The World's Largest Circulation Marine Industry Publication • The Information Authority for the Global Marine Industry since 1939 • Number 8 Volume 80

MARITIME REPORTER AND ENGINEERING NEWS

August 2018

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SMM 2018, Hamburg, Germany

Thordon: Protecting Canadian Waters

Thordon Bearings has played a part in keeping Canadian Coast Guard (CCG) vessels running, with several vessels more than 40 years old.

As a Special Operating Agency within Fisheries and Oceans Canada, the Canadian Coast Guard (CCG) is entrusted to ensure the safety of all mariners, protect the marine environment and support economic growth through the safe and efficient movement of maritime trade in Canada's waters.

To conduct its missions it maintains and deploys a 116-strong active fleet of varying size and class, in diverse waters including the Atlantic and Pacific coasts, Arctic waters and on the Great Lakes. Its choice of seawater-lubricated bearings for stern tubes and propeller shafts, rudders and deck machinery was a nature, with water being the ultimate zero-pollution lubricant.

CCG installed Thordon's COMPAC and XL/SXL bearings and associated seals on numerous vessels in the fleet ranging in size from small fisheries monitoring vessels, to self-righting SAR vessels to its larger icebreaking and navigational aid ships.

The four grades of bearing systems the Burlington-based manufacturer has developed – COMPAC for blue water operation, XL and SXL for varying degrees of abrasives and River-Tough for the most abrasive water conditions – are proprietary synthetic elastomeric polymer alloys combining the best properties of composite materials with the toughness and abrasion resistance of rubber.

New Orders

Thordon's COMPAC systems have recently been ordered for two icebreakers. Having had more than 17 years operational experience with Thordon on the 6098-gt CCGS Des Groseilliers, CCG specified new COMPAC bearings as part of the vessel's major upgrade scheduled for 2020. Des Groseilliers' 5910-gt sister, CCGS Pierre Radisson, is scheduled to have its existing bearings replaced with Thordon COMPAC later in 2018.

These will also be supplied and machined by RMH Industries, along with supply of a Thordon Water Quality Package (WQP) which maintains the correct seawater flow rate to the bearings and removes any abrasives in the seawater, ensuring a long bearing wear life. The Pierre Radisson was launched in 1978, while the Des Groseilliers entered service four years later.

"The Thordon COMPAC bearings were fitted to the Des Groseilliers to replace another manufacturer's dovetail staves," said Jasmin Racicot, Technical Development Director of RMH Industries. "Wear and fatigue had led to the dovetail staves becoming loose between the bronze separators, leading to high levels of vibration. Replacing dovetail staves with full form bearings was a significant improvement in this situation."

A third CCG ship in the same 1200-class, the Amundsen is expected to be converted to Thordon COMPAC bearings in 2019.

Jasmin Racicot, RMH Industries, Thordon's distributor with the Pierre Radisson.

Photos: Thordon Bearings

Permanent Repairs

CCGS Hudson, an offshore oceanographic and hydrographic survey vessel, first entered service in 1963 with the Canadian Oceanographic Service, transferring to CCG in 1996. Hudson's diesel-electric propulsion plant is arranged with twin shafts running in dovetail stave bearings which were also considered to be worn out due to age. Thordon distributor, Avalon Marine, was approached in 2016 about the possible options available for refurbishing the vessel's propeller shaft bearings.

During discussions it transpired that the original shaft packing glands were severely worn and leaking seawater into the ship, requiring continuous pumping out. With the proposed replacement vessel still a number of years away from delivery, CCG wished to carry out permanent repairs to the stern tubes and at the same time fit new inboard shaft seals. Avalon Marine proposed upgrading the vessel to Thordon XL full form bearings (from the existing staves) and to fit new Thordon SeaThigor mechanical seals during the same refit, which CCG accepted, along with a WQP to maximize the life of the Thordon bearings. The company was contracted to engineer the upgrades, refurbish the existing bearing carriers, supply and install new stern tube bearings and to design a compact WQP and integrate it into the ship.

This contract was notable as the first order for SeaThigor, which was placed with Avalon through the Government's 'Build in Canada Innovation Program' (BCIP), introduced to support home-grown innovations and facilitate sustainable economic growth.

The SeaThigor forward seal incorporates a secondary seal module to provide Safe-Return-To-Port capability in the event of a face failure of the primary seal.

Hero Class

The Hero Class Mid-Shore Patrol Vessels are relatively modern, the first of the nine-vessel class being delivered in 2012. They are designed to operate at high speed in heavy weather, engaged in maritime security, search and rescue, fisheries enforcement, anti-smuggling and maritime patrol duties. They were built by Irving Shipbuilding, and based on the Damen Stan Patrol 4207 design, with a 43m (141 ft.) long steel hull and aluminum superstructure. Four are deployed on the Great Lakes and St Lawrence seaway, with the remaining five on coastal patrols on the Atlantic and Pacific coasts. The Hero Class is powered by twin CP propellers driven by two Caterpillar diesel engines, rated at 4992kW for a maximum speed of 25 knots. The propellers run on Thordon COMPAC bearings while Thordon SXL bearings are used in the rudder. Each ship is equipped with a Thordon Water Quality Package. The WQP and SXL bearings were supplied by distributor Avalon Marine, while the COMPAC bearings were supplied and machined by the Duwel Group, Thordon's distributor in Sweden.

Samuel Risley

Icebreaker CCGS Samuel Risley, built in 1985, was converted from oil to Thordon seawater lubricated stern tube bearings in 2009. The 69.7m (229 ft.) long vessel is equipped for buoy handling, emergency towing and firefighting, and has a twin-screw geared diesel propulsion system with two Wärtsilä Vasa 16V22 engines driving CP propellers. The change to seawater lubrication was a decision made by the CCG as part of their commitment to environmentally friendly vessel operation. Thordon supplied COMPAC bearings, a WQP, and the shafts were protected against wear and corrosion with Thordon's Thor-Coat two-part toughened epoxy system. Thor-Coat was specifically developed to complement Thordon COMPAC bearings by providing corrosion protection to meet extended shaft withdrawals.

Louis St Laurent

CCG's largest and heaviest icebreaker, the CCGS Louis St Laurent, was first commissioned in 1969, with steam turbine propulsion. It has undergone several major refits and at least one life extension since it was commissioned, including upgrading to a triple-screw diesel electric system based on five MaK 16V453Cs prime movers. When one refit found that the original dovetail stave bearings were severely worn, CCG considered several repair options to keep the ship in service for another 10 years or so, when Canada's long-awaited replacement heavy icebreaker CCGS Diefenbaker may be delivered.

Avalon Marine was again approached by CCG to put forward a proposal for repairing the existing bearings in order to extend the operating life of the stern tubes.

"It became clear early on that in order to justify the costs of upgrades, SCM implementation would be needed in order to reduce the life cycle costs for the remaining life of the ship," said Avalon Principal Thom Hofmann. "A number of life cycle cost scenarios were completed by Avalon taking into account the costs of implementation and upgrades as well as the periodical survey cycles required by Class."

The outcome was a series of contracts between CCG and Avalon Marine to engineer, assess, submit and obtain the Class approvals as well to design the bearing upgrades and shipboard equipment integration. Based on Avalon's contract, Thordon supplied three full shaft line sets of full form Thordon XL bearings and three custom water quality packages to continuously condition the bearing lubrication water. This was the first time Thordon WQP's had been customized and integrated into the existing propulsion cooling water system of the ship, without dedicated pumps. Avalon worked very closely with the shipyard handling the dry docking. Quebec-based Thordon Distributor, RMH Industries, handled all of the machining to recondition the propeller shafts and machine the new bearings. The ship went back into service with all new bearings and WQPs in August 2017

Since then, Avalon Marine has recently completed engineering studies for upgrading the tailshaft bearings on two CCG Type 1100 Class 2 medium icebreakers, the CCGS Ann Harvey and CCGS Wilfred Laurier to the latest Thordon specifications. These projects are expected to be undertaken during the ships' 2018 drydockings.