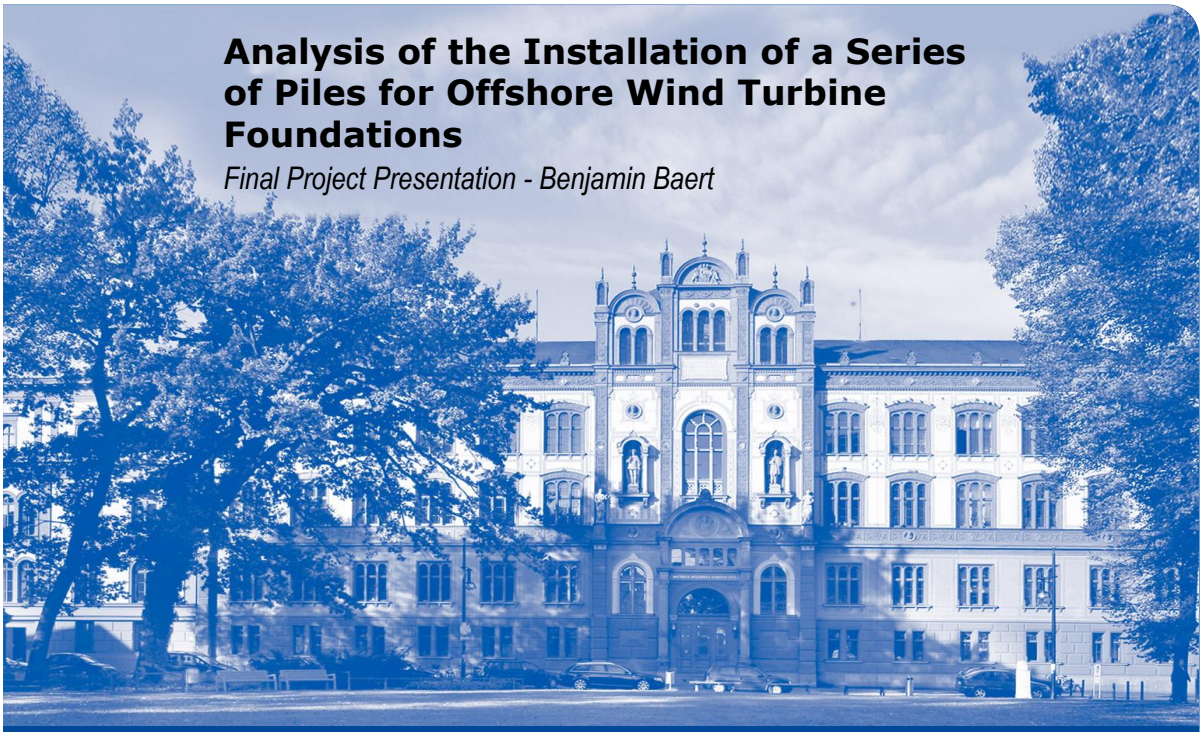
Universität Rostock Traditio et Innovatio

EMship Advanced Design

Analysis of the Installation of a Series of Piles for Offshore Wind Turbine Foundations

Final Project Presentation - Benjamin Baert



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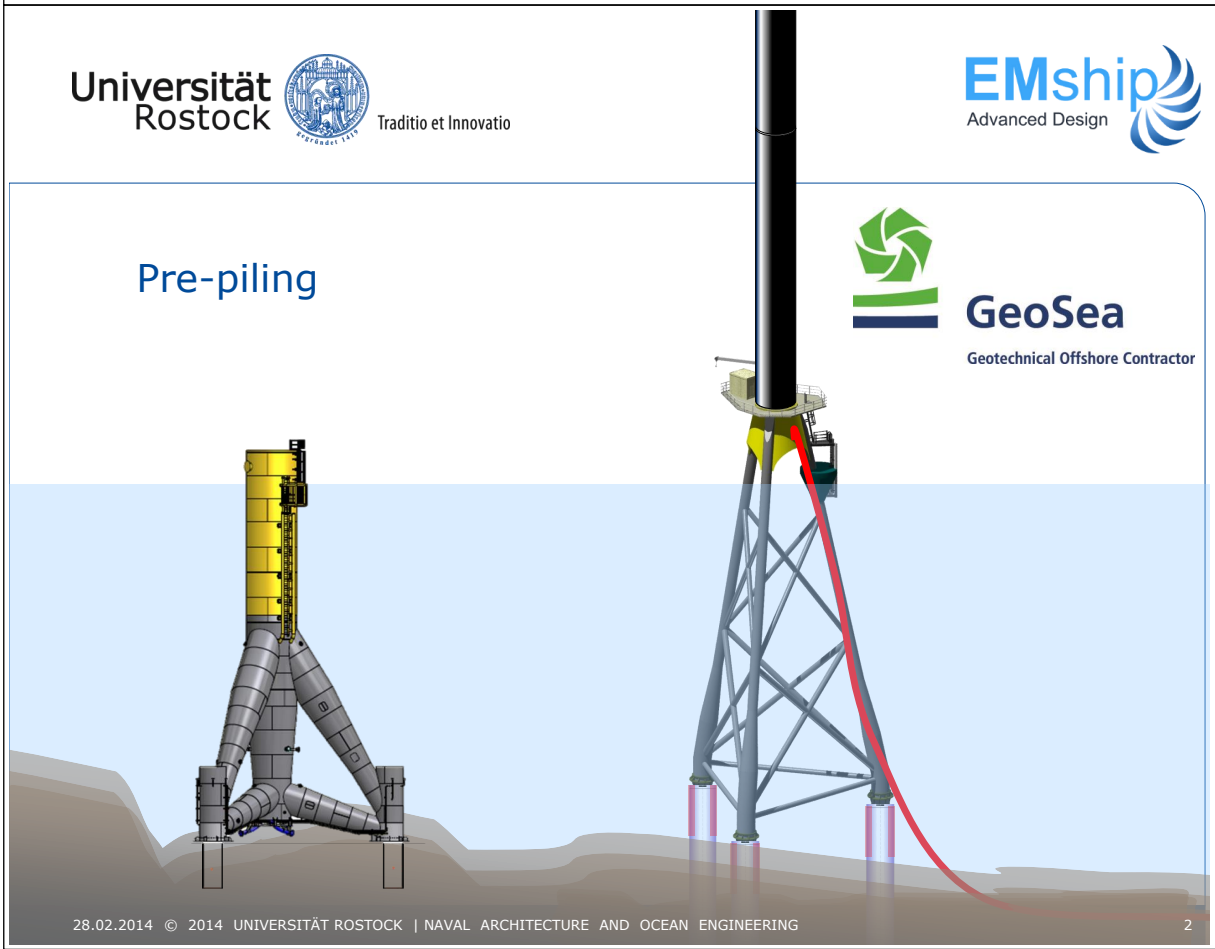
EMship Advanced Design

Pre-piling

GeoSea

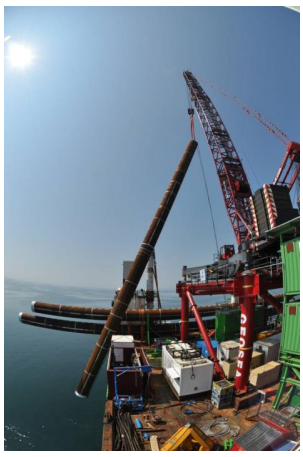
Geotechnical Offshore Contractor

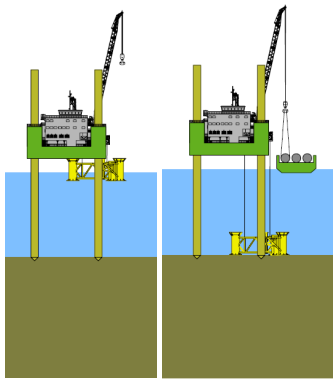


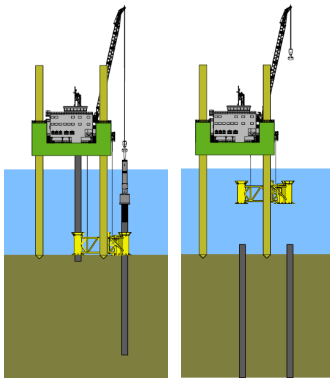
Pre-piling

Principle

1. Jack-up platform (JUP) transit and positioning
2. Piling template lowering
3. Pile transfer
4. Upending and stabbing of piles
5. Pile driving
6. Pile survey
7. Piling template recovery

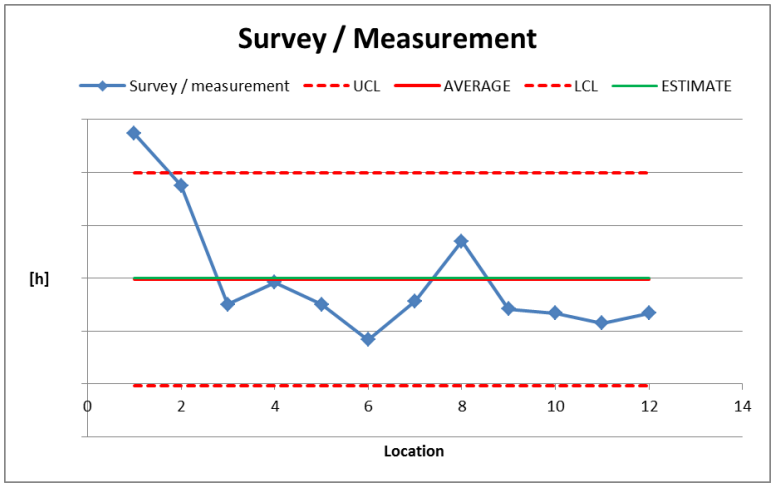






Analysis of the nett production time

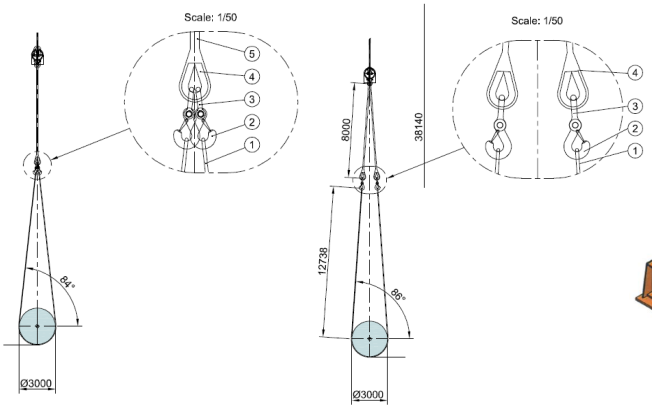
Statistical Process Control (SPC) Charts

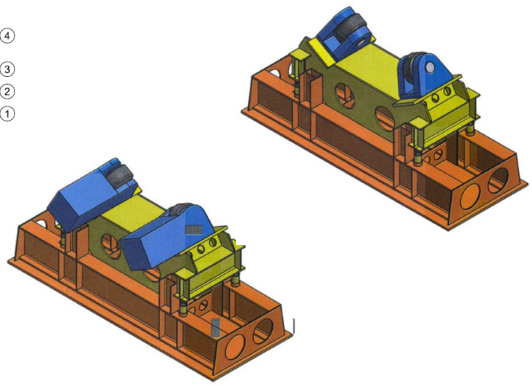


Decision-making

Pile transfer (7 % of production time)
More critical weather limits.

Pile upending (31 % of production time)
Less critical weather limits.





	New lifting arrangement	Roller stands
Estimated time saving	32.9 h	32.9 h
Incl. waiting on weather (May)	?	?
Incl. waiting on weather (January)	?	?

Waiting on weather (WOW)

Suitable Weather Window

- Critical weather limits
- Sufficient persistence

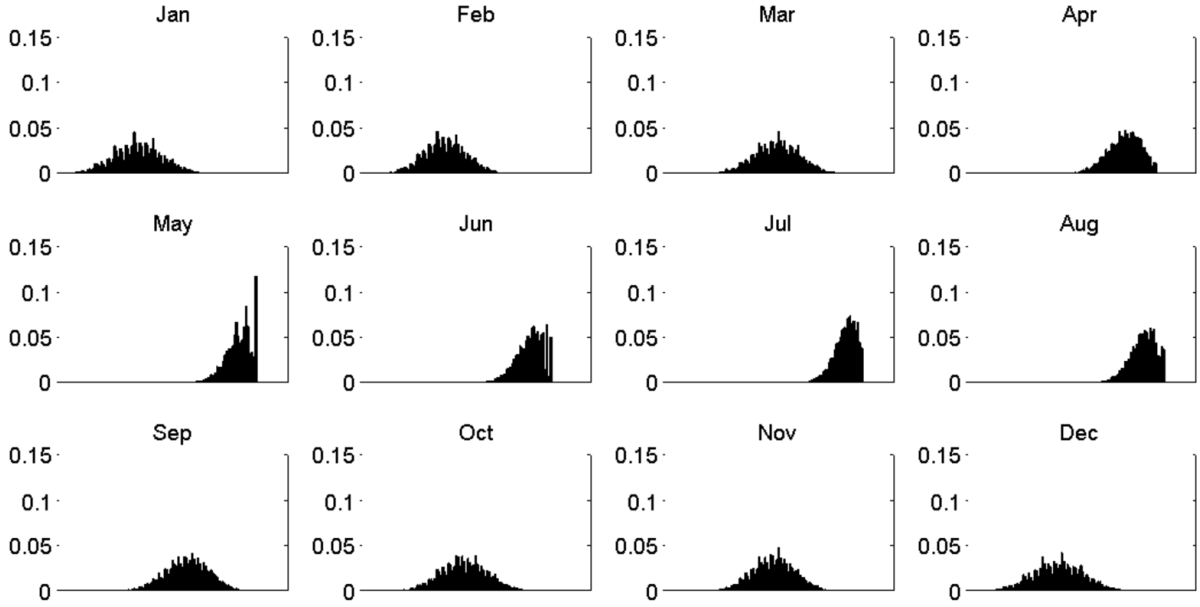
Monte Carlo Simulation

- Based on historical weather statistics
- Calculation of completion date

Waiting-on-weather simulation

Output: probability distribution of number of completed locations per month

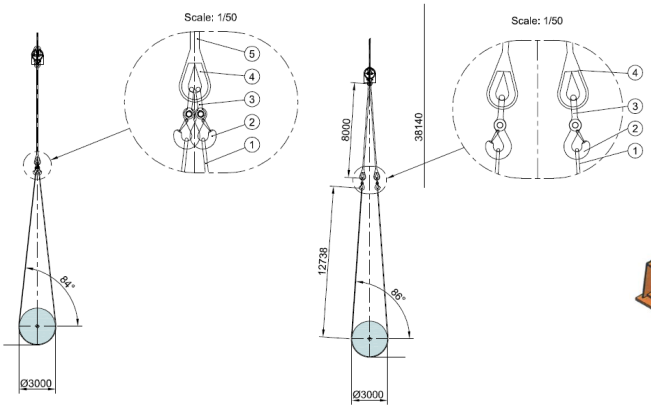
(abscissa: number of locations; ordinate: probability)



Decision-making

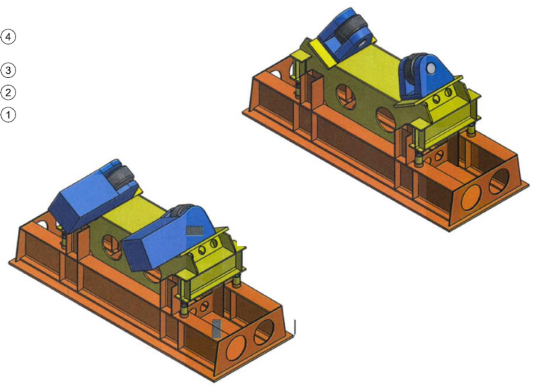
Pile transfer (7 % of production time)

More critical weather limits.



Pile upending (31 % of production time)

Less critical weather limits.



	New lifting arrangement	Roller stands
Estimated time saving	32.9 h	32.9 h
Incl. waiting on weather (May)	33.6 h	33.4 h
Incl. waiting on weather (October)	38.6 h	33.6 h

+ 17 %

Conclusion

Development of a tool to quantify the impact of waiting on weather

➔ decision making

➔ completion date

Serial installation requires continous optmization

➔ SPC charts: define, measure, analyze, improve and control