

Thordon's COMPAC bearing with tapered keyset installed at the shipyard

COMPAC FOR LIFE: THORDON SEAWATER LUBRICATED PROPELLER SHAFT BEARINGS GUARANTEED FOR A LIFETIME

Thordon Bearings is offering its award-winning COMPAC seawater lubricated propeller shaft bearing system with a lifetime bearing wearlife guarantee.

Previously COMPAC bearings have been offered with a 15-year wearlife guarantee but Thordon, the global leader in seawater lubricated propeller shaft bearings, announced at the SMM 2018 trade show in Hamburg, Germany, that its tough polymer bearings will not need to be replaced throughout a vessel's operational life.

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COMPAC FOR LIFE ...continued

The extended wearlife of a component that is critical to vessel performance is based on an extensive study of the performance data of the 550 plus COMPAC shaft bearings in operation on commercial vessels, dating back more than 25 years.

Thordon Bearings' President and CEO, Terry McGowan, said: "After evaluating the performance and operational data of the ocean-going merchant vessels that operate COMPAC seawater lubricated bearings we found that if the environment was controlled - ensuring an adequate supply of clean water consistently delivered to the shaft bearings - the COMPAC bearing wear was minimal. Environmental protection is of course high on the list of priorities for ship owners, but system reliability, reduced operational expenditure and maintenance are other key factors influencing the purchasing decision."

"We believe our system meets these commercial ship owner priorities, and this is why we are pleased to now offer our COMPAC bearings with a lifetime guarantee. With the announcement today, we are taking the seawater lubricated propeller shaft to the next level."

The COMPAC bearing is guaranteed to meet Classification Society propeller shaft bearing wear specifications for the lifetime of the vessel or Thordon Bearings will supply new bearings free of charge. According to VesselsValue.com, the average merchant ship lifespan is 25 years.

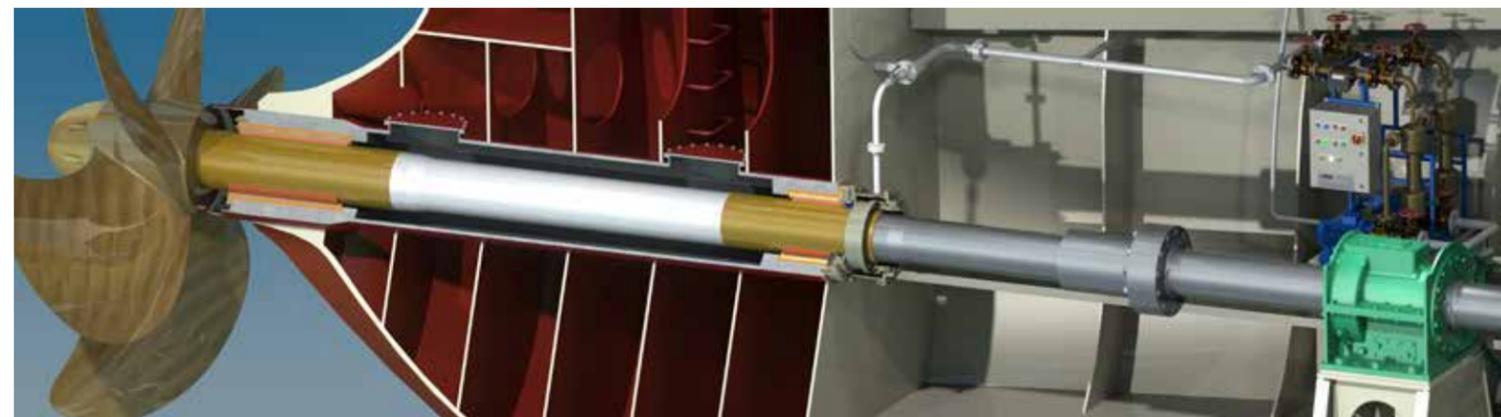
The guarantee is subject to prior approval by Thordon Bearings. All operators of commercial tonnage operating with 300mm diameter shafts or greater can benefit from the guarantee, although the complete COMPAC system must be specified. When COMPAC operates in conjunction with Thordon's Water Quality Package (that removes abrasives), ThorShield anti corrosion shaft coating, shaft liners

and the award-winning SeaThigor forward seal, bearing wear is negligible, providing optimum through life performance from what is already an exceptionally robust bearing.

Commenting on his experience of the COMPAC system installed aboard a number of Princess Cruises Ships, Richard Vie, Carnival Corporation's former Vice-President, Technical Development and Quality Assurance - Shipbuilding, said: "From a business, environmental and safety standpoint, seawater lubricated shaft line bearings offer the optimum solution.

"Thordon's products are proven and reliable with an exceptional lifetime, and of course the lubricant - seawater - is limitless and without cost. This substantially reduces the risk of failures compared to other propulsion solutions and therefore increases ship availability and protects its earning potential over its lifetime. Operating costs are minimal. The risk of polluting the seas through the release of oil or any other lubricants and subsequent fines and adverse publicity is eliminated completely. Ship performance and safety is not likely to be compromised by propulsion system failures thus further strengthening the case for adopting a seawater lubricated shafting solution."

Captain Simon Merritt, Senior Fleet Manager at Carisbrooke Shipping, a long-time proponent of the seawater lubricated propeller shaft arrangement, agreed: "We are very satisfied with

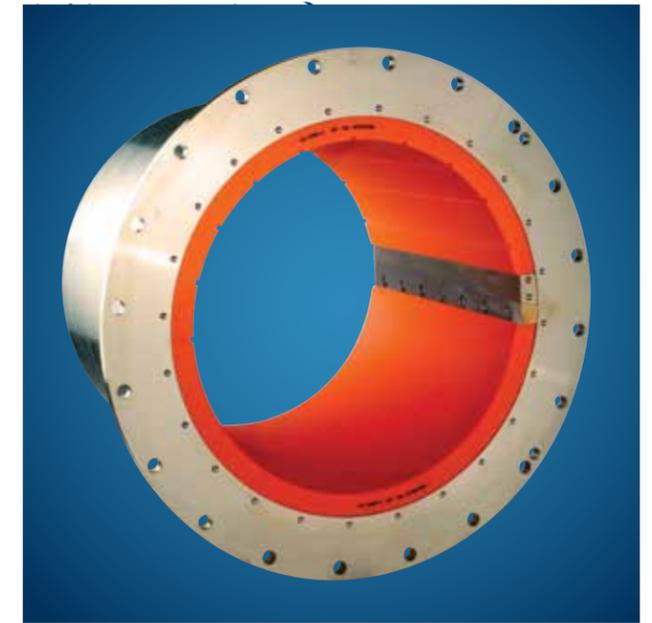


the Thordon system. We first selected seawater lubrication for environmental reasons, but having operated COMPAC on a number of vessels, we have experienced a reduction in ship operational costs compared to oil lubricated propeller shaft configurations. A lifetime guarantee on the bearing is likely to add to those savings."

Carisbrooke Shipping's first COMPAC installation was in 2011 to the 8,651dwt multipurpose dry cargo ship *Vectis Eagle*. Carisbrooke now operates the COMPAC seawater lubricated propeller shaft arrangement on a total of eight vessels.

"Based on our experience with these bearings in continuous service for the last 6 years we will ensure that future building specs incorporate the Thordon system," added Capt. Merritt.

Craig Carter, Thordon Bearings' Director of Marketing and Customer Service, said: "For the global shipping industry to fully support any movement to safeguard the ocean environment, any technological development has to make commercial sense. Shipowners and managers are becoming much more interested in a proven technology that eliminates both operational and accidental stern tube oil pollution while meeting increasingly stringent international environmental regulations. A 'COMPAC For Life' takes advantage of this and helps secure our leading position in the seawater lubricated propeller



Current ship owners using **COMPAC** seawater lubricated propeller shaft bearings include:

- Lomar Shipping (UK)
- Grimaldi Group (Italy)
- Alaska Tanker Company (USA)
- Princess Cruises (USA)
- Atlanska Plovibda (Croatia)
- Groupe Desgagnés (Canada)
- Carisbrooke Shipping (UK)
- Crowley Maritime Corp. (USA)
- ConocoPhillips (USA)
- CSL Group (Canada)
- COSCO (China)
- NY Staten Island Ferries (USA)
- Tropical Shipping (USA)
- BC Ferries (Canada)
- Viking Cruise Lines (UK)
- Polsteam (Poland)
- Erik Thun Group (Sweden)
- Algoma Corp. (Canada)
- Blue Star Ferries (Greece)
- Rederiet Stenersen (Norway)
- More than 40 Navies worldwide

VIKING JUPITER

DELIVERED WITH THORDON WATER LUBRICATED PROPULSION ARRANGEMENT



Viking Jupiter, the 47,800gt cruise ship built at Fincantieri's shipyard in Ancona, Italy for Viking Cruises, has been delivered with a Thordon Bearings' seawater-lubricated propeller shaft system. It is the sixth Viking cruise ship to be fitted out with the COMPAC bearing arrangement.

Two 930 passenger-capacity sisterships, *Viking Tellus* and *Viking Venus*, currently undergoing construction at Fincantieri and slated for delivery in 2021, have also been specified with the pollution-free Thordon system. Further newbuilds of the same class have also been ordered for delivery between 2022 and 2027, though supply contracts have yet to be finalised.

Richard Goodwin, Vice President, Engineering, Viking River Cruises, said: "From the outset, when we first entered the cruise market four years ago with *Viking Star*, we opted for water lubricated propulsion as a cost-effective means of reducing the impact of our operations on the marine environment. The COMPAC system has proven itself both commercially and operationally and we look forward to working with Thordon on future projects."

Thordon Bearings' President and CEO, Terry McGowan, added: "We congratulate Viking Cruises and Fincantieri on the successful and timely delivery of the sixth vessel in this class, a series of ships that have proven immensely popular with passengers and crew. We are delighted that both owner and builder continue to support the use of COMPAC water lubricated propulsion."

Viking's fleet of modern passenger ships are each equipped with energy-efficient hybrid engines to minimise airborne pollution, while the COMPAC propeller shaft bearing system is lubricated by seawater and does not require an aft seal, reducing in-service maintenance costs. The vessels' hull has also been optimised for fuel efficiency.

According to Alfredo Tosato, Managing Director at Pedrotec, Thordon Bearings authorised distributor in Italy, Fincantieri frequently specifies COMPAC for its newbuilding projects.

"When Viking started working with Fincantieri on these vessels, the shipbuilder recommended the Thordon solution at the design stage due to the excellent performance of the installations on the *Disney Magic* and Princess Cruise Lines' *Grand Princess*. For every new project where a conventional propulsion arrangement is selected, we work with both builder and owner to design and engineer the optimum bearing solution."

Pedrotec is currently negotiating the engineering and supply for the continuation of four Viking newbuilds.

The first of the series, *Viking Star* was delivered in 2015, followed in subsequent years by *Viking Sea*, *Viking Sky*, *Viking Sun*, and *Viking Orion*.

“...we opted for water lubricated propulsion as a cost-effective means of reducing the impact of our operations on the marine environment.”

The delivery of *Viking Jupiter* places Viking in pole position as the world's largest small ship ocean cruise line, only four years after launching its ocean business. 

For a
GUARANTEED SOLUTION
based on
PROVEN PERFORMANCE
select a

COMPAC
Seawater Lubricated
Propeller Shaft Bearing
System

**LIFETIME
BEARING WEARLIFE
GUARANTEE**



THORDON



COAST GUARD SOLVES SHAFTLINE PROBLEM WITH THORDON PROPELLER SHAFT BEARING SYSTEM



Canadian Coast Guard ship, *Des Groseilliers*, with converted water-lubricated COMPAC propeller shaft bearings system

The Canadian Coast Guard (CCG) has again selected Thordon Bearings' COMPAC water lubricated propeller shaft bearing system for two icebreakers, the *Pierre Radisson* and the *Des Groseilliers* scheduled to be installed in the 2020 dry dock.

CCG, a long-standing customer of Thordon Bearings, decided to retrofit the award-winning COMPAC system to the 6098gt *Des Groseilliers* following more than 17 years' operational experience with the Thordon solution. The new COMPAC bearings will be supplied and machined by Thordon distributor RMH Industries of Québec, Canada.

Des Groseilliers' 5910gt sister, *CCGS Pierre Radisson*, is scheduled to have its existing dovetail staves replaced with Thordon full form COMPAC bearings later in 2018. These will again be supplied and machined by RMH Industries, along with supply of a Thordon Water Quality Package which maintains the correct seawater flow rate to the bearings, and removes any abrasives in the seawater ensuring a long bearing wearlife.

The *Pierre Radisson* was launched in 1978, while the 6098gt *Des Groseilliers* entered service four years later.

Both vessels are powered by a diesel-electric plant comprising six Bombardier/Alco 251 engines each driving a GEC alternator. There are two DC electric propulsion motors, each turning a fixed pitch propeller, with a total power output of 10,100kW.

“Switching to Thordon COMPAC bearings and Water Quality Packages allows an extension in bearing life, giving the Coast Guard reliable access to the asset, and ultimately savings to the Canadian taxpayer, thanks to greatly reduced maintenance costs.”

Jasmin Racicot, Technical Development Director of RMH Industries, said: “The Thordon COMPAC bearings were fitted to the *Des Groseilliers* to replace another manufacturer's dovetail staves. 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 tube bearings was a significant improvement in this situation.”

Thordon's Scott Groves, Regional Manager for the Americas, pointed out that for once the environmental advantages of water-lubricated bearings, particularly for vessels engaged in Arctic voyages, were not a factor, as this class of ship has always had seawater lubricated screwshafts.

“The work on the *Des Groseilliers* and *Pierre Radisson* mostly has to do with reduced maintenance and limiting future expenditures,” said Groves. “*Des Groseilliers* was fitted with Thordon equipment in 2001 and over the years the bearings have performed in exemplary fashion.

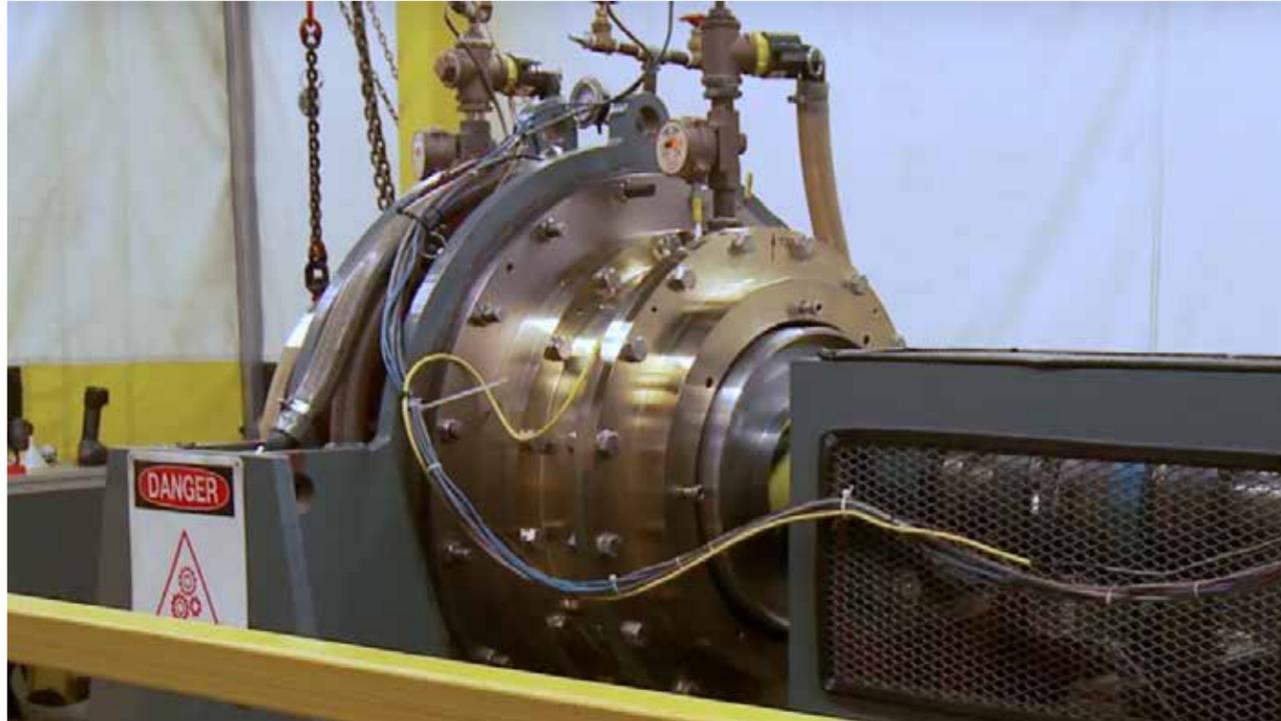
“Switching to Thordon COMPAC bearings and Water Quality Packages allows an extension in bearing life, giving the Coast Guard reliable access to the asset, and ultimately savings to the Canadian taxpayer, thanks to greatly reduced maintenance costs.”

Groves added that it was COMPAC's performance and ease of maintenance that were most attractive to the CCG, along with the recent class requirements for Lloyd's Register shaft condition monitoring (SCM).

A third CCG ship in the 1200-class is also scheduled for COMPAC conversion. Commissioned in 1979 as the *Franklin* (later *Sir John Franklin*), the vessel was declared surplus to requirements and decommissioned in 2000. It was subsequently converted to an icebreaking Arctic scientific research vessel, renamed *Amundsen*, and recommissioned in 2003. The *Amundsen* is expected to be converted to Thordon COMPAC bearings in 2019. ☺



CANADIAN COAST GUARD PROVIDES FIRST ICEBREAKER REFERENCE FOR **THORDON'S SEATHIGOR SEAL**



Thordon's SeaThigor seal on the test rig

Thordon Bearings has received a Canadian Coast Guard contract to supply six award-winning SeaThigor shaft seals for retrofit installation to three purpose-built icebreakers.

The 5,910gt CCGS *Pierre Radisson*, named after the 17th-century French fur trader and explorer, along with sisterships CCGS *Amundsen* and CCGS *Des Groseilliers*, will each be retrofitted with two SeaThigor forward seals during scheduled drydockings over the next year.

The order, confirmed on the 1st of April, follows the success of the 2017 installation and subsequent operation of SeaThigor seals aboard the oceanographic and hydrographic survey vessel CCGS *Hudson*, for which a procurement agreement was signed with the Government of Canada under its Build in Canada Innovation Program (BCIP).

Due to the success of that first SeaThigor installation, the government permitted the Canadian Coast Guard (CCG) to deal directly with Thordon Bearings without either party having to go through a competitive bid process, via the BCIP – Additional Sales.

Scott Groves, Thordon Bearings' Regional Manager – Americas, said: "This is a significant order for Thordon Bearings, marking not only the SeaThigor seal's first-ever reference onboard a purpose-built icebreaker but also the largest propeller shaft seals we have ever manufactured."

The 98.2m (322ft) long, 1200-class vessels are designed to Arctic Class 3 requirements and operate twin 674mm (26.5in) diameter shafts driving fixed pitch propellers. Propulsive power is generated by six Alco M251F main engines delivering 10142kW of power.

"The vessels' existing seals were leaking water into the machinery spaces, which meant they could not discharge oily-water overboard into Arctic waters. Ultimately, CCG needed a seal solution that was robust enough to withstand heavy-duty ice-breaking operations, without leaking. SeaThigor provides that level of robustness," continued Groves.

The seals supplied to the *Pierre Radisson*-class of ships will also be the first SeaThigors designed with a split casing, as Carl Sykes, Manager of Thordon's Global Service & Support division, explained.

"The limited space available in the vessels' engine room prevented the installation of a SeaThigor seal with a conventional, fully encased bronze housing. So, we designed a seal with a split casing to simplify the installation and commissioning process, allowing engineers to access the underside of the seal. Many different departments – procurement, design, engineering and manufacturing – came together to really make this happen. It was a complete team effort."

Jasmin Racicot from Thordon's Quebec-based distributor RMH Industries, added: "What interested CCG about the SeaThigor was the seal's emergency safe-return-to-port function and low maintenance requirement; the silicon carbide faces are designed for reduced wear and tear throughout its operational life, resulting in improved life cycle costs for the Coast Guard."

CCG is a long-standing customer of both Thordon Bearings and RMH, with a number of vessels operating Thordon's seawater lubricated COMPAC bearing system.

One of the first CCG vessels to benefit from COMPAC was the 6098gt CCGS *Des Groseilliers*, which was installed with the system 17-years-ago. It will be fitted with a SeaThigor seal at a scheduled drydocking in 2020. CCGS *Amundsen* will be converted to COMPAC at its next drydocking, when the SeaThigor seals will also be installed. 



LOMAR'S SUPER-ECO BOXSHIPS MARK EUROPEAN BREAKTHROUGH FOR THORDON BEARINGS



Delaware Trader, the first of two 2,700TEU newbuild containerships that China's Guangzhou Wenchong Shipyard is delivering to Lomar Shipping this year, has been fitted with a seawater lubricated propeller shaft bearing system from Thordon Bearings.

The vessel represents another breakthrough for Thordon Bearings' COMPAC seawater lubricated propeller shaft bearing system in the European-owned containership segment.

London-headquartered Lomar Shipping, a privately-owned ship owning and management company, operates a modern fleet of containerships, bulk carriers, chemical and product tankers.

While environmental protection was a key factor in the decision to move away from oil-lubricated shaft systems, Lomar's Technical Department remarked that the long-term savings expected on operational expenditure are "very attractive". While more expensive in terms of CAPEX, Lomar calculated a lower total cost of ownership from the long term savings offered by seawater lubrication, making it a very cost-efficient alternative to stern tube oil-based systems.

Lomar sees a long-term trend across the shipping industry to implement solutions capable of reducing the impact of operations on the environment and seizes every opportunity to do the right thing for the environment. The introduction of these latest, high specification, fuel-efficient vessels is following this commitment.

The COMPAC system meets the most stringent environmental demands with seawater replacing oil as the lubricating medium.

Designed by China's MARIC and built to DNV GL class, the Super ECO 2700 vessels, are the first to operate according to the classification society's stringent TMON requirement. This means they benefit from the same extended shaft withdrawal inspection periods as an oil-based system if certain monitoring conditions are met.

With a hull form designed for maximum fuel-efficiency, DNV GL's RCP notation optimises reefer container carriage in a way that further reduces energy consumption.

"This order is a significant breakthrough for seawater-lubricated stern tube systems not only in the shipping industry but the containership segment as a whole," said Alexandros Alexandropoulos, Project Director, Technava, Thordon Bearings' Greece-based distributor that worked with Lomar on the seawater-based solution.

"Lomar has a clearly defined set of social responsibility standards that must meet the highest level of compliance, so we are delighted that Thordon is considered a trusted manufacturer of environmentally safe solutions. Lomar selected COMPAC because of the brand's reputation, design reliability, zero impact on the marine environment and extended warranty."

In recent years Lomar has undertaken an extensive newbuildings programme with orders for over 25 sub-Panamax containerships and bulk carriers from Chinese shipyards.

Terry McGowan, President and CEO, Thordon Bearings, said: "We are delighted that Lomar Shipping has incorporated COMPAC into the design and build of these super eco-friendly newbuilds. The environmental benefits of seawater lubricated propulsion are, of course, well established, but the acceptance of *Delaware Trader* into the Lomar fleet now establishes the concept as the cost-effective propulsion solution."

Lomar added: "We will evaluate cost efficiencies over coming months to determine seawater lubricated systems for future newbuilds and for converting existing vessels. From an installation perspective, if you follow the manufacturer's procedures it's very straightforward."

In addition to the award-winning COMPAC elastomeric polymer bearings, Thordon's scope of supply included a forward propeller shaft seal, Thordon bronze shaft liners, ThorShield corrosion resistant shaft coating, a Thordon Water Quality Package and its Bearing Condition Monitoring (BCM) system. 



COMPAC propeller shaft bearing with Bearing Condition Monitor (BCM) System



MOORING SYSTEM INSTALLATION HIGHLIGHTS THORDON'S INCREASING RANGE OF BEARING APPLICATIONS



The bearing installations to two Calm Buoys operating offshore Libya are indicative of the wide-range of applications Thordon's environmentally-safe bearing systems have outside the company's traditional maritime market.

A total of 48 bearings and bushings were supplied in 2014 for installation to the chain stoppers of Monobuoy's innovative 400t turntable Calm Buoys, a single point mooring system designed to allow oil tankers to load and offload cargoes offshore, without having to berth alongside the refinery. However, the ensuing Libyan conflict resulted in the project being postponed until late 2017, when they finally entered service.

"Despite the delay, construction and commissioning went very well," said Monobuoy's Andrew Charlton. "We have used Thordon bearings on two or three projects in the past. There are not many suppliers of these types of bearings, but we find Thordon offers a more simplified design and is easier to work with. When we have projects like this we tend to give Wenex a call to help during the design phase and assist with the calculations."

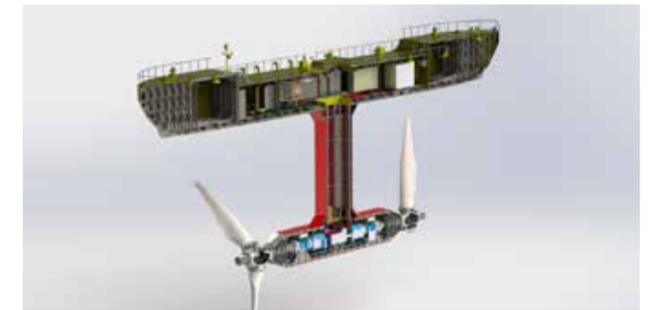
Thordon's authorized distributor in France, Wenex Equipements SA, calculated the load on each bearing, a crucial element in optimising the design of the Calm Buoys in line with the customer's requirement.

Having a 12m (39.4ft.) diameter hull, the Calm Buoy can accommodate 4, 6 or 8 chain legs. An innovative and compact 40t chain pulling winch is fitted, making the buoys easy and quick to install. Single or multi-path swivel stacks can also be fitted with utility swivels to power and control subsea valves.

For each of the buoy's chain stoppers Wenex recommended 32 abrasion-resistant ThorPlas-Blue bearings, due to their ability to pivot with the anchor chain. Thordon also supplied 16 SXL entry chafe bushings that were installed to provide a greater level of wear resistance to the anchor chain, while 32 SXL thrust washers were supplied to help reduce the side-to-side motion of the Calm Buoy during inclement operating conditions.

"There is a willingness with Thordon Bearings to work with companies and come up with specific solutions for applications outside of the norm," said Charlton. "We are very pleased with the technical support Thordon and Wenex provide."

Benoit d'Alançon, Managing Director, Wenex, said: "This was an important project for us. Calm Bouy projects like this are relatively rare in France, where Thordon bearings tend to be specified for use in the renewable energy sector, subsea turbines and river dams. We are delighted that Monobuoy's system is now successfully operating offshore Libya."



OCEAN_2G tidal energy platform utilizing Thordon's COMPAC bearings

One recent renewable energy project included the installation of Thordon bearings for the main turbine shafts of the 2MW OCEAN_2G tidal energy platform launched by Spain's Mgalenes Renewables last year in Vigo bay, Spain.

A specialised stainless steel cladding solution was chosen to protect the 600mm (23.622") diameter shaft, and Thordon's COMPAC elastomeric polymer alloy bearings were selected to ensure the longest possible life in an unpredictable and demanding open ocean environment.

George Morrison, Thordon Bearings' Regional Manager, said: "We are seeing increasing interest from industrial sectors outside our core maritime markets, particularly the mining, offshore and renewable energy sectors. Any rotating machinery can benefit both commercially and technically from our range of unique grease-free and water-lubricated polymer bearing solutions." 



POLYMER PIONEER **GEORGE A. THOMSON** WINS PRESTIGIOUS **ELMER A. SPERRY AWARD**



Sandy Thomson – Thordon’s Innovator and 2019 Elmer A. Sperry Award Winner

Thordon Bearings’ founder and polymer materials pioneer George A. (Sandy) Thomson has been awarded the global transportation sector’s most distinguished accolade, the Elmer A. Sperry Award 2019 for “Advancing the Art of Transportation”.

Sandy joins a long list of Sperry Award recipients, which was established in 1955, including Donald Douglas, Ferdinand Porsche, Sir Geoffrey De Havilland, Christopher Cockerell, Leonard Hobbs, Perry Pratt, Josef Becker and Malcom McLean.

“I am deeply honoured and humbled to win this award, which I accept on behalf of everybody at Thordon Bearings,” said Sandy.

“To be presented with this prize is a testament to the talent and dedication of all those working tirelessly within the company to develop safer, more environmentally-friendly solutions for all sectors of industry. It really is a collective effort rather

than any one individual. It is our material scientists, technologists and engineers – some of the best in the world – that must take all the credit.”

Sandy is a native of Burlington, Ontario, Canada and is the second Canadian to win this prestigious award. He studied aircraft maintenance at Northrop University in Inglewood, California and graduated as a mechanical engineer. After a brief stint working for a Boston based mechanical seal manufacturer, he returned to Canada to join Thomson-Gordon Ltd, founded by his grandfather in 1911.

The prospect of producing engineered components made from elastomers intrigued Sandy, so along with Dr. Pande and Dr. Bill Allan they developed the Thordon polymer in the late 1960s. After several prototype bearings, the world’s first polymer alloy bearing was produced and installed in 1967 into a vertical pump, in partnership with a local steel plant, replacing traditional rubber bearings that typically wore out within a few weeks.

Early on Sandy saw the potential for a wide variety of markets for the new polymer, and after the successful installation in more vertical pump applications, the marine market on Lake Ontario seemed like the perfect place to test the bearing in horizontal applications. The world’s first Thordon water lubricated propeller shaft bearing was installed on a Great Lakes tug owned by McKeil Marine in Hamilton in the late 1970s. Today McKeil is the largest tug/barge owner on the Great Lakes and still a loyal customer 40 years later.

The advantages of Thordon polymers were quickly adopted by ocean-going vessels, with hundreds of ships, including cruise ships and container vessels installing Thordon seawater-lubricated polymer tailshaft bearings. One significant breakthrough

was supplying propeller shaft bearings to the Royal Canadian Navy - Halifax class frigates, which had originally specified rubber bearings that turned out not meeting expectations. However, the products from Sandy’s newly-formed company – Thordon Bearings Inc. – solved the problem. Since then over 40 global Navies and Coast Guard fleets have chosen Thordon’s COMPAC propeller shaft bearing system. Based on the proven operating performance on cruise ships, COMPAC bearings are now offered with an unprecedented lifetime bearing wearlife guarantee.

“To be the best demands a genuine commitment to innovation, problem solving, service and quality.”

Sandy’s pioneering work in eliminating a major cause of ocean pollution – oil leaked from conventional oil lubricated tailshafts – has prevented millions of litres of oil leaking into the sea and rivers, protecting marine ecology.

His work in the marine industry has extended beyond just sea-going bearings – Thordon has developed the RiverTough bearing material to withstand the abrasive conditions typically encountered in the US inland waterways. He has also revisited his early involvement in mechanical seals to develop a robust tailshaft seal design – the SeaThigor for blue water and the TG 100 for abrasive water environments. Both seal designs feature a unique inflatable emergency seal that will allow the vessel to safely proceed, meaning the shaft can still turn with the seal in place if the seal face ever get damaged.

Thordon polymer materials have been used in numerous other maritime applications, including rudder bearings, deck machinery, dredger cutterhead bearings and floating production storage and offloading (FPSO) vessel turret and mooring equipment – all offering easy installation, long life and above all, because they require no oil or grease, any pollution risk is eliminated.

Sandy’s interests and involvement extend beyond the maritime world. Having gained his pilot’s licence at the age of 18, he could see opportunities for his polymer technology in the general aviation industry. He formed Marsh Brothers Aviation to provide aircraft solutions, among them the AeroTough GF, a self-lubricating polymer to replace greased nickel-bronze bushings and ThorFlex elastomeric polymer seals. Not only are these materials long-lasting and self-lubricating, they are cleaner and weigh significantly less than the alternatives. All were developed and tested on Sandy’s own Aerostar aircraft.

Sandy’s latest interest is in clean power generation. Thordon Bearings’ sister company, TG-DNALOP purchased a small hydro facility in Poland which is acting as a demonstration site for Thordon’s water-lubricated bearings and seals in a new generation of Kaplan turbines for the renewables industry.

Sandy sums up his philosophy: “To be the best demands a genuine commitment to innovation, problem solving, service and quality. Our goal is to provide products and services that represent the best possible value for our customers’ needs.”

The Elmer. A. Sperry award is given jointly by the American Institute of Aeronautics and Astronautics, the Institute of Electrical and Electronics Engineers, the Society of Automotive Engineers, the Society of Naval Architects and Marine Engineers, the American Society of Civil Engineers, and the American Society of Mechanical Engineers. ☺

CONTINUED USE OF OIL LUBRICATED SHAFT SEALS COUNTERPRODUCTIVE TO ENVIRONMENTAL LEGISLATION



Media reports indicating the potential volume of lubricating oil polluting the world's seas and oceans due to shaft seal damage or failure should send a clear message to Administrations that this frequently overlooked source of pollution needs to be quickly addressed.

In its evaluation of news clippings over the course of the past few years, Thordon Bearings found more than 100 references to "propeller shaft seal failure and oil leakage into the sea", the most recent of which was published in the June 2019 edition of Tanker Operator magazine.

This article reported a tanker leaking oil after the shaft seals were damaged by rope becoming entangled around the propeller shaft. The 3-lip seal had leaked oil into the sea before divers carried out emergency repairs in Tenerife, Spain.

"Regular reports in the maritime technical press and indeed from hull repair specialists themselves show with alarming frequency that the aft seals of oil-lubricated shaft lines are damaged by either ropes or fishing nets and wholly responsible for this source

of pollution," said Craig Carter, Thordon Bearing's Director of Marketing and Customer Service.

Press releases issued by a well-known underwater ship repair company reference the regularity in which it carries out repairs to damaged seals. One recent report highlighted work carried out to a general cargo ship with a "leaking stern tube assembly", while another reported repairs to the damaged seals of a semi-submersible offshore platform in Mexico. Yet another reported repairs to a ship leaking oil in Antwerp, after fishing nets had become entwined around the seal assembly.

"It's all good business for underwater ship repair companies, of course, but these problematic shaft seals, which account for 43% of all shaftline failures, are not only impacting the marine environment but also the shipowner's bottom line," said Carter.

Based on its calculations, Thordon Bearings says that every vessel that operates an oil-lubricated propeller shaft system configured with aft seal, could be leaking on average 6 litres (1.6 U.S gallons) per day – a statistic backed up by research carried out by

New York-based Environmental Research Consulting, which found 240 million litres of operational oil is leaked annually from ships.

Terry McGowan, President and CEO, Thordon Bearings, said: "While the list of vessels that have polluted the oceans following damage to stern tube seals is extensive, it is only a fraction of the number of incidents taking place. The only certainty we have is that the amount of oil discharged into the marine environment from faulty or damaged seals is of significant environmental concern and should be addressed immediately by Administrations and regulators. And this doesn't even include normal operational leakage from worn seals."

When there are cost-effective, environmentally-safe alternatives available, it is understandable why environmental concern abounds, especially given the drive to reduce other forms of shipborne pollution.

Indeed, based on the potential impact of this level of oil pollution in its marine environment, the US EPA recommended that "all newbuild vessel operators endeavour to use seawater-based systems for their stern tube lubrication in order to eliminate the discharge of oil from these interfaces to the aquatic environment". The EPA has included this clause in its Vessel General Permit rules (sect. 2.2.9) since 2013.

"The maritime industry's continued use of these systems is counterproductive to the excellent work it is doing to clean up our seas with, for example, the introduction of mandatory legislation to reduce emissions, prohibit oily water discharges or prevent the spread of alien aquatic species. We now need regulations to stem the flow of oil leaking from a ship's propeller shaft," said Carter.

Referring to an article published in July last year, Carter added: "Ship Insight magazine questioned the continued use of oil-lubricated propeller shafts in the environmentally-driven times in which we now find ourselves. The Editor wrote: 'With oil lubricated

systems, the outboard propeller shaft seals present a risk in that they are expected to fulfil two functions, namely to prevent oil leaking out into the sea, and to prevent seawater from getting in and contaminating the oil. If the seal fails there could be either an operational or an environmental problem...

Water-lubricated stern tube solutions are emerging as the sensible way to go'. We couldn't agree more."

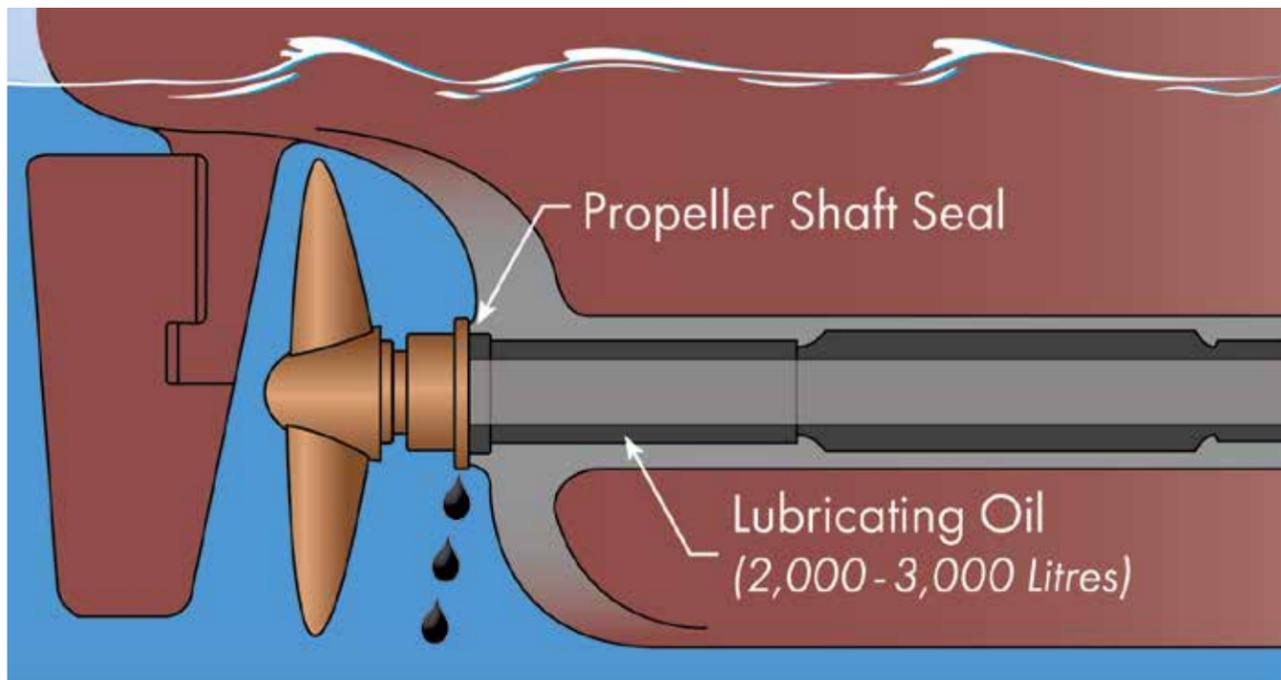
HOW MUCH LUBRICATING OIL ENTERS OUR SEAS AND OCEANS?

95% of the global shipping fleet (48,000 ships) operate with oil lubricated propeller shafts

A ship typically leaks **6 Litres of oil per day** considered "normal consumption"

Global Estimated Oil Leakage of Ship Propeller Shaft Lubricating Oil
60 million Litres of oil per year

Sources:
1. Eric, Roger Schmitt: Environmental Research Consulting. (2010). "Worldwide Analysis of In Port Propeller Shaft Lubrication Discharges and Leakages"
2. Lloyd's Register Type Approval Part B Subject: Main Propeller Shaft Line Product: Stern Tube Seals UK 2005. Retrieved from Web Item ID: 2906. www.lr.com/uk/infocentre



THORDON'S REVOLUTIONARY SEATHIGOR SHAFT SEAL WINS INNOVATION AWARD

Thordon Bearings' revolutionary shaft seal SeaThigor took home the Marine Propulsion Innovation Award in May following the Riviera Maritime Media-organised awards and gala dinner, held this year in Amsterdam, the Netherlands.

The annual technical awards recognise innovations across a range of marine engineering and technology sectors and are presented to those companies or individuals that have developed a novel product, system or process that demonstrates an "imaginative and effective solution to an engineering requirement".

Commenting on the accolade, Jeffrey Butt, Thordon's Business Development Manager – Marine, who collected the award, said: "For a maritime technology company, winning the Innovation category of the prestigious Marine Propulsion Awards is like winning Best Picture at the Oscars. We are absolutely delighted to win this award."

Craig Carter, Thordon Bearings, Director of Marketing and Customer Service, added: "The Marine Propulsion 2018 Award will be added to the Tanker Shipping & Trade award for our COMPAC seawater-lubricated propeller shaft concept, received in 2015.

"Both of these awards are indicative of the shipping industry's increasing commitment to protecting our marine eco-systems from unnecessary oil pollution, while optimising the performance and functionality of shipboard systems and machinery. It is truly a sustainable solution for today's cost conscious shipowner."

SeaThigor won the award despite stiff competition from nominees that included EPS Techno's GSIRE system and Parker Kittiwake's Attenuated Total Reflection Analyser.

A robust mechanical face seal, the Thordon SeaThigor is for water lubricated propeller shafts found in all types of merchant and naval ships. In the event of a face failure of the primary seal, it incorporates a secondary seal module to provide Safe Return To Port capability.

"This unique feature is unlike other maintenance seal, as the propeller shaft can be rotated at reduced speeds allowing the vessel to make it safely to a repair facility under its own power, without causing further damage. No other shaft seal on the market offers this feature as a standard supply," said Carter. 



Jeffrey Butt, Thordon Bearings' Business Development Manager-Marine (left) receiving the Marine Propulsion Award



Sandy Thomson, onboard the Canadian Coast Guard Ship Hudson with SeaThigor Mechanical Face Seal installed.

THORDON'S COMPAC SYSTEM WINS SEATRADE CLEAN SHIPPING AWARD

Thordon Bearings' COMPAC seawater-lubricated propeller shaft bearing system has won the coveted 2019 Seatrade Award for Clean Shipping, in recognition of the technology's capacity to eradicate completely operational oil pollution from ships' stern tubes.

The Clean Shipping Award was presented by guest of honour Professor Dame Jane Francis, Director, British Antarctic Survey, during a gala evening this week at London's historic Guildhall. Dame Francis has witnessed first-hand the effect anthropogenic events can have on the environment.

Craig Carter, Thordon Bearings' Director of Marketing and Customer Service, said: We are absolutely thrilled that COMPAC has won this prestigious award and equally delighted it was presented by Dame Francis. In these environmentally conscientious times, seawater-lubricated propeller shaft systems are now widely regarded as a vital component in the fight to reduce shipping's impact on the marine eco-system. Winning this award marks a significant milestone for seawater-lubricated propeller shaft bearing systems."

The COMPAC bearings system, which Thordon offers with a life-time wear-life guarantee, prevents the seepage of millions of litres of oil into the world's oceans and reduces ship operating costs associated with aft seals and lubricating oil.

George Morrison, Thordon Bearings' Area Sales Manager, said: "To date, those owners that have installed or retrofitted a seawater-lubricated propeller shaft bearing have prevented more than 60 million litres (16 million U.S gallons) of stern tube oil from entering our oceans, seas, lakes and rivers. We hope that by the end of this year we can report that the industry has saved more than 100 million litres."

The advancements now being made in marine systems and technologies are expected to spur the further development of the zero-emission ship. However, Thordon believes this can only be fully achieved once the oil-lubricated propeller shaft has been relegated to history. 



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