AUTOMATED MARSH FUNNEL FOR OIL AND GAS FIELD OPERATIONS

THE INVENTION

The invention is a smart Marsh funnel device that comprise a mass sensor and time sensor that frequently (every 2 to 5 minutes) takes repeated measurements of mudflow time and mud mass. In addition, the device has a built-in code, which provides accurate estimates of mud rheological properties including mud density, apparent viscosity, plastic viscosity, yield point, flow behaviour index and fluid consistency index from the measured flowing time and mud mass. This device has the capability to display these measurements on a digital screen and can provide connection to a computer system for saving of data and data processing. The wealth of data available from this device can provide valuable insights into the pressure drops in the circulation system of an entire drilling rig in order to optimize the drill cutting cleaning process.

Of great convenience, the device has an automated cleaning system feature for cleaning the marsh funnel, the fluid container and disposal of previous mud sample.

MARKET NEED

Determination of the rheological properties of drilling mud is important during any drilling operation. Rheological properties of the mud during drilling impact the hole cleaning, rig hydraulic calculations, surge and swab pressure calculation, and selection of bit nozzles. The existing marsh funnel apparatus is a rugged, easy to operate instrument that is used for making rapid, on the spot measurements of drilling mud viscosity only. However, manual measurements at regular intervals are needed by the mud engineer to determine sudden changes in the mud viscosity that could require corrective action. Therefore, a need exists in the market for an automated marsh funnel system that can not only provide accurate and regular prediction of drilling mud viscosity, but, also other pertinent rheological properties which are key attributes for successful application of robotic drilling in the oil & gas industry.

The global robotic drilling market size is expected to grow at a CAGR of 5.6% to reach $946.6 million by 2025 from $619.4 million in 2017 driven by the increase in global oil demands and surge in need for safer and high-quality drilling system.

Middle East Drilling Fluids
CAGR 5.3%

| 1.45 | 2.19 |
| 2014 | 2022 |
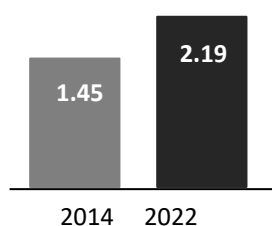
Global Market Growth (bn$)

COMPETITIVE ADVANTAGE

- Easy operation, compact and lightweight device
- Automated system with measurements taken every 2-5 minutes with high accuracy
- Estimates rheological properties of all types of drilling fluids and wells (vertical, horizontal, deviated and multi-lateral)
- Real-time indication of potential for sagging through the active tank
- Automated cleaning system

MARKET READINESS

The subject invention has a Technology Readiness Level of three (Research to prove feasibility). The individual components of the device have been successfully tested and proven to work. Current efforts are towards assembling the individual components to form the complete device to achieve Technology Demonstration-TRL6.
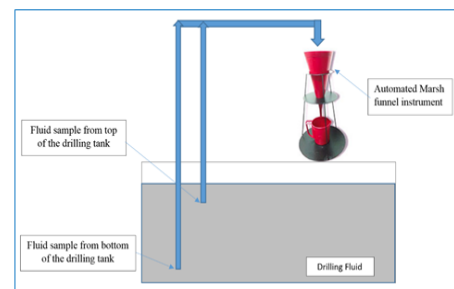
Figure: Automated Marsh funnel instrument used for field applications

PATENT PROTECTION

The technology is covered by a patent applications US16384241 and GCC2019/37390. The IP is owned by King Fahd University of Petroleum & Minerals (KFUPM).

LOOKING FOR A DEVELOPMENT PARTNER

KFUPM seeks an industry partner to develop this technology to a prototype stage and ultimately for possible commercialization.

ABOUT KFUPM

King Fahd University of Petroleum & Minerals is a leading educational organization for science and technology. KFUPM Innovation & Technology Transfer office is tasked with taking innovation from lab to market place.

For further information, please contact:
Email: IP-License@kfupm.edu.sa