This course can be adapted to virtual classroom mode - Graduate Certificate

LNG Processing Engineer Certification

60 days **LNGENG-EN-A**

Overview

LEVEL

Knowledge

PURPOSE

This course provides in-depth technical knowledge of natural gas treatment and liquefaction facilities design and operation necessary to hold rapidly, and very effectively, the position of process engineer, field engineer or technical service engineer.

LEARNING OBJECTIVES

Upon completion of the course, participants will be able to:

explain the thermodynamics involved in natural gas treatment and liquefaction, especially cryogenic loops,

explain natural gas processing and liquefaction process,

analyze operating conditions and basic design of gas treatment and liquefaction plant,

describe the technology of static equipment and rotating machinery used in LNG plants,

identify the main risks related to gas treatment and liquefaction and efficiently contribute to safety engineering studies.

WAYS AND MEANS

Highly interactive training with industry-specialist lecturers.

Multiple teamwork sessions and industrial case studies.

Practice on dynamic simulator.

Numerous process simulation exercises using HYSYS™ or PRO/II™ software.

LEARNING ASSESSMENT

Continuous assessments all-along the program.

Final assessment including a presentation in front of a jury.

PREREQUISITES

Engineering degree or equivalent professional experience within the Oil & Gas industry.

WHY AN IFP TRAINING CERTIFICATION?

- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in LNG Processing Engineer Certification.
- Ready-to-use skills.

Agenda

THERMODYNAMICS APPLIED TO WELL EFFLUENT PROCESSING — 5 d

Well effluent. Ideal gas and real fluid behavior. Gas compression and expansion. Liquid-vapor equilibrium of pure components and mixtures. Mixture separation. HYSYS™ or PRO/II™ simulation: phase envelope

of well effluents, sales gas, LNG. Fundamentals of distillation. HYSYS™ or PRO/II™ simulation: propane cryogenic loop.

GAS PROCESSING & CONDITIONING — 5 d

Commercial specifications for natural gas. Need for gas field processing. Gas hydrates and moisture content of natural gas. Dehydration process: TEG units and molecular sieves. Sweetening: amines, membranes. NGL recovery and fractionation. HYSYS™ or PRO/II™ simulation: associated gas and gas condensate sweetening, dehydration, NGL recovery and compression.

DYNAMIC SIMULATION OF GAS PROCESSING FACILITIES — 5 d

During this week, case study and exercises are performed using a DCS replica in order to allow the participants to understand process dynamics. Hydrates detection and inhibition in gathering network. Gas processing. Gas dehydration: impact of operating conditions. Multistage gas compression and export: study of operating parameters.

LIQUEFIED NATURAL GAS — 5 d

The LNG chain. Specific properties of LNG. Liquefaction processes. Regazification processes. LNG storage, loading/offloading and transport. Technology of LNG-specific equipment.

LNG PROCESS SIMULATION — 5 d

During this week, case study and exercises are performed using HYSYS™ or PRO/II™ software in order to allow the participants to design and optimize liquefaction processes: gas field treatment (separators, dehydration, compression); NGL fractionation and stabilization; simulation of a cascade liquefaction process, of a C3MR liquefaction process, of a turbo-expander based liquefaction process; integration of the liquefaction processes with the NGL recovery/fractionation; comparison of the efficiency of the processes versus load and conditions.

PIPING SYSTEMS & PROCESS EQUIPMENT: TECHNOLOGY & SIZING — 5 d

Piping and valves. Metallurgy. Corrosion. Cathodic protection. Pressure relief systems. PSV's and flare network. Storage equipment. Thermal equipment and cryogenic equipment. Pressure vessels: technology and selection criteria, internals, elements of calculation.

INSTRUMENTATION, PROCESS CONTROL & SCHEMATIZATION — 5 d

Field instrumentation: sensors, transmitters, control valves, ON/OFF valves. Controllers; control loop structures. Study of controller parameters and control loop structures on dynamic simulator. Distributed Control System (DCS). Safety Instrumented Systems (SIS): ESD, HIPS, Fire & Gas System. Process schematization: reading and drawing of Block Flow Diagrams (BFD), Process Flow Diagrams (PFD) and Piping & Instrumentation Diagrams (P&ID).

PUMPS & COMPRESSORS — 5 d

Fundamentals of hydraulic circuits and gas compression. Operating principles, technology, selection criteria, performances and operating conditions of centrifugal and volumetric pumps as well as centrifugal and reciprocating compressors.

GAS TURBINES - ELECTRICAL GENERATION — 5 d

Upon customer request, this module can be tuned to team generation and team turbines operations. Gas turbines: equipment technology, operating conditions, performances, operation. Turbo-expander: technology, operation. Electrical power generation. Electrical power distribution network and equipment.

LNG - SPECIFIC SAFETY ENGINEERING — 5 d

LNG specific hazards: stratification/roll-over, sloshing, LNG clouds ignition, asphyxiation risks, cryogenic liquids jets, piping behavior. LNG spillage control at design stage and in operation. LNG clouds control in operation. LNG fires control at design stage and in operation. Main safety engineering studies: HAZID and HAZOP workflow and application; plant layout case study; QRA - Consequence analysis methodology.

HSE IN OPERATIONS & MAINTENANCE WORKS — 5 d

LNG plant operations. Risk in normal process operations. Risk assessment tools. Job safety analysis. Safe isolation of plant and equipment. HSE in maintenance & construction works. Permit to work system. Organizational framework. Human factors.

CASE STUDY BASED ON LNG PLANT P&IDS & JURY — 5 d

During this week, participants will work in team to analyze LNG plant P& ID's and present the results of their analysis to a jury: this 5-day teamwork project is a real case study based on actual data. Participants

are coached throughout the project to produce the required deliverables, which are to be presented on the last day (jury): process operating parameters, process control loops and safety loops; operating philosophy; materials and equipment selection.