

4D Caliper™ WDP

EM Borehole Imager



Description

High accuracy electro-magnetic borehole imaging tool which acquires pulse-echo measurements while rotating in oil based mud systems.

The measurement principle is electro-magnetic pulse-echo, where borehole size and shape is derived from time-of-flight, and amplitude is derived from the echo/reflection

The 4D Caliper has up to eight (8) pairs of transducers and receivers, which are spaced 45° apart in two (2) planes, allowing to obtain high-resolution four (4) axis measurements.

In addition to its imaging capabilities, it captures wide-band vibration, shocks, instantaneous tool face and RPM.

The 4D Caliper WDP has its own internal batteries, memory and sensors to determine azimuthal orientation.

The Tool Collar I.D is a straight and through bore I.D allowing it to be included in any Bottom-Hole-Assembly.

Applications

- Borehole stability over time (4D)
- Borehole shape and size
- Volume calculations
- Dip measurement
- Formation stress and stress rotation
- Formation Evaluation

Deliverables

- High-resolution amplitude image
- High-resolution radius image
- Instantaneous RPM and tool face
- Tri-axial vibration, stick-slip and whirl
- Temperature
- 3D and 4D Visualization

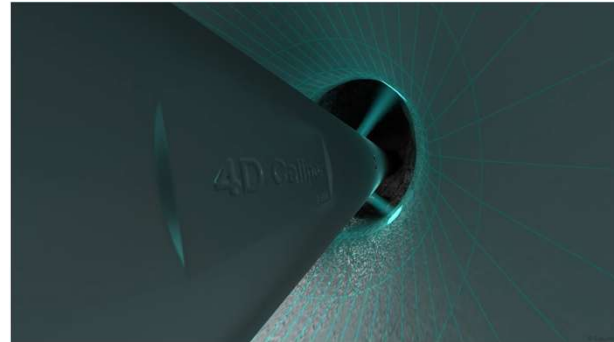
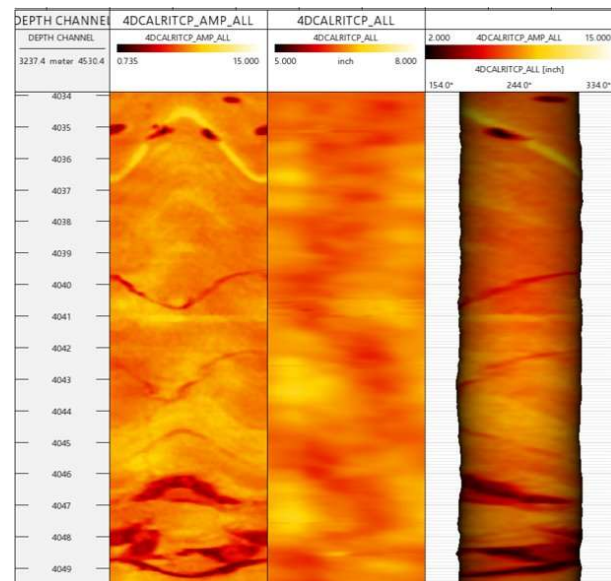
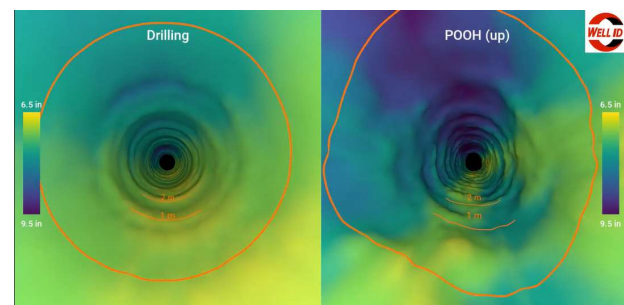


Illustration of how the 4D Caliper scans the borehole while drilling.



Log showing amplitude and radius where formation layers can be observed



Visualization of borehole shape and size while drilling vs same when rotating out of hole. Significant development in shape can be observed from the example.

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Measurement and Performance Specifications

PARAMETER	SPECIFICATIONS	
Imaging	Caliper (time-of-flight)	Amplitude (unitless)
Imaging – Orientation	Gravity High-side	Magnetic
Binning Capability	64 to 512 bins	
Caliper accuracy, in	± 0.04	
Mud system compatibility	Oil Based Mud	
Data Recording	Accelerations & RPM	100 – 500 sps
	Caliper & Amplitude	400 – 1,200 sps
Memory	Internal 128 GB	Configurable
Power Source	Internal Batteries	Configurable

Mechanical and Environmental Specifications

PARAMETER	950 WDP	675 WDP
Borehole Size Coverage, in	12.25 - 26	8.50 – 12.25
Nominal Collar O.D, in	9.50	6.75
Maximum Collar O.D, in	9.50	7.50
Nominal Collar ID, in	3.00	2.25
Collar Length, in	137.6	112.2
Connections	Wired DC58 (v2 coil)	Wired wGPDS50 (v2 coil)
Make-up Torque, ft-lb	63,700	36,500
Overpull non-rotating, Operational lbf	2,100,000	750,000
Max. RPM	250	250
Max. DLS rotating, deg / 100 ft	6	10
Max. DLS sliding, deg / 100 ft	12	21
Max. Temperature Operating, °F (°C)	257° F (125° C)	302° F (150° C)
Max. Operating Pressure, psi	14,500 psi	20,000 psi
Max. Mud Flow Rate, GPM	1,200	650
LCM limitations	No practical limit	No practical limit