

Custom sensor solutions



Thijs Haselhoff

Thijs Haselhoff, New Business Development Manager at Althen Sensors & Controls, talks to PES about the latest sensor solutions for offshore windfarms, and how the newest Quick Connect feature for fibre optic sensors makes instrumenting offshore as easy as ABC.

PES: Welcome to PES Wind. Can you briefly introduce your company?

Thijs Haselhoff: Altheris Sensors & Controls BV (Member of the Althen Sensors & Controls group) is your specialized partner for sensors, instrumentation, measurement systems and industrial joysticks. We offer solutions for OEM, Test & Measurement, Industrial Automation, and IoT Applications. We turn every measurement challenge into a sensor solution.

PES: Please can you tell us about Althen

Sensors & Controls and the partnership with Opsens Solutions?

TH: Roughly three years ago, we started a partnership with Opsens Solutions to be their sensor expert partner in Western Europe. Opsens is a leader in the development of fibre optic sensors based on White Light Polarisation Interferometry (WLPI).

Together with them we developed the best custom sensor solutions for the European market. The WLPI fibre optic solutions are immune to EMI, lightning, temperature



and RF. Also the sensors have no drift over time and they are temperature independent which make them perfect for long term monitoring applications in remote areas such as offshore wind parks.

PES: Can you expand on the measurement challenges facing wind farms?

TH: Maintenance on offshore locations is extremely costly. This is a very big opponent to wind turbine energy developing into a durable renewable energy source. Reliable monitoring systems can prevent frequent maintenance and also extend the wind turbine's lifetime.

With these sensor-monitoring systems there are a couple of challenges when it comes to instrumenting offshore foundations and monopiles of such wind farms.

One of the challenges is to instrument

structures or parts of the windmill after they are constructed offshore. In the construction phase of the foundation and the placing of the monopiles, there is no room for sensitive materials such as fibre optic sensor and cables.

Another challenge is that the sensors that are applied need to survive very harsh conditions when being placed on the foundation or on the structure of the pile. The fibre optic Quick Connect technology is the ideal solution.

PES: Why should we use the fibre optic Quick Connect feature?

TH: Let's assume that you are going to instrument an offshore windmill and you want to measure the strain on the foundation and on the pile. Instrumenting the sensors after the windmill has been constructed is not ideal but since you don't want all the cables and electronics already present during the construction phase it is almost inevitable.

Our market experience tells us that the installation of sensors is a real pain. We were looking for improvements to take away these disadvantages. That's when, last year, the innovative Quick Connect feature for all our fibre optic sensors was developed.

The fibre optic Quick Connect feature offers multiple advantages:

- Prefabrication is now easier. Only the sensors can be fixed onto the pile surface in the factory before construction of the wind park, without attaching the cables and the electronics.
- The cables can be connected later in the process. This prevents pre-instrumented structures being damaged or broken during construction before monitoring is even started.
- This measurement solution is labour saving. On location, the sensors are already pre-installed. The expert only connects the fibre optic cables to the instrumentation unit and it's possible to measure the strain on the foundation and on the pile.

- It is really easy. Plug and play, which means very fast installation and deployment possibilities, which gets the monitoring system up and running faster than ever before.

PES: Can you explain the strain measurement on the foundation of an offshore wind turbine to us?

TH: The strain sensors used in such applications are very robust and can sustain a permanent pressure of 300 bars, without affecting the strain measurements.

Besides which, the strain sensors are not affected by transverse strain or temperature, making them one of a kind. The strength of our fibre optic sensors also lies in the ability to customise the sensor per application.

They are designed for use in harsh conditions related to driving the pile into the ground, that's why we often use stainless steel cables for long time survival in marine environments.

The sensors can also be spot welded or fixed with special adhesive for metallic surfaces, depending on the material.

PES: Besides measuring strain on the foundation and the pile of an offshore wind turbine, what other fibre optic sensor solutions can be applied?

TH: Lately a longer exiting development seems to be of more interest to the wind industry. This is to embed the sensors into the composite material. We have experience in the industry of embedding strain sensors in composite bridges, for full continuous monitoring and now are testing to see if this embedded formula can also be applied in wind turbine blades.

Benefits of the WLPI strain sensors is that they don't need any pre-tension and the strain measurement range can be adjusted for optimal sensitivity, ranging from 0-15.000 µε.

Besides embedding strain sensors into the blades of wind turbines we are also testing the application of flat pressure sensors on the outside of the blades. Measuring the pressure on the outside gives a direct result

