

PRECISE, CHALLENGING AND EXCITING

Cable angle in view

Cable laying for offshore wind turbines works with M1 automation from Bachmann. In the middle of 2014 Van Oord, a solution supplier for dredging coastal areas and building plants for offshore power generation, launched the cable laying vessel Nexus.







▲ The DAM is mounted directly at the CHUTE. The existing arm enables simpler positioning.

This multi-functional vessel is used for installing electrical cables for offshore wind farms. Difficult environmental factors – such as high waves – turn this task into a major challenge. An innovative winding system from Pliant was used to prevent damage to the electricity cable. The M1 automation system from Bachmann ensures that the cable laying is reliable.

The first task of the 123 meter long cable laying vessel Nexus is the laying of power cables between the wind turbines of the Gemini wind farm, 85 kilometers off the coast at Groningen (North Netherlands). The ship will transport a full load of up to 5,000 tons of cable. The expansion of the offshore wind farm is to be completed in 2017 and an annual production of 2.5 TWh of electricity is planned.

Constantly changing environmental conditions

One of the major challenges in this work is the high waves on the open sea – the lowering of employees or the installation of wind turbines becomes here a huge feat. The considerable motion of the ship is the largest problem for cable laying: »The underwater cables are unwound from a large carousel in the middle of the ship and then slide off board at the rear of

the ship down a chute to the bottom of the sea.« Alex Heurkens, CEO at Pliant in Breda, describes the laying process. »If the end of the ship rises and falls several meters on account of the swell, this is critical for the cable – it is either put under too much tension and is thus damaged or it is compressed and in the worst case even breaks off. This results in expensive repairs.«

Always the correct tension

In order to control the unwinding of the cable, the Nexus cable-laying vessel is equipped with an electrohydraulic system, which controls the tension of the cable during unwinding and regulates it accordingly. This is done by monitoring the tension of the cable: »We are constantly checking the departure angle of the cable. In the offshore sector this is called a DAM or 'departure angle measurement system',« Alex Heurkens explains. »It is the angle between the cable and the vessel – at the moment when it leaves the ship«, Heurkens continues. »This angle provides reliable information about the actual tension of the cable.« The data collected is passed on to the controller of the cable tensioner and this is adjusted accordingly. In this way, even severe rising and falling movements do not present a problem for the cable.



The engineering company Pliant is based in Breda (NL), and develops technical solutions for agriculture, the food industry, the marine and offshore sector as well as the recycling industry. The company also includes robotics to its fields of activity, as well as visual scanning systems and machine controls.

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» The M1 offers the required performance to make this process at all possible. «

Alex Heurkens,
General Direktor at Pliant
in Breda

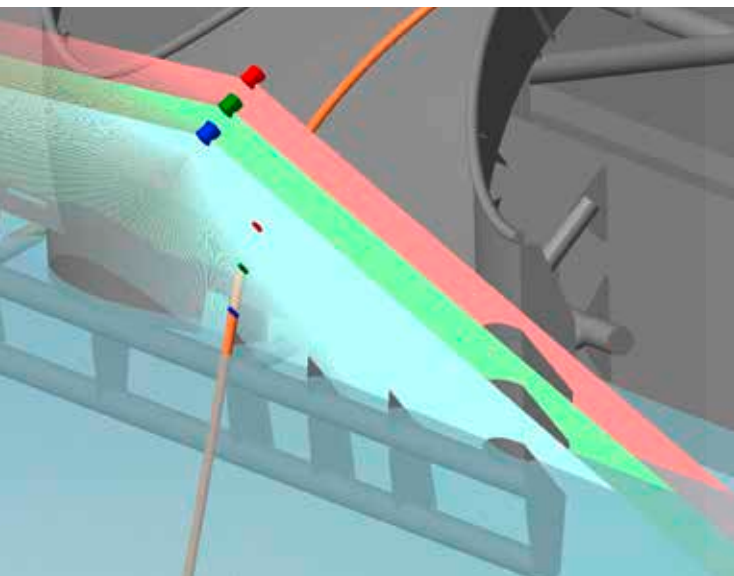
Impressive marine approvals and performance

The measuring system developed for this task consists of a sensor box with three vertically arranged Sick LMS 511pro laser scanners for

measuring distance. With a frequency of 25 Hz, these scanners provide a precise and reliable image so that the departure angle can be determined exactly. The control of the processes inside the sensor box and the connection to the vessel's automation system is handled by a Bachmann M1 controller. »The data from all three lasers is continuously processed by the PLC. This calculates directly the precise position of the cable and passes these values on to the higher-level control system,« Alex Heurkens outlines the process. »The M1 offers the required performance to make this process at all possible. It also provides all the required interfaces for the cameras and for controlling the valves.«

Added to this is the fact that the M1 automation system is very robust and also comes with all the marine approvals that are required: »The sensor box is located at the back of the ship directly above the cable outlet. It is therefore exposed to seawater, wind and rain without any protection,« Heurkens continues. »These are conditions in which only a few controllers can operate reliably and accurately. The Bachmann M1 is one of them.«

▼ Three vertically arranged laser scanners measure the departure angle of the cable at the aft of the ship.



▼ The DAM (Departure Angle Measurement) is used to control the departure angle of the cable. The Bachmann M1 controller controls the processes inside the sensor box and the connection to the vessel's automation system.

