

ARTICLE

PCS100 frequency converters for ship building and ship repair activities



Shipping facilitates around 90 percent of international trade. Although this figure seems impressive, it also entails a heavy impact on the global environment. Facing tight environmental regulations, shipping operators and authorities have to find ways to reduce emission and noise levels. ABB's new Static Frequency Converter technology helps to keep these to a minimum, ensuring necessary legislation compliance.

ABB have provided a leading-edge solution consisting of four 250 kVA PCS100 SFCs (Static Frequency Converters) to the first and only "green shipyard" in India at Pipavav Shipyard Limited (PSL). Whilst providing a "green" solution (by reducing emissions, pollution and noise level), cost saving is also being achieved by using grid power instead of diesel generator (DG) power.

In the majority of shipyards, ships at berth use their diesel generators to run amenities, such as heating, ventilation and cooling, as well as galley equipment. This produces noxious emissions which have a negative impact not only on the surrounding environment, but also on the global climate.

At the same time, noise and vibrations from ships seriously affect quality of life for local communities. Mounting pressures to reduce the pollution generated by the world's fleet and the rising costs of fuel have forced ship-owners to adopt a proactive approach to measuring and monitoring combustion, which is reflected in such schemes as marine fuel management (MFM). However, going green and becoming compliant with the demanding requirements of regulatory authorities, such as IMO/MARPOL and EU, call for decisive steps. And this is where advanced technology steps in.

Shore-to-ship electric power supply, also known as "cold ironing," is the most reasonable and cost-effective choice for greener ports, shipyards and fleet. The solution enables ships to shut down their diesel generators and plug into an onshore power source while berthed. However, the power generation units on most ships operate at a frequency of 60 Hz, whereas local grid in most parts of the world is 50 Hz. This means that providing ships with electricity requires a shore-side electricity supply arrangement; this was the requirement of PSL. Once a ship arrives at PSL the ship will shut off all its power generation and the shipyard will connect the ship's 60 Hz supply to its 50 Hz mains grid.

ABB's technology

As a technology pioneer in low voltage installations for marine applications, ABB offers PCS100 SFCs, which are a safe, economic and highly efficient solution for converting grid electricity to the appropriate load frequency. This leading-edge frequency conversion technology guarantees a seamless automated power transfer of the ship load from the onboard power plant to the onshore source and back.

This solution contributes to a significant reduction of fuel and lubrication oil consumption, which means less pollution and improved financial benefits. Shore-to-ship power is especially applicable to ships operating on dedicated routes, and vessels that consume large amounts of power while in port or at a shipyard. This could bring real benefits for terminal operators whose ships berth each day for a fixed number of hours.

Pipavav Shipyard commented further on ABB's PCS100 SFC, "The Static Frequency Converter is eco-friendly in regards to being air and noise pollution free. It is highly efficient, has quick response against variable load, requires less time to restart, is reliable and boasts a very low maintenance charge, compared to 60 Hz DG sets."

Versatility, integrity and unrivalled flexibility

The PCS100 SFC system is internally configured as an arrangement of modular rectifiers and inverters controlled by a power electronic controller. This unique line-up produces sine wave voltage to supply the output load. The converters also allow for the control of reactive power on the ship as well as on the shore side. This feature permits maximum flexibility in adjusting the system to suit the customer's needs.

The modularity and scalability of these systems enable multiple units to be paralleled, which makes the solution adaptable to the different power requirements of ships and to a variety of shipyard and port infrastructures. The PCS100 SFC has a small footprint design and can be placed indoors or outdoors. This gives the customer flexibility with the physical and spatial layout to harmoniously fit to the surrounding architecture.

Low operational impact

Another advantage of the system is its superior availability due to high reliability and low maintenance (MTTR<30min), which leads to low operational costs. The cost of ownership may be further reduced thanks to the possibility of incorporating renewable energy sources, such as wind or hydro power, solar panels and fuel cells, which can open up a range of new opportunities.

ABB's offering includes comprehensive turnkey shore-to-ship power solutions, from electrical infrastructure on ships (retrofits or new installations) to electrical infrastructure in shipyards and ports, as well as connection and control solutions to ensure personnel safety and seamless power transfer.

Only green shipyard in India

Pipavav Shipyard Limited (PSL) is located in the State of Gujarat and is the largest shipyard in India. It has one of the largest drydocks in the world and a shipbuilding, ship repair and offshore fabrication complex. To have state of the art facilities, PSL has installed and commissioned some of the most modern shipbuilding equipment available.

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

<https://new.abb.com/power-converters-inverters/grid-interconnections/industrial/pcs100-sfc>

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