FLAGHD

Fluid loss and gain detection service

Reduce invisible lost time with early kick and loss detection during managed pressure or conventional drilling

Applications

- Early kick detection of influx and loss in deep and ultradeep water operations, exploration wells, HPHT wells, and narrow mud windows
- Managed pressure drilling (MPD), EC-Drill®, and conventional systems

Benefits

- Reduce the NPT linked to wellbore balance events
- Minimize influx volume to remain below the kick tolerance
- Decrease invisible lost time during connection
- Optimize lost circulation material (LCM) effectiveness
- Real-time fracture identification

Features

- Flow monitoring and modeling
- Identification of ballooning effect
- Drilling fluid displacement monitoring
- Second well control barrier for MPD system
- Microfracture detection

How it improves performance

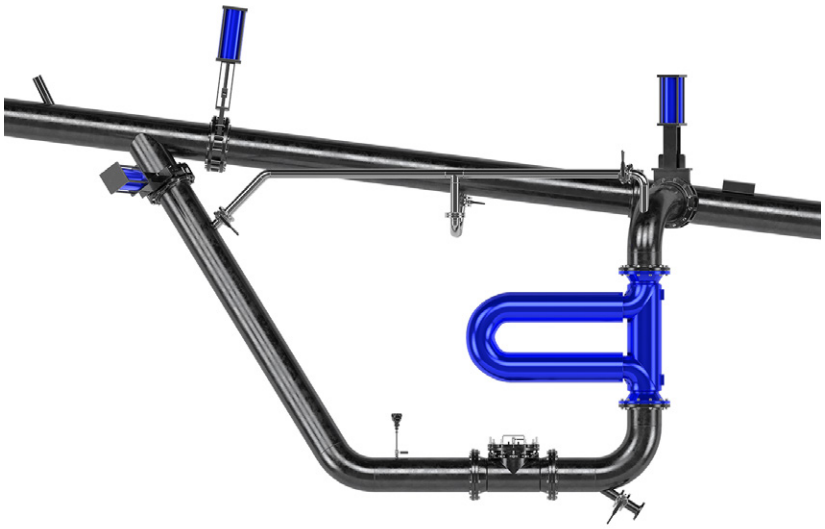
FLAGHD™ fluid loss and gain detection service is the latest generation of early kick and loss detection. Since SLB pioneered the FLAG™ fluid loss and gain detection service, more than 150 successful installations have been performed on all types of rigs, including land, jackup, semisubmersible, and drillship rigs. Now FLAGHD service delivers faster, more accurate flowmetering to reduce invisible lost time and optimize LCM.

FLAGHD service has an advanced compensation process to reflect the real-time operation context in conventional and MPD mode:

- Drillstring movement
- Rig heave
- Drilling fluid compressibility
- Transient flow behavior during pump start and stop
- MPD choke effect compensation
- Filtering to eliminate noise

FLAGHD service optimizes and accelerates well construction operations:

- Improved detection efficiency for reduction of false alarms
- One-click reports to minimize operator inputs and standardize deliverables
- Compatibility with EC-Drill and other MPD systems
- Downhole and backpressure pump efficiency calibration and chart
- Quality control with automated and intuitive process for calibration
- Dedicated human interface



The FLAGHD service flowmetering sensor delivers an outflow signature three times faster than the conventional flow check method. Instead of a 15-minute flow check, an outflow signature is accomplished in just 5 minutes for each pump stop.

Reduce the NPT linked to wellbore balance events

The primary objective of an early kick detection service is to promptly identify influxes or losses directly from the well at the rig site. By implementing the flowmetering FLAGHD service, the process becomes faster and more accurate, enabling quicker decision making to stop drilling operations. In the case of detecting a gain, the well can be shut down, depending on the intensity of the kick.

Traditionally, active volume or flow paddles have been utilized to detect gains or losses. However, these measurements are influenced by the rig activity on the surface. When using active volume, movements such as pit transfers or mud mixing can affect the measurements, which leads to incorrect interpretations and potentially a failure to recognize crucial gain or loss indicators. Similarly, flow paddles rely on a broad, flattened blade to determine the percentage of flow, but the accuracy is limited. Changes in flow may not be reflected by the paddle, particularly at lower flow rates. Also, quantifying the volume of gain is difficult using this method. A flowmetering service installed at the flowline addresses these challenges to enable more reliable detection regardless of rig-related activities.

In MPD mode, the service acts as a secondary well control barrier to identify unplanned gains and losses.

Minimize influx volume to remain below the kick tolerance

FLAGHD service calculates a differential flow measurement between the inflow and outflow. For influx detection, there are two threshold levels. The first level is triggered by an increase in flow, and the second level is activated once the first level's gain volume is surpassed. For fluid loss detection, there are two levels based on the decrease in flow, whether it is partial or severe.

The thresholds for gain and losses are established in two ways. Either the FLAGHD service proposes thresholds after calibration, or the operator manually enters the desired thresholds into the system. The service detects an influx as low as 80 L/min for flow and 160 L (about 1 bbl) for volume.

Reduce invisible lost time during connection

Flowback fingerprinting during connection time or pump stop enables the quick identification of fluid influx or loss. The conventional practice is to perform a flow check and observe the volume increase in the trip tank.

However, the FLAGHD service flowmetering sensor delivers an outflow signature three times faster than the conventional flow check method. Instead of a 15-minute flow check, an outflow signature is accomplished in just 5 minutes for each pump stop.

Optimize LCM effectiveness

FLAGHD service measures the intensity and type of fluid loss. This crucial information helps the derrick man and the mud engineer adapt various parameters to address this issue. They can mitigate losses in a tailored approach by adjusting the volume, concentration, and type of LCM.

How it works

The advanced kick detection system delivers flow monitoring and modeling. Kick detection analyzes the evolution of a key parameter, the differential outflow rate. An increase indicates the presence of a kick, while a decrease indicates losses. The magnitude of the deviation indicates the severity of the kick or loss. The FLAGHD service automatically triggers alarms to inform the operator of normal (green alarm) or abnormal (various color alarms based on severity) operating conditions.

SLB provides the expertise in bypass design and fluid mechanics required to install the flowmetering sensors and has a well-defined process for installing Coriolis and electromagnetic sensors on the flowline. SLB installs many sensor sizes, including 8-in, 10-in, and 12-in Coriolis sensors and 8-in and 12-in electromagnetic sensors.

What it replaces

FLAGHD service is the next generation of the SLB FLAG service and replaces this pioneering service.

slb.com/FLAGHD