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Real Time Solution To Outflow Analysis

ABLE'S MUDMASTER™ PROVIDES DETAILED ANALYSIS OF THE DRILLING FLUID FLOW STREAM IN REAL TIME IN FULL OR PARTIALLY FILLED PIPE CONDITIONS

ABLE MudMaster™ installed on a mobile drilling rig in Texas

During Oil & Gas drilling operations, drilling fluid (mud) is pumped into the drill string to stabilise the well bore, remove cuttings and cool the drill bit. Maintaining the appropriate density of the fluid is imperative to ensure downhole pressure is correctly managed, whilst accurate measurement of the flow rate entering and exiting the well provides an assessment of drilling performance and indication of a potential well control event.

Traditionally, density and flow rate of drilling fluids have not been measured in real time. Inlet flow is often derived from the mud pump stroke count with outlet flow being measured using a mechanical vane type flow transmitter and the density being determined offline at intervals via a sampling point, resulting in inaccuracies originating from human error and time lapsed information. More recently, Coriolis mass flow meters have been utilised to successfully measure inlet flow under the more controlled, full pipe process conditions encountered at this point. However, this technology has been found wanting when exposed to the complex, partial fill conditions associated with outlet flow. Using non-contact and non-intrusive sensing techniques, the MudMaster™ measures the mud flow in the gravity fed return flowline under all partially full flow conditions, giving accurate and repeatable real time measurements during drilling operations. The core technological foundation of the analyser is based on integrating several measurement and control techniques and sensors in one single instrument,

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which, in addition to precise and repeatable monitoring of mass flow, are able to detect multi-dimensional signatures of key events in the drilling process. The assimilated sensor technologies include, nucleonic sources and detectors for density and composition, both Time of Flight and Doppler ultrasonic meters for flow, microwave and ultrasonic gauges for level, and non-intrusive temperature detection. The unique way in which these sensors are used in combination is the key to the MudMaster's ability to cope with the aggressive, demanding and fluctuating process conditions associated with mud drilling.

These measurements provide valuable information for optimisation of the drilling process, presaging potential imbalanced operating problems such as losses to the formation or "kicks". The instrument is spool mounted to bolt directly into the mud outlet pipe and the non-contact nature of the sensing methods employed provides no restriction to flow, zero pressure drop and no moving parts subject to abrasion. Maintenance requirements are therefore minimal.

The MudMaster places a powerful analytical tool in the hands of the drilling engineer, providing a means by which increased safety for personnel, protection of assets and improved production can be realised through enhanced automation of the drilling process, with the consequent, associated commercial benefits. Following extensive trials with a major drilling operator, the MudMaster has been shown to operate successfully on both oil based and water based mud identifying critical episodes in the drilling process as they happen:

- ***Early Kick Detection – one of the wellbore pressure related incidents that has proved very costly to the oil and gas industry and compromises the safety of drilling personnel. A kick can lead to a violent expulsion of the drilling mud column culminating in a blow-out and the associated hazard of the liberation of flammable gases from the well.***

- ***Live Losses to the Well Formation – in the extreme, drilling fluid loss can result in the complete failure of the wellbore. With regard to a definable cost, the value of the drilling fluids can amount to 10% of the cost of well construction.***

- ***Cementing Efficiency – cementing protects and seals off the wellbore, preventing ingress to and from the water table and permanently positions the casing in place. Monitoring the effectiveness of the cementing operation plays a key role in minimising the environmental impact of the drilling operation and optimising its efficacy.***

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ABLE MudMaster™ a powerful analytical tool for the drilling engineer

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