

Completion Design & Flow Assurance

Petrofac — Offshore Cendor Oil Field, Malaysia



Workscope

Optimised Completions

Metallurgical Modelling

Background

The Cendor oil field is located in block PM304, offshore Peninsular Malaysia.

Numerous challenges and uncertainties surround the Cendor field's reservoir characteristics. Phase I of the project was undertaken using a cost effective offshore production installation design in order to obtain the necessary production data which will firm up reserve figures and provide the basis for further development.

AWT was tasked with designing and deploying 7 fit-for-purpose well completions, able to withstand potential reservoir risks and provide for cost effective operation for the required life of well.

Completions designed by AWT were installed successfully within a 3 in 1 conductor wellhead design which enhanced platform utilisation and reduced costs.

Flexibility of completion design was required in order to allow wells to be used as both oil producers and seawater injectors. In meeting this requirement AWT employed 13 Chrome material for lower completion accessories, L-80 steel production tubing and formulated a corrosion inhibitor injection program. This cost effective choice of materials mitigated the effects of both CO₂ damage during production and corrosion due to oxygenated salt water during injection over the required life of well.

The completion design AWT recommended enabled slickline free deployment and included TCP guns, a hydraulic multi-cycle firing head, chemical injection, artificial lift capability and reservoir pressure and temperature monitoring. Once completion tubing was installed and the hanger was landed, the rig was skidded to the next well. Tree landing, underbalanced perforating and flowback was completed offline with each completion requiring only 2-1/2 to 3 days of rig time. Because of simultaneous offline and critical path activities during the batched completions, careful supervision was critical to ensure completion integrity was maintained and downtime was minimised.

"The result has been some quite exceptional performances... among the achievements are; no safety incidents, delivery of several wells ready for production on schedule (despite the late rig delivery), and excellent cost control." ► Alan Ferguson, Petrofac Drilling Manager



Preparation of a Cendor three well support ring

Added Value

AWT's completion designs were deployed under budget, ahead of schedule and without incident. Reduced risk and significant cost savings resulted from the elimination of slickline beyond the tubing hanger and underbalanced TCP perforating with hydraulic multi-cycle firing heads. As an independent solutions provider, AWT assisted Petrofac with the completion design, detailed engineering and procurement of completions components, ultimately providing an effective fit-for-purpose solution.



INNOVATIVE FIELD DEVELOPMENT AND REFURBISHMENT SOLUTIONS