

Potential of hybrid propulsion systems with permanent magnet motors for improvement on surface longliners

The raise in fuel cost have increased the interest on reducing the fuel consumption on fishing vessels. Several research and development projects have been promoted all over the world, many of them with the objective of identifying the energy consumption profile of the different types of fishing vessels as a first step for future optimization.

The propulsion systems employed by most of the fishing vessels are based on conventional fixed or controllable pitch propellers driven by diesel engines, but recent developments on electrical rotating machines, power electronics and electrical energy storage technology suggest that combined mechanical / electrical propulsion can be a very suitable alternative for improving the energy efficiency of these ships.

The results of a preliminary project for assessing the potential of hybrid propulsion systems for surface longliners are presented. The Spanish surface longliner fishing fleet is composed of nearly 300 ships, featuring a very specific and fluctuating power demand. First, the power demand and operating profile of a typical surface longliner is analysed based on the results from several research and development projects and energy efficiency audits carried out on the Spanish fishing fleet. A tentative architecture of the power plant is proposed and described; it is based on a variable speed synchronous permanent magnet motor / generator connected to a double AC / DC bus linked to an electrical energy storage system. Each component of the hybrid power plant is briefly described, carrying out a preliminary calculation of a custom design permanent magnet machine for propulsion and generation, in two alternatives, direct drive and geared