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3X-100 Blade Field Test

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Abstract

In support of a Work-For-Other (WFO) agreement between the Wind Energy Technology Department at Sandia National Laboratories and 3TEX, one of the three Micon 65/13M wind turbines at the USDA Agriculture Research Service (ARS) center in Bushland, Texas, has been used to test a set of 9 meter wind turbine blades, manufactured by TPI composites using the 3TEX carbon material for the spar cap. Data collected from the test has been analyzed to evaluate both the aerodynamic performance and the structural response from the blades. The blades' aerodynamic and structural performance, the meteorological inflow and the wind turbine structural response has been monitored with an array of 57 instruments: 15 to characterize the blades, 13 to characterize inflow, and 15 to characterize the time-varying state of the turbine. For the test, data was sampled at a rate of 40 Hz using the ATLAS II (Accurate GPS Time-Linked Data Acquisition System) data acquisition system. The system features a time-synchronized continuous data stream and telemetered data from the turbine rotor. This paper documents the instruments and infrastructure that have been developed to monitor these blades, turbines and inflow, as well as both modeling and field testing results.