53rd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference
20th AIAA/ASME/AHS Adaptive Structures Conference
23 - 26 April 2012, Honolulu, Hawaii

AIAA 2012-1499

Large Offshore Rotor Development: Design and Analysis of the Sandia 100-meter Wind Turbine Blade

D. Todd Griffith,[1] Thomas D. Ashwill,[2] and Brian R. Resor[3]
Sandia National Laboratories, Albuquerque, New Mexico 87185

Sandia National Laboratories' (SNL) Wind & Water Power Technologies Department, as part of its ongoing R&D efforts, creates and evaluates innovative large blade concepts for horizontal axis wind turbines to promote designs that are more efficient aerodynamically, structurally, and economically. Recent work has focused on the development of a 100-meter blade for a 13.2 MW horizontal axis wind turbine, a blade that is significantly longer than the largest commercial blades of today (approximately 60 meters long). This paper summarizes the design development of the Sandia 100-meter All-glass Baseline Wind Turbine Blade, termed as "SNL100-00", which employs conventional architecture and fiberglass-only composite materials. The paper provides a summary of performance margins from a series of analyses that demonstrate changes in various design drivers for large blade technology. Recommendations for improvements to large blade design and future research investment needs are discussed.

[1] Wind and Water Power Technologies Dept., MS 1124, dgriffi@sandia.gov, Senior Member AIAA.
[2] Wind and Water Power Technologies Dept., MS1124, tdashwi@sandia.gov, Senior Member AIAA.
[3] Wind and Water Power Technologies Dept., MS1124, brresor@sandia.gov, Senior Member AIAA.