

Course No. 1480

LNG & Natural Gas Processing Technology

MIDSTREAM OPERATIONS, PIPELINES, STORAGE & LNG
OIL & GAS

DURATION

5 Days

DELIVERY

Classroom



Course Overview

LNG & Natural Gas Processing Technology is a specialized technical training course designed to develop a comprehensive understanding of natural gas processing, treatment, liquefaction, storage, transportation, and regasification technologies. Natural gas facilities must consistently manage variations in feed-gas composition while meeting strict product specifications, protecting process equipment, maintaining operational reliability, controlling energy consumption, and ensuring safe handling throughout the gas and LNG value chain.

The course provides an integrated technical perspective covering natural gas properties and phase behavior, inlet separation, acid gas removal, dehydration, mercury removal, hydrocarbon dew-point control, natural gas liquids (NGL) recovery, fractionation, refrigeration, cryogenic processing, and LNG liquefaction. Participants examine how these processing stages interact and how operating variables such as pressure, temperature, gas composition, contaminant levels, and equipment performance influence product quality, plant capacity, and process efficiency.

Particular attention is given to LNG production technology, including pretreatment requirements, refrigeration cycles, cryogenic heat exchange, liquefaction trains, LNG storage, boil-off gas management, loading, shipping interfaces, and regasification. The course also addresses the technical challenges associated with low-temperature operations, process control, rotating equipment, heat exchangers, compressors, refrigeration systems, process safety, energy efficiency, and troubleshooting.

By integrating natural gas processing fundamentals with LNG technology and practical plant-performance analysis, the LNG & Natural Gas Processing Technology course enables participants to understand complete process flows, interpret operating conditions, identify performance limitations, troubleshoot common process problems, and support optimization initiatives. The program is valuable for organizations seeking to strengthen technical capabilities across gas-processing plants, LNG facilities, energy infrastructure, and integrated oil and gas operations.

Objectives

- Analyze natural gas composition, physical properties, phase behavior, contaminants, and product specifications within gas-processing and LNG applications.
- Evaluate the complete natural gas processing chain from inlet separation and feed-gas

treatment through NGL recovery, liquefaction, storage, and regasification.

- Apply gas-treatment principles to assess acid gas removal, dehydration, mercury removal, and contaminant-control systems during course exercises.
- Assess hydrocarbon dew-point control and NGL recovery technologies based on feed composition, operating conditions, recovery objectives, and product requirements.
- Evaluate major refrigeration and cryogenic-processing concepts used in natural gas treatment and LNG production.
- Analyze LNG liquefaction processes and identify the functions of refrigeration cycles, cryogenic heat exchangers, compressors, expanders, and supporting systems.
- Assess LNG storage, boil-off gas handling, loading, transportation interfaces, unloading, and regasification requirements.
- Improve process troubleshooting capabilities by analyzing abnormal conditions, equipment limitations, off-specification products, and process instability.
- Strengthen understanding of process control and operating-envelope management across gas-processing and LNG facilities.
- Evaluate energy-efficiency opportunities involving compression, refrigeration, heat integration, process configuration, and utility consumption.
- Assess process-safety risks associated with high-pressure natural gas, hydrocarbons, acid gases, refrigerants, and cryogenic LNG operations.
- Develop an integrated optimization plan for a representative natural gas processing and LNG facility by the end of the course.

Who Should Attend

This LNG & Natural Gas Processing Technology course is designed for engineers and technical professionals involved in natural gas processing, LNG production, gas treatment, process operations, and energy facilities. It is particularly relevant to Process Engineers, Chemical Engineers, Petroleum Engineers, Gas Processing Engineers, LNG Engineers, Production Engineers, Facilities Engineers, Operations Engineers, Field Engineers, Process Technologists, Plant Operators, Shift Supervisors, and technical specialists working in gas-processing plants and LNG facilities.

The course is also suitable for Mechanical Engineers, Rotating Equipment Engineers, Maintenance Engineers, Reliability Engineers, Instrumentation and Control Engineers, Inspection Engineers, Asset Integrity professionals, Process Safety Engineers, HSE specialists, laboratory personnel,

production-chemistry specialists, project engineers, commissioning professionals, and technical support teams whose responsibilities interact with natural gas and LNG processing systems.

Engineering Managers, Operations Managers, Plant Managers, LNG Facility Managers, Maintenance Managers, Technical Managers, Project Managers, Asset Managers, and decision makers responsible for gas-processing performance, LNG production, plant availability, energy efficiency, equipment reliability, process safety, product quality, or facility optimization will benefit from the integrated technical perspective provided by this course.

Learning Outcomes

- By the end of the course, participants will be able to:
- Interpret natural gas composition, properties, phase behavior, heating value, water content, acid-gas content, and other parameters relevant to gas processing.
- Explain the complete natural gas processing sequence from inlet facilities through treatment, NGL recovery, liquefaction, LNG storage, and regasification.
- Evaluate inlet separation and feed-gas conditioning requirements based on downstream process and product specifications.
- Diagnose performance issues in acid gas removal, dehydration, mercury removal, and hydrocarbon dew-point control systems.
- Compare NGL recovery and fractionation processes and explain their influence on gas specifications and liquid-product recovery.
- Explain the technical principles of refrigeration, cryogenic processing, and major LNG liquefaction technologies.
- Assess the performance of compressors, heat exchangers, refrigeration systems, and cryogenic equipment used in LNG facilities.
- Evaluate LNG storage and boil-off gas management and identify factors affecting safe and efficient LNG handling.
- Explain LNG regasification processes and assess the functions of receiving, storage, vaporization, metering, and send-out systems.
- Identify common process problems and develop structured troubleshooting actions using operating data and process relationships.
- Recognize key process-safety hazards associated with gas-processing and cryogenic LNG operations and identify appropriate safeguards.

- Develop technically justified recommendations for improving plant capacity, process stability, energy efficiency, reliability, and product quality.

Course Outline

DAY 01

Natural Gas Fundamentals, Feed Conditioning & Gas Treatment

- Understanding natural gas composition and properties, including methane and heavier hydrocarbons, water, carbon dioxide, hydrogen sulfide, nitrogen, mercury, and other components affecting processing requirements and product specifications.
- Reviewing gas phase behavior, pressure-volume-temperature relationships, water and hydrocarbon dew points, hydrate formation, heating value, gas quality, and the influence of pressure and temperature on processing operations.
- Examining inlet facilities and feed-gas conditioning, including slug catchers, inlet separators, filters, liquid handling, condensate management, compression interfaces, and protection of downstream equipment.
- Evaluating acid gas removal technologies, including amine-based treatment principles, absorption and regeneration, process variables, solvent performance, foaming, corrosion, contamination, and common operational problems.

PRACTICAL APPLICATION OR DISCUSSION

Analyzing a representative feed-gas composition and determining the major treatment steps required to achieve downstream processing and LNG feed specifications.

DAY 02

Dehydration, Contaminant Removal, NGL Recovery & Fractionation

- Understanding natural gas dehydration requirements and technologies, including glycol dehydration, molecular-sieve adsorption, regeneration, water specifications, hydrate prevention, and the stringent dehydration requirements associated with cryogenic LNG processing.
- Examining mercury and trace-contaminant removal and understanding why extremely low contaminant levels are required to protect cryogenic equipment, aluminum heat exchangers, downstream systems, and product quality.
- Evaluating hydrocarbon dew-point control and NGL recovery through cooling, refrigeration, Joule-Thomson expansion, turboexpansion, low-temperature separation, and other processing configurations.
- Understanding NGL fractionation and product separation, including demethanization, deethanization, depropanization, debutanization, condensate stabilization, LPG recovery, and the relationship between recovery targets and plant economics.

PRACTICAL APPLICATION OR DISCUSSION

Reviewing a gas-processing configuration and identifying potential causes of high water content, poor hydrocarbon recovery, off-specification gas, or unstable fractionation performance.

DAY 03

Refrigeration, Cryogenic Processing & LNG Liquefaction Technology

- Understanding refrigeration fundamentals, refrigerant selection, vapor-compression refrigeration, cooling curves, temperature approaches, compression requirements, heat transfer, and the relationship between refrigeration duty and LNG production.
- Examining cryogenic-processing principles, including low-temperature behavior of natural gas, cryogenic separation, heat-exchanger performance, pressure-temperature control, thermal stresses, material considerations, and equipment protection.
- Comparing major LNG liquefaction concepts, including cascade, mixed-refrigerant, propane-precooled mixed-refrigerant, dual mixed-refrigerant, and other process configurations from a technical and operational perspective.

DAY 03 — CONTINUED

- Evaluating key LNG train equipment, including refrigerant compressors, drivers, cryogenic heat exchangers, separators, expanders, coolers, condensers, pumps, control systems, and supporting utilities.

PRACTICAL APPLICATION OR DISCUSSION

Developing a simplified LNG liquefaction process flow and analyzing how feed-gas conditions, refrigeration performance, compressor limitations, and heat-exchanger approach temperatures affect LNG production.

DAY 04

LNG Storage, Boil-Off Gas, Shipping Interfaces & Regasification

- Understanding LNG physical characteristics and storage requirements, including cryogenic tank design concepts, containment, insulation, pressure management, rollover considerations, stratification, tank instrumentation, and inventory management.
- Managing boil-off gas (BOG), including sources of vapor generation, tank pressure control, BOG compression, reliquefaction where applicable, fuel-gas utilization, vapor return, and operational factors affecting boil-off rates.
- Examining LNG loading and unloading systems, marine transfer interfaces, loading arms, transfer pumps, vapor return, custody-transfer considerations, emergency shutdown interfaces, and operational coordination with LNG carriers.
- Understanding LNG receiving and regasification facilities, including unloading, storage, send-out pumps, vaporizers, metering, pressure control, gas-quality management, pipeline delivery, and major regasification technology options.

PRACTICAL APPLICATION OR DISCUSSION

Evaluating an LNG storage and regasification scenario involving increasing tank pressure, changing BOG generation, send-out requirements, and operational constraints.

DAY 05**Process Control, Safety, Reliability & LNG Facility Optimization**

- Applying process-control concepts across natural gas and LNG facilities, including pressure, temperature, level, flow, composition control, compressor control, anti-surge systems, alarms, trips, emergency shutdowns, and operating-envelope management.
- Managing process-safety hazards involving flammable gas, high-pressure hydrocarbons, hydrogen sulfide, refrigerants, cryogenic liquids, rapid phase transition, vapor dispersion, loss of containment, overpressure, and low-temperature exposure.
- Improving equipment and facility reliability through condition monitoring, preventive and predictive maintenance, rotating-equipment performance, heat-exchanger monitoring, instrumentation reliability, inspection, asset integrity, and coordination between operations and maintenance.
- Evaluating plant optimization opportunities involving feed-gas conditions, contaminant removal, compressor performance, refrigeration efficiency, heat integration, LNG train capacity, energy consumption, product specifications, and production bottlenecks.

FINAL WORKSHOP, ACTION PLAN, OR IMPLEMENTATION EXERCISE

Participants develop an integrated LNG & Natural Gas Processing Technology optimization plan for a representative facility, covering feed-gas analysis, treatment requirements, acid gas removal, dehydration, contaminant control, NGL recovery, liquefaction, refrigeration, storage, BOG management, regasification, process control, safety, reliability, energy efficiency, bottleneck identification, and prioritized technical improvement actions.

Register or Request More Information

Course page: <https://quest-training.com/courses/lng-natural-gas-processing-technology>

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