INNOVATION

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ITL Develops Radar Compatible Obstruction Light

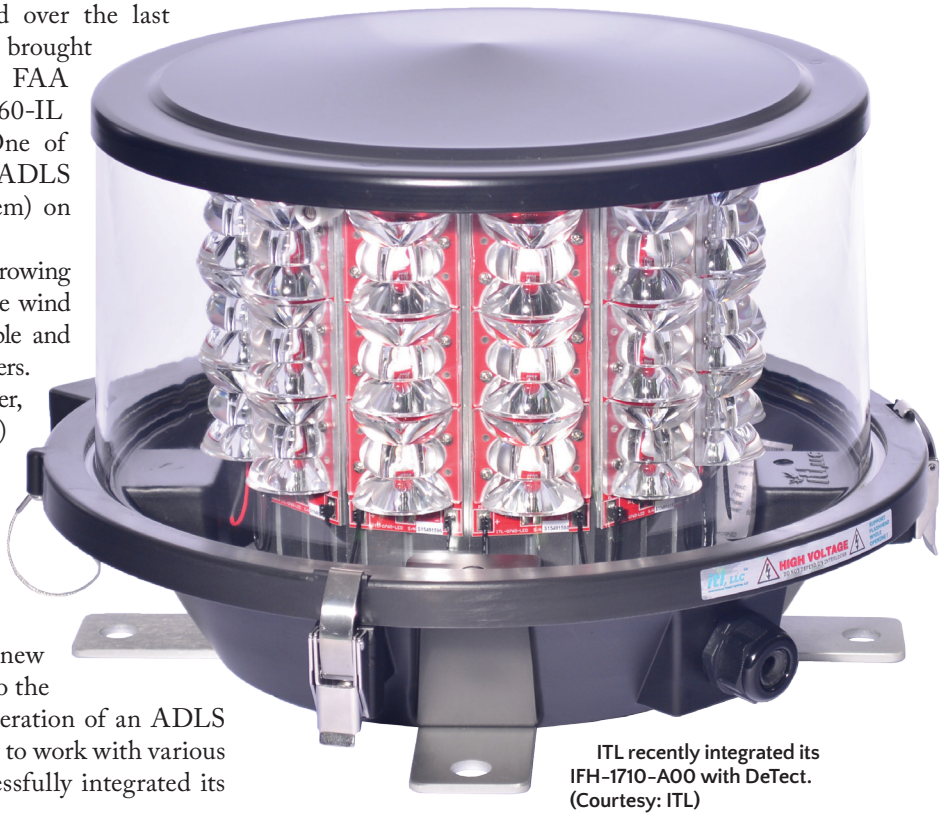
As the wind industry has evolved over the last decade, many new changes were brought forth in the latest edition of the FAA Advisory Circular, AC No: 70/7460-IL released in December of 2015. One of those changes allowed the use of ADLS (Aircraft Detection Lighting System) on wind farms.

This change is in relation to the ever-growing and expanding wind industry as more wind farms are built supplying a sustainable and renewable energy source to consumers. As an obstruction lighting manufacturer, International Tower Lighting (ITL) supports the continued progression of the wind industry while working to exceed the standards set forth by the FAA and understanding how important an ALDS is in mitigating light pollution.

In early 2016, ITL supplied its new radar compatible obstruction light to the first FAA-approved commercial operation of an ADLS on a U.S. wind farm. ITL continues to work with various radar companies and recently successfully integrated its IFH-1710-A00 with DeTect.

DeTect's Harrier ADLS system is a radar-activated obstruction lighting control system based on DeTect's Harrier Security and Surveillance radar. It is used to provide cost-effective, reliable, long-range detection, tracking, and intrusion alerting of cooperative and non-cooperative aircraft, ultralights, and drones/UAVs by airports and industrial facilities. It is also used for unmanned aerial vehicle (UAV) sense-and-avoid and for rocket-launch airspace intrusion control.

For ADLS use, Harrier advantages include solid-state Doppler radar sensors, secondary ADS-B and TAS receivers, and interconnectivity with a wide range of obstruction lighting and SCADA networks. The system is also fully remote controlled, ground-based for lower installation and O&M costs, and provides longer-range detection. This means fewer units are needed at a large site. The technology is being used in 280 systems operating worldwide in a variety of applications and environments.



ITL recently integrated its IFH-1710-A00 with DeTect. (Courtesy: ITL)

ITL was founded in 1998 developing aftermarket replacement parts and common component repairs. Today, ITL provides a variety of quality products, replacement parts, and technical support for most lighting systems in use. Its IFH-1710 provides wind-industry customers with a durable, dependable obstruction light with ease of maintenance and cost savings.

DeTect is a U.S.-based, global leader in remote sensing technologies with offices in the U.S. and Europe and projects worldwide. DeTect's products include drone surveillance and interdiction systems, aircraft bird strike avoidance radars, UAV ground-based sense-and-avoid systems, airspace and marine security radars, border protection radars, and bird radars for wind farm and industrial bird control and protection.

Source: International Tower Lighting

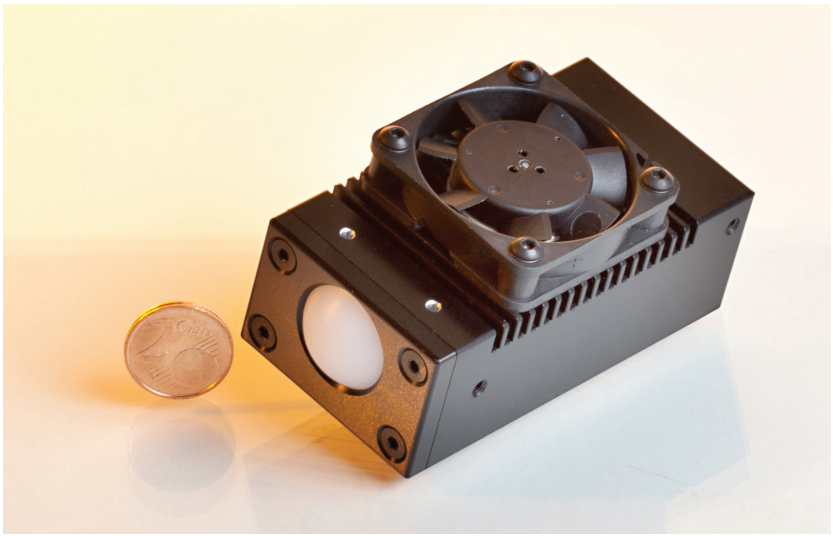
For more information, go to www.itl-llc.com

Radar Technology Used to Increase Wind-Turbine Efficiency

The share of wind energy in the electricity mix is steadily increasing around the globe and is accompanied by a growing need for efficient and high-quality wind turbines with the "Made in Germany" seal. The rotor blades are the centerpiece of a wind turbine, with their production and maintenance subject to rigorous testing procedures. An innovative radar scanner from the Fraunhofer Institute for Applied Solid State Physics IAF can detect defects in the material composition of the wind turbine blades with far greater accuracy and visualized in a cross-sectional view, thereby saving costs in production and operation.

Wind power has become an indispensable part of an environmentally friendly power supply. Approximately 50 GW, equivalent to 12 percent of the total power in Germany, are generated by more than 28,000 wind turbines — with an upward trend. According to the Global Wind Energy Council, the global wind-power capacity will quadruple to 2,110 GW by 2030 — constituting 20 percent of the global electricity supply. Therefore, it is all the more important for this growth market that wind turbines become more efficient, more reliable, and more durable.

According to industry experts, weak points in blade production, for example, could result in unplanned additional operation and maintenance costs amounting to several hundred thousand euros over the entire service life of the turbine. To increase the efficiency and reliability of wind turbines, Fraunhofer IAF has developed a material scanner for checking the quality of rotor blades. Using radar-based technology, defects in the material composition of the wind-turbine



The radar module from Fraunhofer IAF is based on indium gallium arsenide semiconductor technology. It is extremely light and compact due to its monolithically integrated construction, in which different components and functions are integrated into a single chip. (Courtesy: Fraunhofer IAF)

blades can be detected in even greater detail.

IDENTIFYING DEFECTS

The rotors, which are usually equipped with three blades, are the central component of all wind turbines. They convert wind into rotational energy, and then into electricity. Much like the wings on an aircraft, the blades are subjected to enormous external loads and therefore must be designed to be extremely robust. Modern wind-turbine blades are mainly constructed from glass fiber and carbon fiber reinforced plastics (GFRP/CFRP), so they can elastically absorb the wind energy from strong gusts without breaking. For a single blade, up to 100 sheets of glass fiber webbing are layered on top of each other, shaped and then glued together with epoxy resin. Quality control is essential at this stage in production.

"The difficulty lies in layering the glass fiber sheets flat before they are glued, without creating undulations and folds, and avoiding the formation of lumps of resin or sections of laminate, which don't set when applying the epoxy," said Axel Hülsmann, coordinator of the radar project and group manager of sensor systems at the Fraunhofer IAF.

These kinds of defects, as well as delaminations or fractures, can be identified on a large-scale using infrared thermography.

"Our material scanner enables defects to be identified with even greater accuracy, as depth resolution is also possible with radar technology — even in places where ultrasound methods fail," Hülsmann said.

CROSS-SECTIONAL PROFILES

At the core of the material scanner is a high-frequency radar, which operates in the W band between 85 and 100 GHz with only a few watts of transmitting power. Specialized software is then used to process the transmitter and receiver signals and visualize the measurement results.

"This enables us to generate a cross-sectional view of the blade, in which defects can be identified in the millimeter range, and makes our material scanner significantly more accurate than conventional methods," Hülsmann said.

The radar module is based on indium gallium arsenide semiconductor technology. It is extremely light and compact due to its monolithically integrated construction, in which different components and functions are integrated into a single chip. Measuring 42 mm x 28 mm x 79 mm, it weighs 160 grams. It has a low power consumption of about 5 watts and is fitted with an integrated microcontroller that emits measurement signals via an internet interface.

Future improvements will see the module's frequency range extended to 260 GHz into the so-called H band.

"This will quadruple the bandwidth of the radar module from 15 GHz to over 60 GHz," Hülsmann said. "While the resolution of the rotor blade cross-section is already very high, our aim is to improve it even further."

LOWER MAINTENANCE COSTS

In addition to its use in the production of rotor blades, in the future, the Fraunhofer IAF material scanner also may find a role in maintenance, where it could be used to classify defects, such as those caused by the impact of birds.

"Currently, the routine testing of rotor blades is mainly performed by hand: An expert knocks on the blade with a hammer and can tell from the tone whether there are any defects in that section," Hülsmann said. "An automated solution, supplemented by

our radar technology, could vastly reduce the downtime of wind turbines and thus save costs."

This is particularly true for the manual maintenance of offshore wind turbines, which must be reached by boat, sometimes on harsh seas — a time-consuming process.

Alternative testing technologies, such as ultrasound solutions, are extremely difficult to integrate into maintenance procedures.

"Water or gel has to be utilized as a coupling agent, as every air pocket between the sensor and measured part muffles the ultrasound signal to a considerable extent," Hülsmann said. "While this entails certain side effects, it is nonetheless possible when checking for defects during rotor-blade production. But applying water or gel to wind-turbine blades, which are 100 meters in the air, is extremely complicated. Because it allows for non-contact remote sensing, radar is the optimal solution in this case."

The radar scanner from Fraunhofer IAF can contribute to the development of innovative material inspections in other industries as well — for example in the aircraft industry. In newer aircraft such as the Boeing 787 Dreamliner or the Airbus A350, the wings in particular are mainly built out of lightweight composite materials.

"In the aircraft industry, as in the plastics industry, an accurate and rapid defect test during both production and maintenance can save costs and prevent damage caused by material fatigue," Hülsmann said.

Source: Fraunhofer Institute for Applied Solid State Physics

For more information, go to www.iaf.fraunhofer.de

Vaisala's Triton Wind Profiler Powers Through Two Winters North of the Arctic Circle

The Triton Wind Profiler manufactured by Vaisala, a global leader in environmental and industrial measurement, has shown exceptional performance across two winters in the northern reaches of Finland. With two Tritons measuring the wind for Finnish developer and operator Puhuri Oy, Vaisala has demonstrated the unmatched resilience of the system in extreme winter conditions and the strategic and logistical advantages of remote sensing for wind-energy firms in cold climates across the globe.

"We build and operate wind parks in some of the world's most challenging weather conditions," said Teppo Hilakivi, technical expert at Puhuri Oy. "Vaisala's Triton is the only practical way to reduce the uncertainty in our annual energy projections, allowing us to improve the profitability of our development process."

Wind-energy developers are increasingly exploring wind potential in northern latitudes, encouraged by high wind speeds and a clear route to project permitting far from population centers. Innovation in cold-climate wind-turbine technology, such as anti-icing and heating systems, has accelerated the expansion of the wind energy in markets such as northern Europe and Canada.

However, while advancements in turbine technology are driving growth, shortfalls in traditional resource assessment and site analysis approaches have, in many cases, thwarted the efforts of developers and operators in these regions. Cold,

icy weather complicates the installation of measurement masts and can damage mechanical sensors, while off-grid locations and low solar availability in polar regions make it difficult and costly to keep large instruments powered-up.

Remote sensing is swiftly becoming the preferred approach for collecting hub-height measurements for wind-resource assessment and also enables developers to collect reliable early-site data before making further investment decisions. Yet, when it comes to operations in temperatures down to minus-40 degrees C, many remote sensing devices suffer from performance and reliability issues — ranging from icing issues to intensive fuel requirements — that ultimately drive up maintenance costs and affect the quality of the data collected.

The Triton Wind Profiler is built to withstand harsh winter weather conditions. (Courtesy: Vaisala)

"Triton's resilience in cold climate conditions is impressive — its measurements are very accurate, and the power consumption is so low that we can easily keep it running for three or four months without refuelling," Hilakivi said. "And when it does come time to move the Triton to a new site, it's light enough to be towed by a normal passenger car."

Vaisala's Triton Wind Profiler is built to withstand harsh winter weather conditions, and the compact, mobile unit has the lowest power requirements of any system used in the wind industry. With an optional methanol-fueled extended power option to supplement the Triton's solar panels during low sunlight months, the system offers continuous, unattended operation for several months without refueling.

These features have enabled Puhuri to conduct extensive six- to 14-month measurement campaigns throughout northern Finland, improving the profitability of the company's wind-development projects.

Vaisala's Triton Wind Profiler has been deployed at more than 3,700 locations across more than 30 countries worldwide to support project stakeholders from site and resource assessment to ongoing operational performance analysis.

Source: Vaisala

For more information, go to www.vaisala.com/energy

Spectro Scientific Wins Patent for Method Used in Its CoolCheck 2 Analyzer

The CoolCheck 2 with printer. (Courtesy: Spectro Scientific)

Spectro Scientific, one of the world's largest suppliers of oil, fuel, and processed water analysis instrumentation and software, has been awarded U.S. patent 9,448,112 B2 for a method to measure two key vehicle fluids. The patent for "Multifunctional fluid meter and method for measuring coolant, bio-diesel, gas-ethanol and DEF" has also been granted in Australia.

The CoolCheck 2™ is a dual wavelength spectrometer specifically designed to test coolant and diesel exhaust fluid (DEF) without the use of chemical reagents or solvents. Specially designed sample cuvettes allow the analyzer to read in both the UV-visible and NIR range simultaneously. The measurement method provides eight key coolant parameters or two DEF parameters in less than one minute.

A recently released calibration update improves the performance in measuring nitrites, a key coolant additive. This new method is able to analyze a wider range of coolants on the market today as well as new fluids when they are introduced.

The CoolCheck 2 measures the coolant or DEF directly from the vehicle and is designed to be easily operated by vehicle maintenance staff. The analyzer's on-site analysis capability, speed, and convenience eliminate the wait associated with outsourcing laboratory analyses and provide better accuracy than simple test strip methods. The CoolCheck 2 is a companion device to Spectro Scientific's MicroLab® automated on-site oil analyzer, which allows a mechanic to analyze all major vehicle fluids to diagnose the health of the equipment and identify potential problems.

"This patent award reinforces Spectro's role as a world leader in fluid analysis technology," said Patrick Henning, Spectro Scientific's chief technology officer. "It especially benefits our fleet customers with faster and better on-site coolant and DEF measurement, which complements our capability for on-site oil analysis."

The CoolCheck 2 with the updated calibration is available now.

Source: Spectro Scientific

For more information, go to www.spectrosci.com