Press release

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Bachmann Defies Arctic Conditions

Automation specialist delivers SHM system for research

Feldkirch – 20 December 2023

Now tried-and-true even under the harshest conditions: Bachmann hardware literally defies Arctic conditions. A Bachmann structural health management (SHM) system is helping to ensure that German polar researchers in Antarctica don't run out of eco-power.

Bachmann condition monitoring specialists have developed a prototype SHM system that has been in operation for several months now on the tower of the wind energy generation system for Neumayer Station III in Antarctica.

The polar research station is located on the Ekström Ice Shelf in the Atlantic Sector of Antarctica. It is the central basis of German Antarctica research. Over the Antarctica summer, more than 50 people live and work here. And reliable energy must be generated for them.

Wind energy replaces diesel generators

Previously, diesel engines were the primary source of energy for the research station, which is staffed year-round. However, the high reliability of diesel engines is associated with pollutant emissions caused by the combustion of fossil fuels. Until recently, the three diesel generators deployed have been consuming between 300 and 350 tons of diesel each year. This means that approximately one million tons of carbon dioxide have been released into the air for research purposes.

In the future, the share of regenerative energy in the station's energy balance is to be significantly increased through intensified use of wind energy, solar energy, and geothermal energy. The station's sponsor, the Alfred Wegener Institute for Polar and Marine Research, explained to Bachmann that a sophisticated energy concept could reduce diesel consumption by approximately 50 %.

To start with, a first vertical wind energy generation system has recently been supporting the station's combined heat and power unit with regenerative energy. There are plans for two additional wind power generation systems. The data collected by the structural health management (SHM) system delivered by Bachmann will serve as the basis for the design of the two wind turbines that will follow. The data of the pilot turbine will be used to detect systematic errors.

The SHM system controller uses a type MC212 CC processor; "CC" stands for "Cold Climate". – Nowhere is this description more appropriate than it is for Antarctica.

Peak temperatures as low as -40 °C

Bachmann "ColdClimate" modules are designed to operate in temperatures ranging from -30 to +60 °C and they can withstand temperature peaks from -40 to +70 °C. Before these modules leave the Bachmann production facilities, each one is subjected to a 100 percent test during operation. In this test, faultless operation must be validated during phases of extreme temperature change in climate chambers and through standard-compliant measurements in the company's own three-meter, EMC anechoic chamber.

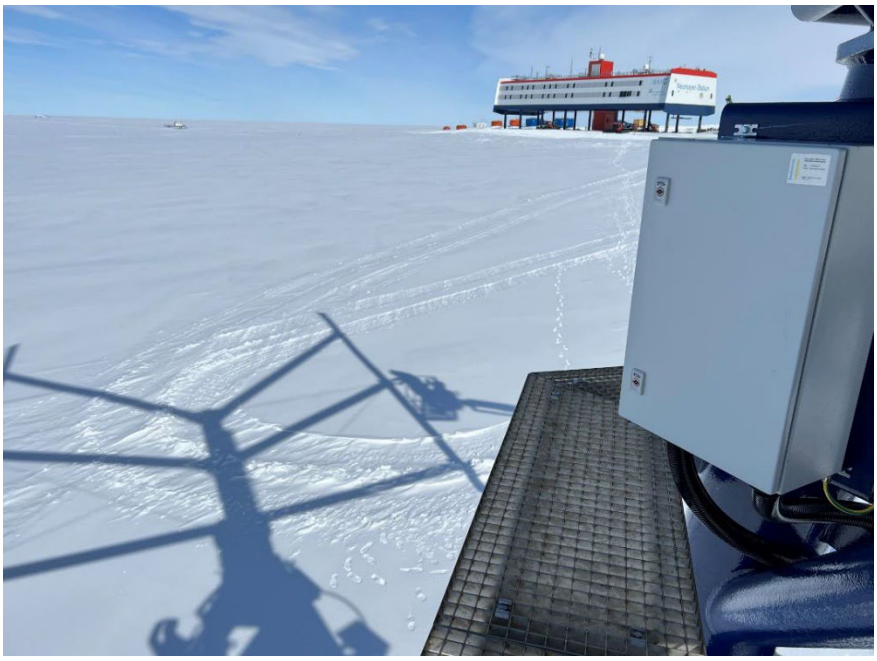
The sensor data of the SHM system on the Antarctica subcontinent is transmitted via Ethernet link to the polar research station's intranet and then relayed by satellite to Europe, where it is systematically analyzed by Bachmann partner P.E. Concepts.

Data is analyzed and reports are prepared with Bachmann's "WebLog Expert" software. WebLog Expert was enhanced with new structural monitoring functionalities especially for the research project. The proven software now offers a uniform platform for holistic energy generation system monitoring. Both drivetrain and structure can now be monitored.

In spite of the harsh environment: The wind energy generation system on the Antarctica subcontinent is just one of more than 140,000 thousand onshore and offshore wind turbines worldwide that Bachmann experts have already equipped with automation components. In other words, the data of the Neumayer Station III wind turbine is in good hands.

Images

Image 1:



A structural health management system built by Bachmann operates in the shadow of the vertical wind energy generation system for Neumayer station III in Antarctica. The components installed in the gray box on the right side and other components installed on the wind turbine itself can withstand temperature peaks of up to -40 °C.
Image: Bachmann

Bachmann Monitoring
Bachmann Monitoring GmbH is a 100% subsidiary of Bachmann electronic GmbH and the competence center for Condition Monitoring within the Bachmann Group. Based in Rudolstadt, Germany, we offer fully certified solutions for Condition and Structural Health Monitoring - from hardware and software, remote monitoring, reporting and service, to accredited training and development.

For more information visit:
https://www.bachmann.info/en/campus/performance/structural-health-monitoring-1

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