

Mills at the wind

Cable Protection for the Electrical Monitoring System of the M5000 5MW Offshore Wind Turbines

Wind Turbines, particularly in offshore installations, are exposed continuously to vibration and the influences of the elements. Since failure of the electrical monitoring system is unacceptable a high quality cable protection system which can ensure that the cables are safe against external influences is essential. PMA offer a simple but very effective system, which is suitable for use in not only on Wind Turbines but also in the segments of machine construction, railways applications and robotics.

Dipl.-Ing. Ullrich Höltkemeier

The interest in wind energy and therefore the requirement for systems, components and service is continually increasing. Today excellent opportunities are to be found for German machine building companies who have traditionally occupied top positions in this segment. One example is the "Alpha Ventus" wind park 45 km off the coast of Borkum (East

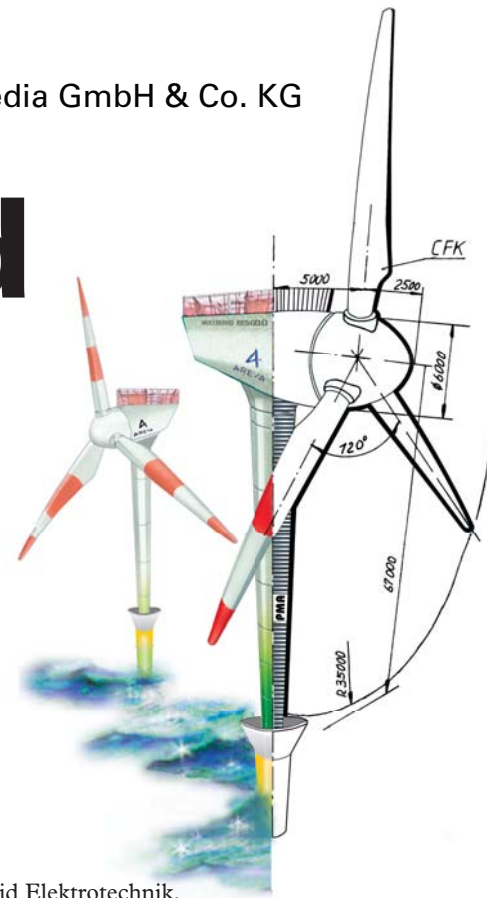
Dipl.-Ing. Ullrich Höltkemeier, editor in chief konstruktionspraxis

Friesland). All twelve turbines in the wind park are scheduled to be in service by the end of this year. Six M5000 5MW systems from AREVA Multibrid are already in service.

Energy from Wind Turbines in the North Sea

AREVA Multibrid based in Bremerhaven, a subsidiary of the French AREVA Group, are responsible for the manufacture and assembly of the first M5000 type wind turbines. Holger Stöven, of

AREVA Multibrid Elektrotechnik. "During the development of the M5000 wind energy system great emphasis was placed upon keeping the weight of the rotor and the associated parts to a minimum. This makes transport easy and allows a simple, safe and fast assembly of each wind turbine since the complete rotor assembly can be lifted in one piece onto the tower. Reliability is the deciding factor for offshore applications and an integral part of the Ariva Multibrid concept. The low rotation speed



5MW Wind Turbine M5000 manufactured by AREVA Multibrid. Part of the "Alpha Ventus" wind park 45 km off the coast of Borkum (East Friesland).

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pictures 3+4: AREVA Multibrid/JanOelker

◀ **5MW Wind Turbines M5000 manufactured by AREVA Multibrid. Part of the "Alpha Ventus" wind park 45 km off the coast of Borkum (East Friesland).**

Consequently the housing and hub of the wind energy equipment are hermetically sealed against the surrounding air. An air conditioning system filters the air in such a way under all climatic conditions the equipment is internally protected against corrosion due to salt and moisture."

At sea there is significantly more wind than on land. That means the installation is constantly in motion torsion in cables, vibration and points of abrasion can occur. Naturally the cables must be protected. Here the cable protection products from PMA are employed. In system construction there is successively less and less space available for electrical components. Cramped cable ducts, junction boxes full to bursting point and extensive EMC protection elements (e.g. EMC shielding) can cause cables and wiring to experience abrasion or chaffing on the edges of electrical components, cabinets etc. above all when vibration and permanent movement are involved. Cable protection is therefore essential.

Why choose polyamide cable protection products ?

Volker Mühlstein, CEO PMA Germany: "The PMA conduit PCS was specially developed for external applications exposed to high mechanical stress. It is manufactured from specially modified PA12 raw material supplemented

by additives to improve the already excellent weathering resistance of the PA12. This provides a life expectancy in predominantly static applications such as this in excess of 25 years. PCS also has very good low temperature characteristics which is very important because the system is exposed to the elements in summer and winter. Polyamide is hygroscopic, absorbing and giving up water to the surrounding air depending upon the humidity. With PA12 this effect is less pronounced ensuring that even with low humidity the material retains very good impact resistance."

Recommended for use where highest reliability is a requirement.

A failure in the electronic monitoring system of a wind energy plant can have fatal consequences. PMA specialists for high quality cable protection systems have designed a simple but effective component, manufactured from specially formulated Polyamide, which can be applied, in addition to a standard lock nut, on the thread of a fitting increasing the outlet radius and thus preventing potential abrasion damage caused by tight bending radii and vibration. The anti-abrasion lock nut is available in a divisible form for retro-fit applications or as a one piece element for application in new designs from conception onwards.

◀ Safe and fast assembly:

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Easily retro-fitted cable protection Volker Mühlstein: "Generally cable protection can be seen as a dispensable element. If a cable is laid without a conduit around it is exposed to the prevailing environmental conditions around it. Cable protection is used to protect the cables from external factors. That means that if through a particularly inauspicious collection of circumstances or some extraordinary mechanical stress damage occurs it is "only" the cable protection which is damaged and the cable function is not affected. The cable protection may be replaced." Through the excellent basic characteristics of the specially modified polyamide 12 material used for the PCS, this conduit type is particularly suitable for use in applications which are permanently exposed to intensive sunlight (UV). Additionally PCS possesses very good resistance to chemicals.

Volker Mühlstein: "On the product side at the moment there are no specific requirements placed upon the cable protection system from the wind energy segment regarding certification. The PCS product which is being used here possesses however - if we may make reference to the rail industry once more - all relevant certificates for world wide application in the highest safety categories. PCS and other PMA products are approved for the shipping industry by Bureau Veritas, Det Norske Veritas and Lloyds Register.

PMA cable protection products are used currently on the offshore wind plants up on the helicopter landing deck for the wiring of the flood lights and beneath at the entrance to the tower equally exposed to the elements.

Holger Stöven: "In wind energy installations, particularly offshore cable protection is indispensable. The products from PMA offer everything today which is necessary for correct cable protection.



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