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Monitored laser grinding by real time nanobots data: A novel mud cake removal approach

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For ensuring casing and cementing quality, mud cake removal is essential. Various problems like stuck pipe take place because of the presence of mud cake. Mechanical methods of water jetting and chemical methods by means of acids, oxidizers, chelating agents and enzymes are currently employed for mud cake removal. However, water jetting can cause water blockage problems. Also, mud cakes of different permeability will be removed unevenly by same intensity water jets. Acids and oxidizers are very reactive but non-specific species, imposing several post perforation problems and formation damage. As an alternative, we propose a new method/device in this study with the usage of nanobots and laser grinding. The nanobots, placed in carrier, can be sent through drill string into the drill bit from where they can be deployed in all directions into the targeted zone. These non-adherent and self-propelled nanobots will move through the vertical permeability of the mud filtrate and would interpret the petro physical properties of the mud filtrate. The sensors would then send this data to molecular processor and with the help of radio frequency transmitter and receiver, we could immediately interpret the real time data from every point in the wellbore. This data would be used to change the intensity of the lasers in accordance with the petro physical properties. Lasers would then vaporise the mud cake according to its thickness and interpretation obtained and will grind the mud cake by creating popped holes. The precision and control over direction and power which laser provides could really be beneficial in mud cake removal and the same device could also be used for various other jobs like perforation and enhancing permeability during production phase. Nanotechnology integrated laser system holds great potential in removing mud cake efficiently and could significantly be useful in multilateral and horizontal wells.

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Revolutionizing O&G operations with the IOT (Internet of Things): Current trends and future directions

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Many experts believe that prices of oil will remain low for years at equilibrium of around \$40-50 after the roller coaster ride from above \$100 to below \$30 over the past 2 years. So to make up for the lost revenue, decreasing production costs is important. Also, unconventional resources has always challenged the oil industry. Exploration and development of oil and gas reservoirs require new sensors, analytics, and processes. Systems require better connectivity, monitoring and control, and process automation. One way to solve both the problems is by investing in the "Internet of Things." The Internet of Things (IoT), which basically integrates sensing, communications, and analytics capabilities, has been simmering for a while, but is now ready to boil and find widespread applications in O&G industry. With the production of millions of barrels per day from around the world, accumulating and organizing data has never been more paramount. By some estimates, internal data generated by large oil and gas companies exceeds 1.5 terabytes a day. IoT solutions come handy here to harness this data for efficient operations. Also, trial and error is money thrown away, so using robots and sensors to analyse surface and subterranean environments could save millions of dollars. The paper talks about applicability of IoT sensors to be deployed across the value chain – from sensors on drilling machines to exploring subsurface, equipment maintenance and remote performance monitoring. Some IoT loop connections are also suggested to mitigate various existing industry problems. Current viability and reliability of IoT solutions and future predictions regarding its domination are also made. Indeed, IoT solutions hold great potential to introduce efficiencies over the whole gamut of business of oil and gas industry with minimum human intervention.

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