Artificial Lift Systems (ALS)

Table of Contents:

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Introduction:

Artificial lift plays a crucial role in oil & gas production, especially in mature oilfield. Artificial lift is not only accelerating the production, but also vital to the economic success of the overall development. Therefore, selecting and designing the appropriate artificial lift is important. After completing the course, the participants will possess and enhance the skills necessary to select, design, plan, analyze and optimize the artificial lift system for offshore oilfield.

This comprehensive course covers the artificial-lift methods and technologies that fall into two groups, those that use pumps and those that use gas. It provides information and concentrates on the proper selection, operation and maintenance of subsurface pumps so the best economical life can be obtained. It will enhance your knowledge, skills, and attitudes necessary to understand the artificial-lift methods and technologies. It provides the attendees with a thorough understanding of the theory behind all forms of artificial lift, the advantages and limitations of each system, application considerations, and sample performance predictions for each lift method.

The course will start with Multi-Phase Flow and NODAL Analysis and how to compare and select the correct artificial lift system. A thorough understanding on the principles, applications, design and operational issues on the artificial lift system will be provided. The candidates will also learn how to analyze the cost when selecting the artificial lift system. Furthermore, the course will cover the advanced artificial lift systems currently available. They will gain knowledge on the advantages and disadvantages of each type of the advanced artificial lift system.

Objectives:

By the end of this BTS training course, participants will be able to:

- Be aware of artificial lift technology
- Compare systems to determine which one is most economically feasible
- Specify components and auxiliary equipment needed for each system Select the appropriate ALS
- Use principles and content mentioned below to focus on maximizing oil production with artificial lift systems
- Understand and apply multiphase tubing and pipe flow principles
- Know what best practices are available to extend the life of equipment and installed lift systems.
- Apply basic design and analysis concepts & understand Nodal Analysis

- Learn how to select and design an ALS, plan its operation, monitor, analyze and optimize its performance
- Design system features that allow for gassy production, production with solids, viscous production, and for other harsh environments
- Understand the fundamentals and the production performance of the various artificial lift methods for offshore application

- Be able to manage and control the production of artificial lift wells and fields
- Be able to study and compare the cost between artificial lift systems
- Learn fluid properties and reservoir performance & understand the relationship between natural flow & ALS

Who should attend?

Production Engineers, Field Operations Engineers, Production Technologists, Production Coordinators, Production Supervisors, Junior and Senior Petroleum Engineers, Senior Operators, Field Technicians; Geoscientists, Reservoir Engineers who wish to understand the implications of production systems on their field reservoirs.

Course Outline:

Multi-Phase Flow, NODAL Analysis & Artificial Lift Selection & Analysis

- Introduction, Black Oil PVT
- Inflow Performance Relationship
- Multiphase Flow
- Pressure loss equation in pipe, Slip holdup phenomenon
- Multi-phase flow correlations and applicability
- Multi-phase flow correlation matching
- NODAL Analysis
- Artificial Lift comparisons, Overview of Artificial Lift, Comparison of Artificial Lift Systems
- Artificial Lift Analysis Using Measured Data, Artificial Lift Selection
- Artificial Lift Selection: Selection Criteria & Lift Type Suitability
- Critical parameters affecting artificial lift type, Artificial lift type and limits
- Artificial Lift Analysis Using Measured Data
- Traditional methods, Use of discharge pressure
- Process where discharge pressure is not available

Gas Lift Design & Optimization

- Overview of Gas Lift
- Understanding fluid mechanics, fluid properties and gas lift principles
- Principles of Gas Lift
- Installation Types, Total Systems, Optimum Design

- Valve Mechanics
- Fluid Operated Valves vs Casing Pressure Operation
- Gas Lift Operations
- Gas Lift Installation Types
- Continuous Flow, Intermittent Lift
- Gas Lift Troubleshooting

Beam (Rod) Pump Systems

- Surface and Subsurface Equipment
- Pumping unit, rods, pump, prime movers, gas anchor, pump-off controls
- Power Requirements
- Dynamometers and Troubleshooting
- Pump Off Controls, Optimization

Progressive Cavity Pumps System

- Applications, Surface and Subsurface Equipment
- Geometry of Downhole Pump
- Fit (Interference), Viscosity, Slip
- Elastomers, Power Requirement

Electric Submersible Pumping (ESP) Design & Optimization

- ESP Systems, ESP Components, Multisensors, Applications
- Pump Performance Curves, Pump Intake Curves
- ESP Design And Selection, ESP Installation& Operation

- Operational Issues
- ESP Diagnostics and Real Time Well Operations & Optimization
- ESP Diagnostics & Troubleshooting
- Real Time Well Operations & Optimization

Artificial Lift Offshore & Advanced Artificial Lift Systems

- Artificial Lift Offshore
- Advanced Artificial Lift Systems
- Gas Lift System & Plunger Lift System