

Slip Joint Offshore Qualification

Publieke samenvatting / Public summary

The connection between the foundation pile of an offshore wind turbine and the wind turbine itself is currently achieved by either grouting or bolting, both of which are expensive and have resulted in industry wide failures. To tackle this problem, the slip-joint was identified as a very good candidate technology.

Objective

To get the slip joint ready for commercial use in direct tower to Monopile connections, the next step in development is to achieve a TRL of 8. The challenge in this step lies specifically in the qualification of the final steps of this technology's R&D trajectory. In consultation with qualification and certification body DNV-GL it is concluded that with some extensions to the current scope of the SJOR project, a C- and B-level certification could be achieved using the SJOR test set-up as a starting point. This would be a major step towards a full A-level certification and thus commercial use of the slip joint concept at relatively low costs since the needed offshore installation of a prototype (a B-level certification requirement) is already realised within the SJOR project. When the joint is applied within or below the splash zone it is envisaged that an additional development step is needed to also get the design of such a slip joint to TRL8.

Short description

Van Oord and the TU Delft cooperated earlier on the Slip Joint technology and DOT has initiated and completed an onshore slip joint test in 2016. The results of these previous projects show that the use

Projectinformatie / Project information

Projectnummer / Project number

TEHE117056

Subsidiebedrag / Grant amount

€ 848.844,00

Algemene informatie / General information

Penvoerder / Secretariat

Delft Offshore Turbine B.V.

Publicaties en materialen / Publications and attachments

- 23.09.2021

Eindrapport TEHE117056

Links

- More information on the Slip Joint project can found on the GROW website.

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of the slip joint is feasible, but two main challenges remained; (i) long term verification of the joint's performance, including the effects of (fretting-) corrosion and fatigue damage in the joint (ii) the prediction and quantification of the actual stress distribution and contact area within the joint. To further research these topics, a follow-up project, the Slip Joint Offshore Research project (SJOR - TSE HE 2016), was also initiated. During this project, a 500kW wind turbine with a slip joint connection will be placed in an offshore environment. The scope of this project includes the previous challenges with the goal to take a first step towards certification.

Result

The needed extensions to the SJOR project to achieve the B-level certification for the TRL8 are not included in the SJOR project scope and budget. Therefore, the SJOQ project is proposed focussing on the following items:

- Additional sensors will be installed to get a more comprehensive overview of the strain distribution in the slip joint needed for validation of a detailed FE model;
- Extension of the offshore operational window of the wind turbine to provide relevant load cases on the slip joint, as prescribed by DNV-GL for (C- and) B-level certification;
- Creating and validating a FE model to acquire insight in the actual stress distribution within the slip joint connection;
- Creating and validating a design method that can be used for future commercial projects;
- Increasing the number of (design) reviews by DNV-GL.

This will result in a full C- and B-level certification of the slip joint technology and thus making a TRL level of 8 possible.

Voor meer informatie over de TSE / Energie-Innovatie regelingen die RVO aanbiedt, ga naar www.rvo.nl/tse.