

Prefab Modular Root Bushing

Publieke samenvatting / Public summary

Aanleiding

In offshore wind, currently, the only connection used for mounting the blades to the hub of the turbine is the traditional T-bolt connection. It is the safe choice for decades. Unfortunately, it also comes with a number of serious disadvantages, that become even more severe as blade length increases. • The T-bolt connection requires a lot of space. • Therefore, a lower number of bolt connections can be placed in the rotor blade root, which, in its turn, limits the maximum blade length. • On average, the T-bolt is expected to be 6% more expensive than the root bushing. A root bushing is a promising and (relatively) new technology to attach the rotor blades to the turbine. It is a bushing that is infused into the blade during its manufacturing. The root bushing require less space, therefore, an estimated 35% more bolts can be applied on a certain reference circle (compared to the T-bolt connection). This means that more loads can be applied on the connection, so longer blades can be used. Ultimately, more sustainable electricity can be produced. A technical challenge with root bushings, however, are wrinkles and air inclusions that arise in the production process.

Doelstelling

The main objective of the project is to develop a Prefab Modular Root Bushing, combining several root bushings so as to make the production of rotor blades with infused bushings easier and the resulting connection cheaper, less spacious, and more reliable and durable. With the issues solved, the root bushing can be used offshore as well, increasing the potential installed capacity.

Projectinformatie / Project information

Projectnummer / Project number

TEHE118016

Subsidiebedrag / Grant amount

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Algemene informatie / General information

Penvoerder / Secretariat

We4Ce Engineering B.V.

Publicaties en materialen / Publications and attachments

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Eindrapport TEHE118016

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Korte omschrijving

A total number of 5 work packages is planned within this project. The execution of the work packages will bring the proposed innovation from TRL level 5 to 8. Within the execution of the project we will first focus on M20, a smaller size butts and bolts than applied in the largest wind turbines, to limit our test-costs. The actual size will be M36 and upscaling from a proven M20 concept to the 1:1 M36 size of the concept is included under the projects WP's. Planned work packages are: Work package 1: Test-development Work package 2: Concept Development Work package 3: Proof of concept; scale models Work package 4: Proof of concept 1:1 Work package 5: Proof of concept factory

Resultaat

Developed and tested product: Modular Prefab Root Bushing. M20 bushing solution as verification of technology. This first step to verify the technical working principle will enable low threshold physical examination of test models. - Developed and tested Modular Prefab Root Bushing in M36 for 2MW to 6 MW rotor blades. This is a common size for larger turbines - Validated technology, functionality demonstrated to potential clients on a real wind turbine (preferably offshore, more likely onshore). After the project, a launching customer is convinced that the technology works, which will speed up the market introduction. - Product ready to get certified. - Joint exploitation strategy with all consortium partners (possibly a joint venture or spin-off), in which high-quality products can be produced for the offshore wind market. This has the advantage that reserve factors can become lower and the weight of the rotor blades can be further reduced. Alternatively, a wind turbine can be constructed with longer rotor blades. - Patent research and preparation for the application.

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