty Ltd, Ferrum Crescent Limited, CEF Limited, Rio Tinto Alcan, Industrial Development Corporation of SA (IDC) and AECI Limited.

Mr. Harvey has **Master** (**Cum Laude**) and **Bachelor** degrees in **Chemical Engineering**. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**) and has delivered various trainings, seminars, conferences, workshops and courses globally.

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	***Overview of Fuel Gas Systems*** *Components of a Fuel Gas System • Types of Fuel Gas Systems in Refining • Key Operational Parameters • Importance in Refinery Processes*
0930 - 0945	*Break*
0945 – 1045	***Principles of Gas Flow & Distribution*** *Basic Gas Flow Principles • Gas Pressure and Temperature Regulation • Types of Gas Compressors and Pumps • Distribution Network Design*
1045 - 1145	***Fuel Gas System Control Methods*** *Control Loops and Automation • PID Control in Fuel Gas Systems • Pressure and Flow Control Systems • Control Valve Selection and Configuration*
1145 - 1230	***Fuel Gas Measurement & Monitoring*** *Gas Flow Measurement Techniques • Pressure and Temperature Monitoring • Leak Detection Methods • Monitoring Systems for Operational Efficiency*
1230 – 1245	*Break*
1245 – 1330	***Fuel Gas Purity & Quality Control*** *Importance of Gas Quality in Refinery Operations • Gas Contamination and its Impact on Performance • Filtration and Purification Systems • Gas Analysis Techniques*
1330 - 1420	***Safety Considerations in Fuel Gas Operations*** *Hazard Identification in Fuel Gas Systems • Safety Management and Protocols • Emergency Shutdown Systems (ESD) • Safe Handling of Combustible Gases*
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 – 0830	***Fuel Gas Storage & Handling*** *Storage Tank Design and Operation • Pressure Vessels and Their Safety Aspects • Handling Procedures for High-Pressure Gas Systems • Safety Valves and Rupture Discs*
0830 – 0930	***Gas Compressors & Pumps*** *Types of Compressors (Reciprocating, Screw, Centrifugal) • Pumping Mechanisms and Their Applications • Compressor Performance Monitoring • Maintenance and Troubleshooting of Compressors*
0930 - 0945	*Break*
0945 – 1130	***Fuel Gas Piping & Valves*** *Material Selection for Fuel Gas Piping • Types of Valves Used in Gas Systems • Piping Layout Considerations • Valve Maintenance and Troubleshooting*

1130 - 1230	***Heat Exchangers in Fuel Gas Systems*** *Role of Heat Exchangers in Gas Conditioning • Types of Heat Exchangers • Heat Exchanger Operation and Maintenance • Troubleshooting Common Heat Exchanger Issues*
1230 - 1245	*Break*
1245 - 1330	***Gas Pressure Regulators & Control Valves*** *Types and Working Principles of Regulators • Control Valve Sizing and Selection • Valve Automation and Control Systems • Troubleshooting Common Valve Problems*
1330 - 1420	***Fuel Gas Burner Management Systems (BMS)*** *Burner Safety Systems and Controls • Combustion Management in Gas-Fired Equipment • Burner Optimization and Tuning • Troubleshooting Burner Malfunctions*
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 – 0830	***Automation Systems in Fuel Gas Systems*** *Overview of SCADA and DCS Systems • Role of Automation in Gas System Control • Control Strategies for System Optimization • Integration with Refinery Process Controls*
0830 – 0930	***Control Systems for Fuel Gas Pressure & Flow*** *Pressure and Flow Regulation in Gas Systems • Control Algorithms for Fuel Gas Systems • Managing Fluctuations in Gas Demand • Calibration and Tuning of Control Loops*
0930 - 0945	*Break*
0945 – 1130	***Safety Instrumented Systems (SIS)*** *Principles of SIS in Fuel Gas Systems • SIL (Safety Integrity Level) Requirements • Emergency Shutdown (ESD) Systems Design • Testing and Validation of Safety Systems*
1130 - 1230	***Fuel Gas System Troubleshooting Methodology*** *Common Failure Modes in Fuel Gas Systems • Fault Isolation and Troubleshooting Techniques • Diagnostic Tools for Gas System Issues • Root Cause Analysis for System Failures*
1230 - 1245	*Break*
1245 - 1330	***System Optimization for Efficiency & Reliability*** *Optimizing Fuel Gas Consumption in Refinery Operations • Energy-Saving Strategies in Gas Systems • Monitoring System Efficiency and Performance • Best Practices for Maintaining Reliable Operation*
1330 - 1420	***Software Tools for Fuel Gas System Management*** *Overview of Simulation Tools for Gas System Analysis • Predictive Maintenance Using Software Tools • Real-Time Monitoring and Data Logging • Software Integration with Refinery Operations*
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 – 0830	***Fuel Gas Compressor Failures*** *Common Compressor Failure Modes • Diagnosing Compressor Vibrations, Leaks and Noise • Preventive Maintenance Practices for Compressors • Repair and Replacement Considerations*
0830 – 0930	***Gas Leak Detection & Prevention*** *Types of Gas Leaks and their Causes • Leak Detection Technologies (Infrared, Ultrasonic) • Leak Sealing and Remediation Methods • Gas Detection Alarms and Systems*
0930 - 0945	*Break*
0945 – 1130	***Control System Failures & Troubleshooting*** *Troubleshooting PLC/DCS Control System Issues • Analyzing Control Loop Malfunctions • Common Faults in Sensors and Transmitters • Restoring Control System Functionality*
1130 - 1230	***Fuel Gas Pressure & Flow Issues*** *Diagnosing Pressure Drops and Flow Inconsistencies • Impact of Faulty Regulators or Control Valves • Correcting Pressure Regulation Problems • Dealing with High-Pressure Safety Cutoffs*
1230 - 1245	*Break*
1245 - 1330	***Fuel Gas Burner Issues & Troubleshooting*** *Common Burner Malfunctions (Flame Instability, Ignition Failure) • Flame Detection and Monitoring Systems • Combustion Efficiency Troubleshooting • Burner Re-Tuning and Maintenance Procedures*
1330 - 1420	***Maintaining & Repairing Fuel Gas System Components*** *Common Wear and Tear Issues in Gas Systems • Overhauling Pumps, Compressors and Valves • Replacement Parts and Maintenance Schedules • Minimizing Downtime During Repairs*
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 Four*

Day 5

0730 – 0830	***Case Study: Fuel Gas System Failure & Recovery*** *Review of a Real-World Fuel Gas Failure Incident • Step-by-Step Failure Analysis and Recovery Actions • Lessons Learned and Preventive Measures • Discussion of Alternate Solutions and Preventive Strategies*
0830 – 0930	***Best Practices for Fuel Gas System Design*** *Design Considerations for Maximizing Efficiency • Minimizing Risk in Fuel Gas System Installations • Recommendations for System Longevity • Incorporating Redundancy and Backup Systems*
0930 - 0945	*Break*
0945 – 1100	***Advanced Fuel Gas System Troubleshooting Techniques*** *Use of Advanced Diagnostic Tools • Proactive Troubleshooting: Predictive versus Reactive • Troubleshooting Under Extreme Conditions • Expert-Level Problem-Solving Strategies*
1100 – 1200	***Fuel Gas System Performance Monitoring & Reporting*** *Key Performance Indicators (KPIs) for Gas Systems • Real-Time Monitoring and Reporting Tools • Using Data to Forecast and Prevent Issues • Setting Up Automated Alerts and Warnings*

1200 - 1215	*Break*
1215 – 1345	***Fuel Gas System Safety & Compliance*** *Regulatory Standards for Fuel Gas Systems (API, ASME) • Safety Protocols for Maintenance and Operation • Incident Management and Documentation • Compliance Audits and System Certifications*
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*

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-

Course Coordinator

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