



Siemens PLM Software

Specialized solutions for wind energy

Addressing the entire wind blade
development process

[siemens.com/plm](https://www.siemens.com/plm)

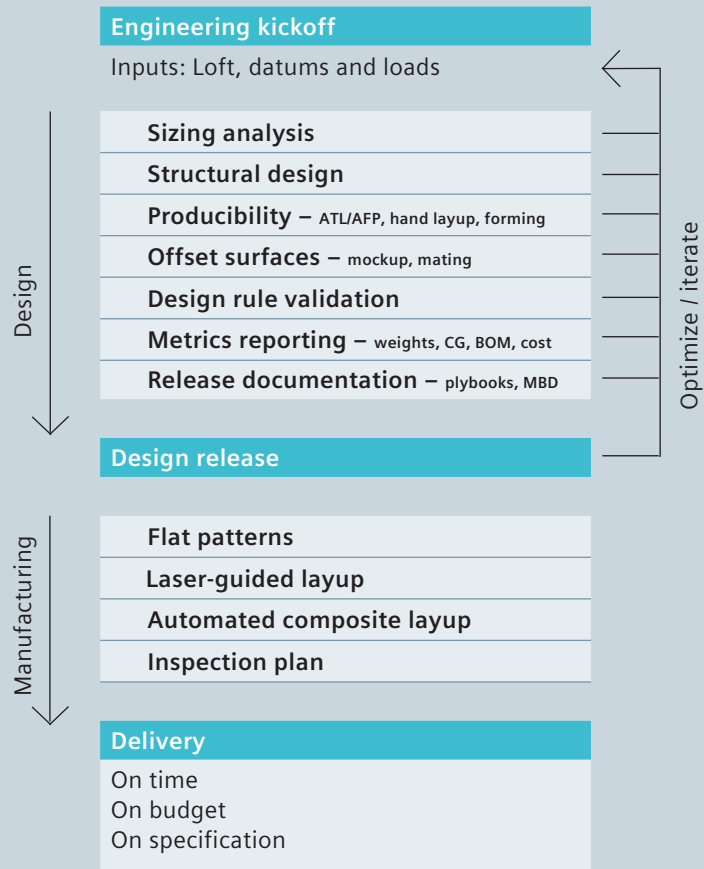


Addressing the entire wind blade development process

Conquering challenges with wind-specific engineering software and services

Developing composite blades for large wind turbines comes with substantial challenges. Global competition and the volatility of the energy market leave manufacturers and their suppliers grappling with how to decrease engineering cycle times and reduce production and total lifecycle costs. With wind turbines becoming bigger for added efficiency, manufacturers must adopt new blade designs as well as advanced materials and processes. But doing so adds risk and compounds the already complex challenge of building large composite blades less expensively while improving performance, reliability and quality.

Wind-specific software and services from Siemens PLM Software streamline the design-to-manufacturing process for complex composite wind blades and help engineers work more efficiently, reduce time-to-market, improve product performance and quality, and command a premium price.



The industry-specific approach



In a rapidly growing and competitive industry, wind turbine blade manufacturers are struggling to improve product lifecycles, reduce maintenance costs and lower the overall cost of delivered wind energy. To achieve this goal, engineering teams are given the daunting task of designing ever larger and lighter blades that must be produced using automated manufacturing methods to reduce labor and other manufacturing costs such as assembly time, material waste and manual rework.

With their current manual processes for information exchange between design, analysis and manufacturing, wind energy companies are insufficiently prepared to manufacture more sophisticated composite designs at high volume. Wind turbine blade manufacturers are consequently searching for a better composite blade development process and the best partner to help them devise and implement it.

The developers of Fibersim™ software, now comprising a business segment of Siemens PLM Software, are the recognized thought leaders in composites engineering, having worked for over 20 years with leading companies to establish the vision and processes for composites design and manufacturing for aerospace and defense and high-performance automotive companies. This experience, coupled with knowledge gained from strategic partnerships with wind industry leaders, uniquely positions Siemens PLM Software as the only proven vendor to create an industry-specific, end-to-end system for composite wind blade development.

Siemens PLM Software provides flexible and open technology that empowers users of the highest performing CAD systems to author and leverage wind-specific, structured engineering data that is far more powerful than geometry alone. Our approach enables new best practices for concurrent design and analysis, design for the manufacturing process, upfront design change validation, seamless transition to manufacturing, manufacturing automation and effective communication with the supply chain.



Fibersim software is proven in production to:

- *Provide a master model for the composite engineering process*
- *Deliver a powerful CAD-integrated environment for detailed ply layup design, resulting in up to 30 percent time savings*
- *Support truly concurrent design and analysis workflow for optimized blade designs*
- *Create a seamless link from 3D CAD to production for ply cutting, positioning and layup automation, resulting in up to 80 percent time savings*

Fibersim is the best-in-class solution for each phase of the composite wind turbine blade development process

Optimize performance

Challenge: Optimize wind blade performance while accounting for critical details of the composite and core layup definition. Rapidly move from the preliminary design definition to the composite layup detailed design.

Solution: A wind-specific blade design interface capability enables instantaneous import of a blade laminate structural definition into Fibersim for further detailed design of the ply and core elements.

Develop precise designs

Challenge: Develop an optimized composite design based on rapid and accurate stress analysis of the wind blade for reduced weight and improved strength and durability.

Solution: Fibersim supports tight bi-directional integration between composite design and stress analysis, supporting all the major CAE systems currently used in the wind industry.

Ensure design manufacturability

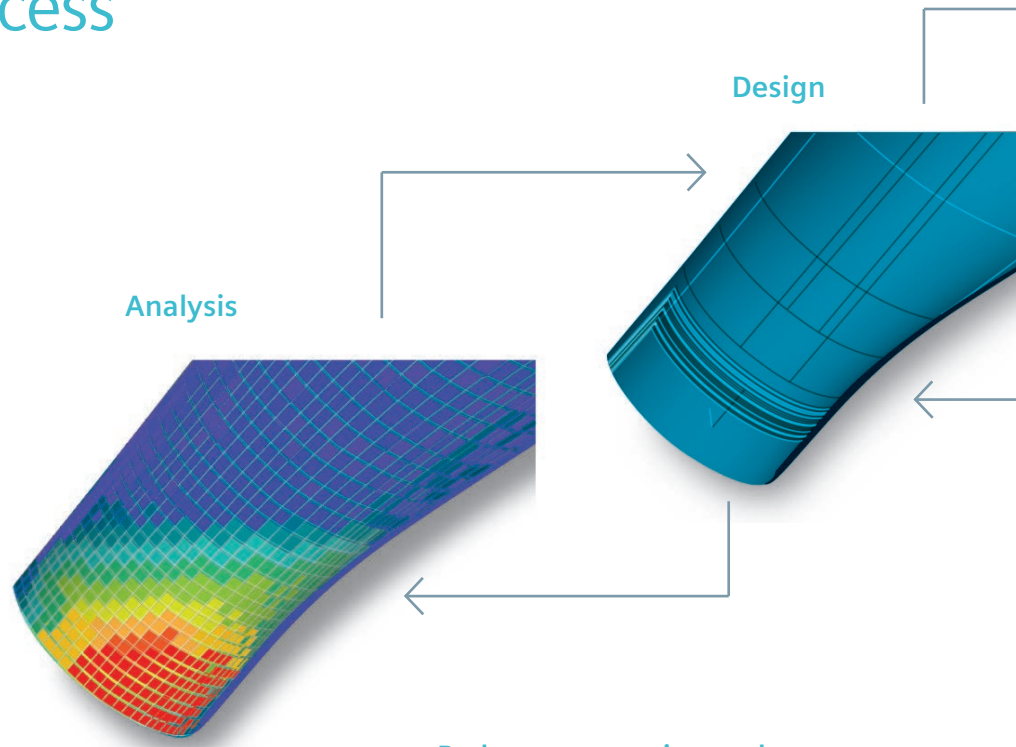
Challenge: Ensure manufacturability and consistency of blade design for the production process, including vacuum-assisted resin infusion, prepreg layup and broadgood automated deposition.

Solution: Fibersim supports multiple design methodologies including zone- and ply-based design, accurate producibility simulation and design validation for the composite manufacturing methods used by the wind industry.

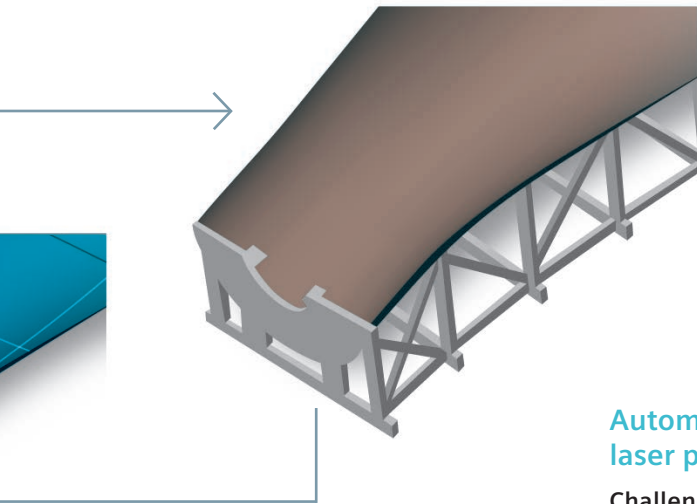
Reduce prototyping cycles

Challenge: Simulate the preform layup and resin injection manufacturing process for early problem detection and reduced prototyping cycles.

Solution: Fibersim supports the export of detailed layup data to resin flow simulation software, enabling accurate process simulation based on true fiber orientations.



Manufacturing



Produce accurate solid laminates

Challenge: Generate an accurate solid of a laminate to check possible interferences between parts and obtain tool surface data for mating parts.

Solution: Fibersim allows enhanced generation of offset surfaces based on the complete and accurate ply layout and core definition of the blade components.

Generate manufacturing documentation

Challenge: Generate a complete, detailed and up-to-date set of drawings and work instructions for manufacturing that ensures a repeatable and high quality blade production stream, eliminating costly errors and reworks.

Solution: Fibersim helps designers and manufacturing engineers easily create and seamlessly transition accurate designs, drawings and related data onto the manufacturing floor.

Automate ply cutting and laser projection

Challenge: Ensure plies are accurately cut to shape before laid down in the mold and that they are positioned in the right order and place.

Solution: Fibersim automates the creation of flat patterns and instructions for nesting, cutting and kitting directly from the 3D CAD model of the part. Fibersim enables laser projection systems to be used on the factory floor for error-free ply placement according to the design release.

Reduce cost and cycle times

Challenge: Replace manual layout with robotic deposition to reduce cost and cycle times in production.

Solution: Fibersim readily exports manufacturing data sets including ply shapes and center lines to manufacturing solutions vendors for tow and fabric placement.

"We've undertaken an ambitious program called '500 sets of wind power blades annually.' To reach that goal, we need composites engineering software that will enable us to take our process to the next level. Fibersim is well-suited for that task because it provides a digital thread that runs from design to manufacturing, enabling us to connect all the disciplines so we can move more accurately and quickly through the entire process. That also enhances our ability to establish a repeatable manufacturing process."

LTD's Manager of the Design and Research Department
Sinomatech Wind Power Blade Co.

"Transferring data between design and analysis can be extremely time-consuming. But during the testing phase we recognized that if we had a design tool that had a seamless interface to our CAE analysis tools, it would enable us to significantly reduce the product development cycle. Fibersim also enhances the automation of our development processes, helps us improve blade quality, and alleviates time-consuming reworks in the factory."

Hendrik Klein
Chief Designer
Nordex Rotor Blade Division

About Siemens PLM Software

Siemens PLM Software, a business unit of the Siemens Digital Factory Division, is a leading global provider of product lifecycle management (PLM) and manufacturing operations management (MOM) software, systems and services with over 15 million licensed seats and more than 140,000 customers worldwide. Headquartered in Plano, Texas, Siemens PLM Software works collaboratively with its customers to provide industry software solutions that help companies everywhere achieve a sustainable competitive advantage by making real the innovations that matter. For more information on Siemens PLM Software products and services, visit www.siemens.com/plm.

Headquarters:	+1 972 987 3000
Americas:	+1 314 264 8499
Europe:	+44 (0) 1276 413200
Asia-Pacific:	+852 2230 3333

© 2018 Siemens Product Lifecycle Management Software Inc. Siemens, the Siemens logo and SIMATIC IT are registered trademarks of Siemens AG. Camstar, D-Cubed, Femap, Fibersim, Geolus, GO PLM, I-deas, JT, NX, Parasolid, Solid Edge, Syncrofit, Teamcenter and Tecnomatix are trademarks or registered trademarks of Siemens Product Lifecycle Management Software Inc. or its subsidiaries in the United States and in other countries. Simcenter is a trademark or registered trademark of Siemens Industry Software NV or its affiliates. All other trademarks, registered trademarks or service marks belong to their respective holders.

31282-A16 9/18 A