Engineering a unique solution

80% cost saving compared to alternative solution of replacing a riser

1. Problem Statement

Correcting the slippage of buoyancy modules on the Global Producer III FPSO vessel's risers without replacing the riser or carrying out a planned shut down is an extremely expensive and risky operation. The challenge was to find a way to correct this slippage whilst keeping the riser in operation, something that hadn't been done before.

2. Aim

To correct the buoyancy module slippage in a targeted manner using a remotely operated vehicle (ROV), allowing us to move away from conducting saturation diving operations and also engineer a solution that could be implemented whilst in operation.

3. Method

- The Maersk Oil team engaged with SubC Partner, inventor and owner of the technical solution. Over six months, the team created a bespoke tool that connected to an ROV.
- The tool had to be specifically designed for the task because there were a number of specific requirements.
- It had to work underwater while connected to the ROV, dock onto the riser and remove the old buoyancy module and inner clamp. It had then to bring the old parts to the surface, pick up the new clamp and module and go back down to the riser to install the new parts.
- The new clamp was also installed with rubber compliant pads to stop future slippage, a technique already effectively used by Maersk Oil.

4.Impact

- Replacing the buoyancy modules on a live riser system had never successfully been completed before. The Maersk Oil team met this challenge head on and in collaboration with SubC Partner, a bespoke tool was developed to replace the buoyancy modules, correcting the slippage.
- The solution avoided the need to replace the whole riser, an extremely expensive and risky operation, and also meant that the riser could be kept in operation during the replacement, resulting in no production loss.
- By using a tool docked onto an ROV the need for saturation diving personnel was eradicated, reducing the risk to human life.
- The installation of rubber compliant pads on the inner clamp helps prevent future slippage.
- Replacing the buoyancy modules is more efficient compared to the alternative of replacing the riser entirely; there was no impact to production and the solution saw around 80% savings compared to alternative method. This solution has been shared at a Society for Underwater Technology (SUT) lecture.

Total hours saved	Total savings anticipated
No significant saving.	Solution cost approx. 20% of the average fee of replacing a riser, around 80% saving.