



# Signal Engineering Corp.<sup>®</sup>



Providing leading-edge technology to the upstream oil & gas industry since 1992...  
Managed Pressure Drilling, UBD, Field Execution, Training, Software and more





# ENGINEERING

## FULL-CYCLE PETROLEUM ENGINEERING

- Engineering Evaluation, Design and Execution
- Onshore & Offshore Applications
- International & Domestic Projects
- Vertical, Directional, Horizontal or Multilateral Wells

*Signa provides leading-edge technology for all aspects of the upstream energy industry, including design, project management, feasibility studies, plans for field development, surface equipment design and software.*

## MANAGED PRESSURE DRILLING

- Control Annular Pressure while Drilling
- Decrease NPT & Reduce Drilling Days
- Improve Well Economics
- Reach TD in "Undrillable" Environments

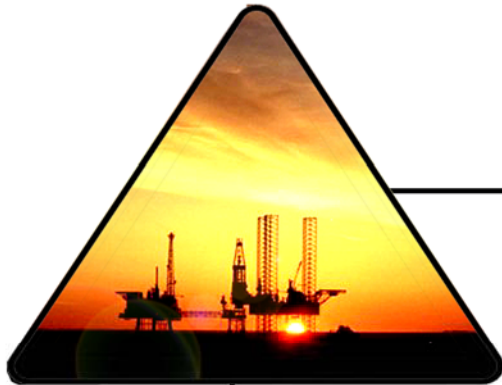
*Signa is a registered engineering firm in the State of Texas. We don't offer tools, rigs, equipment or other materials, so our recommendations are unbiased. Since 1992, knowledge has been our deliverable.*

## UNDERBALANCED DRILLING

- Avoid Formation Damage & Skin Damage
- Increase O&G Production
- Keep Lost Circulation to a Minimum
- Increase Rate of Penetration



# OPERATIONS



## WELLSITE PROJECT MANAGEMENT

- Contract Wellsite Consultants
- Consulting Engineers
- International & Domestic Projects
- Conventional / Unconventional Applications

*Field personnel must understand “what the formation is doing” and make critical adjustments to overcome the endless obstacles Mother Nature produces. Signa provides hand-selected consultants to give our clients extra manpower and added technical expertise.*

## TAILOR-MADE CONSULTING SOLUTIONS

- Get Help for your Offshore and Onshore Projects
- Onsite Experience on a Contract Basis
- Avoid Added Expenses of Full-Time Employment
- Drilling, Completion or Production Assistance



*Signa maintains a comprehensive database of 150 seasoned consultants, which includes details of each individual's work history. Their broad exposure brings strong leadership and competency to your project.*



## FLUIDS ENGINEERING SERVICES

- Onsite Drilling Fluids Management
- Fluid Specialists Hand-Picked for your Job
- Drilling, Completion or Workover Fluids
- Ensure Optimal Circulation in your Well





## Engineering

**Gulf of Mexico.** Signa provided deepwater MPD engineering design, HAZID/HAZOP and logistics for Shell Exploration (SEPCO) on the Auger A-8, A-13 and A-18 tension-leg platforms.

**Algeria.** Signa prepared drilling plans/procedures for wells being drilled using gasified fluids and foam in Hassi Messaoud Field for SONATRACH.

**Offshore Malaysia.** Signa designed MudCap drilling project for Shell Malaysia in East Sarawak. Overcame total losses while drilling from a moored semi-submersible.

**South Texas.** Signa served as project manager for ConocoPhillips project in Lobo Field using a new Managed Pressure-Casing Drilling hybrid.

**Caspian Sea.** Signa engineered MudCap Drilling project for AGIP/KCO in Kashagan Field. Implemented the first multi-stage cement job in a high-pressure MPD operation.

**Argentina.** Signa engineered UBD project by utilizing produced hydrocarbon gas and water-based liquids as drilling fluids in Huamampampa and Santa Rosa Fields for Pluspetrol.

**Gulf of Mexico.** Signa completed an MPD study for a deepwater (6,000') Thunderhorse development project for BP America.

## Operations

**Gulf of Mexico.** Used Dynamic Annular Pressure Control equipment to drill through several problematic hole sections for Shell Exploration (SEPCO) on MARS A-14.

**Venezuela.** Signa provided field execution for Shell (SVSA) in highly fractured, sour reservoir in Lake Maricao. Record time through entire fractured carbonate using annulus pressure.

**Kazakhstan.** Signa provided MPD field execution for TCO (Chevron) in Tengiz Field. Drilled the highly fractured, sour, abnormal-pressure (15.5 EMW) oil reservoir using MudCap Drilling.

**Austin Chalk.** Signa executed over 20 wells using Flow Drilling in Texas for Chesapeake. Pore pressure ranged from 10 ppg to 16.5 ppg.

**Colombia.** Signa provided field execution for Harken de Colombia for high-pressure, horizontal project using concentric casing gas injection.

**South Texas.** Signa provided operations consulting to Apache for drilling the Buda and Georgetown formations using MPD.

**North Sea.** Provided field execution for Power Chokes on an MPD directional well, offshore Norway. The well was drilled from a platform in the Kvitebjorn Field, Brent Group.



## MPD/UBD Case Histories



# TRAINING

## MANAGED PRESSURE DRILLING CLASS

- Educates Students on Entire MPD Process
- MPD Variations (CBHP, PMCD) & UnderBalanced
- Intended for Operations Personnel & Engineers
- 5-Day Class in Houston, TX or Custom Training

*Shorten your company's learning curve with Signa's Managed Pressure Drilling class. Our instructors are industry experts with years of on-the-job experience, who utilize case histories and class problem-solving.*

## FUNDAMENTALS OF PETROLEUM CLASS

- Plain-Language Introduction to Oil & Gas Industry
- Educates Workers About Operations they Support
- Attendees Visit a Working Drilling Rig
- 3-Day Class in Houston, TX or Custom Training

*For optimal performance, employees must have a comprehensive grasp of the industry in which they work. Signa's Fundamentals class helps foster technical and non-technical communication.*

## WELLSITE FOREMAN INTERN TRAINING

- 6-Mo. Comprehensive Training in Houston/Onsite
- Prepares Workers for Wellsite Supervisory Jobs
- Provides Technical Drilling Competency
- Fills Needs of Understaffed Operating Companies



# SOFTWARE



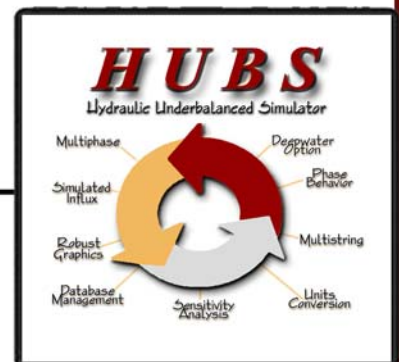
## EXTENDED REACH DRILLING SIMULATOR (ERDS)

- Extended Reach / Managed Pressure Operations
- HTHP Fluid Density and Rheology
- Surge and Swab / Torque, Drag and Buckling
- Fluid Formation / Heat Transfer

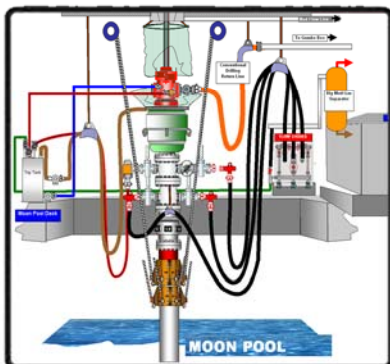
*Successful MPD or UBD requires proper design of well trajectory, capacity of drilling equipment and circulating fluid. ERDS incorporates all these into one user-friendly package, even predicting adequate hole cleaning.*

## HYDRAULIC UNDERBALANCED SIMULATOR (HUBS)

- Gas, Mist, Foam and Gasefied Fluid
- Optimum Injection Rate(s) Design
- UBD / OBD / MudCap Drilling
- Jet Sub and Parasite Tubing / Casing



*HUBS accounts for a variety of dynamic situations: Formation influx, lost circulation, phase change and gas solubility, parasite strings and concentric casing injection, and reverse circulation during UBO.*

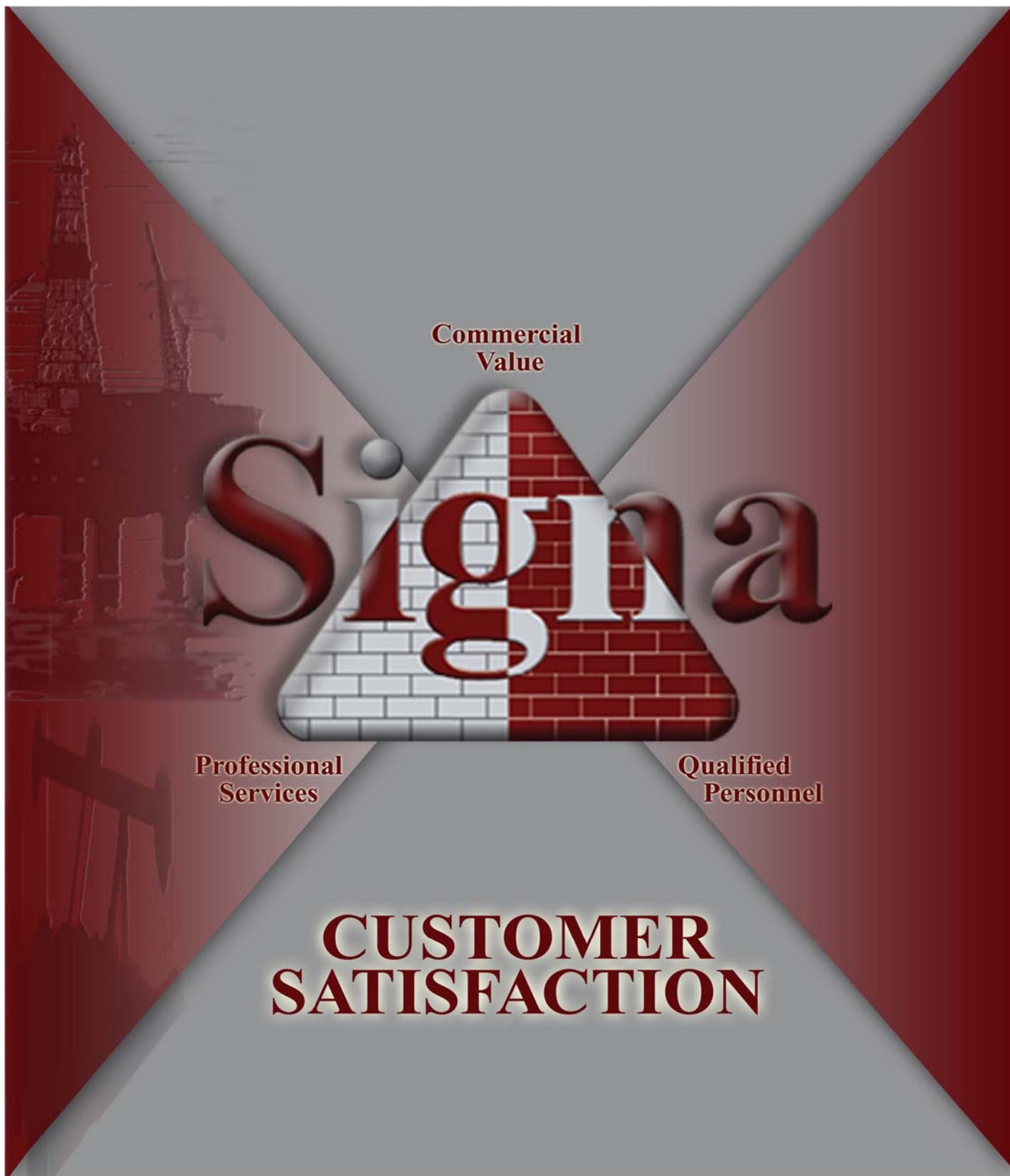


## CUSTOM HYDRAULIC & TECHNICAL MATERIAL

- Custom Drilling Software as per Client Needs
- High-Impact Computer Animations
- Engineering Drawings / Expert Witness
- Technical Graphics & Equipment Schematics.







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