LWD SOLUTIONS

SCIENTIFIC DRILLING

THE **ULTIMATE PARTNER** IN WELLBORE PLACEMENT

Scientific Drilling International is the largest independent service provider offering complete high-accuracy navigation and drilling solutions. Globally positioned to support a Oil & Gas, CBM/CGS, Geothermal, and Mining Industries, Scientific Drilling is committed to delivering a customer experience that makes it **Easy** to Do **Business.**

- Directional Drilling
- **LWD Services**
- MWD Services
- Magnetic Ranging
- Drilling Motor Services
- Wellbore Surveying
- Survey Management
- Rotary Steerable Services
- Well Planning
- Drilling Engineering
- Cased Hole Services

LWD SOLUTIONS

POWERED BY **SCIENTIFIC DRILLING**

Scientific Drilling's innovative LWD technology provides a reliable, fit-for-purpose, and cost effective solution for the industry's wellbore placement and geological challenges.

We are proud to design and manufacture all components down to the sensor level, ensuring product integrity and performance. Our commitment to consistently deliver an unparalleled customer experience makes it **Easy** to do **Business.**

Our suite of LWD technologies provide a wide rangeof solutions to target your most complex operations.

AZIMUTHAL GAMMA RAY

- **AZI-GAIN**
  Azimuthal Gamma Ray and Inclination
- **HALO AZI-GAMMA**
  Azimuthal Gamma Ray
- **SMART MOTOR**
  Instrumented Mud Motor with Near-Bit Azimuthal Gamma and Continuous Inclination
- **BITSUB**
  At-Bit Azimuthal Gamma and Continuous Inclination

RESISTIVITY SOLUTIONS

- **PRT**
  Propagation Resistivity Tool
- **WPR**
  Wave Propagation Resistivity

ADVANCED FORMATION EVALUATION

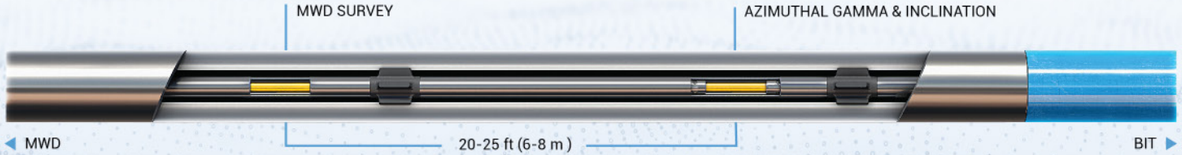
- **ULT**
  Azimuthal Spectral Gamma Ray, Azimuthal Sonic, and Ultrasonic Borehole Imager

AZI-GAIN

AZIMUTHAL GAMMA RAY AND INCLINATION

Scientific Drilling's Azi-GAIN is a probe-based, API calibrated sensor that provides hemispherical azimuthal gamma ray and continuous inclination measurements for geosteering and well placement purposes.

The sensor can be placed just above the motor for quicker reaction times to formation changes. It can be run with any of SDI's MWD and LWD systems in all configurations.



DELIVERING THE ULTIMATE VALUE

- Supports all BHA sizes
- Real-time compatibility with MP and EM MWD
- Up and Down Azimuthal Gamma Ray
- Continuous Inclination while sliding and rotating
- Accurate measurement capabilities directly adjacent to the mud motor

TARGET APPLICATIONS

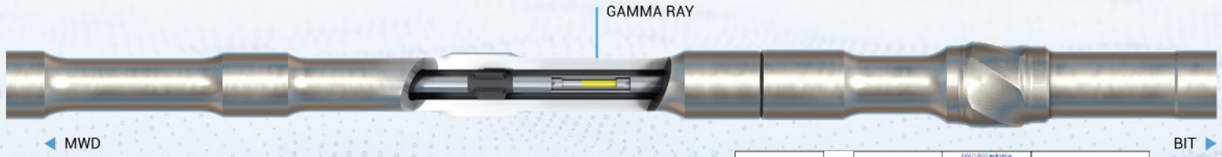
- Geosteering
- Casing and Coring Point Selection
- Lithology Identification
- Shale/Non-Shale Determination

HALO AZI-GAMMA

AZIMUTHAL GAMMA RAY

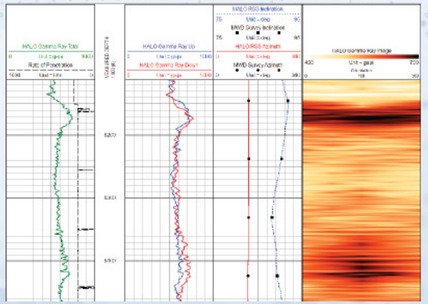
Scientific Drilling's HALO Azi-Gamma is a probe-based, API calibrated sensor that provides quadrant azimuthal gamma ray for advanced geosteering and well placement operations.

This sensor can be utilized in the HALO RSS or placed above the motor in a conventional motor BHA. HALO Azi-Gamma is compatible with all SDI MWD and LWD systems in all configurations.



DELIVERING THE ULTIMATE VALUE

- Four sector real-time azimuthal gamma ray imaging
- Eight sector azimuthal gamma ray data in memory
- Decreased bit-to-sensor distances with HALO RSS
- Compatible with MP and EM MWD systems

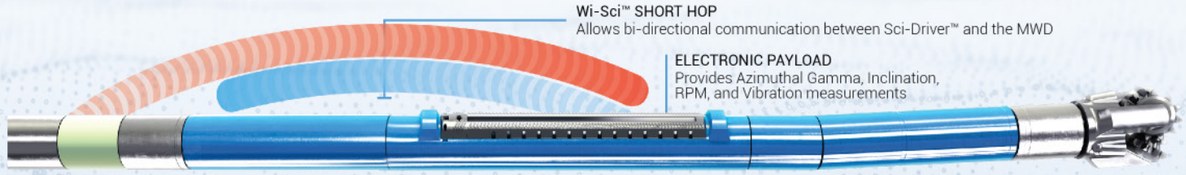


SMART MOTOR

NEAR-BIT INSTRUMENTED MUD MOTOR

Scientific Drilling's Near-Bit Smart Motor is a positive displacement mud motor housing an electronic payload that provides hemispherical azimuthal gamma ray, continuous inclination, RPM and vibration measurements close to the bit, making it the ultimate geosteering solution.

Using its Wi-Sci™ short hop bi-directional communication system, the Smart Motor wirelessly transmits real-time logging data to the MWD system, which is then sent to surface via mud pulse or electromagnetic telemetry.



DELIVERING THE ULTIMATE VALUE

- Available in 4.75", 6.75" and 8" configurations
- Real-time compatibility with MP and EM MWD
- Near Bit Up and Down Azimuthal Gamma Ray
- Continuous Inclination measurements only 9ft from the bit
- Short bit-to-bend

TARGET APPLICATIONS

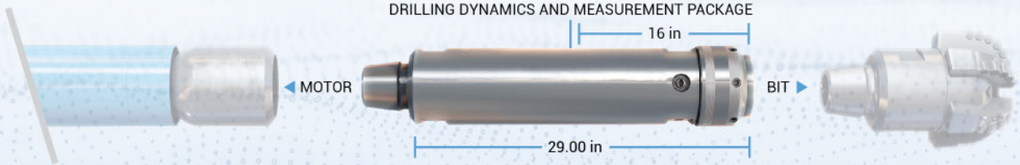
- Geosteering
- Tight Trajectory Control
- Early Payzone Detection
- Casing and Coring Point Selection
- Early Monitoring of Motor Yield

BITSUB

AT-BIT AZIMUTHAL GAMMA AND INCLINATION

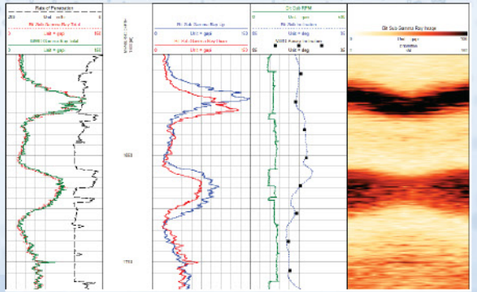
Scientific Drilling's BitSub is a short at-bit measurement sub which is placed between the motor and bit, providing high-resolution azimuthal gamma ray imaging, continuous inclination, and drilling dynamics information.

The integrated sensor package is always rotating and utilizes improved WiSci EM short hop technology to communicate with the MWD tool in both oil-based and water-based mud systems



DELIVERING THE ULTIMATE VALUE

- Available in 5" and 6.75" configurations
- Azimuthal data regardless of rotating or sliding 16 inches behind the bit
- Real-time 4 or 8 sector azimuthal gamma ray
- 16 sector gamma ray image in Memory
- Mud motor independent



PRT | PROPAGATION RESISTIVITY TOOL

Scientific Drilling's PRT tool is a probe-based, dual spacing (23 in. and 33in.) 2 MHz resistivity tool that provides four resistivity curves (two phase and two attenuation) with multiple depths of investigation.

Its unique sonde design allows for interchanging between collar sizes, reducing the number of tools needed at the wellsite

DELIVERING THE ULTIMATE VALUE

- Available in 4.75", 6.5", 6.75", and 8" configurations
- Real-time compatibility with MP or EM MWD
- Works in all drilling mud types
- Collar sizes interchangeable with same PRT probe
- Large memory capacity: 1 second acquisition rates in memory

TARGET APPLICATIONS

- Geosteering
- Formation Correlation
- Payzone Identification
- Casing and Coring Point Selection
- Pore Pressure Evaluation

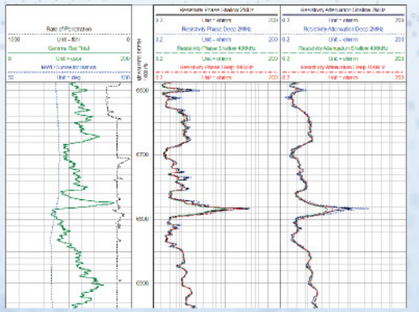
WPR | WAVE PROPAGATION RESISTIVITY

Powered by APS Technologies, Scientific Drilling's WPR tool is a collar-based resistivity tool that offers both dual spacing (22.5 in. and 36 in.) and dual frequency (2 MHz and 400 kHz) to provide eight total resistivity curves (phase and attenuation).

It's spatially compensated, symmetrical design with centrally located receiver antennas provide real-time compensation, improving the accuracy for wireline-equivalent resistivity measurements.

DELIVERING THE ULTIMATE VALUE

- Available in 3.75", 4.75", 6.75" and 8" sizes
- Real-time compatibility with SDI MP or EM MWD
- Works in all drilling mud types
- 400 kHz frequency increases measurement's depth of investigation
- Robust collar design with high-temperature capability

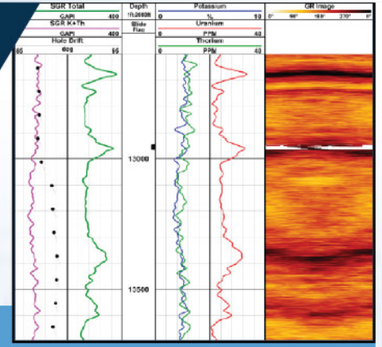


ULT | UNCONVENTIONAL LOGGING TOOL

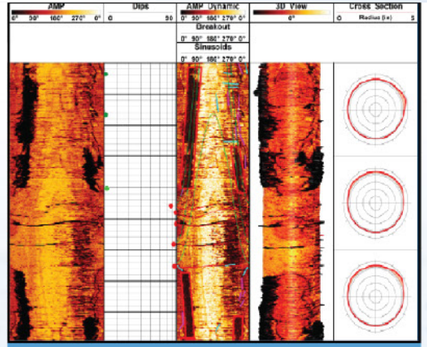
Scientific Drilling's ULT tool is a compact, integrated LWD system designed for advanced geosteering, formation evaluation, and optimized completion of unconventional reservoirs.

With its three primary measurements housed in a single 14.5 ft collar, optimal BHA placement can be achieved to ensure minimal impact to drilling operations

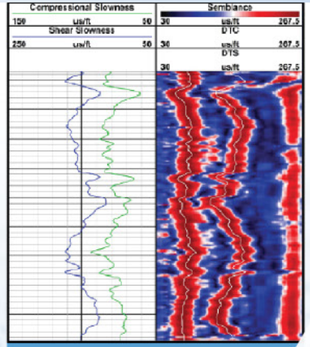
ULT INCLUDES THE FOLLOWING MEASUREMENTS INCORPORATED INTO A 6 ¾" COLLAR:



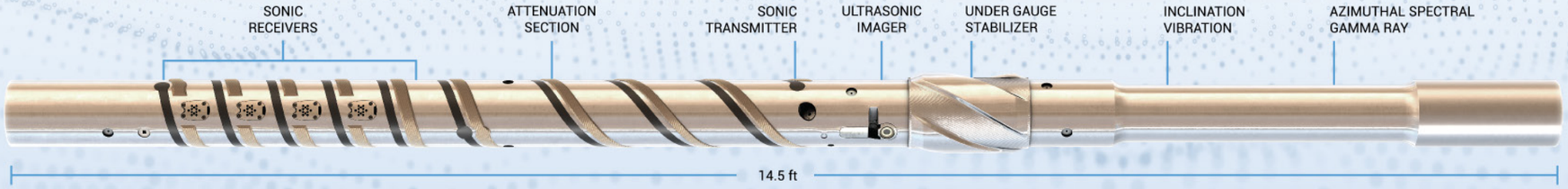
AZIMUTHAL SPECTRAL GAMMA RAY



ULTRASONIC BOREHOLE IMAGER



AZIMUTHAL SONIC



TARGET APPLICATIONS

- Geosteering
- Borehole Caliper Variances
- TOC and Clay Content Evaluation
- Sourceless Porosity Measurement
- Formation Geomechanical Properties
- Natural and Induced Fracture Detection

DELIVERING THE ULTIMATE VALUE

- Azimuthal Spectral Gamma Ray providing total gamma ray, spectral concentrations (K,U,Th), and 32-sector azimuthal gamma imaging
- Ultrasonic Imager and Caliper providing high-resolution (128-sector) measurements of the borehole in both oil-based and water-based mud systems
- Azimuthally Focused Sonic providing bulk and 16-sector Compressional (DTC) and Shear (DTS) Slowness
- Real-Time compatible with SDI MP or EM MWD systems
- High dogleg capability with unique sonic isolator design

Our LWD technology is designed with cross compatibility in mind, providing unique solutions to evaluate and navigate complex reservoirs.

1 FORMATION CORRELATION

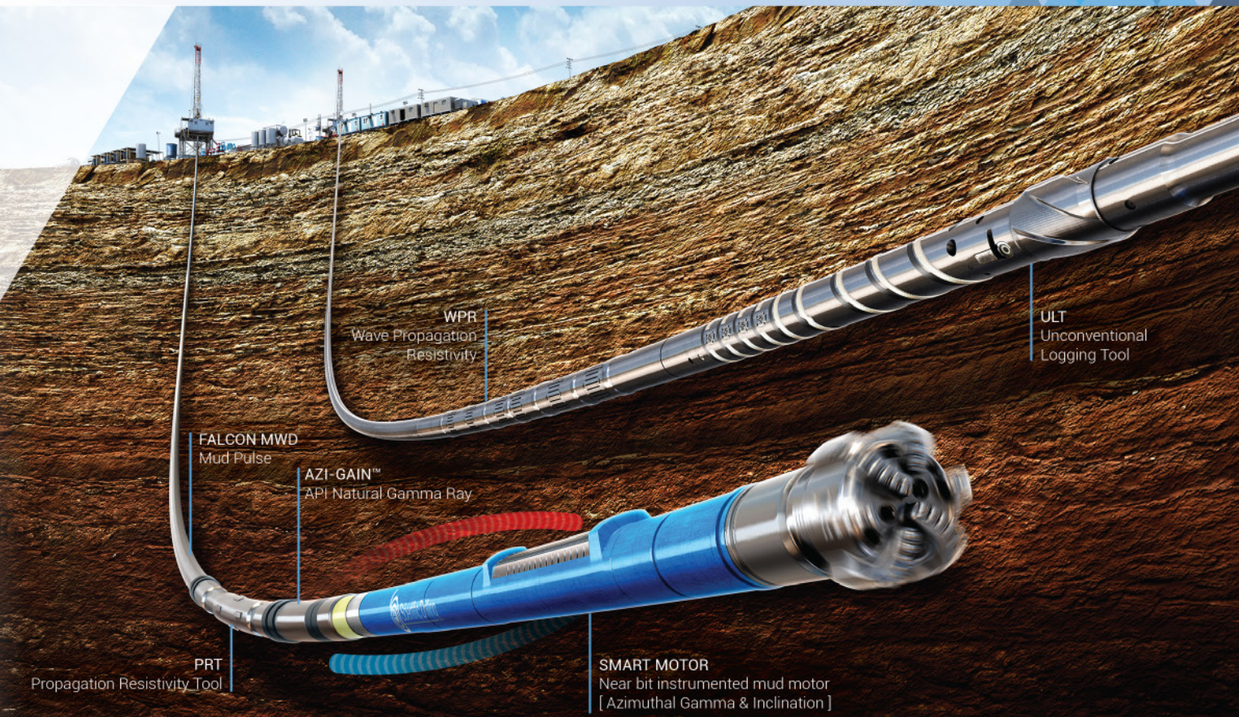
Combine Azi-GAIN or HALO Azi-Gamma with PRT or WPR to provide realtime gamma and resistivity measurements for accurate formation correlation and lithology identification.

2 PROACTIVE GEOSTEERING

Incorporate Smart Motor or BitSub with PRT or WPR for decreased bit-to-sensor distances and deep depth of investigation measurements for a cost-effective, proactive geosteering approach when drilling in tight target windows.

3 ADVANCED WELL PLACEMENT

Utilize the ULT with PRT or WPR for a comprehensive geomechanical evaluation of the reservoir by measuring hydrocarbon content and rock quality for optimizing production potential.



AREAS OF OPERATION

PROVEN PERFORMANCE

SDI's extensive portfolio of LWD Technology assists in the geosteering and evaluation of the world's most challenging environments.

Our experience spans a wide range of markets, including conventional and unconventional resources.

SDI currently operates in 26+ countries, with over 40 locations

Visit www.scientificdrilling.com/LWD to view our recent successes.

Scientific Drilling

1.800.514.8949