

Clean technology a step closer for heavy marine transport

There are over 100,000 oceangoing vessels in the global fleet. These ships are responsible for 2-4% of the world's annual fossil fuel consumption. Wellington-based company HTS-110 Limited (HTS-110), working with Australian company Guina Energy, has taken the world a step closer to clean technology for marine transport with its recently completed propulsion motor project.

Guina Energy is now successfully operating the largest composite high temperature superconducting magnet system ever built by HTS-110. The magnetic system is part Guina Energy's homopolar motor technology development platform. Guina Energy's homopolar technology overcomes the challenges of previous homopolar designs through the use of innovative liquid metal brush technology that operates in regions of null magnetic field. This approach allows the brushes to operate in close proximity to a high strength magnetic field delivering outstanding power density.

Superconducting homopolar motors are amongst the most power-dense and electrically-efficient devices in the world. They provide significant improvements in marine transportation efficiency with counter-rotating electromagnetic turbine motors, promising an increase in propulsion efficiency of sea-going vessels of up to 15-25%.

HTS-110 Founder and Chief Technology Officer Dr Donald Pooke reports "This project was challenging in both design and build characteristics. The magnet contains over 5 kilometres of high temperature superconducting wire and operates at minus 250 degrees Celsius, uses large and complex composite components to hold the magnet coils in place at forces of several tonnes when energised, and all in a vacuum equivalent to near-earth outer space."

John Kells, Manager, Development at Guina Energy explains "Using high temperature superconducting magnets, outstanding power densities and power to weight ratios can be achieved for homopolar motors and generators. We chose HTS-110 to design and produce this magnet system because they had the capability to translate our initial specifications into a workable design and deliver a final product."

Completion of the magnet system required close co-operation between the HTS-110 team in Wellington and the Guina team on the Gold Coast, and involved high tolerance, highly-specialised components including complex glass-fibre composite cryostats and high purity copper components.

HTS-110 CEO Tye Husheer said "We are very proud of the result achieved by the HTS-110 team working together with Guina Energy and our superb components suppliers. We look forward to the next exciting project with Guina Energy, extending a relationship which we have built over the past decade."

What is a homopolar motor?

A Homopolar motor is a pure direct current machine offering very high efficiency and high power-to-weight ratios, though in fact it was the first electrical motor to be built starting with a demonstration by Michael Faraday in 1821 at the Royal Institution in London. The term homopolar indicates that the positive and negative poles of the conductor and the magnetic field poles do not change in relative direction.

About us:

HTS-110 Ltd. is the only company on the planet that commercially manufactures high temperature superconducting magnets for users in clean technology, data storage, chemical analysis and fundamental physics research. HTS-110 was formed in 2004 as a spin out company from Industrial Research Limited and is based in Seaview, Wellington. HTS-110 is 100% owned by listed company Scott Technology. See www.hts-110.com

Guina Energy produces designs and concepts combining innovations sourced from a range of novel technologies to produce advanced Green Energy solutions. Guina Energy technology harnesses the power of highly compressed magnetic field to produce superior reaction and power to weight ratios than other motors and generators. Guina Energy was established in the mid 1990's by Ante (Tony) Guina, a Croatian born scientist and initially commenced research into magnetic and electromagnetic fields. In 2004 the company broadened its research focus to include the rapidly advancing fields of Superconductivity and Superconductive Materials. See www.guinaenergy.com

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On homopolar motors:

http://en.wikipedia.org/wiki/Homopolar_motor

On energy use of ocean going ships:

Corbett, J. J. (2004), Marine Transportation and Energy Use, in Encyclopedia of Energy, edited by C. J. Cleveland, pp. 745-748, Elsevier Science, San Diego, CA.