

3 Day Drilling Hydraulics Design

This 3-Day course is designed for drilling operational staff and drilling engineers. The objective of the course is to determine subsurface wellbore pressures during drilling operations under static and dynamic conditions. It starts with a calculation of hydrostatic pressure using high school mathematical equations and physical laws governing fluid dynamics. After refreshing basic concepts, the course explores how to calculate the forces and stresses in submerged tubular, the density of drilling fluids required to drill safely and efficiently, various rheological models for calculating frictional pressure losses in tubular and in annulus, the surge and swab pressures while moving the drill string, optimizing drilling rates according to the design and size of the bit nozzle and the annular velocity for efficient cutting removal from the wellbore.



Dr. Qamar J. Sharif

B.Sc. Mining Engineering

M.Sc. Petroleum Engineering

Ph.D. Petroleum Engineering



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Enhancing Return on Investment in Oil & Gas Training

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What Will the Course Cover?

This course covers the conversion between English and metric units, with an emphasis on commonly used units in the oil and gas field operations; properties of drilling fluids; properties of gases and ideal gas law; calculation of hydrostatic pressure of liquid and gas columns; buoyancy factor; axial stresses in tubular; forces balance and free body diagram; identification of a kick and well control; estimation of formation pore pressure and fracture gradients; loss circulation; fluid flow calculations; hydraulic horse power; rheological models; flow regimes; Reynolds's number; bit hydraulics and optimum bit nozzle sizes; and hole cleaning in vertical, directional and horizontal wells..

What Will You Learn?

On completion of this course you will be able to fully understand the following:

- Drilling fluid properties and hydraulic design
- Axial stresses
- Well control
- Estimation of pore pressure
- Prediction of fracture gradient
- Fundamental laws of fluid flow
- Rheological models
- Hole cleaning in vertical and horizontal wells
- Optimal bit nozzle sizes
- Surge and swab pressures

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Who Will Benefit?

The following oil & gas company personnel will benefit from the knowledge shared in this course:

- Drilling crews
- Rig managers
- Drilling foremen
- Drilling engineers
- Mud engineers
- Wellsite geologists
- Directional drillers
- Drilling contractor's staff



We offer more than just knowledge sharing.
We offer a partnership to share in
your vision.

Course Outline

INTRODUCTION TO OIL & GAS DRILLING

- Oil and gas development
- Formations, rock pressure, fluid traps
- Fundamentals of petroleum
- Basic geology
- Drilling hydraulics

DRILLING FLUID PROPERTIES

- Density
- Compressibility of fluids
- Properties of gases
- Z-Factor Factor
- Hydrostatic pressure
- Annular pressure in complex fluid columns

FLUID MECHANICS

- Free body diagram
- Buoyancy
- Forces and stresses in submerged tubular

WELL CONTROL

- Identification of a kick
- Shut-in pressures
- Kill mud weight calculations
- Annular pressure during well control
- Strength of casing shoe and maximum allowable annular pressure
- Exercises

FORMATION PRESSURE

- Pre -pressure development
- Porosity and permeability
- Pore pressure measurements
- Fluid pressure gradient and mud weight requirements
- Fluid level in annulus after loss circulation
- Exercises

PREDICTION OF FRACTURE GRADIENT

- Definition
- Estimate fracture gradient from correlations
- Measurement of fracture gradient – leak of test (LOT)
- LOT data analysis
- Exercises

BASIC LAWS OF FLUID FLOW

- Introduction
- Conservation of mass
- Velocity equation
- Energy and pressure balance equations
- Hydraulic calculations
- Pressure drop through bit nozzles



RHEOLOGICAL MODELS

- Introduction
- Calculation of frictional pressure losses
- Newtonian model
- Bingham Plastic model
- Power-Law model
- Flow regimes, laminar and turbulent
- Frictional pressure loss equations
- Exercises

BIT HYDRAULICS

- Introduction
- Bit nozzle size design
- Optimization of bit hydraulics
- Bit hydraulic horsepower
- Jet impact force
- Exercises

HOLE CLEANING IN VERTICAL WELLS

- Introduction
- Plastic slip velocity
- Cutting transport ratio
- Factors affecting hole cleaning
- Empirical correlations
- Exercises

HOLE CLEANING IN DIRECTIONAL WELLS

- Same rules don't apply
- Cutting transport in directional wells
- Difficulties in hole cleaning at different angles
- Factors affecting hole cleaning in directional wells
- Flow rate requirements for hole cleaning in different hole conditions
- Exercises

SWAB AND SURGE

- Definitions
- Burkhardt method
- Mitchell method
- Recommended speeds for running in hole and pulling out of hole
- Exercises



DR. QAMAR J. SHARIF

Dr. Sharif worked as a petroleum engineering specialist with Saudi Aramco. He has over 35 years of practical experience in the oil and gas industry, including academia. He has diversified background in drilling, workover and completion operations, research, technology development and implementation, field development planning, well cost estimation, contracts and contracting strategy for oil and gas operations.

He started his career on a steam-powered rig as a trainee drilling engineer in 1980. He worked as Assistant driller, driller and tour pusher on offshore drilling rigs in Abu-Dhabi, U.A.E.

After working 11 years in operations he joined graduate school and earned his MS and PhD in Petroleum Engineering from Texas A&M University, College Station, Texas. He has a unique blend of hands-on field operations and academic knowledge. He worked with Shell International Exploration and Production (SIEP) in Houston and was a recipient of the Shell President Award for premier performance for design and implementation of multi-string steam injection well design at Bakersfield, California.

Dr. Sharif has been involved in new joint ventures startup, product line development, commercialization strategy for Enventure GT, an Expandable Tubular Company (a JV between Shell and Halliburton). He deployed the first expandable casing, downhole.

He worked with Shell Nigeria, Farcodus Yokri Project, Warri and reduced well completion time by more than 50% for dual completions. He has expertise in developing novel ideas and transforming them into robust and practical solutions. He has been teaching stuck pipe prevention and lost time reduction course and conducted an awareness campaign for offshore drilling department. He has been involved in teaching undergraduate and graduate courses at King Fahd University of Petroleum and Minerals (KFUPM), Petroleum Engineering Department, Dhahran, Saudi Arabia. He brings out the best in his students.

He served as Curriculum Advisor - Well Construction discipline, representing Saudi Aramco with PetroSkills.



EDUCATION

- B.Sc. Mining Engineering
- M.Sc. Petroleum Engineering, Texas A&M University, USA
- Ph.D. Petroleum Engineering, Texas A&M University, USA

PORTFOLIO OF COURSES

- Offshore and Deep-Water Drilling
- Drilling Operations
- Stuck Pipe Prevention
- Drilling Operations Optimization
- Advanced Drilling Engineering
- Drilling Hydraulics Design

PUBLICATIONS

- Fiber Glass Lined Tubular as completion string for corrosion protection
- Application of Drilling-with-Casing (DwC) Technology
- Meeting Economic Challenges of Deepwater Drilling With Expandable Tubular Technology
- Strategic Cost Leadership - reduction of completion time by more than fifty percent
- Probability of getting stuck while drilling and probability of freeing the pipe, if stuck
- Unconventional Methods for Shallow Water Flow Conductor Installation
- Carbonated Water Imbibition Flooding for fractured reservoirs

COURSES DELIVERED IN

- Cambodia, Australia, Singapore, Kuala Lumpur, Dubai, London, Houston, Mexico, Pakistan and Saudi Arabia

Please complete the following Form and e-mail it to mianma@OGKnowledgeShare.com OR Submit the same details via the **Event Registration** on the website www.OGKnowledgeShare.com. We will then send you additional course details along with a detailed course registration Form.

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Full payment is due within 14 days from date of invoice and before the course commences. Delegates will not be allowed entry to the course if any payments are outstanding. A confirmation letter and invoice will be sent to you on receipt of your booking.

You may substitute delegates at any time as long as reasonable advance notice is given to O&G Knowledge Sharing Platform. For any cancellation received in writing not less than twenty (20) working days prior to the date of the training course, you will receive a full refund less US\$ 150 administration fee and any related bank or credit card charges.

Delegates who cancel the registration less than twenty (20) working days of the date of training course, or who do not attend the course, are liable to pay the full course fee and no refunds will be granted.

In the event that KSP cancels or postpones the course for any reason, the delegates will be given choice to (a) request full refund less applicable credit card or bank charges, (b) attend the same course at the rescheduled date at the same or other venue or (c) receive credit note to be used by any employee of the same company for any other course offered by KSP, which must occur within one year from the date of postponement.

COMPANY GAURANTEE

If Company Payment is selected as the Billing Method, an official letter from the company, signed by HR or responsible Management, stating names of the delegates who will attend the course and the total course fee payment guaranteed by the company to be paid within 30 days upon receipt of invoice from KSP shall be submitted ten (10) working days before the start date of the course.

CHARGES AND FEES

1. For Payment by Direct Telegraphic Transfer, client has to bear both local and oversea bank charges.
2. For credit card payment, there is additional 4% credit card processing fee, which shall be added to the course fee.

COURSE FEES & VENUE

Middle East – US\$ 3,500

All Other Locations – US\$ 3,950

The fees is per participant. Hotel accommodation and travel costs are not included in the fees. The Fees includes refreshments, lunch and course material. Course is held preferably in a 5-star hotel. The final venue selection will depend upon the number of delegates attending the course and availability of the venue. All delegates will be informed about the venue two weeks before the course start date.