Co-creation in the wind energy market works!

DSM, 3B-the fibreglass company, Siemens Wind Power and DTU Wind Energy propose a new-to-the-world composite system for making wind turbine blades, featuring easy blade manufacturing, low weight, high stiffness, and excellent resistance to fatigue.




By

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The wind energy market requires reliable wind turbines that can generate energy without interruption and at the lowest investment and operating cost. Consequently, wind turbine manufacturers need blades at competitive cost with a long and efficient working life.

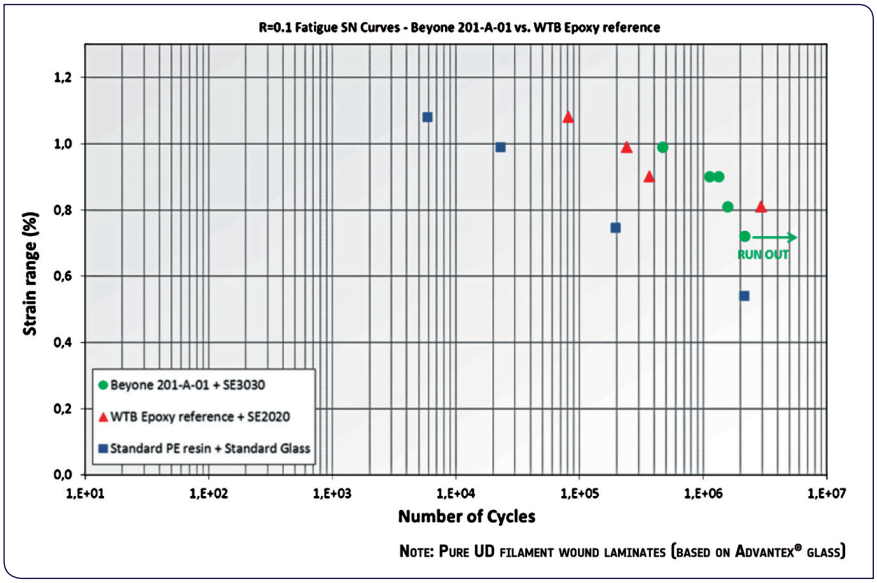
Styrene-free, Cobalt-free, 40 % bio-based

The current material systems used for making wind turbine blades are in majority based on epoxy resins. While they bring resistance to fatigue, these resins are more sensitive to process variations, and require a time-consuming post-cure for reaching optimum physical properties. Systems based on polyester resins are easier to process but lack the high strength and fatigue resistance required for this demanding application. Moreover, blade manufacturers prefer to use resin systems without styrene, in order to have the best working environment for their operators.

Sustainable innovation

A new-to-the-world composite system is being evaluated by Siemens Wind Power for its next-generation wind turbine blades. This system was introduced by DSM and 3B, with support from DTU Wind Energy, and offers the best of both worlds: easy resin infusion and processing, zero styrene emissions, and excellent fibre/resin interaction yielding superior strength and fatigue resistance.
The system is based on DSM's Beyone™ 201-A-01, a resin that is styrene-free, cobalt-free (based on BluCure™ Technology), and 40 % bio-based. The system also uses 3B's novel SE3030 glass rovings. Enhanced adhesion to the reinforcement is achieved through an optimized sizing applied on the glass filaments. This sizing gives excellent fibre/resin interaction, resulting in improved composite properties that ensure long-lasting blade operation. In addition, it has been demonstrated that this system can be used for making long blades at a record speed (through faster resin infusion and limited post-cure), giving an increased output per mould and an outlook for excellent process consistency.

Excellent resistance to fatigue



Excellent resistance to fatigue for long live blade performance. Tensile fatigue performance (S-N Curve) of Beyone™ 201-A-01 glass reinforced composites compared to standard epoxy systems for wind turbine blades

Peace-of-mind on cost and operation

For wind turbine suppliers, the new composite system provides many benefits, including a major reduction in blade manufacturing cost and an increased process output. Peace-of-mind is what the new system brings to energy providers, as the resilient material system allows making strong blades that enable wind turbines turning in energy day after day. Consequently, the technology supports wind energy to become more competitive and presents a sustainable alternative to power generated from traditional fossil sources such as coal.

Co-creation works

In order to commercialize new technologies that have the potential to revolutionize the manufacturing of wind turbine blades, it was required to think out of the box and form a strong channel partnership. DSM, 3B, Siemens Wind Power and DTU were able to demonstrate that through co-creation, a complex technology can be evaluated at record speed and prepared for live application in line with market requirements.
Starting back in 2011, DSM and 3B worked on the development of new glass fibre sizing systems for 3B's rovings that would make it possible to get the maximum out of the styrene-free resin technologies created by DSM. When DSM proposed the new second-generation styrene-free resins based on bio-ingredients, it was found that the combination of both companies' expertise could yield a composite material system with the potential to revolutionize wind turbine blade manufacturing.

The companies sought the support of DTU, one of the world's leading research and testing institutes for wind energy materials. DTU helped to optimize the material system for obtaining maximum performance (including material screening and documentation), and provided support to bring the technology to market. Presently, the material system is under evaluation by Siemens Wind Power for its next-generation wind turbine blades. More details about this evaluation will be disclosed as appropriate.

Wind turbine installation

Great outlook

It is estimated that the world market for wind turbine blades is in the order of 450-500,000 MT of composite materials per year, with an average anticipated growth of 7% until 2020. The partners are convinced that the new composite system can largely contribute to that growth.

Bright future for wind energy

Around the world, the need for sustainable power generation is steadily growing in line with the economic and social development of the increasing world population. The full use of the power offered by wind will become a more important element of the energy mix of the future. Yet wind energy still has a long way to go, both in terms of installed capacity as well as in the energy conversion efficiency and total cost of ownership.
This new composite system enables wind energy to become more competitive and present an even more sustainable alternative to power technologies that generate energy from traditional fossil sources. ■

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