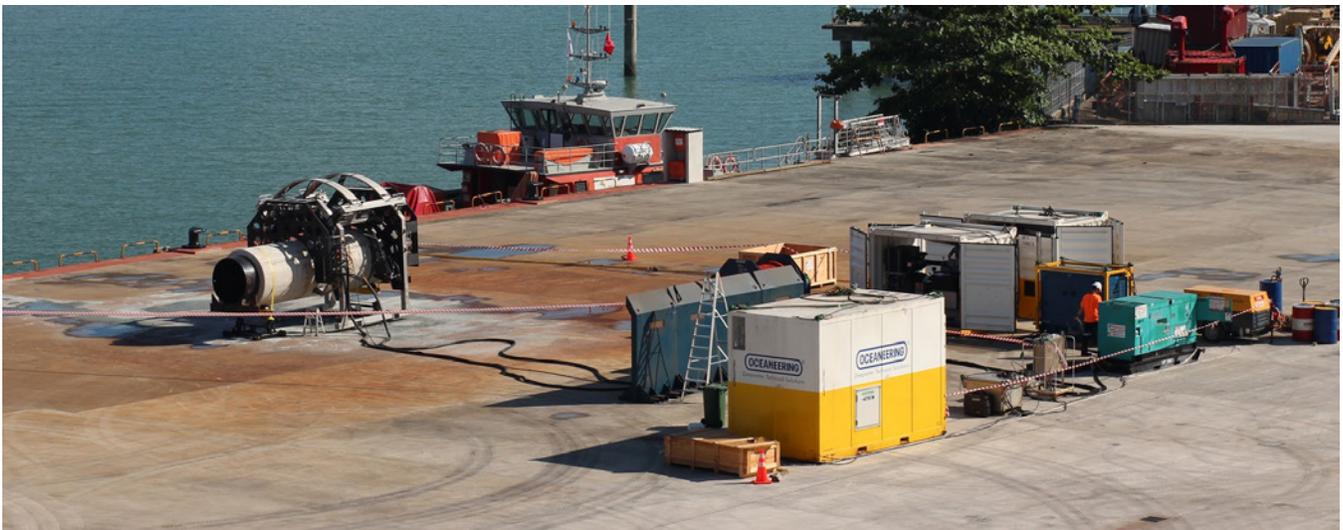


## Oceaneering Completes Installation of Pipeline Repair Clamps

Project restores flow to 48 in pipelines off the coast of Singapore



### Project Overview

In late 2017, Oceaneering assisted in a pipeline repair campaign off the coast of Singapore. The project, completed at 20-25 m water depths, covered the customer's requirement for the installation of two external 48 in pipeline clamps for temporary mitigation against internal corrosion. The project scope included offshore and onshore project management, engineering and design, tooling, and personnel.

The customer had a tight window for mobilization, which was already based on preset schedules and weather windows. The equipment required to perform the work was not off-the-shelf and had to be custom-designed and manufactured to meet their specific needs.

## The Oceaneering Solution

As an industry-leading provider in pipeline repair services and products, we rapidly responded to the customer's mobilization window. Part of this scope included the custom design, fabrication, assembly, and testing of a suitable pipeline coating removal tool (PCRT) within eight weeks. The pipelines size, and additional six inches of concrete weight coat (CWC), ruled out using a rental tool from our standard portfolio. The short lead time required input from engineers and designers based in Australia, India, and Houston, which enabled us to provide continuous coverage and support.



## Execution Plan

The customer had a short window to mobilize and prepare for the completion of work. The quick turnaround prompted a global mobilization of both equipment and personnel. Equipment that wasn't already in country was relocated from Australia while personnel joined the project team from Aberdeen, Singapore, and Australia.

Prior to mobilization, Oceaneering assisted with the development of deck layouts, completion of Hazard Identifications (HAZIDS), and developed bespoke offshore procedures for the customer.



The offshore scope of work included:

- » Excavation and dredging at the two clamp installation locations, including rock breakup
- » Removal of 7.2 ft (2.2 m) of soil and 6 in of CWC and coal tar enamel/epoxy (CTE) at the two clamp locations
- » Repair clamp positioning
- » Repair clamp installation

The pipelines were half buried in the seafloor. This meant each location had to be dredged roughly 7 ft (2.2 m) deep to provide sufficient access for the PCRT. An estimated volume of 3,500 ft<sup>3</sup> (100 m<sup>3</sup>) of soil was excavated at each location. Divers used Oceaneering's 6 in dredge and high pressure pump to excavate and breakup soil, rock, and grout bags. After each location was successfully dredged to the required depth, the PCRT was deployed and installed by divers.





The PCRT was designed to be fully controlled topside using integrated hydraulics. This enabled Oceaneering operators to control linear and circumferential motions, as well as nozzle distance using feedback from a graphic user interface (GUI). The tools were also equipped with several redundant features to maximize cleaning time and mitigate downtime. In order to optimize the monitoring and performance of the tool, the PCRT includes standard with LED cameras, providing an enhanced overview of the cleaning process.



### Challenges

In addition to the bespoke development of the PCRT, the global mobilization of personnel and equipment, and the requirement to expose the pipeline before installing the vendor-supplied clamps, Oceaneering successfully troubleshooted equipment issues

as they developed offshore. The project was also affected by high currents, potentially jeopardizing the tight execution window.

After pipe polishing was complete, the clamps were deployed via the Oceaneering Clamp Installation Spreader Bar and the Oceaneering Cofferdam. The cofferdam provided a controlled environment for divers during high currents. It also gave a stable platform for the spreader bar. The spreader bar allowed for a controlled descent and installation of the repair clamps.

### Equipment Highlights

Tooling equipment used to complete the job included an Oceaneering 6 in dredge, 64 in pipeline coating removal tool (PCRT), clamp installation tooling, and high pressure jetting equipment for rock breakup.



### Results

Oceaneering's equipment successfully dredged, excavated, removed CWC, polished the pipe and removed all CTE, and assisted in the installation of the two repair clamps at each of the locations. The successful installation of the clamps enabled the customer to extend the life of the pipelines. Although the project saw several variables including quick turnaround, rough currents, and unplanned conditions, Oceaneering was able to support and help complete the project.



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