ABB's power converters team continues to supply pioneering static frequency conversion (SFC) technology for shore-to-ship applications, reducing pollution and greenhouse gas emissions. The vast majority of ships and floating platforms run an onboard 60 Hz power supply and require a frequency converter to connect to local 50 Hz supplies. This application is a little different as the vessel will operate most equipment at 50Hz from gas turbine generators, but some of the ship’s equipment requires a 60 Hz supply. ABB’s state of the art PCS100 SFC technology, with its high efficiency, reliable operation and small footprint, make it an ideal solution to supply the remaining 60 Hz loads.

With years of experience in floating production, storage and off-loading (FPSO), designer and integrator of support vessels Bumi Armada (Malaysia) has adopted a complete e-house building package designed by ABB for Armarda Sterling, previously known as the Monte Umbe vessel. The Armada Sterling is located off Mumbai in India. ABB in Singapore is supplying the e-house building package which includes design, fabrication, assembly, supply, testing and installation of the PCS100 Static Frequency Converter (SFC).

Bumi Armada considered replacing all the ships existing 60 Hz electrical equipment with 50 Hz but this was prohibitively costly. ABB proposed the PCS100 SFC to provide a 60 Hz power supply for the existing equipment that will remain on the FPSO after conversion. The remaining 60 Hz load includes power transformers, switchgear, monitoring, and safety equipment.

**Reliable technology**

PCS100 SFCs rugged and reliable design was a key factor in Bumi Armada selecting ABB for the e-house supply. The precise control capability of the PCS100 SFC, coupled with its high efficiency and small footprint, meant it was an ideal solution. The modular nature of the SFC means that it is highly serviceable which is a key requirement for any offshore application. Adopting the PCS100 SFC was a practical and cost effective solution for Bumi Armada.

With an overall project value of USD 10 million, this is ABB’s second FPSO reference for the PCS100 SFC and marks the continued success of the reliable PCS100 SFC technology in the FPSO arena. The contract also included a control and safety system and a challenging schedule where ABB is required to complete the project within eight months by mid-year 2012.

**A tricky situation**

The thermal design of the e-house was a challenge for the ABB design team, but was helped by the high efficiency of the PCS100 SFC. Accumulation of heat in an enclosure is potentially damaging to electrical and electronic devices, and must be carefully controlled especially in tropical climates like Mumbai’s. Overheating and humidity can shorten the life expectancy of costly electrical components and lead to unreliability. ABB’s design ensured the environment inside the e-house is well controlled.

**Competitive advantage**

The SFC-2000 (16 module pairs of inverters and rectifiers in six converter cabinets) is configured to share the load with two diesel generator supplies. The implementation was straightforward with no additional synchronizers needed.
Due to the advanced generator emulation control feature available on the SFC. Built-in N+1 redundancy was a key feature in the SFC units and will enhance reliability and availability. If one module shuts down, the system continues to operate with slightly reduced capacity but still sufficient for the application. Bumi Armada was impressed with the features of the PCS100 SFC and its ability to be configured to meet this demanding application requirement.

D-1 FPSO
The D-1 field, owned by Oil and Natural Gas Corporation Limited (ONGC), is located about 200 km to the west of Mumbai city in the western offshore area at a water depth of 85 m – 100 m. The FPSO vessel will be located approximately 2 km south east of existing D1 wellhead platform and provide production processing for the existing D1 wellhead platform and three new wellhead platforms. Control and monitoring facilities for the four wellhead platforms will be located on the FPSO. Once processed, the crude oil will be stored on the vessel and periodically offloaded to a shuttle tanker for onward transportation to the refinery.

Meeting the regulation needs of ship owners and ports
PCS100 SFC technology responds to current global legislation to mitigate environmental impact. As shipping companies continue to expand, emerging compliance laws requiring emission control on ships needs to be addressed. Regulators realize that pollution stemming from the shipping industry is having a major impact on public health as well as costs.

In addition to reducing local carbon dioxide emissions, the use of shore-to-ship power in preference to on-board diesel generators helps to lessen sulphur dioxide, nitrogen oxide and particulate emissions. It also helps with the reduction in low frequency noise and vibrations. In 2000, ABB was the first to deliver a complete shore-side power supply system. Since then, shore-to-ship solutions have been supplied to various ports and further developed the system for vessel types such as cruise and container ships, Ro-Ro and FPSO vessels and LNG carriers.

To find out more about ABB’s power protection solutions:
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