

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



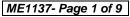


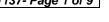


This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.

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-ofthe-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.

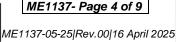
























Course Instructor(s)

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, Manufacturing Process Technology. Fertilizer 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.

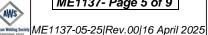
Mr. Harvey has Master (Cum Laude) and Bachelor degrees in Chemical Engineering. Further, he is a Certified Instructor/Trainer, a Certified Internal Verifier/Assessor/Trainer by the Institute of Leadership & Management (ILM) and has delivered various trainings, seminars, conferences, workshops and courses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

Day I	
0730 - 0800	Registration & Coffee
0800 - 0815	Welcome & Introduction
0815 - 0830	PRE-TEST
	Overview of Fuel Gas Systems
0830 - 0930	Components of a Fuel Gas System • Types of Fuel Gas Systems in Refining • Key
0930 - 0945	Operational Parameters • Importance in Refinery Processes Break
0930 - 0943	
0045 4045	Principles of Gas Flow & Distribution
0945 – 1045	Basic Gas Flow Principles • Gas Pressure and Temperature Regulation • Types
	of Gas Compressors and Pumps • Distribution Network Design
	Fuel Gas System Control Methods
1045 - 1145	Control Loops and Automation • PID Control in Fuel Gas Systems • Pressure
	and Flow Control Systems • Control Valve Selection and Configuration
	Fuel Gas Measurement & Monitoring
1145 - 1230	Gas Flow Measurement Techniques • Pressure and Temperature Monitoring •
	Leak Detection Methods • Monitoring Systems for Operational Efficiency
1230 - 1245	Break
	Fuel Gas Purity & Quality Control
1245 1220	Importance of Gas Quality in Refinery Operations • Gas Contamination and its
1245 – 1330	Impact on Performance • Filtration and Purification Systems • Gas Analysis
	Techniques
	Safety Considerations in Fuel Gas Operations
1330 - 1420	Hazard Identification in Fuel Gas Systems • Safety Management and Protocols •
1000 1120	Emergency Shutdown Systems (ESD) • Safe Handling of Combustible Gases
	Recap
1420 – 1430	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
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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

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
	Gas Leak Detection & Prevention
0020 0020	Types of Gas Leaks and their Causes • Leak Detection Technologies (Infrared,
0830 - 0930	Ultrasonic) • Leak Sealing and Remediation Methods • Gas Detection Alarms
	and Systems
0930 - 0945	Break
	Control System Failures & Troubleshooting
0945 - 1130	Troubleshooting PLC/DCS Control System Issues • Analyzing Control Loop
0943 - 1130	<i>Malfunctions</i> • <i>Common Faults in Sensors and Transmitters</i> • <i>Restoring Control</i>
	System Functionality
	Fuel Gas Pressure & Flow Issues
1130 - 1230	Diagnosing Pressure Drops and Flow Inconsistencies • Impact of Faulty
1130 - 1230	Regulators or Control Valves • Correcting Pressure Regulation Problems •
	Dealing with High-Pressure Safety Cutoffs
1230 - 1245	Break
	Fuel Gas Burner Issues & Troubleshooting
1245 - 1330	Common Burner Malfunctions (Flame Instability, Ignition Failure) • Flame
1243 - 1330	Detection and Monitoring Systems • Combustion Efficiency Troubleshooting •
	Burner Re-Tuning and Maintenance Procedures
	Maintaining & Repairing Fuel Gas System Components
1330 - 1420	Common Wear and Tear Issues in Gas Systems • Overhauling Pumps,
1550 - 1420	Compressors and Valves • Replacement Parts and Maintenance Schedules •
	Minimizing Downtime During Repairs
	Recap
1420 - 1430	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

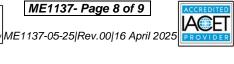
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0730 – 0830	Case Study: Fuel Gas System Failure & Recovery
	Review of a Real-World Fuel Gas Failure Incident • Step-by-Step Failure
	Analysis and Recovery Actions • Lessons Learned and Preventive Measures •
	Discussion of Alternate Solutions and Preventive Strategies
0020 0020	Best Practices for Fuel Gas System Design
	Design Considerations for Maximizing Efficiency • Minimizing Risk in Fuel Gas
0830 – 0930	System Installations • Recommendations for System Longevity • Incorporating
	Redundancy and Backup Systems
0930 - 0945	Break
	Advanced Fuel Gas System Troubleshooting Techniques
0045 1100	Use of Advanced Diagnostic Tools • Proactive Troubleshooting: Predictive versus
0945 – 1100	Reactive • Troubleshooting Under Extreme Conditions • Expert-Level Problem-
	Solving Strategies
	Fuel Gas System Performance Monitoring & Reporting
1100 – 1200	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
	Course Conclusion
1345 – 1400	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

<u>Practical Sessions</u>
This practical and highly-interactive course includes real-life case studies and exercises:-



<u>Course Coordinator</u>
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