

Methodology for floating offshore wind turbine Major Component Replacement (MCR) - Webinar



Floating Offshore Wind Operations and Maintenance (FLOWTOM) project

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PARTNERSHIP:



With the financial support of:



1. Introduction & context



Laure Cossalter, FRANCE ENERGIES
MARINES



- Heavy maintenance at sea such as **Major Component Replacement (MCR)** is a research and development challenge for the offshore wind sector
 - MCR (mainly gearbox & generator) contribute the most to O&M costs by material costs and repair time (excluding mean time to access), despite low failure rate¹

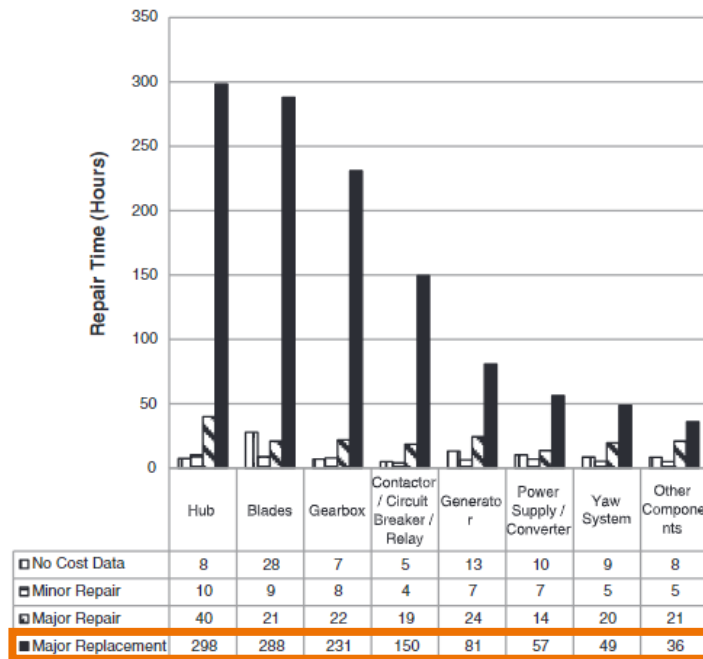


Fig 1 : Average repair time for subassembly/sub component

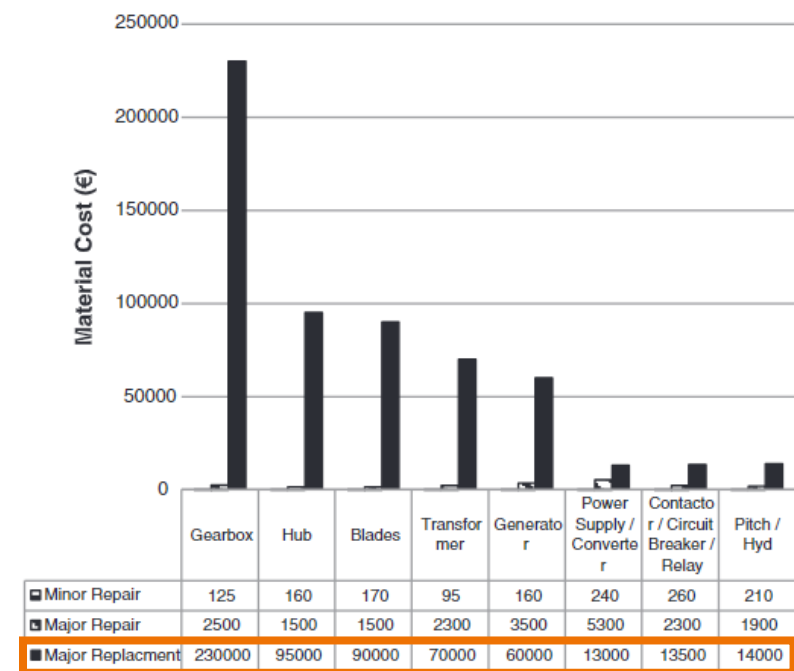
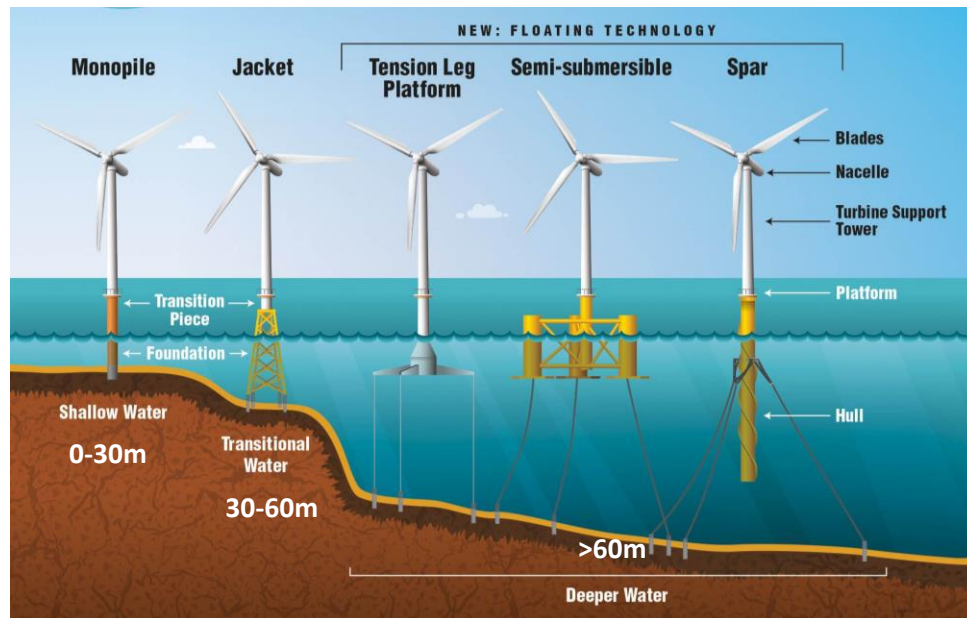


Fig 2 : Average repair cost for subassembly/sub component

- For FOWT, **accessibility and operability** of maintenance methods increase in complexity
 - Farms are installed further than jack up vessels capabilities
 - Relative motion between floaters result in high demands on vessel's dynamic positioning system and induce restrictive metocean windows

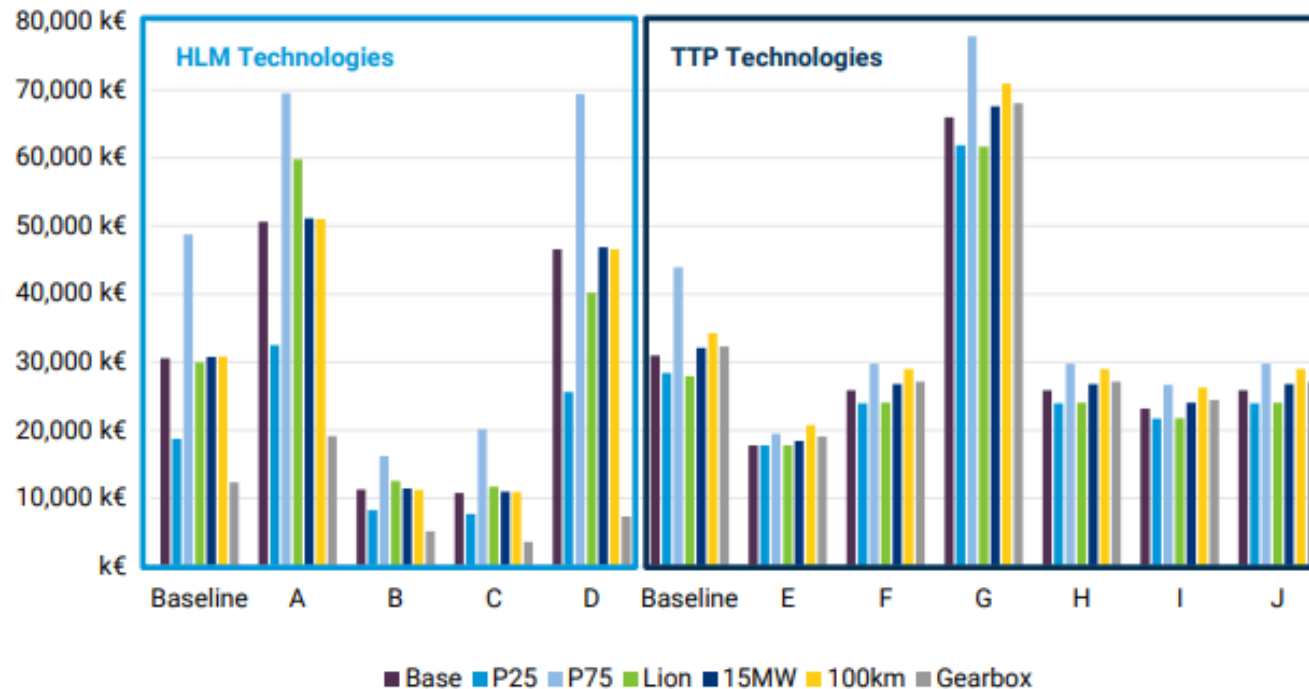


→ Need of **reliable** and **proven** solutions for MCR operations on FOWT **cost competitive** with tow to port alternative

A, B, D Turbine Mounted Crane



C Vessel Mounted Crane



E to J Tow To Port

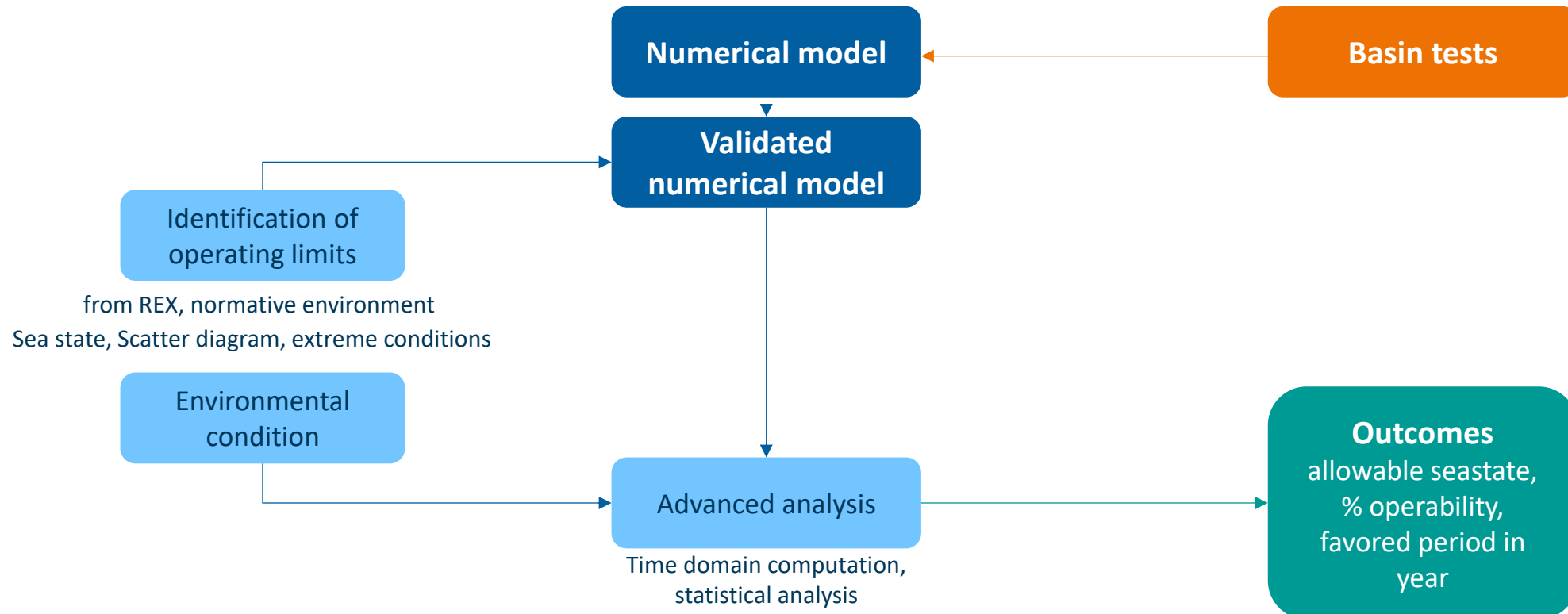


HLM technologies can achieve MCR campaign within TTP cost range, but are more sensitive to sea state conditions

FLOWTOM project objectives [2021 - 2024]

Challenge FOWT LCOE reduction by improving MCR operation accessibility (\searrow downtime) in sea states conditions

→ Via the development and assessment of methodology & simulation tools for MCR solutions operability evaluation



Case study on one MCR solution : self erecting, turbine mounted crane

- **Self erecting lifting solution :**
 - System package prior installation
 - System crane
- **Advocating**
 - **Improved EHS** : no relative floating to floating motion on the FOWT
 - **Higher availability > lower downtime**
 - **Resistance to harsh environment**



The case study is inspired by the MCR solution design and aims at crash-testing the methodology but **DOES NOT** assess the full system operability

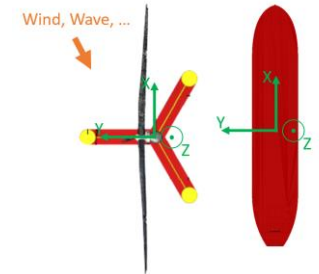
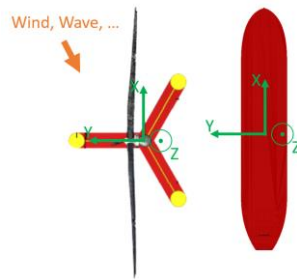


Basin test specifications

Case study specifications

- Comparison Basin test VS dedicated numerical model:
 - Semi submersible VoltturnUS-S + IEA 15MW
 - Mono hull vessel
 - Scale 1/50

- Complete Numerical study:
 - Semi submersible VoltturnUS-S + IEA 15MW
 - Mono hull vessel
 - Float4Wind + IEA 15MW
 - MCR self erecting system
 - Specific lift case studies



- 1. Welcome word, agenda and context – Laure Cossalter, *France Energies Marines* 10'
- 2. Basin tests for numerical model validation 45'
 - Specification of wave tank tests – Benoit Augier, *IFREMER*
 - Validation of numerical model – Tanguy Coquio, *France Energies Marines*
- 3. Case study : operability definition of MCR steps 45'
 - Methodology development and case study specifications - Tanguy Coquio, *France Energies Marines*
 - Case of transfer of heavy package from vessel to floating offshore wind turbine – Melissa Mak, *EDF R&D*
 - Case of hub replacement at tower top of a floating offshore wind turbine – Pierre Alain Frémont, *SBM offshore*
- 4. Interactive Q&A session 15'
- 5. Conclusion and wrap up – Laure Cossalter, *France Energies Marines* 5'