BLUE EDGE CONSULT
SUSTAINABLE ENGINEERING AND CONSULTING SERVICES

5th Offshore days Warnemünde

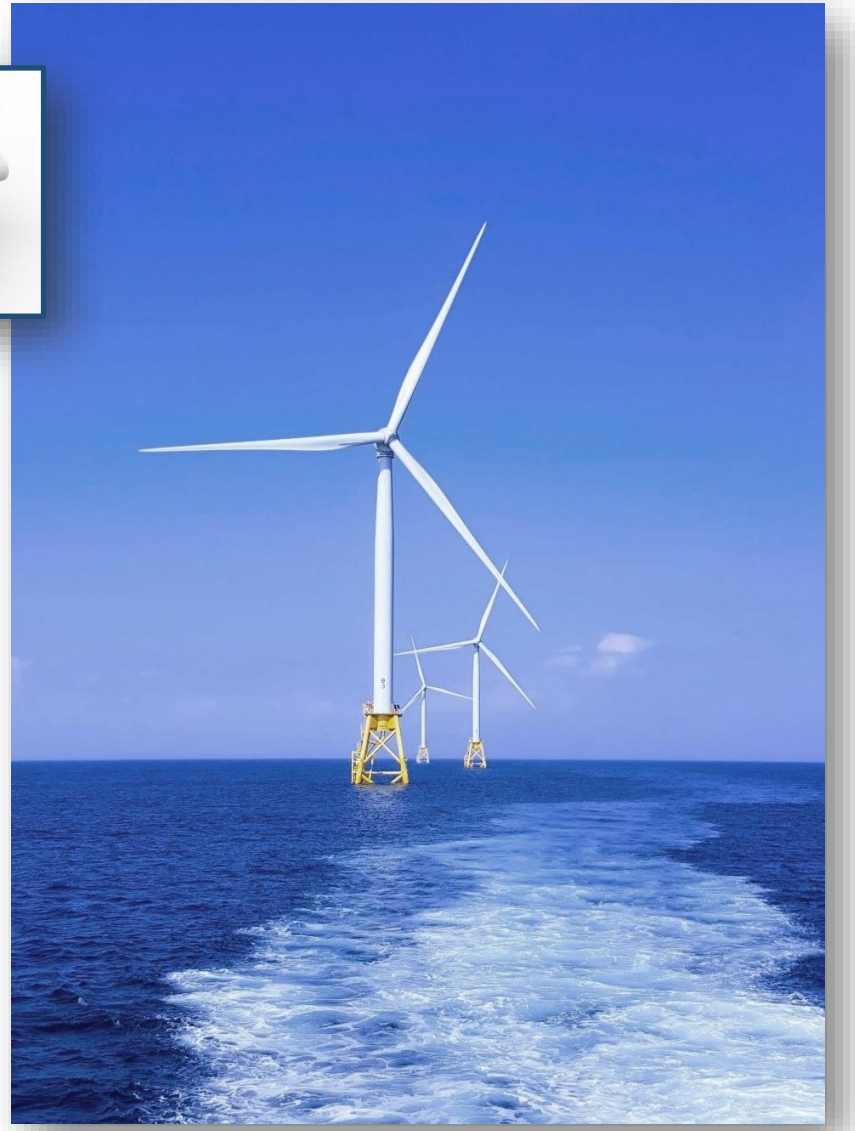
BEC – Tim Klatt – 02.03.2018

Costs (further) down – efficiency (further) up !

Concrete ideas for CAPEX and OPEX / Extract

Kosten (weiter) runter – Effizienz (weiter) rauf ! Konkrete Anregungen für CAPEX & OPEX

Content



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BLUE EDGE CONSULT
SUSTAINABLE ENGINEERING AND CONSULTING SERVICES

Business & investment development
Project development
Technology development
Corporate & orga development

Sales & proposal management
Project management
Contract management
Engineering management

Project manager
Product / program manager
Interim manager
Consultant

Offshore wind
Onshore wind
Civil works
Logistic & transport

- **Create awareness for:**
  - **The tough times w/ regard to extreme cost pressure in offshore wind in the coming years**
  - **The need to think lateral to cope w/ this**
- **Show some good ideas for further cost reductions in CAPEX & OPEX – also on smaller scale**

- **Highlight the need to implement these approaches early in the OWF development phase**

Speaker Tim Klatt: Managing Partner, Senior Consultant of Blue Edge Consult (BEC):

- 49y old, Hamburg, DE
- Civil and industrial engineer
- 21y business experience in executive project and technology management functions of international major projects
- Since 10y in the (offshore) wind industry (Nordex, Senvion, Bilfinger)
- The last 6y until mid 2017 @ Bilfinger Offshore* as Head of Sales and Development (responsible for sales & marketing, business development and applied R&D)
- Since 08.2017 managing partner of the newly founded Blue Edge Consult, Hamburg, DE

* The German EPCI (foundation) contractor Bilfinger Marine & Offshore Systems GmbH (e.g. OWF Horns Rev 2, OWF London Array, OWF Dan Tysk, OWF Sandbank, etc.) was acquired by the Dutch Van Oord Group in 10.2016 and acts until today as Van Oord OWP Germany GmbH, Hamburg, DE.

The advantages of each idea are listed

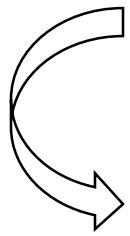
- Advantage 1
- Advantage 2
- …

The left challenges of each idea are listed

- Challenge 1
- Challenge 2
- …

Each idea is allocated to the Technology/ Manufacturing Readiness Level (TRL/MRL)

	M	Full market availability
Phase	MRL	State of Development
Phase 3: Production Implementation	9	Full production process qualified for full range of parts and full metrics achieved
	8	Full production process qualified for full range of parts
	7	Capability and rate confirmed
Phase 2: Pre production	6	Process optimised for production rate on production equipment
	5	Basic capability demonstrated
Phase 1: Technology assessment and proving	4	Production validated in lab environment
	3	Experimental proof of concept completed
	2	Application and validity of concept validated or demonstrated
	1	Concept proposed with scientific validation



3. List of topics treated within the presentation (regular 25min)

CAPEX topics

1. FOU T&I: Vibro Piling & Blue Piling (in Offshore Wind)
2. FOU: Concrete (in Offshore Wind)
3. FOU: Double Slip Joint
4. FOU FAB: Fully automated robotic welding (jacket nodes)
5. FOU T&I: Optimized footprint of jackets (via CAP*)
6. FOU T&I: Ordinary Portland Cement (OPC) for jackets (@ OFW)
7. T&I contract: P0 / Shared Adverse Weather Risk (P0 ADW)
8. FOU T&I: Shuttle transports of MPs/TPs, jackets
9. FOU T&I: Intelligent & re-usable sea-fastening for TP/MPs and jackets
10. FOU T&I: Conducted Bubble Curtain (CBC)

OPEX topics

1. FOU: Basalt Fiber Protectors
2. FOU/OWF: Basalt Fiber Textile (as sole steel CPS)
3. OWF: Oxifree (preservation of complex components)
4. OWF: Virtual Maintenance (Training & O&M support)

CAPEX & OPEX topics

1. OWF: Offshore Wind specific Computer Aided Process Planning (CAP) tools
2. OFW: Building Information Modelling (BIM) in Offshore Wind

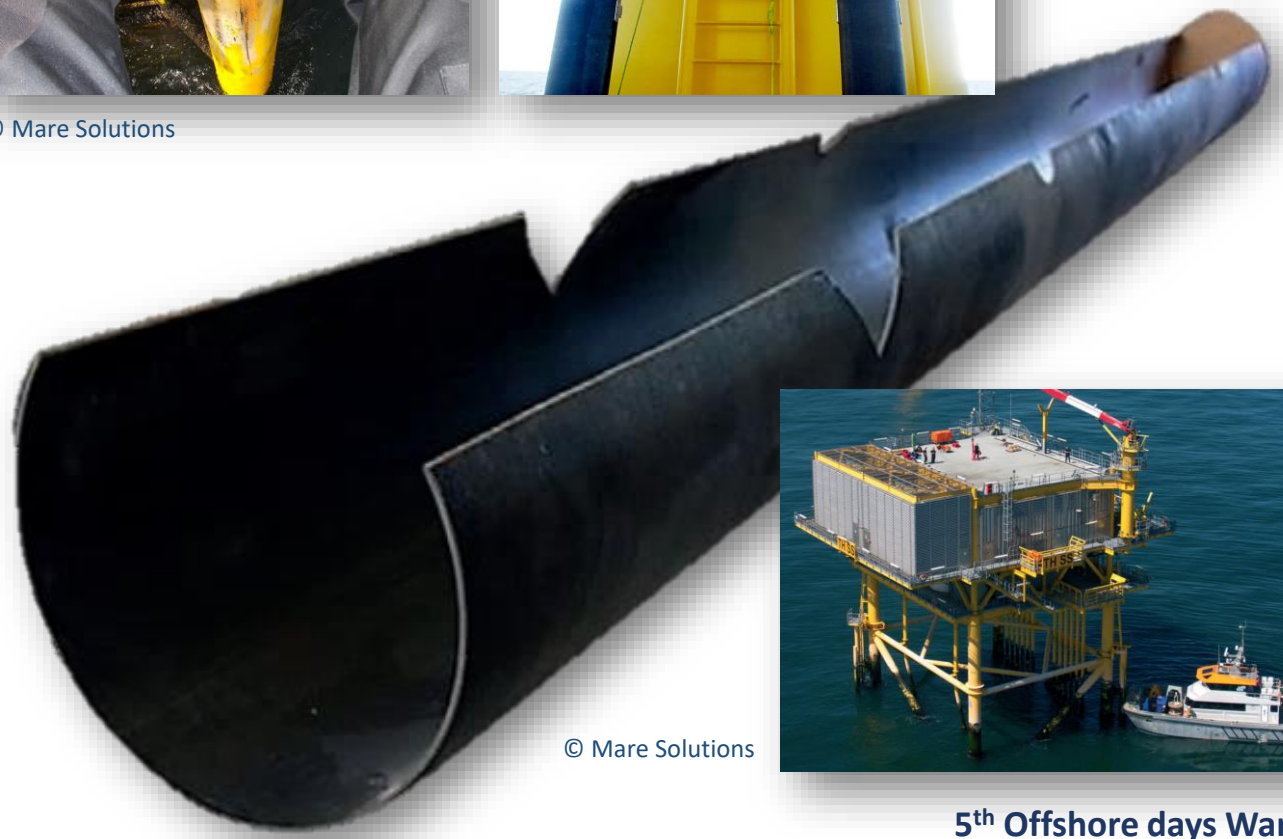
… list tbc. w/ further ideas.

4. FOU: Basalt Fiber Protectors (BFP)

By Mare Solutions GmbH, Bremen, DE

Basalt fiber textile

© Mare Solutions



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Advantages

- Very resistant & durable to mechanical, and UV/chemical attack (CTV & seawater)
- Easy adaptable to all boat-landings
- Adaptable also to other applications
- OPEX cost saving potential ⇨

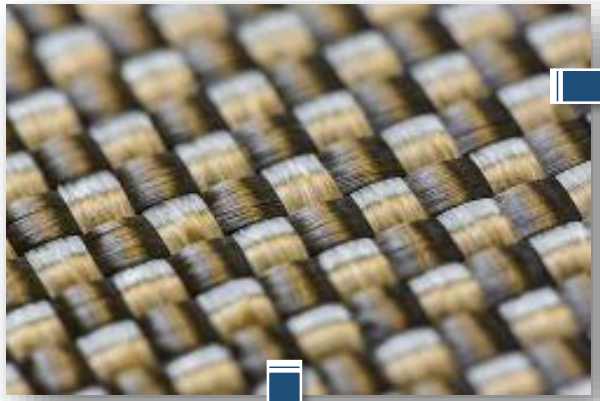
Left challenges

- Large scale & international business
- Hurdles to overcome:
  > Contractual demands by OF contractors
  > 'Unproven technology'

BFP	1	2	3	4	5	6	7	8	9	M

4. FOU/OWF: Basalt Fiber Textile (as sole steel CPS) (BFP)

By Mare Solutions GmbH, Bremen, DE



Basalt fiber textile

Test application on steel >

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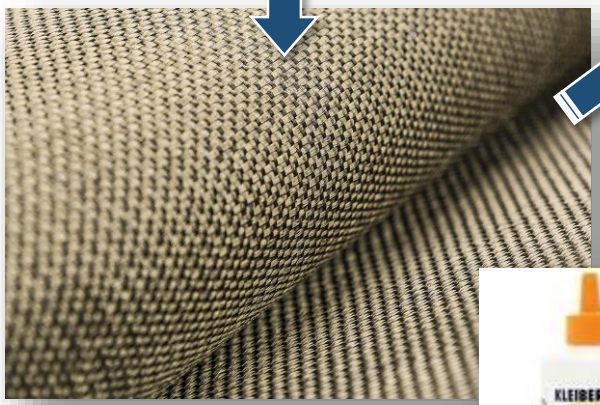

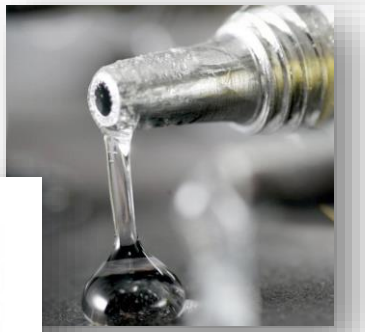

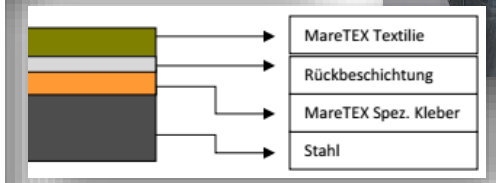

Revolutionary applicat. process: Wall-/surface 'papering w/ glue' ('tapezieren m. Kleber') instead of coating in several layers

Advantages

- Very resistant & durable to mechanical, UV/chemical attack and resistant to cuts
- (Up to) Minus 70% marine growth !
- Special 2K glue + BFP instead of several, sensitive coating layers
- OPEX cost saving potential ⇧ (huge > offshore, ships, other steel structures)

Left challenges

- Hurdles to overcome:
  - > (Resistance of) Coating lobby
  - > BSH requirement RAL 1023 (yellow)
  - > 'Unproven technology'

BFP	1	2	3	4	5	6	7	8	9	M

Thanks for your kind attention. Any questions left ?

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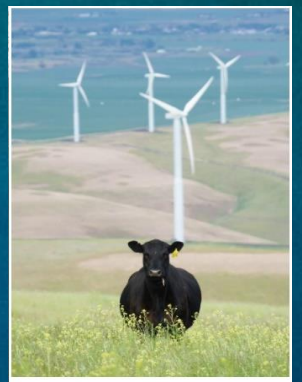
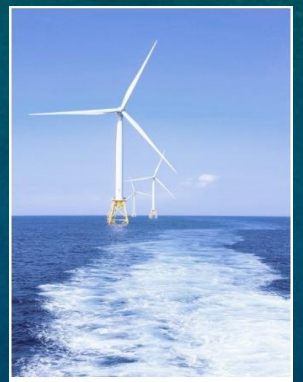


ONSHORE



OFFSHORE

CIVIL WORKS

What are your challenges ?
Get in touch !
Blue Edge Consult – one edge further.

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