

# Offshore Rigless

## AccessESP Enables Efficient Electric Submersible Pump Replacement Conveyance System

By John Algeroy • Greg Nutter

Operators in challenging offshore locations continually seek to select optimal forms of artificial lift to sustain maximum production, and there are a variety of different options available for the purpose: electric submersible pumps (ESPs), sucker-rod lift, plunger lift, gas lift, chemical lift, progressive cavity pumps (PCPs) and hydraulic pump-ing systems.

ESPs are often considered the best artificial lift option in terms of cost-efficiency. However, the optimum potential of ESPs in offshore and remote locations has been constrained by the high cost of intervention associated with rig deployment, the associated loss of production, and an inability to access the reservoir without pulling the production tubing.

AccessESP reduces the cost of operating ESP wells with its innovative ESP deployment system, allowing ESPs to be replaced through tubing using slickline. The company focuses on operating in remote areas, such as the Arctic and offshore, where changing a traditional ESP takes a long time due to rig availability and associated loss of production. The AccessESP system offers significantly lower intervention costs, reduces lost production and provides full-bore access to the reservoir by eliminating the need for a workover rig. Furthermore, the live well intervention saves costs and avoids reservoir damage, as no kill fluid is required.

### Technology

A robust production-tubing landing string is combined with a side-pocket-mounted downhole wet connector

and a high-power permanent magnet motor (PMM) to form the "rigless" conveyance system, comprising the permanent completion system and the slickline retrievable ESP assembly.

The permanent completion system is deployed with the production tubing and comprises two components: the side-pocket-mounted downhole wet connector and the connector orientation and latching system. Electrical power is provided via the ESP cable to the surface. The PMM is compatible with surface electrical equipment (variable speed drives, step-up transformers, downhole cables and wellhead/packer penetrators) from all major suppliers. The client's surface electrical equipment can, therefore, remain the same.

The slickline retrievable assembly integrates the PMM and wet connect system with industry-standard ESP components (pumps, gas handling equipment, seals, cables) from all major ESP providers, allowing the operator to combine the system with ESP components from various different suppliers. The lightweight, high power density PMM is only a fifth of the weight and length of conventional ESP induction motors. Following on from the deployment of the permanent completion, it takes a matter of hours to complete the through tubing installation of the slickline assembly. The retrieval of the slickline assembly also only takes a few hours and is essentially the reverse of the installation. The wet connector on the retrievable ESP assembly is aligned with the mating connector on the permanent completion before engagement. The mechanical forces generated by the retrievable ESP system are taken by mechanical supports provided by the permanent completion.

The system can be installed and retrieved with a standard slickline operation through tubing in live wells. Most offshore platforms do not have a permanent rig installed, therefore a rig or hydraulic workover unit will have to be mobilized whenever a tubing-deployed ESP requires replacement. In order to manage costs and efficiency, these units are typically assigned work scopes months in advance. Therefore, it may take months before a workover can be scheduled. It may not be economical to mobilize a rig for a single well workover. Slickline operations, however, are typically performed on an as-needed basis and require a short approval process given the low cost, low HSE risk and routine operation. Mobilization of equipment and personnel can be performed in a matter of days, or hours, if relevant equipment and personnel are available on board.

In summary, the permanent completion and the slickline retrievable ESP system together represent a dependable, lightweight and robust system to carry out rigless ESP replacements both offshore and onshore. The lightweight aspect allows for slickline deployment and the short length for easy lubricator deployment. To reach the target installation depth in wells with high deviation and installation depths beyond reach of typical slickline operations, the system has been implemented using coiled tubing, wireline tractor or pumpdown. With the full-bore access to the lower completion or formation when the retrievable assembly is removed, coiled tubing can be used to remove sand plugs, pump acid or pump fracturing fluids to clean up or stimulate the wellbore. The live well intervention also enables deployment with no need for pumping kill fluids. This provides added cost savings and ensures there is no reservoir damage.

### Case Study, Nigeria

AccessESP installed the first rigless ESP conveyance system in Nigeria in the Ukpokiti Number Four offshore well January 2014. The installation was performed using the Access375 series, 190 HP PMM and wet connector system. The ESP system was deployed through 4.5-in. tubing on conventional 0.125-in. slickline after

installation of the tubing string.

The Ukpokiti Number Four system was deployed via slickline to a depth of 5,900 ft. and took less than 15 hr. to install. AccessESP delivered a flexible solution tailored to the company's specific needs in this region.

### Case Study, Alaska

In only two days, through a live well intervention, the AccessESP system enabled retrieval of the existing ESP pump and the install of a newly optimized ESP pump using only a slickline unit, lubricator and a crane, marking the industry's first ESP pump swap on a commercial well, in October 2016.

Surface diagnostics determined that the Access375 PMM was fully functional, therefore replacement was not required, thus reducing operational time and costs. In this case, the ESP pump had not failed but showed signs of wear and tear; therefore, it was proactively replaced with an optimized pump. This would have been cost prohibitive using a workover rig, requiring the replacement of the entire conventional ESP system.

To resize a conventional ESP pump, the operator would mobilize a workover rig, kill the well, pull the tubing and ESP and then replace the ESP and rerun the tubing. Rig availability is limited in this challenging location, and the time to replace a standard ESP pump can be up to six months. This involves waiting for the well workover to be placed on the drilling rig schedule. A complete loss of production for half the year would result. Add to this the cost of using a drilling rig to replace the pump, and the total cost to the operator is substantial.

By utilizing a standard slickline unit, lubricator and crane, the rigless conveyance system reduces the cost, time and risk associated with ESP resizing. In this project, the operator saved approximately \$2 million in workover costs by using the slickline deployed system. The system allowed the operator to replace only the ESP pump, leaving the permanent magnet motor in the well.

## Upcoming Projects

AccessESP currently has upcoming installations in West Africa, the Middle East and the U.S., with one to two more pump swaps planned in 2017 in areas where the costs to pull and replace a current technology ESP are substantial (in excess of \$5 million) and/or the well is in a remote location.

For instance, an operator's wells offshore West Africa are approaching the end of their productive lives and are, therefore, of limited future financial value. The operator was looking for a solution in which ESPs in the wells could be economically retrieved and replaced, extending the economic life of the field. This project will demonstrate that the system will reduce the operator's lost production time from typically three to six months to just two weeks, as well as eliminate the need to kill the well, leading to further significant time and cost savings.

## Conclusion

The AccessESP retrievable ESP system delivers a degree of flexibility and ease of operation that has not been possible with ESPs in the past. Slickline retrievable ESP

systems are now a commercially viable technology, proven in a range of challenging environments and successfully operating in fields all over the world. The application of this technology significantly reduces operating costs, capex and cost per barrel for operators in a large segment of the global ESP market, while actively increasing rates of production. ■

*John Algeroy is AccessESP's Europe and Africa Region manager, based in Houston (accessesp.com). Responsible for all marketing, sales and operations for clients throughout the region, Algeroy has more than 30 years of domestic and international oilfield experience serving in a variety of operational and managerial positions, primarily in the completions sector. He may be reached at john.algeroy@accessesp.com or 832-657-6297.*

*Greg Nutter is the vice president of operations for AccessESP, based in Houston. Responsible for global operations and QHSE, Nutter has more than 28 years of domestic and international experience serving in technical, operational and managerial postings in the drilling and completions business. He may be reached at greg.nutter@accessesp.com or 281-253-0897.*