Endurance test of an offshore wind turbine in the laboratory

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Scientists at the Fraunhofer Institute for Wind Energy and Energy System Technology IWES in Kassel are testing the complex control system of wind turbines under real conditions in the laboratory before they are built into offshore wind energy plants, for example. This way, software and hardware faults can be found and eliminated before the costly installation of the turbine.

"Our virtual wind turbine tricks the control computer into believing it is controlling a real system. Here at the institute we can simulate every conceivable environment, depending on what the manufacturers are planning and want to test. The advantage of our system compared with existing solutions is a special modeling approach that makes secure and reliable real-time simulations possible," explains Dr.-Ing. Boris Fischer, a scientist at IWES.

There is wide variance in wind turbines and the hardware and software modules manufacturers use. The researchers adapt the simulation to the relevant requirements. Reality tests can be performed not just on the control unit but on the electrical generator or the systems for adjusting the rotor blades as well.

A further advantage of the system is that wind turbines are subjected to rigorous inspection by certification centers before they can be commissioned. All the specified parameters must be correct and all guidelines must be observed. The system enables this to be checked by way of automatic test runs. This considerably speeds up the certification

process.

For this, researchers use a desktop computer to organize test runs and to present and document the results, and an industrial PC for real-time simulation and signal acquisition.

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