Advanced Materials Science Research

Extended Abstract Open Access

Case Study: Algerian Offshore Project BEJ-1: The Appropriate Mobile Offshore Drilling Unit and the Use of Digitalization in Optimizing Drilling Operations

Salah Eddine Bougroura

Ain Djasser, Algeria

Keywords: Digitalization, Crude, Hydrocarbon, Fluids, Thermo-hydraulic

Abstract:

Oil fields are exploited either by onshore or offshore drilling, the latter entail some additional requirements because it is different from the first. Hydrocarbon exploration at sea is one of the most important topics nowadays. It demands a floating support that meets different specifications in order to perfectly achieve the targeted objective.

Offshore drilling could be a mechanical method wherever a wellbore is trained below the bottom. It's usually administrated so as to search for and later extract crude that lies in rock formations at a lower place the bottom. Most ordinarily, the term is employed to explain drilling activities on the ocean bottom, although the term may also be applied to drilling in lakes, inshore waters and midland seas.

Offshore drilling presents environmental challenges, both offshore and onshore from the produced hydrocarbons and also the materials used during the drilling operation. There are many various sorts of facilities from that offshore drilling operations happen. These embrace bottom supported drilling rigs, combined drilling and production facilities either bottom supported or floating platforms, and deep water mobile offshore drilling units (MODU) together with semi-submersibles and drillships. These are capable of operative in water depths up to 3,000 metres (9,800 ft). In shallower waters the mobile units are anchored to the bottom, but in deeper water (more than one, 500 metres (4,900 ft) the semi-submersibles or Drillships are maintained at the required drilling location using dynamic positioning.

Offshore oil and gas production is more difficult than land-based installations because of the remote and harsher atmosphere. Abundance of the innovation within the offshore crude sector issues overcoming these challenges, together with the necessity to produce terribly massive production facilities. Production and drilling facilities could also be terribly massive and an oversized investment, like the Troll A platform standing on a depth of three hundred meters.

Another variety of offshore platform could float with a mooring system to take care of it on location, whereas a floating system could also be lower value in deeper waters than a set platform, the dynamic nature of the platforms introduces several challenges for the drilling and production facilities. The ocean will add many thousand meters or a lot of to the fluid column. The addition will increase the equivalent current density and down hole pressures in drilling wells, yet because the energy required raising made fluids for separation on the platform.

As a part of the digital transformation, the oil and gas sector ought to move on the far side the normal method of drilling, towards utilizing new and a lot of economical technologies. The target of this paper is to indicate however a digital twin supported the virtual model of a drilling well will be wont to optimize the operation and improve operational performance.

Utilizing digital twins in drilling could be a lot of advanced and cost-efficient technique to set up, monitor and operate well construction than the normal technique. A Digital twin in drilling is to use advanced down hole knowledge and advanced modelling of the physical drilling system supported thermo-hydraulic and mechanical models throughout the lifecycle of well construction. It provides many edges to the operation and improves drilling performance. Varied drilling models move throughout the complete drilling life cycle. Throughout operations, period knowledge from wells is employed in combination with sculptural knowledge from a digital twin. This may understand early detection of anomalies and provide early diagnostic messages to avoid issues before they totally develop. It helps to cut back non-productive time and increase safety.

Through this modest work, we have conducted a general study of this type of exploration , we outlined the Algerian offshore field, we then studied the case of Bej1 project in the Algerian territorial waters which is classified as an Ultra deep-water (Total depth of 19700 feet including 6600 feet as water depth, we chose the most adequate Offshore Drilling unit for Bej1, and we emphasized the added value digitalization can bring in optimizing drilling programs throughout drilling parameters extracted from neighboring wells (WOB, Pump Strokes Rate, bit rpm…) delivering best Rate of penetration (ROP) for each and every single formation using the data available online of Volva field located in the north sea . The main objectives of this study are: - Presenting the estimated potential of the Algerian offshore, focusing on the ideal choice of floating support that meets all the techno-economic requirements to successfully complete all drilling operations for an Algerian project BEJ-1. - The benefit digitalization can bring into drilling operations by optimizing programs, as illustrated in the software we were able to create relying on BIG DATA and Data mining.