Shell Philippines Exploration and Production faced the challenge of replacing integral valves on an operating offshore platform that supplies nearly half of the energy supply to the largest island in the Philippines. After careful consideration, pipeline isolation was chosen to replace the valves, minimise cost and maintain the island’s energy supply.

The Malampaya Shallow Water Platform in the Philippines provides 40 per cent of the gas to Luzon, one of the most populated islands in the world. Shutting down the platform for any length of time could result in gas shortages and serious damage to Luzon’s economy.

In 2010, Shell Philippines Exploration and Production (SPEX) learned that the shallow-water platform’s main emergency shutdown valve (ESDV) and neighbouring manual block valve were defective. If the platform needed to be isolated in case of emergency such as a fire, the valve could leak and fuel the flames. The consequences could be disastrous – major hydrocarbon spills into the environment, potential loss of the platform, and large-scale disruption of an integral part of Luzon’s supply of energy.

Due to the dangers inherent to a leaky valve, operating companies diligently monitor internal leakage in critical valves and replace them if the leakage rate is above a certain threshold. In this situation, that threshold had been crossed.

SPEX, the line’s owner-operator, knew the valves had to be replaced, but needed a solution that would cause the least disruption to the island’s energy supply.

One option would be to bleed down the line, blow down 504 km of pipeline, purge the entire length of the pipeline using nitrogen, replace the valves, and then carry out additional purging steps prior to the reintroduction of natural gas. Blowing down the line would cause the loss of a significant amount of product, massive gas flares, and lengthy shutdown of the gas supply from the line to the island.

Since that option was not efficient or economically viable, SPEX chose to explore
SPEX knew the valves had to be replaced, but needed a solution that would cause the least disruption to the island’s energy supply.

Beyond maintenance: what operators don’t know about isolations

Valve maintenance – maintenance similar to that undertaken by the operator for the above-mentioned Philippines project – is the most common SmartPlug operation. However, according to Rolf Gunnar Lie, TDW’s Regional Manager of Business Development in the Far East Asia Pacific, the technology can be used for much more.

One growing application is the isolation of subsea pipelines during large construction projects. During construction, heavy equipment is lifted and carried over the subsea pipe, and there can be a risk of dropping a multi-tonne object onto the existing pipe, which could result in a catastrophic spill. By isolating a short portion of the pipe, construction work can continue with significantly reduced risk, and the product of the pipeline can largely remain in place.

Other perhaps lesser-known SmartPlug applications in use today are isolations for hydrotesting, midline repair, and tie-ins.

Gary Anderson, Director of SmartPlug Technology, cites the ability to extend the life of subsea reservoirs as a cutting-edge tool use. “We want to extend the life of subsea reservoirs by planning a bypass location and booster station during pipelay. The booster station would lie dormant until the pressure from the reservoir no longer produced a strong flow of product. At that point, we would pig down the tool, isolate the pipeline, and reroute the flow through the bypass and booster.”

TDW has already achieved a record 299-day isolation, but these reservoir-extending isolations would be in place much longer, perhaps three to five years, and Mr Anderson forecasts that this application will be available soon. Until then, operators will likely continue to use SmartPlug isolations in their most well-known capacity; as a low-risk, cost-saving, alternative to blowing down lines for planned maintenance.

SmartPlug technology uses two independent plug modules – each of which is capable of isolating the full pipeline pressure. This independence provides a double barrier in the unlikely event that one of the systems fails.

It is because of this redundancy that the technology meets the Norwegian Det Norske Veritas (DNV OS – F101) and other stringent standards and requirements for pipeline pressure isolation.