New innovation for measurement

Measuring While Drilling By Capsules (MWDC)

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Abstract: This innovation facilitates the monitoring of oil wells quickly and accurately, especially in the smart wells, which are consistent with this innovation. In the traditional way, the pressure of the well and the movement of fluids are monitored with heavy tools and then the samples are sent to the laboratory but this innovation is accurate and light tools, A nanotechnology laboratory is sent in a hole in the vineyard and in turn sends data through the intelligent tube. It can be disposed of once it is finished and crushed or pulled through the mud for drilling. Measurement capsules are a miniature measurement laboratory And fast

-Give quick results
-Get rid of the small capsules through the filtering process
-It can be produced continuously like a pill
-Reduce radioactive emissions
-Labor reduction
-Get rid of heavy machinery
-Reducing financial costs

Keywords: (Measuring While Drilling By Capsules MWDC)

1. Introduction

Measurement while drilling (MWD)

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Although many measurements are taken while drilling, the term MWD refers to measurements taken downhole with an electromechanical device located in the bottomhole assembly (BHA).

Overview

Telemetry methods had difficulty in coping with the large volumes of downhole data, so the definition of MWD was broadened to include data that were stored in tool memory and recovered when the tool was returned to the surface. All MWD systems typically have three major subcomponents:

1) Power system
2) Telemetry system
3) Directional sensor

1.1 Power systems

Power systems in MWD generally may be classified as one of two types: battery or turbine. Both types of power systems have inherent advantages and liabilities. In many MWD systems, a combination of these two types of power systems is used to provide power to the MWD tool so power will not be interrupted during intermittent drilling-fluid flow conditions. Batteries can provide this power independent of drilling-fluid circulation, and they are necessary if logging will occur during tripping in or out of the hole.

1.2 Battery systems

Lithium-thionyl chloride batteries are commonly used in MWD systems because of their excellent combination of high-energy density and superior performance at MWD service temperatures. They provide a stable voltage source until very near the end of their service life, and they do not require complex electronics to condition the supply. These batteries, however, have limited instantaneous energy output, and they may be unsuitable for applications that require a high current drain. Although these batteries are safe at lower temperatures, if heated above 180°C, they can undergo a violent, accelerated reaction and explode with significant force. As a result, there are restrictions on shipping lithium-thionyl chloride batteries in passenger aircraft. Even though these batteries are very efficient over their service life, they are not rechargeable, and their disposal is subject to strict environmental regulations.

1.3 Turbine systems

The second source of abundant power generation, turbine power, uses the rig's drilling-fluid flow. Rotational force is transmitted by a turbine rotor to an alternator through a common shaft, generating a three-phase alternating current (AC) of variable frequency. Electronic circuitry rectifies the AC into usable direct current (DC). Turbine rotors for this equipment must accept a wide range of flow rates to accommodate all possible mud-pumping conditions. Similarly, rotors must be capable of tolerating considerable debris and lost-circulation material (LCM) entrained in the drilling fluid.

1.4 Telemetry systems

Mud-pulse telemetry is the standard method in commercial MWD and logging while drilling (LWD) systems. Acoustic systems that transmit up the drillpipe suffer an attenuation of approximately 150 dB per 1000 m in drilling fluid.[1] Several attempts have been made to construct special drillpipe with an integral hardwire. Although it offers exceptionally high data rates, the integral hardwire telemetry method requires:

1) Expensive special drillpipe
2) Special handling
3) Hundreds of electrical connections that must all remain reliable in harsh conditions

The explosion of downhole measurements has stimulated new work in this area,[2] and data rates in excess of 2,000,000 bits/second have been demonstrated.

Low-frequency electromagnetic transmission is in limited commercial use in MWD and LWD systems. It is sometimes used when air or foam is used as drilling fluid. The depth from which electromagnetic telemetry can be transmitted is limited by the conductivity and thickness of the overlying formations. Repeaters or signal boosters positioned in the drillstring extend the depth from which electromagnetic systems can transmit reliably.

Three mud-pulse telemetry systems are available: positive-pulse, negative-pulse, and continuous-wave systems. These systems are named for the ways in which their pulses are propagated in the mud volume. Negative-pulse systems create a pressure pulse lower than that of the mud volume by venting a small amount of high-pressure drillstring mud from the drillpipe to the annulus. Positive-pulse systems create a momentary flow restriction (higher pressure than the drilling-mud volume) in the drillpipe. Continuous-wave systems create a carrier frequency that is transmitted through the mud, and they encode data using the phase shifts of the carrier. Many different data-coding systems are used, which are often designed to optimize the life and reliability of the pulser, because it must survive direct contact with the abrasive, high-pressure mud flow.

Telemetry-signal detection is performed by one or more transducers located on the rig standpipe. Data are extracted from the signals by surface computer equipment housed either in a skid unit or on the drill floor. Successful data decoding is highly dependent on the signal-to-noise ratio.

A close correlation exists between the signal size and the telemetry data rate; the higher the data rate, the smaller the pulse size becomes. Most modern systems have the ability to reprogram the tool's telemetry parameters and slow down data-transmission speed without tripping out of the hole; however, slowing the data rate adversely affects log-data density.

2. Signal noise

The most notable sources of signal noise are the mud pumps, which often create a relatively high-frequency noise. Interference among pump frequencies leads to harmonics, but these background noises can be filtered out with analog techniques. Pump-speed sensors can be a very effective method of identifying and removing pump noise from the raw telemetry signal. Lower-frequency noise in the mud volume is often generated by drilling motors. Well depth and mud type also affect the received-signal amplitude and width. In general, oil-based muds (OBMs) and pseudo-oil-based muds are more compressible than water-based muds; therefore, they result in the greatest signal losses. Nevertheless, signals have been retrieved without significant problems from depths of almost 9144 m (30,000 ft) in compressible fluids.

2.1 Directional sensors

The state of the art in directional-sensor technology is an array of three orthogonal fluxgate magnetometers and three accelerometers. Although in normal circumstances, standard directional sensors provide acceptable surveys, any application in which uncertainty in the bottomhole location exists can be troublesome. Recent trends to drill longer and more complex wells focused attention on the need for a standard error model.

Work carried out by the Industry Steering Committee on Wellbore Accuracy (ISCWA) aimed to provide a standard method of quantifying positional uncertainties with associated confidence levels. The key sources of error were classified:

1) Sensor errors
2) Magnetic interference from the BHA
3) Tool misalignment
4) Magnetic-field uncertainty

Along with uncertainties in the measured depth, bottomhole survey uncertainties are one contributor to errors in the absolute depth. Note that all methods of real-time azimuth correction require raw data to be transmitted to the surface, which imposes load on the telemetry channel.

The development of gyroscope (gyro)-navigated MWD offers significant benefits over existing navigation sensors. In addition to greater accuracy, gyros are not susceptible to interference from magnetic fields. Current gyro technology centers upon incorporating mechanical robustness, minimizing external diameter, and overcoming temperature sensitivity. The main application of the technology is in saving the rig time used by wireline gyros when carrying out kickoffs from areas affected by magnetic interference.

3.Tool operating environment and tool reliability

MWD systems are used in the harshest operating environments. Obvious conditions such as high pressure and temperature are all too familiar to engineers and designers. The wireline industry has a long history of successfully overcoming these conditions.

3.1Temperature

Most MWD tools can operate continuously at temperatures up to 150°C, with some sensors available with ratings up to 175°C. MWD-tool temperatures may be 20°C lower than formation temperatures measured by wireline logs, owing to the cooling effect of mud circulation, so the highest temperatures encountered by MWD tools are those measured while running into a hole in which the drilling-fluid volume has not been circulated for an extended period. In such cases, it is advisable to break circulation periodically while running in the hole. Using a Dewar flask to protect sensors and electronics from high temperatures is common in wireline, where downhole exposure times are usually short, but using flasks for temperature protection is not practical in MWD because of the long exposure times at high temperatures that must be endured.

3.2Pressure

Downhole pressure is less a problem than temperature for MWD systems. Most tools are designed to withstand up to 20,000 psi, with specialist tools rated to 25,000 psi. The combination of hydrostatic pressure and system backpressure rarely approaches this limit.

3.3 Downhole shock and vibration

Downhole shock and vibration present MWD systems with their most severe challenges. Contrary to expectation, early tests using instrumented downhole systems showed that the magnitudes of lateral (side-to-side) shocks are dramatically greater than axial shocks during normal drilling. Modem MWD tools are generally designed to withstand shocks of approximately 500 G for 0.5 ms over a life of 100,000 cycles. Torsional shock, produced by stick/slip torsional accelerations, may also be significant. If subjected to repeated stick/slip, tools can be expected to fail.

3.4 Tool reliability statistics

Early work done to standardize the measurement and reporting of MWD-tool reliability statistics focused on defining a failure and dividing the aggregate number of successful circulating hours by the aggregate number of failures. This work resulted in a mean-time-between-failure (MTBF) number. If the data were accumulated over a statistically significant period (typically 2,000 hours), meaningful failure-analysis trends could be derived. As downhole tools became more complex, however, the International Association of Drilling Contractors (IADC) published recommendations on the acquisition and calculation of MTBF statistics.[3]

3.5 See also

This innovation facilitates the monitoring of oil wells quickly and accurately, especially in the smart wells, which are consistent with this innovation. In the traditional way, the pressure of the well and the movement of fluids are monitored with heavy tools and then the samples are sent to the laboratory but this innovation is accurate and light tools, A nanotechnology laboratory is sent in a hole in the vineyard and in turn sends data through the intelligent tube. It can be disposed of once it is finished and crushed or pulled through the mud for drilling.

The project offers the field of petroleum and measurement of liquids in the wells new technology and the idea is to reduce the equipment to nanotubes for the previous work, including measuring pressure and fluid movement

Measurement equipment which determines the nature of the material in the well, the amount of mud and the pressure of the well, and also the knowledge of the well content. Is the gas or oil through this equipment

Which records the measurements of the borehole: includes the work of tests on the clay of drilling and well cutters

Recording of clay measurements: Recording of sub-surface geological information

Testing of the drill stem: electrical and radiological methods

It is also a way to test ground configurations for pressure and temperature

Recording devices Measurements:

Radioactivity for ground and nuclear formation for recording Radiation activity to measure natural radiation, rock type, density, liquids, gases, and sound collides with rocks, ie, to measure the diameter of the well and other types

These fias are sent in pipes from Slick Line

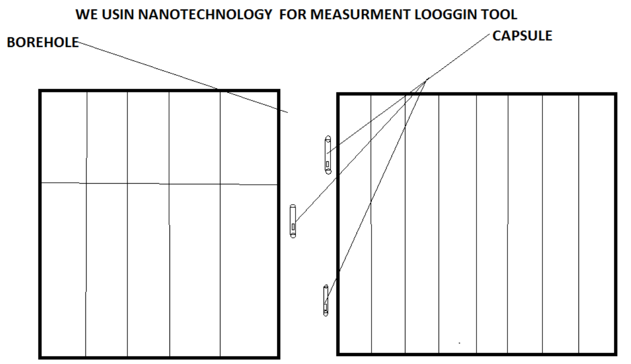

Figure 1. The process of lowering the measuring capsules into the well

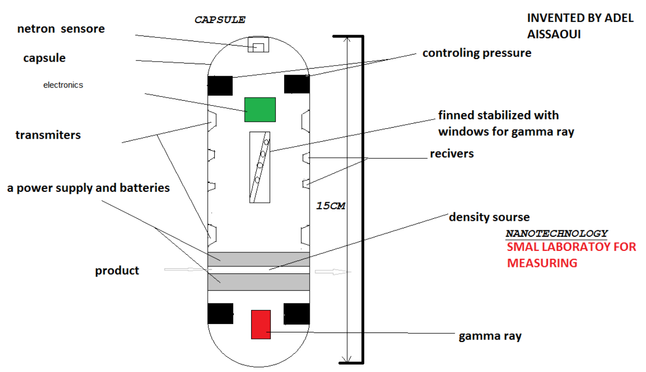

Figure 2. Diagram

For the installation of a well measuring capsule from the inside

4. Conclusion

Measurement capsules are a miniature measurement laboratory And fast
-Give quick results

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-It can be produced continuously like a pill
-Reduce radioactive emissions
-Labor reduction
- Get rid of heavy machinery

This is a new tool for measuring oil wells that needs to be tested in the laboratory is just an idea

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https://startup.dz/

This is a study to collect measurement mechanisms and make them into something miniature to reduce costs and labor and reduce the emission of gamma radiation

The capsules are like a miniature laboratory for sending data through RFI
Thank you for opening up the field for me to publish my innovative ideas and projects .

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