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Techlog Acoustics

Optimize sonic data—from acquisition to advanced interpretation

APPLICATIONS

- QC and validation of raw sonic waveforms
- Formation slowness processing for geophysics, petrophysics, and geomechanics, including dispersion analysis
- Acoustic anisotropy analysis

BENEFITS

- Save time and reduce costs by getting answer products directly from sonic data
- Increase confidence in the use of sonic data processed for further interpretation

FEATURES

- Workflow wizard to guide processing
- Majority of sonic tools in the industry supported
- Specialized tools for waveform quality control
- Full integration with other wellbore information available

Sonic data measurements are vital for well evaluation and interpretation tasks in domains such as geophysics, petrophysics, geomechanics, and drilling. Data quality control and validation are critical for these applications.

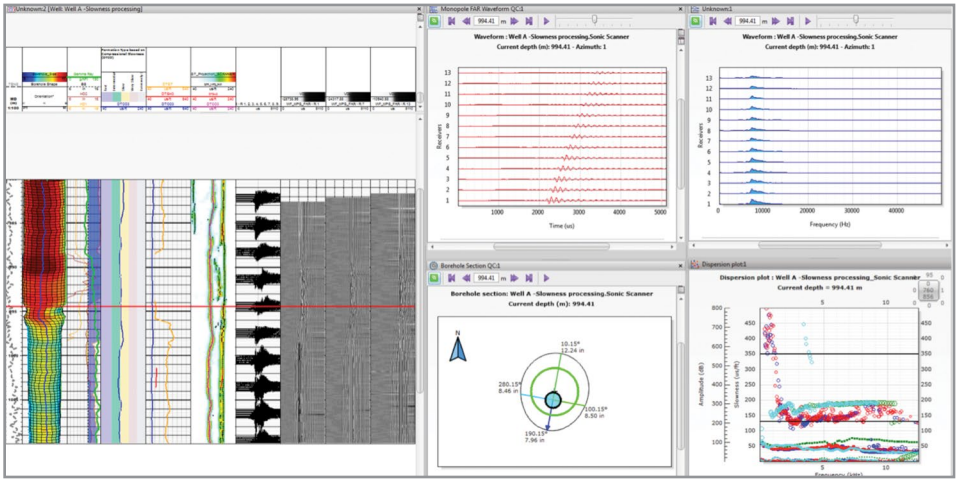
The Acoustics module for the Techlog* wellbore software platform provides all the functionalities required to load, analyze, and quality control data from all the major service companies, for both wireline and logging-while-drilling tools. With the Delta-T and Anisotropy workflows in the Techlog platform, processing of the sonic waveforms produces results you can rely on.

Confidence in raw sonic data

Without appropriate software, processing raw sonic data is challenging due to its large size and the complexity of its structure (e.g., multidimensional arrays). The Techlog platform can load waveforms from all the major sonic tools in the industry, enabling you to process data sets in a single platform.

The workflow starts with the preparation of acquired sonic data for all subsequent processing. This step ensures that all tool-specific preprocessing (e.g., gain normalization, DC-offset filtering, and start-time channels) is conducted and that the depth reference for each tool is honored before starting the quality control of the data.

The Techlog platform offers different ways to display and interact with acoustic data, such as waveforms and slowness time projection, along with other relevant data such as gamma rays, calipers, and wellbore images. Specialized tools for quality control investigation of sonic arrays such as waveform plots, spectrum plots, and dispersion analysis plots are available. The caliper data can also be viewed in borehole section plots to help analyze the borehole shape and the tool eccentricity inside it.



Viewing and validating acquired sonic data in the Techlog platform: Different logs, waveforms, and borehole shape plots (left); and a waveform plot, spectrum plot, dispersion plot, and a tool centralization QC plot (right).

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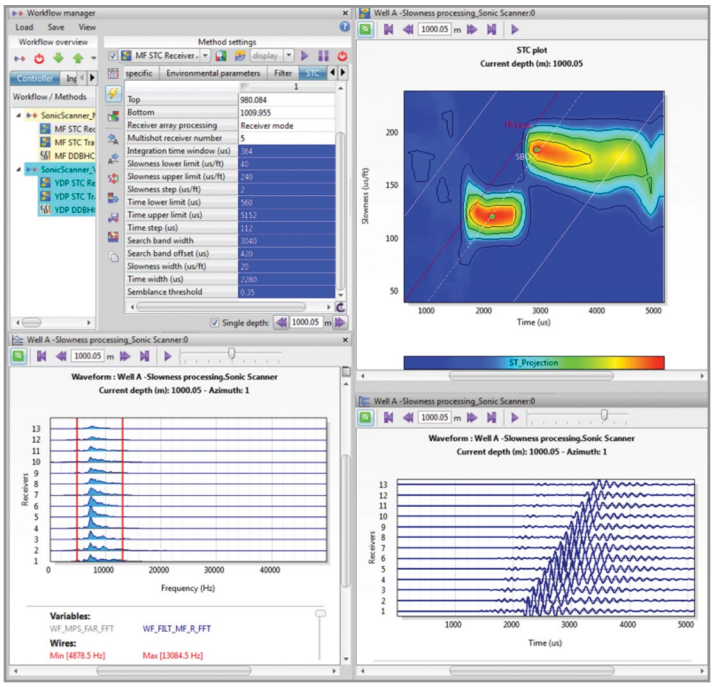
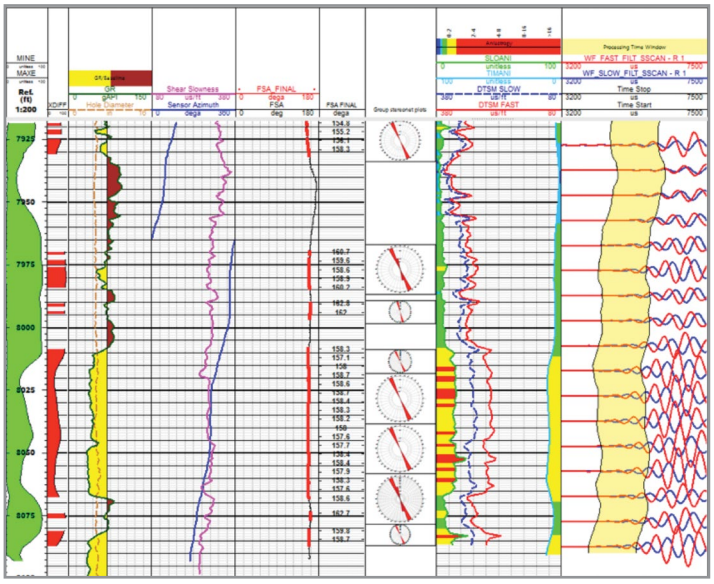


Formation slowness processing can show the STC plot at a particular depth.



The different outputs resulting from the anisotropy analysis: The azimuth of fast shear processed from cross-dipole waveforms is shown in polar plots, and coincides with the maximum horizontal stress direction.

Fully benefiting from sonic data

The Slowness Time Coherence (STC) module comprehensively extracts formation slownesses from sonic waveforms. The processing can be conducted efficiently with default parameters adapted to each tool and environment when possible.

For more challenging sonic data, advanced features are available for receiver disabling, transmitter mode, and interactive parameters in single depth for different formation types. For some Schlumberger tools, dispersive STC can be conducted for dipole data, Stoneley, and Leaky-P sources.

The Delta-T wizard provides guided workflows, allowing users to build the full workflow and adapt their parameters interactively depending on their inputs and on the environment that has been logged (slow formation, fast formation, etc).

Anisotropy analysis from sonic data

Anisotropy analysis from cross-dipole array waveforms can be performed efficiently using the Four-Component Rotation tool. This tool is based on the generalized four-component rotation (Alford rotation) technique to determine the direction of fast shear slowness.

Waveform filtering, time windows selection, and statistical averaging are also incorporated to enhance the processing and guide the users to extract all the QC outputs that go with this analysis.

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