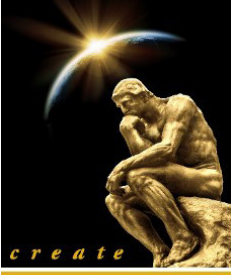
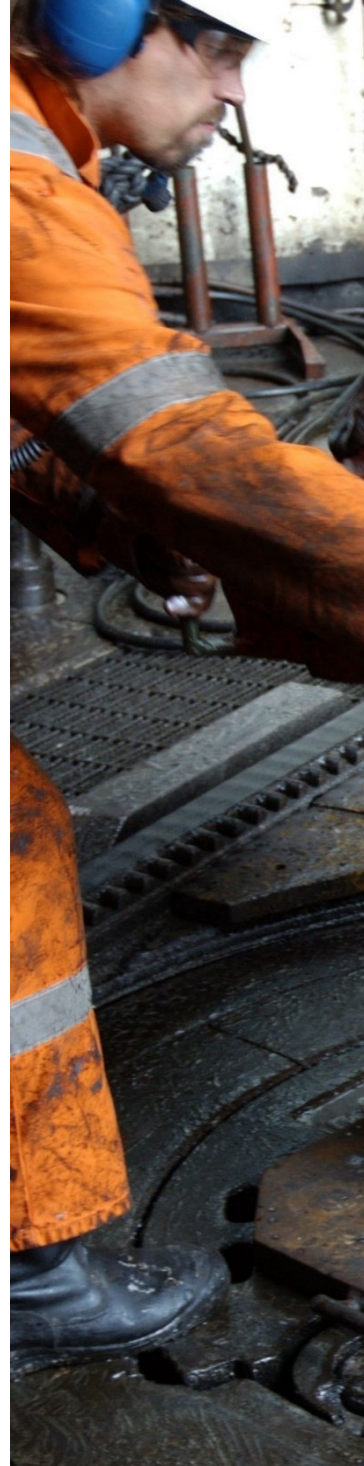


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ADVANCED STUCK PIPE PREVENTION



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ADVANCED STUCK PIPE PREVENTION

Course Overview

This course has been written for Operators, Drilling Contractors and Service Company personnel who require an in-depth detailed understanding of the causes of stuck pipe (which includes drill pipe, BHA's, casing, liners and logging tools) and how sticking can be prevented. The following media are used:-

- 1) Lectures (the Trainer began his career 35 years ago and has worked both on and offshore worldwide on land rigs, jack-ups, platforms, tender-assist, semi-submersibles and drill ships for Operators & Drilling Contractors);
- 2) PowerPoints (written by the Trainer);
- 3) Videos;
- 4) Case history examples;
- 5) Teamwork exercises.

New technologies available to the Industry are readily covered.

Provision is also made for delegates to discuss any aspect of their up-coming wells which are pertinent to their employer's projects in order to attain success not just first time – but every time.

For each subject area, the benefits of certain industry practices are covered in detail as well as why difficulties are often encountered on the rig.

Solutions are also presented (e.g. optimal practices per IADC) so that the well to be drilled is incident-free.

Aims & Objectives

By the end of the course, delegates will understand those key drivers behind zero stuck pipe incident wells – as well as what can be done – and should be done – in order to prevent stuck pipe problems occurring.

Delegates will also benefit from the successes – and failures – of studying stuck pipe Case Histories which have been carried out worldwide in recent years and what can be done to maximise success and minimise failure.

Consultancy services can be provided both before the course (e.g. certain wells / problems can be looked at), during the course (e.g. certain problems can be reviewed) or after the course (e.g. advice / well review) should delegates require.

Who Should Attend

Assistant Drillers, Drillers, Toolpushers, OIM's, Mud Engineers, Drilling Engineers; Senior Drilling Engineers; Offshore Drilling Engineers; Offshore Supervisors; Drilling Superintendents; Drilling Managers; Service Company Personnel.

Your Dedicated Coach

Michael Gibson (PhD)



❖ **Overview**

- Seasoned professional with 35 years' worldwide experience on drill-ships, semi-submersibles, tender-assist units, platforms, jack-ups and land rigs.
- Extensive experience both onshore and offshore in engineering and operations for Operators and Drilling Contractors on exploration, appraisal & development wells.
- Extensive risk assessment, advisory, planning and rig-site work experience ranging from Drilling Engineer through to Drilling Supervisor, Superintendent & Drilling Manager.

❖ **Training**

Training experience worldwide ranges across Operators, Drilling Contractors and Service Companies both in-house and public in the following areas :-

- HPHT
- Stuck Pipe Prevention & Fishing
- Deepwater Well Engineering
- Deepwater Operations
- Directional Drilling
- Horizontal & Multilateral Wells
- Accelerated Drilling Programmes for Drilling Contractors
- Graduate Drilling Engineering for Operators
- Optimised Drilling Practices
- Well Planning & Engineering
- Well Construction
- Well Control (Advanced, Understanding, Deepwater & HPHT)

❖ **Consultancy**

Engineering & Operations Advisor to Operators, Drilling Contractors, Banks & Insurance Companies worldwide re Drilling & Field Development, Risk & Blowouts

- Hazard Analysis
- Offshore Operations
- Technical Advisor for HPHT Developments
- Well Control
- Technical Advisor for Deepwater Operations

❖ **Project**

- Project Manager for HPHT Field Development; Standard Field Development
- Production Optimisation
- Risk Mitigation
- Brownfield Re-development
- Deepwater
- Well Control
- Management Systems

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ADVANCED STUCK PIPE PREVENTION

DAY ONE

INTRODUCTION TO DOWNHOLE FORCES

During this introductory session you will gain an understanding of the forces at work which can cause pipe / casing, liners, logging tools etc. to become stuck. We will cover the following subject areas:-

- Cohesion / Adhesion, Mobile Formations, Fractured Formations
- Reactive Clays & Shales, Tectonic Stress, Differing Overburden Pressures
- Over-pressure, Unconsolidation, Contamination & Fracture, Differential



Tectonically Stressed Shale

REVIEW OF RECENT INDUSTRY DATA

During this section we cover what recent industry data tells us re the following areas:-

- Drilling
- Reaming
- Tripping out and Tripping into the hole

STUCK PIPE AREA 1: SOLIDS INDUCED / FORMATION COLLAPSE PACK-OFF

This is the longest section of the course since there are so many inter-related areas.



Formation Collapse Pack-off

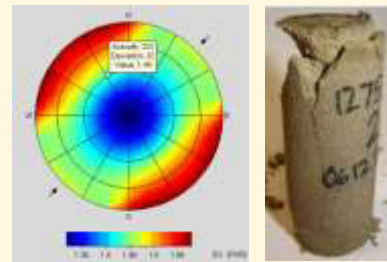
- Bridging Warning Signs
- Pack-off Warning Signs

THE DRILLER'S FIRST ACTIONS ON BECOMING STUCK

- Pump Pressure / Speed
- Torque
- Pull / Set-down
- Pressure beneath the pack-off
- List of Actions (When & How)

ROCK MECHANICS & PROBLEM PREVENTION

Rock mechanics work is essential is problems downhole are to be avoided – particularly on high-angle long reach wells and where the rock is likely to collapse so causing stuck pipe. In this section we will look at what's important and why.



Rock Mechanics work is Essential for Cost Effective Drilling

MOBILE FORMATION PROBLEM PREVENTION

As the term implies, mobile formations move. Certain formations (like mudstone and claystone) and salt can move when under huge pressure. In this section we look at what we can do to prevent becoming stuck through formations “squeezing” into the wellbore.



Becoming Stuck Through Mobile Salt Movement

We will also look at pressures and drilling fluids in this sub-section.

WHAT CAVINGS TELL US

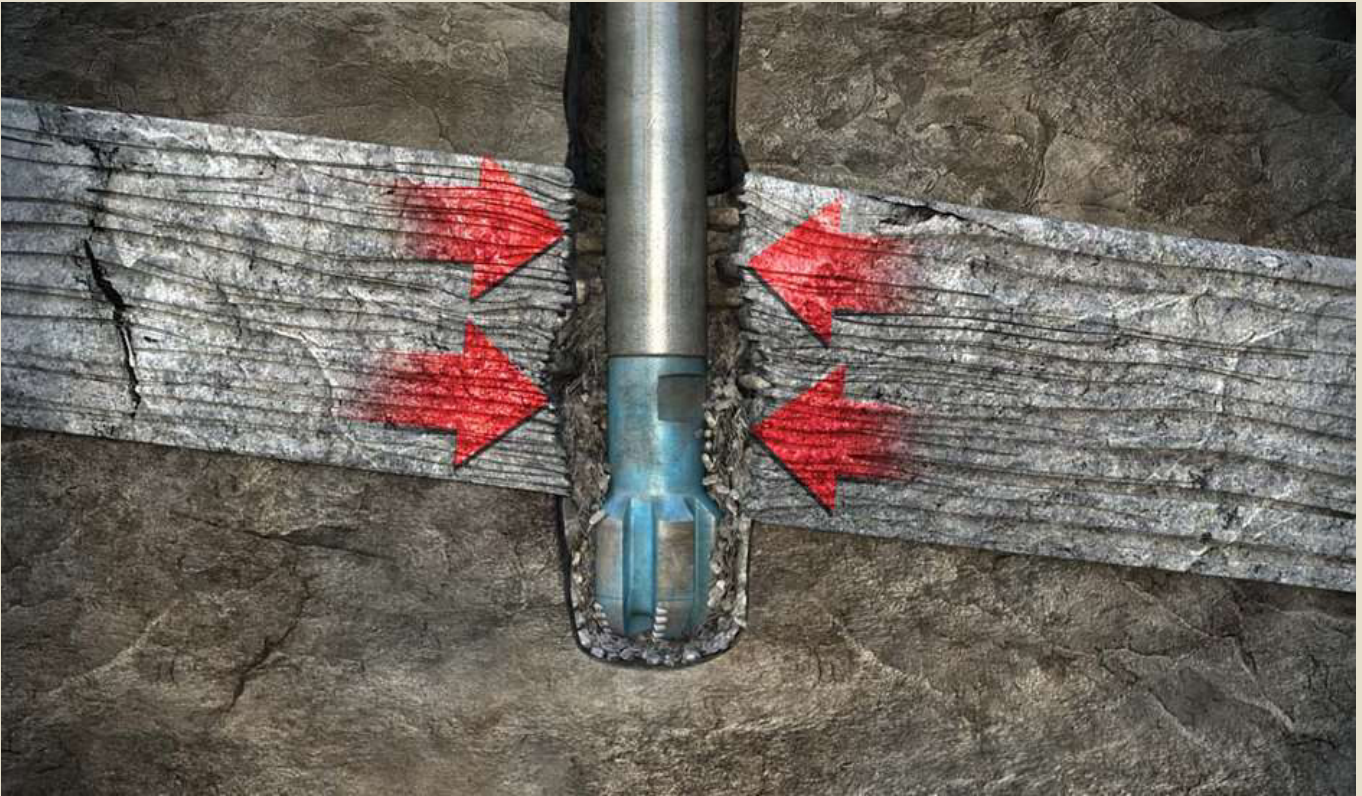
During this section we will study what cavings tell us, how and why they happen and what we can do the prevent cavings from falling into the wellbore.

ADVANCED STUCK PIPE PREVENTION

DAY ONE

ROCK STRENGTH & BRITTLENESS

Here we look at compressive strength, how rocks are affected by the drill bit, and their brittleness.



Wellbore Instability

DATA & INTERPRETATION

What can we learn from increasing / erratic torque, fluctuating stand-pipe pressure, changing RPM, PWD (ECD) data, Mud Loggers Data, Returns over the shakers etc.?

DRILLING FLUIDS

Why mud weight and chemistry are so important. Advances in WBM's. Advantages of OBM's. Effect of: - mud weight on solids suspension, viscosity on hole cleaning, gel strength on solids suspension, filter-cake downhole. Wellbore stability. Shale inhibition. Filter cake quality. Reducing torque and drag. Ensuring less risk of differential sticking. Lower dilution rates. Increased ROP.

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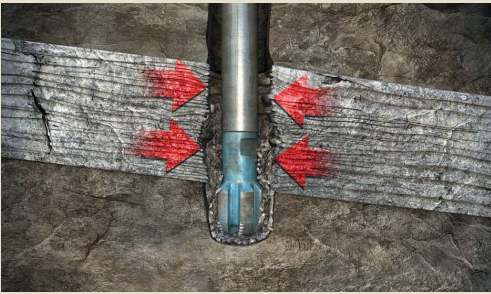
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ADVANCED STUCK PIPE PREVENTION

DAY TWO

WELLBORE STABILITY / INSTABILITY

Today's session begins with looking at Wellbore Stability / Instability: - What causes rock instability and how can it be countered through mud weight and mud chemistry.



Wellbore Instability

We discuss the effects of mud weight and chemistry in detail to achieve maximum understanding as to the types of mud which give maximum benefit.

THE USE OF EXPANDABLE LINERS

This section looks at the 2 types of Expandable Liners on the market and the advantages of running them:-

- Solid Liner Expandables
- Lattice Expandable Liners

INCREASING HOLE ANGLE EFFECTS

This section looks at the effects which increasing hole angle has on the wellbore, in particular stability / instability and hole cleaning.

TRIPPING PRACTICES

This section looks at those areas which are vitally important on trips out – and into – the hole:-



On the Drill-floor

STUCK PIPE AREA 2: DIFFERENTIAL STICKING

This section of the course looks at:-

What causes Differential Sticking (e.g. high mud weight overbalance with respect to pore pressure, thick sticky filter / mud cake across a porous & permeable formation, un-stabilised assembly and no string movement);
How it can be prevented and
What the Driller's First Actions should be if the string becomes differentially stuck downhole.



Differentially Stuck Drillpipe

Typically, it does not take much overbalance to create a differential sticking situation: Even being as low as only 200 psi overbalance can be enough to create a differential sticking risk if all the other conditions are in place.

THE DRILLER'S FIRST ACTIONS ON BECOMING STUCK

- Circulate at Maximum Allowable Rate
- Slump torqued-up string (Optional)
- Jar
- Spot suitable pills / acid
- Pump Nitrogen / U-Tube

HOW DIFFERENTIAL STICKING CAN BE PREVENTED

- Low overbalance
- Well Stabilised BHA
- Thin / hard filter-cake
- Oil Based Mud
- Know where your porous / permeable formations are
- Keep the pipe moving
- Reduce time for MWD surveys

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ADVANCED STUCK PIPE PREVENTION

DAY TWO

STUCK PIPE AREA 3: MECHANICAL STICKING

This section looks at what can be done if mechanical sticking occurs downhole, such as the BHA is stuck across a backed-out casing shoe joint or there's junk causing the string to become stuck. We also look at the Driller's First Actions should he become stuck in this way.

THE DRILLER'S FIRST ACTIONS ON BECOMING STUCK

- Ensure circulation is maintained
- If the drill-string became stuck when moving up, apply torque and jar down
- If the drill-string became stuck when moving down, do not apply torque and jar up
- Jarring operations should start with light loading of about 50,000 lbs & then systematically be increased to maximum load over a one hour period
- Stop or reduce circulation when:
 - a. cocking the jars to fire up
 - b. jarring down
- Pump pressure increases jar blow when jarring up, so full circulation is beneficial but beware of maximum load at the jar.
- If jarring is unsuccessful, consider acid pills where conditions permit.

STUCK PIPE AREA 4: WELLBORE GEOMETRY STICKING



**Example of Wellbore Geometry Stick:
Stuck at a Ledge at High Angle**

This section looks at what can be done if wellbore geometry sticking occurs downhole, such as the BHA is stuck at a ledge on a high-angle well. We also look at the Driller's First Actions should he become stuck in this way.

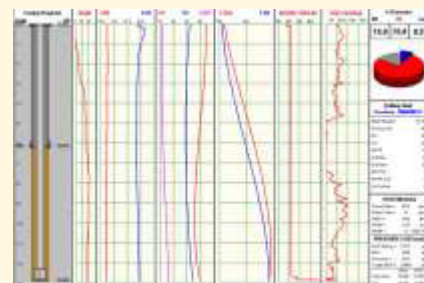
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- If jarring is unsuccessful, consider acid pills where conditions permit.

HOLE CLEANING

First class hole cleaning is absolutely essential in stuck pipe avoidance. And the deeper and higher the angle you go, often the greater the problem. This area of the course covers the following areas in detail:

- Characteristics of Cuttings Beds
- Hole Cleaning in Deviated Wells
- Hole Cleaning Pills
- Drill String Movement
- Back Reaming & Hole Cleaning
- Surface Hole Section
- Use of Larger Drill Pipe
- Circulation Before Conns / Trips
- Wiper Trips
- Trend Information
- Hole Cleaning Charts
- Cuttings Transport
- Rheology
- Yield Stress
- Flow Rate
- Hole Geometry
- Mud Weight
- Cuttings Properties
- Rate of Penetration
- Drill String Rotation



Monitoring Hole Cleaning

With today's PWD Pressure Whilst Drilling subs & Virtual Hydraulics Software packages, we can very quickly see if we are cleaning the hole properly or not, and take the appropriate action – e.g. slow our ROP, increase flow rate etc.

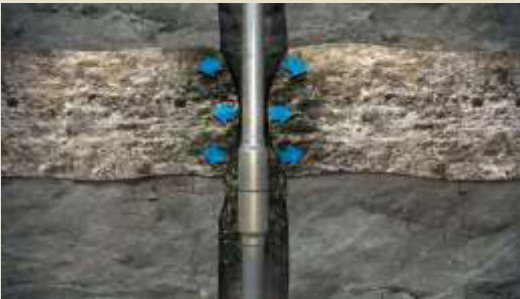
ADVANCED STUCK PIPE PREVENTION

DAY THREE

BEST PRACTICES

Throughout this section we look at Best Practices from a Stuck Pipe Prevention perspective, covering the following areas: -

- Reaming & Back Reaming
- Tripping in Deviated Hole
- Connections
- Surveying
- Drilling Parameter Trends
- Running Casing & Liners
- Logging
- Coring
- Well Control
- Lost Circulation
- Air & Foam Drilling
- Example Procedures
- Drilling with Coiled Tubing
- Care of Tubulars



The loss of water from WBM can cause swelling of Mudstones, Claystones & Shales

JARS & ACCELERATORS

Knowing how to cock and fire the jar / accelerator in the string is crucial as it's typically "the last chance saloon" if you become stuck downhole. Very often jarring practices and procedures are less than optimal – and sometimes people think the jar / accelerator has failed only to find that it wasn't cocked or fired correctly. This section of the course teaches delegates how jars / accelerators should be cocked and fired.

- Jar Types, How they're designed and How they work
- Cocking and Firing
- Successful Usage
- Forces required to fire
- Jar Descriptions (Mechanical & Hydraulic)
- Accelerator Descriptions
- Proper Handling of Jars
- Delivery to Location
- Picking Up & Laying Down
- Stand Back Procedure
- Routine Maintenance
- Jar & Accelerator Positioning
- Vertical Wells
- Deviated & Horizontal Well

This section concludes with Jarring Videos & Jarring Calculations

COMMUNICATIONS & TEAMWORK

This section of the course looks at the importance of good, clear, specific communications and teamwork and how good communication & teamwork can readily prevent the problems associated with stuck pipe.

Next, "Class Teams" will review Stuck Pipe Incidents which have actually happened to see a) how to solve them and b) what could have been done to prevent them from happening.

FLOW CHARTS

The delegates are given a set of flow-charts on "Stuck Pipe Prevention Warning Signs" to take away and place in the Driller's Doghouse for use when drilling the next well which will hopefully help avoid getting stuck.

YOUR WELL(S) – Q & A

This section allows participants the opportunity to discuss what's important to you regarding your up-coming well(s). The Trainer will spend as much time as he can to discuss what's important to you and will give as much advice as possible.



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Contact Details



- I am interested to register for “Advanced Stuck Pipe Prevention”
- I would like to contact IDEAS for In-House Training Solutions
- I would like to contact IDEAS for In-House Consultancy Solutions
- Other enquiry

Name : _____

Job Title : _____

Company : _____

Department : _____

Mobile / DID : _____

Email : _____

**Independent Drilling Engineering
Associates Singapore**
18 Sin Ming Lane
#08-26 Midview City
Singapore 573960
Tel: +65 6659 0272
Email: info@wellideas.com
Website: www.wellideas.com

**Independent Drilling Engineering
Associates Scotland**
1 Mill Court
Gourdon Montrose DD10 0NL
Scotland, United Kingdom
Tel: +44 1561 360358
Email: info@wellideas.com
Website: www.wellideas.com

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