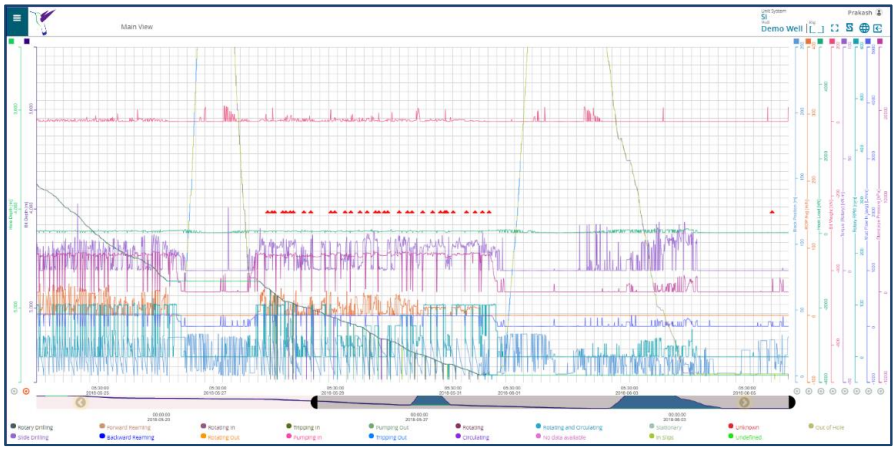
HummingBird

Overview

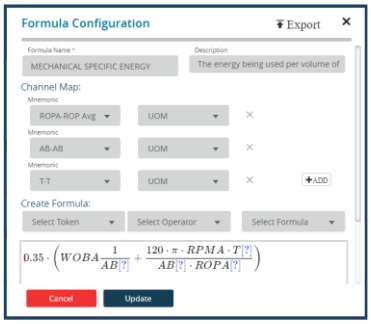
HummingBird is an engineering visualizer primarily aimed at making visualization of streaming data simple and effective. In addition to visualization, data correction and KPI generation are important capabilities of HummingBird. Flexibility, configurability, and extensibility are the key characteristics of the product architecture, making it possible to consume data from a wide variety of data sources such as WITSML, WITS, Modbus, OPC/UA, and many other protocols. In addition to being a visualization platform, HummingBird is also a very effective collaboration tool allowing drilling engineers and rig crew to annotate data and communicate in the context of drilling operations.

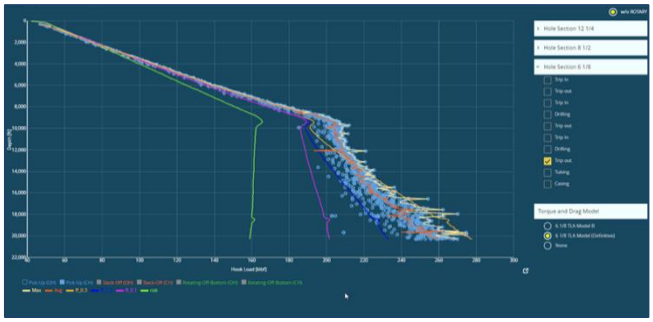


HummingBird offers a diverse range of pre-built graphic widgets that can be used to create personalized dashboards, which can then be shared with other users. These widgets are easy to configure and customize, allowing for flexibility in the layout. Furthermore, HummingBird can be accessed through a web browser on various platforms and devices, including desktops, tablets, and smartphones. To provide a preview, a selection of sample screens is also provided.



MAIN VIEW

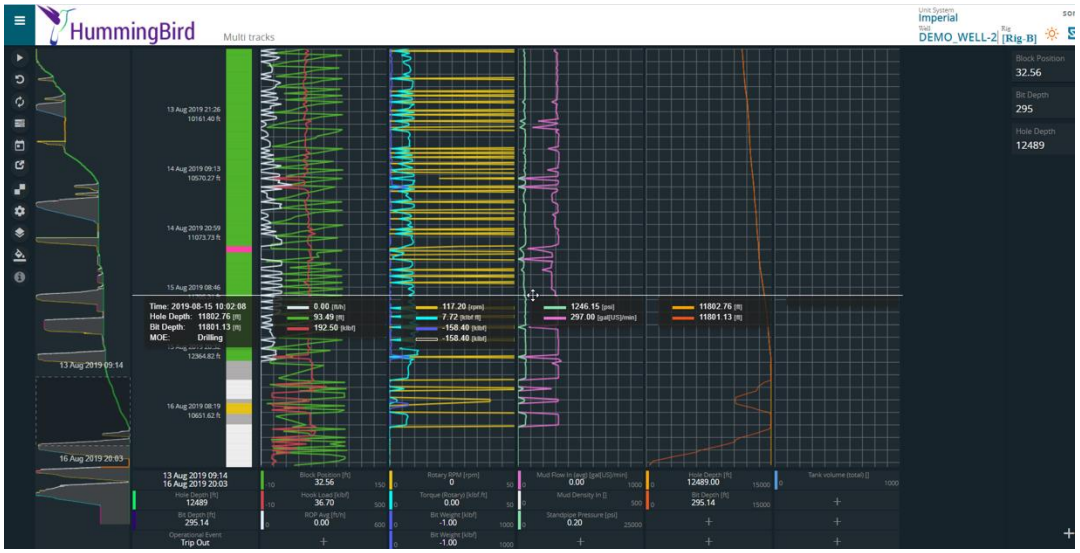




Tripping Load Analysis

BENEFITS

- Visualization of streaming data in real-time from multiple data sources along with operational events
- Generation and graphical presentation of KPIs
- Provision for depth and event correction along with approval workflow and audit trail
- Supports visualization of historic data and replay
- Highly interactive and adaptive dashboards with a selection of dials, gauges, and graphs
- High frequency data handling
- Integration with YellowHammer© and WITSML servers.
- Monitoring of health metrics for rig(s), well(s) and device(s)
- Provision of control widgets to remotely set rig operating parameters
- Support for localization
- Browser-agnostic



Real-time Data

SYSTEM REQUIREMENTS

Server

OS: Windows 10+
Ubuntu 14+
MacOS X
CentOS 6+

CPU: Quad-core at 2.5 GHz or higher

Memory: 16 GB or higher

Disk space: At least 2 TB of free space

Client

Browser(s): Browsers with HTML5 support

Device(s): iPad and Android tablets (9+ inch screen)

SIGMASTREAM

SigmaStream, LLC

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Features

The key features of HummingBird are listed below:

Scroll graph — The live scroll graph view allows visualization of multiple data channels, streaming at different frequencies, on a single page. User is offered the flexibility of selecting data channels and customizing visual representation by assigning colors as per algorithmic rules.

LogViews — LogViews display data for the chosen channels of the entire well. The view also features a bit vs hole-depth difference graph along the time axis. The user can zoom-in and inspect the curves. Also included are 'Remarks' entered by the drilling operator.

KPIs — Basic Operational Events and complex Operational Events are processed by HummingBird into KPIs. These KPIs are presented graphically with various selection criteria. In-built KPIs include operational event analysis, connection analysis and torque and drag analysis. A framework to build customized KPIs is in place for users to develop their own KPIs.

Data Wrangling — HummingBird allows depth and event correction. Markers can be added for additional information during correction. Data gaps are identified and user is given a choice about its usage. Approval mechanism is in place for the corrections and audit trail is maintained.

Adaptors and Operators — Various adaptors and operators can be configured to integrate external data sources and apply filters, such as *decimation* and *simple moving average,* to the data while being displayed graphically. A user with administrator privileges can configure adaptors and operators.

Dashboard Designer — A versatile graphical tool helps users design customized dashboards. The user can choose, place, size and align different dashboard components such as graphs, gauges, dials, etc. The user can also choose from a list of mnemonics to display and/or control.

Units of Measurement — HummingBird allows users to select the displayed units which may differ from the source UoM.

Control Widgets — HummingBird is not only a data visualizer but is also a control interface that allows users, with the right privilege, to send set points and other advisory messages back to the rig's operating system via YellowHammer. Support for device 'TARE' operation is also provided.

Administration — By integrating with LDAP servers such as Microsoft Active Directory, administrators can exercise control on data exposure at a well (or asset) level or at a predefined dashboard level.

Formula Editor — Users can assemble complex mathematical formulas using real-time channels. The calculated channels can then be used to build custom dashboards.