



Electrical Submersible Pumps (ESP)

Training program



Introduction:

This course deals with topics related to sucker components and systems of electrical submersible pumps (ESP). It covers the development of electrical submersible pumps, outline of systems range, components, and completions, variable speed controllers, sizing " implications " data requirements, operation and trouble shooting. This course will enhance the participant's knowledge, skills, and abilities necessary to understand the components and systems of electrical submersible pumps (ESP). ESPs are one of the higher volume methods of lift. ESPs have advantages over some other high volume methods since they can create a higher drawdown on the formation and achieve more production, if problems such as gas interference and sand production can be solved. This course will allow the user to become familiar with the ESP system and when it should be used. All components will be described in detail.

Who Should Attend?

Supervisors, Production engineers, Senior Operators, Operators, Mechanical Engineers, Geoscientists, Technicians, Field Supervisors and others interested in ESP systems

Course Objectives:

By the end of this course delegates will be able to:

- Explain the history and development of electrical submersible pumps
- Outline of systems range
- Be familiar with variable speed controllers
- Understand operation conditions and troubleshooting methods
- Maximize oil production using ESP Systems
- Identify components of the ESP system
- Design and analyze a system using up to date computer programs
- Implement best practices for longer system life
- Improve power efficiency of the system
- Combat gas, solids, corrosion and viscosity in the produced fluids
- Compare to other artificial lift methods

Course Outline:

- History & development of electrical submersible pumps
- Introduction to artificial lift and electrical submersible pumping
- Artificial lift principles
- Reservoir and production system performance relationships
- Introduction for reservoir and production considerations
- Surface components of ESP systems

- Description of all components of the electrical submersible system starting at the surface to the pump; transformers; controllers/VSD; wellhead; tubing cable; cable guards; motor lead cable; pump; intake/gas separator; equalizer/protector; motor; instrumentation
- Subsurface components of ESP systems
- Theoretical inviscid performance of ESP pumps
- Installation considerations and cautions
- Design of an ESP system to fit current and future well conditions
- Operation of a given design
- Analysis of an ESP system using diagnostics from installed instrumentation and using diagnostic computer programs
- Removal of failed equipment
- Controls for ESP systems including variable speed drives
- ESP instrumentation available in the industry
- Failure analysis
- Data keeping
- Viscosity effects on pump performance motor characteristics and selection
- Variable speed drives
- Maintenance and Monitoring
- Outline of systems range
- Components
- Two-phase flow effects on pump performance
- Pump selection
- Centrifugal pump
- Electrical motor
- Seal section
- Cable characteristics and design
- Gas separator
- Controllers
- Completions

- Variable speed controllers
- Sizing, Implications & Data requirements
- High water " Oil ratio
- High gas " Oil ratio
- Effects of viscosity on ESP™s
- Productivity index
- Inflow performance ratio
- Operation and trouble shooting
- Troubleshooting ESP installations