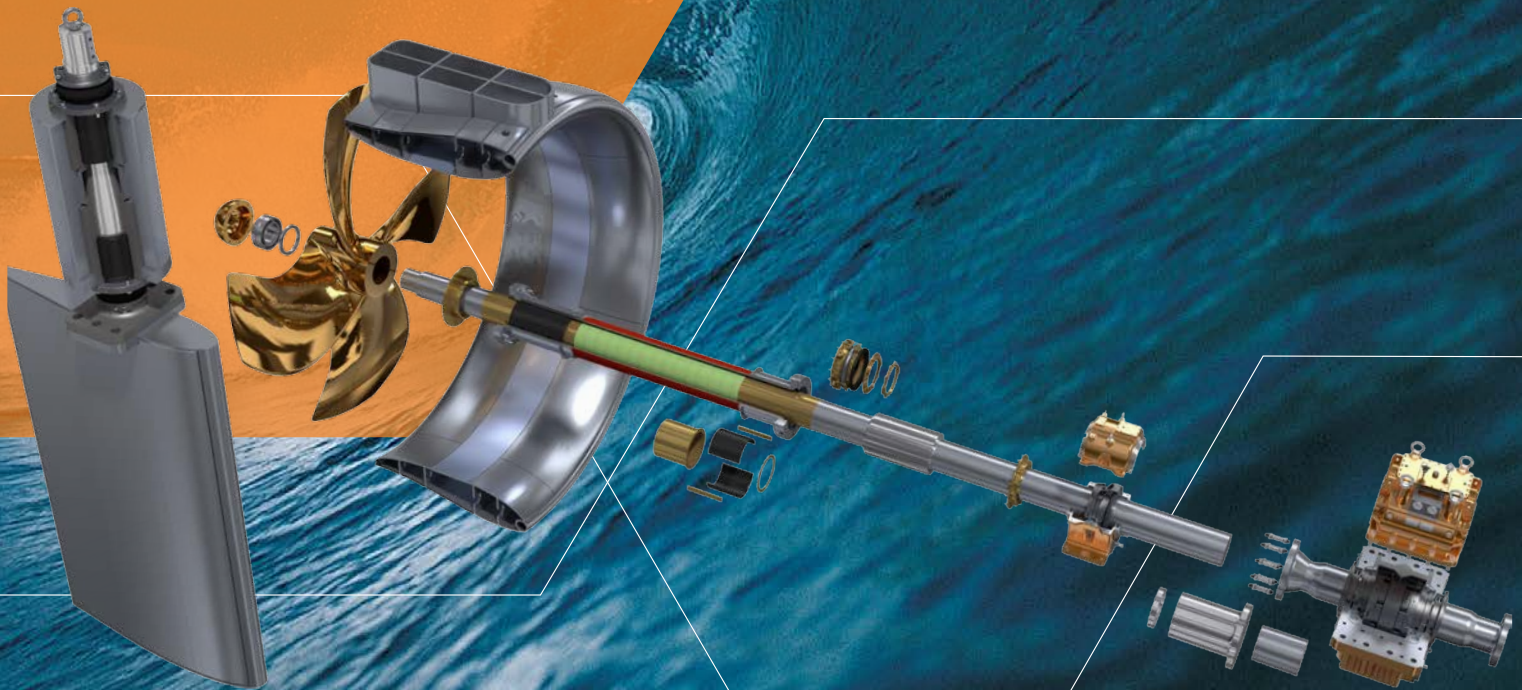


Water Lubricated Solutions



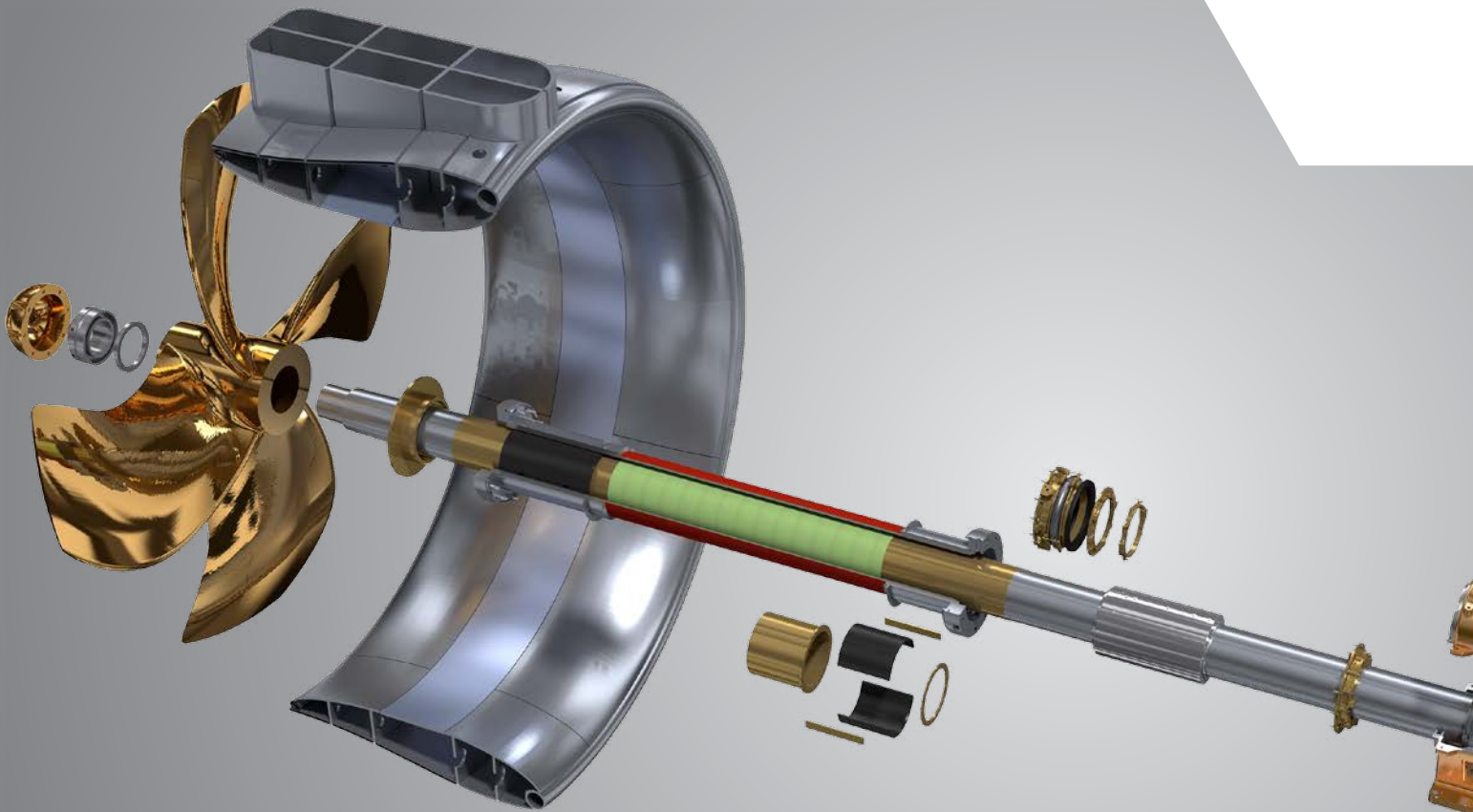
Products, Packages and Services Available from Wärtsilä Seals & Bearings

- Complete water lubricated packages for new build vessels
- Oil to water stern tube conversions
- Measurement and alignment services
- Underwater engineering seal repair and maintenance
- Stern tubes
- Stern tube seals and bearings
- Water quality system (WQS)
- Ropeguard and a cutter system
- Fully split construction for seal
- Hydraulic couplings
- Oil supply package

Our Solution

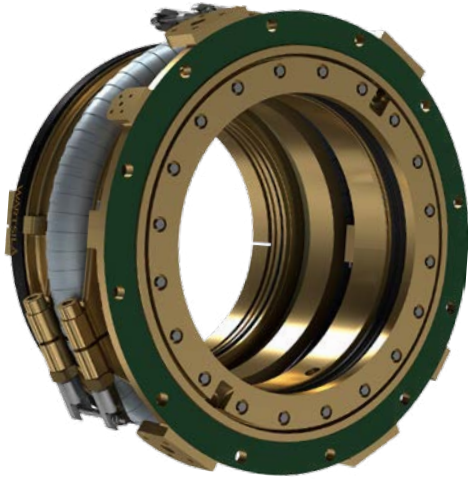
Wärtsilä Seals and Bearings' products and services support you by maximising efficiency and minimising operational risks at the lowest lifecycle cost. Our water lubricated solution portfolio is designed to ensure smooth and continuous operation of all types of vessels, even in the most challenging environments. Whatever the requirement, Wärtsilä can provide a solution.

Our oil-free offering is fully compliant with the requirements in the 2013 US EPA Vessel General Permit. The installation of Wärtsilä's open water package removes all risk of pollution, particularly for vessels operating in environmentally sensitive areas, and reduces lifecycle cost by extending the operational life of the seals and bearings. We have a proven record of supplying water lubricated systems to the marine market for over 60 years, proving reliability, flexibility, and excellence.



Wärtsilä Enviroguard

The Wärtsilä Enviroguard range are environmentally friendly, low maintenance, high performance face type seals, which have an extensive fitted history spanning many years and numerous different vessel types. These seals can accommodate large and repeated axial and radial shaft movements, as well as vibrations. The Wärtsilä Enviroguard range has a pressure balance configuration that optimises wear across interfaces. In addition, maintenance can be completed without shaft removal due to a static inflatable seal.

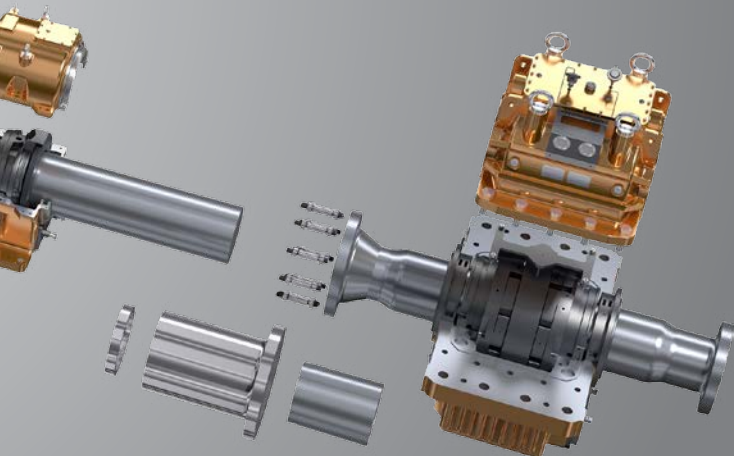


Key Features and Benefits

- Environmentally friendly, pollution free, water lubricated seal
- Partially and fully split options available
- Available in both metallic and composite materials
- Ice class option available
- Retrofit and service in dry dock without propeller or shaft removed
- Suitable for both blue and brown water applications
- High abrasion resistance
- Split replaceable components available in service kits
- No shaft or sleeve wear
- Tailored designs to suit specific needs
- Shaft sizes from Ø 70 to Ø 1040 m

Wärtsilä offers a 25 year extended warranty on new build Enviro-safe composite stern tube bearings in Class Approved vessels.*

*Applicable when sold as part of a package. Terms and conditions apply.



Water Lubricated Stern Tube Solutions

Wärtsilä stern tube solutions are packaged and ready-to-install and can be custom designed to fit specific vessels, meeting individual customer requirements and specifications. The installation and alignment is a simple procedure when compared to older traditional methods, allowing for significant reduction in installation time and resources.



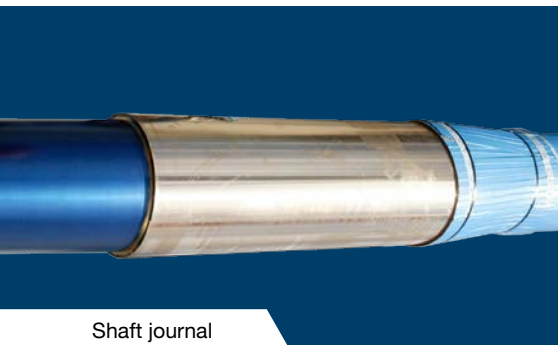
Stern Tube & Bearings Housing

Wärtsilä offers full stern tube assemblies for direct resin chocking into the vessel. The stern tube is complete with composite bearings and the necessary stern tube corrosion protection applied, ready for direct installation. Alternatively, bearings can be supplied in housings, or separate for final installation into the stern boss.

Tail Shafts, Shaft Journals & Shaft Coatings

Wärtsilä can supply complete tails shafts with shaft journals and industry leading shaft corrosion protection.

Alternatively, shaft journals, and coatings are available separately along with on-site installation support.



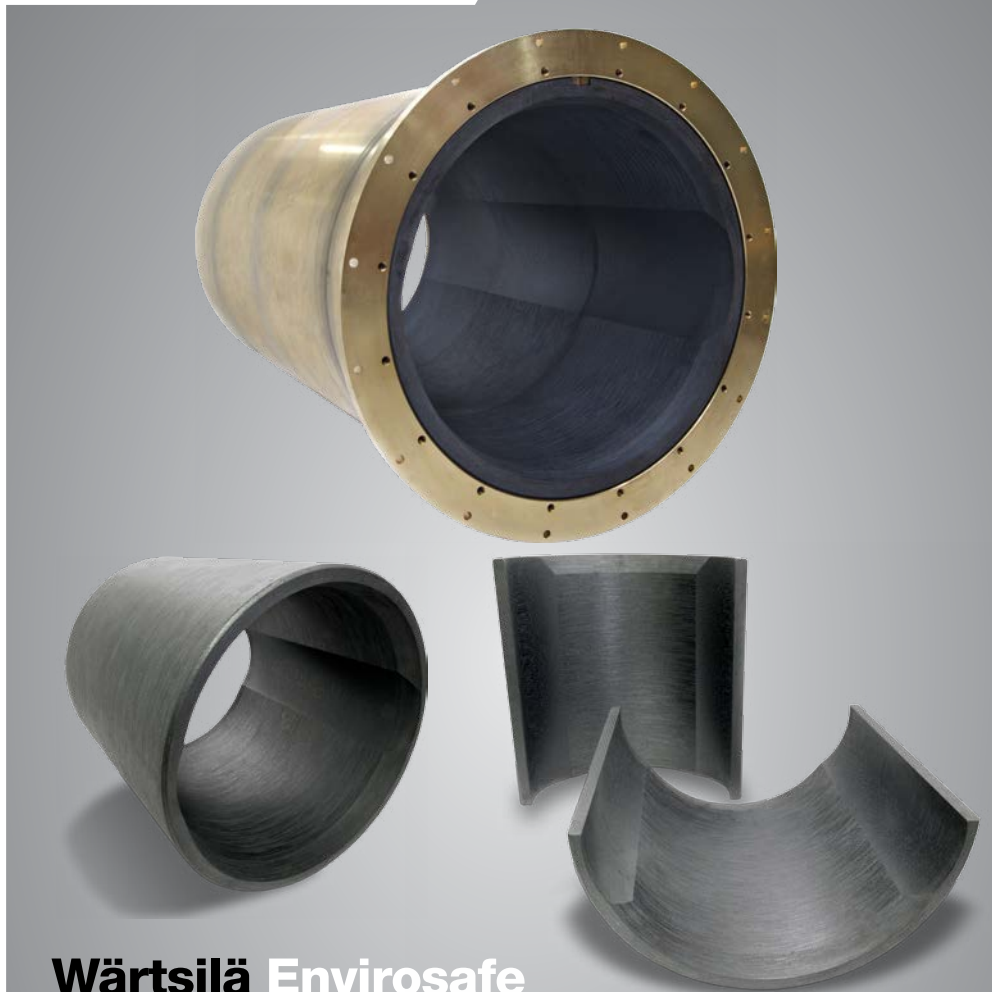
Shaft journal



Coated shaft



Coated stern tube



Wärtsilä EnviroSAFE

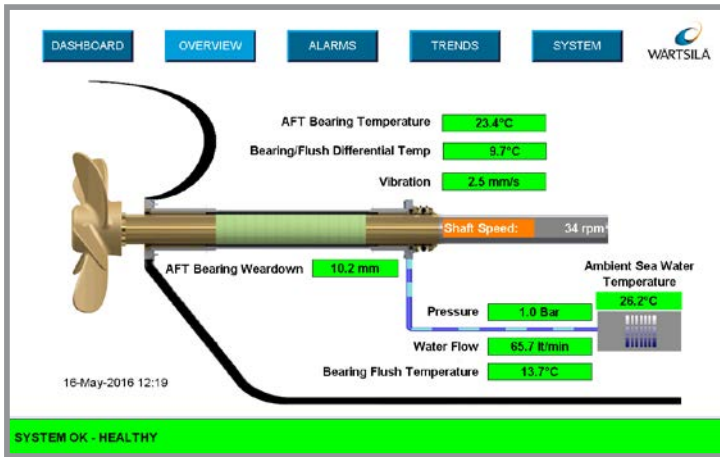
The Wärtsilä EnviroSAFE bearing is the culmination of years of research, development and collaboration with yards and owners around the world to develop a superior composite bearing material for the marine industry.

The Wärtsilä EnviroSAFE range can be supplied for all water lubricated propeller shaft bearing applications from open brackets to stern tubes. Split bearings can be supplied in a housing, or fitted directly into the stern tubes or brackets. This allows easy bearing replacement or system inspection with the shaft remaining in-situ, providing cost efficient servicing.

Key Features and Benefits

- Environmentally friendly, pollution free, water lubricated bearing system
- Market leading wear resistance that gives long life expectancy
- Low speed hydrodynamic operation increases the lifecycle efficiency of propulsion
- Low friction, giving low wear and long life
- High abrasion resistance and low noise generation
- Low swell rate and thermally stable, equally suitable for icebreaker and tropical use
- Readily available (stock billets)
- Suitable for both blue and brown water applications
- Future proof – fully compliant with the 2013 US EPA Vessel General Permit rules
- Approved by all major Classification Societies
- Shaft sizes from Ø 70 to Ø 1100 mm
- Wärtsilä offers a 25 year extended warranty on new build EnviroSAFE composite stern tube bearings in Class Approved vessels.*

*Applicable when sold as part of a package. Terms and conditions apply.



Wärtsilä Sea-Master System

The Wärtsilä Sea-Master system is a platform that is transforming tail shaft asset management.

Remote digital monitoring of tail shaft systems performance, delivers unprecedented levels of data, while a range of support and consultancy services helps you make informed decisions to optimize operations.

This groundbreaking platform also enables you to meet environmental legislation today and tomorrow, extending the maintenance intervals for water lubricated systems. That means a lower cost of ownership, enhanced performance and greater control.

Combinations in use with both installed to new build and retrofit applications with existing equipment.

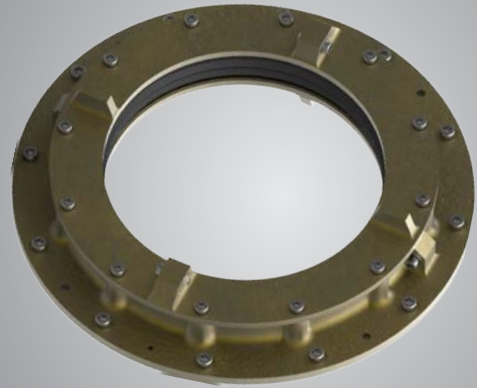
Wärtsilä Water Quality Systems (WQS)

Wärtsilä Water quality systems provide conditioned water for both open and closed lubricated stern tube systems. Our systems increase the life of seals and bearings products by filtering the water supply to required standards. A range of filtered supply systems are available.



Wärtsilä Floodguard

Wärtsilä Floodguard range is a water lubricated face type seal suitable for both standard and high speed vessel solutions. Should the vessel experience a flooded compartment, the self-activating Floodguard seal ensures that vessel integrity is maintained, allowing continued passage to dock. The seal has a long track record of performance in both military and commercial applications.



Key Features and Benefits

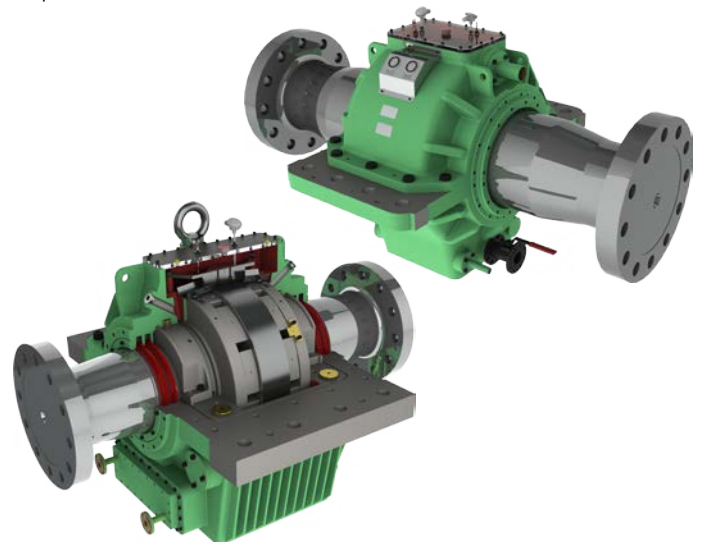
- Maintenance and replacement without shaft removal due to fully split design
- Variety of materials and configurations available
- Accommodates high axial and radial movement
- Long life expectancy
- Shock resistance
- Approved by major Classification Societies
- Shaft sizes from Ø 50 to Ø 680 mm

Wärtsilä Thrust Bearings

Wärtsilä thrust bearings are single collar, self-aligning thrust bearings. They are designed with two faces of titling pads on pivots. The standard is for axial loads only and there is an option for axial and radial loading.

The oil circulating and cooling system is available either as a self-lubricant system with integrated cooler, or as external pump and cooler unit.

Fitted with complete remote monitoring of the temperature and oil flow, the thrust bearing solutions enable easy management of the product.





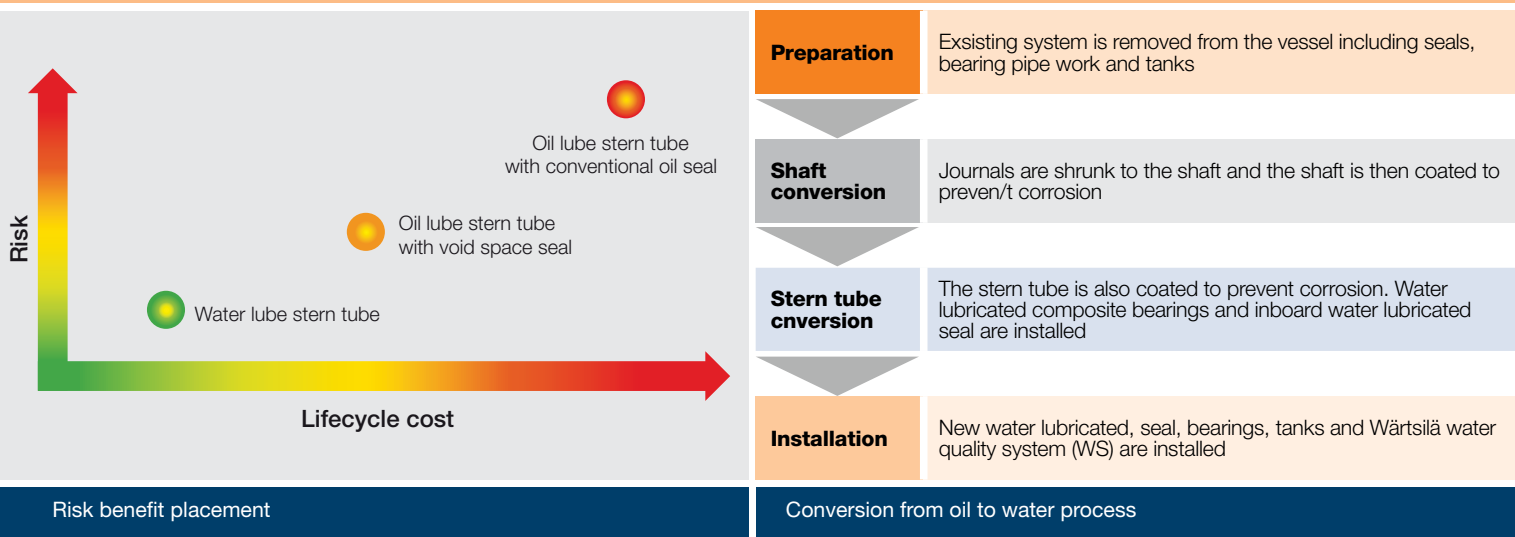
Why Convert to Sea Water Lubrication?

1. Zero risk of operational oil leakage
2. Investment in an environmentally sound solution
3. No need to buy oil lubricants
4. Solution compliments legislation
5. Avoidance of fines and risk of vessel being impounded in case of accidental stern tube oil loss
6. Eliminates need to repair outboard shaft seal following cable and rope entanglement
7. Reduced complexity – no lube oil, no lube oil testing
8. Reduction in port fees – relating to green ship certification
9. Compliance with future and current legislation

Who Should Consider a Conversion?

A conversion can be the right choice for any size of vessel from superyacht to cruise vessel.

We can provide a costed proposal for conversion and assist with a lifecycle cost analysis for your vessel.



Other Water Lubricated Propulsion Systems

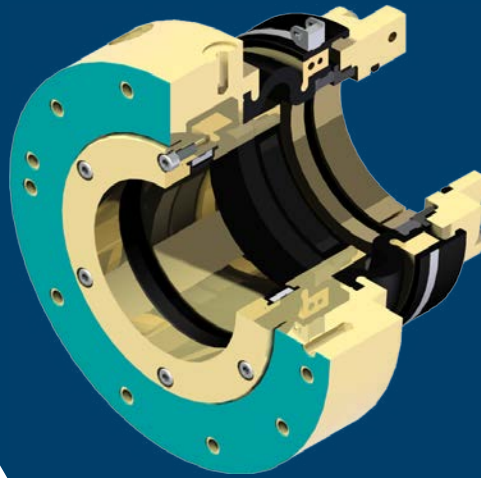
Other Products and Services Available from **Wärtsilä** Seals & Bearings

Wärtsilä Jetguard

Wärtsilä Jetguard range consist of water lubricated face type sealing solutions, specifically designed for waterjet input shafts. Available in both metallic and composite materials. This seal has been developed for demanding operating conditions, such as the high speeds and varying pressures typically seen on waterjets.

Key Features and Benefits

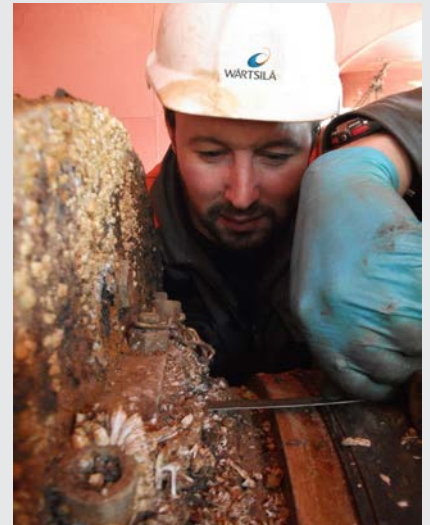
- Commercial and military options available
- Partially and fully split options
- Maintenance and seal replacement without shaft removed
- Maintenance without dewatering through inflatable seal
- Corrosion free composite materials available
- Shaft sizes from Ø 110 to Ø 410 mm



Wärtsilä's unequalled network of sales and engineering offices around the world offers technical support 24 hours a day 7 days a week. Wärtsilä has a team of service engineers available to assist on-site with all seals and bearings installation and repair work that you may need.

Wärtsilä Seals & Bearings provides integrated systems, packages and products that offer our customers lifecycle efficiency, reduce risk, and are environmentally sustainable. Our global service network responds at very short notice and provides expertise where and when needed.

Find out more about Seals & Bearings at wartsila.com/sealsandbearings



Field services



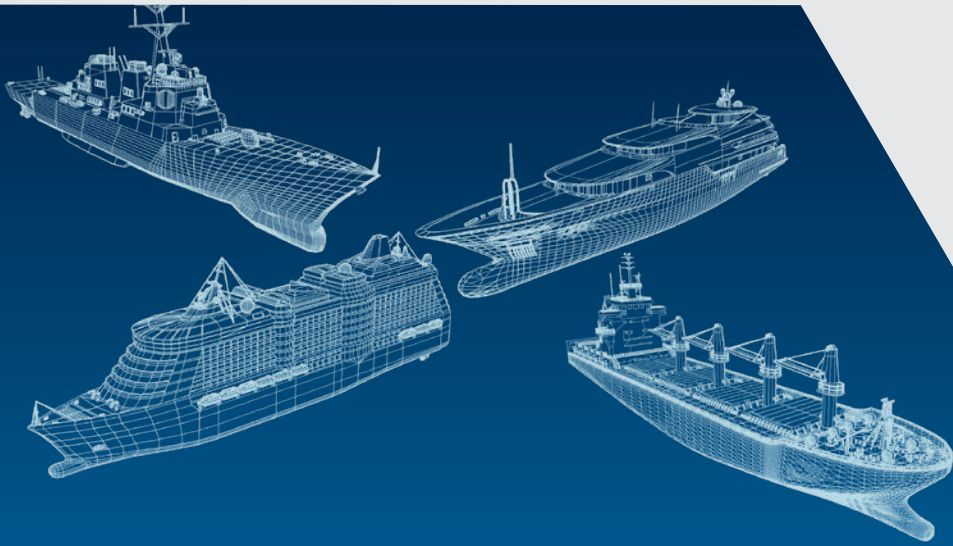
Spare parts



Wärtsilä alignment and measurement services



Wärtsilä Ropeguard and a cutter system



Wärtsilä is a global leader in complete lifecycle power solutions for the marine and energy markets. By emphasising technological innovation and total efficiency, Wärtsilä maximises the environmental and economic performance of the vessels and power plants of its customers.

www.wartsila.com