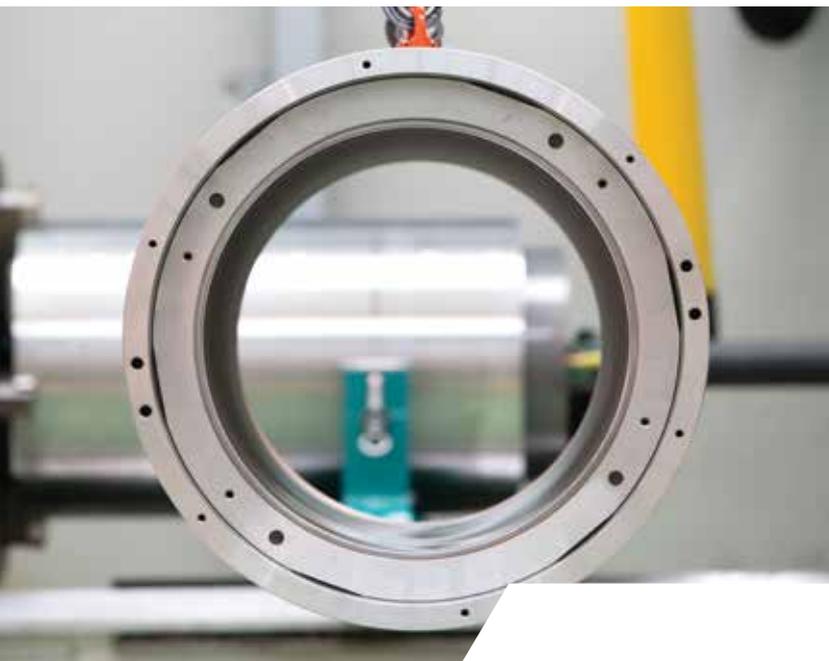
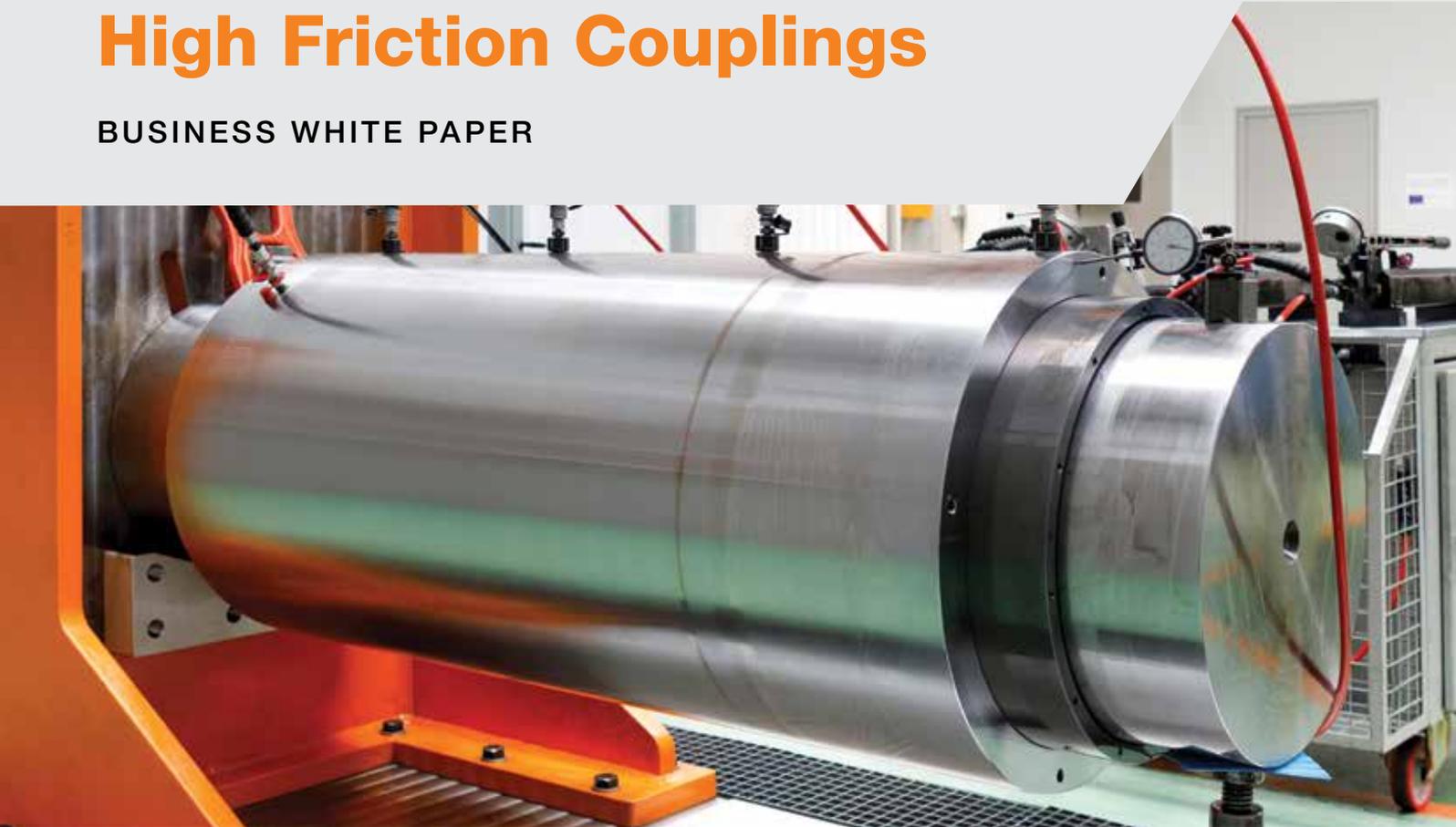


Wärtsilä High Friction Couplings

BUSINESS WHITE PAPER



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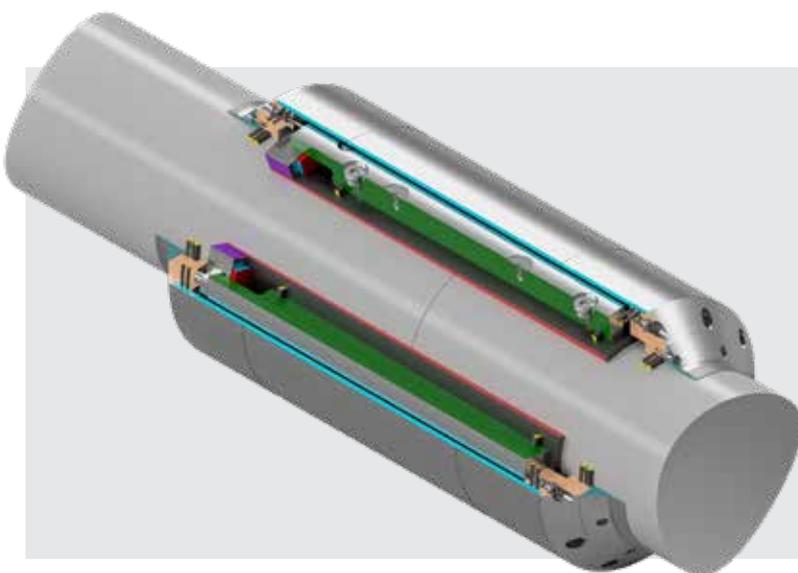
Introduction

— Meeting the demand for faster, easier installation.

Technologies relating to ship design and operation have evolved over the years, creating greater efficiencies and extended lifespans for shaft line equipment. These developments are typically born by customer needs. One such market demand is to have a larger shaft line torque capacity with reduced shaft dimensions. This requirement refers to the hydraulic couplings connecting the different shafts, which enables the torque transmission through the shaft lines.

This is supported by the International Convention for the Safety of Life at Sea (SOLAS) treaty, which requires passenger ships to have a 'Safe Return to Port' system installed. This is to ensure that in the event of flooding around the shaft line and its equipment, including the mounted hydraulic couplings, the vessel can still operate and sail to the nearest port. This means that even if the shaft line tunnel is flooded, the shaft line to the propeller must still be operable, securing the safety of the passengers. Shipyards, meanwhile, have been calling for shaft line hydraulic couplings to be easier and faster to install, to reduce both installation time and costs.

Wärtsilä Shaft Line Solutions, has more than 40 years of experience in designing and manufacturing shaft line hydraulic couplings and has addressed these challenges by developing a new generation of hydraulic couplings, using the most advanced technologies. Through this, we have engineered a specialised design which produces an improved friction coefficient. This contributes towards an increase in torque transmission capacity and a reduction in coupling dimensions.



Flexibility within the standard designs

Wärtsilä's High Friction Couplings are engineered to provide high torque propulsion efficiency through a simple shaft connection method. In addition to standard designs, all installations are performed on a case-by-case basis for each customer, dependent on their specific needs. This includes special protection covers designed to protect the hydraulic couplings in outboard installations or specific shock requirements for navy customers.

Product description

— Designed and manufactured to the highest quality standards.

The Wärtsilä High Friction Couplings consist of two main parts, a coupling boss and inner sleeve, with a tapered surface between both. When the coupling boss is driven on the taper, it compresses the sleeve and generates the shrink fit force that acts over both shafts and allows for the torque transmission. Through the new high friction treatment, the shafts are able to transmit twice the amount of torque than a standard friction coupling.

The inner sleeve is in contact with the shaft and the coupling boss, and can be built with a flange in order to connect to the second shaft. This element includes the special treatment developed by Wärtsilä that enhances the coupling reliability and endurance. These components are manufactured from high quality forged alloyed steel, tested with classification societies.

The new, enhanced high friction treatment does not require additional material, such as a reinforcement sleeve, which makes it more resistant to surface damages.

The coupling is equipped with a sealing system oil in the low and high pressure chambers, allowing the quick, clean and easy installation of the coupling. The sealing system also acts as a barrier against dust and other kind of contaminants that could damage the coupling and make it impossible to dismount.

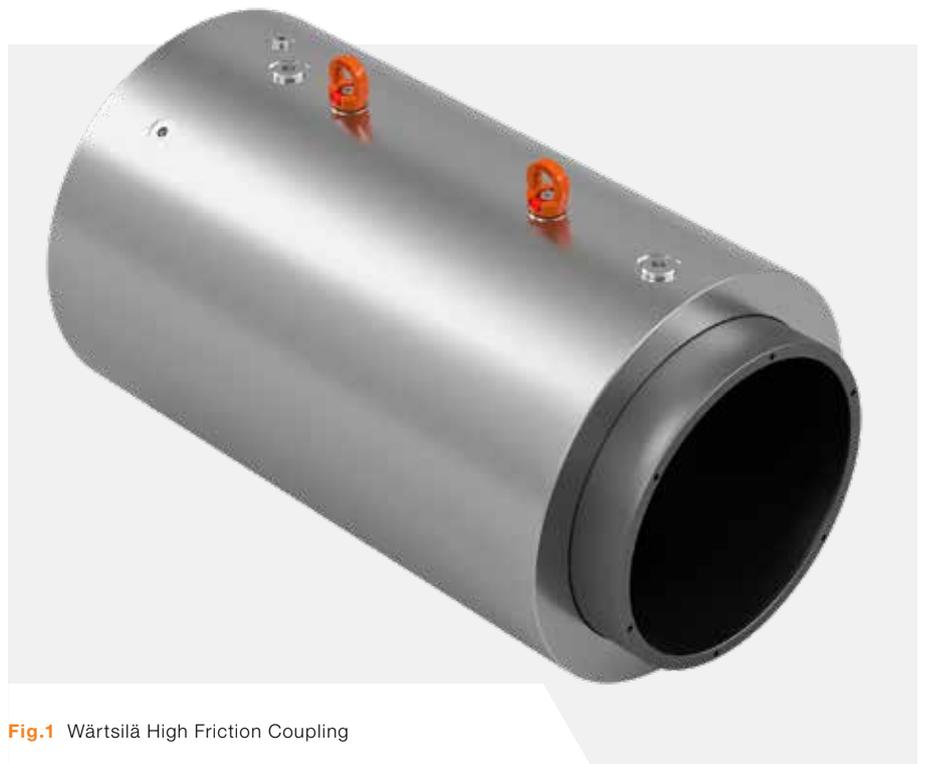


Fig.1 Wärtsilä High Friction Coupling

Design features

— Specially manufactured to ensure service life longevity.

The Wärtsilä High Friction Coupling standard design can easily be custom engineered to meet a customer needs. These standard designs can be adapted to specific configurations, dimensions and installation requirements.

The Wärtsilä High Friction Couplings allows shaft designs or CPP systems with a higher hollow shaft, without the use of expensive reinforcement sleeves in the shaft hole. This is due to the high quality design which provides reduced surface contact pressure over the shaft surface.

For installations with cross pitch propellers (CPP), the cylindrical shaft end design of the Wärtsilä OHSN-BX High Friction Couplings model allows a greater distance between shafts, avoiding the use of distance rings. This assembly can be installed without damaging the coupling due to the design of the sealing system and coupling boss. This allows two separate pressure chambers over the shafts to be connected.

To protect the coupling from seawater, Wärtsilä has developed a wide range of covers that protects the coupling and maintains the distance over the shaft needed to mount and dismount the coupling. This is dependent on the shaft material and shaft line configuration. This design allows easy access to the coupling area and an easy assembly and disassembly process of the unit.

Wärtsilä High Friction Hydraulic Couplings are designed using the latest 3D computer aided design (CAD) software to provide a view of the final product throughout the entire design process.



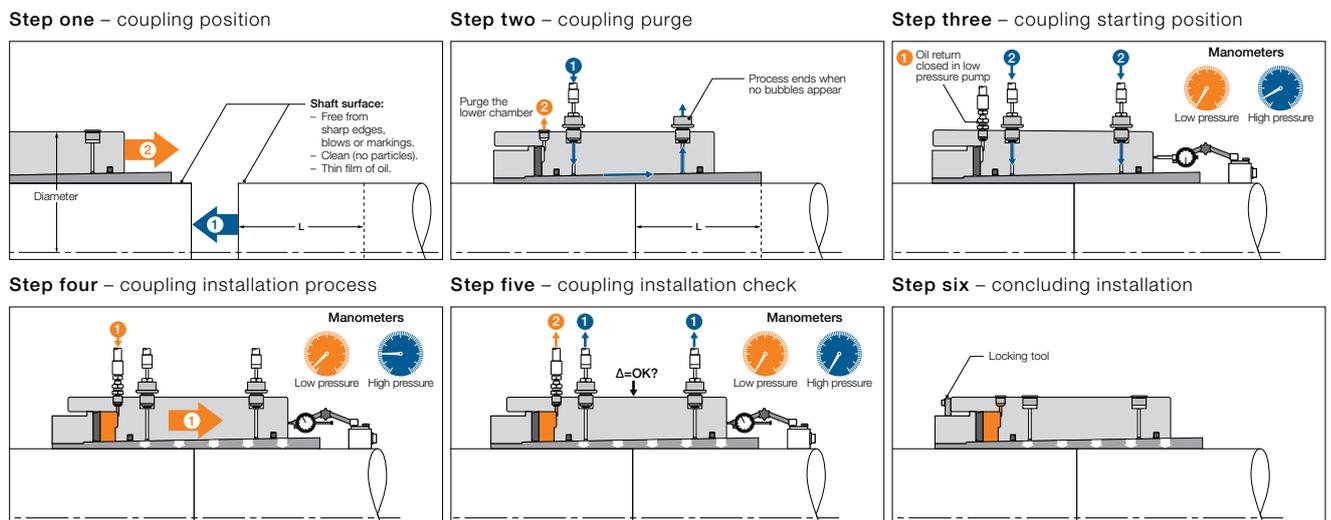
Installation

Simple and quick installation, simpler to service.

The special treatment developed by Wärtsilä Shaft Line Solutions provides enhanced reliability and endurance to the coupling, improving its friction coefficient. Customers desire a quick, easy and clean installation process which is addressed through the Wärtsilä High Friction Couplings.

By increasing the torque and reducing the coupling dimensions, the installation process is easier and requires less hydraulic equipment. The high friction coupling treatment enables minimum shaft preparation during installation and improved control of the manufacturing tolerances.

The sealing system assists in providing a simple and quick installation process with minimum staff required. The seals retain the oil in the low and high pressure chambers, which avoids metallic contact between the coupling boss and inner sleeve tapered surfaces. This allows a quick, clean and easy installation of the coupling.



Higher torque capacity

Supporting higher torque than previously possible.

The total length of the shaft line may require different shafts to be produced, which need a connection capable to transmit the torque from one shaft to the other. The Wärtsilä High Friction Hydraulic Couplings are designed to achieve this to optimise performance.

By combining many years of experience and features from its portfolio of hydraulic couplings, Wärtsilä has responded to the market need for a higher torque capacity from the shaft line hydraulic couplings. The Wärtsilä High Friction Hydraulic Couplings feature an optimal relation between weight and torque transmission capacity, making them the ideal solution to transmit the torque between the shafts, adding the smallest possible weight to the shaft line.

Operating in outboard conditions

— Increased coupling life.

The shaft line ends with the shaft that supports the hub. When the length of the shaft line design external to the hull prevents the hub shaft going inside the hull, a shaft connection is required. Depending on the shaft material, there are two possible solutions. With the first solution both couplings are used on the shaft connection and the shaft needs protection from seawater. With the second solution only the coupling needs protection. To meet these requirements, Wärtsilä has developed different cover designs to protect the coupling and the shaft length needed to mount and dismount the coupling when necessary. These protection covers are quick and easy to install, and reduce the cost of the installation and maintenance process, increasing the life of the coupling.

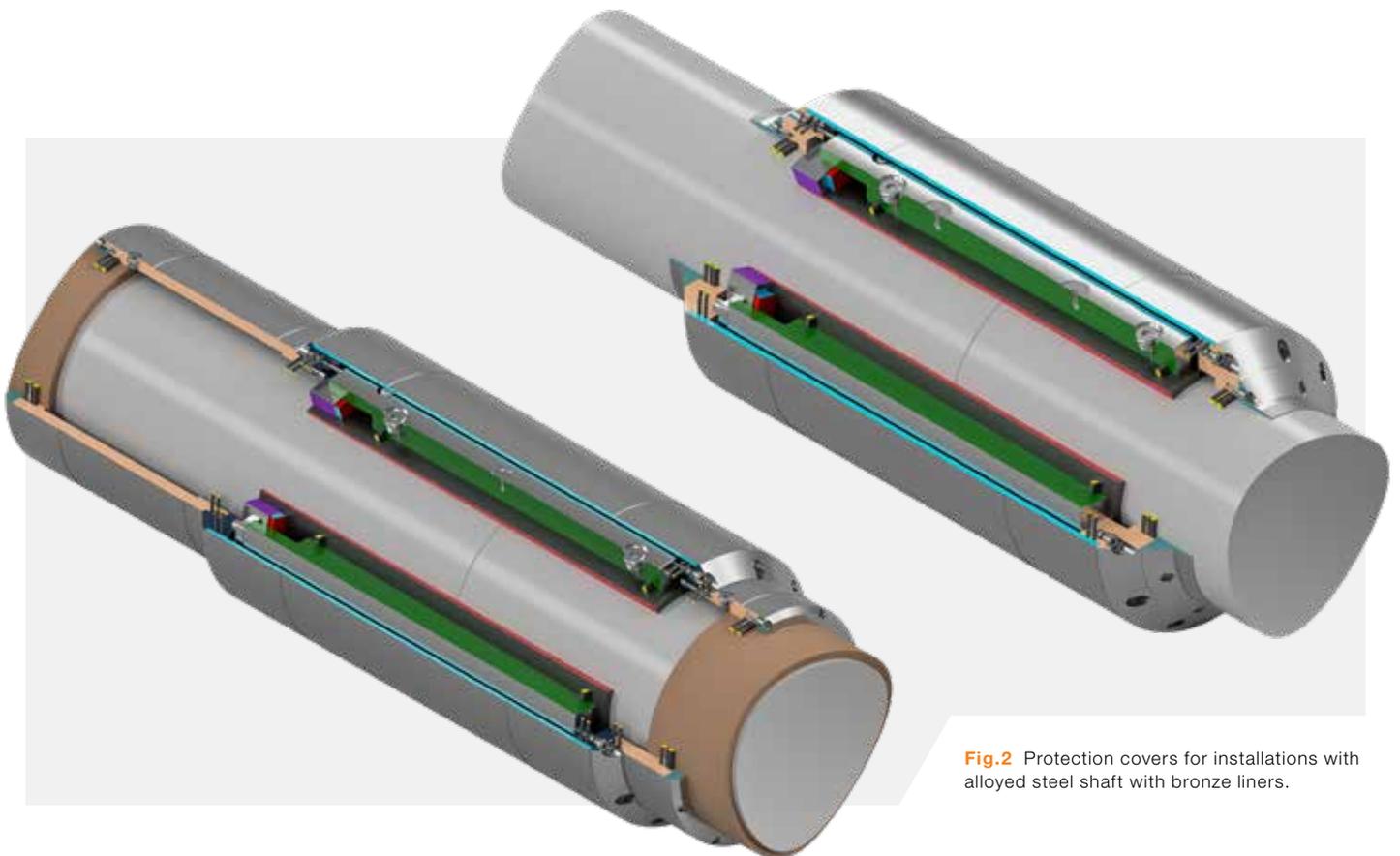


Fig.2 Protection covers for installations with alloyed steel shaft with bronze liners.

Summary

— “It’s the beginning of a new generation of hydraulic coupling.”

Cástor Casas Alcalde
Technical Design Engineer

At Wärtsilä Shaft Line Solutions, we are committed to providing our customers with products that ensure longevity and reliability. That’s why through years of research and development and understanding customer needs, we have engineered a specialised design approach towards our Wärtsilä High Friction Couplings.

The Wärtsilä High Friction Couplings meet various legislations such as the International Convention for the Safety of Life at Sea. They are easy to install, and they have been proven time and time again to improve efficiency, save money and increase reliability.

The next generation of hydraulic couplings starts here.

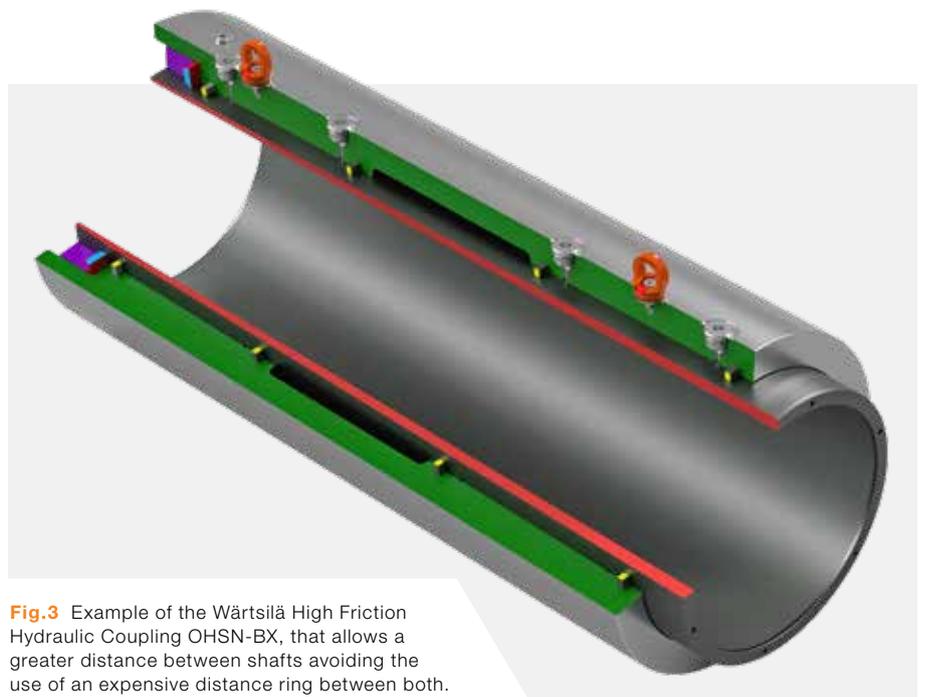


Fig.3 Example of the Wärtsilä High Friction Hydraulic Coupling OHSN-BX, that allows a greater distance between shafts avoiding the use of an expensive distance ring between both.



An industry leader in shaft line components Wärtsilä Shaft Line Solutions delivers a portfolio of end-to-end services and integrated solutions for the marine markets that builds on our core values: lifecycle efficiency, risk reduction, environmental leadership and design excellence. As an original equipment manufacturer operating in 75 countries, we have the capabilities to support customers on a global scale, and remain committed to providing in-country and round-the-clock expertise.

[wartsila.com/shaft-line-solutions](https://www.wartsila.com/shaft-line-solutions)

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