training for advanced drilling operations

Improve operational performance with down-hole simulation and training
The Intellectus hiDRILL is a world leading down-hole simulator, combining the topside feel of the drilling operation with an accurate and precise downhole model. The simulator consists of three parts:

1. The hydraulic flow model, which calculates the effect of the hydraulics throughout the circulation system. This model is ensuring we get the correct output values to the downhole torque and drag model.
2. The downhole torque and drag model is already in use in offshore installations, and as such is a valued and effective system. The system ensures a real-time feedback, giving operators an early warning system of issues in the well.
3. The final part of the simulator is the topside model, which consists of two Driller Chairs, a large view of the drill floor and derrick as well as several separate monitors, with details of pumps, valves etc.

The combination of the highly advanced model and an accurate topside simulator enables Maersk Training to run very realistic courses and trainings on actual wells from real data. The simulator can handle:
- High Pressure High Temperature - HPHT
- Managed Pressure Drilling – MPD
- Extended Reach Drilling – ERD
- Coiled Tubing Drilling – CTD
- Through Tube Rotary Drilling - TTRD

Training on a simulator will give you a wide range of benefits, the most obvious being experience and competence in handling the well. The simulator can be set up to meet any specific requirements and demands, and your drill crews will have to handle the cases exactly as they should offshore. However, the simulator will also create a forum where discussions, debates and competence sharing increases each participants understanding and involvement, thus ensuring a deeper and more thorough learning than any classroom can supply. With the obtained competence follows safety and reliability in handling the well.

Research shows, that learning retention is highly dependent on how the theory and exercise are presented and worked with. At Maersk Training we base our training on Taxonomy and extensive studies on learning to ensure we deliver a better learning experience, by utilizing discussions, practical exercises and other well documented teaching methods.
why advanced well control?

The search for oil and gas drives the industry into deeper waters and harsher environments, increasing the need for specialized knowledge to promote safety and secure profitability.

Starting by assessing the needs of the client, Maersk Training develops the exact requirements necessary to gain the maximum effect from the learning process. From junior drillers to the most senior members of a crew doing Advanced Well Control or Train-the-Trainer, the oil and gas portfolio is one of the most extensive.

Our training focuses on usability: Learning must be relevant when working on the rig, no matter what client we train for. Improving team communication is an essential part of putting learning to use.

team based training

Drillers of today are certified by either IWCF or IADC. These certifications are standard courses with a fixed syllabus, thus in essence, stating the minimum requirements.

When crews go offshore, they are however met with a different set of requirements, where team efforts and advanced wells, not only test their abilities to work together, but also stress their competences on interpretation of the well data.

With Maersk Training’s Advanced Well Control programs, your crews will gain a high knowledge of well control, Rig Resource Management, Team based crew training and well specific cases. Furthermore we will train your crews on market leading simulators.

Maersk Training combines classroom education with simulator training, and utilizes our very accurate and realistic simulators to stipulate learning and competence enhancement in the best possible way.

The expertise of Maersk Training is acknowledged by the International Well Control Forum (IWCF), and relevant courses are certified by them. Maersk Training also holds accreditation from the International Association of Drilling Contractors (IADC). Our facilities, knowledge and competences are often used to develop or test industry practices.

Experience and knowledge from the world of our clients are at the core of our training. We base our training on advanced teaching methodology, to ensure that the learning is converted to improve real life results.

The courses are conducted with mixed content, such as theoretical seminars, simulator training, workshops and well calculations. Courses can be done by multiple crews at once, or focused on single crews at a time – depending on customer requirements and team competences. Admission levels to this type of training is typically Assistant Drillers, Drillers and Tool Pushers, but also Mud Engineers, Company Man and Rig Managers can be involved. Maersk Training provides continuous competency building between certifications, thus enhancing understanding of well bore behavior as well as team cooperation in challenging environments.

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HPHT training

Wells of today are being drilled at remote locations and with increasing levels of complexity. This means, that competence demands for crews on board rigs have drastically increased the last years, and will continue to do so, in the years to come.

At Maersk Training we have extensive and well proven competencies that can aid your company in the process of drilling advanced wells. Our instructors have years of practical experience, and we invest in our people to ensure they can deliver a high quality course. With regards to HPHT wells, we can supply your crews with the knowledge needed to ensure a safe and efficient operation, by stipulating knowledge transfer and hands on training.

HPHT training will give the professional drilling team the necessary understanding of the concerns and hazards of drilling HPHT wells prior to Spud-in or the HPHT phase.

We can assist your company in several levels, including:

**PLANNING PHASE**

Maersk Training can assist you in the planning phase with reviewing procedures, producing gap documentation, rig surveys, drill well on paper, capacities of the well or producing full drilling manuals. We can review existing material, and be your sparring partner during the entire phase.

**DRILLING PHASE**

Maersk Training can assist you with well specific seminars, gas handling exercises, drilling handling, simulator training, crew based training, on rig coaching and several other types of training within the areas of HPHT. In example, we can utilize our simulators to run real time scenarios based on information from the rig, thus assisting your company in making the right decisions – in real time.

In essence, Maersk Training prepares your teams to execute tasks, handle critical situations, and ensure safe and efficient drilling operations.

other advanced training concepts

Managed Pressure Drilling (MPD) is defined by the International Association of Drillers (IADC), as “an adaptive drilling process used to more precisely control the annular pressure profile throughout the wellbore”. The objectives of MPD are “to ascertain the downhole pressure environment limits, and to manage the annular hydraulic pressure profile accordingly”.

Maersk Training has run several MPD projects with customers, and can assist your process in both Planning phase and Drilling phase. Our model has a built in MPD module, but it is possible for MPD suppliers to link their models to the simulator, thus enabling training on the used equipment.

Extended Reach Drilling (ERD) is directional drilling of very long horizontal wells. The aims of ERD are:

1. To reach a larger area from one surface drilling location
2. To keep a well in a reservoir longer, in order to maximize its productivity and drainage capability

Today’s challenges in ERD are hole cleaning, managing the mechanical loads on the drill string and managing downhole pressure.

Maersk Training has run ERD training on several wells, and can apply many of our services in both Planning phase and Drilling phase.

Coiled Tubing Drilling (CTD) is used to perform open hole drilling and milling operations. It can also be used to fracture the reservoir, a process where fluid is pressurized to thousands of psi on a specific point in the well, to break the rock apart and allow the flow of product. Coil tubing can perform almost any operation for oil well operations if used correctly.

Through Tubing Rotary Drilling (TTRD) is a slim-hole side-tracking technique currently used on offshore wells to inexpensively drill marginal targets, with a kick off point in the existing production line or completion tubing, usually with the goal of prolonging the economic life of a mature field. TTRD eliminates the need to recover completion tubulars to perform a sidetrack.

Dual Gradient Drilling is used to manipulate the down hole pressure by altering the hydrostatic head in the riser. In our model, this is done by altering the height of the fluid column, by a subsea pump.
advanced training services

PLANNING PHASE:

Procedure review
• Maersk Training can go through all your drilling procedures and processes, and ensure they are up-to-date, efficient and safe to use. We will provide you with documentation of procedures and our input to changes of these.

Gap documentation
• Drilling operations are complex projects, and often requires a fusion of documents and procedures between Operators and Suppliers. Maersk Training can go through all documentation for you, and supply your company with Gap Documentation for the operation. Furthermore we can add our suggestions and inputs to the documents.

Drilling manuals
• Maersk Training can assist your company in reviewing drilling manuals, or producing these from scratch. Our experienced instructors will supply your company with a comprehensive manual – ready for operation.

Rig surveys
• Drilling rigs are not always perfectly suited for the task at hand. In a market where every available rig is working back-to-back, Maersk Training can help you establish the needs and the recommended developments for the rig you will be utilizing. Our consultants go on-board the rig for 2-4 days and inspect the equipment, and subsequently supply you with a report of our findings, documented by text, interviews and pictures.
• Drill well on paper
• Capacities of the well

DRILLING PHASE

Well specific seminars
• Just before spud-in, or prior to drilling the challenging part of the well, Maersk Training can host well specific seminars for all parties involved in the well. During the seminars (which typically lasts 2 days and have 20-40 attendees pr. seminar), all involved personnel will be briefed on the well, the procedures, the challenges and other issues regarding the well, such as geology, gas conditions etc. Attendees will be given a manual, and be involved in discussions, work-shops as well as lectures regarding the well being drilled. We utilize all known information as well as relevant case-studies to ensure all attendees have a common understanding of the well.

Simulator training
• Maersk Training has several simulator facilities across the world with state-of-the-art simulators. In our complex facilities, we can accurately simulate both topside and downhole scenarios, ensuring drilling crews a close to reality experience. Simulator training can be extended with focus on teamwork and cooperation. Maersk Training has extensive experience with people skills, and employs own psychologists, who attend the sessions and via video, audio and personal feedback, work with drill teams cooperation and interpersonal skills. A highly effective tool for improving performance, and more relevant than ever, given the extensive recruitment process drilling companies face.

In our simulators we can work with Gas handling exercises, drilling handling, equipment handling, ERD, MPD, HPHT, TTRD, CTD and other scenarios.

Real-time simulations
• The Norway facility has an additional option in the simulator, as the software which the simulator is based on, is also used on rigs to evaluate the wells. Our simulators can therefore be set up to the exact conditions on the rig, and our instructors and your drilling engineers can assist your crews in making the right decisions real-time.
STATEMENT, MR. J. L. THOROGOOD:

“This paper considers how apparently successful organizations can ‘drift into failure’ in part as a result of the consequences of organizational complexity. These ideas set the scene for a review of high reliability organization theory and suggest ways in which the principles might be applied to the management of drilling operations.”

He comes to the conclusions that drilling operations needs to cultivate resilience.

“Cultivate resilience

• Formalize the processes of operational decision making and management of change ensuring that personnel are trained and assessed for their suitability in role.

• Ensure there is adequate competent staffing for operations accompanied by continuous and systematic training of the organization in the management of surprises.

• Ensure that individuals and the organization as a whole maintain their fitness to operate by being continuously active on operations that place demands on their skills.

• Maintain currency of skills in dealing with surprises through regular drills and exercises.”

Is there a place for High Reliability Organizations in Drilling?
J. L. Thorogood, Drilling Global Consultant LLP
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partners

The simulator is constructed by Oiltc, eDrilling, Sintef and Maersk Training with Statoil as developing partner. The simulator is constructed using the combined knowledge of the partners, ensuring a close-to-reality simulator on both topside and down-hole models. The models can be modified to match almost any situation that can be met offshore, and includes MPD, HPHT, ERD, CTD and other situations.

"a better learning experience" says it all.
We deliver knowledge and learning, thus increasing work performance, effectivity and business potential, while decreasing risk of incidents and cost.

For any further information on our services, please contact:

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