



CONTENT

PAGE

- 3 Maersk Drilling
Pioneering the
Deployment of the first
Hybrid, Low-Emission
Drilling Rig
- 6 Engineered Well Design:
From Spud to
Abandonment
- Pioneering the Deployment
of Low Emission Technology
on the first Hybrid Drilling
Rig
- 10 Digitalization within E&P:
from promise to performance



Please follow us on LinkedIn to be up to date on SPE Cph events and other great stories:

<https://www.linkedin.com/company/spe-copenhagen-section>

FUTURE MEETINGS

FOR MORE INFORMATION REGARDING THE PROGRAMME SEE PAGE 8

WE LIVE IN EXCITING TIMES: DIGITALIZATION OR DIGITAL TRANSFORMATION?

We had a good start of the SPE 2019-2020 season in October at DTU, event sponsored by Danish Hydrocarbon Research and Technology Centre (DHRTC). Morten Jeppesen and John Bagterp Jørgensen educated us with how digitalization can lead to optimization in the oil & gas industry. Finally, Ali A Eftekhari shared with us an interesting view of the energy balance in Denmark. In November, Noreco's event covered the energy transition and their entry into DUC.

As mentioned in the last newsletter, digitalization is at the forefront of our industry and one can see it is reflected in the increased number of events in the SPE Copenhagen 2019-2020 season. While I recently visited the US, I attended a talk about technical disruption and it made me dig deeper into the topic. That led to increase my understanding about the difference between digitalization and digital transformation, terms that are used indistinctively, however are not the same. Digitization is only the process of compressing analog media into bits and bytes so that they are available in digital form; Digital transformation is the profound and accelerating transformation of business activities, processes, competencies and models to fully leverage the changes and opportunities of digital technologies

and their impact across society in a strategic and prioritized way. In other words, digitalization comes before digital transformation. In the oil and gas context I believe that we are quickly evolving in the digitalization and just starting to look at how to apply digital transformation to our business.

The year will end with the event sponsored by Maersk Drilling in December, "Engineered Well Design: From Spud to Abandonment", where Hussain Rabia (SPE Distinguished Lecturer) will cover modern well design methods required throughout the life of a well from spud to abandonment. 2020 will start full speed with the Schlumberger sponsored event which will be on one of the focus topics of the moment: "Digitalization within E&P: from promise to performance"; followed by the PetroBowl quiz, where knowledge will be gauged. So, get ready for that! As this is the last newsletter of the year, I am wishing all SPE members and their families a very Happy holidays season and prosperous 2020 year.

Looking forward to seeing all of you at the December and January events at Maersk Drilling and Schlumberger respectively. ◀

Sincerely Yours,

Jaime Casasus-Bribian
SPE Copenhagen
Section Chairman

SPE

COPENHAGEN SECTION THE BOARD · 2019-2020 SEASON

SECTION CHAIRMAN

Jaime Casaus-Bribian, HESS Denmark
Østergade 26B, 1100 Copenhagen
Tel.: +45 2999 9654 · E-mail: jaime.casaus@hess.com

SECTION PROGRAM CHAIRMAN

Jonathan Hastings,
Total Upstream Denmark A/S
Amerika Plads 29, 2100 Copenhagen Ø
Tel.: + 45 5164 0531 · E-mail: jonathan.hastings@total.com

SECRETARY

Hans Horikx, DTU – Centre for Oil and Gas
Elektrovej Building 375, 2800 Kgs. Lyngby
Tel.: +45 6114 1852 · E-mail: horikx@dtu.dk

NEWSLETTER CHAIRMAN

Miriam Lykke, Noreco Oil Denmark A/S
Midtermolen 3, 4 floor, 2100 Copenhagen
E-mail: miriam.lykke@noreco.com

MEMBERSHIP CHAIRMAN

Adebowale Solarin, Maersk Drilling
Lyngby Hovedgade 85, 2800 Kgs Lyngby
Tel: +45 6336 3472 / Mobile +45 4029 2184
E-mail: adebowale.solarin@maerskdirilling.com

TREASURER

Mette Juncker Brødstrup, Schlumberger
Dampfærgevej 27-29 3rd floor, 2100 Copenhagen Ø
Tel.: +45 6035 0711 · E-mail: mhansen4@slb.com

WEB MASTER

Pernille Silberg, INEOS O&G Denmark
Teknikerbyen 5, 1. DK-2830 Virum
Tel.: +45 3018 6690 · E-mail: pernille.silberg@ineos.com

SPE STUDENT REP

Hadise Baghoosee, DTU
– Centre for Oil and Gas
Elektrovej Building 375, 2800 Kgs. Lyngby
Tel.: +45 5035 9199 · E-mail: hadise@dtu.dk

SPE YOUNG PROFESSIONALS REP.

Natalia Krygier, Maersk Drilling
Lyngby Hovedgade 85, 2800 Kgs Lyngby
Tel: +45 5031 5176
E-mail: natalia.krygier@maerskdirilling.com

MEMBERS

Alexander Shapiro, DTU CERE
Department of Chemical and Biochemical Engineering
DTU b. 229 Søtofts plads, 2800 Kgs. Lyngby
Tel.: +45 4525 2881 · E-mail: ash@kt.dtu.dk

Mette Lind Fürstnow, Welltec

Gydevang 25, 3450 Allerød
Tel.: +45 6114 1849 · E-mail: mfurstnow@welltec.com

Carsten Møller Nielsen, GEUS

Øster Voldgade 10, 1350 Copenhagen K
Tel.: +45 9133 3761 · Email: cmn@geus.dk

Solvejg Kolbye Jensen, Rambøll Denmark AS

Hannemanns Allé 53, 2300 København S
Tel.: +45 51614836 · E-mail: skjens@ramboll.dk

MAERSK DRILLING PIONEERING THE DEPLOYMENT OF THE FIRST HYBRID, LOW-EMISSION DRILLING RIG

By: Adebowale Solarin.



In recognition of the need to minimize the environmental impact of industry activities, Maersk Drilling has in the last few years devoted resources to the development of energy emission efficiency solutions on its rigs. Specifically, the CJ70 designs were specially equipped and prepared for the implementation of these kinds of solutions.

The latest step in this arena is a series of upgrades that are being implemented on the Maersk Intrepid to convert the jack-up into the first hybrid, low-emission rig and set a new standard for low-emission drilling on the Norwegian Continental Shelf. The Maersk Intrepid is a harsh environment jackup rig in CJ70 XLE design, currently contracted to Equinor in the North Sea.

MAERSK DRILLING PIONEERING THE DEPLOYMENT OF THE FIRST HYBRID, LOW-EMISSION DRILLING RIG

THREE UPGRADES TARGETING REDUCED EMISSIONS AND ENERGY CONSUMPTION

The upgrades combine the use of hybrid power and data intelligence with NOx filters, resulting in reduced energy consumption, CO2 emissions, and NOx emissions. The project is supported by a grant from the Norwegian NOx Fund, and by Equinor's decision to introduce compensation formats to stimulate emission reductions.

The hybrid power system consists of an energy storage system which in combination with the power management system provides peak-shaving and waste energy recovery capabilities. This means that reverse power from key drilling equipment controlled by Variable Frequency Drives (VFDs) can be stored in the energy storage system.

When compared to the standard CJ70 XLE rig setup, simulations of the power grid point to an estimated fuel saving in double-digit percentage figures compared to the current average operational consumption, which in turn provides a corresponding reduction in emissions.

In addition to the hybrid power system, each engine on the rig will be equipped with Selective Catalytic Reduction (SCR) units. This system reduces NOx emissions from the remaining part of the rig's power production by more than 90%. The NOx reduction is obtained via the SCR process which utilizes injection of urea into the exhaust gas which transforms the nitrogen oxides into pure nitrogen and water.

BENEFITS OF HYBRID ENERGY SYSTEM TO RIG OPERATIONS

The peak-shaving capability introduced by the hybrid power Energy Storage System (ESS) will result in a reduced number of engines running during high power consumption activities like tripping in/out of the hole while running the drawworks.

The implementation of the ESS adds energy to the grid, levelling out power peaks to obtain a constant load on a reduced number of engines. This results in higher average load on the engines at a more optimal point on the Specific Fuel Oil Consumption Curve (SFOC) which also gives enhanced engine performance.

Furthermore the Energy Storage System will enable recovery of the waste energy from electrical braking of the drawworks for charging of the ESS. In the current rig layout, which is standard in the industry, this energy is not being utilised and therefore disposed in the water cooled brake resistors as heat.

In addition to the Energy Storage System, the rig will be outfitted with Energy Emission Efficiency (EEE) software developed by Maersk Drilling. This is a tool that visualizes how and where energy is consumed on the entire rig, which enables the operator to have focus on unnecessary power consumption. This targets a change in the mindset of the personnel running the power plant, leading to additional fuel savings.

In general, the installation of ESS, EEE and SCR units on the rig provides attractive possibilities to operate the rig in a more responsible and cost-saving manner when operating heavy machinery on the drill floor. ◀



ABSTRACT

Engineered Well Design: From Spud to Abandonment

Hussain Rabia, EPL SPE DL

This talk is designed to discuss and explain modern well design methods required throughout the life of a well from spud to abandonment, including well integrity and well control issues. The talk will discuss technical and non-technical factors involved in well design including regulatory requirements, the concept of pressure vessel, how to establish and calculate casing properties from the various industry standards (API and ISO) and how to establish the correct casing shoe strength from well integrity tests. The concept of kick tolerance (swabbed and drilling kicks) will be reviewed from both a well design aspect and a well control aspect. A review of current well design methods will be made including the discussion of burst, collapse and tension criteria for each casing string. A review of the various elements that make up the well design document (eg service loads, well completion) for a typical on-shore and offshore well will also be made. Well integrity will be reviewed in terms of zonal isolation, role of cement, number of barriers and testing of barriers including inflow testing. The importance and proper procedure for carrying out inflow testing will be made. Finally the importance of engineering the suspension and abandonment of wells will be discussed using current regulatory requirements. ◀

BIOGRAPHY



Hussain Rabia, EPL SPE DL

Dr Hussain Rabia is the managing Director of Entrac Petroleum, a consulting company engaged in well design and training. Dr Hussain Rabia completed his Bachelor degree with a BSc First Class Honours degree in Mining and Petroleum Engineering and a PhD in Rock Mechanics and Drilling Engineering, all from Leeds University, England. Dr Rabia has over 37 years continuous experience in the oil industry. He has served on several committees and conferences worldwide and was secretary and then chairman of the Drilling Engineering Association (Europe). Dr. Rabia also served on the Technical Board for UK National Grid to deal with the technology of injecting and storing CO₂ in deep wells. Dr Rabia worked for a number of Oil companies including British Gas (Well Engineering Manager), ADCO (UAE), Aramco (Saudi Arabia) and several other companies as an in-house senior consultant. Dr. Rabia has been involved in over 300 wells from all over the world either at the design stage, supervision or both. Dr. Rabia has supervised wells in the North Sea (Drilling Manager for Rough Field Enhancement Project), Abu Dhabi, Saudi Arabia, Tunisia, Bulgaria, Russia and Pakistan. Dr. Rabia wrote four text books on well drilling, casing design, rig hydraulics and well control. His fourth book on Well Control is his latest contribution to the oil industry and is designed to improve well safety by helping field engineers to solve field well control problems and also prepare for the IWCF and Wellsharp well control tests. Dr. Rabia has consulted and delivered training courses to every major oil and service company in the world. ◀

ABSTRACT

Pioneering the Deployment of Low Emission Technology on the first Hybrid Drilling Rig

Mikkel Søndergaard Pedersen – Maersk Drilling

In recognition of the need to minimize the environmental impact of industry activities, Maersk Drilling has in the last few years devoted resources to the development of energy emission efficiency solutions on various rigs. Specifically, the CJ70 designs were specially equipped and prepared for the implementation of these kinds of solutions. Like Maersk Drilling, Equinor also has the desire to be proactive in complying with future Norwegian emissions reduction targets. Maersk Drilling is implementing a series of upgrades to the Maersk Intrepid to convert the jack-up into the first hybrid, low-emission rig and set a new standard for low-emission drilling on the Norwegian Continental Shelf. The Maersk Intrepid is a harsh environment jackup rig CJ70 XLE design currently contracted to Equinor in the North Sea. ◀

BIOGRAPHY



Mikkel Søndergaard Pedersen,
Technical Superintendent
– Maersk Drilling

Mikkel graduated from Aalborg Maskinmester Skole in 2001 as marine engineer. After an initial offshore part of his career he moved onshore as Technical Superintendent in Norway. Since 2002 Mikkel has occupied various positions in deep-

sea shipping and various offshore functions such as Start up support for three newbuilds, and Technical operational support engineer Mikkel is now Technical Superintendent for Maersk Intrepid a harsh environment jack up, operating for Equinor on the Martin Linge field. ◀



DECEMBER

PROGRAMME

17:00 – 18:00
DRINKS

18:00 – 19:00
PRESENTATION AND SPE NEWS

19:00 – 21:00
DINNER

LOCATION

Maersk Drilling
Lyngby Hovedgade 85
2800 Kgs. Lyngby

SPEAKER

Hussain Rabia, EPL SPE DL

TOPIC

Engineered Well Design:
From Spud to Abandonment

AFTER DINNER SPEAKER

Mikkel Søndergaard Pedersen,
Technical Superintendent
– Maersk Drilling

TOPIC

Pioneering the Deployment of Low
Emission Technology on the first
Hybrid Drilling Rig

ENTRANCE FEE

None

REGISTRATION

Registration is required.
Please sign up by Tuesday 26th
of November at
www.spe-cph.dk

SPONSOR

 **MAERSK DRILLING**



SPE
COPENHAGEN
SECTION

www.spe-cph.dk
www.spe.org

October 22	MAIN SPEAKER	AFTER DINNER
TOPIC	Improving Danish oil and gas production. Digitalization and optimization in the upstream oil and gas industry.	Ali Eftekhari, DTU: A sustainable view of the future energy DHRTC balance of Denmark
SPEAKER	Morten Jeppesen, DHRTC balance of Denmark John Bagterp Jørgensen, DTU	
LOCATION	DTU	
SPONSOR	DTU/DHRTC	
November 19	MAIN SPEAKER	AFTER DINNER
TOPIC	The Energy Transition and DCS - still room for E&P? Why Energy Transition - is climate the only driver?	Atle Sonesen, Noreco: Making a difference
SPEAKER	Jarand Rystad, Rystad Energy	
LOCATION	Admiral Hotel	
SPONSOR	Noreco	
December 3	MAIN SPEAKER	AFTER DINNER
TOPIC	Engineered Well Design: From Spud to Abandonment	Mikkel Søndergaard Pedersen, Maersk Drilling: Pioneering the Deployment of Low Emission Technology on the first Hybrid Drilling Rig
SPEAKER	Hussain Rabia, EPL SPE DL	
LOCATION	Maersk Drilling	
SPONSOR	Maersk Drilling	
January 23	MAIN SPEAKER	AFTER DINNER
TOPIC	Digitalization within E&P: from promise to performance	Petrobowl Quiz
SPEAKER	Guido van der Holt, DELFI Champion, Schlumberger	
LOCATION	Schlumberger	
SPONSOR	Schlumberger	
February 26	MAIN SPEAKER	AFTER DINNER
TOPIC	Jill Exploration Well	Innovative manner to apply existing technology in South Arne: Abrasi jet acid stimulation for long complex horizontal wells.
SPEAKER		
LOCATION		
SPONSOR	Hess	
March	MAIN SPEAKER	AFTER DINNER
TOPIC		
SPEAKER		
LOCATION		
SPONSOR	GEUS	
April 14	MAIN SPEAKER	AFTER DINNER
TOPIC	"Reservoir Engineering While Drilling" in Horizontal Wells	
SPEAKER	Shahid Azizul Haq	
LOCATION		
SPONSOR	Welltec	
May	MAIN SPEAKER	AFTER DINNER
TOPIC		Agm
SPEAKER		
LOCATION		
SPONSOR	Total	
June	MAIN SPEAKER	AFTER DINNER
TOPIC	Summer Party	
SPEAKER		
LOCATION		
SPONSOR	TBD	

CONSTRUCT
WITH INTEGRITY,
COMPLETE
WITH CONFIDENCE,
INTERVENE
WITH THE SPECIALISTS!



Welltec



**THE FAST AND EASY WAY
TO RELIABLE PVT SIMULATION RESULTS**

PVT simulations changed from a tedious expert discipline to a click on a button.

www.pvtsimnova.com

by **calsep**



HESS A Trusted Energy Partner

<small>DENMARK FACTS</small> \$1 Billion <small>INVESTED TO EXTEND PRODUCTIVE LIFE OF THE SOUTH ARNE FIELD</small>	14,000 <small>(BOE/D) NET PRODUCTION</small>	5th <small>LARGEST PRODUCER IN DENMARK</small>	7% <small>OF DENMARK'S PRODUCTION</small>
---	--	--	---

Hess is a leading global independent energy company engaged in the exploration and production of crude oil and natural gas. We are one of the largest oil producers in Denmark and adhere to rigorous operational standards. Our employees work closely with our communities and partners to find new approaches and apply innovative technologies that can help us operate safely, improve efficiencies, protect the environment and make a positive impact on the lives of those we touch.



Making a difference

Noreco is entering the DUC with lots of energy, competence and ambitions



Committed to Better Energy



www.dk.total.com/en



ABSTRACT

Digitalization within E&P: FROM PROMISE TO PERFORMANCE

For many of us we are now multiple years into our digital transformation journey. We have passed the promise of digital and the initial euphoria of successful pilots and proof of concepts and are now looking at enterprise deployments with proven returns on the investment made. I like to think of this as a journey on digital maturity, which every company is going through, and where most will come across the same conclusions on the journey. This talk will discuss some findings of ours. The cloud offers us a fantastic opportunity to work in new ways that were not possible when everyone was working on their own desktop. Also, data is a hugely important asset in an organization - liberating data from inside applications and structured databases is key to success, and software companies have a critical role to play. It is not enough just to move data to the cloud or put data into a data lake. Without understanding the end-user workflows, standards and governance, we will continue to just get transfer of data between applications annihilating any prospects of enrichments.

Likewise, elastic compute power as well as solid and comprehensive data manipulation capabilities, ensure that the foundation for a data-driven approach for oil and gas data is progressively enabled to complement and enrich deep physics-based approaches to solve our challenges. This led to the major advancements in the field of structural and stratigraphic interpretation, exploration portfolio management, field development planning, well-construction and production management, monitoring and optimization. Our industry has reached a tipping point and converged on a common digital data platform through the Open Subsurface Data Universe Forum, based on open source principles. We show how the new open digital platform will drive unparalleled integration between domain specific scientific workflows and data-driven technologies such as AI/ML, IoT, Big Data Analytics and highly scalable public cloud infrastructure. This will enable all players in the industry to achieve significant step changes in efficiency and performance.

But this is only the beginning. Workflows are only starting to become truly transformative through enrichment with various degrees of analytics and inferences. Automated event detections will evolve from being real-time to become predictive; reaching a stage where machine-triggered preventive countermeasures are soon to be a reality. ◀



- Superior ROI
- Efficient exploration
- Capital efficient projects
- Profitable production

Combining Digital Technologies with Domain Expertise to Achieve Industry Goals

COPENHAGEN MEETING

THURSDAY 23 JANUARY

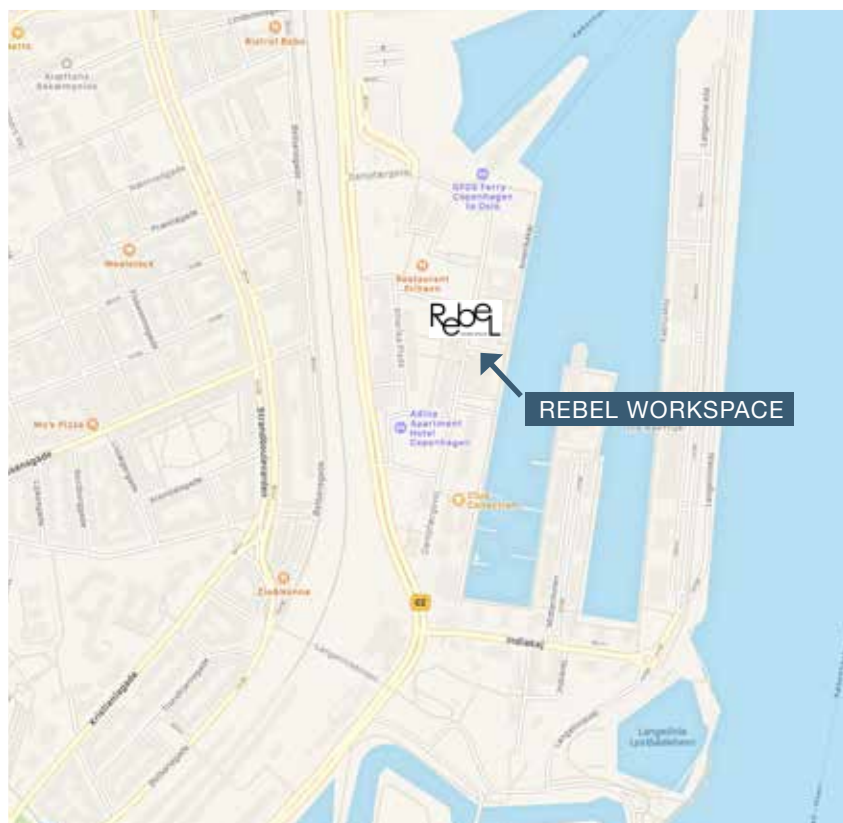
BIOGRAPHY



Guido van der Hoff,
DELFI Champion, Schlumberger

Guido currently has the role of DELFI Champion in which he is responsible for all cloud and digital business in Scandinavia delivered through Schlumberger's DELFI services. He has over 20 years' experience in the E&P industry with a wide variety of

leading technical, business and marketing roles in geoscience services, E&P software product and cloud solution development. ◀



JANUARY

PROGRAMME

17:00 - 18:00
DRINKS AND SNACKS

18.00-18.30
PRESENTATION

18.30 - 19.30
PETROBOWL QUIZ
DRINKS AND SNACKS

LOCATION

REBEL WORKSPACE
Dampfærgevej 27-29 5th floor
2100 Copenhagen Ø

SPEAKER

Guido van der Hoff, DELFI
Champion, Schlumberger

TOPIC

Digitalization within E&P: from
promise to performance

ENTRANCE FEE

None

REGISTRATION

Registration is required.
Please sign up by Friday 17th of
January at www.spe-cph.dk

SPONSOR

Schlumberger



SPE
COPENHAGEN
SECTION

www.spe-cph.dk
www.spe.org

Every hour spent on a well counts - there's a lot to play for

Offshore oil and gas is in a race to produce the most competitive barrel of oil. We provide solutions that plan, orchestrate and integrate the services involved in a drilling campaign.

We call it
Smarter Drilling for Better Value

www.maerskdrilling.com



**MAERSK
DRILLING**



DELFI

Cognitive E&P Environment

A multidimensional environment that unites planning and operations, bringing together advances in technical disciplines such as artificial intelligence, data analytics, and automation.

Underpinned by decades of unrivaled domain knowledge—the result is an E&P experience like no other.

Find out more at: slb.com/DELFI

Schlumberger

DELFI is a mark of Schlumberger.
Copyright © 2019 Schlumberger.
All rights reserved.
19-15-000106