



Artificial Lift System (ESP)



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Introduction:

This comprehensive course is designed to provide a complete understanding of artificial lift systems, it will review the major types of artificial lift systems, explain the benefits and drawbacks of each type and what are the ideal applications for each system with emphasis on the ESP system and the application of Nodal systems analysis to design, optimize, and analyze of the ESP system to overcome all kind of challenges

Targeted Groups:

Production, Reservoir, and Completion Engineers, Supervisors, Engineering staff involved in the design, performance, and monitoring of the wells

Course Objectives:

At the end of this course the participants will be able to:

- Apply and gain in-depth knowledge of the subsurface production operations.
- Describe reservoir performance as inflow & outflow relationships.
- Evaluation criteria used for, the selection of artificial lift methods.
- Identify components of the ESP system.
- Design and analyze the ESP system and Carry out ESP performance calculations.
- Maximize oil production using ESP systems.
- Selection of proper ESPs for specific purposes and, considerations for using in harsh environments.
- Interpretation of downhole Tool and ESP log data.
- Combat gas, solids, and corrosion in the produced fluids.
- Perform ESP failure root cause analysis.

Course Content:

Unit 1: Introduction to Artificial Lift technology:

- Overview of artificial lift technology: sucker road pump, gas lift, Electric Submersible Pump ESP.
- Impact of changing well conditions and need for artificial lift.
- Application of artificial lift technology and its limitations.

Unit 2: Reservoir Performance:

- Wellbore and reservoir performance overview.
- Concepts of productivity index.
- Inflow and outflow relationships.

Unit 3: Fundamentals and Applications of ESP:

- Introduction to ESPs and ESP Systems.
- Electrical and Hydraulic concept of the ESP.
- Description and Operational features of all ESP system components.
- Step down transformer
- Controllers SWB/VSD
- wellhead; tubing cable
- Cable guards/steel band
- Motor lead extension
- Pump
- Intake/gas separator
- Protector
- Motor
- Downhole Tool "Sensor"

Unit 4: ESP System Design, Performance Calculations, and Equipment Sizing:

- Establishing Basic Requirements.
- Determining Well Production Capacity.
- Determining Fluid Composition and Volume, Including Volume of Free Gas.
- Calculation of Total Dynamic Head.
- Determination of Optimum Pump and Motor Type and Size.
- Determination of Downhole Cable Configuration and Sizing.
- Identifying Optimum Drive Systems, Power Supplies, and Accessories.
- Variable Speed Drive Requirements.
- Design Examples.

Unit 5: Alternative ESP Application and Configurations

- Application of ESPs with multiphase fluids, viscous fluids, abrasive contaminants, high temperature, and corrosive substances.
- Alternative ESP Configurations Inverted/Bottom Intake, Dual /POD ESPs Dump flood ESP.

Unit 6: ESP Installation, Commissioning, Operation, and Troubleshooting:

- ESP installation Procedures and Best Practices.
- Surface Equipment Commissioning and Troubleshooting guidelines.
- ESP Operation efficiency and the effect of Surface Chokes.
- Case Studies and Examples of ESP Problems and Failures.
- Root Cause Analysis for the Failed Equipment.