OFWEC 4

Publieke samenvatting / Public summary

Aanleiding

With the continuous growth of offshore wind turbines, higher capacity connections are needed to connect wind turbine towers, monopiles and transition pieces. In OFWEC 1 and 2, partners demonstrated that the C1 Wedge Connection provides this higher capacity. In OFWEC 3, an OEM implemented the Wedge Connection in a large prototype WTG, and project partners developed an improved flange design. An offshore test in the second half of 2022 is expected to show that the connection will enable safer and faster offshore installation. During OFWEC 3 we identified potential improvements which would lead to further cost reduction of the C1 Wedge Connection. Therefore, project partners C1 Connection and TU Delft defined a final project phase, OFWEC 4, to accelerate implementation of the Wedge Connection and reduce its costs even further. Together with support from industry partners across the supply chain, the partners will acquire knowledge to optimize the design and fabrication of flanges by testing innovative fabrication technologies with the purpose to reduce the LCOE of offshore wind farms. Furthermore, we will develop an analysis tool allowing third parties to analyze Wedge Connections.

Doelstelling

The goals of OFWEC 4 are to optimize the production methods of the flange design that was developed in OFWEC 3. This will reduce the cost of a Wedge Connection compared to conventional connections and will accelerate the implementation in commercial projects. The gained knowledge will

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Algemene informatie / General information

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be shared with the industry to catalyze the use of the Wedge Connection.

Korte omschrijving

• In work package A, C1 Connections will focus on integrating plasma cutting in the fabrication process of the flanges of the connection. The effect on the structural resistance of the connection is investigated. • In work package B, C1 Connections investigates how the connection can be optimized by reorienting the weld in the upper flange, if post machining of the weld is feasible, and if the weld can be inspected according to industry standards. • In work package C, TU Delft and C1 Connections will investigate electron beam welding for circumferential welds and perform cyclic loading tests to define the fatigue resistance of these types of welds. • In work package D, C1 Connections will investigate improvements allowing mass-scale, fully automated, fastener production. • In work package E, C1 Connections -with the support of an industry partner- will develop a parametric analysis tool to analyze the C1 Wedge Connection for project specific conditions.

Resultaat

• A tested and validated method for applying plasma cutting that enables significant improvements in fabrication time and thereby reduces the costs of the Wedge Connection flanges. • A tested production method with repositioned welds in the upper flange for further reduction of weight and cost. Supported by structural analysis and external validation by welding, inspection and fabrication experts. • A production plan for fast upscaling of fully-automated fastener production allowing the lowest possible fastener costs. • A tested production method integrating an innovative (electron beam) welding technology in the fabrication of the flanged construction. TU Delft will have defined the fatigue detail category of these welds by cyclic load tests. • Develop, and make available to the industry, knowledge of electron beam welding of circumferential welds and the fatigue detail category of these welds for potential wider application in the renewable offshore industry.

• An analysis tool that combines all integrated knowledge for designing a C1 Wedge Connection, allowing any party in the industry to use the tool and analyse and design the connections in the future.

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.
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