

IN FOCUS: Offshore Repairs



IN-SITU SOLUTIONS ENSURE FAST TURNAROUND

Constant salt spray and wave impact create perfect conditions for erosion and corrosion in the splash zone areas of offshore assets. Risers and platform legs, for instance, can become severely damaged due to continuous exposure to the erosive nature of the marine environment. Salt spray also has a potential to reach equipment and machinery aboard platforms and FPSOs, leading to corrosion, which can be exacerbated by the process conditions, such as in case of hot pipework.

If not addressed promptly, the damage can lead to high repair and replacement costs, costly shutdown periods and environmental complications. A whole deck may require repair or replacement due to years of corrosion.

Repair solutions

Various systems are available designed to repair damage to splash zone areas

and offshore structures. Typically, repair procedures involve the use of hot work, which has its issues and limitations. Replacement of parts or provision of custom made clamps for areas where structural integrity has been compromised can also be a viable option. However, these tend to be costly and time consuming, which can sometimes persuade the maintenance managers to turn to temporary repair materials, such as sheathing or common paints.

While getting the job done, these methods do not provide an ultimate long-term solution that would eliminate the need to shut down the operation or minimise future maintenance costs. Due to the nature of the business and high revenues at stake, asset owners are looking for repair alternatives that would not compromise the flow of the process and maintain equipment's integrity. ▶▶



Holed deck



Corroded platform leg

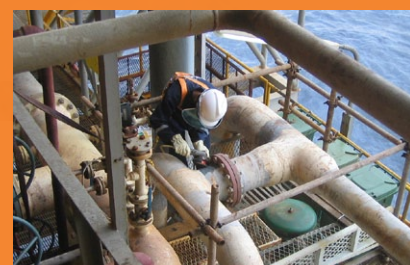
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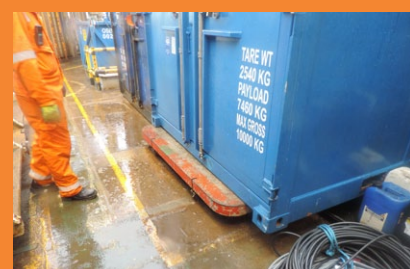
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REPAIRS ABOVE AND BELOW THE WATERLINE

Belzona surface-tolerant materials can be applied and cure even underwater.

Paste grade repair:



- » [Belzona 1212](#) for emergency repairs
- » [Belzona 1161 \(Super UW-Metal\)](#) for larger surface area repairs

Coating protection:



- » [Belzona 5831 \(ST-Barrier\)](#) for added protection

Elastic sealing:



- » [Belzona 2000 Series](#) elastomers for rubber repair and sealing applications
- » [Belzona 3411 \(Encapsulating Membrane\)](#) for flange corrosion protection

» Belzona in-situ solutions to splash zones and offshore structures

In response to industry needs for permanent repair solutions which are not overly costly and can be completed with minimal disruption to operations, Belzona developed a range of systems that allow the repairs to be carried out in-situ. Surface-tolerant repair materials and coatings, for instance, have the ability to displace contaminants and bond strongly to wet substrates. Belzona adhesives in turn can be used to replace welding for structural integrity restoration by allowing plates and equipment to be bonded in place without hot work. Last but not least, elastomeric materials are ideal for sealing applications and repairing damaged rubber substrates.

From coatings and pit filling materials, to wraps and cold plate bonding, Belzona offers tailor made solutions that have been vigorously tested and proven to last in service.

Ease and safety of application makes Belzona materials a preferred choice for offshore repairs. Prefabricated kits can be stored aboard and utilised when needed for leak sealing, flange repairs and other routine maintenance needs. For complex projects, comprehensive training, supervision and inspection services by NACE and FROSIO qualified inspectors are available.

Visit belzona.com to view 3D maps illustrating Belzona applications onto platforms and FPSOs among others.

Why Belzona?

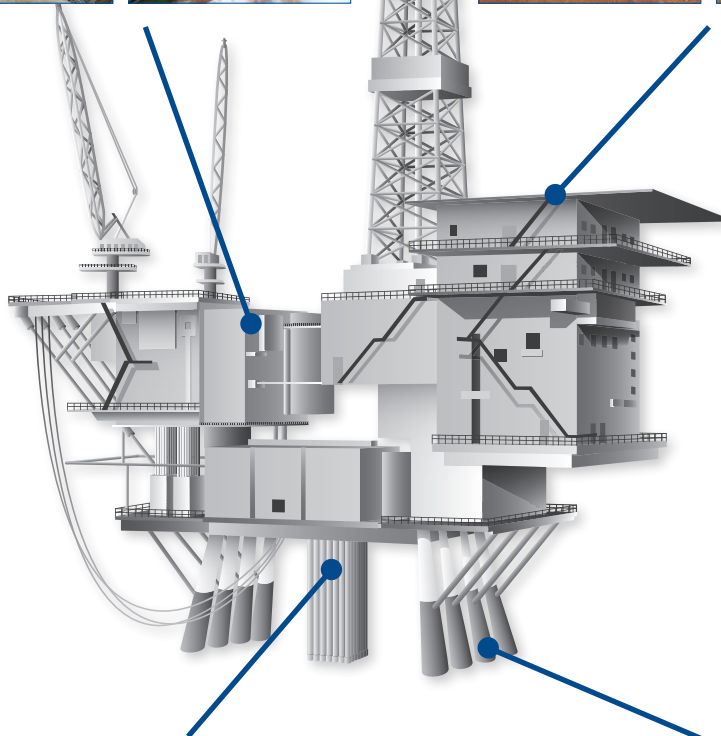
Oil and Gas companies choose the Belzona solution because it helps them to:

- Reduce capital expenditure
- Lower maintenance costs
- Improve efficiency and safety
- Reduce downtime
- Simplify maintenance procedures
- Extend machinery and equipment life ■

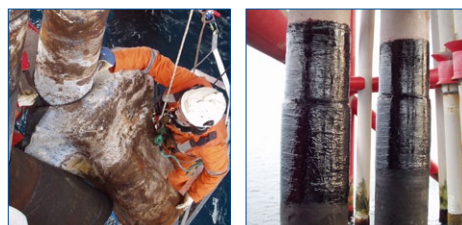
Pipework repairs



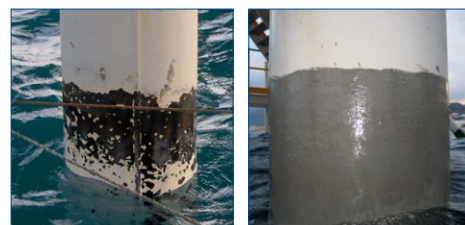
Deck repairs



Riser repairs and cladding sealing



Repairs at the waterline



KEEPING THE PLATFORMS IN PLACE AND SAFE

Riser Protection with Belzona SuperWrap II

In dealing with repair and/or maintenance issues occurring on offshore production platforms, the asset owner is always looking for a solution that will not require shutting down the operation, or will not result in production loss.

The corrosion on 4" and 6" platform risers started to cause thinning of the walls, compromising the structural integrity of the risers. The operator was looking for a complete solution to restore the pipe without interruption to the production process.

Belzona SuperWrap II, the ISO/ASME compliant composite repair system specifically designed to restore strength to weakened or holed metallic substrates, was selected as it allowed for the repair to take place in-situ and

with minimal interruption to the operation. The original thickness of the riser wall had to be rebuilt prior to being reinforced with Belzona SuperWrap II. Due to severe pitting Belzona 1121 (Super XL-Metal) was chosen to fill the pitted areas and to restore the original profile of the pipe. Belzona SuperWrap II was applied onto the pipe in 4 wraps (8 layers) in compliance with the engineered design. Belzona 9382 was applied to consolidate repair during cure. After 24-hour cure, the surface of the cured wrap was washed, sanded and the pipe received an overcoat of Belzona 1121, prior to application of an urethane top coat.

The installation of the system took 7 hours, with an additional 24 hours to allow it to cure, not disrupting the operation of the platform. ■

RISER REPAIR AND PROTECTION

Common Problems

- » Surface deterioration due to constant contact with sea water
- » Loss of pipe integrity
- » Thinning of the walls in splash zone areas
- » Damaged riser cladding and disbondment



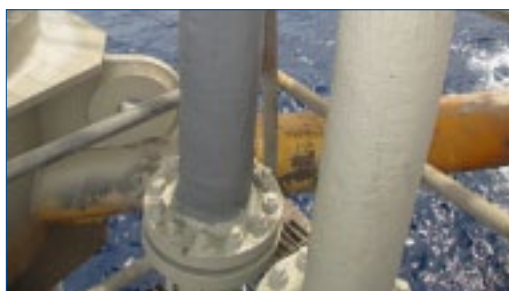
Pitting filled with Belzona 1121



Four wraps of Belzona 1982 applied



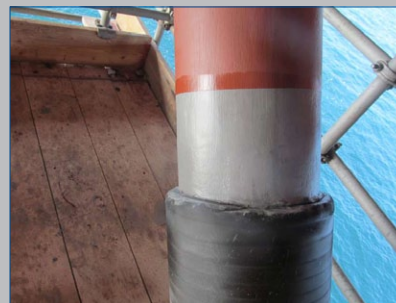
Belzona 9382 applied to consolidate repair



Complete application

Belzona Solutions

Belzona offers a complete system, which restores corroded metal and repairs cladding in-situ, sealing the neoprene boot topping of the riser, thus preventing further water permeation.



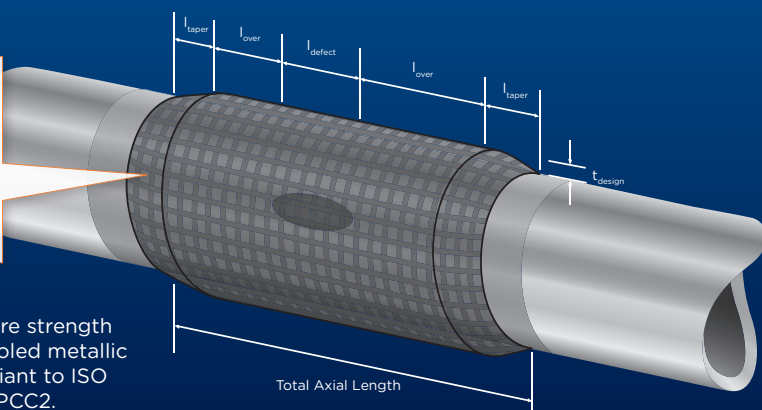
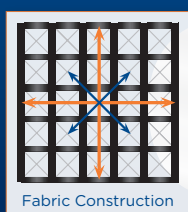
Recommended Products

Belzona SuperWrap II for thin- and through wall defect repair
Belzona 5831 (ST-Barrier) for corrosion protection
 Belzona 2100 elastomers for riser boot sealing



Belzona SuperWrap II

ISO / ASME COMPLIANT COMPOSITE REPAIR SYSTEM



Designed to restore strength to weakened or holed metallic substrates, compliant to ISO 24817 and ASME PCC2.

KNOWLEDGE AND EXPERIENCE

Since 1952, Belzona has been providing lasting repair solutions to:

- » Pipework
- » Process and storage vessels
- » Flare system
- » Pumps and compressors
- » Platform deck
- » Splash zone areas



Visit Belzona.com to find out more about turnkey solutions Belzona can offer to minimize downtime and extend your maintenance-free periods.



Belzona strives to provide a complete supply and apply package through its Global Distribution network, created to provide clients with direct access to materials, specialist application services, supervision and inspection services. It is Belzona's mission to meet specialist repair and maintenance needs in its target industries and markets worldwide.

SUCCESSFUL DECK MAINTENANCE ON A NORTH SEA PLATFORM

Fluid grade epoxy injection ensures impact loading resistance

Belzona's cold bonding technology was applied to a badly deteriorated deck on a North Sea platform in 2004. The deck had become weakened through daily operation and weather. The original 8mm steel deck was corroded through in many locations and welding was not an option due to the installed under-deck passive fire protection.

The following application procedure was developed, specified and applied by a competent team, who received comprehensive Belzona training. Steel plates, drilled to accept jacking bolts and injection ports, were prepared and positioned onto the grit blasted deck. The jacking bolts were used to obtain accurate levels. The sides of the plates were dammed using an epoxy

paste. A fluid grade epoxy was then injected into the void using an airless pump to seal and bond the reinforcement plate to the deck achieving full contact.

Independent testing showed that the Belzona bonding method in this case was equivalent in strength to a welded plate. Very good resistance to impact loading was achieved and considered by the independent engineering designers to be "robust enough to withstand the rigours of the laydown area operations". Daily operations were not interrupted and the passive fire protection in the machinery space below was not affected. This work has been inspected annually and now, almost 12 years on, is still in perfect condition. ■



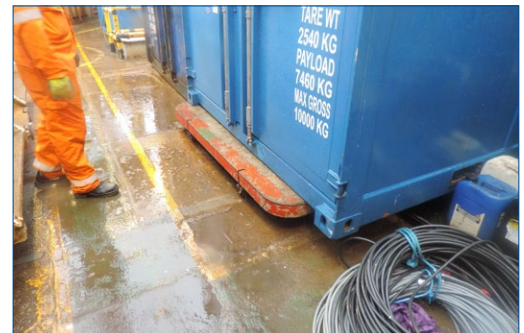
Corroded platform deck



Close up: corroded platform deck



Plates bonded onto the deck



Deck inspected in 2015, 11 years later after application: Belzona plate bonding solution in excellent condition



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