

ACTive CT Services and Intervention Tower Save 15 Days on Deepwater Operations for Total

Motion-compensated intervention tower enables simultaneous drilling and rigless intervention operations offshore, Republic of Congo

CHALLENGE

Perforate long reservoir intervals (up to 200 m [656 ft]) offshore from a tension-leg platform (TLP) with limited deck space and simultaneous production and drilling operations.

SOLUTION

- Design and deploy a motion-compensated intervention tower with CIRP* completion, insertion, and removal under pressure equipment for coiled tubing (CT), wireline, and slickline operations.
- Convey perforating guns using ACTive Perf* CT real-time perforating service with ACTive PTC* CT real-time pressure, temperature, and casing collar locator tool and ACTive GR* CT real-time gamma ray logging tool to ensure depth, and eFire-TCP* tubing-conveyed perforating electronic firing head to perforate.

RESULTS

- Performed world's first CIRP equipment perforating operation from a TLP in deep water with no HSE or well control incidents.
- Perforated 78 m [256 ft] of reservoir section and retrieved the guns under live well conditions using real-time correlation.
- Saved more than 15 days of rig time with simultaneous drilling in one well and rigless intervention operations in another.



Challenging deepwater field development

Total is developing a 17-well deepwater field offshore Congo. The field is prone to asphaltene deposition and rapid water breakthrough, requiring a high level of well interventions. Because of the strong need for well access, dry head installation was the preferred option from a TLP. To achieve the high level of interventions while producing and drilling, a special frame was required to enable coiled tubing, perforating, electric line, and slickline operations simultaneous with drilling and production. The limited deck space, heaves, and TLP moment, and requirements to be able to perform operations underneath the mast equipment package (MEP) added complexity to the project.

In addition, it was critical to perform the perforation operations without killing the well, which added challenges for well control when deploying and retrieving the long bottomhole assemblies.

Custom tower and well control system

Schlumberger and Total designed a motion-compensated intervention tower to enable perforating and other CT, wireline, and slickline operations separate from the drilling activity. Designed to fit on the limited-space deck of the TLP, the tower can skid easily from one well slot to another and convey a long string of perforating guns even while working below the drilling mast equipment package (MEP).

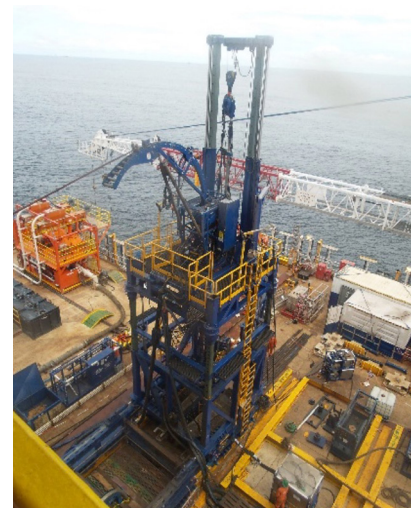
To enable perforating operations without killing the well, the remotely operated CIRP equipment was used from the tower to insert and retrieve long gun strings under wellhead pressure. A 5/16-in braided wireline cable for gun deployment was integrated with the tower while an A-frame gin pole crane facilitated gun deployment in the live well to meet the working height limitations. A custom CT well control stackup that worked within the tower's dimensional limits was rigged up on top of the Christmas tree and enabled by the motion-compensation system.

To accurately deliver the gun assemblies and verify depth and performance in real time, engineers used ACTive* real-time downhole coiled tubing services and tools.

Long perforating string and real-time data

After drilling the first well and running the completion, the MEP was moved to drill the second well and the tower moved into place to prepare the first well for production. Slickline was deployed from the tower to remove plugs, and then the ACTive service used the tower to perform a cement bond log.

For the first perforating operation, 81.8 m [268 ft] of perforating guns and spacers were deployed from the tower on braided line into the live well. The perforating guns were conveyed to depth using the ACTive Perf service with a gamma ray tool and a casing collar locator for real-time depth correlation. The guns were activated on the first attempt and verified in real time with ACTive services downhole data acquisition.

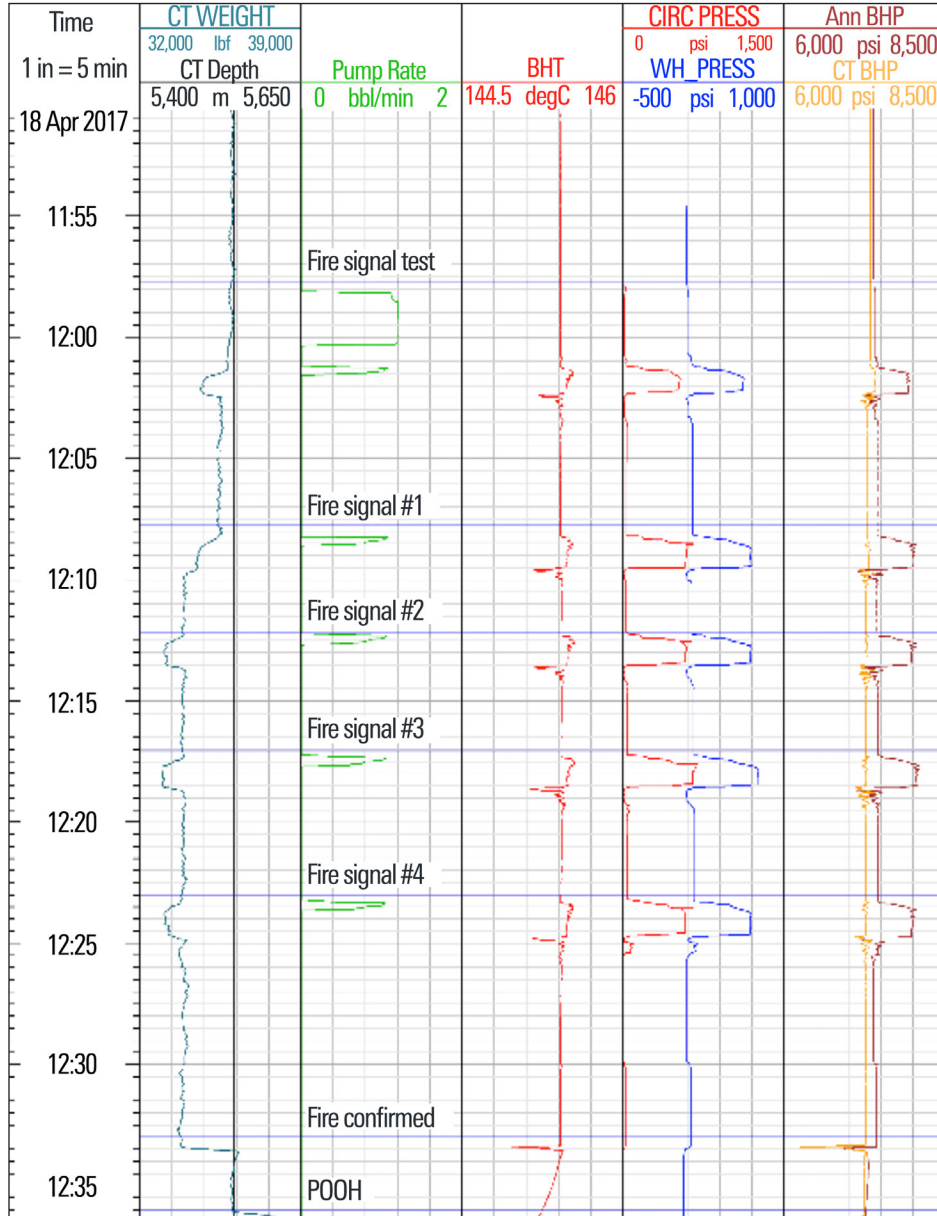


The motion-compensated intervention tower was designed to suit the TLP's limited deck space and fit under the MEP when necessary. This enabled accurate CT deployment of the perforating guns and other rigless interventions even in moving seas.

CASE STUDY: ACTIVE CT services and rigless intervention tower save 15 days for Total in deepwater, Republic of Congo

After perforating, the tower was used for an acid wash operation on coiled tubing and a massive stimulation operation followed by flow profiling on slickline during the well cleanup and well testing.

In all, Total estimated that the new tower equipment saved 15 days of rig time by enabling the rigless well intervention work to be performed simultaneous with drilling operations.



The ACTIVE Perf service delivered the long bottomhole assembly, verified depths, and fired all guns as planned in one run with real-time notifications of success.

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