



## Evaluation of a quick turn-around time splash zone coating system



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**Erik Broesder**  
**Research & Development**

**Stopaq Europe b.v.**  
**Gasselterstraat 20**  
**9503 JB Stadskanaal**  
**the Netherlands**



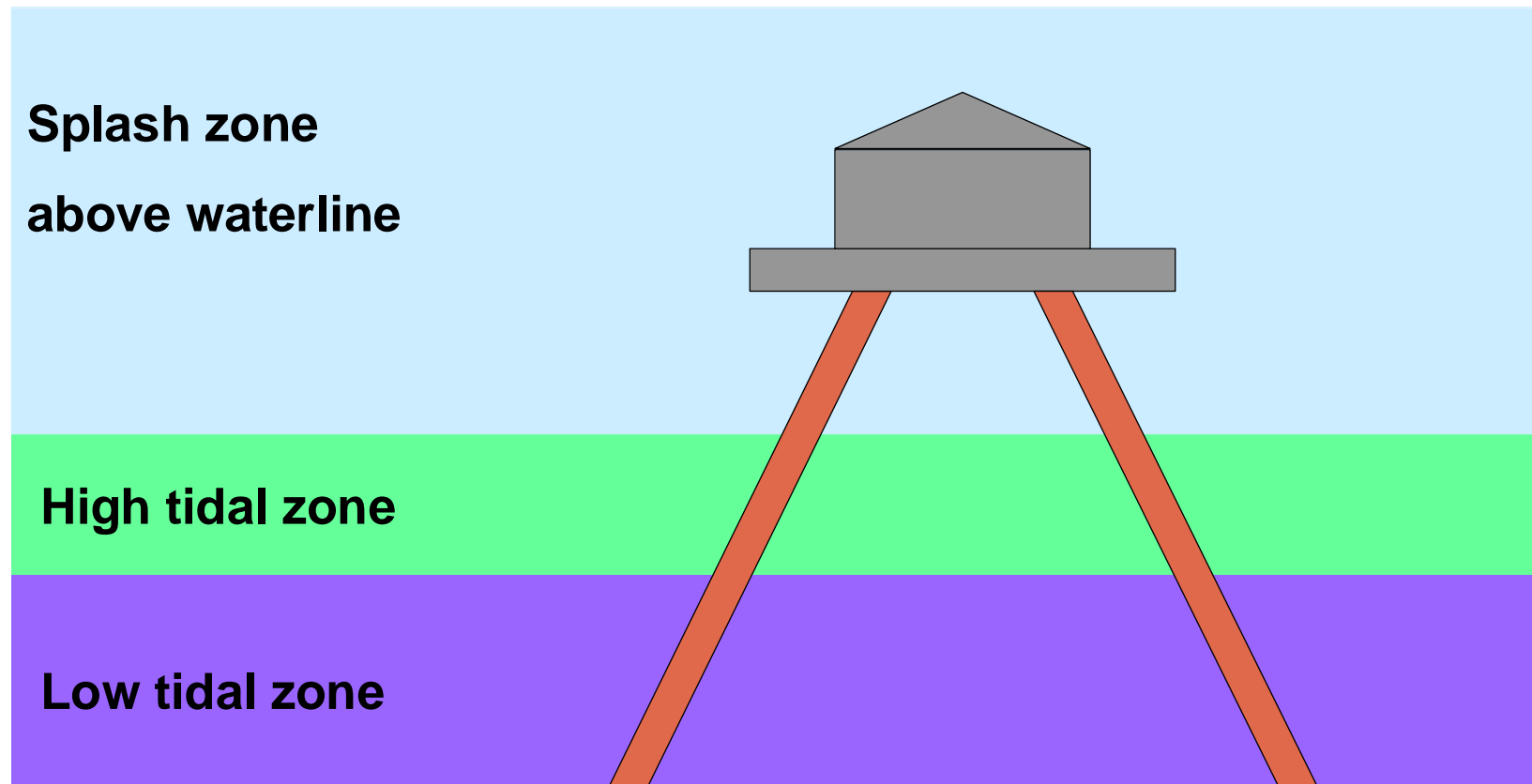
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- The assets and its environment
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- Existing coatings
- Criteria for a coating system
- Stopaq coating system: application

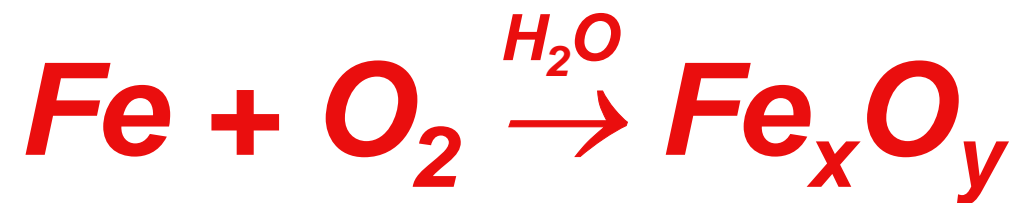
## Offshore assets



## The asset and its environment



## The problem (1)



## The problem (2)

Corrosion causing severe damage to essential structures.



## Possible causes (1)

Inappropriate specification of coating material and / or coating process:

- ◆ Interaction of the coating with environment may lead to deterioration of the coating. Can be caused by humidity, water, salt, wind, biological growth, (UV-) irradiation and temperature fluctuations.
- ◆ Poor resistance to mechanical impact may lead to interaction of the substrate with the environment.

## Possible causes (2)

Poor surface preparation and/or coating application:

- ◆ Complex structures hampering workers to reach all surfaces to be prepared and/or coated
- ◆ Residues of salt, dust, grease, old coating, etc. on the surface



## Possible effects (1)

- ◆ Disbondment of coating
- ◆ Undercreep
- ◆ Cracking and blistering
- ◆ Shielding in cathodic protection systems
- ◆ Osmosis

## Possible effects (2)

Poor adhesion and disbonding





## Existing coatings (1)

Rely on adding extrinsic properties:

- ◆ Hard (mechanical impacts)
- ◆ Unbreakable (mechanical impacts)
- ◆ Impermeable (oxygen and water)
- ◆ Durable (irradiation, chemicals)

## Existing coatings (2)

Paints rely on functional crosslinking, resulting in a hard shell around the substrate

Tapes rely on functional properties of their backings and adhesives and are wrapped with 50% overlap

Sleeves are wrapped and heated in order to shrink it to the substrate, minimizing the distance between the sleeve and the substrate

But, why do they fail ??  
Hard may not always be tough enough?



## A new approach

Stopaq visco-elastic corrosion preventing coating systems as starting point for development of a quick turn around time splash zone coating system...

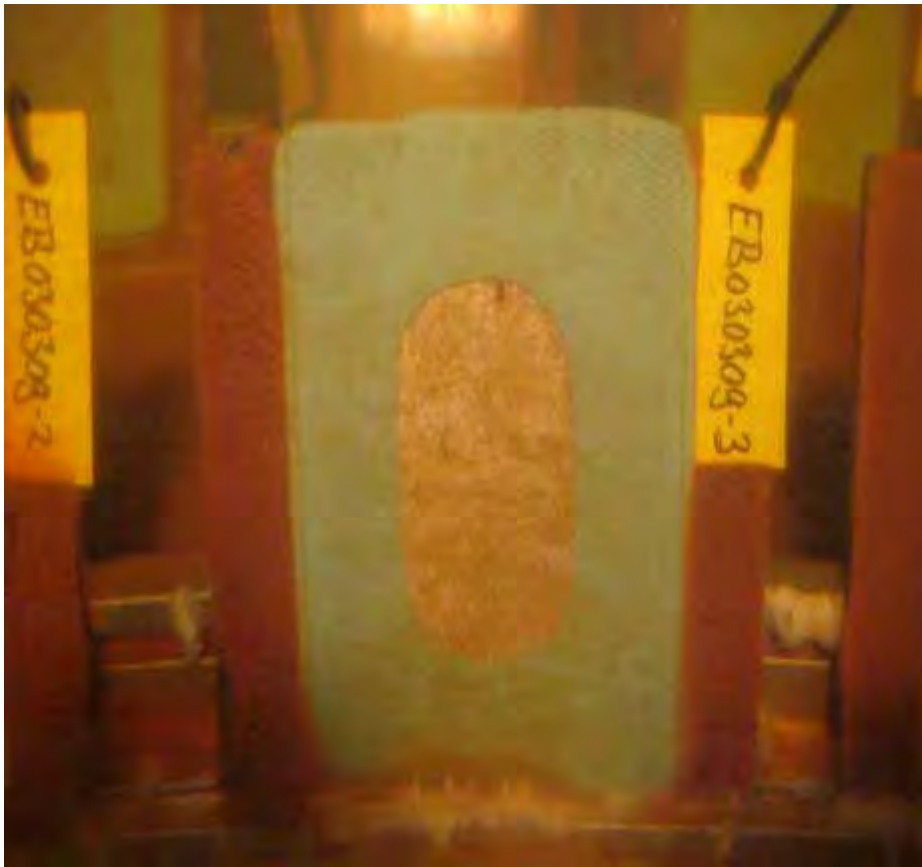
...eliminating the causes of system failure...



## Criteria for a coating system (1)

- ◆ Highly impermeable to oxygen and water

## Impermeable to oxygen and water (1)



## Impermeable to oxygen and water (2)



**Steel surface  
after removal of  
Subsea compound**

**Subsea compound**

**Unprotected steel, exposed for several  
months in salt water**



## Criteria for a coating system (2)

- ◆ Highly impermeable to oxygen and water
- ◆ Excellent adhesion & cohesion to any substrate

## Excellent adhesion and cohesion (1)

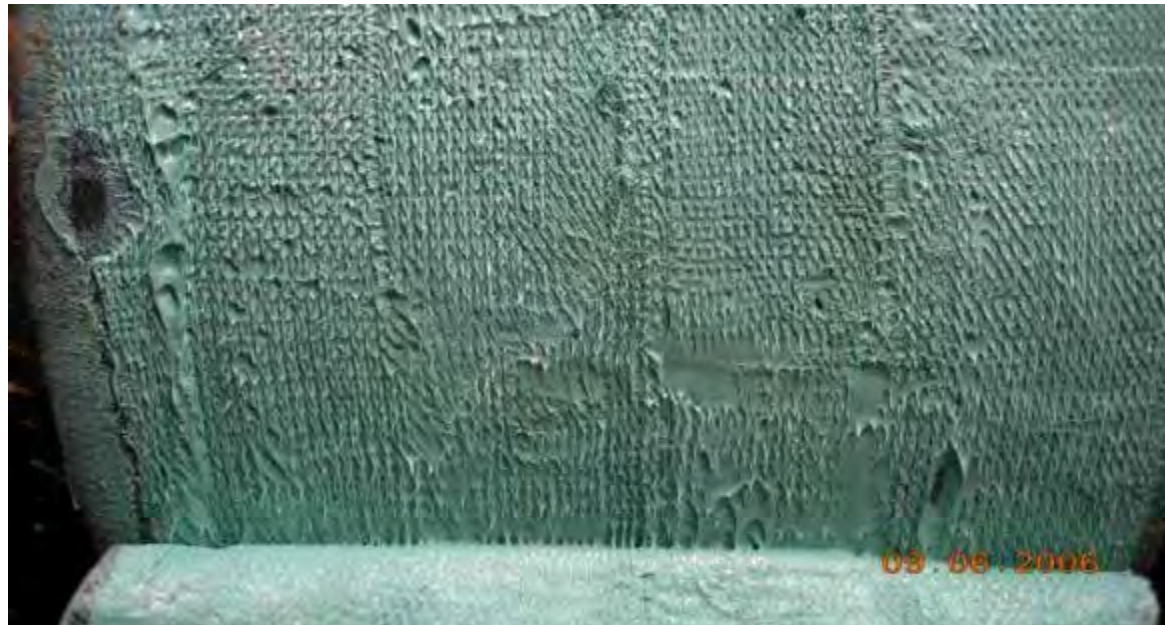
Bitumen Coating →



← EPOXY

↑ Prepared Steel (ST 2 – 3)

## Excellent adhesion and cohesion (2)



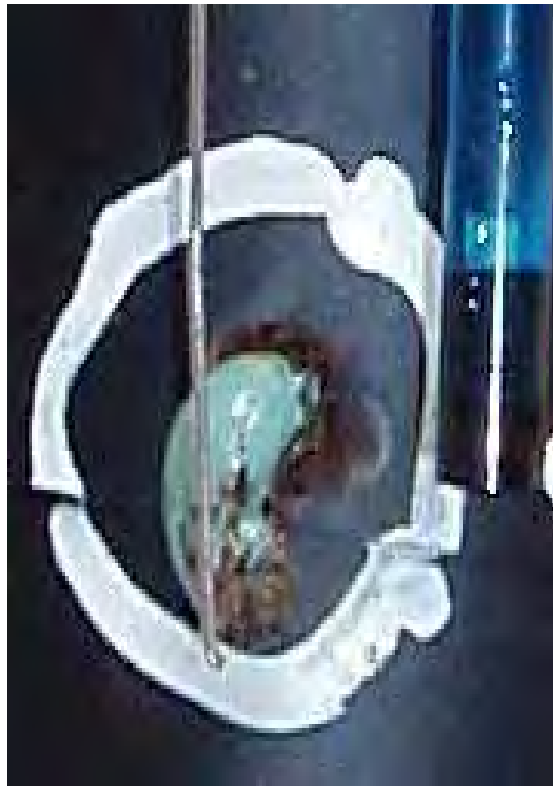
Even when peeled Stopaq technology ensures the substrate remains fully coated



## Criteria for a coating system (3)

- ◆ Highly impermeable to oxygen and water
- ◆ Excellent adhesion & cohesion to any substrate
- ◆ **No disbondment**

## No disbondment





## Criteria for a coating system (4)

- ◆ Highly impermeable to oxygen and water
- ◆ Excellent adhesion & cohesion to any substrate
- ◆ No disbondment
- ◆ **No internal stress build-up**

## No internal stress build-up



Stopaq is a fluid with high viscosity, even at temperatures down to  $-45^{\circ}\text{C}$

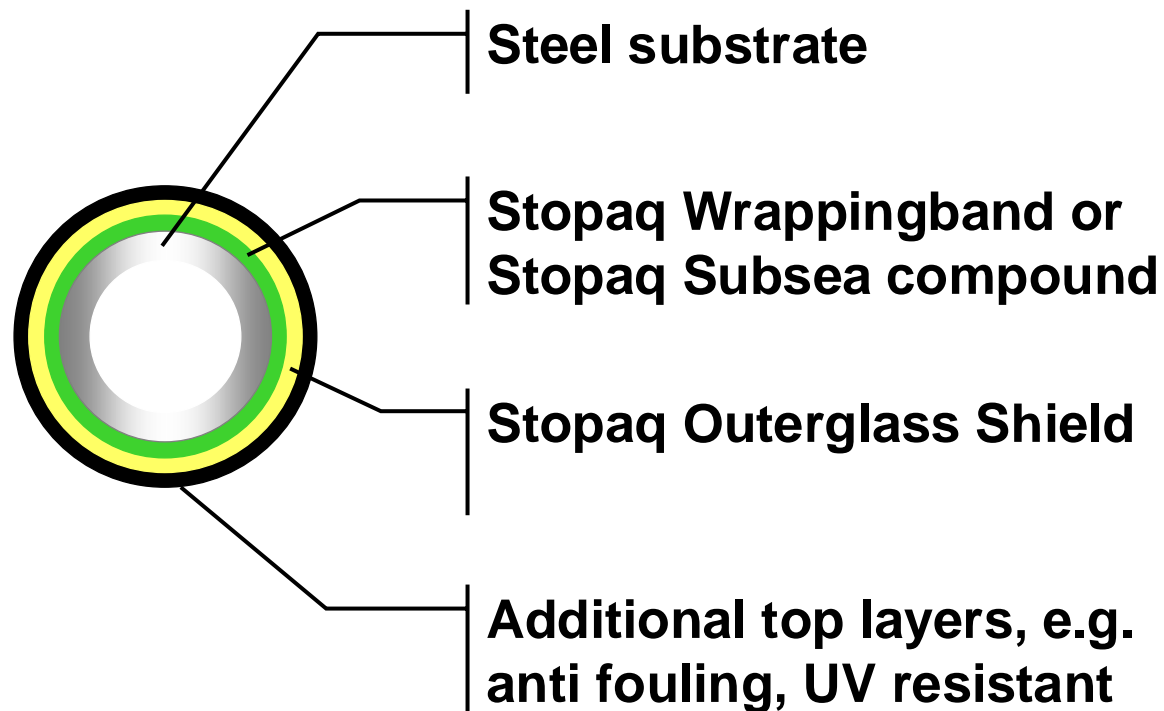


## Criteria for a coating system (5)

- ◆ Highly impermeable to oxygen and water
- ◆ Excellent adhesion & cohesion to any substrate
- ◆ No disbondment
- ◆ No internal stress build-up
- ◆ Resistance to mechanical impacts and ideally self heal when damaged
- ◆ Excellent UV- and weather resistance



## Mechanical impact, UV- and weather resistance



## Self healing effect





## Criteria for a coating system (6)

- ◆ Highly impermeable to oxygen and water
- ◆ Excellent adhesion & cohesion to any substrate
- ◆ No disbondment
- ◆ No internal stress build-up
- ◆ Resistance to mechanical impacts and ideally self heal when damaged
- ◆ Excellent UV- and weather resistance
- ◆ **Conform to any shape**

## Conform to any shape



Application of Wrappingband and  
Subsea compound without any tension

No internal stress

Conforms to any shape



## Criteria for a coating system (7)

- ◆ Highly impermeable to oxygen and water
- ◆ Excellent adhesion & cohesion to any substrate
- ◆ No disbondment
- ◆ No internal stress build-up
- ◆ Resistance to mechanical impacts and ideally self heal when damaged
- ◆ Excellent UV- and weather resistance
- ◆ Conform to any shape
- ◆ Safe to work with and environmentally friendly



## Safe to work with and environmentally friendly

- ◆ Wrappingband and Subsea compound do not contain hazardous ingredients.
- ◆ Waste can be treated like household refuse

## Criteria for a coating system (8)

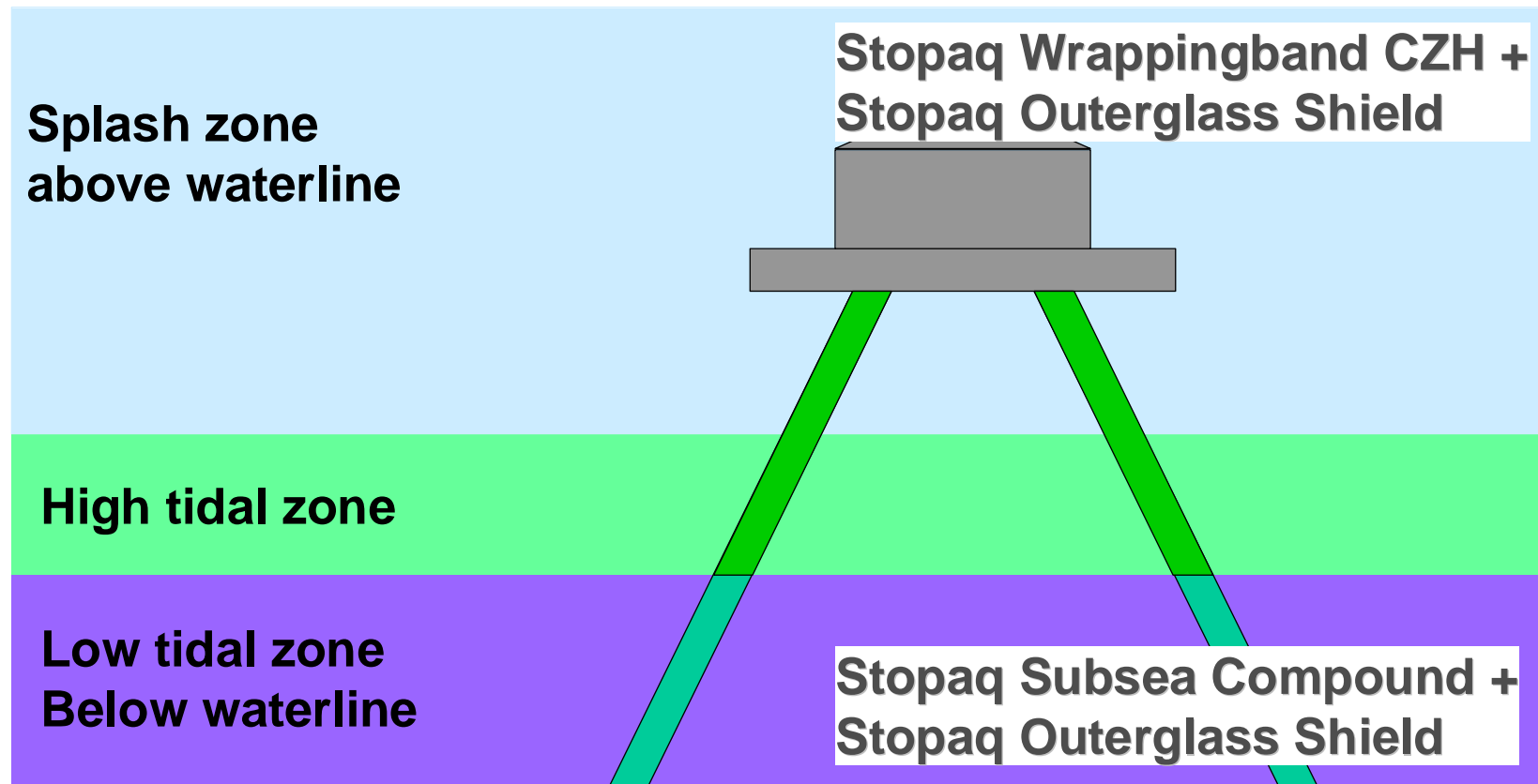
- ◆ Highly impermeable to oxygen and water
- ◆ Excellent adhesion & cohesion to any substrate
- ◆ No disbondment
- ◆ No internal stress build-up
- ◆ Resistance to mechanical impacts and ideally self heal when damaged
- ◆ Excellent UV- and weather resistance
- ◆ Conform to any shape
- ◆ Safe to work with and environmentally friendly
- ◆ **Not critical to surface preparation and easy to apply**

## Surface preparation and ease of application

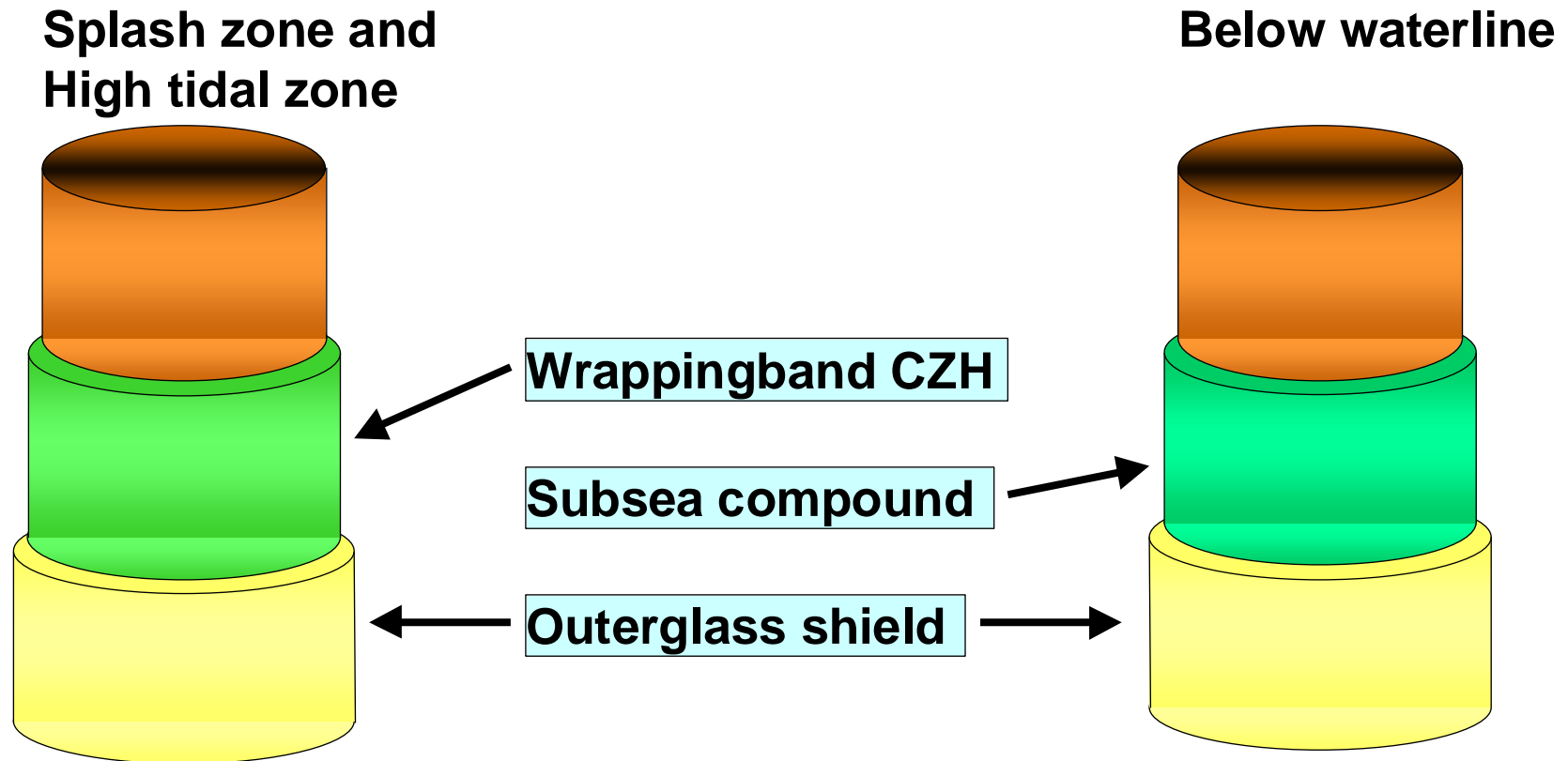


Not critical to surface preparation; power tools of hydro jetting is sufficient – huge savings over abrasive cleaning

## Stopaq coating system; overview (1)



## Stopaq coating system; overview (2)



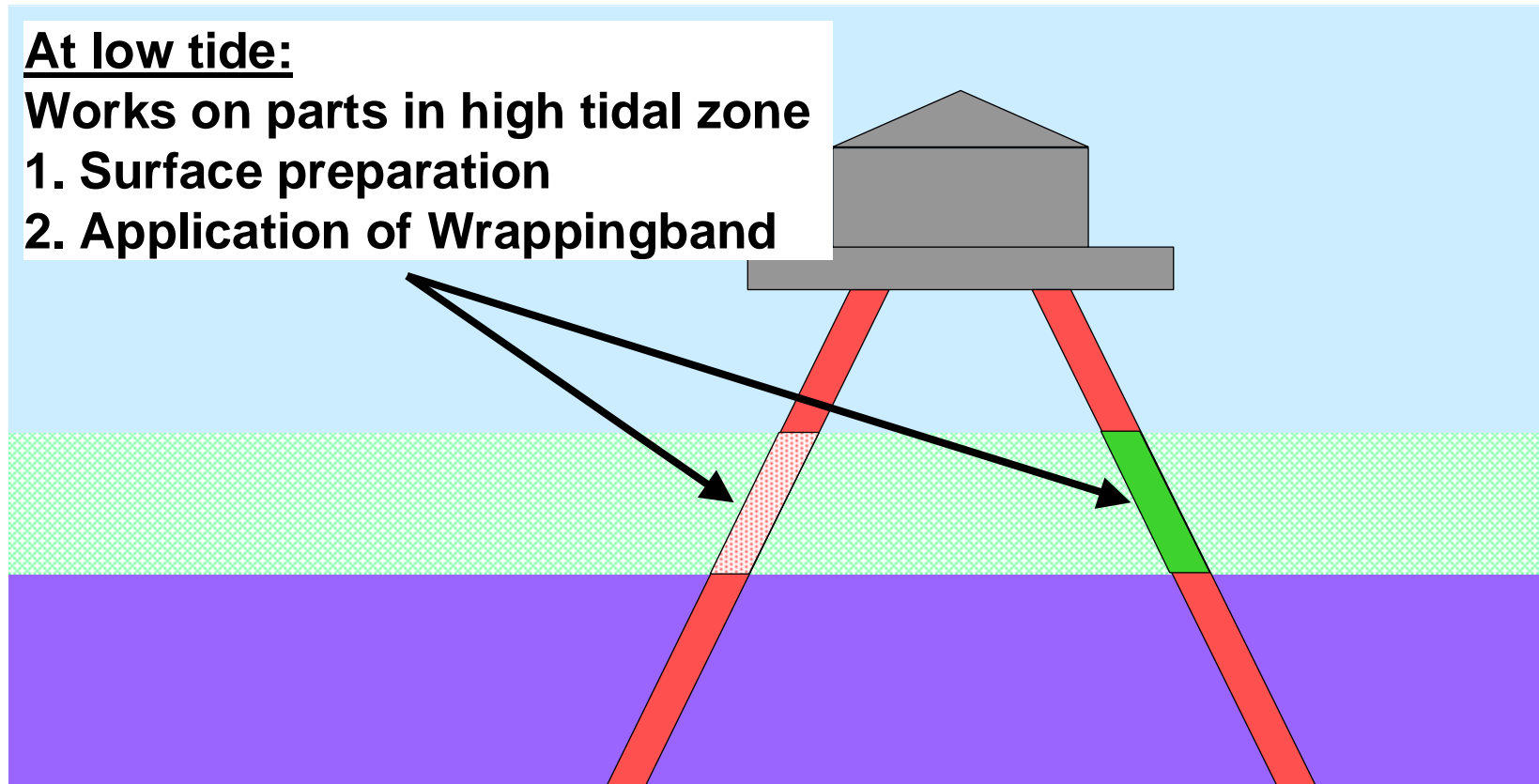
## Stopaq coating system; application step by step (1)

**At low tide:**

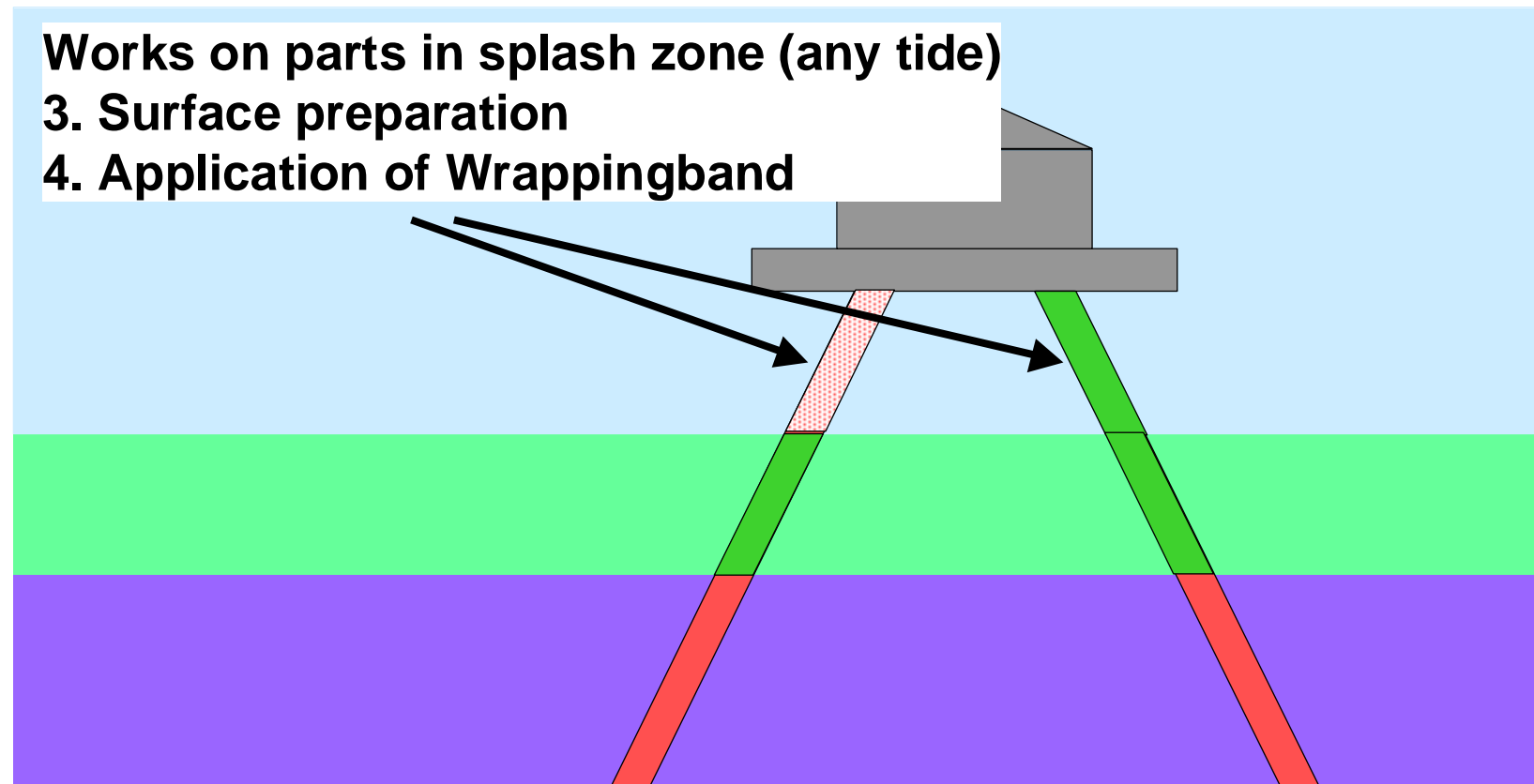
**Works on parts in high tidal zone**

**1. Surface preparation**

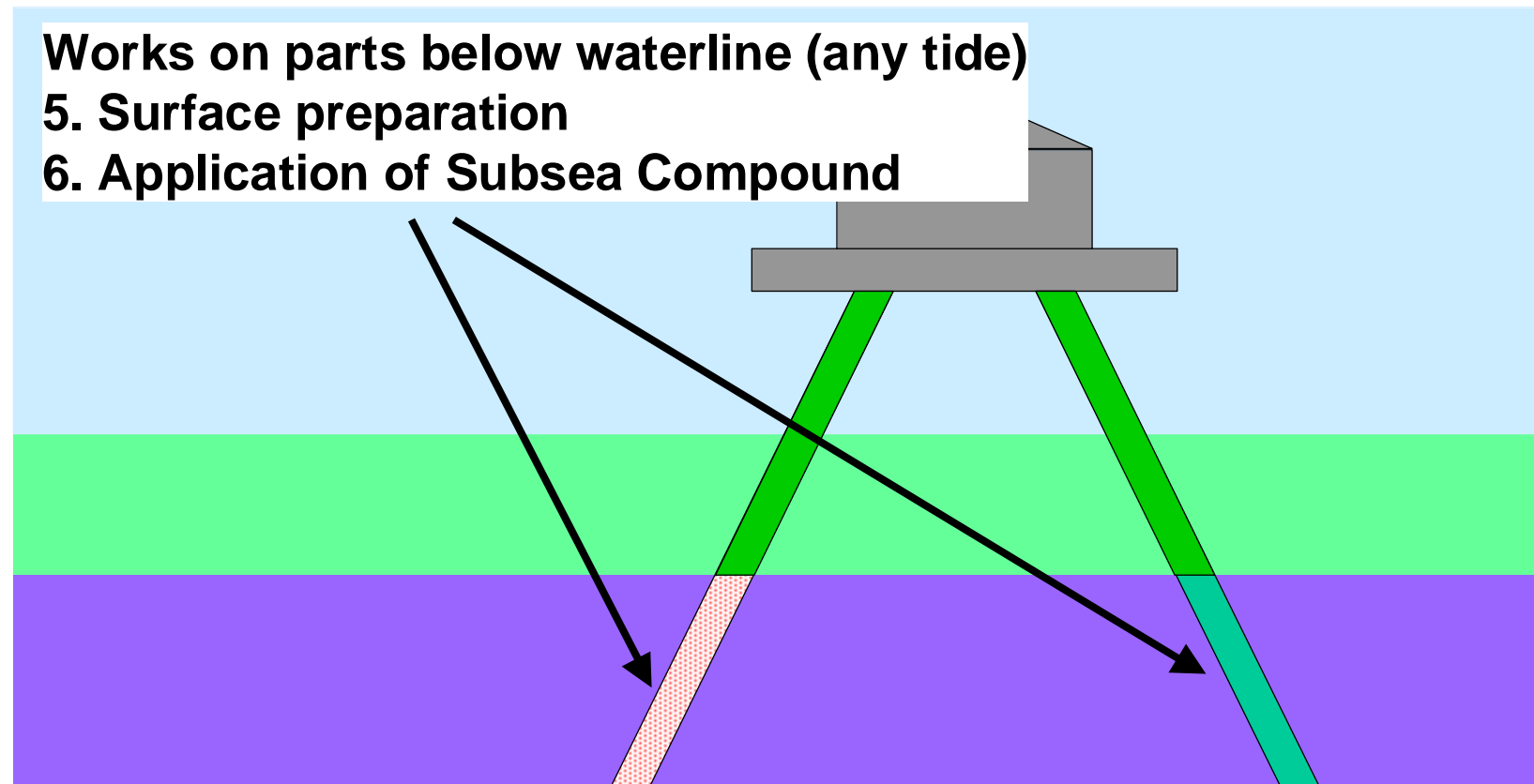
**2. Application of Wrappingband**



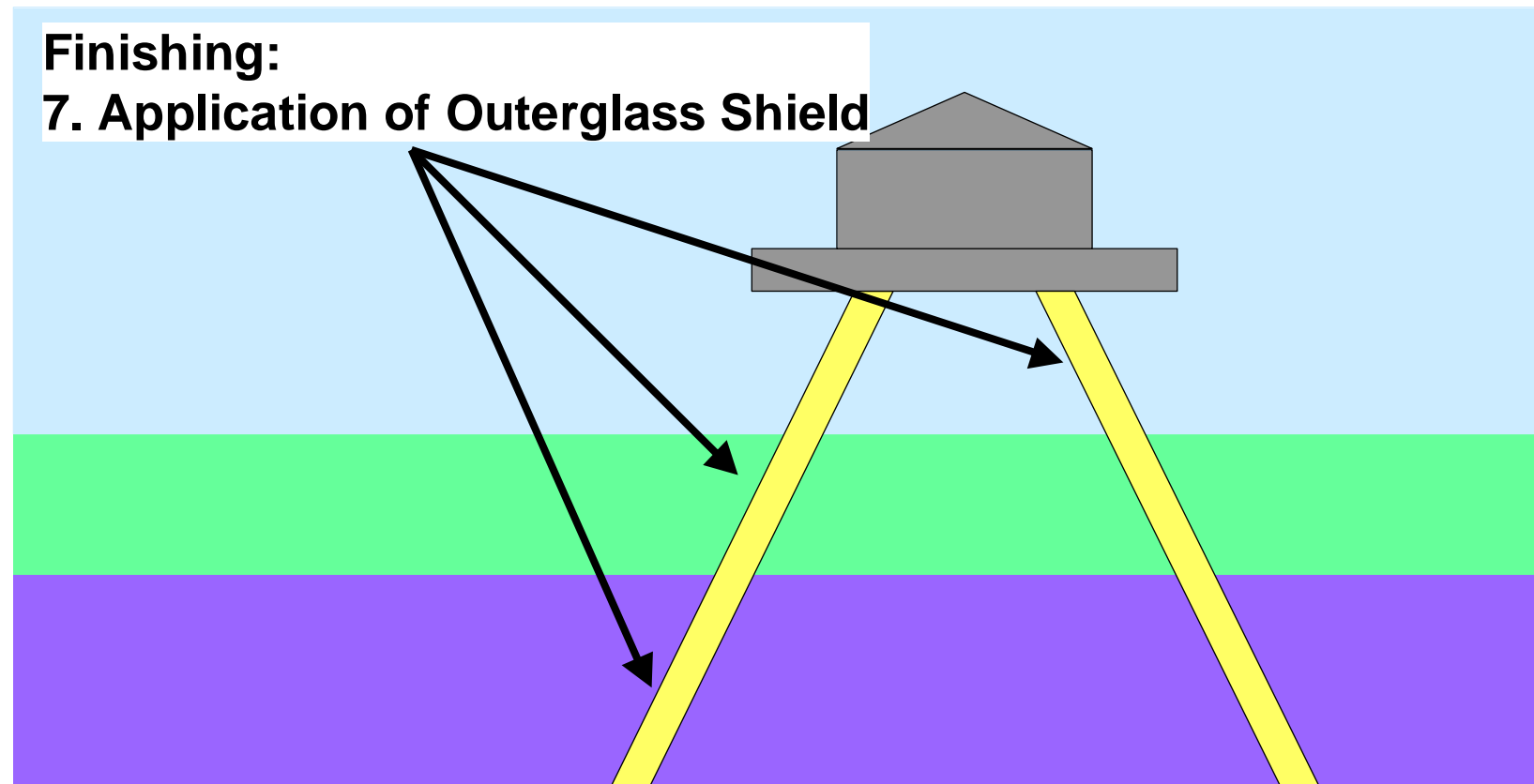
## Stopaq coating system; application step by step (2)



## Stopaq coating system; application step by step (3)



## Stopaq coating system; application step by step (4)



## Stopaq coating system: demo of application (1)



## Stopaq coating system: demo of application (2)



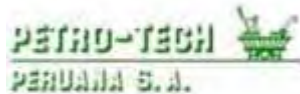


## References

## Current projects



**Smit subsea, the Netherlands**



**Petro-tech Peruana, Peru**



**The end**

**Thank you for your attention**

**More info at:**

**[www.stopaq.com](http://www.stopaq.com)**