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Keeping calm during an oil accident

Safety measures for accidents involving hydraulic equipment

HANSA-FLEX

POINTING THE WAY FORWARD WITH THE SEA

OFFSHORE WIND FARM IN THE GERMAN BIGHT

Sustainable climate protection starts at sea. Germany is reducing its use of nuclear energy for power generation, planning to phase it out altogether by the year 2020. Wind power can make a significant contribution to power generation in the future and help cut emissions of greenhouse gases. A commercial provider is now planning to establish several offshore wind farms in the German Bight from 2009.

The company responsible for the design, construction and operation of these wind parks is the BARD Group, which has chosen Germany's North Sea as the site for eight farms in total, each boasting 80 five-megawatt turbines. The firm was founded in Bremen with a team of four staff in 2003. With currently almost 600 people employed the company is setting up for business with its first wind farm in 2009: "BARD Offshore 1", based some 90 km north-west of the island of Borkum and 120 km from Helgoland, Germany's only "high-sea island". The first batch of power to be produced by the wind park will already be supplied to the national grid this summer. The regenerative electricity from the individual turbines will be accumulated on an energy platform and converted to direct current to reduce losses during transport. The electrical power will then be transmitted to the national supply network via some 100 km of undersea and 80 km of land cables, ready for distribution to consumers.

In October 2008 an identical pilot plant with a total height of 152 metres was initially put into service off the coast of Hooksiel on the North Sea coast. The plant has been specially designed for tough offshore conditions. Like the other installations that are planned, it stands on a so-called "Tripile", a sort of tripod made of steel piping. These steel pipes are topped by a cross-piece which supports the tower and the generator gondola. Installation of the Tripile takes place at sea using a special erection vessel at depths of approx. 40 m. With a diameter of 4.20 metres at the base of the blade, the dimensions of the rotor blades are quite breathtaking. These blades, which are almost 60 m long and weigh in at nearly 29 tons, are manufactured using a special process. This takes place at a high-tech production plant in Emden, where the blades are produced "directly at the waterfront". A quick look at Emden's harbour shows current stock levels. Numerous blades lie ready to be loaded onto the pontoons for transport: BARD is already planning to install the first thirty of the gigantic turbines at sea in 2009. Installation can even take place in rough seas and heavy winds thanks to a special jacking-up platform with an enormous built-in crane. The turbine gondola alone weighs some 280 tons. The three-blade rotor measures approx. 122 m in diameter and is positioned as usual on the wind-

ward side. The turbine delivers its rated output even with just a light breeze and only needs to be shut down in very stormy weather.

BONDED BLADE BY BLADE

BARD has pushed back the boundaries in terms of rotor blade dimensions. Measuring six metres in hight even when lying flat on the ground, the blades are the size of a house. They are made of up to 64 layers of fibre glass reinforced synthetic material based on epoxy resin – a material that has proved its worth in the manufacture of rotor blades for almost a quarter of a century. The longitudinal spar flanges are also made of fibre glass, so guaranteeing optimum rigidity. All three-dimensional components and bracings have a core of plastic foam. While the classical design consists of an upper and lower shell, these blades have three parts: a central section with the base of the blade, as well as a leading and a trailing edge. This avoids splicing at delicate sections of the blade, i.e. the blade tip and trailing edge, which are known trouble spots for conventional rotor blades.

GIANT DIMENSIONS: The WEA measures 152 meters in height and is constructed in the North Sea, for the assembly of the tower and its 60 meters long rotor blades entirely new procedures had to be established.

This meant that BARD was entering new territory with the design and development of blade production in Emden. It has built new laminating systems 60 and 48 m in length to manufacture the jumbo-sized rotor blades. A machine delighting in the name of Trailing-Edge Segment Bonder (TSB) is used to bring together the segments which have been prepared for the blades in a previous production process. This device works like an oyster shell: the production technicians join up all parts and make the part ready for bonding. Once the adhesive has set, the two casting moulds are gently prised apart again with hydraulic control, and the component can then go off for final assembly.

From the outset HANSA-FLEX's Industrial Installation department in Oldenburg was responsible for the TSB. Clemens Otte was in charge of all parameters involving the complex hydraulic systems of the machine. HANSA-FLEX dealt with control of the complete hydraulics while handling electronic control of the machine in cooperation with etw Elektrotechnik Wilhelmshaven. The electrical specifications for stationary and remote control of the system were also provided by Clemens Otte.

Besides offering engineering support, HANSA-FLEX also supplied all components for the TSB, from the hydraulic pumps through to valve blocks and hydraulic cylinders, as well as the line engineering. Further, HANSA-FLEX was responsible for assembly of the machine, including commissioning. But until this could take place, the HANSA-FLEX fitters had to install 1,500 metres of hydraulic pipes alone. The hydraulic oil for the machine has also been selected with care: the environmentally compatible Panolin HLP SYNTH 32 will not cause pollution should the pipework spring a leak. HANSA-FLEX is currently redesigning the TSB according to its experience over the first few years while conducting discussions with the customer about making improvements to the 60-metre production plant. They are working together on new hydraulics solutions such as the installation of small hydraulic cylinders to further optimise the closing process.

The future lies with offshore wind energy

From January 2009 until 2015 operators will be paid 15 cent per kilowatt hour for electricity generated by offshore wind turbines. This is the timeframe envisaged by Germany's Renewable Energies Act ('EEG'), which aims to boost the share of regenerative energy in the power supply system to 20 percent by the year 2020. Today this figure is still 15 percent. By 2030 the German government wants wind energy to account for 25 percent of the power supply, with 15 percent to come from offshore wind farms.