

PREON®marine: Foundation system based on SEALENCE-project

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Summary

The SEALENCE-project, funded by the BMWi, is an ongoing joint project formed by Vallourec Deutschland GmbH together with Leibniz University of Hannover, Institute for Geotechnical Engineering and Fraunhofer Institute for Wind Energy IWES. The aim of this joint project SEALENCE is the development of an environmentally friendly and cost-effective foundation system especially for offshore wind turbines, preferably for the anchoring of supporting steel frame foundation structures. The main results of the project shall be presented at the R&D conference.

1. Introduction SEALENCE [1]

1.1 Background

The main idea of the new developed foundation system is the distribution of forces to several piles. In combination with an adapter a bigger pile can be substituted, e.g. to anchor a jacket structure (Fig 1) or other supporting steel frame foundation structures. The main advantage of the new system yield in a low-noise pile installation technique, which can be applied.

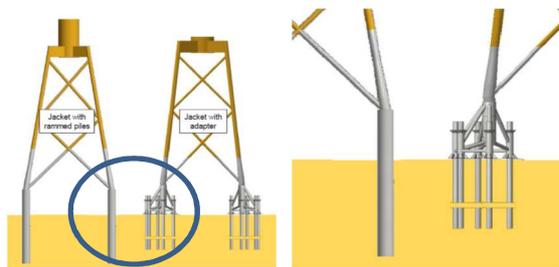


Fig. 1: Adapter solution

The theoretical considerations and model tests on the static and cyclic load-bearing behavior of the piles being installed with the new technique will be developed together with the joint partners. These investigations ensure that the required technical background for an industrial application is available.

1.2 Sub-project IGtH

The developed installation process of the piles and the determination of the load-bearing capacity of a single pile for the new foundation structure will be investigated by model tests on different smallscale tests and by numerical simulations. The goal is to extrapolate the experience and results to the original scale in order to predict the required installation forces and bearing behavior for an offshore location.

1.3 Sub-project IWES

Main aspect is the creation of valid, experimentally confirmed information for the bearing behavior under static, cyclic and post-cyclic loads of the innovative piles (bigger scale than IGtH) in North Sea-typical soil in the test center. This information will strengthen the basic understanding of the structural behavior of piles being installed under offshore conditions (water-saturated sand, dense storage, cyclic loads) and will be used, among other things, for the creation of experimentally validated calculation methods (design tools) for the installation and design of the piles. In addition pile group effects will be verified based on small-scaled trials.

1.4 Foundation system

The installation technique alone will not provide a cost-efficient solution. Only the consideration of further, closely aligned aspects, which are included within the SEALENCE-project, will establish a cost-efficient, ecologically sustainable and scalable concept:

- Offshore pile system designed for typical loads of modern and future offshore wind turbines
- Scalable adapter solution (standalone or integrated in support structure) for combining single piles (Fig. 1)
- Environmentally friendly installation technique
- Feasible cost-efficient Offshore logistic concept

2. References

[1] Descriptions taken from application documents to BMWi, SEALENCE-project