

CAST-V™ Circumferential Acoustic Scanning Tool-Visualization

The CAST-V™ tool is an ultrasonic tool that provides high-resolution images in both open and cased holes. The tool's interchangeable head rotates a full 360° and contains a high-frequency acoustic transducer to provide a full 360° profile of the borehole or cement. A second acoustic transducer is mounted in the tool housing and is used to measure characteristics of the borehole fluid. A directional sub is provided to orient images to either the high side of the hole or to north. The image mode, run primarily in open hole, consists of 200 points horizontally by 40 samples per foot vertically while the cased-hole mode measures 100 points by 4 samples/ft. The CAST-V tool is designed to operate in conjunction with other DITS™ tools.

The system provides high-resolution images indicating texture changes in the borehole wall or on the interior portion of the casing. These images can be used to identify fractures in the formation or slight internal defects in casing.

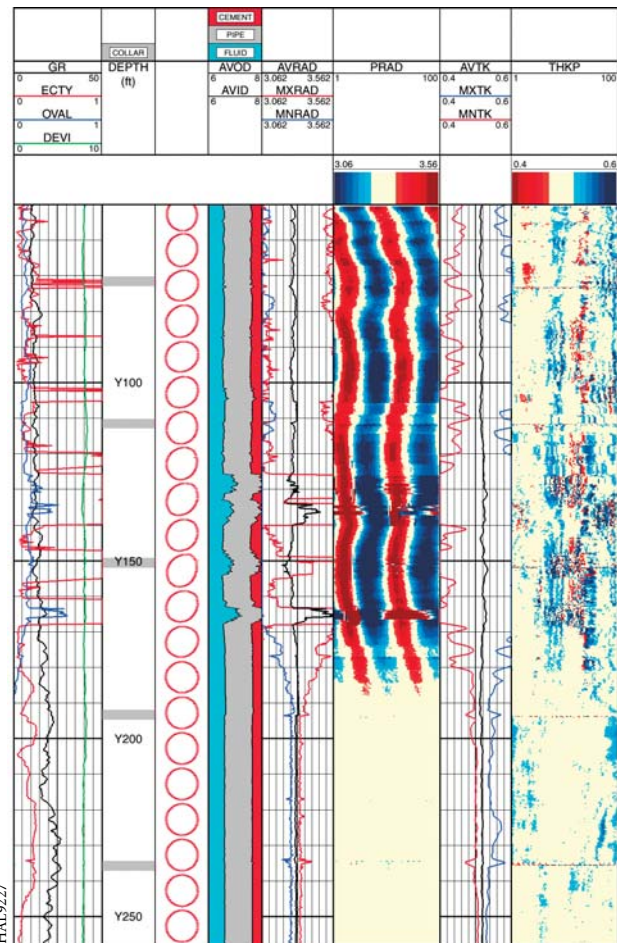
The CAST-V tool in the cased-hole mode also determines the casing thickness for pipe inspection. Simultaneously the CAST-V tool determines the type of material in the annular space between the casing and borehole wall.

The CAST-V tool must be run centralized in fluid filled boreholes. It must be the bottom tool in any combination. Its operation is limited by factors such as high mud density and dissolved gases that increase the attenuation of the tool's acoustic pulses as they travel through the borehole fluid.

CAST-V tool differs from other ultrasonic type tools in the cased-hole mode by several different ways. It has 100 shots per depth frame versus 72 (maximum) and includes a real-time fluid travel time (FTT) measurement. The competition down logs FTT and then plugs the results into the uplog. All measurements are made real-time with no mode selection to determine what is or what is not being processed. It is fully combinable with all DITS tools, especially the M305 FWS™ tool for the CBL portion. The complete navigation package is standard with service. The competitor's standard service does not include a navigation package—they additionally charge for running the service.

Applications

- Simultaneous ultrasonic pipe inspection and cement evaluation
- 2D and 3D borehole imaging
- Process images, histograms, and curve-type data



The casing-evaluation presentation includes casing ovality, eccentricity, hole deviation, and gamma ray in Track 1. In this instance, the eccentricity is composed of both tool and casing eccentricity due to formation movement. Track 2 shows a cross-sectional presentation of the pipe shape. A cross-sectional of the pipe wall is presented in Track 3. Track 4 provides the average, minimum, and maximum value of the pipe radius that is shown in Track 5. Track 6 provides the average, minimum, and maximum value of the pipe thickness that is the image plotted in last Track 7. On the image logs red shows pipe thinning while blue indicates pipe thickening.

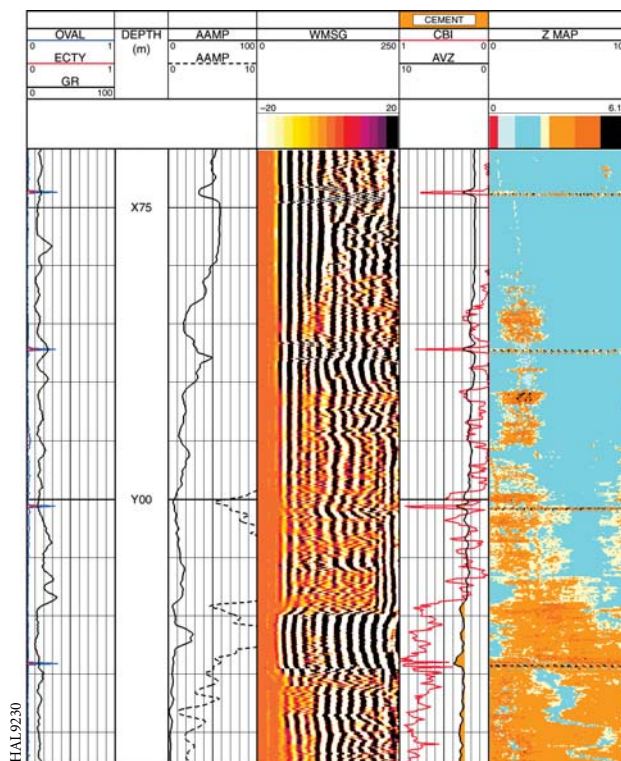
Features

- Allows 100 shots per depth frame measurement, providing complete circumferential coverage in cased-hole cement evaluation and pipe inspection
- Near real-time evaluation of complex and lightweight cements is accomplished through ACE™ processing
- Combinable with all DITS™ tools. This can reduce rigtime when run with the M305 FWS™ tool for the cement bond log
- Simultaneous cement evaluation and casing inspection capability
- Real-time fluid cell measures both borehole fluid transit time and fluid impedance for measured data correction
- Real-time casing thickness, casing OD, and ID

Associated Answer Products

- ACE™ processing for cement evaluation
- CASE™ evaluation for casing inspection

The CAST-V™ tool is also useful in cement evaluation. See page 33 for more information on Cement Evaluation tools.



The cement-evaluation presentation includes casing ovality and tool eccentricity in Track 1 along with the gamma ray. Conventional CBL amplitude and amplified amplitude data is presented in Track 2. Track 3 provides the typical CBL waveform showing both pipe to cement bond along with cement to formation bond. Data from the CAST-V™ scanner is displayed in Tracks 4 and 5. Track 4 provides information regarding the average impedance of the ZP image in Track 5. Likewise a CBI is a bond index from the same image and provides a quick indication of the percent of bond. The image in Track 5 is the Z map from 0 to 360° (left to right) with 0° representing the high side of the hole. The center of the track is scaled at 180°, which represents the low side of the hole.

CAST-V™ Circumferential Acoustic Scanning Tool-Visualization Specifications

Length ft (m)	Diameter in. (mm)	Maximum Pressure psi (Mpa)	Maximum Temperature °F (°C)	Weight lb (kg)
17.9 (5.5)	3.63 (92.2)	20,000 (137.9)	350 (176.7)	316 (143.3)