DRILLING AUTOMATION using DIGITAL TWIN technology

Analyze & Control to Perform

DrillTronics®

Knowledge Forum – AOG 2019
13th March 2019
Preface – Why Drilling Automation?

Focus:
- Reducing Non-productive time
- Increasing Efficiency
- Safer operation

Way forward:

Rising demands
(explore deep resources)

Constant fluctuation in Oil Price

After successful digitisation

Automation
Drilling Automation – Status quo

Today’s Drilling Control Systems are directly operated by the driller.

• No account of comprehensive well situation
• Relies on driller competence to stop and react correctly
Drilling Automation – Concept

Safety
Predictable
Efficient

Wellbore Condition

Digital Twin Technology

Safety Limits
Deviations
ML & AI

Safety Triggers
Safe Automated Sequencing

DrillTronics®
Drilling Automation – Digital Twin

- RT data
- WITSML
- Modelled / Calculated data
- Digital Twin

- Actual Operation
- Drilling Automation – Digital Twin

- DrillScene

- WITSML
DrillTronics® - Drilling Automation Software

✓ Fully integrated with the DCS
✓ Operated from the Drilling Control System into which it is embedded
✓ Enable or Disable by Driller
✓ Controls the drilling machinery
✓ Objective is to:
  / Prevent incidents
  / Optimize drilling operations

Reads well conditions and operates the drilling machinery based on the downhole understanding of wellbore conditions.

• Automation capability performs smart tasks improving process efficiency.
• Delivers higher levels of repeatability and consistency across crew.
• Minimizes the risks of inadequate safety margins or damage to the well.
DrillTronics® - Drilling Automation Software

• Calculating the safe operating windows in real time – Safe Guards
• Then applying these windows to the Drilling Control – Safety Triggers
• Automatic Functions
  ▪ Automatic start/stop of mud pump
  ▪ Automatic tripping
  ▪ Automatic reciprocation
  ▪ Automatic friction tests
Tripping (POOH) safeguarding – DrillTronics®

Without DrillTronics

With DrillTronics
Pump start up safeguarding – **DrillTronics®**
Friction test Automatic Sequencing – DrillTronics®

[Graphs showing friction test data for different samples labeled #1 through #33, with time on the x-axis and force on the y-axis.]
Automatic Mud Pump Start Automatic Sequencing – DrillTronics®

Figure 21 Profiles of standard pump start-ups in 17 ½” sections

Figure 22 Profiles of Automated pump start-ups in 17 ½” sections
The First Use Report (Equinor) indicated increased efficiency (up to 12%) and operational consistency across all crews.

Equinor awarded Sekal the second license summer 2016

Equinor awarded Sekal third license April 2017 for the Semi-Submersible Songa Enabler and in January 2019 for the remaining 3 Transocean cat D rigs.

Equinor awarded Sekal the forth license October 2018 for the Mariner field in UK

Wintershall awarded Sekal the fifth license December 2018 for the SeaDrill Semi-sub West-Mira

Transocean awarded Sekal the 9th license January 2019 for the Transocean Semi-sub Transocean Spitsbergen
DrillTronics® - Digital Twin Technology based Drilling Automation Software

Combining the capability of Digital Twin technology & Adaptive automation results in Automated Drilling Control (ADC) to give ultimate client valve by making drilling operation:

✓ Safer
✓ More consistent
✓ Optimized & efficient
✓ Predictable

Optimises the reaction of drilling machinery inline with the dynamic and changing downhole conditions