




## THE STRUCTURAL SAFETY IMPROVEMENT FOR FPSO HULLS



Courtesy of TOTAL- Photographer: Olivier Robinet

**ColdShield™** : The only Cold Reinforcement Class-Approved for hull girder strength

Coldshield offers hull structural repairs through COLD WORK techniques allowing to:

-  **Reduce exposure to HSE risks for offshore personnel**  
(>140 saved mandays/10m<sup>2</sup> for COT)
- **Minimize**  **production disruption** (no HOT WORKS)
- and **Better manage POB** (short offshore cycle time yielding to lower risk )

### APPLICATION AREAS

Repair & Reinforcement of **FPSO hull structures**:

- Deck
- Side shell
- Longitudinal or transverse frames
- Crude Oil Tanks
- Sea Water Ballast Tanks

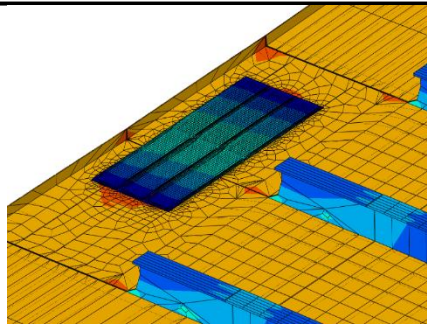
### BENEFITS

- **No welding** or grinding : safe installation with no downtime
- **Class approved alternative to Crop & Renew**
- **Permanent status - Restores initial structural strength**
- **Extreme durability** even under harsh environment
- **Fast & qualified installation** procedure for all weather conditions
- **Very light footprint** onto existing structure (virtually no stress concentration, no residual stress)

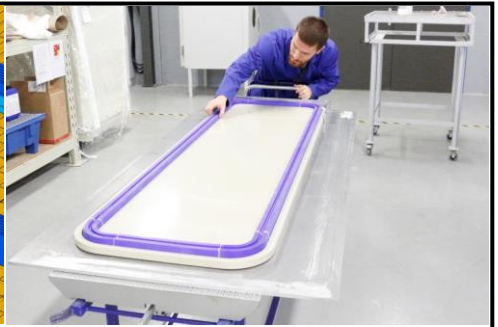
## ColdShield™ Standard Process



1- A prerequisite **Site Survey** is performed.



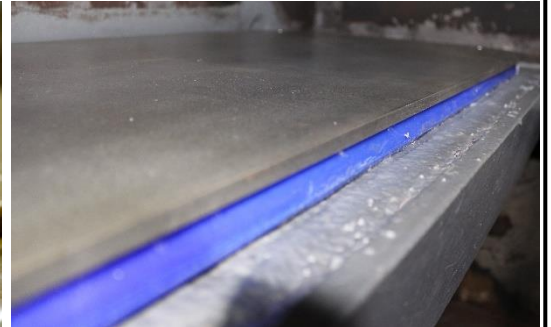
2- Then, **Engineering** is carried out.



3- Pads **Prefabrication** is performed as per Aerospace standards.



4- Then, the two-step **Offshore Installation Process** is carried out: A qualified **Surface Preparation** is performed prior to the **Vacuum-Assisted Injection** of the structural polymer (epoxy resin).



5- Finally, specific **NDT** are used for **Structural Monitoring**.

## ColdShield™ features

ColdShield™ is designed to **permanently restore weakened/corroded structures to their initial capacity** and to protect durably the damaged area against further **corrosion**.

ColdShield™ is a unique and patented technology leveraging vacuum-assisted resin injection in a fully controlled manner even in harsh conditions like an **Offshore environment**.

This technology is based on the proven techniques of bonded composite reinforcement already used in **demanding industries** such as aerospace, military and civil engineering.

ColdShield™ has been developed in a partnership with



TOTAL

and



## COLD PAD®

Our ambition is to be acknowledged as the leading strategic partner for safe, reliable & durable solutions when structural bonding is at stake in harsh industrial environments.

COLD PAD provides innovative solutions designed to enhance the reliability of structural bonding for the **Offshore industry and especially FPSOs** (maintenance and life extension). This includes corrosion-induced issues like plate thinning, fastening and fatigue life extension.

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VERITAS

Certified by



Certificate N°: 43154/A0 BV  
Bureau Veritas Rules for the Classification of Steel Ships  
Bureau Veritas Rules for the Classification of Offshore Units  
Bureau Veritas Rules on Materials and welding for the  
Classification of Marine Units

Certificate N°: 16-HS1514812-PDA  
2016 ABS Rules for Conditions of Classification, Part 1  
2016 Offshore Units and Structures 1-1-4/9.7, 1-1-A2, 1-1A3

1<sup>st</sup> prize winner at Innovation Award



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