The »VENTUM« at work. (Courtesy: Enercon)

As the first five-fold extendible semi-trailer on the market, the "VENTUM" permits wind-turbine manufacturers and heavy haulage companies to transport extra-long rotor blades well over 70 meters in length on roads, tracks and construction sites. In combination with Goldhofer's mature pendular axle technology, the "VENTUM" is the key to fast and safe passage over bridges and round tight bends and roundabouts as well as easy maneuvering on confined construction sites. The hydraulically lift-and-lowerable gooseneck ensures rotor blades with very large hub diameters can safely negotiate tunnels and underpasses. Pendular axles with a stroke of ±300 mm give the vehicle full maneuverability and compensate uneven ground in the longitudinal and transverse directions. Loading height is 1,250 mm. Where required for the route to be taken, ground clearance can be increased over and above the suspension stoke. Two support legs facilitate extension and retraction of the telescopic tubes, which permit the deck behind the gooseneck to be extended from a basic length of 13.5 meters for empty running to more than 68 meters. The steering is adjustable, so the vehicle can be driven in its basic length without a second man in the cab, while optimum cornering performance is available with the deck extended.

"With a steering angle of up to 60 degrees and the user-friendly »SmartControl« remote control system, Goldhofer provides outstanding support for drivers in their task of safely transporting loads of this enormous size to their final destination," said member of the Goldhofer Board and Head of Transport Technology Rainer Auerbacher.

The gigantic rotor blades are used above all for sites with low wind speeds and also, where there is sufficient hub height, for refurbishing and upgrading existing wind power plants.

MORE INFO www.goldhofer.de

INNOVATION

Field measurement campaign begins on wind turbine

Three innovative 20-meter-long rotor blades developed within the context of the SmartBlades2 project will be assessed under natural weather and wind conditions in Boulder, Colorado, over four months. For this purpose, the rotor blades, which were designed by the Fraunhofer Institute for Wind Energy Systems (IWES) and built by the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR), have been successfully installed in the United States at the Department of Energy's National Wind Technology Center (NWTC) of the National Renewable Energy Laboratory (NREL).

Among others, the field campaign aims to clarify how well the rotor blades — designed with bend-twist coupling — are able to effectively dampen peak loads during strongly variable wind speeds. The results will serve as a basis for the further development of smart rotor blades. The SmartBlades2 project is funded by the German Federal Ministry for Economic Affairs and Energy (BMWi) and is being carried out by the Research Alliance Wind Energy, with its partners DLR, Fraunhofer IWES, and ForWind, in collaboration with industry partners from GE, Henkel, Nordex Acciona, SSB Wind Systems, Suzlon, Senvion, and WRD Wobben Research and Development.

LONGER SERVICE LIFE, GREATER YIELD

Rotor blades equipped with bend-twist coupling are able to adapt to variating wind conditions by themselves — at higher wind speeds the rotor blades can bend or twist, thus offering the wind a smaller impact surface. This reduces the overall load on the system, increasing the service life of the wind turbine as well as its power yield. In order to be able to fully capture the structural and aerodynamic behavior of the newly developed blades during the field experiment, the project partners integrated specially developed measurement systems into the blades' structure already during production at the DLR Center for Lightweight-Production-Technology (ZLP) in Stade, Germany.

FIRST ANALYSIS UNDER REAL WEATHER CONDITIONS

"We are very excited to observe and find out how our rotor blades behave during these field assessments. This measurement campaign represents the first practical trial for our blade technology," said SmartBlades2 Project Manager Zhuzhell Montano Rejas of the DLR Institute of Composite Structures and Adaptive Systems.

Installation of the "SmartBlades2" rotor blades. (Courtesy: Lee Jay Fingersh, NREL)

"The findings will also be used to improve simulation models for next-generation wind turbines."

Fraunhofer IWES is leading the measurement campaign.

"We are using several measurement systems that will allow us to monitor the entire length of the blades in order to capture the deformations, accelerations, and loads they are subjected to," said Dr. Christian Kress of Fraunhofer IWES, who is responsible for the campaign. "In addition, the air flow around the rotor blades will be recorded at the surface using an aerodynamic measurement system."

Inside the rotor blades, various systems designed by DLR, IWES, and SSB Wind Systems will continuously control how the blades behave under the diverse wind loading conditions the turbine will experiment. Furthermore, the turbine's tower and the nacelle made available by NREL is also equipped with extensive measuring technology, enabling the team to measure the whole system's behavior in detail.

The resulting measurements will be correlated with data on wind conditions, which will be recorded by the NREL data acquisition systems present on the NWTC's field and a SpinnerLIDAR (Light Detection And Ranging) measurement device from the Center for Wind Energy Research (ForWind) at the University of Oldenburg. This Lidar is normally installed in the spinner of a wind turbine, but in this case it is set up on top of the nacelle to be able to analyze the wind field both in front and behind the turbine.

With a laser system, the SpinnerLIDAR scans an area of wind field in front of or behind the turbine.

"In this section, the SpinnerLIDAR can measure at over 300 points every second," said ForWind scientist Prof. Dr. Martin Kühn. "This enables us to measure wind speeds, wind directions, vertical wind shear components, as well as local turbulences with a spatial resolution that cannot be matched with conventional Lidar devices."

The comparison of the structural behavior measured by the sensors with the wind data will show whether the developed rotor blades achieve the desired behavior. At the beginning of the measurement campaign, the SpinnerLIDAR will measure the incoming wind field while at the end it will also measure the wake flow behind the wind turbine to better understand the influence of the blades on the surrounding environment.

The measurements in the three-bladed Controls Advanced Research Turbine (CART3) provided by NREL, unlike systems used for commercial power generation, will allow the scientists to conduct various validation scenarios, such as an abrupt deceleration of the rotor. On site — on the edge of the Rocky Mountains — the wind conditions can range from very low speeds to powerful gusts in winter and early spring. This will make it possible for the researchers to assess the SmartBlades2 rotor blades under a variety of environmental conditions.

"We are delighted to be able to validate the new rotor blades at our research turbine at the NWTC," said Andrew Scholbrock, who is responsible for the measurement campaign with the CART3 turbine at NREL. "We are also eager to find out how these rotor blades, designed with bend-twist coupling, perform in practice under real world conditions."

The partners of the BMWi-funded SmartBlades2 project are hoping that the measurement campaign will yield meaningful findings on the behavior of the new rotor blades. The validation process will start with data analysis while the measurements are still being conducted and will continue until the end of the project, during the autumn of 2019. The project will help to support the wind-energy industry in the further development of rotor blades with bend-twist coupling and is set to pave the way for the implementation of this technology.

MORE INFO www.iwes.fraunhofer.de

INNOVATION

Lidar lights up wind opportunities for Tilt in Australia

Tilt Renewables, a leading developer, owner, and manager of renewable energy generation assets in Australia and New Zealand, has confirmed the use of wind Lidar technology from ZX Lidars to remotely measure wind

ZX Lidars provides vertical and horizontal profiling wind Lidar to accurately measure wind conditions remotely and ahead of their installed position. (Courtesy: ZX Lidars)

conditions above ground without the need for a traditional met mast. Initial deployment has been to a remote site in complex terrain primarily for the purpose of confirming the quality of the wind resource.

With more than 1.6 GW of approved wind projects in Australia and New Zealand, Tilt Renewables required a flexible solution to wind-resource assessment that could also be used to bolster existing anemometry and with an eye on operational sites emerging. New Zealand-based wind engineering consultancy Energy3 provided expert advice and support on how to achieve this.

"A key advantage of Lidar is that it can be easily mobilized and rotated to a number of sites within the Tilt Renewables' portfolio and can be used so flexibly for a range of purposes including feasibility assessments at potential new sites and improving the coverage of site measurements at existing sites," said Sherrin Yeo, engineering manager at Tilt Renewables.

ZX Lidars provides vertical and horizontal profiling wind Lidar to accurately measure wind conditions remotely and ahead of their installed position. These accurate, independent wind measurements are a cornerstone in the development, construction, and operation of wind farms globally.

MORE INFO www.zxlidars.com

MAINTENANCE

Training course to explain new corrosion protection for turbines

The new corrosion protection coating, "SikaCor® SW-1000 RepaCor," developed in a research association, promises a significantly simplified, faster, and more cost-effective on-site repair of wind turbines. Following the successful start in February 2018, a free product training course this year in Rostock provides an insight into the possible applications on wind turbines and technical information. The event will again be organized by WindSourcing.com GmbH together with Sika Deutschland GmbH on February 12, 2019 (German) and February 13, 2019 (English) in Rostock.

The four- to five-hour event is aimed at all service companies involved in the maintenance and repair of wind turbines. It consists of a theoretical part and practical exercises.

"The aim is for the participants to be able to reliably use the product themselves after the training and pass on the knowledge to their employees," said Stefan Weber of WindSourcing.com, managing director of the Hamburg-based trading company. "Various practical applications in recent months have confirmed this: The product is a revolution in the repair of corrosion damage to onshore and offshore wind turbines."

The use of wind power, especially on the open sea, demands the highest standards of corrosion protection — and thus maintenance — due to the mechanical and climatic conditions. (Courtesy: WINDSOURCING.COM)

The use of wind power, especially on the open sea, demands the highest standards of corrosion protection — and thus maintenance — due to the mechanical and climatic conditions.

"A long and thus profitable service life of the turbines can only be achieved with conscientious maintenance," Weber said. "The systems cannot simply be transported away, especially on the high seas. All work has to be carried out on site in wind and weather — often by industrial climbers who can only handle heavy tools and material to a limited extent."

In addition, protective coatings have to dry and harden quickly due to the weather, Weber saod. This is exactly where SikaCor® SW-1000 RepaCor comes into play.

The solvent-free 2-component coating material is the result of the three-year research project RepaKorr, which sought — and found — solutions to the problems mentioned above. The Fraunhofer Institute for Manufacturing Technology and Applied Materials Research (IFAM), among others, was involved in the joint project funded by the Federal Ministry of Education and Research.

Between 2013 and 2016 Sika Deutschland GmbH was in charge of the material requirements and launched SikaCor SW-1000 RepaCor on the market in summer 2017.

"The coating dries four hours faster than conventional systems," Weber said. "The practical packaging in the form of mixed cartridges facilitates processing and thus guarantees absolute process reliability with minimum waste at the same time. Industrial climbers are thus loaded with low weight."

Other properties include single-layer performance (corrosion protection as with multi-layer systems), UV and colour stability and Norsok M501 approval with ISO 20340 testing.

On February 21, 2018, WindSourcing.com, together with Sika Deutschland GmbH, welcomed, for the first time, customers from the service sector for wind turbines in Hamburg to present the new corrosion protection