



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 Re-

search 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](http://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](http://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 said. 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



The Tillman 1772 and 1773 cold weather gloves. (Courtesy: Tillman)

SikaCor SW-1000 RepaCor in a product training course. Besides other participants, the team of Christian Schulte, managing director of Windspektrum GmbH, also took part in the training.

“The product training with Wind-Sourcing.com and Sika appealed to my team and me very much,” he said. “The product ‘SikaCor® SW-1000 RepaCor’ was professionally presented. In addition, all participants were able to test the product extensively and direct their questions to the two trainers. The networking on the evening before the training was not neglected either.”

**MORE INFO** [deu.sika.com/de/SikaAkademie/Verarbeiter/Windenergie/Windenergy.html](http://deu.sika.com/de/SikaAkademie/Verarbeiter/Windenergie/Windenergy.html)

## MAINTENANCE

### Tillman introduces glove choices for cold weather

Keep Jack Frost from nipping at your

fingers with the Tillman 1772 and 1773 high-visibility cold weather gloves. Both the 1772 and 1773 feature a 13-gauge polyester with ANSI A2 Cut Resistance with a choice of either a sandy nitrile grip (1772) or a sandy latex grip (1773).

Tillman’s 1772 and 1773 offer three levels of protection for your hands:

- ▶ Keeping hands safe with an ANSI A2 Cut Resistance.
- ▶ Keeping hands dry with either a 3/4 dip nitrile coating, 1772, or a full dip latex coating, 1773.
- ▶ Keeping hands warm with a soft acrylic terry for warmth that won’t chafe the user’s hands or wrists for all-day comfort.

#### ABOUT THE 1772

- ▶ High-Vis 13-gauge polyester with ANSI A2 Cut Resistance with a 10-gauge High-Viz yellow acrylic terry for warmth.
- ▶ Smooth blue coated 3/4 nitrile helps keep hands dry.
- ▶ Sandy nitrile coating provides superior grip in dry, wet and oily applications.

- ▶ Knit wrist helps prevent dirt and debris from entering the glove.

#### ABOUT THE 1773

- ▶ High-Vis 13-gauge polyester with ANSI A2 Cut Resistance with a 10-gauge High-Viz yellow acrylic terry for warmth.
- ▶ Smooth orange coated 3/4 latex helps keep hands dry.
- ▶ Sandy latex coating provides superior grip in dry, wet, and oily applications.
- ▶ Knit wrist helps prevent dirt and debris from entering the glove.

Both the 1772 and 1773 can be laundered, extending the life of the glove, lowering replacement costs, and offer a color binding on the cuff that indicates the glove size.

The Tillman 1772 and 1773 can be used in many industries, including manufacturing, construction, maintenance, and municipal services. The Tillman 1772 and 1773 is available in five sizes, S- 2XL. ↵

**MORE INFO** [www.JTillman.com](http://www.JTillman.com)