Effective Sand Management Strategy is Critical in Maximizing Hydrocarbon Production

28 November 2016—2 December 2016
Kuala Lumpur, Malaysia
Course Overview

It is estimated that 70% of the world’s oil and gas reserves are contained in reservoirs where sand production is, or will become, a problem during the life of the field. Consequently, and effective sand management strategy is critical in maximizing hydrocarbon production while minimizing sand production.

Course Design Combines the Geomechanics and Completions Components

Our course starts by looking at the geomechanics principles used in the prediction of rock failure and sand production, including pore pressure prediction and 3D reservoir geomechanics, then goes on to the review the principles, applications, and design considerations, of the various sand control techniques commonly used across the industry, including the standalone screens, gravel packs, high rate water packs and frac packs.

Includes Specific and Practical Case Studies

Practical examples and exercises, including some from Malaysia, will make extensive use of Microsoft Excel. Participants should be familiar with basic calculation and charting functions in Microsoft Excel and should either bring their own computer or be provided with access to one loaded with Microsoft Excel (e.g. shared computers for the group)

How Does This Course Benefits You?

- How to determine reservoir and overburden stresses, their magnitudes and orientation
- How to determine rock strength on core and how strength can be predicted in the overburden and in uncored intervals
- What data is required to build and calibrate geomechanical models
- Understand how sand failure happens and how to do Wellbore Stability Modeling
- Perform 3D reservoir geomechanics
- When to manage sand and when to exclude it
- The various sand control techniques used in the industry including standalone screens, gravel packs, high rate water packs and frac packs
- Basics of sand control selection, design & installation
PetroSync Distinguished Instructor

**DR. FRANS MULDERS**  
SENIOR GEOMECHANICS ENGINEER, LR SENERGY

**Practical & Consulting**  
- Dr. Frans Mulders, Senior Geomechanics Specialist for LR Senergy, has 12 years of practical geomechanics experience, ranging from applied research and consultancy in Geomechanical Engineering in the Netherlands and Malaysia, to reservoir and production engineering for an operator in the Southern North Sea. Frans currently provides consultancy services, technical support and training to operating companies on a range of geomechanical issues, including coupled reservoir-geomechanical modelling, fault reactivation, subsidence, wellbore stability, and sand failure analysis. Frans is keenly aware of the geomechanics challenges in the North Malay Basin.

**PHILIP WASSOUF**  
MANAGING DIRECTOR, DUNEFRONT

**Practical & Consulting**  
- Philip Wassouf is the founder and Managing Director of DuneFront. Prior to founding DuneFront, he worked for Schlumberger in a number of positions, including field engineering roles in both completions and pumping services, before taking on the role of Product Champion at its sand control headquarters in Houston to work on a variety of new technology projects. He now works internationally on the design and evaluation of sand control completions for a variety of clients and has authored a number of technical papers, presentations, and patents relating to completions and sand control.

The first three days of the course will cover the topic of geomechanics with the last two days covering the topic of sand control. These are very much connected but highly specialized so, to provide participants with the maximum value, separate instructors will be used to provide subject matter experts for both topics. Dr. Mulders will be delivering the first 3 days, and Mr. Wassouf will be delivering the last two days on the topic of sand control.

Who Needs This Program

- This training program is developed and designed for people who would like to understand the roles of geomechanics in sand production and how to manage and control this when it happens. Participants do not need to have prior knowledge of geomechanics or sand control as the fundamental principles required to understand the various course topics will be discussed at the start of the course.

Course Schedule

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>08:00—09:00</td>
<td>Registration (Day 1)</td>
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<tr>
<td>09:00—11:00</td>
<td>Session I</td>
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<tr>
<td>11:00—11:15</td>
<td>Refreshment Session I</td>
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<tr>
<td>11:15—13:00</td>
<td>Session II</td>
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<tr>
<td>13:00—14:00</td>
<td>Lunch</td>
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<tr>
<td>14:00—15:30</td>
<td>Session III</td>
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<tr>
<td>15:30—15:45</td>
<td>Refreshment Session II</td>
</tr>
<tr>
<td>15:45—17:00</td>
<td>Session IV (Last Session)</td>
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general@petrosync.com  |  +65 6451 4500  |  www.petrosync.com
Course Agenda — 5 Days

DAY 1

GEOMECHANICS

Introduction to Geomechanics and Basic Concepts
- What is sand failure and how does it lead to sand production?
- What is wellbore instability and how does it occur?
- Stress and Strain
- Rock Properties
- Rock Failure Mechanisms
- Poro-Elasticity and Reservoir Depletion

Rock Strength and Modelling
- Coring and how to avoid core damage, sidewall core issues
- Rock Mechanics Tests (UCS, TWC, TRIAXIAL)
- Scratch Testing
- Index Testing – Equotip
- Quality Control
- Young’s Modulus, Poisson’s Ratio, Mohr-Coulomb Parameters from Core
- Core-Log Integration
- Estimating Rock Strength in Absence of Core: Generic Strength Models and their Application
- Log Derived Elastic Moduli

DAY 2

GEOMECHANICS

Far Field and Borehole Stresses
- Stress Regimes: Normal, Strike—Slip and Reverse
- Stresses around Boreholes
- How to obtain vertical, maximum, horizontal and minimum horizontal stress magnitudes and horizontal stress orientation
- Density log integration, Gardner equation
- Poro-elastic models, FIT/LOT/XLOT/mini frac, horizontal stress correlations
- Image log analysis, stress polygon, shear wave anisotropy (dipole sonic log), core testing
- Stress Path Factor

Sand Failure Prediction
- Physics of Sand Failure and Sand Production
- Sand Failure Model Calibration
- TWC and Boost Factor
- Sand Volume Prediction
- Effects of Water production
- Sand Failure in Water injectors
- Passive Sand Management by Oriented and Selective Perforation

DAY 3

GEOMECHANICS

Pore Pressure Prediction
- Causes of Overpressure
- Overpressure Indicators
- Normal Compaction Trends
- Estimating Overpressure via the Terzaghi Effective Stress Principle
- Log Based Modeling
- Seismic
- Basin Modeling
- Centroids and Buoyancy
- Overpressure in the Malay Basin

Reservoir Geoemechanics (High Level)
- Reservoir Compaction
- Surface Subsidence
- Fault Reactivation
- 3D Coupled Reservoir-Geomechanics Modelling
- Hydraulic Fracturing and Unconventionals

Wellbore Stability
- Wellbore stability modelling workflow
- Geomechanical stress and strength model build
- Model calibration
- Drilling incidents database
- Safe mud weight window
- Breakouts and lost circulation
- Concept of damage angle
- Cavings
- Rock strength anisotropy in horizontal / ERD wells

Field Case Studies
DAY 4
SAND CONTROL

- **Sand Control** – Review the basics of geomechanics, and sand production, discussing the importance of sand control and the conditions under which it may be required
- **Sand Control Techniques** – Introduce the various sand control techniques used across the industry along with their respective advantages and challenges
- **Completion Types and Selection** – Discuss the reservoir and logistics considerations involved in selecting the most appropriate completion type and sand control techniques for a well
- **Formation Sand Sampling** – Review and compare the various formation sand sampling techniques in relation to sand control completion design
- **Screen and Gravel Selection** – Discuss the guidelines used in selecting the most appropriate screen and gravel (types and sizes) for a well
- **Practical Project** – Participants will be given basic well data and must select the appropriate sand control techniques

DAY 5
SAND CONTROL

- **Well Preparation for Sand Control** – Discuss the various well considerations while installing the sand control completion including reservoir drilling fluids (RDFs), wellbore cleanout and fluid loss control
- **Pumping Fluids Systems** – Discuss the various carrier fluid systems used in sand control treatments including Newtonian, VES and Polymer
- **Surface and Downhole Equipment** – Review the surface and downhole equipment used to execute sand control treatments
- **Sand Control operations Overview** – Review the operational steps commonly involved in sand control operations
- **Gravel Placement Techniques** – Discuss the various gravel placement techniques used across the industry along with their relative advantages and challenges
- **High Rate Water Packing and Frac-Packing** – Review the main principles and packing mechanisms of HRWP and Frac-Pack Techniques

You Might Also Be Interested In:
- Petroleum Systems for SEA
- Geomechanics for Unconventional
- Natural Gas Geochemistry
- Practical Basin Analysis
- Geostatistical Reservoir Modeling
- Advanced Seismic Data Acquisition & Processing
- Applied Carbonate Sedimentology & Geomorphology

Register For This Course Now!

Kindly fill up your particulars in the registration form placed at the end of this brochure, and send it to us or email to registration@petrosync.com
INVESTMENT PACKAGES (Please Circle)

<table>
<thead>
<tr>
<th>INVESTMENT PACKAGE</th>
<th>DEADLINE</th>
<th>FULL MASTERCLASS</th>
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<tbody>
<tr>
<td>Standard Price</td>
<td>21 November 2016</td>
<td>USD 4,295</td>
</tr>
<tr>
<td>Early Bird Offer</td>
<td>24 October 2016</td>
<td>USD 4,095</td>
</tr>
<tr>
<td>Group Discount (3 or more Delegates)</td>
<td>21 November 2016</td>
<td>USD 3,995</td>
</tr>
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Group Discount is based on Standard Price
*To enjoy the promotion & discount offer, payment must be made before dateline
* For 7 or more delegates, please inquire for more attractive package.
* Prices include lunches, refreshments and materials. Promotion & discount cannot be combined with other promotional offers.
* Important: Please note that registration without payment will incur a SGD 200 administration fee.

DELEGATES DETAILS

1st Delegate Name: ___________________________  Mr  Mrs  Ms  Dr  Others  
Direct Line Number: ___________________________  Email: ___________________________
Job Title: ___________________________  Department: ___________________________
Head of Department: ___________________________

2nd Delegate Name: ___________________________  Mr  Mrs  Ms  Dr  Others  
Direct Line Number: ___________________________  Email: ___________________________
Job Title: ___________________________  Department: ___________________________
Head of Department: ___________________________

3rd Delegate Name: ___________________________  Mr  Mrs  Ms  Dr  Others  
Direct Line Number: ___________________________  Email: ___________________________
Job Title: ___________________________  Department: ___________________________
Head of Department: ___________________________

INVOICE DETAILS

Attention Invoice to: ___________________________
Direct Line Number: ___________________________  Fax: ___________________________
Company: ___________________________  Industry: ___________________________
Address: ___________________________  Postcode: ___________________________
Country: ___________________________  Email: ___________________________

Please note:
- If you have already registered by Phone  Fax  Email  Web  
- If you have not received an acknowledgement before the training, please call us to confirm your booking.

PAYMENT METHOD

- By Credit Card: Please quote invoice number(s) on remittance advice
  PetroSync Global Pte Ltd Bank Details:
  Account Name: PetroSync Global Pte Ltd
  Bank Name: DBS Bank Ltd
  Account No: SGD: 288-901898-0  USD: 0288-002682-01-6
  All bank charges to be borne by payer. Please ensure that PetroSync Global Pte Ltd receives the full invoiced amount.

- By Direct Transfer: Please quote invoice number(s) on remittance advice

CONFIRMATION

I agree to PetroSync’s terms & conditions, payment terms and cancellation policy.

Authorized Signature: ___________________________

PAYMENT TERMS : Payment is due in full at the time of registration. Full payment is mandatory for event attendance.