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# **Numerical Manufacturing And Design Tool (NuMAD v2.0) for Wind Turbine Blades: User's Guide**

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## **Abstract**

Sandia National Laboratories has an on-going effort to reduce the cost of energy and improve reliability for wind systems through improved blade design and manufacture. As part of this effort, a software tool named NuMAD (Numerical Manufacturing And Design) has been developed to greatly simplify the process of creating a three-dimensional finite element model for a modern wind turbine blade. NuMAD manages all blade information including databases of airfoils, materials, and material placement to enable efficient creation of models. NuMAD is a stand-alone, user-friendly, graphical pre-processor for the ANSYS<sup>®</sup> commercial finite element package. The blade information contained in the NuMAD database is also used to manage capabilities such as output for CFD mesh, computation of blade cross section properties, and aeroelastic instability analysis of the blade. This user's manual describes the capabilities and usage of NuMAD.