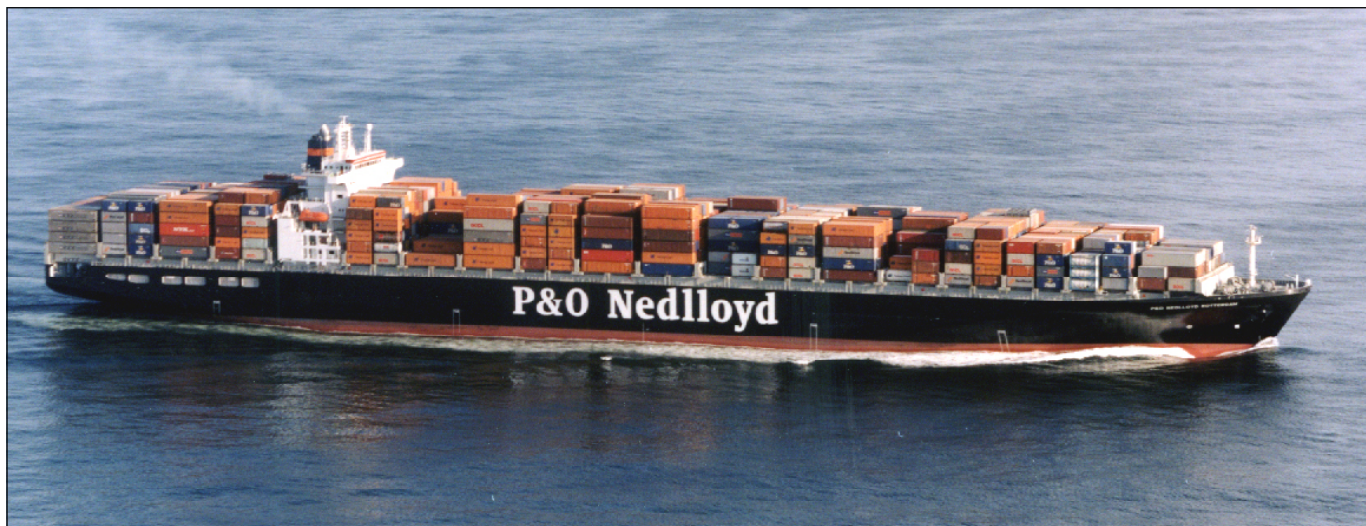
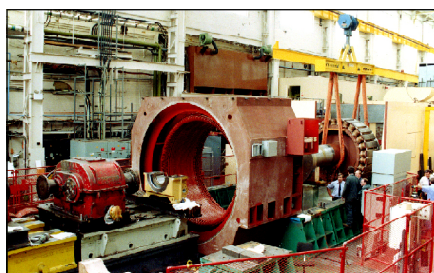


POST-PANAMAX CONTAINER VESSELS FOR P&O NEDLLOYD

P&O NEDLLOYD SOUTHAMPTON, ROTTERDAM, KOBE & KOWLOON



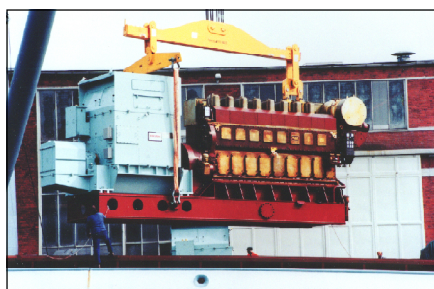
P&O NEDLLOYD ROTTERDAM on her first voyage laden with containers.



The first Brush shaft generator being assembled at the Brush Works.

BEM supplied the main generation and 6.6kV distribution and control equipment for four “Post Panamax” container ships built by Ishikawajima Harima Heavy Industries Ltd at their Kure shipyard near Hiroshima for P&O Nedlloyd. The ships were delivered during 1998.

Each of the ships is able to carry 6700 standard containers, over 700 of which are self-contained refrigerated units powered from the ship's electrical system. These vessels are designed to operate between Europe and the Far East.



One of the sixteen Brush diesel-driven generators being shipped from MaK, Germany.

Each ship is 299.9 metres long and 42.8 metres wide with main propulsion by a Sulzer RTA 96C 12-cylinder slow speed diesel engine - the world's most powerful of their type, rated at 66MW at 100 rev/min. The engines were built under licence by Diesel United in Japan and power the ships at 24.5 knots, each ship having one main engine driving a 8.95 metre diameter propeller.

BEM's order was for equipment which involved several companies in the FKI Electrical Engineering Group. System design coordination was carried out by BEM Power Systems Department.

A main feature of the power system is the “shaft generator” which is fitted around the main propeller shaft and is used when the ship is at sea to supply the majority of the electrical power utilising the relatively cheap heavy fuel used by the main Sulzer engine. This generator is a 28-pole statically excited machine generating at 800 volts.

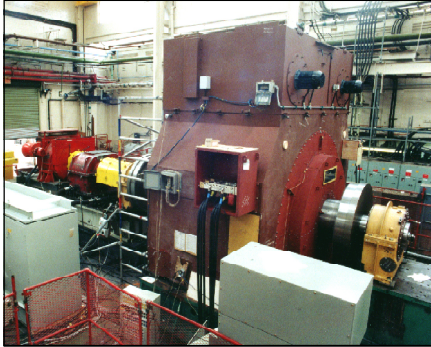


The SOUTHAMPTON nearing completion.

BEM supplied four diesel-driven 6.6kV generators for each ship. These are each rated 3.6MW, for use with Krupp MaK M32 600 rev/min diesels. These generators were despatched to MaK at Kiel, Germany, for testing with their engines.



The first ship on unladen sea trials.



The shaft generator system under test in the Brush works at Loughborough.



The P&O NEDLLOYD SOUTHAMPTON at sea.

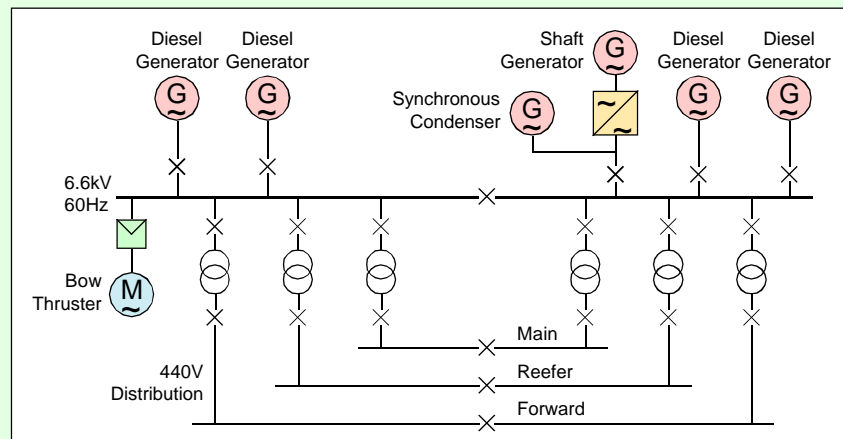
A BEM "Prismic" Power Management System was provided for automatic control and monitoring of the main power generation and distribution system. The "Prismic" hardware is fitted into a central control panel, providing local control of the 6.6kV system in the main switchroom. The "Prismic" system has been designed to communicate with the ship's central data management computers and the Bridge Control systems to enable remote control and monitoring of the system from computer terminals distributed around the ship.

Each ship also has a Kawasaki bow thruster to assist manoeuvring in and out of port. Each thruster is powered by a 900 rev/min vertical shaft induction motor rated 2.6MW. The starter unit for the bow thruster is included in the main 14-panel 6.6kV switchboard which was designed by BEM Power Systems Department and uses Hawker Siddeley "Hawkvac 15" circuit breakers.

BEM also supplied the cast resin shaft generator output and distribution transformers and battery/charger units.

The main components of the shaft generator system from one of the ships were assembled at the Brush works for a combined test of the complete system. This enabled system tests to be carried out over the full range of shaft speeds, under steady-state and transient load conditions. Operation of control and protection functions were checked without the pressures that would be present under trial conditions at the shipyard or at sea.

One-line diagram of main power system



Liaison was undertaken with:

IHI, Japan

P&O Nedlloyd, London and Rotterdam

MaK, Germany, for diesel generator control interfaces

Sabroe, Denmark, for alarm system/remote control interfaces

Summary of equipment supplied by BEM for each of the four ships:

- 1 Shaft generator, 3.5MW, 60-110rev/min
- 1 Synchronous condenser, 4MVA
- 4 Diesel driven generators, 3.6MW
- 1 Bow thruster motor, 2.6MW
- 1 14-panel, 6.6kV switchboard
- 1 Generator control panel incorporating "Prismic" Power Management System
- 1 Frequency converter for shaft generator
- 1 Set of cast resin converter output and distribution transformers
- 1 Static excitation system for shaft generator
- 2 Battery charger units
- 1 6.6kV harmonic filter panel for shaft generator system.



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