Real-Time Monitoring for Offshore Oil & Gas Operations

National Academy of Sciences Transportation Research Board

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Who is Athens Group?

Pioneered the exploration and production systems verification business in 2002

First to focus on integrated control systems as a key driver of operational safety and reliability

Our extensive experience and expertise with control systems, software, and automation uniquely positions us as a leader in equipment lifecycle management
Setting the Stage

• Remote Real-Time Monitoring (RTM) of two fronts:
  – Wellbore Parameters
  – Critical Equipment Status/Health

• Automating a process requires four distinct stages:
  1. Measure – Identify the parameters required and develop the methods to effectively and consistently measure them
  2. Control – Develop the methods to change conditions based on data received from measurements on demand
  3. Characterize – Establish the protocols for each control method and define the operating parameters they depend on
  4. Automate – Design the system to automatically control the process to minimize manual intervention
Critical Parameters

• Wellbore Parameters
  – Data that pertains to downhole conditions of the formation, including but not limited to: mud characteristics and flow, formation pressure, fracture pressure, pore pressure, etc.
  – Useful to determine if the well is under control

• Critical Equipment Status/Health
  – Data that pertains to the condition of the equipment deemed to be critical for the safety and integrity of the operation: BOP Stack/Control System status, DP WSOG status (if deepwater), etc.
  – Useful to determine the availability of critical equipment
The Role Of RTM

• Wellbore parameters and critical equipment status is monitored in real-time onboard
  – Current operational protocols depend on situational awareness at the rig site to interpret measurements and initiate the proper controlled response
  – Process and technology improvements continue to be adopted to improve measurement and control of operations

• Until we can determine the exact conditions of the well through data alone, remote RTM from shore should be used strictly as a support tool for the existing chain of command
  – Remote RTM is not a substitute for competency at the rig site
Remote RTM Oversight

• Promotes timely, functional, and value added inspections
  – Facilitates coordination and scheduling of visits based on operational performance → focus on specific areas
  – Enables assessment of equipment condition prior to arrival
  – Inspection shifts from equipment readiness assessment to evaluation of the rig’s operational framework (asset readiness)

• However, remote oversight should only be implemented via pre-established protocols that do not impact decision making on the rig
The Role Of Automation

• Effective automatic functionality requires detailed characterization of operations to ensure predictable and consistent results despite external conditions
  – Quality and Cyber-Security culture in the industry is not ready to immediately mitigate potential risks

• Automation and predictive tools should be reserved for analytics in support of Condition-Based Monitoring (CBM) and Preventive Maintenance Inspection and Test Program (PMITP) stewardship, without remote control capability
  – High potential risk of eroding the existing chain of command or inadvertent/accidental operation if unrestricted
Recommendation To BSEE

• Remote RTM oversight can reduce the frequency of visits by enabling inspections to be based on operational performance, but cannot replace site visits
  – If intervention is required it should be coordinated via the existing chain of command, not supersede it

• Prior to considering enforcement, evaluate current regulatory scheme, risk assess improvement opportunities, determine if the safety case justifies the expense, and pilot the program

• Enforcement should be operation based, not prescriptive

• Industry is not ready to effectively implement automation today