

FPSO Hull brackets repair by cold bonded reinforcements

Project lessons learnt from a world first Offshore West Africa

Vito FLORIO & Timo DE BEER; 

Xabier ERROTABEHERE, Christophe PAILLUSSEAU ; 

MCEDD
DEEPWATER DEVELOPMENT

Outline

- The context
- A cold work repair solution for structural hull maintenance
- Challenges of implementing innovation
- Lessons learnt of Project execution and Offshore implementation
- Conclusions and limitations

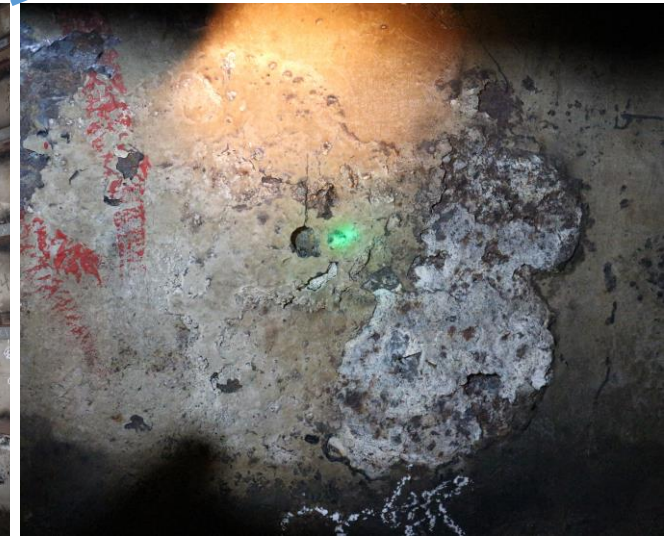
The Context

- Permanently moored FPSO located in deep-water West Africa
- set of corroded brackets in a void located close to two crude oil tanks
- Classification society imposed steel renewal for 4 brackets

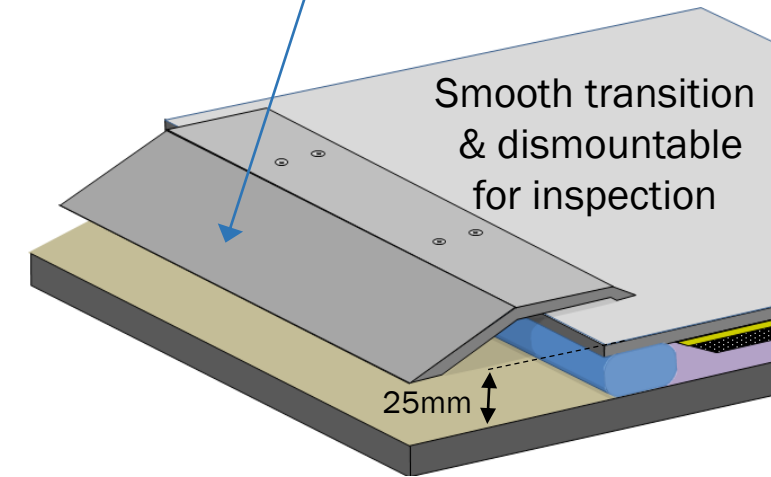
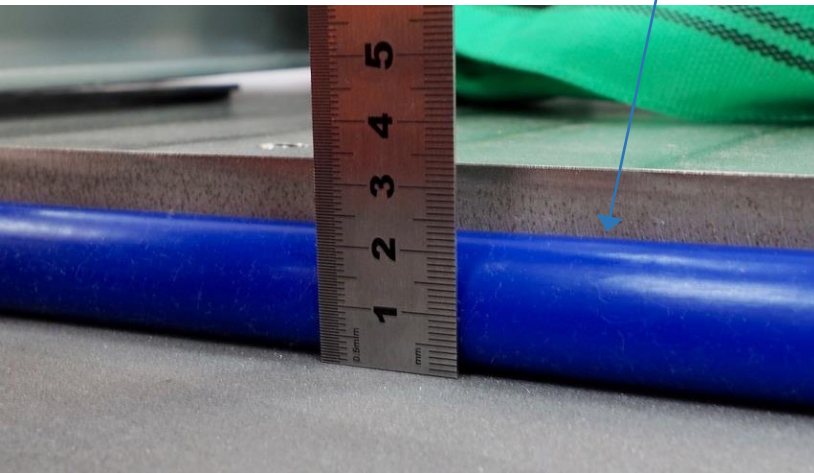
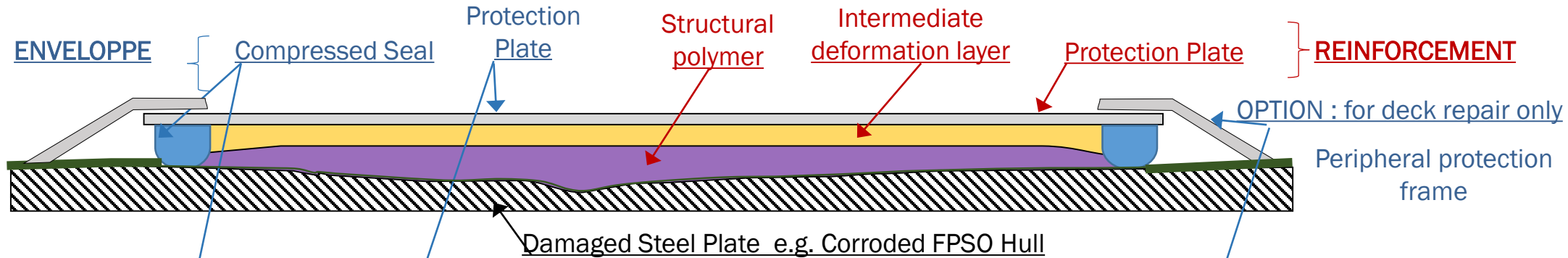
→ The challenge

Hot works would yield to

- a highly detrimental production disruption (~3 MUSD)
- Risks linked to the explosive environment



A cold work repair solution for structural hull maintenance



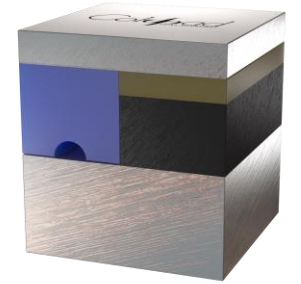
Functions :

- ➔ Restore Initial Structural Capacity
- ➔ Protect Against Further Corrosion

Standard shape
0,5 to 5 m²

How to deal with a first of a kind ?

- **Coldshield**, an innovative cold work solution for structural reinforcement
- INNOVATION, yes but how ?



How to deal with innovation ?

Is it class approved ?

How to manage the risks ?

Can I trust them ?

- In 2016, COLD PAD was



1st prize winner at Innovation Award

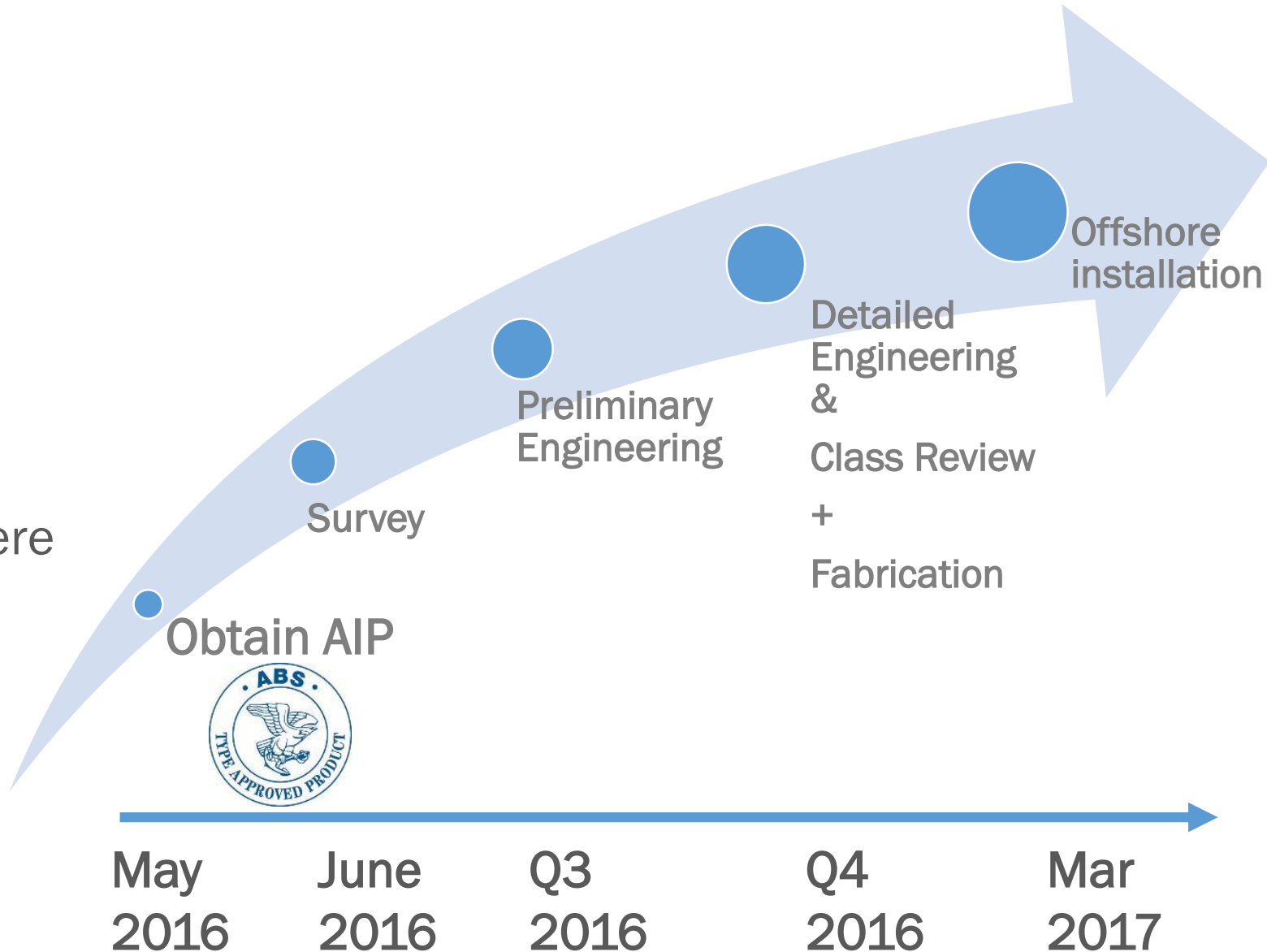


3+ years of R&D
3M€ of co-development



A True Partnership towards one goal

- Build confidence
- Transparency in objectives
- A clear Final goal with intermediate Milestones
- Obtain ABS class approval
- An Entrepreneurship spirit where CLIENT and SUPPLIERS are in the same boat



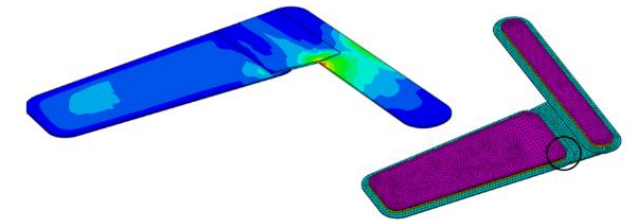
Lessons learnt on the Project Execution

- Creation of a 3-party project team with regular communication
- Overall Evaluation
 - ➔ Good command of Safety
 - ➔ On time delivery
 - ➔ Respect of budget
 - ➔ Good Reactivity during engineering

FPSO operations team – West Africa

Cold Pad – Paris

SBM Asset integrity - Monaco

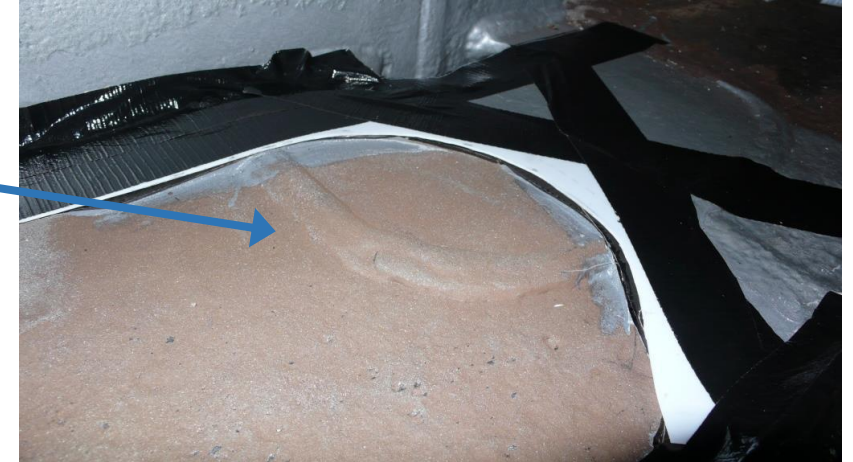


Lessons learnt from offshore Campaign

- **coldshield** proved to be highly compliant with surface irregularities (including weldments)
- The installation process proved to work offshore
 - In a confined space
 - Dehydration under Coldshield <1% HR
 - Surveyed and class approved

→ INDUSTRIAL PROCESS

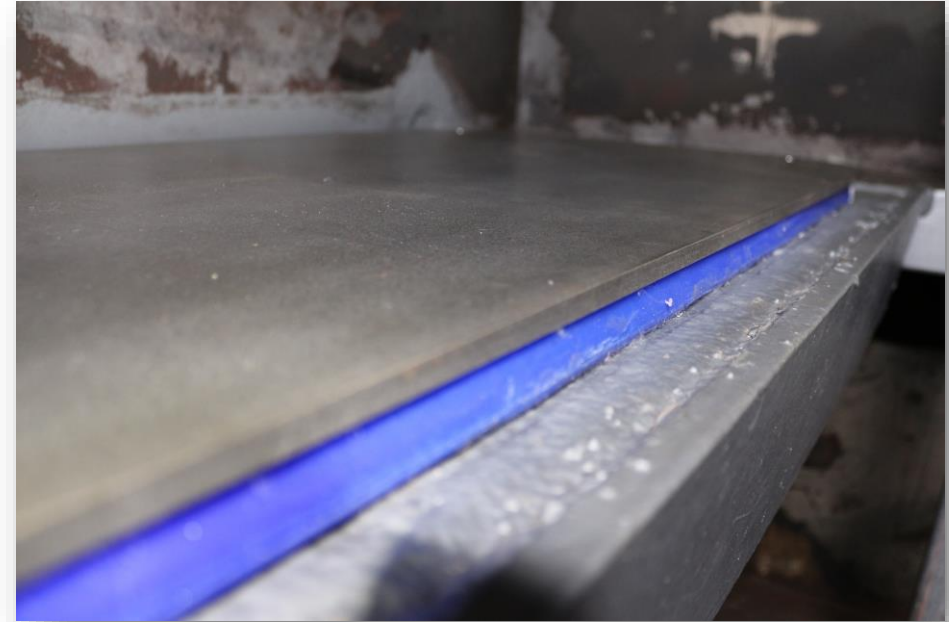
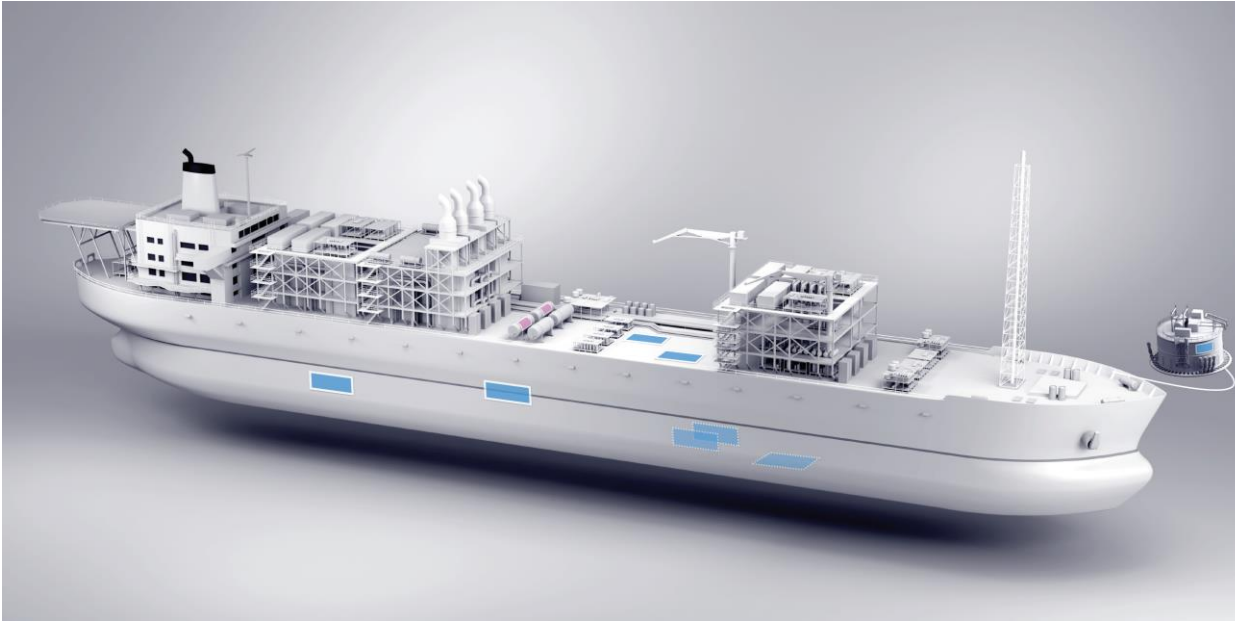
- 4 brackets were installed within 3 days
- Planning was overall respected
- To improve
 - Interface with Offshore personnel & permitting
 - Clamping device



The offshore Campaign



Way forward and Limitations



- SAFETY WISE, **coldshield** is an important improvement (No Hot Works)
- From a COST PERSPECTIVE, **coldshield** is an attractive solution if hot works result in production disruption or use of cofferdams

- **coldshield** offers a unique solution for bottom shell repair of COT in direct contact with Produced waters

Overall Lesson learnt

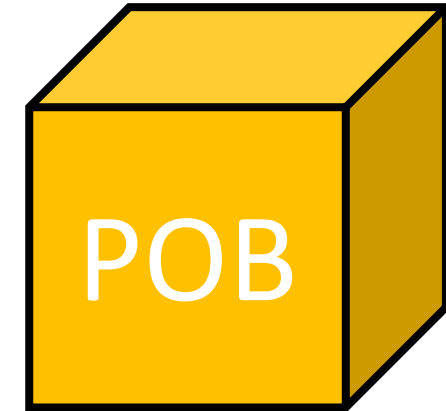
- through that project, **COLDSHIELD** proved to



Reduce exposure
to HSE risks
for offshore personnel



- Maximize FPSO uptime
& generate savings
- reduce contingencies



4 people crew
16 mandays offshore

Thank you + author information and contact

- Special thanks to the Offshore Operations team, the Charterer and ABS
- Vito Florio – Naval architect
- Timo de Beer – Technical Authority
- Xabier ERROTABEHERE – CTO
- Christophe PAILLUSSEAU – VP Sales & Marketing

