Offshore®

BEYOND THE HORIZON

Adoption of new technologies can help keep offshore E&P lean and profitable

Prior to the market downturn, the offshore E&P industry had been slow to adopt new technology. But deployments accelerated as the inclement market conditions dragged on and producers sought dramatic cuts in their time and costs to first oil, and overall production costs after that. The good news was that many technologies already proven in other industries were readily adapted to offshore applications. The better news would be a continuation, if not acceleration, of this trend. New approaches will help offshore operators produce at a significantly lower cost per barrel.

Consider, for example, how artificial intelligence algorithms that automate the processing of ultrasound images in healthcare — enabling doctors to identify fractures 50% faster — have been adapted recently to analyze multi-beam echo sounding (MBES) data gathered by oil and gas exploration vessels. The new software, called Marine Image Processing and developed in collaboration with Royal Dutch Shell geoscientists, can locate hydrocarbon gas escaping the ocean floor with 95% accuracy.

Such precision is significantly better than manual processing, which typically produces accuracies of less than 80%. That's a big difference, especially when the financial risks of drilling a dry well can top $100 million. What's more, the new technology is four times faster. This means decisions about next steps can be made more quickly, so the time aboard exploration vessels, with daily operating costs of many thousands of euros, can be spent more effectively.

Another example comes from adapting electrification technologies used in the marine industry. The world's first all-electric car ferry in Norway, the Ampere, combines sophisticated electric propulsion with BlueVault, an advanced lithium-ion battery system. In offshore oil and gas applications, this battery technology can provide both all-electric and hybrid energy-storage solutions needed to condition power and to ensure its continuity in case of any interruptions in an offshore platform's generating capabilities.

In turn, the same kind of electrification expertise behind this innovative battery technologies led to the development of the world's first subsea power grid, called DigiGrid, for offshore oil and gas applications in depths up to 4,000 m (13,123 ft). With inputs from several interested E&P majors, a modular, highly scalable low- and medium-voltage subsea grid successfully passed shallow-water tests at full loads in mid-2018.

In addition, industry is developing a first-of-its-kind subsea power grid to reduce the cost and risk of providing power to production-boosting equipment that sits deep below the surface of the ocean on the seabed, thereby making otherwise uneconomically recoverable hydrocarbon resources recoverable. At the same time, the industry is providing offshore operators with greater topsides visibility and control via an easy-to-use, web-page dashboard. Likewise, we can enable remote condition monitoring and diagnostics of the equipment from either onboard a platform or an onshore control room.

There are several other examples of adapting technologies from other industries for use in offshore oil and gas applications that help to improve operations, including:

- Predictive maintenance (from mass transit). Availability rose to 99.92% for trains operating between Barcelona and Madrid after their operator adopted a predictive maintenance model, shifting more passenger preference from planes to trains. In offshore operations, today's topsides integration of electrical, instrumentation, control and telecom (EICT) capabilities plus advanced sensor technologies on platform equipment can enable the implementation of predictive maintenance models to boost availability, asset utilization, and lower operating costs.
- Improved cycle times (from automotive). A high-end Italian car maker cut development time by 30% and time to market by 16 months, while increasing production 300% and gaining greater manufacturing flexibility. Its secret? The "digital twin." With computer-aided drawing, engineering, and manufacturing software, it is now possible to integrate all asset data to build a virtual representation or "digital twin" of an asset, from conceptual design through detailed design, fabrication, construction, commissioning, and finally operations. Application of the digital twin concept in a full topsides lifecycle, from FEED through commissioning and operation, is capable of cutting project cycle times by three to five months — accelerating time to first oil — while potentially reducing 10-year opex by an estimated $100 million.
- Remote monitoring (from shipping). A major Korean ship operator can monitor in real time 40% of all critical onboard systems via satellite communications. Condition-monitoring of these systems

enables condition-based and predictive maintenance, so needed parts and expertise can be available at a ship's next port of call, accelerating maintenance and repair cycles. This same model was refined and deployed on Aker BP's Ivar Aasen platform in the North Sea, enabling low-manned platform operation and remote monitoring from an onshore control room 1,000 km (621 mi) away.

Adapting proven technologies from other industries—especially those that are somewhat ahead of oil and gas on the digital and evolutionary automation curves—is critical for the cyclical upstream offshore industry. Such tectonic shifts in how things are done will, of course, require close operator-supplier collaboration, to ensure holistic solutions that leverage the respective expertise of both parties. And the sooner such changes are implemented, the greater their benefits over the long haul will be.

Matthew Chinn
Executive Vice President Oil & Gas
Siemens

This page reflects viewpoints on the political, economic, cultural, technological, and environmental issues that shape the future of the petroleum industry. Offshore Magazine invites you to share your thoughts. Email your Beyond the Horizon manuscript to David Paganie at davidp@pennwell.com.