



# BOAT LANDING REPLACEMENT WHITEPAPER

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October 2021

**THE POWER OF PREPARATION**



## OVERVIEW

Late 2019, Mammoet Qatar was approached by Dopet, one of the contestants of a boat landing replacement project. As the offshore specialist within the Mammoet Group, Conbit was requested to provide input. During a concept development session with all stakeholders, a new replacement method was developed.

Dopet's initial thoughts concentrated on adding a lot of steel to create an overhang. A crane vessel would perform the complete lift. There were many questions raised during the first meeting and the project partners led by Conbit came up with a more cost-effective solution. This solution became the winning bid and Qatar Petroleum awarded Dopet with the prestigious project.

After reading this whitepaper, you will be able to start on your boat landing replacement project. You will be able to reach out to Conbit for further support in the process and feel confident with the outcome of your project. You made the first step by downloading this whitepaper. We promise you all the support you need throughout your project.





## INTRODUCTION - PROBLEM DEFINITION

Replacing boat landings at offshore facilities is a challenging task. Without proper planning and engineering, Lost Time Incidents, budget overruns, and loose production will occur. Working in the splash zone, above and under water at the same time, makes the project complex. You will require a few service partners to complete the project and you will need to manage all those interfaces.

In this whitepaper, we will share the lessons learned from many boat landing replacements and other lifting projects. We will share the pitfalls and the actions that will prevent you from facing failure.

This whitepaper is written primarily for project managers and engineers in the oil and gas, and the offshore renewable industry. This whitepaper is a must-read for all those involved in replacing boat landings offshore.

What boat landings do we consider in this whitepaper?

There are many types of boat landings, therefore, further narrowing down the specifics is required to establish the basis for this whitepaper. The boat landing's primary function is to prevent vessels from hitting the platform, which is typically located on the side of the main crane. The boat landing is not used for personnel access, rather only as an escape route in case of emergencies. The weight of boat landings varies from 5 tonnes at offshore wind turbines to in excess of 150 tonnes at oil and gas production platforms.

## SAFETY

Some pitfalls that cause potential safety hazards:

- ▶ Lifting through a splash zone. The boat landing has a large horizontal surface that provides stability during the lifting operation.
- ▶ Limited weather window. Lifting near the offshore asset requires control over the lifted load. Both the sea and the wind impact the lifting operation, limiting the available time slot for lifting.
- ▶ Connecting large structures below the sealine. When connecting or disconnecting large structures below the sealine, you should limit the use of divers, as sudden movement of the lifted object might cause the diver to be trapped or worse.
- ▶ Human interfaces. The project requires many different disciplines. The interfaces between those disciplines might result in errors offshore.
- ▶ The difference in motion between crane and offshore asset. When using a crane which is not on the offshore asset, the motions of the crane will be different. This happens if you use a crane vessel or a jack-up barge to lift the boat landing to and from its installation location.

Other hazards need to be addressed during the engineering and project preparation phase.

Additional hazards are that of a typical project, lifting and marine spread hazards, therefore, having experienced contractors onsite will prevent most hazards from occurring.

However, each project should be prepared in detail without relying on the track record of one contractor.

## TIME CHALLENGES

The boat landing is a critical part of the logistics of the platform. Supplies, replacement components, and crew rely on the availability of the boat landing. When the boat landing is out of operation, there is a significant impact on the operation.

“The project lead time should be minimized to limit the operational impact and the exposure.”

It is generally accepted that the longer a project runs offshore, there are more risks involved in the project. It is more likely that a Lost Time Incident will occur within a month than within a week, for example:

The boat landing replacement project affects the production of the offshore asset. Production should be stopped or delayed for the shortest possible time. The pressure of lost production on the team can be intense and requires additional attention.

## ENGINEERING CHALLENGES

During a boat landing replacement project, different engineering challenges are identified:

- ▶ Different engineering projects which impact each other.
- ▶ Multi-disciplinary engineering competencies required.

### Several independent engineering projects

Adjusted industry guidelines.

A replacement project is defined by two major engineering exercises that are closely connected. The new boat landing will be engineered and the replacement method requires engineering. Both projects impact each other.

The design of the new boat landing will need to be assessed on constructability. Can the new boat landing be transported and installed with the operational limitation of the project? Even if a like-for-like replacement is introduced, the installation will probably be different. The existing boat landing is installed together with the jacket. It might have been installed at the quayside, offering different installation options than in a brownfield situation offshore.

The installation methodology is impacted by the design decisions made by the engineer of the new boat landing. The weight and dimensions will change during the design process - these changes will result in changing starting points for the engineering of the installation.

Another engineering challenge to consider, is that the installation plan for the project is often not taken into consideration at the beginning of the initial design phase – but rather at a later stage when the detailed design phase is prioritized. This leads to the implementation of major design changes at a very late stage of the project. Therefore, a successful boat landing replacement requires close cooperation between the two engineering parties. This collaboration will need to be accommodated by the platform operator. He can decide to award the full scope to one main contractor who manages the interfaces with the engineering and installation subcontractor. Or, the operator can create a collaborative environment, in which both engineering cycles will work hand-in-hand.



## Multi-disciplinary engineering competencies

Several disciplines are impacted by the project. All these disciplines must provide input at the right time. To name a few disciplines:

- ▶ Structural engineering.
- ▶ Installation engineering.
- ▶ Marine engineering.
- ▶ Subsea engineering.

Within those disciplines, there should be sufficient welding expertise. The team should have experience with the engineering challenges of boat landings, which are affected by weather conditions, the sea, and the impact of boats.

The integration between the boat landing and the platform is an integral connection to consider during the design, along with noting that boat landings often have an escape route function. Therefore, you will need to get HSE or safety engineers to provide their input as well.

To find one subcontractor to cover all disciplines will be challenging. The management of all these disciplines is equally challenging.

## Changed industry guidelines

Boat landings are installed during the construction of the offshore asset. They are assembled in the yard and installed onshore or during the offshore installation campaign. When the boat landing is due for replacement many years have passed by, which may have led to many industry standards and regulations changing. Some asset certification and insurance companies allow operators to perform like-for-like replacements using the same guidelines that were used in the original design. However, a like-for-like replacement is often not economical because of the changed installation method.

Often, the design of the new boat landing will be different than the existing one. This means that new industry guidelines will be used. These guidelines include changed or adjusted safety factors, taking new vessels into account, and having other parameters changed or new ones introduced.

The new guidelines will change the design of the boat landing. The new design results in different loads needing to be accommodated, and this requires structural analysis of the offshore asset. Additionally, the operator might need to request a third-party to re-certify the new platform. The third-party will have a need for information, which adds to the engineering challenges.

## REPLACEMENT METHODS

Offshore structural components can be installed either pre-assembled or as small parts connected offshore. The industry prefers to pre-assemble larger components because offshore time should be kept to a minimum and connecting many pieces in the splash zone is not realistic.

Installation of pre-assembled boat landings can be done using different installation philosophies, such as:

- ▶ Lifting directly into place by an external crane
- ▶ Take over boat landing by rigging from either the external crane or a deck crane
- ▶ Float-in and retrieve with rigging

This list is not complete but provides an overview of the most-used installation methods. The choice of method depends on project limitations and the lay out of the offshore facility.

### External cranes

If the design of the platform allows, an external crane can be used. A vertical clearance is needed between the COG of the boat landing and the side of the platform. There is a difference in the motions of the external crane and the offshore asset, which will limit the weather window and increase project risk.

The design should allow for fast initial connection of the boat landing to the offshore asset. The external crane cannot control the load well within the splash zone. Therefore, additional tag lines and a temporary connection is required to secure the boat landing at the right location. Sudden movements of the load of the external crane can cause safety challenges. Consequently, the requirement for personnel near the boat landing should be limited. Divers also cannot be in the vicinity when the temporary connection is being established. To overcome some of the challenges, the load can be taken over by a rigging configuration.

### Rigging configuration at offshore asset

As soon as the boat landing is taken over by a rigging configuration connected to the offshore asset, the boat landing can be controlled better. Lift lines are shorter and the movement of the platform is similar to the installation location.

The boat landing will be temporarily secured above sea level to await a suitable weather window to create a connection at the final installation location.

The installation sequence is as follows:



1. The deck crane or external crane lowers the boat landing on the side of the installation location.
2. Pre-installed rigging configuration is connected to the boat landing.
3. The load of the boat landing is transferred into the rigging configuration.
4. The boat landing is disconnected from the lift lines of the deck crane or external crane.
5. The boat landing is rigged towards the offshore asset.
6. The boat landing is temporarily secured to the offshore asset (optional).
7. The boat landing is lowered into the final installation location and temporarily secured.
8. The boat landing is then permanently connected.

## Float-in and retrieval

Less common, but possible, is to float-in the new boat landing. Either the buoyancy of the boat landing can be used, or the boat landing can be positioned on a barge.

Tugboats will be used to bring in the new boat landing. Once close to the offshore asset, the rigging configuration is connected, which retrieves the boat landing from the water. Steps 6 to 8 will be used to connect the boat landing.

The main advantage of this method is that there is hardly no weight limitation for the new boat landing.

The biggest challenge is to create a tug procedure which holds the boat landing in control. It is not possible to tug in four equal directions. Only two tugs can be used, which have to pull hard to maintain the right position. Additional bumpers will be required at the offshore asset to allow for landing the boat landing.







## RESOURCES

To complete the offshore works, several resources are required, such as manpower and equipment. These resources need to work together to complete the project safely and effectively.

### Equipment

The main equipment required for boat landing replacements can be found in the table below. The difference between the different installation methods is included.

	External crane	Rigging	Float-In
<b>Marine and logistics</b>	<ul style="list-style-type: none"> <li>▶ Jack up barge.</li> <li>▶ Standby vessel.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Jack up barge or construction vessel with crane or supply vessel (if deck crane can be used).</li> <li>▶ Standby vessel.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Tugs and barge.</li> <li>▶ Standby vessel.</li> </ul>
<b>Subsea</b>	<ul style="list-style-type: none"> <li>▶ Diving support vessel.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Diving support vessel.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Diving support vessel.</li> </ul>
<b>Lifting and rigging</b>	<ul style="list-style-type: none"> <li>▶ Lift config external crane</li> <li>▶ Lift configuration external crane.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Lift configuration crane.</li> <li>▶ Hand-over lift congiation.</li> <li>▶ Rigging congification.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Rigging congification.</li> </ul>
<b>Mechanical</b>	<ul style="list-style-type: none"> <li>▶ Welding and fitting.</li> <li>▶ Bolting.</li> <li>▶ Lashing and other sea fastening material.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Welding and fitting.</li> <li>▶ Bolting.</li> <li>▶ Lashing and other sea fastening material.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Welding and fitting.</li> <li>▶ Bolting.</li> <li>▶ Lashing and other sea fastening material.</li> </ul>
<b>Access and egress</b>	<ul style="list-style-type: none"> <li>▶ Gangway.</li> <li>▶ Scaffolding.</li> <li>▶ Rope access equipment.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Gangway.</li> <li>▶ Scaffolding.</li> <li>▶ Rope access equipment.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Scaffolding.</li> <li>▶ Rope access equipment.</li> </ul>

Vessels that are directly involved in the lifting operation (construction vessels) will have DP@ capabilities to hold position.



## Manpower

The offshore construction team will include all trades required to perform the scope of work. The team will be led by the offshore construction manager, who reports to the Offshore Installation Manager (OIM). The captains of the marine assets will be in direct communication with the offshore construction manager.

The manpower required for the project is as follows:

- ▶ Construction manager
- ▶ Marine crew
- ▶ Diving crew
- ▶ Mechanical crew, including scaffolding
- ▶ Rigging crew, including rope access
- ▶ HSE Officers

## HOW TO PLAN FOR BOAT LANDING REPLACEMENT

An integrated project approach is advised. This means that the design of the new boat landings and the replacement of the boat landings will run in parallel. Operators can avoid redoing one of the engineering exercises when the input from the other interferes.

During the start of the project, the parameters should be set and multi-disciplinary discussions should commence. The project definition and concept development phase require communication between all parties.

After the concept has been set, the design of the new boat landings can begin to be drawn. A preliminary conservative estimate of the weight and dimensions will form the basis for the concept installation method.

According to the concept installation method, initial market consultation for major equipment and contractors can begin. The marine spread should be shortlisted and main contractors, such as a diving company and mechanical contractor should be approached.

When the plans become more detailed, a fabricator for the new boat landing will be contracted. The fabrication process will take 4 to 8 months, during which the offshore works can be prepared.

### Include timeline

The offshore works will take between 2 and 12 weeks, depending on the complexity, level of preparation, and the weather conditions.

A successful project is completed without Lost Time Incidents, within budget, and on time.

## CONCLUSION

Anyone who is involved in a boat landing project, face many challenges, will obtain many new competencies, learn about other disciplines, and will be a part of a mixed team of professionals. It may seem like a small modification project, but the complexity should not be underestimated.

Conbit has replaced many boat landings. We always work diligently, act as a consultant, and offer a realistic perspective of the potential risks to make the projects successful. We have gained a very good understanding of the factors leading to a successful project and look forward to bringing this experience and expertise to the next boat landing project.

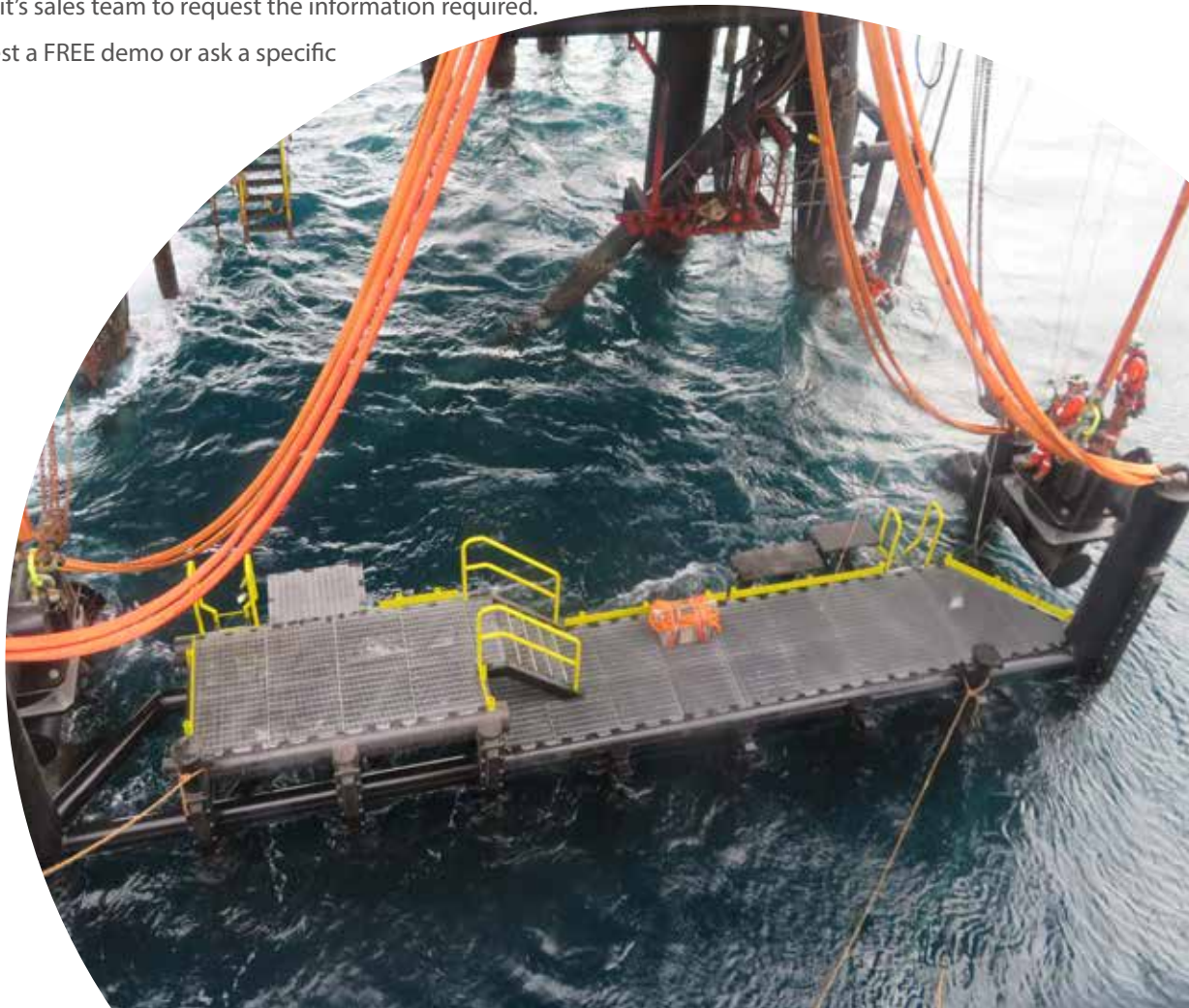
## NEXT STEP

Conbit has a lot of resources available to plan for a boat landing replacement project. Some of the things we can support are:

- ▶ A Standard Document Register List.
- ▶ The typical installation method descriptions.
- ▶ Typical project schedules.
- ▶ Explanatory videos.

Reach out to Conbit's sales team to request the information required.

You can also request a FREE demo or ask a specific question.





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