ΛNSYS® + Winfoor

"ANSYS engineering simulation is an indispensable tool for the engineers at Winfoor for developing Triblade, a ground-breaking new technology for large scale wind turbine rotor blades. The software received through the ANSYS Startup Program has proved to be very effective when analyzing and optimizing the layup and orientation of composites. These materials are highly non-isotropic and require advanced models to be analyzed correctly."

Rikard Berthilsson
CEO
Winfoor

Using ANSYS Simulation Solutions to Develop an Innovative Rotor Blade Design for Wind Turbines

Introduction

Rotor blades are causing big problems for wind power industry. They are expensive, heavy and made in one piece. Both production and shipping pose significant challenges. New designs are needed to drive the wind industry and make it more competitive as an energy source. However, new blades require a precise, optimized design, which would have been prohibitively expensive without efficient simulation tools like ANSYS Mechanical and ANSYS Fluent.

Challenges

Triblade, being a complex structure involving different types of materials, is laborious to analyze in detail without using simulation. We needed simulation software that could predict the loads and buckling of the whole rotor blade. After solving for the loads, the software had to be able to simulate the composite at the mesoscale to prevent material failure.

Technology Used

ANSYS SpaceClaim

ANSYS Mechanical

ANSYS Fluent

Engineering Solution

We We used ANSYS simulation solutions to:

• Predict buckling behavior.

• Compute buckling safety factor.

• Predict loads at different radiuses and positions on the Triblade.

• Compute expected deformations of the Triblade in different load cases.

• Simulate the deformation behavior of components made of carbon fiber reinforced plastic (CFRP).

• Simulate the safety factor to failure of CFRP components for different designs.

• Optimize bolted joints.

Benefits

The software has help us to:
• Shorten time to market.
• Optimize product performance.
• Spur innovation and insight into complex mechanical properties.

Key Elements of Metrics

Increase	Decrease	"Soft Savings"
• Revenue	• Cost	• Morale
• Profit	• Warranty claims	• Attitude
• Throughput	• Footprint	• Recruiting
• Customer satisfaction	• Failures	• Urgency
• Cost savings	• Time to market	• Productivity
• Capacity	• Admin costs (staff)	• Quality
• Competitiveness	• Search times $$	• Repeat business
• Reliability	• Weight	• Customization
• Value	• Errors	• Optimization
• Retention	• Redundancy	
• Innovation	• Documentation	
• Number of products	• Maintenance	

Company Description

Winfoor is developing Triblade, a disruptive technology for large-scale wind turbine rotor blades. The unique technology is a 3-in-1-blade that lowers the costs for rotor blades dramatically. It makes shipping easy and efficient. Blades are much lighter and can be made in modules. Looking ahead, Triblade could spearhead the development of larger and more powerful wind turbines by allowing for longer blades than today.

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