



**Drilling Optimization**  
**A practical Course for the Drilling Team**

**Instructor: Dr. Saleh  
 Drill-Sense International**

**Course Perspective**

This course is designed to address how to optimize drilling performance from all aspects of the drilling process. The course will address bit performance diagnostics, technical limits, and the way that a real time data analysis can reveal drilling performance shortcomings and safety issues.

**Objectives**

- Identify causes of poor drilling performance
- Understand the main drilling dynamic behaviors, and how to dissipate them and avoid them.
- Determine best possible drilling performance for any given lithology
- Determine drilling efficiency in real time and
- Interpret real time data for possible bit malfunctions

**Course Content**

Day	Topics
<b>1</b>	<b>Drilling Mechanics</b> <ol style="list-style-type: none"> <li>1. Definitions</li> <li>2. Drilling efficiency</li> <li>3. Bingham Evaluation</li> <li>4. Symptoms of poor drilling performance</li> <li>5. ROP models</li> <li>6. The 41 factors that affect drilling rate: Drilling fluids effects, Drill solids type and concentration, Weight on bit , RPM, Others</li> </ol>
<b>2</b>	<b>Drilling Dynamics</b> <ol style="list-style-type: none"> <li>1. Definitions and introduction to drilling vibration</li> <li>2. Causes, prevention, and cure of axial, rotational, and whirl vibration</li> <li>3. Case studies</li> <li>4. Real time diagnosis using downhole and surface measurements</li> <li>5. Real-time diagnosis from bits wear pattern</li> <li>6. Practical guidelines and best practices</li> </ol>
<b>3</b>	<b>Bit Performance Optimization</b> <ol style="list-style-type: none"> <li>1. Types of bits and selection</li> <li>2. PDC bit selection and performance</li> </ol>

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	<ol style="list-style-type: none"> <li>3. Time to pull a bit</li> <li>4. Mechanical specific energy</li> <li>5. The “d” exponent</li> <li>6. Drill off tests interpretations and practical guidelines</li> <li>7. Bit performance diagnostics in real time</li> <li>8. Drill off test analysis with different levels of hydraulics</li> </ol>
<b>4</b>	<p><b>System Optimization</b></p> <ol style="list-style-type: none"> <li>1. Drilling fluid</li> <li>2. Solids control</li> <li>3. Drilling window</li> <li>4. Wellbore stability</li> <li>5. Hydraulics</li> <li>6. Minimum circulation rate</li> <li>7. Drill string</li> </ol>
<b>5</b>	<p><b>Other Topics in Drilling Optimization</b></p> <ol style="list-style-type: none"> <li>1. Limitations to drilling optimization</li> <li>2. Pore pressure</li> <li>3. Maximum cuttings load (for a given ROP)</li> <li>4. Technical limit drilling</li> <li>5. Course recap</li> </ol>



## The Instructors: Dr. Saad Saleh



Dr. Saleh holds a Ph.D. and MS degrees in Petroleum Engineering from the Colorado School of Mines. He has over 20 years of professional drilling experience in industry and 6 years in academia. Dr. Saleh is a specialist in real time geopressure, wellbore stability, and drilling analysis. Dr. Saleh is highly experienced in drilling technology frontiers (HPHT deepwater, sub salt drilling to name few) in many parts of the world including Latin America, Gulf Coast, North Sea, Canadian Shelf, and the Far East. Dr. Saleh has been involved in training and mentoring drilling engineers and drilling operation personnel on geopressures prediction, wellbore stability analysis, drilling fluid solids control, and drilling fluids optimization.

Currently, Dr. Saleh is the President of Drill-Sense International, a consulting firm which specializes in advancing real time drilling technologies, training in all aspects of Petroleum Engineering with emphasis on drilling training, as well as providing expert advice to the global drilling industry on drilling diagnostics, optimization, well planning, and real time drilling surveillance.

Dr. Saleh was a Senior Drilling Fluid Specialist with Saudi Aramco (from 2005 to 2007), a Principal Geopressure advisor for Knowledge Systems (6 years from 2000 to 2005) in Houston, Texas, a Drilling Advisor for PDVSA-Intevep (3.5 years from 1997 to 2000), Assistant Professor at the Colorado School of Mines (4 years from 1994 to 1997) and the University of Alaska (2 years from 1988 to 1990), and a Drilling Engineer for BP Exploration in Alaska (4 years from 1990 to 1994) and Northern Petroleum (2 years from 1977 to 1979).

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