

Geothermal Drilling Technology



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Introduction:

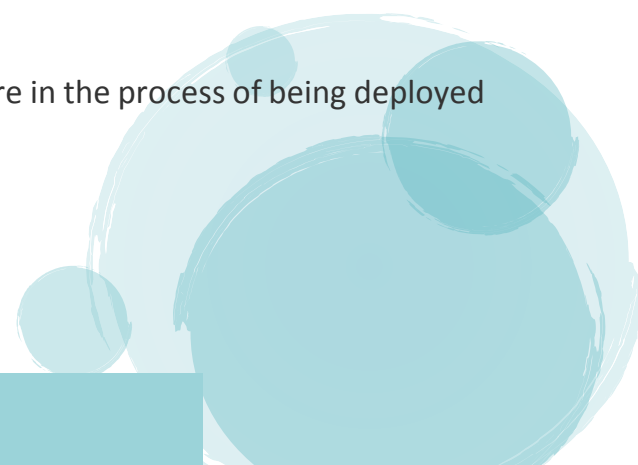
The course objectives are to provide a comprehensive understanding of the technology and engineering required to successfully design and execute geothermal wells. The course is addressed to the personnel of those companies that deal with geothermal energy; having basic engineering basics knowledge.

This course will cover the basic drilling principles which are now analyzed from the point of view of a geothermal developer. The course is structured by presenting the basic drilling technology and then linking it with the features of geothermal drilling activities. The course will cover the following drilling aspects: the design and evaluation of well drilling systems; identification and solution of drilling problems; wellbore hydraulics, well control, casing design; well cementing.

This course provides an overview of geothermal energy, particularly focusing on the concepts, equipment, materials, technologies, techniques and practices involved in drilling geothermal wells and how these differ from those used for drilling oil and gas wells. It is meant to provide insights into factors to consider in designing and engineering a geothermal well in relation to the type of geothermal system being developed. Geothermal well planning, with focus on rig selection, consumable materials and the tools/equipment that will be involved in the geothermal well construction process will also be discussed.

Objectives:

By the end of this BTS training course, participants will be able to:

- Understand the basics of drilling engineering related to geothermal applications
 - Understand the interdependency between geothermal well drilling and oil and gas business
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- Understand the specific tools to drill a well in general and specific for geothermal
 - Have a broad knowledge of the technologies involved to date at drilling rig side.
 - Have an overview about drilling costs
 - Get an overview of geothermal drilling and what makes it different from drilling operations for oil and gas wells
 - Acquire insights into factors to consider in planning, engineering and designing a geothermal well
 - Know the materials, equipment, technologies and methodologies required to be able to drill and construct geothermal wells
 - Gain familiarity with geothermal drilling practices as it pertains to the different phases of the drilling operation
 - Identify potential problems that can be encountered in geothermal drilling and how they are typically addressed
 - Learn about advanced and emerging technologies that are in the process of being deployed in drilling geothermal wells
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Who should attend?

Drilling Engineers, Senior Drilling Engineers, Drilling Supervisors, Petroleum Engineers, Completion Engineers, Tool Pushers, Reservoir and Senior Reservoir Engineers, Geologists, Production and Completion Engineers, Foremen, Industry Personnel

Course Outline:

- Short history of drilling engineering
- Introduction to geothermal engineering
- Geothermal well design and engineering
- Drilling a well and drilling methods
- Drilling rig components and drilling rigs classification
- Overview of rock mechanics process
- Effect of geothermal reservoir on the rock mechanics process
- Drilling fluids and wellbore hydraulics
- Drill Bits and their application
- Drill string components

- down hole motors and down hole tools
 - Prime drivers, rotary system
 - Hoisting system, mud circulation system
 - Geothermal well design and engineering
 - Well design/casing design
 - Drilling hazards
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- Rate of penetration (ROP)
 - Completion considerations
 - Thermal stress
 - Blowout preventers
 - Cementing
 - Wellheads
 - Other design factors
 - Casing and cementing of geothermal wells
 - Well completions for geothermal applications
 - Special aspects of geothermal drilling
 - Effect of high temperature on drilling mud
 - Economic aspects of geothermal drilling

- Geothermal well planning
 - Rig Selection
 - Rig Capacity
 - Rig Footprint
 - Pump Capacity
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- Fluid Cleaning
 - Drill String and Bottom hole Assembly
 - High-Temperature Capability
 - Rig Instrumentation
 - Consumable Materials
 - Drilling Fluids
 - Cement
 - Drilling Tools
 - Bits
 - Drill Pipe
 - Tools/Equipment
 - Directional Drilling

- Cementing
 - Tubular Running
 - Fishing
 - Aerated Drilling
 - Logging and Measurements
 - Well Testing
 - Well control
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- Drilling problems related to geothermal drilling
 - Lost circulation
 - Stuck pipe
 - Wellbore instability
 - Cementing difficulties
 - Wellbore diameter reduction
 - Temporary zone closure
 - Well control
 - Special drilling techniques for geothermal