

FT01.02_2022 Mechanical and structural testing parameters in risk assessment

Datadrevet risikoevaluering for grøn vækst i vindmøllebranchen



Indledende oplysninger

Indsatsområde	Datadrevet risikoevaluering som katalysator for grøn vækst i vindmølleindustrien
Institut	FORCE Technology
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Ændringer

Dette er første version af aktivitetsbeskrivelsen for 2022. Den bygger videre på aktiviteter og resultater gennemført i 2021. Beskrivelsen er på engelsk.

Beskrivelse

Mål

The previous activity plan in 2021 focused on individual tools for evaluating testing data and optimizing data analysis and extraction, for example in fatigue testing programs. The activities for 2022 will build upon the work from 2021 by looking to begin utilizing testing inputs and results in risk based planning of testing programs. This dive into the risk-based planning of testing programs will be driven through a digital solution setup, with looking into building a roadmap for the development of a data management system. A digitalized data management system combined with optimized data analysis tools will enable the cooperation with the industry in pursuing the risk-based planning approach of mechanical and structural testing programs.

Within 2021 cooperation work with DTU CASMat and Wind Denmark focused on assessing historical data and looking into currently available testing infrastructure. The 2022 activities will be aimed at being forward looking in new demonstrations and in identifying necessary and important testing targets.

Indhold

Kompetenceopbygning, videnhjemtag og vidensamarbejde:

- Work with Wind Denmark and Energy Cluster Denmark on issues related to collaborative innovation and research into test planning and validation.
- Continued collaboration with DTU CASMat which moves from analysis of historical testing data to trying out new test methods and new testing routines for advanced operation and maintenance investigations. Supporting DTU with the start of testing activities in 2022. A demonstration project on hybrid testing of offshore jacket foundations will be conducted with DTU to document the possibility of using hybrid testing as a tool for evaluating operation and maintenance concerns in offshore structures.
- Focus on building skills and knowledge within digitalization in mechanical and structural testing – data management systems, machine learning, and AI. A white paper on core findings will be published through Wind Denmark or Energy Cluster Denmark.
- Develop further industrial and research coalitions for technological development and demonstration projects. Work with an additional consortium to establish a demonstration project on a new turbine component that was not previously explored in 2021.
- Participate in university student projects, bachelors, masters and/or PhD projects – contribute to or sponsor minimum 2 student projects in 2022.

Udvikling af teknologisk service:

- Develop a roadmap to move from working with individual data collection tools to a data management system for testing inputs and results. Establish this roadmap by involving the input from minimum 10 industrial partners, which will be disseminated through Wind Denmark or Energy Cluster Denmark.
- Develop a plan and approach for digitalization in mechanical and materials testing by utilizing machine learning and AI with testing inputs and results, i.e. risk optimized test strategies, predictive results assessments. Identify 2 testing types and the digitalization strategy within these testing types.
- Digitization and optimization of full-scale testing inspections – collecting and sorting qualitative data – inspection pictures, observations, etc.
- Pursuing demonstration testing of hybrid test and simulation projects for offshore turbine components. At least 2 demonstration projects will be conducted within either:
 - Components – offshore foundations – jackets and monopiles, towers, turbine dampers, hydraulic systems, bearings working within the new additional consortium from above.
 - Further support of the hybrid testing of offshore foundations project at DTU CSMat

Aktører

Materials, component and structure testing from FORCE Technology will run the activity and is supported by the business units of engineering and industrial processes, and digital asset integrity solutions. The activity will work to establish physical testing programs with DTU CSMat within 2022, looking at further refinement of testing methods and treatment of testing data.

FORCE Technology will engage with Danish Companies and Wind Denmark through its Megavind initiative to explore both the current and future challenges and opportunities for Danish Industry in test and validation in the wind industry.

International collaboration with Fraunhofer IWES and Fraunhofer LBF will be expanded to pursue involvement in the international research community of EERA JP Wind for looking within the wider European community for knowledge and feedback on testing and validation with the wind industry.

Sammenhæng med andre projekter

The concurrently running EUDP Hi5Jack project which is proceeding towards technology qualification will benefit this activity as reference and test case for validation and test planning.

Følgegruppe

This activity plan refers to the advisory board of the overall performance contract and will follow its plan of taking part in two meetings per year for the purpose of presenting and review the plan, direction, and progress of the activity plan. The specific plan for 2022 was presented and discussed with the advisory board December 6th 2021.

Formidling af resultater

The focus within knowledge sharing and industrial engagement within this activity is on the utilization and benefit that individual pieces of testing inputs and data can create in the risk profile, planning, and execution of mechanical and structural testing programs.

Collaborations established within 2021, such as participation in the Wind Denmark Megavind Strategic Committee on Test, Validation and Verification will be utilized throughout the activity plan.

The industrial engagement efforts have three-fold goals:

- Working with industry to establish the goals and scope.

- Co-development and testing of the within data management, digitalization, and hybrid testing.
- Engagement with industry in the go-to-market strategy and use-cases for achieving as quickly as possible adaptation of tools, ideas, and services from the developments.

Knowledge sharing and dissemination will be coordinated through the activity plan “FT01.01 Videnspredning og Økosystem”.