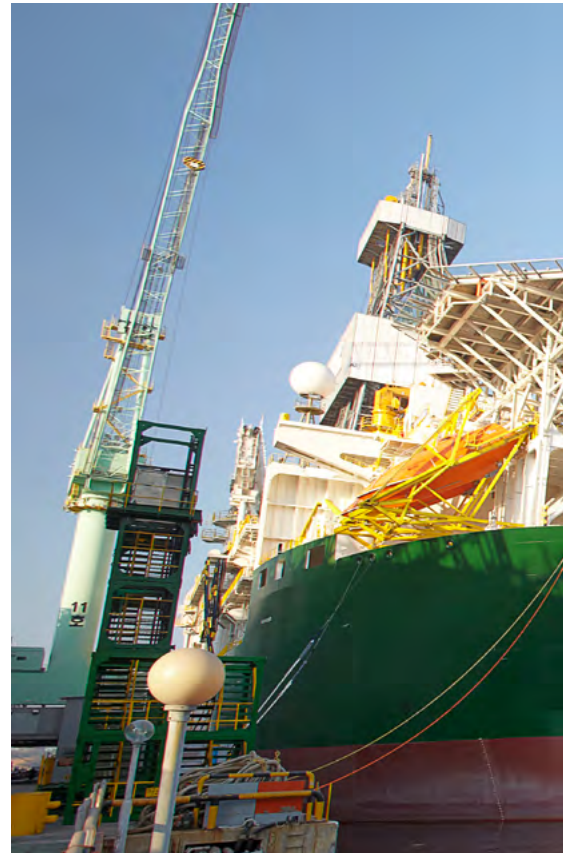


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# Substations and electrification Shore-to-ship power converters for Samsung Heavy Industries' Geoje Shipyard in South Korea

# Shore-to-ship power static frequency converters to support ship construction at Samsung Heavy Industries' Geoje Shipyard in South Korea

Static frequency converters (SFC) will enable the shipyard to build, set-up and test the 50 Hertz (Hz) power network and onboard systems of ships during construction, even before the onboard diesel generators are installed and commissioned.



Samsung Heavy Industries' Geoje Shipyard in South Korea

A SFC is required for shore-to-ship power connections because of the mismatch of onboard frequency with the local distribution grid frequency. As a result, most shore-based power connections require frequency conversion. ABB's highly efficient, low-maintenance SFCs provide an economical solution to connect any ship to any grid, independent of the required frequency. Depending on the port's layout, a centralized solution with one converter may serve multiple ships and docks. Thanks to their small footprint, the converters can fit into any substation building or container along with the compact switchgear and transformers for grid connection and voltage adaptation. Depending on the project requirements, low-voltage PCS 100-type or medium-voltage PCS 6000-type converters are used.

Samsung Heavy Industries (SHI) was looking for the most efficient way to extend power supply capabilities to fit the actual sizes of ships built at its Geoje shipyard. An evaluation showed specific advantages of SFCs compared to classic motor/generator solutions. For example, the SFC enables the shipyard to build,



set-up and test the 50 Hz power network and all onboard systems of ships during construction, prior to the installation and commissioning of onboard diesel generators. Apart from adapting the grid power frequency to that of the ships, ABB's SFCs offer reactive power compensation and voltage control. These features help to reduce energy costs while stabilizing the grid. In comparison to the rotating machinery (motor/generator) that has traditionally been used for frequency conversion, SFCs offer higher efficiency as well as reduced operating and maintenance costs.

ABB supplied SHI with two, 5 megavolt-ampere (MVA) PCS 6000-type SFC units, two external heat exchangers, converter auxiliary supply and load-side transformers and switchgear, cooling equipment as well as local controllers. In addition to the delivery of products and systems, the contract includes services such as system and on-site engineering, testing, commissioning as well as training for operators and maintenance engineers. The PCS 6000-type SFCs are compliant with the customer's power quality specifications and will be installed in a remote

substation feeding the docked ships via a three-kilometer long cable. The Geoje shipyard's SFCs were delivered within only four months.

Geoje is an island off the southern coast of the Korean peninsula. The SHI shipyard spans over four million square meters and features five offshore floating docks and three traditional docks. It is considered to be one of the world's most efficient shipbuilding centers and is utilizing SHI's innovative mega-block techniques. The types of ships mostly built in these docks include ultra-large container ships, LNG (Liquefied Natural Gas) carriers and LNG-FPSO (Liquefied Natural Gas Floating production Storage and Offloading) ships.

In addition to shipyards, ABB also supports port operators in achieving their emissions reduction targets. ABB's shore-to-ship power technology provides docked ships with onshore electricity to power onboard systems like heating, lighting and refrigeration. This allows to turn off onboard diesel generators, and helps to reduce greenhouse gas and noise emissions from ships while docked in ports. As a full-scope supplier, ABB provides products as well as fully engineered and integrated systems along with services ranging from the main incoming substation to retrofitting the vessels' electrical systems to receive shore-based power.



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