Electric Ship
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Advanced power technologies are being researched in electric ship design. The U.S. Navy is the driving force behind much of this research and expects to have designed and developed an all-electric ship by 2011. The concept behind all-electric ships is Integrated Power Systems, a common power source that allows nearly all shipboard systems—from propulsion and radar to weaponry and communications—to be driven by electric power. This research in electric ship design encompasses technologies not only for next-generation warships, but also for use in cargo ships, cruise ships, and other large commercial vessels.

Superconductor technology enables the size and weight of motors, generators, power transmission and supply units to be reduced. Although a superconductor motor generates the same amount of power as a conventional motor, it is nearly 70 percent smaller and lighter. This reduction allows for increased motor efficiency which translates to hundreds of thousands of dollars in annual fuel savings for a typical cargo ship. Smaller electric equipment frees up space for additional cargo space adding additional capacity for cargo ships. For cruise ships this can mean increased revenue with room for an additional 20 berths. [1]

Integrated Power Systems are especially important in naval ships, as improved reconfigurability can lead to increased combat survivability. In the case that damage occurs to the ship, electrical power—unlike mechanical power—can be easily redirected to undamaged propulsion systems or mission critical combat systems allowing for maintained functionality. Reduced acoustic noise emitted by electric motors reduces detectability, increasing stealth and further improving survivability.

In addition to improving survivability, the near- to mid-term electric ship technologies provide for increased warfighting capabilities. The flexible, open-architecture of integrated power allows any generating unit to supply propulsion or ship service power to support operational priorities. Such systems allow power to easily be diverted to next-generation naval weaponry including advanced multifunction radars, ultra-powerful microwave systems, lethal lasers, electric rail guns and electromagnetic launch and recovery of aircraft. [1]

The Office of Naval Research manages the Electric Ship Research and Development Consortium (ESRDC), an association of electric power research institutions focused on research in electric ship concepts. Universities participating in ESRDC include: Florida State University, Massachusetts Institute of Technology, Mississippi State University, Purdue University, United States Naval Academy, University of South Carolina and University of Texas at Austin. These institutions are dedicated not only to furthering research in electric ship and other advanced electric technologies, but also to address the national shortage of electric power engineers by providing educational opportunities.

It is estimated that conversion to electric ship propulsion will accelerate the growth of the current $400 million ship propulsion motors and generators market to $2-4 billion annually in the next ten years.[2] Electric ship technologies hold a number of possibilities. Among these are reduction in weight, environmental pollution and overall lifecycle costs, reduced manning through use of automated systems as well as increased speed, improved survivability for naval ships and increased reconfigurability of power.

References