

# Southwest Windpower: Ensuring the Reliability of Small Wind Turbines with nCode DesignLife™

Energy is a vital commodity and the demand for clean, renewable wind energy is increasing very rapidly. The world's total installed capacity reached 120.8 GW at the end of 2008, representing a 36% growth rate in the annual market and many countries have aggressive goals for wind energy over the next 10 years. In addition to these global changes, many businesses and individuals are turning to wind power for their energy needs. Over its life, depending upon the wind speed average and actual energy consumption, a small residential wind turbine can provide a savings of up to 30–80% in residential energy costs. Southwest Windpower, based in Arizona, USA, is a leading company in the design and manufacture of small

residential and commercial wind turbines. Like their larger counterparts, residential wind turbines also need to deliver a high level of reliability.

In response to these demands, Southwest Windpower selected nCode DesignLife to perform fatigue life predictions on their wind turbine designs. nCode DesignLife combines stress results from finite element analyses with loading schedules to help ensure the required years of failure-free operation. The blade loads are typically generated using knowledge of the expected wind profiles – and nCode DesignLife enables complex and real-world loading scenarios to be defined and assessed. Both the composite blades and the structural aluminum housing are examples

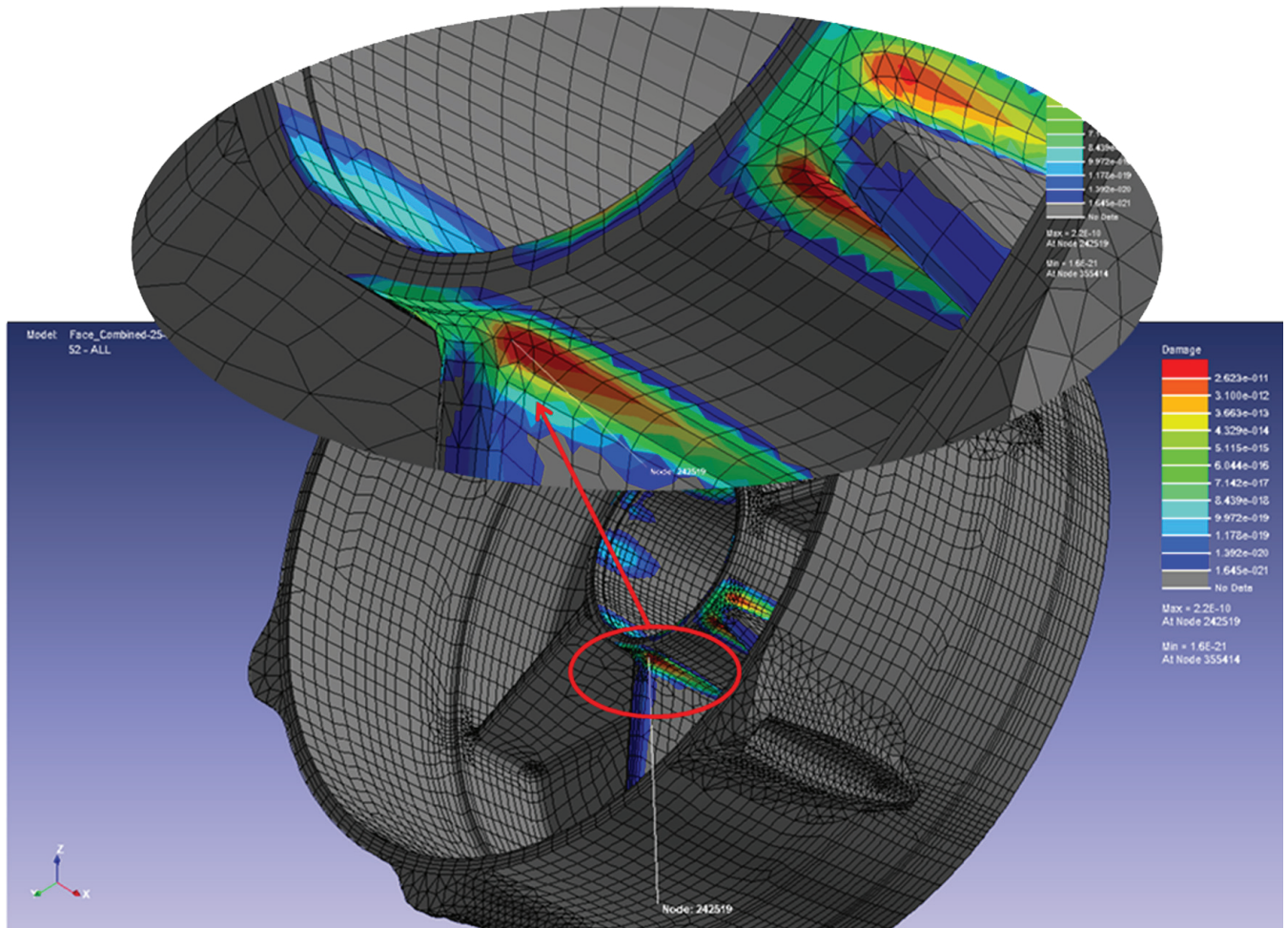


Figure 1: Damage plot of nacelle face casting.

of system components that have been successfully analyzed by Southwest Windpower using nCode DesignLife.

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- Josh Walton, P.E. Mechanical Engineer,  
Southwest Windpower

Southwest Windpower has extensive expertise in the design and manufacture of small wind turbines. In addition to helping meet design certification requirements, nCode DesignLife enables Southwest Windpower to gain greater insight and understanding of the durability of their products. Southwest Windpower assessed nCode DesignLife against other commercial software and outside consultancy resources. Josh Walton, P.E., Southwest Windpower Senior Mechanical Engineer, states, "We were able to quickly and accurately determine the hot spots on our nacelle castings using FE-based software by nCode. We were able to directly import our wind turbine aeroelastic simulation load time series into nCode DesignLife, create a duty cycle to extrapolate our loads to approximate 20 years of operation, and determine the damage associated with 20 years of operation. Before purchasing nCode DesignLife, we were only able to evaluate damage for components consisting of simple geometry using spreadsheets. Now we can quickly assess complex geometry associated with blades and castings." Jon Aldred, nCode product manager said "By using nCode DesignLife, wind turbine manufacturers such as Southwest Windpower are able to improve the efficiency of their analysis processes and assess the durability of more designs up-front. The benefit of this is lower overall costs of development with reduced risk."

## About HBM nCode products

nCode products are provided by HBM, a world-wide technology and market leader, offering products and services across the entire measurement spectrum, from virtual to physical. For over 25 years, nCode has been the leading brand for durability and data analysis solutions. Its technologies aid customers understand product performance, accelerate product development and improve design. The company's Product Lifecycle Performance portfolio comprises tools which enable data acquisition in the harshest environments, analysis of the most complex test data sets, and optimization of product durability. The power and ease of use of HBM technologies is a direct result of its world-class development process, expertise and in-depth experience of a broad range of industries. nCode product development is ISO9001 certified. Product support is available through nCode offices in Europe, North America and Asia. For more information, please visit [www.hbm.com/ncode](http://www.hbm.com/ncode).

## About Southwest Windpower

Southwest Windpower is the world's leading producer of small wind turbines. Since 1987, the company has pioneered new technologies to make renewable energy simple. Whether you're looking to reduce your home electric bills or power a home, boat or business off the grid, they offer a range of wind power systems to help you. The mission of Southwest Windpower is to be a global leader as a responsible designer, producer and provider of wind turbines up to 40kW, offering wind products chosen by customers for their quality, focused technology, performance, reliability, aesthetics, quietness, simplicity and lowest cost of energy, thereby accelerating global adoption of reliable and economic renewable energy providing the world the "Power to Choose."

HBM United Kingdom Limited, tel: +44 (0) 114 254 1246 | HBM, Inc. (HBM-nCode), tel: +1 248 350 8300