GE Power Conversion

"Pourquoi pas ?” Research Vessel

The deep sea research vessel "Pourquoi pas ?" built for Ifremer and the French Navy was the first ship to be propelled by GE Power Conversion's medium voltage PWM* in conjunction with slow speed induction motors.

The “Pourquoi pas ?” is a multifunctional ship, mainly dedicated to deep sea oceanographic expeditions and hydrography missions, such as the study of marine life and update of maritime maps. The 105m vessel, built at STX France Lorient SAS shipyards in Lanester (France), operates at a service speed of 13.3 knots.

The “Pourquoi pas ?” equipped with a Power Conversion electric propulsion system

The “Pourquoi pas ?” features two shaft lines, driven by two 1,650kW at 148rpm induction motors, supplied and controlled by 3-level neutral point clamped (NPC) medium voltage PWM press-pack IGBT MV7000 converters.

Power Conversion also supplied two 2,000kVA propulsion transformers as well as the remote control system for the propulsion. This system is used as an interface with the operator during the normal operation of the ship. Levers and controls are fitted at each location to generate the speed references.

The module controls allow the starting, stopping and maneuvering of the propulsion system.

... and an A-Series dynamic positioning (DP) system

The “Pourquoi pas ?” is fitted with an A-Series ADP21 DP system featuring advanced tracking facilities and deep water ROV follow capabilities which use high resolution operator displays. The DP system provides redundant control with interfaces to the survey system ECDIS, four DGPS systems, acoustics, inertial navigation & high precision doppler logs. The DP control system is networked to the propulsion system and power system over Ethernet providing an integrated solution.

MV7000 innovative drives

Using the powerful press-pack IGBTs in conjunction with proven technologies from Power Conversion's extensive range of drives, the MV7000 converters offer reliability and compactness for all variable speed drive applications, including the more dynamic and high performance demands.

Equipped for deep sea oceanographic expeditions

- Robust induction motor technology for high propulsion system availability
- MV7000 converters - power dense for space saving and highly responsive for ship control
- Efficient system for low maintenance and reduced running costs
- Advanced DP system for precise and effective position keeping and maneuvering

MV7000 drives cover the medium and high power range up to 33MW at two motor voltages 3.3 and 6.6kV. The drives are water cooled PWM voltage source inverters. MV7000 converters offer:

- Quality of motor supply:
  - high grade torque
  - low noise signature
  - no motor derating

- Minimum network interference:
  - low harmonics
  - high power factor

- Compactness and robustness:
  - high efficiency
  - low reactive power
  - high reliability

- Easy to operate:
  - advanced control features
  - functional block diagram (FBD)
  - remote PC

- Easy to maintain:
  - monitoring system
  - low component count
  - all front access
  - modular construction

*PWM: Pulse Width Modulation

imagination at work
Power and Propulsion Single Line Diagram

**PWM strategy**

Adjustable PWM patterns and frequency at every operating point provide a wide range of benefits: low commutation losses, low motor current THD, operation at very low frequency and low noise & vibration levels.

**MV7000 converter + Low frequency induction motor**

**Main advantages**

- Stringent noise & vibration level
  - Adjustable PWM pattern & frequency
  - 3 level NPC inverter topology
  - Low noise induction motor

**Reliability and robustness**

- Press-pack IGBT technology
- Fuseless protection
- Reduced number of components for the converter
- Induction motor design

**Compactness**

- Powerful switches
- Front access
- No need for harmonic filter
- No need for sinusoidal filter
- No need for excitation

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