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Advances In Wind Turbine Blade Design And Materials (Woodhead Publishing Series In Energy)



Synopsis

Wind energy is gaining critical ground in the area of renewable energy, with wind energy being predicted to provide up to 8% of the world's consumption of electricity by 2021. Advances in wind turbine blade design and materials reviews the design and functionality of wind turbine rotor blades as well as the requirements and challenges for composite materials used in both current and future designs of wind turbine blades. Part one outlines the challenges and developments in wind turbine blade design, including aerodynamic and aeroelastic design features, fatigue loads on wind turbine blades, and characteristics of wind turbine blade airfoils. Part two discusses the fatigue behavior of composite wind turbine blades, including the micromechanical modelling and fatigue life prediction of wind turbine blade composite materials, and the effects of resin and reinforcement variations on the fatigue resistance of wind turbine blades. The final part of the book describes advances in wind turbine blade materials, development and testing, including biobased composites, surface protection and coatings, structural performance testing and the design, manufacture and testing of small wind turbine blades. Advances in wind turbine blade design and materials offers a comprehensive review of the recent advances and challenges encountered in wind turbine blade materials and design, and will provide an invaluable reference for researchers and innovators in the field of wind energy production, including materials scientists and engineers, wind turbine blade manufacturers and maintenance technicians, scientists, researchers and academics. Reviews the design and functionality of wind turbine rotor blades Examines the requirements and challenges for composite materials used in both current and future designs of wind turbine blades Provides an invaluable reference for researchers and innovators in the field of wind energy production

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"Mechanical and chemical engineers describe developments in the engineering of rotor blades for a wind turbine, evaluate the challenges in rotor blade design, and discuss the requirements and challenges for the composite material to be used in the wind turbine blades of the future. Their topics include the aerodynamic design of wind turbine rotors, aerodynamic characteristics of the blade airfoils, effects of resin and reinforcement variations on fatigue resistance" --ProtoView.com, February 2014 "Edited by two academic leaders in this field, this eagerly awaited collection of papers offers an authoritative, highly technical overview of developments in wind turbine blade design and the various materials used in their construction." --Real Power, Autumn 2013

Prof. Povl Br ndsted leads a research program on composites and material mechanics at the Materials Research Department in the National Laboratory for Sustainable Energy at the Technical University of Denmark. Dr Rogier Nijssen is a research scientist at the Knowledge Centre Wind Turbine Materials and Constructions, The Netherlands. Their research has been both in research contracts and in public projects. Br ndsted and Nijssen have worked together in material research consortia such as the European Optimat and Upwind projects.

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