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SHORE CONNECTION POWER SUPPLY SYSTEM FOR SHIPS: SIHARBOR

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Sustainable power supply for **eco-friendly ports**

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Tapping the full optimization potential of an integrated solution

Shipping is booming continuously, and more and more vessels are docking in the ports. This, of course, poses a challenge for port operators, as the ship also needs to generate electricity for on-board operations while it is berthed. This means that the vessel's diesel generators must also run permanently, generating large amounts of CO₂, NOX, and hazardous particulate matter. With consideration for their employees and the residents of the area, port operators are determined to cut back the air and noise pollution. With SIHARBOR, Siemens offers a power supply solution for eco-friendly ports that allows ships to draw reliable, clean power from the onshore grid when berthed so that it will not be necessary to operate the diesel generators. SIHARBOR is applicable for different types of ships such as passenger ships, container ships, ferries, as well as for shipyards. It provides numerous benefits not only for port operators, but also for ship owners, local residents, and the port staff.

Totally Integrated Power (TIP)

Totally Integrated Power (TIP) comprises our comprehensive power supply portfolio of software and hardware products, holistic systems for all voltage levels, as well as energy management solutions. It is closely linked to industrial and building automation systems and is integrated into enterprise IT systems. In this way, the full optimization potential of an integrated solution can be tapped. TIP meets even the toughest requirements of supply-critical assets. An extensive support throughout the entire lifecycle starting with planning up to services completes our offering.

Compact onshore power supply solution with high efficiency

With our modular concept, we provide you with a system that is adapted to all required power ratings, voltages and frequencies. SIHARBOR allows any combination of 50 Hz and 60 Hz power supply systems as well as different voltage levels. An isolation transformer galvanically isolates the ship's network from the onshore power grid and other ship networks.

Siemens Power Link (SIPLINK)

The converter system SIPLINK is adapted for network applications. It can connect two or more medium-voltage AC networks with different voltages, phase angles and frequencies. With SIPLINK, the voltage is adjusted by transformer tap changing and by modification of the converter output voltage. Thus, any required transfer voltage to the ship can be implemented.

For the correct dimensioning of the frequency converter, short-term power peaks of consumers must be considered. In steady state, the load is a multiple smaller than the dynamic peak load. Often the frequency converter has to supply 50% or less of its rated power and is therefore in partial load operation most of the time. Due to a special inverter topology, SIHARBOR enables particularly high partial load efficiencies and losses are minimized.

Why must the frequency be converted?

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Why must the frequency be converted? In international maritime traffic, around 75% of all ships are equipped with 60 Hz networks. However, only 25% of the countries operate their power grids with this frequency. Therefore, the onshore frequency must be adjusted to the onboard frequency in 75% of the countries. With the SIPLINK converter system, ships operating at 50 Hz and at 60 Hz can be supplied.

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SIPLINK converter system for network applications in a

Small system footprint

With the SIHARBOR solution, the highest possible voltage is already made available on the converter side, which means that lower currents flow. This minimizes losses. At the same time, the cable cross-sections can be selected smaller, which means less space is required as well as less installation work, especially for longer distances and routing around curves.



Quick and easy ship connection via cable management system

Safe and easy operation

In order to eliminate the residual risk of arcing in the plug-in connection, the cable connection to the ship is tested at rated voltage with low power before being connected. On a higher level, the control unit with operator panel monitors the state of the whole SIHARBOR system centrally. Thereby, all relevant messages and data can be indicated, and all operating safety functions can be selected. The control unit ensures that only permissible switching operations according to IEC/ISO/IEEE 80005#1-3 are executed. Personnel operating the plug-in connection on shore and on board are protected by double electrical interlocks. Safety is ensured by both the software and by the hardware, independently of each other. The entire shore connection system can be controlled remotely from the ship without additional personnel.

Parallel operation with two ships

The SIHARBOR system enables parallel operation, allowing two vessels to be supplied with shore power at the same time. Parallel operation reduces the CAPEX footprint and optimizes operating costs with a system that is even available for more than one berth position.

Matrix operation

The extended set-up for supplying shore power to more than two ships at the same time is the matrix operation. It allows the flexible allocation of shore power and the required power rating to the defined position of the berthed ships. The reduction of CAPEX footprint with optimized operating costs offers the advantage of higher annual operational utilization.

Everything from a single source

On request, SIHARBOR can be designed as a turnkey solution, from planning and system integration (with all low- and medium-voltage products and switchgear for grid connection) to commissioning and service. The system can be installed either in a container or in existing buildings.

Benefits



For ships: Reduction of maintenance costs and fuel consumption of the diesel generators when at anchor in port; discounts for vessels using the shore connection power supply system



For ports: New business opportunities for the port operator by providing power supply for ships **For local residents and port staff:** Improving the quality of life by reducing emissions, noise and vibrations

Bringing ships to the socket at **Port of Kiel in Germany**

To reduce CO_2 and noise emissions as well as vibrations, Port of Kiel is making the supply of onshore power to two vessels in parallel available. The power is generated from renewable sources such as wind or solar which makes it an environmentally friendly alternative to the vessel's diesel engines.

Not diesel but green power from the socket

The onshore power supply at Port of Kiel distributes the green power via its medium-voltage switchgear to the Schwedenkai and Ostseekai terminals, which are about 1.4 kilometers apart. That's where ferries and cruise ships berth, and – using the SIHARBOR solution from Siemens – where they can draw an 11 kV power supply from the socket, which means they can turn their generators off. To ensure smooth operation, Port of Kiel uses the cloud application SENTRON powermind from Siemens. Performance data can be accessed at any time using a range of devices, so potential malfunctions can be quickly rectified. For Dr. Dirk Claus, Managing Director at Port of Kiel, the objective is to provide green power to 50-60 percent of all incoming vessels in order to save even more CO₂.



Green onshore power is provided to this cruise ship at Port of Kiel.

Sustainable power supply reduces environmental impact

Supplying green onshore power saves 12,000 metric tons of CO_2 per year. An additional benefit is an end to noise emissions and vibration caused by the ships' diesel generators.

Efficiency and reduced costs

During operation, operators and users of solutions from Siemens especially benefit from a unique level of transparency across all power flows at every point in the power distribution system. Power can be completely monitored, flexibly controlled, and used much more efficiently. There are also major improvements in availability, maintenance and servicing.

Transparency all the time, everywhere

The cloud app SENTRON powermind can be used on various mobile devices such as tablets. That means current power and system data can be accessed anytime and anywhere.



At Port of Kiel and beyond: With more than 210 MVA of installed base, Siemens is a world leading technology pioneer in sustainable power supply for eco-friendly ports.

We calculate this system will save a total of 12,000 metric tons of CO₂ per year. With this project we'll ultimately be able to provide onshore power to 50-60% of the ships that put into harbor here."



Dr. Dirk Claus Managing Director Port of Kie Smart Infrastructure combines the real and digital worlds across energy systems, buildings and industries, enhancing the way people live and work and significantly improving efficiency and sustainability.

We work together with customers and partners to create an ecosystem that both intuitively responds to the needs of people and helps customers achieve their business goals. It helps our customers to thrive, communities to progress and supports sustainable development to protect our planet for the next generation.

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