Our company

Since the company’s foundation in 1993, Advanced Logic Technology has grown to become a globally recognised leader in developing borehole logging instruments, data acquisition & processing software.

With more than 20 years of experience, the company has built a solid reputation for the design and production of state of the art imaging tools.

Our data processing software WellCAD provides a framework for the daily work of thousands of people dealing with borehole data. WellCAD handles the entire data loading, log editing, analysis and presentation workflow.

Our instruments and software are used for

- Mining & mineral exploration
- Oil & Gas
- Geotechnical projects
- Groundwater applications
- Geothermal energy

Our technology

The acoustic borehole imager records a 360° unwrapped and 3D image of the borehole wall. The tool emits an ultrasonic beam towards the formation and records the amplitude and the travel time of the reflected signal. The amplitude record is representative of the impedance contrast between the rocks and the fluid. The travel time is used to determine accurate borehole diameter data which makes the tool ideal for borehole deformation description, stress field analysis and casing inspection. Sophisticated algorithms and real time processes are also implemented to extend the possible tool applications to casing thickness measurement, corrosion evaluation and measurement behind a PVC casing.

The optical borehole imager produces a continuous, sharp, true color, 360° unwrapped digital image of the borehole wall in dry and water filled boreholes.

Both technologies use a built in high precision orientation package incorporating a 3-axis fluxgate magnetometer and 3 accelerometers for the orientation of the images to a global reference and determination of the borehole’s azimuth and inclination. All tools are fully digital and can operate on standard wirelines. They can either be combined with other logging tools of the QL product line to build tool strings or be operated as a standalone tool.
QL40 ABI-ABI40 GR
Acoustic borehole imager

Technical specifications

- **Diameter**: 40 mm (1.6”)
- **Length (min/max)**: 1.61/2.12 m (63/83”)
- **Weight (min/max)**: 6.7/8.7 kgs (14.7/19.2 lbs)
- **Max temp**: 70°C (158°F)
- **Max pressure**: 200 bar (2900 PSI)
- **Acoustic sensor**: fixed transducer and rotating focusing mirror
- **Focusing**: Collimated acoustic beam
- **Frequency**: 1.2 MHz
- **Rotation speed**: up to 35 revolutions per second - automatic
- **Caliper resolution**: 0.08mm (0.003”)
- **Deviation sensor**: APS544-3 axis magnetometer - 3 axis accelerometer

Operating conditions

- **Cable type**: mono, multi-conductor, coax
- **Compatibility**: ALTIogger / Bbox / Matrix
- **Digital data transmission**: variable baudrate telemetry according to cable length/type
- **Telemetry**: variable - function of image resolution, borehole diameter, wireline and acquisition system model, e.g. 8m/min in 7” diameter borehole with 144 azimuthal resolution - 4mm vertical sampling rate @ 250kbps baud rate.
- **Centralisation**: required
- **Borehole fluid**: water, water based mud, brine, oil (oil based mud not applicable)
- **Measurement range**: 2” to 20” borehole - depending on mud conditions

Open hole

- Detailed and oriented caliper and structural information
- Borehole deformation (stress field analysis)
- Fracture detection and evaluation
- Breakout analysis
- Detection of thin beds
- Determination of bedding dip
- Lithology characterisation (detection of thin beds, determination of bedding dip)
- Rock strength

Cased hole

- Casing inspection
- Inside & outside diameter
- Casing thickness & corrosion rate
- Scale & hole detection
- Casing wear & deformation
- Metal loss indicators
Technical specifications

Diameter: 40 mm (1.6”)
Length (min/max): 1.5/1.7 m (57.9/67”)
Weight (min/max): 5.5/6.5 kgs (11.7/14.3 lbs)
Max temp: 70°C (158°F)
Max pressure: 200 bar (2900 PSI)
Optical sensor: 1/3” high sensitivity CMOS digital image sensor
Color resolution: 24 bits RGB true colors
Responsivity: 5.48V/lux-sec
Light source: High efficiency LEDs
Azimuthal resolutions: 120, 180, 360, 600, 900, 1800 points
Vertical resolution: User defined. Function of depth encoder vertical resolution
Deviation sensor: APS544-3 axis magnetometer - 3 axis accelerometer

Operating conditions

Cable type: mono, multi-conductor, coax
Compatibility: ALTagger / Bbox / Matrix
Telemetry: variable baudrate telemetry according to cable length/type
Logging speed: Function of image resolution and wireline electrical properties e.g.: 6 m/min with 900 pixels azimuthal resolution, 2 mm vertical sampling rate @ 100 Kbps
Centralisation: required
Borehole fluid: dry, clear water filled
Measurement range: 2 ½” to 21”

Open hole
- Detailed and oriented caliper and structural information
- Reference for core orientation
- Fracture detection and evaluation
- Breakout analysis
- Detection of thin beds
- Determination of bedding dip
- Lithology and mineralogy characterisation
- Rock strength

Cased hole
- Casing inspection
**Technical specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diameter</strong></td>
<td>43mm (1&quot;11/16)</td>
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<tr>
<td><strong>Length</strong></td>
<td>1.77 m (70”)</td>
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<tr>
<td><strong>Weight</strong></td>
<td>10kgs</td>
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<tr>
<td><strong>Max temp</strong></td>
<td><strong>Open hole</strong>: 125°C (257°F) <strong>Cased hole</strong>: 170°C (338°F)</td>
</tr>
<tr>
<td><strong>Max pressure</strong></td>
<td>800 bar (11600 PSI)</td>
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</table>

**Field exchangeable acoustic head**

**Acoustic sensor**
- Collimated acoustic beam

**Frequency**
- 1.2 MHz - 0.5 MHz

**Caliper resolution**
- 0.08mm (0.003”)

**Operating conditions**

- **Cable type**: mono, multi-conductor, coax
- **Compatibility**: ALTrigger / Bbox
- **Digital data transmission**: variable baudrate telemetry according to cable length/type
  - e.g.: 7500 m (24600 ft) – 5/16” mono - 62 Kbps
  - 1800 m (5900 ft) – 1/8” mono – 222 Kbps
- **Logging speed**: variable function of resolution, wireline and surface system
- **Centralisation**: required
- **Borehole fluid**: water, water based mud, brine, oil
  - (oil based mud not applicable)

**Field exchangeable acoustic head**

**Open hole**
- Detailed and oriented caliper and structural information
- Borehole deformation
- Stress field analysis
- Fracture detection and evaluation
- Breakout analysis
- Detection of thin beds
- Determination of bed dip
- Lithology characterisation (detection of thin beds, determination of bed dip)
- Rock strength

**Casing inspection**
- Inside & outside diameter
- Casing thickness & corrosion rate
- Scale & hole detection
- Casing defects
- Casing wear & deformation
- Metal loss indicators

**Cement evaluation**
- Cement location
- Cement channeling

**Open hole & Corrosion**

**QL43 ABI HEAD OHCO-L**
- 5” 1/8 x 15”
  - depending on borehole conditions with a minimum of 5 mm thickness

**Corrosion Small Pipe Diameter**

**QL43 ABI HEAD CS-S**
- 2” ½ x 5” ½
  - depending on borehole conditions with a minimum of 3 mm thickness

**Cement**

**QL43 ABI HEAD CE-L**
- 5” 1/8 x 15”

**Cement Small Pipe Diameter**

**QL43 ABI HEAD CE-S**
- 2” ½ x 5” ½
**Technical specifications**

- **Diameter**: 85 mm (3”3/8)
- **Length**
  - with “inline” centralisers: 5.2 m (205”)
  - without “inline” centralisers: 3.7 m (145”)
- **Weight**: 150 kgs
- **Operational temp & pressure**: see figure 1
- **Acoustic sensor**: fixed transducer and rotating focusing mirror
- **Focusing**: Collimated acoustic beam
- **Frequency**: 1.2 MHz
- **Caliper resolution**: 0.08mm (0,003”)
- **Deviation sensor**: APS544-3 axis magnetometer - 3 axis accelerometer

**Operating conditions**

- **Cable type**: multi conductor
- **Compatibility**: ALTigger / Bbox
- **Telemetry**: variable baudrate telemetry according to cable length/type
- **Borehole fluid**: water, water based mud, brine, oil (oil based mud not applicable)

**Options**

- **Centralisers**: in-line 85 mm & 92 mm (OD versions)
- **Pressure housing**: 92 mm (OD version)
- **Fluid excluder** (figure 2)

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**Open hole**

- Detailed and oriented caliper and structural information
- Borehole deformation (stress field analysis)
- Fracture detection and evaluation
- Breakout analysis
- Detection of thin beds
- Determination of bedding dip
- Lithology characterisation (detection of thin beds, determination of bedding dip)
- Rock strength

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Since the delivery of the first 2 systems to Sandia National Laboratories in 2005, the ABI85 has been deployed successfully in several geothermal fields including Iceland, New Zealand, Australia & Japan.

**Some publications**


Data import

Borehole image data from a variety of tools including acoustic televiewer, optical televiewer, corescanned images, FMI, FMS, CAST, CBL, UBI, STAR and Sondex MIT are supported.

Data processing

Before any form of analysis is performed, the data needs to be processed. This involves the creation of a reliable high quality image from raw tool measurements. A number of processing options are available for enhancing the quality of the data. These include:

- Bad trace interpolation
- Image normalisation
- Despiking filters
- Centralise image
- Adjust brightness and contrast (for RGB logs)

Data presentation

Data can be displayed as an image (user definable image color palette), as curves (shifted or stacked curves) or as 3D cylinder display (virtual core). Data can be visualised as 3D images using 3D borehole view (ideal to visualise breakouts, well deformation, pipe corrosion). Data can be oriented to North or Highside, or rotated by a user defined input (magnetic North to true North correction).
Any number of planar features can be interactively picked recording azimuth, dip values and aperture. Each pick can be qualified into user definable categories (ToadCAD). Picks can be displayed as sinusoid, tadpole or stick plot. Picking of linear features (e.g. breakouts, tensile fractures) is also possible.

Fully interactive structure interpretation including dips workspace with polar, rose and vector plots. The module includes specific processes such as, caliper calculation from traveltime images, extraction of curves indicating rock strength, reflectivity from images.

The new Image & Structure Interpretation (ISI) workspace combines manual and automated structure picking tools, sophisticated data visualization and a logical workflow into a powerful, built for purpose processing and interpretation platform.

- A navigation bar allows structuring the workload by zonation based on a structure complexity map and image data overview.
- Simultaneous picking of planar, linear and free hand features on multiple images is supported.
- The geologist controls the manual, semi-automatic and auto picks.
- Picking results are tagged with a confidence value and structural planes are displayed superimposed to a virtual 3D core improving the data quality control.
- Real time conversion from apparent to true picks.
- An interactive stereonet algorithms to find similar or most representative picks enhance the interpreters control of the data and optimise the picking results.

Corrosion evaluation

Mapping distribution, configuration, orientation and severity of corrosion through the entire borehole. (Thorough or detailed analysis). WellCAD 3D data virtual borehole reality can help to identify internal deposits, localize pipe deformity or pipe buckling.

The software includes specific processes such as metal loss calculation for multi-arm caliper.