

# WELL COMPLETION DESIGN AND PRODUCTIVITY

**DRL007**

## COURSE DESCRIPTION

This course emphasizes the role of the Well, as part of the Integrated Production System for a Hydrocarbon Asset. Well Completion design concepts and the technical selection criteria for the main completion components are reviewed in detail. During the fifth day of the Course, participants are introduced to Economy concepts relevant in Well Interventions and major Work over's (like re-completions).

The course also highlights the Operating Company's viewpoint in the area of Well Completion and Well Production Management, and group exercises enhance the learning process.

By the end of the course, participants should be able to: State how Well Completion fits into the E&P Activity; Recall and discuss hydrocarbon exploitation considerations for well productivity and completion design; Describe the main parameters that influence Well Performance and Productivity; Describe the factors that influence the selection and design of the completion string and components; Calculate main economy indicators relevant to a work over; Carry out a completion design and explain how it will be run in the well.

## COURSE GOAL

To enhance the participants' knowledge, skills, and ability necessary to know about the design and productivity of Well Completion.

## COURSE OBJECTIVES

By the end of this course, participant will be able to:

- 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.
- Describe the requirements to pressure test and retain well control throughout the completion process.
- Define the need for full and accurate reporting and records to be kept.

## WHO SHOULD ATTEND

- 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, Tool pusher, Drillers)

## COURSE DURATION

5 Working Days

## COURSE OUTLINES

### 1. 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
- Matching VLP Curves with an IPR Curve
- Well Completion Design Considerations
- Reservoir Considerations
- Mechanical Considerations
- Classification of Completions

### 2. 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

### **3. 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
- Work over Reasons
- Well Killing Operations Technique and Consideration
- Example for Work over Operations (Gas lift wells, Natural gas well, ESP well)

### **4. Overview of Sand Control Completion**

- Sandstone Formation Properties and Geology
- What causes Sand Production?
- Consequences of Sand Production Down hole 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
- Losses Controlling during Sand Control Operations
- Perforating System for Sand Control
- Standalone Screen Applications

## 5. Fundamentals of Rig less Operations Theory & Stimulation

- Coiled Tubing Surface and Subsurface Components
- Coiled Tubing Applications
- Cleaning Operations with CT
- Well Back Flow (nitrogen lift)
- Wire line Types and Application
- Surface and Subsurface Components of Wire line
- 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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