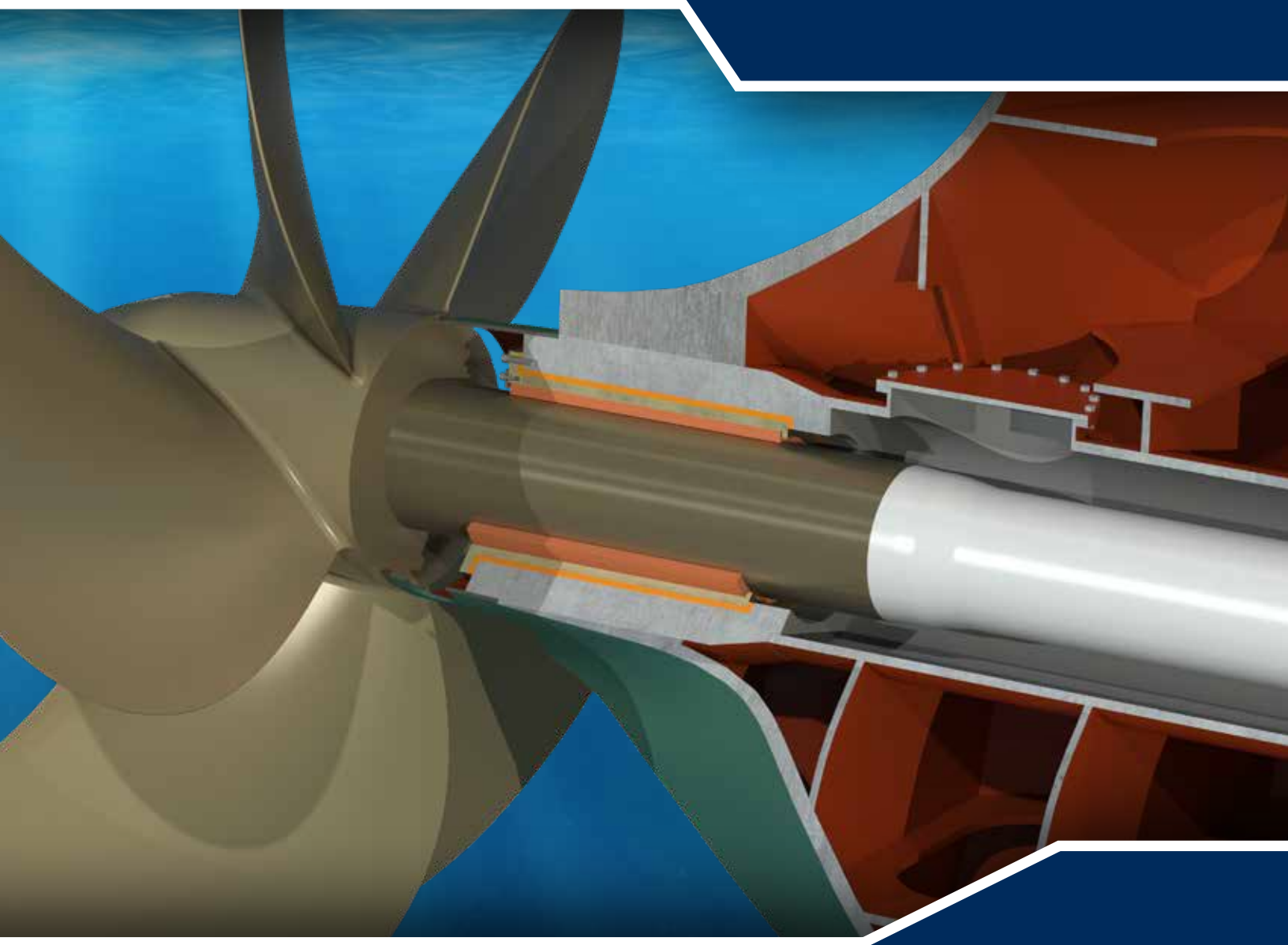


THORDON

THORDON BEARINGS INC.



**COMPACT OPEN SEAWATER LUBRICATED
PROPELLER SHAFT BEARING SYSTEM
FOR MERCHANT FLEET VESSELS**

COMPAC FOR LIFE

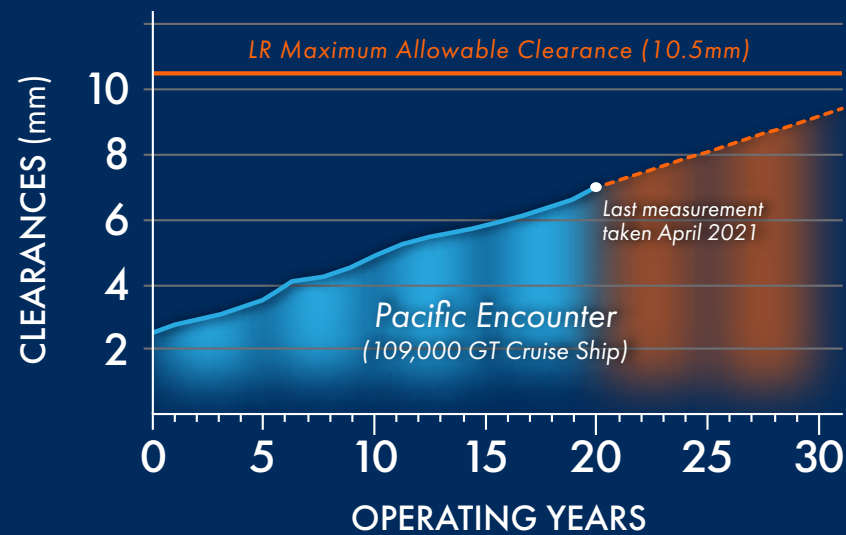
SEAWATER LUBRICATION IS FREE

Ship Owner Benefits

- Technical equivalence to oil lubricated white metal propeller shaft bearings
- Lowest operating costs
- Virtually maintenance-free
- Elimination of aft seal issues
- Zero environmental impact as no oil is used
- Compliance with US VIDA and Polar Code regulations
- Proven reliability on over 2000 ship references

Thordon COMPAC Water Lubricated Propeller Shaft Bearing Clearance

(Avg. Clearance of Port & Starboard)



LIFETIME BEARING WEARLIFE GUARANTEE

Controlled Bearing Environment

Thordon's Water Quality Package ensures an adequate supply of clean water is consistently being delivered to both the forward seal and the stern tube bearings. Lubrication of the bearing is assured and a long predictable bearing wear life is achieved. A controlled supply of clean water allows Thordon to offer a lifetime bearing wearlife guarantee.

Easily Machined and Fitted

Thordon COMPAC machines cleanly and produces no airborne machining debris. COMPAC is much lighter than white metal bearings and can be fitted quickly and easily by freezing in liquid nitrogen or dry ice.

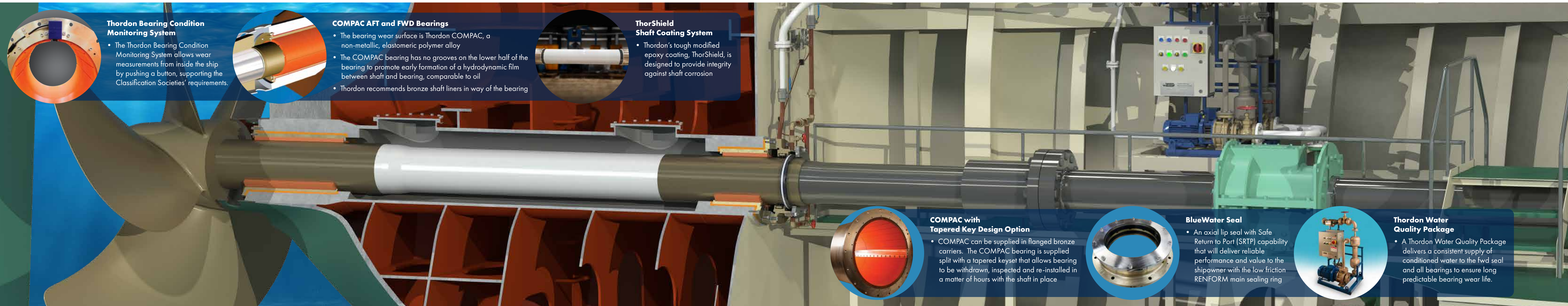
Cost Savings

The COMPAC seawater lubricated propeller shaft bearing system eliminates stern tube oil or EALs as seawater is used as the lubricant. There is no aft seal, no leakage of oil, no storage of oil, no sampling of oil, no disposal of oil, and no risk of seawater ingress contaminating the oil. Compared to synthetic EALs that are 500 - 1000% more expensive than mineral oil, seawater is free and recommended by the U.S.A. Environmental Protection Agency (EPA) to meet VIDA requirements. Emergency aft seal repairs will never happen as there is no aft seal.

Compliant Operation

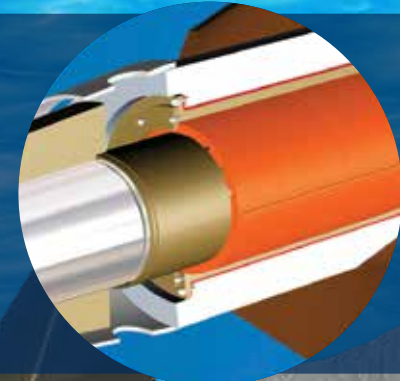
Extended shaft withdrawal notations are approved for all class societies with the exception of NK and KR (as they don't have these notations). This allows the propeller shaft for open water lubricated systems to remain in place if monitoring conditions are met. Extended shaft withdrawal notations ensure technical equivalence of the COMPAC system with oil lubricated propeller shaft systems. Thordon's COMPAC system assures ship owners/operators that there will be no environmental violations resulting from stern tube oil leakage and meets both US VIDA and Polar Code regulations guaranteeing zero risk of pollution.

COMPAC OPEN SEAWATER LUBRICATED PROPELLER SHAFT BEARING SYSTEM



Thordon Bearing Condition Monitoring System

- The Thordon Bearing Condition Monitoring System allows wear measurements from inside the ship by pushing a button, supporting the Classification Societies' requirements.



COMPAC AFT and FWD Bearings

- The bearing wear surface is Thordon COMPAC, a non-metallic, elastomeric polymer alloy
- The COMPAC bearing has no grooves on the lower half of the bearing to promote early formation of a hydrodynamic film between shaft and bearing, comparable to oil
- Thordon recommends bronze shaft liners in way of the bearing

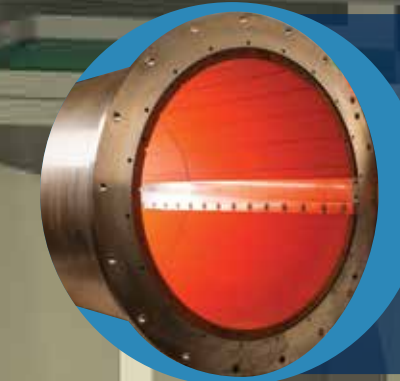


ThorShield Shaft Coating System

- Thordon's tough modified epoxy coating, ThorShield, is designed to provide integrity against shaft corrosion

COMPAC with Tapered Key Design Option

- COMPAC can be supplied in flanged bronze carriers. The COMPAC bearing is supplied split with a tapered keyset that allows bearing to be withdrawn, inspected and re-installed in a matter of hours with the shaft in place



BlueWater Seal

- An axial lip seal with Safe Return to Port (SRTIP) capability that will deliver reliable performance and value to the shipowner with the low friction RENFORM main sealing ring



Thordon Water Quality Package

- A Thordon Water Quality Package delivers a consistent supply of conditioned water to the fwd seal and all bearings to ensure long predictable bearing wear life.



"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."

– Captain Simon Merritt, Technical Manager, Carisbrooke Shipping Ltd. (U.K.)

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"Spills always come at times when you do not need them, and they must be resolved as soon as possible. Prior to the switch to these seawater lubricated bearings, Flinter, like others, had been fined for oil pollution, especially in U.S. ports."

– Martijn Berends, Newbuildings Manager, Flinter Management BV, Netherlands



COMPAC was a no brainer for us. These new 300-TEU vessels will have a raft of equipment designed to protect the environment, so COMPAC fits well with our environmental sustainability goals. A seawater lubricated propeller shaft bearing installation means there will be zero risk of these vessels leaking oil into the sea

– Erwin Holder, General Manager Vessel Construction, Tropical Shipping (USA)

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"The Trillium Class design includes many industry leading efficiency and pollution reduction features. Eliminating any possible source of pollution was given a high priority when designing these vessels."

– Kevin Begley, Director -Project Management, CSL International (USA)



"Thordon's products are proven and reliable with an exceptional lifetime, and of course 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 and the risk of pollution of the seas is eliminated completely"

– Richard Vie, former Vice-President, Technical Development and Quality Assurance – Shipbuilding, Carnival Corporation (U.K.)

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"Having water-lubricated stern tube bearings not only improves a company's environmental credentials but also eliminates the costs associated with maintaining an oil system and associated equipment."

– Enio Stein, CFO Log-In Logística (Brazil)

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"When we first entered the cruise market 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."

– Richard Goodwin, Vice President, Engineering, Viking Ocean Cruises (U.K.)



"EPA recommends that all newbuild vessel operators endeavour to use seawater-based systems for their stern tube lubrication to eliminate the discharge of oil from these interfaces to the aquatic environment."

– Section 2.2.9; 2013 Vessel General Permit (VGP) effective Dec. 19, 2013 (USA)

CUSTOMER FOCUSED TO QUICKLY MEET YOUR NEEDS

Quick and Responsive Service

It takes quality products to be globally successful in the water-lubricated bearing and shaft seal industry. It also takes great service to keep customers coming back.

Thordon Bearings Inc. is geared to respond quickly to supply high performance seal and bearing solutions. Our products arrive quickly, fit right and last!

Extensive Distribution Network

Thordon Bearings has an extensive distribution network of more than 75 distributors in 100 countries to supply and service our global customer base. Non-standard requests are met with responsive design, quick machining and speedy delivery.

Application Engineering

Thordon engineers work closely with customers to provide innovative bearing and shaft seal system designs and solutions. Global installation and technical support is available for those cases where specific application engineering is required.

Manufacturing Quality

Thordon Bearings Inc. is a family-owned company with manufacturing and new product development facilities in Burlington, Ontario, Canada. In addition, we operate a new leading edge manufacturing plant in Slupsk, Poland.

We manufacture to ISO 9001 Quality System requirements. Contact us for our installation references.

High Performance Bearings and Seals; Industry-Leading Service

Thordon Bearings is an industry leader in the design, manufacture, supply and installation of high performance, pollution-free, shaft seal and bearing systems.

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