

## Abstract

The geotechnical site investigation for offshore wind farms is a key input for the foundation selection and design, as well as cost optimisation of the whole wind farm. The effort to improve the output, from the site investigation work, is an ongoing process. The aim for the optimisation can have different focus areas. For Geo the first area of focus has been to improve even further the HSE performance. The challenge from the technical point of view is how best to combine the HSE focus with the aim of still being able to deliver the best possible site investigation solution in a cost effective way.

In relation to offshore wind farm locations, one of the major technical challenges have been how to improve the sample quality in inhomogeneous soil and soft rock formations – such as boulder clay, chalk and other often complex formations.

The paper presents the background and realisation of the drilling concept and discusses the results obtained. The discussion includes comparison with the predominate present drilling and sampling technique used in challenging seabed formations, such as hard soil and chalk. The link between geotechnical investigations and project cost will also be addressed, and key factors for potential cost saving will be highlighted.

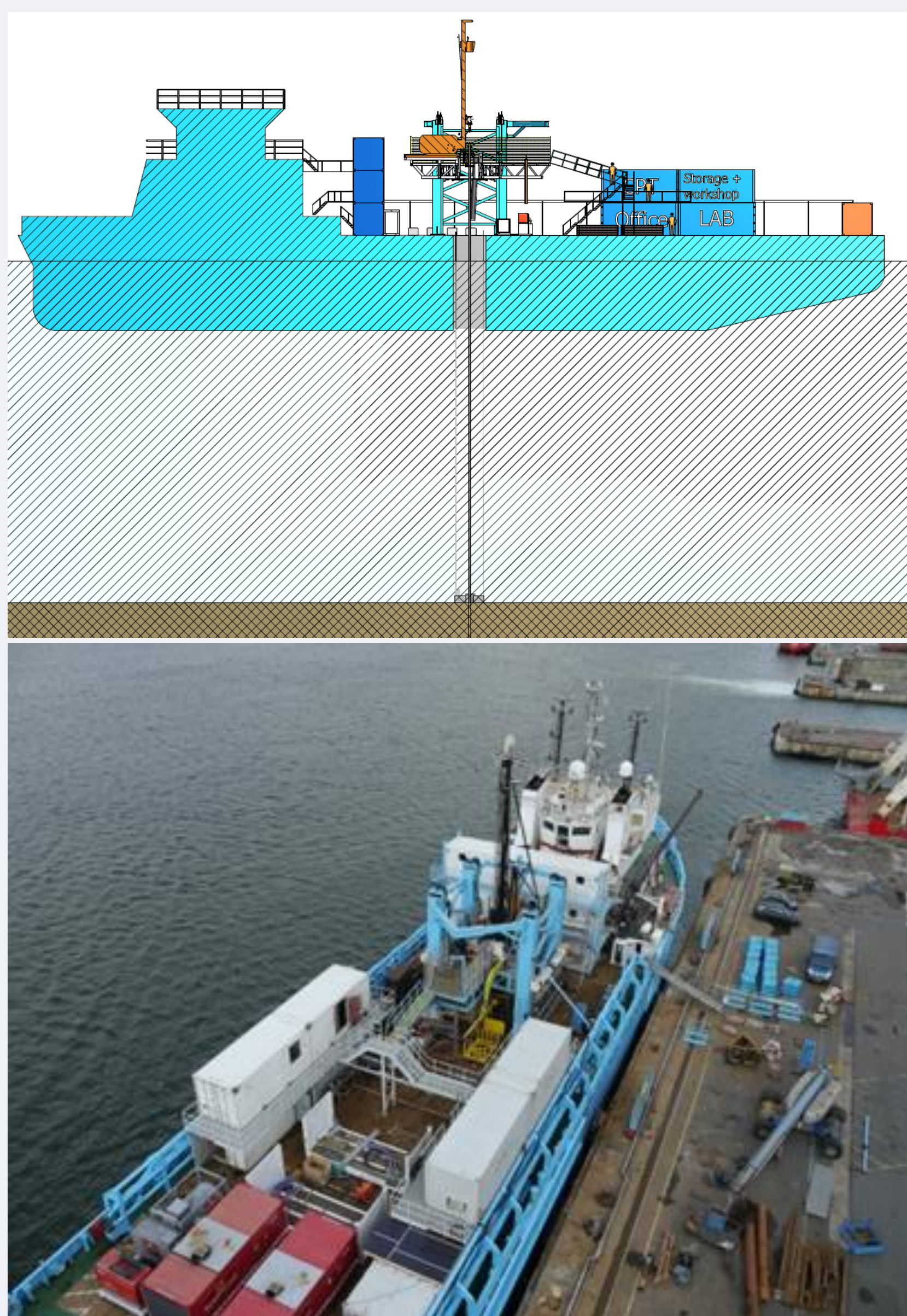
## Objectives

To evolve the approach and methods to carry out geotechnical drilling work for offshore wind farms, Geo has developed a new concept for floating (heave compensated) drilling. One ambition for this new concept was how to transform 50 years of knowledge from high quality onshore geotechnical drilling work, to be used in the offshore environment, while still performing and providing high sample quality. The key element in the technical design of the system was the principal belief that to perform geotechnical drilling, the basic drill rig should be a “geotechnical rig” operated with heave compensation

## Methods

# Geotechnics. Managing Risk. Reducing cost.

### New designed heave compensated drill technique



### Managing risk

#### Risk reduction in SI work :

- Reliable and high quality SI setup
- Higher degree of standardization in relation to T&C (e.g. reference to international standard terms)
- Technical specification (e.g. reference to new ISO 19901-8)
- Sharing all available data up front (e.g. soil, metocean)
- Flexible working window
- WOW model - with risk sharing between the parties

#### Project flow



The flow is “linked” – but the success is proportional to the quality of the input

### Reducing cost

#### Where to look for cost efficiency:

- Field operation optimizing work procedures
- Development of “new” methods
- Tender and Contract frame work
- T&C
- Technical solution
- Time schedule and planning
- Closer dialog in relation to solutions (making use of all knowledge)
- WOW risk model

## Conclusions

Optimising the geotechnical investigation is not an unbiased part of the total geotechnical package. The SI investigation can and shall on a continuous basis be adjusted and improved in relation to testing and sampling methods to make the product safe and cost effective. However, the overall optimisation is linked to the other related parts of the project flow. Addressing the different risk factors and making preventive actions to reduce them are the most important factor in the puzzle to reduce the total cost.

