QL43-ABI

High temperature acoustic borehole imager

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Our technology

The QL43-ABI is the most compact high-resolution ultrasonic imaging tool available in the wireline logging industry. Based on more than 20 years of experience and market leadership with ultrasound technology, the QL43-ABI consists of a state-of-the-art electronics and sensors designed to meet the oil & gas industry standards. The electronic architecture uses a super fast digital signal processor performing complex data processing operations in real time on each individual ultrasonic wave train. Its wide dynamic range of signal detection and its easy field operation offer a large variety of logging applications.

Fields of application

- Mining & mineral exploration
- Geothermal energy
- Geotechnical projects
- Water industry
- Oil & gas

Applications in details

OPEN HOLE

- Geological structure identification and orientation
- Lithology and mineralogy characterization
- Stratigraphic analysis
- Core orientation
- Stress field analysis (breakout and borehole deformation analysis)
- Caliper information
- Rock strength

CASED HOLE

- Casing integrity: internal and external inspection of casing/tubing (corrosion, wear, perforations, scale deposits, deformation analysis)
- Inside and outside casing/tubing diameter
- Direct measurement of casing and tubing thickness
- Metal loss

Key benefits

- Slimest tool of its kind currently available
- Real-time high-resolution images and thickness measurement
- Wide measurement range from 2"7/8 to 15" tubulars
- Records 36 ultrasonic waveforms per revolution for data post-processing
- Operates on mono, multi or coax electric lines
- Auto-adaptive telemetry system with equalizer option

Principle of measurement

The acoustic borehole imager records a 360° unwrapped and 3D images of the borehole wall. The tool emits an ultrasonic beam towards the borehole wall and records amplitude and travel time of the reflected signal. Amplitude records are representative of the impedance contrast between the borehole wall and fluid. Travel time is used to determine accurate borehole diameter data, which makes the tool ideal for borehole deformation - stress field analysis and casing inspection.

Sophisticated algorithms and real time processes are also implemented to extend tool applications for casing thickness measurement, corrosion evaluation and measurement behind a PVC casing.

The QL43-ABI uses a built-in high precision 3-axis fluxgate magnetometer and 3 accelerometers to orient the recorded images to a global reference - Magnetic North or High Side[1].

Measurements features

Cased hole mode

- 360° Unwrapped image of the steel casing based on travel time and amplitude records : caliper, amplitude, thickness and CADI[2] image logs
- 36 ultrasonic waveforms per revolution for data post processing (WellCAD cased hole ultrasonic workspace)

Open hole mode

- 360° Unwrapped and oriented image of the borehole wall based on travel time and amplitude records : caliper and amplitude image logs
- Deviation parameters : azimuth, tilt, tool relative bearing, magnetic field, gravity
- 3 Accelerometer calibrated components, 3 Magnetometer calibrated components

[1] Only applicable in open hole

[2] Cement Attenuation Decay Index

Technical specifications

Cartridge

Diameter : 43 mm - 1"11/16
Length : 1.45 m - 4.8 ft
Weight : 6.2 kg - 13.7 lbs
Max. Temp : 170 °C – 338°F
Max.Pressure : 700 bar – 10,000 psi

Orientation sensor

Sensor : 3-axis fluxgate magnetometer
3 accelerometers
Location : Mid point @ 1.66 m from tool bottom
Inclination accuracy : +/- 0.5 deg
Azimuth accuracy : +/- 2.5 deg

Operating conditions

Centralisation : Always required
Borehole fluid : Water
Water based mud
Brine
Pure oil (not applicable in oil based mud)
Cable type : Mono conductor
Multi-conductor
Coaxial
Acquisition system : OPAL
SCOUT-PRO

Acoustic heads

Acoustic sensor : Fixed transducer and rotating focusing mirror
Focusing : Collimated acoustic beam
Frequency: 1.2 MHz
Acoustic beam width : 3 mm @ focal distance
Mirror rotation speed : Up to 20 rev/sec - automatic
Azimuthal resolution : 72 – 144 or 288 (user defined)
Caliper resolution : 0.08 mm

OPEN HOLE & CORROSION
QL43 ABI HEAD OHCO-L

Application :
Open Hole: up to 21" depending on borehole conditions
Cased Hole: 5"1/2 to 15" with a minimum of 5mm casing thickness

Max. Temp. Open Hole: 170°C – 338°F
Max. Temp. Cased Hole: 150°C – 302°F
Max.Pressure: 700 bar – 10,000 psi
Weigth: 2.8 Kg – 6.2 lbs
Length: 0.48 m – 1.57 ft

CORROSION SMALL FOCUS
QL43 ABI HEAD CO-S

Application:
Cased Hole : 3" to 5"1/2 with a minimum of 3mm casing thickness

Max. Temp. Cased Hole: 150°C – 302°F
Max.Pressure: 700 bar – 10,000 psi
Weigth: 2.8 Kg – 6.2 lbs
Length: 0.51 m – 1.57 ft

CORROSION – EXTRA SMALL FOCUS
QL43 ABI HEAD CO-XXS

Application:
Cased Hole : 2"7/8 with a minimum of 3mm casing thickness

Max. Temp. Cased Hole: 150°C – 302°F
Max.Pressure: 700 bar – 10,000 psi
Weigth: 2.8 Kg – 6.2 lbs
Length: 0.51 m – 1.57 ft

Real time acquisition and processing options

ALT systems are delivered with LoggerSuite and WellCAD® software package to handle data acquisition, real-time visualisation, log editing, log analysis and presentation workflow. The modular architecture of WellCAD® allows users to easily activate add-on modules and workspaces for advanced processing.

More specifically, the following modules and workspaces are recommended with the QL43-ABI:

- Image and Structure Interpretation (ISI) workspace
- Cased Hole Ultrasonics (CHU) workspace
- Casing Integrity module

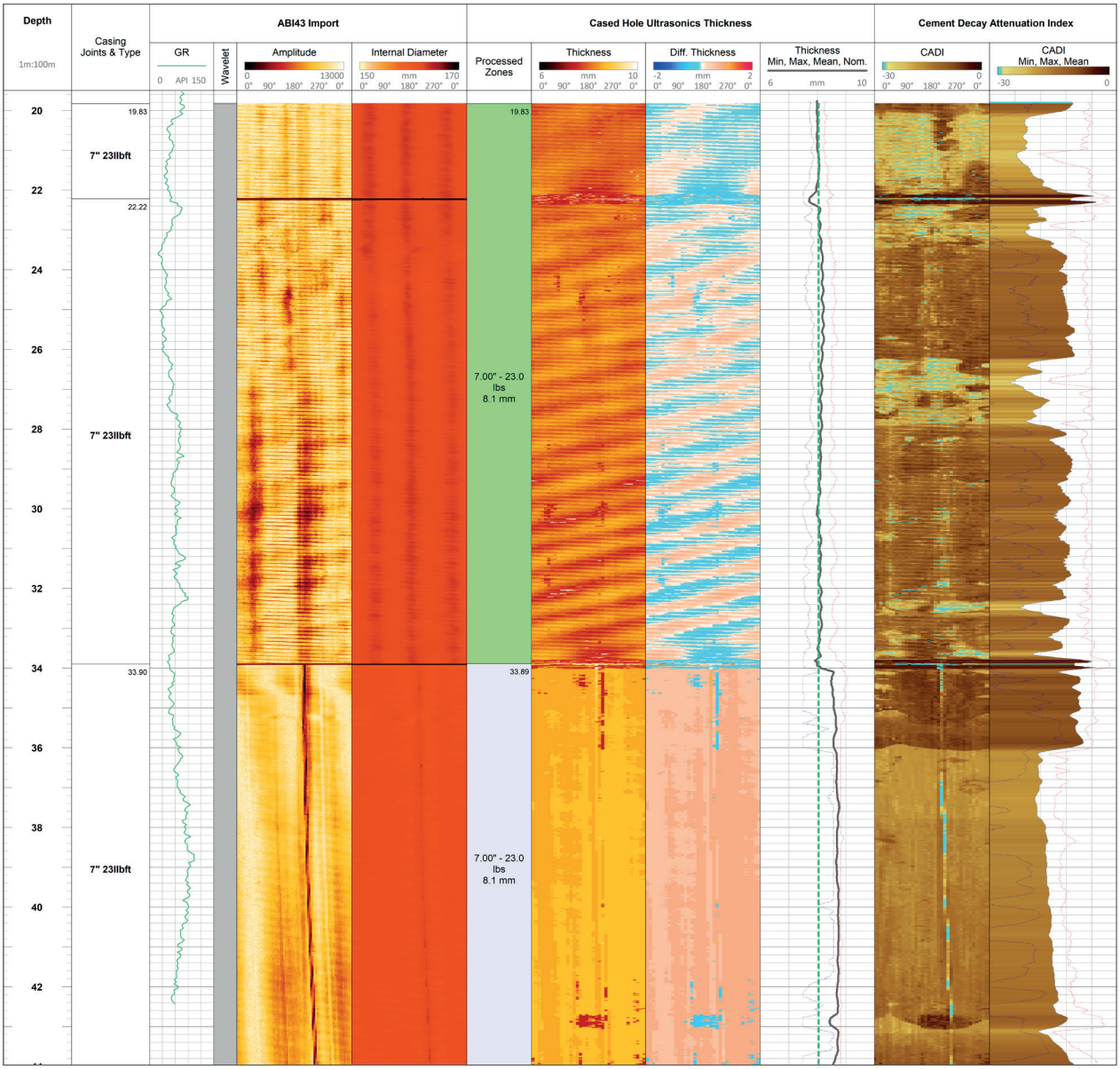

Figure 1 : Example of ultrasonic casing inspection using the QL43-ABI