



Well Performance & Relation to Damage and Stimulation



Well Performance & Relation to Damage and Stimulation

Introduction:

The course is designed to provide a comprehensive approach to perform NODAL analysis for the production system. The participant will be guided to practice predicting the rate at which a well should be capable of producing, given reservoir and fluid properties, wellbore configuration, and flowing wellhead pressure. Identify which components of the reservoir/completion/wellbore system are restricting performance

The impact of skin on well inflow is analyzed in a descriptive review of completion operations such as perforating, sand control, and matrix acidizing. The contribution of hydraulic fractures to reservoir performance will be examined. Finally, the course examines the effect of horizontal wells in optimizing the reservoir potential. Practical worked examples are used to reinforce the theoretical content.

Targeted Groups:

Reservoir and Production Engineers

Course Objectives:

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

- Apply Well Performance Analysis Concepts to Represent Total Producing System from Reservoir
- Through Completion, Wellbore and Gathering System
- Prepare Proper Well Performance Analysis
- Assess Skin, Well Completion and Effect of Damage on Well Inflow
- Define Horizontal Well Effect on Inflow Performance.

Course Content:

Unit 1: Concept of Well Performance Analysis:

- Objective of Well Performance Analysis.
- Reservoir Performance IPR: Steady State, PSS, Transient Flow.
- Productivity Index PI, Effects of PVT.
- Solution Gas Drive. Non-linear IPR Relationships.
- Gas Flow, Different Pressure Formulations, and Non-Darcy Flow.
- Concept and Assumptions of Nodal Analysis.
- Inflow and Outflow Performance Relationship.

Unit 2: System Pressure Losses:

- General Pressure Drop Equation for Pipes.
- Concept of critical Flow.
- Systems Plot and its Uses.
- Localized Pressure Losses in Nodes.
- Surface Network Modeling.
- The Concept of Artificial lift.

Unit 3: Skin, Well Completion and Effect of Damage on Well Inflow:

- Skin Component Identification and Analysis.
- Perforations: Geometry and Penetration, Flow Profiles, Perforation Skin Modeling.
- Sand Control: Mechanisms of Sand Production and Sand Exclusion Methods.
- Gravel Pack Damage & Skin.
- Formation Damage Mechanisms and Their Impact on Skin.
- Chemical Damage Removal Treatments and Matrix Stimulation.

Unit 4: Hydraulic Fracturing:

- IPR for a Fractured Well - Stimulation Candidate Selection.
- Rock Mechanics and its Relation to Fracturing Treatment.
- Fracturing Treatment Design.
- Fracture Conductivity and Skin.
- Fluid and Proppant Effects on Fracture Conductivity and Reservoir Performance.
- Acid Fracturing of Carbonate Reservoirs.

Unit 5: Horizontal Wells:

- Horizontal Well IPR and Boundary Effects,
- Coning/Cusping Relationships.
- Relative Skin Effects in Horizontal Completions - Stimulation of Horizontal Wells.
- Practical Well Performance Cases