

Conclusion

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FOW Market is expecting to experience **significant growth** in the near future. There is a need for cost reduction to accelerate project development:

- Anchoring constitutes a substantial part of project development cost
 - Site Survey / Fabrication / Installation
- Seek innovative/unconventional anchoring solutions
- Develop appropriate design methods or optimize already available ones
- Adapt design rules originally intended for O&G

SHARED ANCHORS represent an opportunity to reduce project costs and shorten their schedules

Less anchors is :

- Fewer survey points to be performed in preliminary stage for collecting data for BOD
- Less fabrication cost and less installation time due to fewer anchors

Shared suction CAISSON in soft clay has already been successfully done

- Limited development for slender piles in SAND is currently available
- Need to better understand multi-directional cyclic behavior in sand

MUTANC has developed a **COMPREHENSIVE** approach:

- Mooring System Design and Anchor Loads - a Realistic Model
Floater / Lay out / Water Depth / Meteocean data
- Centrifugal Testing
Small scale testing on idealized loadings / Monotonic and Cyclic – Uni and Multidirectional
- Advanced Geotechnical Numerical modeling
Calibrated on sample tests and on centrifugal test results
- Cost Model
Gives rational basis for selecting shared anchors

This success is the result of
a **CLOSE COLLABORATION**
between industry and
public research entities

Those main **OUTCOMES** :

- Better understanding of the sand cyclic behavior
- COLLECTION of quantitative data and a CALIBRATION of numerical models for parametric studies
- Confidence on shared anchoring as a **TECHNICAL** and **COST-effective** solution

From an **INDUSTRY perspective** :

- Will help to IMPROVE our DESIGN PRACTICE
- May accelerate development of FOW by achieving COST and SCHEDULE savings

OW sector need

- Reduction of the LCOE for floating offshore wind parcs
- Improve mooring & anchor installation phases

R&D challenges

- Anchor sharing:
 - Better understanding of pile in sandy soil under multidirectional and cyclic loads, Toward an industrial approach
 - Understanding of extended type of soil (Clay) and type of anchors (Suction) → Geotech
- Line sharing:
 - Optimization of mooring layout & configuration
 - Cost optimization
- Class requirement (initiate methodology for certification of shared anchors/lines)

Expected results

- Layout optimization were FOWT are sharing lines
 - Loads, costs, materials, geometry
 - Specific challenges: Hydrodynamic behavior; Installation, Operation and maintenance considerations
- Geotechnic study
 - Detailed investigation on pile behavior in sandy soil (MUTANC+): safety factor recommendation & development of a simplified anchor design tool for industrial needs
 - Extended study to other type of anchors (suction) or soils (clay, mud...), loading (vertical/horizontal loading ratios)
- Benefits on the LCOE
- Class requirement

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