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Digital Transformation For Promoting Renewable Energy & Sustainability: A Systematic Approach For Carbon Footprint Reduction In Well Construction

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Abstract

As the industry recovers from the recent downturn in petroleum commodity prices and the economic impacts from coronavirus (COVID-19), governing authorities in most countries are imposing methodological measures to promote the reduction of carbon footprint. This affects every industry including the petroleum sector. Therefore, most investors and stakeholders have increased their focus on Environmental, Social, and Corporate Governance (ESG) policies. During the well construction phase, a transition from a hydraulic to an electric tong is achieved, resulting in carbon footprint reduction.

Achieving carbon neutrality or carbon emission reduction while producing hydrocarbons is one of the topmost key performance indicators (KPIs) in the industry. With the implementation of digital technologies in the tubular and casing connection make-up process, a hydraulic tong is substituted with an electric tong of an equivalent specification. The energy consumption for both systems are calculated and compared. Other important KPIs on tracking operational cost are also assessed and the results are then compared to determine the benefits of implementing the upgraded digitalized tong solution.

The electric tong digitalized solution, commercially available in the petroleum industry, is a key enabler for carbon emission reduction while running tubulars in/out of the wellbore. This solution is one of the milestones that serve as foundation to advocate carbon reduction. Eventually, this will lead to establishing carbon neutrality during hydrocarbon extraction and production.

The results concluded that a digitalized solution eventually reduced personnel on board working in the “red zone,” which eventually leads to carbon emission reductions caused by a decrease in fuel consumption. The decrease of 40% in CO₂ emission is observed while performing tubular connection process. Moreover, an overall comparison between a legacy system with the digitalized electric system displayed more than 59% reduction in CO₂ during the tubular running services. In addition to carbon reduction, this electric power and control solution allows for more precise torque control, leading to enhanced system integrity and increased reliability achieved by cleaner energy.

With this digital solution, not only is the safety and well-being of rig personnel enhanced to avoid any recordable incidents, the reduction of carbon emission is also achieved, aligning to the objectives of current ESG regulatory authorities. This paper will provide comprehensive details on the novelty of this technology and solution offered to the industry.
