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# Well Completion Design

## INTRODUCTION

- In the development of a hydrocarbon reservoir, many wells are drilled and required to be completed, to allow the structure to be depleted. However, the drilling and completion operations are crucial to the long-term viability of the wells in meeting the specified objectives.

The design and completion of both production and injection wells are required to satisfy several objectives including:

- Provision of optimum production/injection performance
- Ensure safety
- Maximize the integrity and reliability of the completion over the envisaged life of the completed well
- Minimize the total costs per unit volume of fluid produced or injected, i.e.
- Minimize the costs of initial completion, maintaining production and remedial measures

This training course on Well Completion Design will feature:

- The main functions of completion
- Developing a high-level completion strategy for wells in a variety of situations
- Select tubing, packers, and completion flow control equipment
- Understand different sand control techniques and their application

## OBJECTIVES

- Evaluate for a given reservoir scenario the bottom hole completion options and make a recommendation based on well integrity and reservoir management requirements
- Identify, evaluate and recommend functional capability of completion strings for a variety of situations
- Describe the purpose and generic operating principles for major completion equipment components
- Identify limitation of well completion schematically designs and potential failure mechanisms / operational problems with equipment
- Assess well safety requirements and capabilities inherent in well design
- Describe the integration of the various stages of completing a well
- List and flow chart a general procedure to run a completion string

## TRAINING METHODOLOGY

- This Well Completion Design training course will utilise a variety of proven adult learning techniques to ensure maximum understanding, comprehension and retention of the information presented. The daily workshops will be highly interactive and participative.

## ORGANISATIONAL IMPACT

The organisation will gain in sending their employees to attend this training course, the following:

- Reduction in the cost of the well and the proper selection of production string
- Extending the well life and control it, achieve the optimum production
- Ensuring the well integrity and avoiding all risks

## PERSONAL IMPACT

- Obtain integrating knowledge of well completion design
- Hone their knowledge and get the self-confidence in designing proper completion
- Get the latest technology in well operations
- Solving and avoiding the problems which impact on the optimum production, and well integrity

## WHO SHOULD ATTEND?

This training course is suitable to a wide range of professionals but will greatly benefit:

- Asset Managers
- Petroleum Engineers
- Production Technologists
- Production Personnel (Production Operators, Maintenance Supervisors)
- Drilling and Well Servicing Personnel (Drilling Manager, Drilling/Well Engineers, Completion and Well Service Engineers, Drilling Supervisors, Rig Manager, Toolpusher, Drillers)

## Course Outline

### Well Completion Design, Practices and Strategies

- Introduction of Reservoir Drive Mechanism
- Introduction into Artificial lift methods and their application
- IPR and Productivity Index
- Vertical Lift Performance
- Well Outflow and Inflow Systems
- Typical Vertical Lift Performance (VLP) for Various Tubing Sizes

## Lower & Upper Completion String Components & Selection Consideration

- Production Packer functions
- Packers Types
- Packers Generic Mechanisms
- Permanent and Retrievable Packers
- Locator Seals and Anchor Seals
- Applications for Permanent and for Retrievable Packers
- Setting Packers
- Inflatable Packer Applications
- Sliding Side Door Function
- Gas Lift Mandrel
- Running the Completion
- Perforation Methods and Perforating Equipment
- Perforation Selection and Conveying Methods

## Wellheads / Sub-Surface Safety Valves & Flow Control Equipment

- Wellheads Components, Function and Types
- Subsurface Safety Valves Function
- Safety Valves Types
- Setting Depth of Subsurface Safety Valves Consideration
- Surface Control Subsurface Safety Valves
- Flow Control Devices
- Nipple Profiles Types and Plug Selection
- Workover Reasons
- Well Killing Operations Technique and Consideration

## Overview of Sand Control Completion

- Sandstone Formation Properties and Geology
- What causes Sand Production?
- Consequences of Sand Production Downhole and on Surface
- What is the mean of sand control?
- Perforation System for Non-sand Control Completion
- Sand Control Options
- Chemical Consolidation
- Mechanical Sand Control Methods
- Cased Hole Gravel Pack
- Open Hole Gravel Packing
- Expandable Screens
- Gravel Pack Design, Gravel Sizing and Slot Sizing
- Placement Methods
- Carrier Fluid Concept
- Choosing the Appropriate Method of Sand Control

## Fundamentals of Rigless Operations Theory & Stimulation

- Coiled Tubing Surface and Subsurface Components
- Coiled Tubing Applications
- Cleaning Operations with CT
- Well Back Flow (nitrogen lift)
- Wireline Types and Application
- Surface and Subsurface Components of Wireline
- Formation Damage Mechanisms and their Remediation
- Stimulation Design Considerations
- The Most Important Production Logging (PLT)
- Well Barrier Philosophy during Well Interventions

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