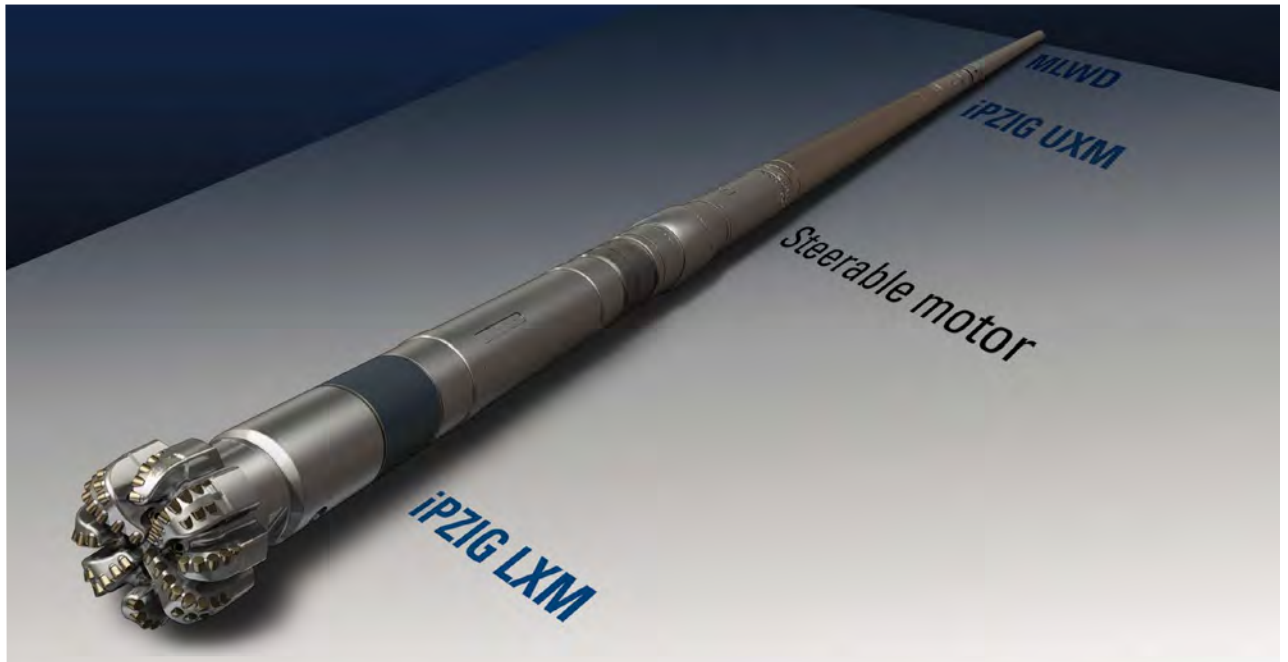


iPZIG

At-bit inclination, gamma ray,
and imaging service

At-bit inclination, gamma ray, and imaging—an industry first
iPZIG* at-bit inclination, gamma ray, and imaging service is the industry's first image gamma and inclination tool positioned directly behind the bit. Part of the iFinder* imaging service family, the iPZIG service provides at-bit gamma ray imaging along with traditional natural gamma ray measurement, dynamic inclination, revolutions per minute (rpm), and temperature. This real-time data enhances geosteering capabilities at the surface.



Applications

- Horizontal, extended-reach, and directional drilling
- Steering within formations with dipping beds
- Casing point selection by detecting formation changes at the bit

Benefits

- Optimal well placement in critical hole sections
- Accelerated production
- Reduced well tortuosity and dogleg severity, reducing NPT and improving the borehole condition

Features

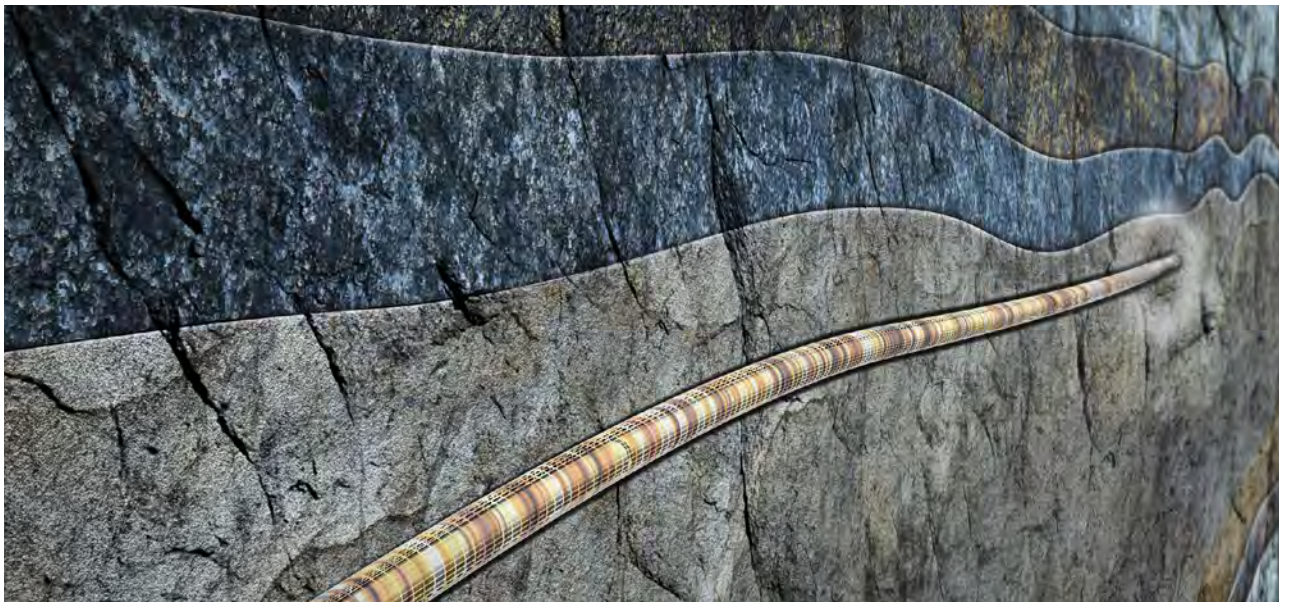
- Inclination and natural gamma ray measurements at bit
- Azimuthal natural gamma ray image measurements at bit
- Wireless electromagnetic communication between upper and lower subs with data transmitted real time via a Schlumberger LWD system
- Compatibility with positive displacement motors and rotary steerable tools
- Stand-alone battery-operated electronics
- Compatibility with all mud types

Real-time data for time-critical geosteering decisions

iPZIG service provides real-time, at-bit, 8- to 16-sector image natural gamma ray and dynamic inclination measurements. Operating as two separate subs, the lower sub, placed directly behind the bit, acquires data that it transmits to the upper sub, located above the motor. This information is then sent to the surface using MWD telemetry systems.



Conventional



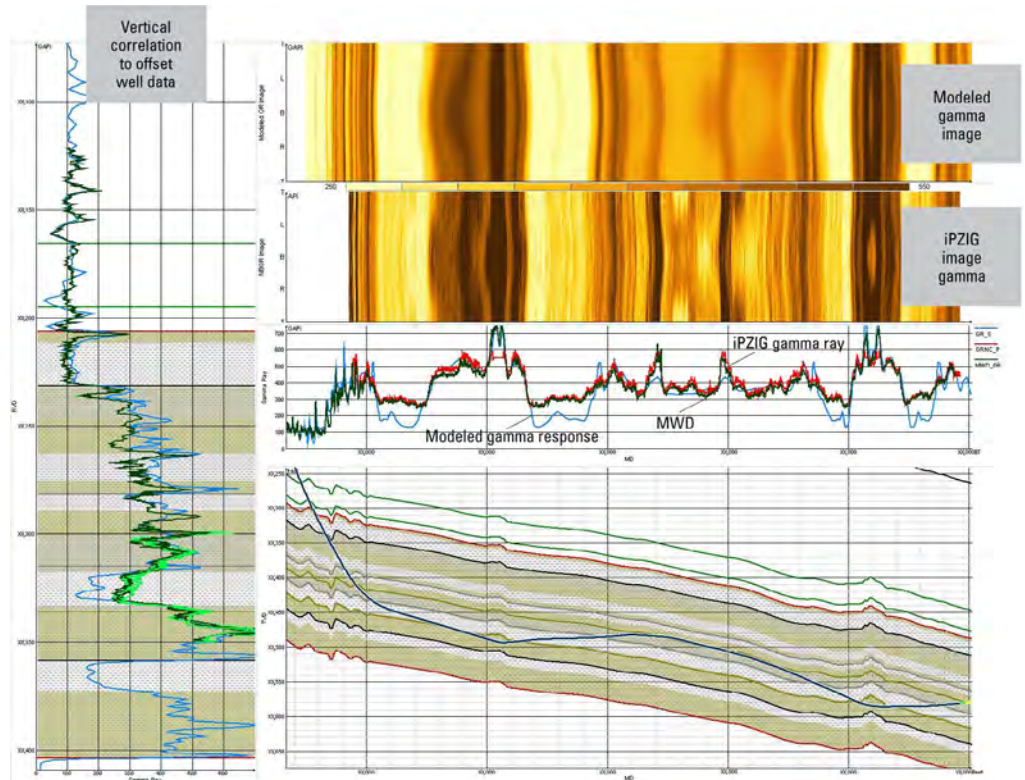
Real-time data transmission helps reduce directional drilling risk in critical hole situations. With every foot drilled out of zone, there is potential for significant loss in production revenue. Many imaging tools are located 30 to 45 ft behind the bit, creating a delay in response time and increasing the chance of drilling out of zone. By retrieving imaging data directly behind the bit, the iPZIG service allows the directional drilling and geological teams to make real-time decisions so that geosteering can be adjusted immediately to stay within the target zone.

Optimal drilling parameters for drilling within the target interval

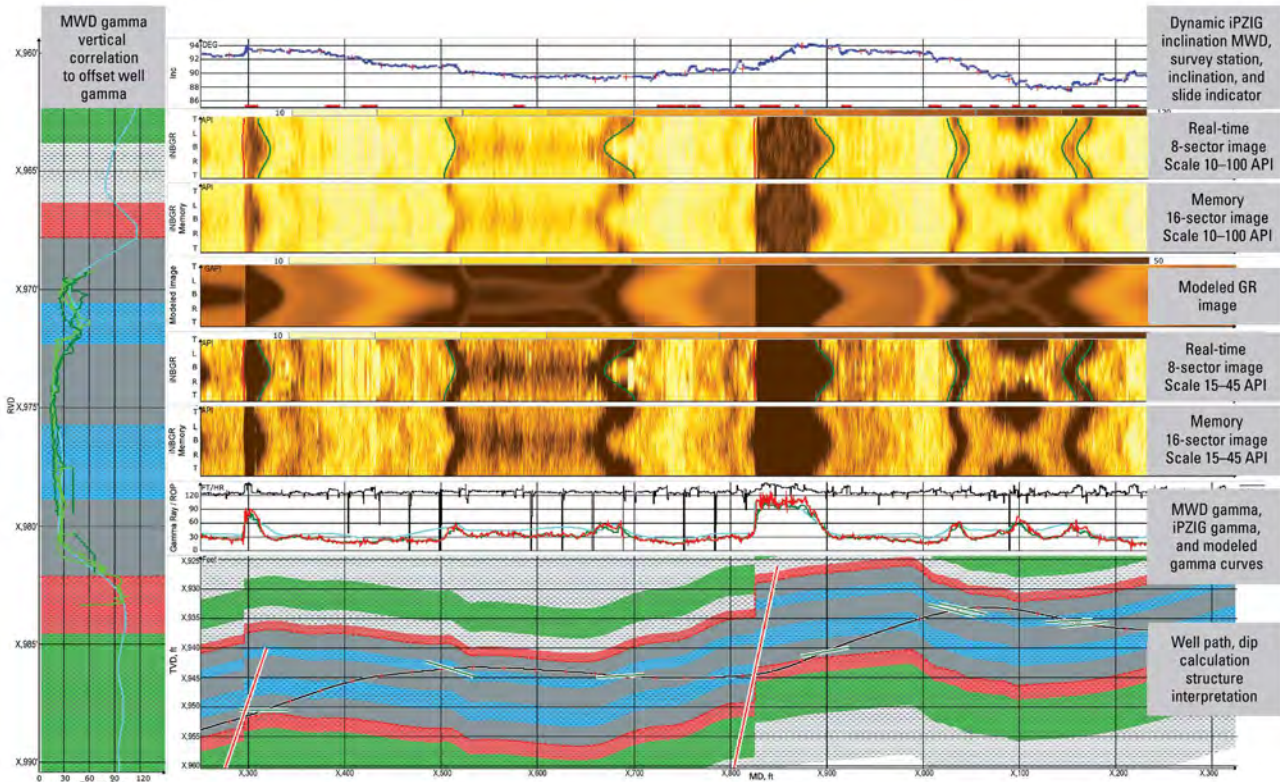
As soon as drilling begins, the iPZIG service starts measuring data from the bit. While rotating through the borehole, the tool captures data from 1 to 32 sectors. In real-time applications, 8-sector data is typically provided. Using a pre-defined scale, the data is shaded accordingly and formed into a cylinder to represent the borehole.

At the surface, the cylinder is unraveled to show a 2D log, which is then analyzed by the directional drillers and geologists. Geological features observed from this data can aid in interpretations.

When the borehole intersects a geological feature, it appears as a sinusoid on the gamma ray image. By fitting the sinusoids to the image data, apparent and true dip angle and dip directions can be quantitatively determined, ensuring that optimal drilling parameters are implemented to steer the well and maintain the correct position within the best defined target interval.



Steering interpretation based on iPZIG service measurements correlated to PayZone Steering* well placement service geologic model based on offset data.



Steering interpretation based on iPZIG service measurements.

iPZIG

At-bit measurements

Real-time measurements directly behind the drill bit reduce directional drilling risk in critical hole sections. The early indication of changes in lithology, delivered by real-time logs, helps accurately land horizontal wells and maximize the interval within production zones.



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