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Blade Manufacturing Improvements

Remote Blade Manufacturing Demonstration

TPI Composites, Inc.
373 Market Street
Warren, RI 02885

ABSTRACT

The objective of this program was to investigate manufacturing improvements for wind turbine blades. The program included a series of test activities to evaluate the strength, deflection, performance, and loading characteristics of the prototype blades. The original contract was extended in order to continue development of several key blade technologies identified in the project. The objective of the remote build task was to demonstrate the concept of manufacturing wind turbine blades at a temporary manufacturing facility in a rural environment. TPI Composites successfully completed a remote manufacturing demonstration in which four blades were fabricated. The remote demonstration used a manufacturing approach which relied upon material "kits" that were organized in the factory and shipped to the site. Manufacturing blades at the wind plant site presents serious logistics difficulties and does not appear to be the best approach. A better method appears to be regional manufacturing facilities, which will eliminate most of the transportation cost, without incurring the logistical problems associated with fabrication directly onsite. With this approach the remote facilities would use commonly available industrial infrastructure such as enclosed workbays, overhead cranes, and paved staging areas. Additional fatigue testing of the M20 root stud design was completed with good results. This design provides adhesive bond strength under fatigue loading that exceeds that of the fastener. A new thru-stud bonding concept was developed for the M30 stud design. This approach offers several manufacturing advantages; however, the test results were inconclusive.