

Oil Field - Primary Cementing

Drilling | Well Engineering



⬡ Duration/Dates of Course

4 - 5 days (Classroom format)

⬡ Overview

'Life of Well' Oil Field Cementing is fundamental to well integrity assurance after a casing string has been installed or a wellbore section has to be suspended, abandoned, side-tracked or remediated. This foundation course presents the delivery of onshore/offshore oilfield cementing for drilling and workover operations to deliver these tasks. The course enables participants to develop the knowledge and skills to design cement slurries, cement casing strings, liners and wellbores to meet life of well integrity and compliance requirements, yet with a practical and cost effective applications approach. The course addresses casing tools, equipment, blending, rig-site mixing, job execution, post evaluation, remedial, plug back, side-track, well suspension and abandonment cementing.

⬡ Target Participants

Persons engaged in managing, leading, supervising, drilling, well design, engineering, operational or organizational and technical support functions.

Pre-requisite: 2-3 years' knowledge of drilling wells.

⬡ Purpose

- A participative course to support individuals with the knowledge to assure oil field primary cementing is compliant to meet 'life of well' integrity desired.

⬡ Goals and Objectives

- Deliver the foundation elements to safely deliver compliant primary cement design, execution and long term life of well integrity requirements.
- Develop the knowledge of laboratory test procedures assure the proper use of cement additives and what optimal cement slurry results can demonstrate to deliver a job's success.
- Recognize and analyze cement challenges and difficulties presented within oil field drilling and how to mitigate hazards and risks identified to as low as is reasonably practicable.
- Execute cement calculations, design exercises and cement evaluation methods.
- Outline special purpose cements and demonstrate when they should and should not be used.
- Equip participants with the knowledge of cementing tools, equipment and technology methods to enable compliant cement design and operations from a well project's start to its end.

⬡ Course Take Away

- How to design cement slurries using API and/or best practice field adapted and laboratory testing procedures, know cement chemistry, how to apply cement additives in slurry design, and be able to interpret lab and field results.
- How to design and execute primary cement job operations for casing, liners, tie-back strings, plug back, remedial, squeeze and abandonment application.
- Recognize oil field primary cementing challenges within onshore, offshore and complex wells.
- Be able to optimize effective mud removal, optimal and efficient displacement, and a practical casing centralization program to deliver more assured cement job success.
- Knowledge and foundation skills to interpret cement sheath evaluation logs.
- A wider skill set to enable compliant life cycle primary cement using technologies available.

Course Summary

Oil Field - Primary Cementing



Session	Day 1	Day 2	Day 3	Day 4
08:30 to 10:15	Goals & Objectives Oil Field Cementing introduction Self-test quiz	Primary cement calculations (continued)	Cementing equipment Casing hardware Casing/cement Equipment, Units, Casing Hardware, remedial cementing	Well abandonment Plug back cement calculations Worked examples
15 - 30 mins		Break		
10.30 to 12.00	Cement Functions, Additives, Composition Lab testing	Cement / Formation Interactions Fluids loss, Formation damage, Loss circulation	Cement job evaluation Theory and application Case studies/ Worked examples	Horizontal well cementing Case studies
12:00 to 13:00	Lunch Break			
13:00 to 14:30	Fluids mud displacement Fluid migration Case studies	Specialized Cements Part 1 Case studies	Remedial cementing Squeeze cementing Case studies	Life of well Cementing, Case studies
15 - 30 mins		Break		
14:45 to 16:30	Primary cement calculations Group exercises	Specialized Cements Part 2 Case studies	Cement plugs Plug placement Reasons for failure Case studies	Simulation and data acquisition software Course feedback Close out

Course Details

Oil Field – Primary Cementing



Day 1

Oil Field Primary Cementing

Oil Field Primary Cementing - Introduction:

- Introduction, goals and objectives
- Oil field cementing introduction
- Self-test

Cement Functions, Additives, Composition, Lab Tests:

- Functions, type, composition and classification
- Cement additives and mechanism of action
- Rheology of well cement slurries
- Cement laboratory testing
 - Sample preparation
 - Performance evaluation
 - Characterization and analysis

Fluids Mud Displacement, Fluid Migration:

- Fluid mud displacement
 - Mud removal and channeling
 - Displacement factors, problems
- Fluid migration
 - Flow Through mud channels
 - Micro-annular flow
 - Flow through unset cement

Primary Cement Calculations

- Primary cementing
 - Calculated Volumes, Example 1
- Primary cementing exercise
 - Volumes of cement, mix water
 - Volumes of mud displacement

Debrief: Review of Day 1

Day 2

Cement Calcs, Interaction, Special Cements

Single Stage Cement Calculations:

- Exercise; Example 1, Example 2
- Results discussion and review

Cement / Formation Interactions:

- Fluid loss (dynamic and static)
- Fluids loss during remedial cementing
- Formation damage
- Lost circulation - consequences
 - Classification of loss circulation
 - Loss circulation drilling, cementing
- Lost circulation conclusions

Specialized Cement Systems:

- Thixotropic, expansive and freeze-protected cement systems
- Salt cement systems
- Latex modified cement systems
- Cement for corrosive environments
- Cementitious drilling fluids
- Light weight and particle size cementing
- Thermal cements
- Foam cements
- Horizontal well cementing

Debrief: Review of Day 2

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Oil Field – Primary Cementing



Day 3

Tools | Equipment, Evaluation and Plug Back

Cementing Equipment:

- Cement placement tools and equipment
- Float equipment
- Cement mixing and pumping
- Bulk supply
- Chemical metering
- Other specialized equipment
- Batch mixers
- Specialized cementing equipment

Cement Evaluation Guidelines:

- Traditional logging method for CE
- Analysis of different cement conditions
- Peripheral and longitudinal evaluation of CB
- Practical work session problems

Remedial / Plug Back Cementing:

- Squeeze cementing theory,
- Placement techniques
- Slurry design , application procedures
- Evaluation and reasons for failures
- Plug back cementing, methods and techniques
- Plug cementing theory and cause of failure
- Plug setting enablers and testing

Debrief: Review of Day 3

Day 4

Squeeze, Horizontal, Life of Well Cementing

Plug Back Cementing Calculations"

- Well suspension and abandonment
- No Spacer, Equal Height Spacers
- Spacer Ahead of Cemen. (only)
- Two Unequal Spacers
- Mixtures and Solutions

Horizontal Well Cementing:

- Well classification
- Well applications
- Completion procedures
- Mud removal
- Cement slurry properties

Life of Well Cementing:

- Well engineer casing and cement solutions
- Effects of well stress and modes of failure
- Life of well engineering and design
- Job Execution and cement plug success
- What causes micro-annulus?
- An integrated approach

Cement simulation and Data Acquisition Software:

- Process overview
- 2D and 3D hydraulic simulations
- Cement sheath stress analysis
- Real time data acquisition
- Case history application

Debrief: Review of Day 4

Course feedback and close out

Note: Course attendees will receive a 16-page Glossary of UBD/MPD terms with the course handout materials