



Securing daily dribbling operations

ABB is a leader in supplying electrical system solutions for drilling rigs, drilling ships and semi-submersible drilling rigs, based on the latest proven technology.

The products are all produced in-house, which enables ABB to provide a secure delivery and service the equipment in operation. O&G catches up with ABB's **Jorulf Nergard** to find out more.

O&G. How would you describe a typical application for a drilling rig?

JN. Sixth generation drilling rigs have DP2, DP3 or something in between (so-called DP2+) – six to eight generator sets with power ratings between 3.6-5.6MW each for production of the necessary electrical power; six to eight azimuthing thrusters with ratings from 2.5-5.5MW each; and a drilling system typically between two times 7500kVA to four times 4000kVA. The systems are configured in such a way that a only a maximum of two to three thrusters out of the installed six to eight will be lost in the event of a major fault. The drilling system is based on AC frequency drives for controlling the speed of the various motors, and is fed from two or three switchboard systems; these are located in two or three different fireproof rooms in order to get the appropriate redundancy, which ensures the most important task onboard – securing the daily drilling operation.

O&G. What are the success factors with drilling rig solutions?

JN. Systems should be as easy as possible to use and easy as possible to install. We focus on straight-through, top-to-bottom solutions – from the generators to working applications, such as the position-keeping thrusters and the moneymaking drilling system. This will ease the installation for the shipyards and make it easier to get acceptance for the functionality from classification societies. For the operators, this philosophy will bring a greater understanding of system functionality and eventually help in any fault-finding situations.

The frequency drives we use employ a world-leading technology called direct torque control (DTC), a voltage source converter that provides significant advantages when it comes to dealing with total harmonic distortion (THD). This type of converter gives less contribution to the power network, meaning we can keep the level under the required limits without using any filtering.

O&G. ABB has a special way of treating the drilling braking power from the draw works and anchor winces. Can you explain more about this?

JN. We use shared resistors that are controlled by a couple of very fast semiconductors. The number of semiconductors and resistors in operation will be controlled in accordance with the actual braking demand automatically by the drive control. All the resistors are located in one or two seawater-cooled tanks, giving better environmental conditions when it comes to noise,

compared to an air-cooled solution.

O&G. Delivery of a complete and successful system is dependent on your interfaces with all other systems in such a complex vessel. How do you manage this?

JN. We have already developed relationships with the best-known suppliers in this sector, and are focusing on close cooperation with the shipyards in order to understand these two-way interfaces. Unless all parties can manage their tasks, the whole project is open to delays. One of the ways we are securing this is to be very close with the shipyards.

O&G. What challenges do you face when developing drilling drives for offshore operations?

JN. THD is a big challenge that can destroy the operation totally. The concerns are real, but our engineers have the necessary means to avoid such problems as soon we have control of the total electrical system. The standard and rules say that the THD level must be lower than five percent, which we can maintain without any special filtering. We use 12-pulse configured rectifiers for the drilling and thruster drives, and also a quasi 24-pulse configuration, whereby pairs of transformers are shifted an additional 15 degrees from each other. This has been measured in many systems and the results prove the calculation methods can be trusted. Such systems have been in operation for many years now.

O&G. How does technology aid in the drilling solutions you offer for the marine industries? And how do you keep abreast of technology developments?

JN. The solutions must be as compact as possible with as little heat dissipation as possible, and we have developed a compact drive solution that is water-cooled. The vessel's water-cooling system is just connected to our units, and we take care of the internal circuit or systems. With this solution, the contribution to air is less than 10 percent, the rest is cooled with water, either seawater or freshwater. Both the big transformers and machines are cooled in the same way in order to reduce the need for large air-conditioned systems. The DTC technology for the drives is also a good fit for these marine applications, and in addition we have developed a drilling motor that is very easy to disassemble and reassemble when doing maintenance.