



THE POWER OF PREPARATION

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EFFECTIVE FLARE TIP REPLACEMENT

INTRODUCTION

A flare tip replacement is a challenging operation which exerts pressures across the entire project team. Extremely tight shutdown windows are necessary to minimize impact on productivity but present a level of complexity and risk that demands excellence in engineering skill and safety standards.

This is why major offshore operators such as ExxonMobil trust Conbit to undertake their flare tip replacement work. This whitepaper combines decades of Conbit's engineering expertise and customer feedback to provide an overview of the flare tip replacement process, selecting the right supplier and the benefits that mechanical handling can offer.

*Trusted
engineering for
safe, efficient
offshore
flare tip
replacements.*



SAFETY

Safety is of utmost importance, requiring careful consideration of various factors, including personnel, equipment, infrastructure, and the environment, to ensure the successful delivery of a safe project.

As flare tips are located above the plant or above water, the possibility of the unit itself or parts of the handling equipment dropping presents a significant risk. Time pressure, which is always present during shutdowns, increases the risk of a hazardous situation occurring, and that is why offshore operators frequently look to a specialist contractor to ensure the work is carried out safely.

The key criteria to consider when selecting a specialist contractor are:



Detailed method statements and 3D renderings of procedures

These allow all those involved to have the best view of the planned work and can prove invaluable in identifying required precautions during the Hazard Identification (HAZID) stage.



Quality and condition of equipment

A supplier with their own inventory and strong equipment management processes can be critical to project safety.




Safety record of the supplier


Strong safety records provide assurance that you are working with a conscious supplier who prioritizes safety.

TIME CHALLENGE

A flare tip replacement can be on the critical path during maintenance shutdowns, which means delays or time savings in the replacement work can have a direct impact on plant performance.

Operators of offshore assets require confidence that schedules will run on time, so selecting not just the right supplier but also the best working methods is essential.

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Repetition and routine in flare tip replacement can make a major difference in the time required to safely and accurately finish the work. Selecting a supplier with a strong track record in similar jobs is the best way to achieve this.
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Communication lines should be kept as short as possible. The offshore team can make decisions independently, which can save valuable time. They are able to determine the impact of their decisions and can consider whether further consultation with the engineering team is required.

ENGINEERING CHALLENGE

There are three ways in which offshore flare tip replacements are more challenging than onshore lifting projects.

- 1


The job must be completed in a harsh, fast-changing environment
- 2


The lifting is done high above the deck of the offshore asset, which makes mobilization challenging
- 3


The temporary lifting system has to be erected from below without any lifting aids above

These challenges demand both strong engineering skills and well-trained offshore teams to ensure a smooth transfer from planning to implementation.

The combination of these facets is highly valued by many offshore operators, and Conbit has found the following factors are often crucial when assessing engineering capabilities.

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Strong structural engineering and analysis experience
The dynamic factors of the lifting operation require detailed structural analysis. Flare tip lifting to and from supply vessels are engineered without the use of motion compensated systems. The use of high-speed winches in combination with lightweight lifting material demands detailed feasibility analysis by qualified structural engineers.
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Offshore operators demand engineering that can be verified
The reporting style of Conbit allows for third party checks, which is like a breath of fresh air for the project team of the client.
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Marine Warranty Surveyors
In our operation, we have more and more interactions with third party Marine Warranty Surveyors. Offshore operators feel confident that they are able to convince these parties of the feasibility of the engineered solution with the engineering documents provided by Conbit. Often, our clients let Conbit take control of the MWS process and be in direct contact, which increases the project's efficiency.





FLARE TIP REPLACEMENT PROCEDURE

Shutdowns for flare tip maintenance and replacement are typically planned well in advance as they require cessation of production at the facility. They are therefore kept to a minimum, limited to unavoidable repairs and replacement. The flare is the last part of the plant to be shut off and the first to be turned on, which puts pressure on the team completing the flare scope.

DIFFERENT METHODS

There are several different methods to replace flare tips. The selection of the most appropriate solution depends on safety requirements, budget, and the availability of crane vessels or jack up barges and bed spaces.

ExxonMobil often chooses to replace their flare tips with a mechanical handling method. This requires a small team of 4 – 6 persons and only a few days of shutdown. It allows for easy planning and preparation, and for the lifting to be done in a controlled manner with unnecessary risks mitigated during the preparation phase.



| | Helicopter | Crane or Jack Up Vessel | Mechanical |
|--|---|--|---|
| Safety at flare tip access platform | The flare tip access platform is small and there are no rapid escape possibilities if the load starts to swing. | Standard riggers at the flare tip access platform. | The crew is used to working at this altitude. |
| Exposure | Limited in time. The operation will draw attention. | Minimum exposure. | Operation will take 3-5 days at the top of the flare. |
| Visibility on the load | From the cockpit, the pilot usually cannot see where the hook is – even with plexiglass side-bubbles or removable doors. The pilot must rely on the signaler's communication to maneuver into position. | Line of sight depends on the positioning of the jack up vessel, which depends on soil conditions and other jack-up barge activities. | Clear line of sight from winch to load. |
| Load positioning | Hovering with a load is difficult, fatiguing and potentially dangerous activity that requires a high level of concentration from the pilot and should therefore be limited in time. | The long line of the crane might cause some swinging of the load. | The load can be controlled from within arm's reach. |
| Flexibility | Needs to be booked well in advance. Dedicated mobilization. | Spot market availability. | Just in time mobilization |
| Standby | Full spread rate applies. | Full spread rates apply. | Limited cost impact |

| | Helicopter | Crane or Jack Up Vessel | Mechanical |
|----------------------------|---|--|--|
| Associated services | Different crew required to perform rigging below the flare tip access platform, and for mechanical works. | Additional lifting equipment required for lifting below the flare tip access platform. Additional crew required for the mechanical work. | Equipment can be used for lifting below the flare tip access platform. The same crew can perform mechanical works, repair and modification services. |
| Duration | Pre-S/D: 2 days S/D: 1 day Post-S/D: 1 day No option for additional works | Pre-S/D: 2 days S/D: 1 day Post-S/D: 2 days | Pre-S/D: 2 days S/D: 3-4 days Post-S/D: 2 days |
| Persons on Board | 4-5 | 3-4 | 5-6 |
| Costs | High – often outweighs any saving in duration | Depending on availability. | Moderate. |

In some flare structures, a davit or other permanent lifting structure is incorporated. Many offshore operators integrate this permanent lifting solution into the design during the construction of the offshore facility, because they feel that they need to take precautions for the future. The main disadvantage of permanently installed lifting systems is that you need to inspect and test them before use. These activities need to take place within the shutdown period. If the system does not pass the tests, you cannot complete the flare tip replacement as planned. It will either jeopardize the shutdown duration and/or the budget, or the flare tip cannot be replaced.

MECHANICAL HANDLING – THE MOST EFFECTIVE SOLUTION

Conbit advocates the use of handling flare tips with temporary lifting equipment. The lifting equipment is installed at the flare tip access platform and is operated by winches, which remain at deck level.

WHY?

The mechanical flare tip handling method provides the maximum control of the load. Your lifting system is based on a fixed platform, so you can position the flare tip smoothly. Methods based on floating, or helicopter crane capacity have the risk of bumping the flare tip when positioning it.

Testing of the temporary lifting system can be done before mobilization. This advantage results in fewer project risks during the operation. The last thing you want to happen during your shutdown is that you are unable to perform the lift, because the lifting system is not fit for purpose. Permanently installed davit systems do not provide this advantage.

The use of temporary lifting systems can be planned better. For other lifting methods (e.g. a helicopter or crane vessel) the operator depends on the availability of expensive equipment. Although the operation might be shortened, the standby costs for contingencies are very high. Temporary lifting systems can be mobilized well in advance with lower costs.



METHOD

The flare tip replacement project starts with a period of engineering and project preparation, which results in a load tested system packed into an offshore container. This container is transported to the offshore facility and brought onboard. The crew soon follows and arrives at the offshore facility a few days prior to the shutdown.

Before the shutdown, Conbit's crew unpacks the container and starts preparing at deck level. For a typical flare tip replacement project, two winches will be installed that are used for setting up the flare tip handling system and they will perform the actual lifting. The winches are connected to their power source and are then ready to commence the lifting operations.

When all flanges of the flare system are spaded and the system is flushed, the works inside the flare structure start. This part of the job is within the shutdown and is kept to a minimum. The first operative climbs up in the flare tower and brings a rope and a sheave, which is used to pull up one of the winch wires. Once this winch wire is reeved through the sheave, all other components are lifted to the flare tip access platform by the winch. At the flare tip access platform, the lifting configuration is assembled and load tested. Once load tested, the old flare tips are detached then lifted overboard. They can either be lifted to a supply vessel or can be lowered and retrieved from the platform. The new flare tip is lifted and connected to its flange at the top.

After the flare tips are replaced, the lifting configuration is disassembled and lowered to deck level. The shutdown period can end after the flare tip access platform is cleared, the flare tips are commissioned, and all crew have safely departed the flare structure. After the shutdown, the winches and all flare tip handling equipment are packed into the container, and demobilization of crew and equipment commences.



CASE STUDY

EXTENSIVE FLARE WORKS OFFSHORE MALAYSIA

SCOPE

Carigali Hess contracted Conbit for a major flare system overhaul on the Central Processing Platform at the Cakerawala field, about 150 km northeast of Kota Bharu. The scope included replacing the flare tip access platform, one permeate flare tip, two HP flare tips and their headers, the LP flare tip, and a manifold.

SOLUTION

Conbit typically installs a modular lifting system on top of the flare tip access platform. However, since the platform itself required replacement, a custom base frame was designed and secured to the side of the flare tower. This supported a modular lifting setup operated from deck level.

EQUIPMENT

Six winches—two main lift, two luffing, and two service—were powered by generators and powerpacks, enabling fully independent operation. Lifts were executed directly between the flare structure and a supply vessel.

EXECUTION

Before mobilization, a full load test was completed at Conbit's premises. During a 10-day shutdown, a 20–30 person offshore crew installed the system, replaced over 20 tonnes of components, and safely demobilized.

EVALUATION

Despite limited access, Conbit delivered the project smoothly and on time, using creative engineering and strong preparation.



Scan to watch the full project video showcasing Conbit's complete offshore execution.

CARIGALI HESS

Client:
Carigali Hess

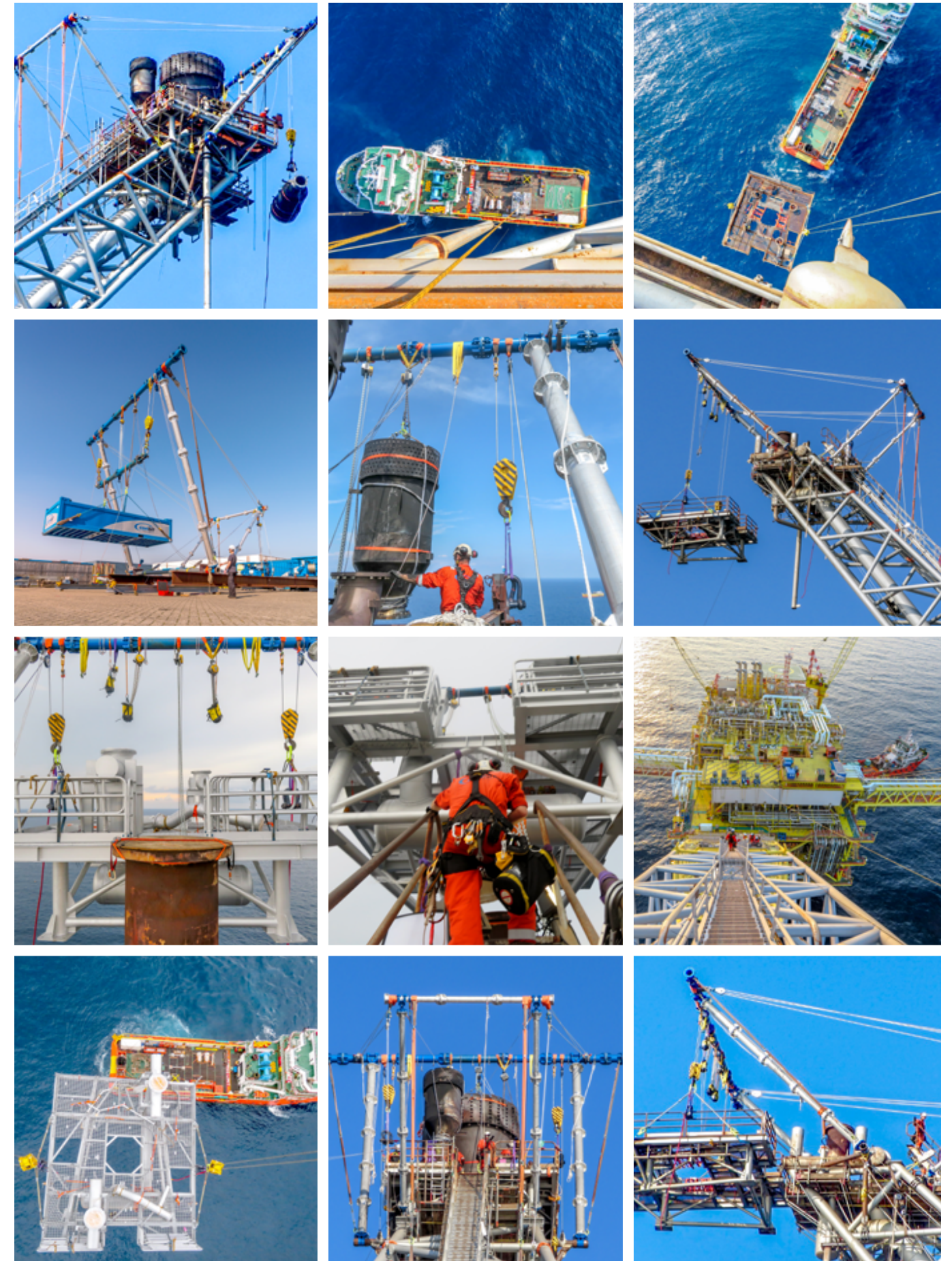
Field:
Cakerawala, Gulf of Thailand

Scope:
Replaced 3 flare tips, headers, access platform

Solution:
Custom rigging on flare tower, 6-winches setup

Duration:
Completed in 10-day shutdown

Result:
20+ tons replaced, 30-person crew, zero delays





CASE STUDY

KAOMBO NORTE FPSO FLARE TIP REPLACEMENT

SCOPE

Conbit was contacted by Saipem to replace the HP flare tip on the Kaombo Norte FPSO, located offshore Angola. The project also required relocating and replacing the ignition and thermocouple junction boxes.

SOLUTION

A PLE lifting system was selected for the operation. Equipment was transported from the main laydown to the work area using a 15-ton monorail. A 5-ton trolley with a 6-ton air hoist lifted materials from the process deck to the hull deck. The PLE system was installed on the flare stack's top platform and load-tested before use.

EQUIPMENT

The system consisted of two portals, a base frame, rigging lines, and guidelines for load control. A 1-ton service winch and a 5-ton main winch were positioned at the bottom of the flare stack.

EXECUTION

The ignition and thermocouple boxes were relocated to a lower platform. Cables and pilot lines were adjusted and welded. Additional inspection of obstruction light cables and real-time adjustments were handled on-site.

EVALUATION

Despite unexpected challenges in the electrical scope, the project was delivered successfully with no time lost—thanks to Conbit's adaptive team and efficient coordination.



Client:
Saipem

Field:
Offshore Angola

Scope:
Replaced
HP flare tip,
ignition and
thermocouple
boxes

Solution:
PLE system
with monorail
transport and
gantry setup

Duration:
Completed
despite delays
and electrical
scope expansion

Result:
On-time
delivery, smooth
execution, no
time loss



Scan to view the full video of the HP flare tip replacement using Conbit's PLE system.

CASE STUDY

FLARE TIP REPLACEMENT SHELL PHILIPPINES

SCOPE

For the second time, Shell Philippines requested Conbit to carry out flare tip replacement on their Malampaya platform, located in the West Philippine Sea, about 80 kilometers off the coast of Palawan Island.

SOLUTION

A mechanical handling method was selected using a drop-and-retrieve approach. The flare tip was lowered from the flare tip access platform and retrieved on the main deck. Due to space constraints, the flare tip had to be handed over mid-air to the deck crane—unlike the previous operation, where a direct lift was possible.

ENGINEERING

Every structural interface had to be checked and designed during preparation. Alongside structural analysis, all lifting systems and procedures were detailed in-house by Conbit's engineering team.

EQUIPMENT

The system included a gantry and strut mounted on a custom base frame. After lowering the flare tip, the load was transferred to another lift line, then pulled toward the platform using a tugger winch.

EXECUTION

The operation proceeded smoothly with precise coordination. Cables, pilot lines, and lifting systems performed as intended.

EVALUATION

The project was completed safely, on time, and within budget. It showcased strong collaboration between Conbit and Shell's teams, with a focus on engineering clarity and offshore efficiency.



Client:
Shell Philippines

Field:
West Philippine Sea

Scope:
Flare tip replacement using drop-and-retrieve method

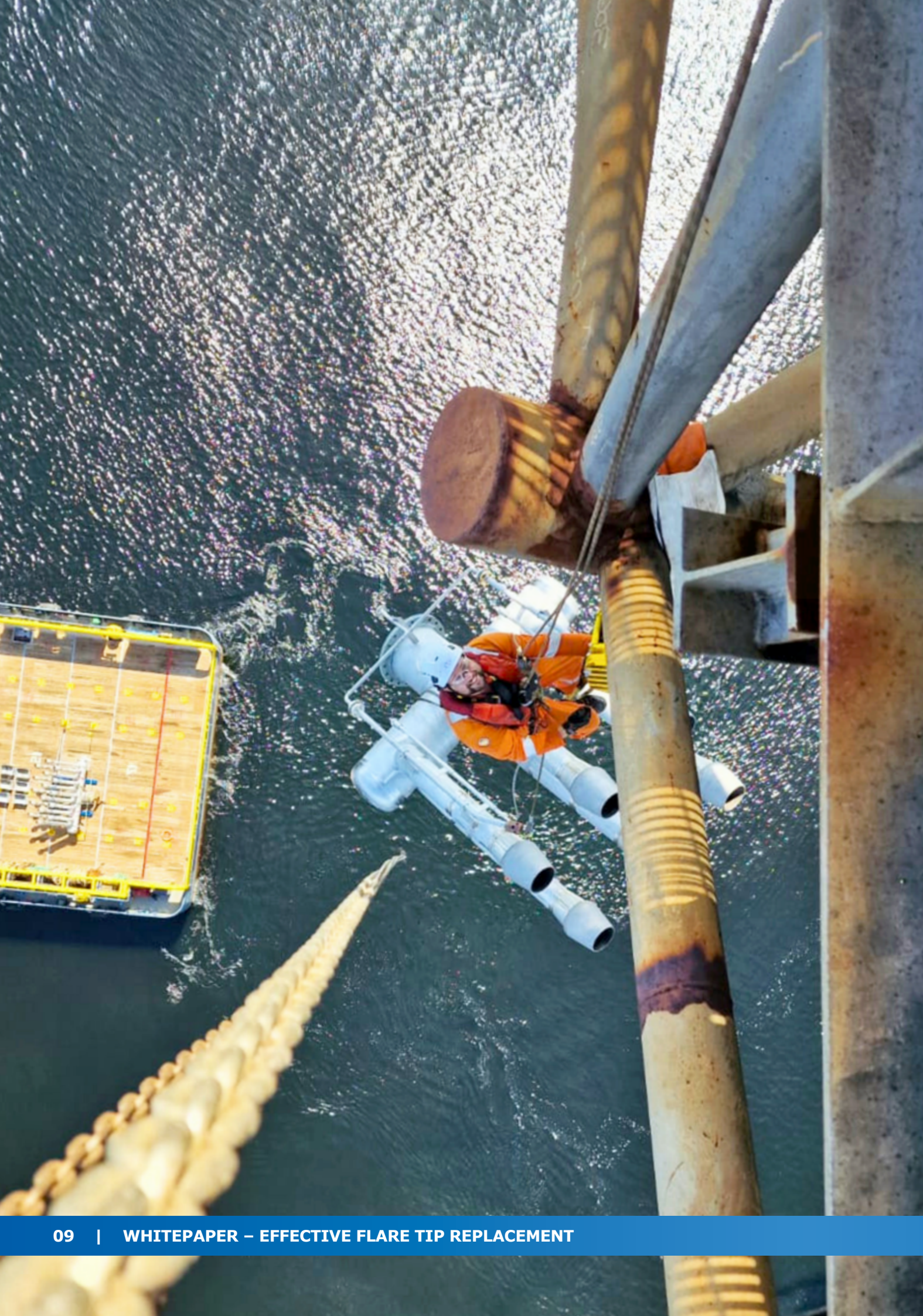
Solution:
Gantry system with mid-air load handover due to space limits

Duration:
Completed on time and within budget

Result:
Seamless coordination, precise execution, client satisfaction



Scan to watch the complete project video of the Malampaya flare tip replacement using mechanical handling.



ABOUT CONBIT

We believe that in our business preparation is key. We prepare our projects so thoroughly that they always run smoothly and efficiently. This is how we make a difference for our clients.

Our people are who make Conbit the leader in our field. For us, project preparation is all about teamwork in an open and transparent atmosphere. We challenge ourselves to go beyond limiting boundaries to find better and more creative solutions and to design, supply, install and maintain projects perfectly, safely and on time. Our clients rely on us not only because of our strong team that works with them in close consultation but also because we invest in the latest technologies and equipment to meet their needs, so that they can excel in their industry.

With over 20 years of experience, we have a proven track record in special lifting and structural engineering. Clients come to us for our full-service approach and our innovative customized solutions. In preparing our projects so thoroughly we create a reliable, safe and sustainable base, from which we have a powerful impact in our clients' benefit.

*Reach out to Conbit's sales team to request any additional information you require.
You can also request a FREE demo or ask a specific question.*



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