CONCEPT

Heavy Oil Production: Thermal Recovery, Artificial Lift and Emulsion Treating

1 – 5 November 2027
Amsterdam - Zuidas business district hotel



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Ref: 596_17805 **Date:** 1 – 5 November 2027 **Location:** Amsterdam - Zuidas business district hotel **Fees:** 23500 SAR

Introduction:

Heavy oil production fails most often at the interfaces: a thermal scheme chosen before viscosity and reservoir screening data are checked, completions that leak under steam cycles, pumps that stall on viscous or sandy fluid, and emulsions that will not reach sales dehydration specifications. This Core Concept course takes production, reservoir and facilities engineers through heavy oil fluid behaviour, cold production and CHOPS, cyclic steam, steamflood and SAGD design, thermal completions, PCP, ESP and rod pump selection, diluent and heating, emulsion treating, sand handling and steam water quality. Participants build a Heavy Oil Development and Lift Selection Plan.

Course Objectives:

- Classify heavy and extra-heavy crude from API gravity, viscosity-temperature and SARA data and screen a reservoir for cold, solvent or thermal recovery
- Compare cold production, CHOPS, cyclic steam stimulation, steamflood and SAGD and set first-pass values such as cycle length, well pair spacing and steam-oil ratio
- Specify casing, cement, connections and sand control for wells exposed to steam temperatures and repeated thermal cycles
- Select and size PCP, high-temperature ESP and rod pump systems for viscous, hot or sandy heavy oil production
- Design diluent, heating, emulsion treating, sand handling and steam feedwater arrangements that keep heavy crude on specification and flowing
- Build a Heavy Oil Development and Lift Selection Plan with surveillance measures and cost drivers for a case heavy oil field

Target Audience:

- Production engineers responsible for heavy oil well rates, lift run life and well interventions
- Reservoir engineers who screen and forecast cold and thermal recovery for viscous oil accumulations
- Facilities and process engineers who operate dehydration, diluent, sand handling and steam generation systems
- Completion and well integrity engineers who design and maintain wells for thermal service
- Artificial lift specialists who select and troubleshoot pumps for viscous and sand-laden crude

Course Outline:

Day 1: Heavy Oil Fluid Properties, Viscosity and Reservoir Screening

- API Gravity, Density and Viscosity Classification of Heavy and Extra-Heavy Oil
- Viscosity-Temperature Curves and Dead Versus Live Oil Viscosity Measurement
- Asphaltene, Resin and Wax Content from SARA Analysis of Heavy Crude
- Unconsolidated Sandstone Characterisation: Net Pay Thickness, Permeability and Oil Mobility
- Heavy Oil Recovery Method Screening Matrix for Cold, Solvent and Thermal Options

Day 2: Cold Production and Thermal Recovery Design Principles

- Cold Production with Horizontal and Multilateral Wells and Early Decline Behaviour
- Cold Heavy Oil Production with Sand CHOPS: Wormhole Growth and Foamy Oil Drive
- Cyclic Steam Stimulation Cycle Design: Injection, Soak and Production Phases
- Steamflood Pattern Layout, Wellbore Heat Losses and Steam Quality at Overview
- SAGD Well Pair Spacing, Steam Chamber Growth and Cumulative Steam-Oil Ratio

Day 3: Thermal Well Completions and Artificial Lift for Viscous Crude

- Thermal Casing, Cement and Premium Connection Design for Cyclic Temperature Loading
- Slotted Liners and Wire-Wrapped Screens for Thermal and Cold Heavy Oil Producers
- Progressing Cavity Pump Elastomer, Metal Stator and Rotor Fit Selection for Viscous Fluid
- High-Temperature ESP Design with Sub-Cool Control and Rod Pump Rod Fall Limits
- Heavy Oil Lift Selection Matrix by Viscosity, Temperature, Sand Rate and Free Gas

Day 4: Flow Assurance, Emulsion Treating, Sand and Steam Water Handling

- Diluent Blending Ratio, Downhole Diluent Injection and Heated or Insulated Flowlines
- Tight Emulsion Stability, Demulsifier Bottle Testing and Heated Treater Dehydration
- Sand Handling in Wellheads, Tanks and Vessels: Desanding and Slurry Disposal Routes
- Steam Generator Feedwater Quality: De-Oiling, Warm Lime Softening and Evaporators at Overview
- Heavy Oil Problem Cases: Pump Stalls, Casing Failures, Steam Breakthrough and Off-Spec Crude

Day 5: Case Study: Heavy Oil Development and Lift Selection Plan

- Case Field Data Pack Review: Viscous Fluid, Reservoir and Facility Constraints
- Recovery Method Choice with Steam-Oil Ratio and Energy Balance Checks
- Well, Completion and Lift Selection by Development Phase
- Surveillance Measures and Economics: Fuel, Diluent, Water Handling and Break-Even Drivers
- Heavy Oil Development and Lift Selection Plan Presentation and Peer Challenge

Skills You Will Gain:

- Heavy Oil Fluid Characterisation
- Thermal Recovery Method Screening
- SAGD and Cyclic Steam Design
- Thermal Well Integrity Design
- Viscous Crude Lift Sizing
- Diluent and Heating Design
- Heavy Crude Emulsion Treating
- Heavy Oil Project Economics

Why Attend This Course:

- Return with a Heavy Oil Development and Lift Selection Plan that names the recovery method, well design, lift type and surveillance measures for a case field
- Avoid committing to steam, diluent or pump choices before viscosity, reservoir and sand data support them
- Recognise early signs of pump stalls, thermal casing damage, steam breakthrough and off-spec crude and know which control to apply
- Compare heavy oil practice with production, reservoir and facilities engineers from different operators and service companies

Conclusion:

Heavy oil production succeeds when fluid data, recovery method, well design, lift and treating are chosen as one system rather than in separate silos. The course moves from viscosity and reservoir screening through cold production, CHOPS, cyclic steam, steamflood and SAGD, then to thermal completions, PCP, ESP and rod pump selection, diluent and heating, emulsion treating, sand handling and steam feedwater quality. The final day applies this work to a case field and produces a Heavy Oil Development and Lift Selection Plan.