Drilling Technology in harsh environment with focus on Compensation systems

St.John’s - 1.October 2014 - Per Aasgaard

…MHWirth - new name - long history

We have designed drilling facilities and supplied drilling equipment to the offshore marked for more than 40 years

Our equipment has been installed on more than 500 rigs and platforms

We are more than 4,300 employees

We operate in more than 20 counties

We will open office in St.John’s
Drilling arrangements for Semis, ship shaped or circular concepts – we know them all

Drilling facilities to permanent installations in the North Sea - we have designed most of them
..a new trend - rigs are now being prepared for cold climate

West Mira (Seadrill)
- heading for Newfoundland

Statoil’s Arctic step-up
Cat I - Arctic Drilling Unit

...so we are heading North

H-6 rigs (Transocean)
- prepared for Barents Sea

Series of rigs
- being prepared for cold climate

...which motion compensation system is the preferred one when operating in harsh environment (rough seas)?

this one or that one
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**Derrick with either CMC or AHD**

Hydraulic hoisting w. built-in compensation

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**..so how does it work - the motion top compensator**

The rig moves up and down

The drill-string is held in steady position
The Crown Mounted Compensator (CMC) is a fantastic tool, tuned to give perfect weight on the drill bit, but it is a large and heavy piece of equipment to have on top of the derrick structure that effects the COG and wind drag.

The original Ram Rig Concept, developed by smart engineers during the 1990’s:

- Hydraulic hoisting system with built-in heave compensation
- Typical technical evolution process:
  - Starts with a bright idea and a primitive technical solution
  - Improvements often result in complicated systems (just add-ons)
  - Re-thinking results in smart and simple solutions
  - ...so what is yet to be seen?
Winner of Innovation Award at the ONS exhibition 1996

Eleven rigs now in operation

First Generation RamRig
- Stevberg Gull
- Bleford Dolphin
- Borgland Dolphin
- West Venture
- West Navigator
- Snoerm B
- 2012 - 361101

Second Generation RamRig
- West Phoenix
- West Impulse
- Transocean Ventures
- Transocean Spitsbergen
- Scarabeo 9
- 2013 - 5000100

The existing double Ram Rig

Third Generation RamRig
(next generation - new)
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The new generation Ram Rig will have:

- More cylinders allowing for combination of max lifting capacity and high hoisting speed (gear shift)
- Very high lifting capacity
- Compensation will allow for extreme vertical movements
- Turned sheaves and block retraction, giving improved tripping speed
- New hydraulic arrangement and control system
- Energy efficient hoisting and accumulator system

New sheaves

New hydraulic arrangement

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The new Ram Rig hoisting system can absorb +/- 15 meter vertical motion (heave)

The Top Compensator can absorb +/- 5 meter vertical motion (heave)

Comparison in heave capacity

..we all like to minimize waiting on weather

Typical rig characteristics
State of the art in today's market

Seadrill’s West Mira (Moss Maritime CS60 rig w. top compensator)

Transocean’s Spitsbergen and Barents (Aker H6e rigs w. Ram Rig)

Lesson learned

…efficiency in exploration drilling is all about reducing down-time

Rigs that have been drilling on the Grand Banks have not demonstrated very good statistics wrt “waiting on weather” and incident occurrences.

The weather conditions are worse than we know from the North Sea.

The way forward must be:
• Choose rigs with the best motion characteristics available
• Ensure implementation of reliable drilling equipment
• Perform drill crew training and prepare for the unexpected
Husky Energy’s new tool for Newfoundland and Labrador waters

Probably the best rig available for the task.

• Owned by Seadrill (North Atlantic Drilling)
• Moss Maritime design
• Fabricated by Hyundai
• Furnished with derrick and drilling equipment from MHWirth

(picture from Korea taken last week)

Drill crew training in simulator will reduce incident occurrences, improve safety and reduce downtime
Thank YOU for listening

MHWirth – your best partner in drilling concept development

- MHWirth has worked with the majority of international oil companies and taken part in their development programs throughout the world, such as North Sea, Caspian Sea, Gulf of Mexico, Beaufort Sea, Canadian east coast, Brazilian waters, West African waters, Australian water, East and West Barents Sea, Siberia, etc.

- MHWirth has in addition a long track record in development and co-ordination of design work in joint with major design houses for floating drilling units. In the past Aker MH has interfaced drilling design with the following hull concept contractors:

  - Moss Maritime semi
  - GVA semi
  - GustoMSC ship and JU
  - LMG Marin ship
  - DSME ship
  - Inocean ship
  - Frigstad semi
  - Fried and Goldman JU
  - Aker Solutions (AET) various
  - Keppel Fels JU
  - MPF ship
  - Ulstein/USOS ship
  - Bassoe technology semi
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