

# Ramboll's True Digital Twin could increase lifetime of structures



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🕒 05/01/2021 📍 Ramboll



Image source: Ramboll

Ramboll has reached a milestone in the ROMEO project, demonstrating the potential of its True Digital Twin technology through a pilot-test at the [Wikingen](#) offshore wind farm in the Baltic Sea. The pilot-test - based on a measurement campaign using Structural Health Monitoring (SHM) solutions - revealed the potential for lifetime extension for the offshore substation and the offshore wind turbine foundations.

*"Our goal with this project is to demonstrate the feasibility and impact of data-driven O&M strategies by having the True Digital Twin continuously deliver instantaneous insights on the physics of the assets that are being monitored. The results from this pilot-test are stunning, revealing significant potential for lifetime extension and cost reductions in operating and maintaining offshore wind structures",* said Ursula Smolka, Lead Consultant Asset Management Wind at Ramboll.

The results of the pilot-test have been summarised in two reports which Ramboll has delivered to its ROMEO project partners. According to the reports, the full power of a True Digital Twin lies within the continuous monitoring of the factors that can affect the structural integrity of a wind turbine over its entire lifetime. The monitoring process can be done at all possible locations using SHM solutions, cloud computing and advanced mathematical calculations.

Based on a few sensors, the patterns of movements are captured to let the True Digital Twin undergo the full history of loads. The True Digital Twin can detect structural integrity issues like failure of jacket braces, excessive scour or corrosion. Extensive simulation studies showed that monitoring modal properties like natural frequencies and mode shapes not only can detect anomalies but can also identify the type of anomaly if combined with a design model database.

*"The concept of the True Digital Twin makes detailed design models available for predicted lifecycle management and provides the framework to incorporate measurement findings of a specific turbine into the simulation world. We can track the history of exposure of an individual structure or detect damages and replace the extensive instrumentation of traditional methods with mathematical calculations",* Smolka explained.

During the next phases of the ROMEO project, Ramboll and its partners will continue exploring the value of continuously monitoring offshore wind structures. The project partners anticipate a reduction of human offshore time for annual inspections and a reduction in the number of planned time base offshore visits.

*"The benefits of the True Digital Twin are very clear to us and this pilot-test has now reinforced our initial expectations. Ramboll has made great progress in the ROMEO project and we look forward to collaborating with them during the next phases of the project where we will look at True Digital Twin's potential of reducing human offshore time and number of offshore visits",* said Mark Paine, Offshore Asset Integrity Manager at Iberdrola Renewables.