



# Gas Lift Design and Optimization

## Course Description

This course is designed to develop a solid foundation of the gas lift system (GLS) design and optimization process. Participants will understand the impact of gas lift valve selection, tubing sizing, gas lift mandrel spacing, unloading sequence, casing pressure, surface choke size, gas volume, types of gas for lifting, optimum operation point, among other design variables and operational considerations.

The course will provide Intermediate level knowledge of the GLS components: inflow performance, vertical lift performance, and surface gas lift equipment. This training covers the artificial lift selection process as well as pros and cons related to the gas lift method.

Participants will learn how to design GLS under different reservoir uncertainties and operation conditions. Participants will also gain knowledge and skills related to continuous and intermittent gas lift approaches. Different scenarios will be reviewed and discussed to understand the applications and limitations of GLS as one of the most widely used artificial lift methods. Basic principles of reservoir modeling, fluid flow and heat transfer modeling will be presented to have a better understand of the GLS design process. Participants will practice the gas lift design process using actual field data by using commercial software programs.

Gas lift course material includes hands on exercises, presentations, case studies and lessons learned based on industry best practices designed to consolidate and reinforce learning and identify and offer solutions to specific problems associated with GLS of oil fields. At the end of the training, participants will learn how to select the appropriate gas lift equipment, design continuous gas lift systems, perform system optimization, and troubleshooting.

## Who Should Attend?

This course is designed for petroleum and production engineers, integrated study members, reservoir engineers, reservoir managers, facility engineers, service company engineers, production managers, and others engineers seeking knowledge in production engineering and artificial lift methods.



## What You Will Gain:

- Understanding the artificial lift selection process
- Understanding the workflow for designing Gas Lift Systems (GLS)
- Learning how to model the interactions between the reservoir deliverability and the wellbore completion (IPR/VLP)
- Understand pros and cons of continuous and intermittent gas lift systems
- Interpreting gas lift performance curves
- Learning the configuration of the gas lift system and valve mechanics
- Understanding gas lift applications and limitations
- Learning how to increase oil production rates from existing wells using gas lift technology and optimization
- Using of commercial software for gas lift design, and optimization
- Using case studies, hands on exercises and interactive group discussion to identify and offer solutions to specific problems associated with GL operations.

## Training Methodology

The training course will combine lectures (30%) with workshop/work presentations (30%), interactive practical exercises and case studies (20%), supported by video material, software and general discussions (20%).

## Course Content

### Introduction to Nodal Analysis

- Review of reservoir inflow performance modeling
- Reservoir inflow performance modeling (IPR)
  - Flow regimes
  - Reservoir models
  - Types of well architecture
- IPR calculations exercises using commercial software
- Modeling fluid flow in pipes (VLP)
- History matching of production tests

### Introduction to Artificial Lift System (ALS) selection process, Gas Lift equipment

- Types of artificial lift technologies
- Artificial lift selection process
- Artificial lift system selection optimization
- Gas Lift system
  - Gas lift equipment and valve mechanics
  - Valve selection and calibration
  - Unloading process



- Gas lift technologies
- Onshore versus offshore considerations

### **Gas lift design, hands-on project**

- Gas Lift System
- Gas Lift Design
  - Continuous gas lift, and Intermittent gas lift
  - Properties of injection gas (natural gas, nitrogen, CO<sub>2</sub>)
  - Volumetric gas throughput of a choke/orifice
  - Description of the gas lift equipment
  - Gas lift design using a commercial software
- Monitoring Tools
- Gas lift design hands-on project to implement lesson learned.
  - IPR, and VLP calculations and sensitivity analysis
  - Continuous gas lift system design
  - Performance curve analysis
  - Valves selection, valve sensitivities
  - Gas rate sensitivities
  - Causes and solutions of instability

### **Gas lift network optimization**

- Single well optimization
- Network optimization
- Automation – surveillance and diagnostics
- Integrated System Modeling (ISM) concept
- Practical ISM fundamentals
- Connecting GAP, PROSPER and MBAL workflow examples
- Connecting ECLIPSE or CMG STARS and GAP models workflow examples
- Hands on project to implement production optimization for gas lift system (