

Nakashima Propeller first worldwide to install CFRP propeller on main propulsion system of commercial vessel

Nakashima Propeller Co., Ltd. (president: Motoyoshi Nakashima) of Okayama prefecture has become the first in the world to install a carbon fiber reinforced plastic (CFRP) propeller on the main propulsion system of a general commercial vessel. The main propeller of Taiko Maru was replaced with the new technology, which measures 2.12 meters in diameters, in May 2014 at the Kagawa prefecture-based shipyard Koa Industry Co., Ltd. (president: Tetsuo Masago). The 499-gross-ton chemical tanker, owned by Sowa Kaiun Y.K. (president: Hiroo Ouchi), a shipping company that is also based in Okayama, was outfitted with a side thruster with a CFRP propeller in September 2012. The side thruster propeller had been rated highly enough to lead to the decision for the May replacement work of the main propeller. The design and manufacturing methods were both approved by Nippon Kaiji Kyokai (ClassNK).

Taiko Maru's main propulsion CFRP propeller was produced using a new design of an enlarged diameter and a reduction in overall blade surface area. The propeller blades can flex, just like the wings of Boeing 787 Dreamliner airplanes. Making the most of this feature, the propeller can provide the chemical tanker with higher efficiency. Nakashima Propeller had conducted tests in a towing tank to verify the performance of the new product. The CFRP propeller weighs approximately 60 percent less than conventional metal propellers,

while enjoying a larger diameter. The lighter body can be operated with a narrower propeller shaft, which can contribute to reducing the overall weight of the entire shafting system and curtailing operational costs.

Taiko Maru was operated in a sea trial on May 18, 2014. The results confirmed that the main CFRP propeller offers about a 9 percent reduction in required shaft power compared to the same ship equipped with conventional metal propellers and running at the same cruising speed. The lighter weight is also effective in reducing hull vibration. Nakashima Propeller will measure engine output, fuel consumption and other data to prove the higher performance of the new propeller.



Research and development of CFRP propellers was supported by The Nippon Foundation and the Japan Ship Machinery and Equipment Association (JSMEA) from fiscal 2007 to fiscal 2011. Since fiscal 2012, research support has been given under ClassNK's "Joint R&D with Industry" scheme. Nakashima Propeller is now working on the project jointly with the University of Tokyo's school of engineering, ClassNK, National Maritime Research Institute (NMRI), Nippon Yusen Kaisha (NYK), Monohakobi Technology Institute Co., Ltd. (MTI) and Imabari Shipbuilding Co., Ltd.