



Electric Submersible Pumps (ESPs) Selection, Installation, Operation & Maintenance

Course Description:

- This course is designed to provide the participants with the skills to understand the principals of Electric Submersible Pumps (ESPs), how they are selected, installed, operated and maintained in both onshore and offshore oil production installations. This course is interactive and encourages delegates to participate through questions and answers, along with opportunities to discuss with the presenter specific issues which may result in appropriate solutions.



The Training Course will highlight:

Participants will learn:

- Mainstream ESP system configurations
- Alternative ESP system configurations
- Installing ESPs in difficult and harsh environments
- How ESPs and their associated drives are selected
- Installing, operating and monitoring ESP systems
- Maintaining and troubleshooting ESP systems

Course objectives:

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

- Learn about the different types of ESP Systems and where they are used
- Understand the components and equipment used in ESP systems
- Learn about ESP pump technology!
- Learn about ESP Selection and Performance Calculations
- Understand the Advantages and Limitations of various ESP Drive Systems
- Understand the Power Supply Requirements of ESP Installations
- Learn about installing, maintaining and troubleshooting ESP systems

Training methods:

This interactive Training will be highly interactive, with opportunities to advance your opinions and ideas and will include:

- Lectures
- Workshop & Work Presentation
- Case Studies and Practical Exercise
- Videos and General Discussions



Course outline

Fundamentals of Electric Submersible Pumps

- Introduction to ESPs and ESP Systems
- A Brief History of ESPs
- Design Requirements for Typical Mainstream ESPs
- ESP Pump Designs
- ESP Motor Designs
- Cabling Requirements
- Motor Control
- Miscellaneous Accessories
- Alternative ESP Configurations
- Inverted/Bottom Intake
- Dual and Triple ESPs in same well
- Boosters for ESPs

Course outline

Application of ESPs in Difficult or Harsh Environments

- On-Shore and Off-Shore
- Multiphase Fluids
- Abrasive Contaminants
- High Temperature and Corrosive Substances
- Viscous Fluids, Emulsions, Scaling and Asphaltenes
- Off-Shore
- Modular Requirements
- Platform Cable Connections
- FPSO Disconnect able Turret Swivel and Mooring System
- Subsea Cabling and Electrical Connections
- Subsea Located Equipment

ESP System Selection, 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

Course outline

ESP Monitoring, Control and Protection, Installation

- Downhole monitoring and sensors
- Embedded fiber optic cable for downhole monitoring and sensors
- Earthed (grounded) and unearthed (ungrounded) ESP motors
- Earthing and lightning propagation in ESP circuits
- Electrical protection equipment for ESPs
- SCADA/EMS (ESP Management System) for local and remote installations
- Safety and shut-down systems

Commissioning, Operation and Maintenance

- Commissioning requirements and procedures
- Pre-production optimization
- Regular operation and monitoring
- Maintenance management, monitoring and detecting abnormal conditions
- Troubleshooting guidelines
- Case studies and examples of ESP problems and failures
- Servicing equipment
- Well workover rigs
- Cable reels, reel supports, and cable guides
- Shipping cases
- Transport for long shipping cases
- Factory repair and reconditioning