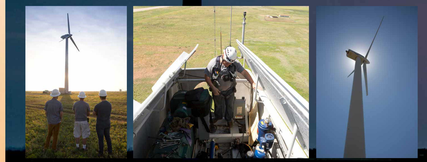
SANDIA NATIONAL LABORATORIES

NATIONAL ROTOR TESTBED

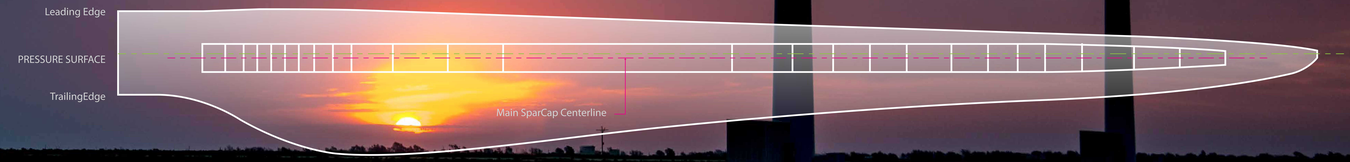
Successful Collaboration Accelerates Testing of New Sandia Blade Designs

Sandia National Laboratories

Together, national laboratories and industry partners are coming up with new ways to lower the cost of wind energy and accelerate the deployment of new wind energy technologies directly to the industry.



The Scaled Wind Farm Technology (SWiFT) facility operated by Sandia National Laboratories, where the National Rotor Testbed blades will undergo flight testing.

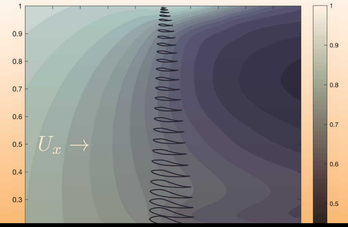


A computer rendering of the National Rotor Testbed (NRT) blade . The first blade of its kind, the NRT is a scaled-down version of the nation's most common 1.5MW blade. Instead of duplicating the shape and performance of these blades, Sandia engineers designed the NRT to replicate the wakes of industry blades currently in service. This unique small-scale design will enable DOE and Sandia to analyze turbine-to-turbine interactions cost effectively.

Accelerating Wind Energy Technologies

Thanks to a successful partnership between Sandia National Laboratories, Oak Ridge National Laboratory's (ORNL), National Renewable Energy Laboratory's (NREL), and TPI Composites® Inc., new wind energy technologies from concept to market are being accelerated.

An innovative wind turbine blade was accurately, quickly, and cost effectively created using Sandia's blade design capabilities, ORNL's 3D printing capabilities, NREL's blade structural testing capabilities, and the worldwide commercial design and manufacturing capabilities of wind blade manufacturer, TPI Composites.



Wake Research

The National Rotor Testbed (NRT) blade was designed by Sandia to create the same scaled wake as a GE 1.5sle commercial wind turbine. The contour plot shows the wind speed reduction through the rotor plane and into the wake which is equal for the NRT and a GE 1.5sle wind turbine. By creating

Additive Manufacturing

ORNL 3D printed the NRT blade molds (left) eliminating the need for a blade plug before making a blade mold. Since short production runs for wind blade prototypes are cost-prohibitive, innovation is stifled. The goal was to see if this novel design-build approach could be economically feasible not only for subscale research blades, but also potentially for full-size commercial blades. This partnership brought together expertise from labs and industry to quickly go from concept to demonstration through a highly cooperative team.

Streamlining Mold-making Process

TPI Composites® manufactured the NRT blades in the 3D printed

Property Verification

The NRT structural properties were verified through static and fatigue tests at NREL (below). This ensures the blades will safely operate in the most extreme conditions ever experienced in 50 years at SWiFT which is consistent with the IEC design standards for all commercial wind turbines.