

## ENVIRONMENTALLY FRIENDLY BEARING SOLUTIONS

# ANOTHER INDUSTRY FIRST...15-YEAR RUDDER BEARING GUARANTEE FOR NEWBUILDS

In 1993, Thordon Bearings was the first company to introduce a 10-Year Rudder Bearing Wear Life Guarantee to commercial ship owners and managers. After 11 years of ongoing product improvements and over 4000 rudder bearings installed worldwide, Thordon is boldly re-confirming the confidence in the performance of SXL rudder bearings by introducing a guarantee period of 15 years.

It takes a high performance quality product, and confidence built over many years tracking successful installations, to offer a 15-year wear life guarantee. "Although selling Thordon performance and quality has become a bigger challenge due to the cheaper alternatives now available, once customers have experienced the performance of the product, technical support and after care service from Thordon Bearings and our distributors, they stay with us," says Allen Taylor, Thordon's Commercial Director. "Total life cycle cost is much more important than initial purchase price. Our new 15-Year Rudder Bearing Wear Life Guarantee is being introduced to point out that the cheapest bearing to purchase often ends up being the most expensive!"

Thordon SXL self-lubricating rudder bearings offer total freedom from grease, thus eliminating pollution concerns. In today's regulatory environment, anything that eliminates a source of pollution has both cost and environmental protection advantages.

Thordon's 15-Year Rudder Bearing Wear Life Guarantee ensures provision of a replacement if a Thordon SXL rudder bearing wears out and requires renewal before the 15-year period.



SXL Rudder Bearing Installation

The guarantee covers pintle, rudder stock and carrier disc bearings above and below the waterline in newbuild Classed vessels. The 15-Year Rudder Bearing Wear Life Guarantee applies to the original owner of the ship and is non-transferable. Engineering and other details such as Classification Society, rudder specifications, vessel name, ship owner's name the guarantee will apply to etc., will be required prior to issuing the guarantee to ensure proper installation and that bearing pressures are accurate.

Thordon continues to offer its repair/conversion guarantee as well. In

conversion pintle, stock or carrier applications, Thordon SXL rudder bearings are guaranteed to meet Classification Society wear specifications for twice the life of the non-Thordon bearing replaced, up to a maximum of ten years, or Thordon Bearings will supply a new rudder bearing free of charge. **Nw**

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# FENGMAN CHINA HYDRO-ELECTRIC PRODUCER CONVERTS TO SXL MAIN GUIDE BEARINGS

China has the fastest growing economy and the largest hydro-electric resources in the world. So it's no surprise that the country is committed to not only building massive new hydro projects such as Three Gorges, but also upgrading its existing facilities. In a recent United Nations symposium, Zhang Guoba, VP of China's State Development and Reform Commission (SDRC), said that hydro-electric projects were a "priority". Fengman Hydropower Station is a good example.

Nestled in the upper reaches of the Songhua River in northeast China, Fengman Hydropower Station is operated by Northeast Electric Power Group Corporation (NEEPGC). The facility was originally built in 1937 and is today equipped with 10 turbo-generated units featuring a total installed generating capacity of 1002.5 MW.

## The Challenge

"Fengman has been using rubber main shaft guide bearings for decades," says Mr. W.C. Aw, President of Proco International — a Hong Kong-based company that provides Thordon products

throughout China. "But there were problems." Rubber hardens over time, substantially reducing its performance characteristics. As a result, the bearings in each turbine needed to be replaced at frequent intervals.

To add to the maintenance challenge, the rubber bearings required huge amounts of lubricating water, had low loading capacity, high start-up friction and were prone to over-heating.

## The Solution

"The Chinese had been using rubber for so long, they thought it was their only alternative," says Mr. Aw. "They were surprised to learn that Thordon SXL could do a much better job."

We explained that Thordon SXL Main Guide Bearings have earned an unparalleled reputation in the hydro-electric industry. An elastomeric polymer, SXL is renowned for its reliable operation, low coefficient of friction, long wear life, and an excellent performance and reliability track record — spanning nearly three decades.

After the engineers at NEEPGC were presented with the advantages of Thordon SXL they were optimistic, but cautious. "They agreed to try the SXL bearing in one of the turbines as a test," says Mr. Aw.

One of the issues that initially concerned NEEPGC was the bearing design. "They wanted to retain the same basic design as the rubber bearing, but enhance the performance," says Mr. Aw. Fortunately, Thordon's engineering expertise and extensive application experience ensured NEEPGC's request would not be a problem.

## The Results


The Thordon SXL Main Guide Bearing (970 mm [38"] shaft diameter) was installed in the No. 7 turbine and during

the next 17 months, a technical committee set up by NEEPGC evaluated the design, installation and performance. Ultimately, they concluded that Thordon SXL:

- improved the dynamic performance of the turbine
- had lower friction and, as a result, generated little heat
- was tough and experienced low wear rates (approximately 0.5 mm [0.02"] after 17 months)
- was very stable, reducing maintenance costs
- required significantly less lubricating water (approximately 27 m<sup>3</sup>/h [950 ft.<sup>3</sup>/h] less, which equals a US\$37,000 annual savings)

## Next Steps

As a result, the committee recommended that Fengman Hydropower Station continue to use Thordon SXL. "In fact," says Mr. Aw, "they plan to replace the rubber bearings in the other turbines with Thordon."

This is the first time a Chinese hydro-electric plant has installed a Thordon SXL main guide bearing. But, chances are, it won't be the last. The NEEPGC committee also recommended that word of the product's exceptional performance be spread to the other hydro-electric stations throughout the country. 



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**THORDON**

# ROLLS-ROYCE MARINE'S 17-YEAR TROUBLE-FREE HISTORY WITH THORDON BEARINGS

When Charles Rolls partnered with Henry Royce in 1906, they created a company that has remained on the leading-edge of industrial technology for almost a century. Rolls-Royce innovations make jets fly faster, cars run quieter, and ships move faster. They even built the engine that powered the first transatlantic flight. So it's no wonder that Rolls-Royce is careful when specifying components to be used in their systems. They have a reputation to protect.

"In the area of marine propulsion systems," says Roger Duwel, President of Duwel Tecno, Thordon Bearings distributor in Sweden, "no one in the world has a better name than Rolls-Royce. They take pride in that name and do everything they can to protect it."

Today, more than 20,000 commercial and 400 naval vessels use equipment developed at the Rolls-Royce Marine division. The company's product portfolio includes the most advanced systems available for the supply of power, propulsion and motion control.

## Selecting the best

Rolls-Royce has been using Thordon products for water lubricated stern tubes since 1987 and has been consistently impressed with the reliability and performance. "Thordon are a little more expensive than other bearings," says Jan Pahnke, Strategic Sourcing Specialist for Rolls-Royce Marine, "but they offer technical advantages that we feel are worth the extra money."

As Duwel puts it, "The folks at Rolls-Royce particularly appreciate the technical expertise." The knowledge base at Thordon Bearings goes well beyond bearing design and includes surrounding components and systems as well. "This is an important advantage for Rolls-Royce. They can send us shaft calculations, for

example, and we can add value with our comments and suggestions."

As the pioneers in water-lubricated bearing technology, Thordon has more than a quarter century experience in a full range of applications in commercial and naval vessels. Thordon bearings are pollution free, highly resistant to abrasion, have low static and dynamic coefficients of friction, offer high resilience and impact resistance, and feature a long wear life.

"Thordon's track record in Rolls-Royce propulsion systems has been exceptional," says Duwel. "That's why they continue to specify Thordon in the systems they supply to their most important customers."

Here are just a few recent examples.

Thordon SXL water lubricated journal bearings are being used on waterjets from Rolls-Royce in a number of ships:

- YS2000 Visby Class 73 m Stealth Corvettes for the Swedish Navy - the first ships in the world to have fully developed stealth technology.



Swedish Navy YS2000 Visby Class Corvette

- A 210 ton carrying capacity ferry for Techno-Seaways of Japan. This vessel will be used to transport up to 700 passengers and cargo between Tokyo and the Ogasaware Islands.

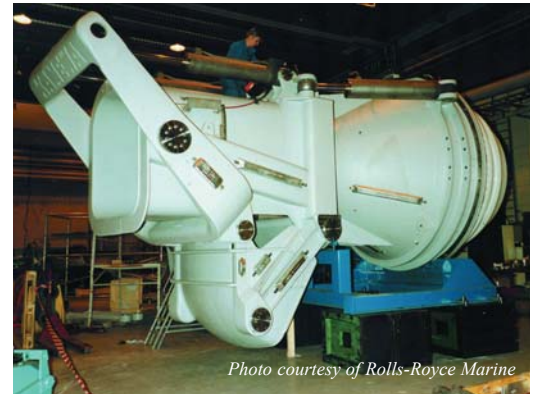


Photo courtesy of Rolls-Royce Marine

Very Large Waterjet

Thordon COMPAC is the pollution-free water lubricated propeller shaft bearing of choice for a number of new vessels featuring Rolls-Royce systems:

- KBV 201 & 202 class multi-purpose patrol ships for the Swedish Coast Guard. To meet the demanding operational criteria, the propulsion design concept was evaluated at the Rolls-Royce Hydrodynamic Research Centre in Kirstinehamn, Sweden.
- Thordon COMPAC has been used by Rolls-Royce on over 10 different Navies, primarily in the Far East.
- Three new multipurpose container vessels currently being built at the Bodewes Shipyard in The Netherlands.
- New large tugs for the Bharati Shipyard - the largest private shipbuilder in India.
- New pusher tugs currently under construction at EISA Shipyard in Brazil.

It all comes down to trust. "We have had a good track record with the bearings," says Pahnke. "And there have never been any problems working with either Thordon or Duwel Tecno."

Obviously, one great name deserves another. **NW**

# THORPLAS® ELIMINATES GREASE AND EXTENDS MTBF IN EXTREME INDUSTRIAL APPLICATIONS

Like most managing professionals involved in an industrial process, Peter Krufehinski is dedicated to improving productivity while reducing costs. As VP of Operations for Berman Brothers Scrap Metal, "I'm willing to experiment," says Krufehinski "In fact, I'll try just about anything to boost efficiency."

A third-generation family business, Berman Brothers is a leading steel distributor as well as an experienced scrap steel processor. At their 16



Thordon ThorPlas® Bearings Installed on Berman Brothers Grapple

hectare (40 acre) facility in Florida, the company sustains a production level of over 4500 metric tonnes (5000 tons) of scrap iron per month.

One of the main workhorses of the yard is a massive 4-Tine Scrap Metal Grapple with a wide 1.4 m (1.5 yard) bite. Working under high shock and impact load conditions, the pressures average more than 27 MPa (4000 psi).

"We've tried just about every bearing material imaginable," says Krufehinski. "Steel, brass, nylon, you name it." The problem was that these bearings needed to be greased on a regular basis, or they would rapidly fail. Even with diligent maintenance, the nylon bearings that Berman Brothers were currently using required replacement every 2-3

weeks. "Having to replace the bearing itself wasn't our major concern," Krufehinski points out. The real issue was that a worn bearing would eventually cause the grapple tines (the fingers) to misalign, adding severe stress to the hydraulic cylinders. "We've had to replace cylinders for this reason more than a few times. At a cost of thousands of dollars each."

Fortunately, Thordon had the solution.

Thordon bearings have a proven track record in rugged, wet and dirty industrial applications. The low coefficient of friction and self-lubrication properties dramatically reduce or

eliminate the need to grease. In addition, these thermoplastic bearings outperform their metallic cousins under shock loading conditions.

ThorPlas® is the newest addition to the line. A proprietary engineered thermoplastic, ThorPlas® offers:

- Increased strength and rigidity to a maximum working pressure of 31 MPa (4500 psi) in an interference fit bearing.
- Improved operating temperatures to a maximum continuous service temperature of 80°C (175°F) in water and 110°C (230°F) dry.

- Improved chemical resistance in all major chemical product categories.

Thordon's distributor in Florida, Coppedge Marine & Industrial, assisted in the ThorPlas® installation in the Berman Brothers grapple in December 2003. The installation process was virtually effortless," says Krufehinski. "We just froze them and put them in place as Coppedge directed us."


Since that time, the grapple has been operating on a very busy schedule with the ThorPlas® bearings. "We're already beyond 3000 hours on this unit," Krufehinski says, "and there is no sign of bearing wear."

Berman Brothers expects to save money with ThorPlas® in three ways: extended MTBF (Mean Time Between Failure); reduced labor costs because the bearings no longer have



Thordon ThorPlas® Bearing Replacement of Grapple Bushings

to be greased; and lower risk of having to replace expensive hydraulic cylinders.

This is our first experiment with this product and we're very pleased," says Krufehinski. "We're already planning to use ThorPlas® on another, bigger grapple unit." 

# THORDON FAST BECOMING THE LEADING CHOICE AMONG GERMAN SHIPYARDS

A little more than a hundred years ago, Germany had only a handful of small shipyards. Most of the country's commercial and naval vessels were, in fact, imported from England. But a lot can change in a century. These days, Germany is still maintaining its dominant position in the European shipbuilding industry. Its shipyards are renown for innovative design and quality workmanship, as well as for utilizing the best materials — which is one reason why Thordon is specified so often.

To date, nine major German shipyards are using Thordon propeller shaft and rudder bearing products extensively for dozens of newbuilds. “German yards build an astonishingly wide variety of vessels,” says Ron Wolff of Belthor Systems GmbH, a long-time Thordon Distributor. “These include ships for naval and commercial applications and even some of the largest luxury yachts in the world.”

## Commercial Vessels

One of the world's most experienced container-shipbuilders, Howaldtswerke-Deutsche Werft (HDW), is installing SXL rudder bearings into four new

Type SSW Super 25 ships. Three 2900 TEU container ships built by Volkswerft Stralsund, along with three 3000 TEU ships and two 2700 TEU ships, all feature Thordon SXL rudder pintle bearings.

Thordon SXL grease free rudder bearings are also specified in all newbuilds at the Nordseewerke, Flensburger, Aker Ostee and JJ Sietas KG shipyards.

Why is Thordon fast becoming the leading choice among German commercial shipbuilders? In a word: reputation. **As F. Mullrich, Ships Equipment Purchasing Manager for Aker Ostee puts it, “We have used Thordon bearings for 28 newbuilds since 1996. Our experience with this product is good and we have never received a claim from our customers.”**

## Naval Applications


Blohm + Voss, one of the first significant German shipbuilders to emerge in the late 1800s, recently delivered the second in a series of six MEKO 100 Corvettes for the Royal Malaysian Navy. Each is equipped

with Thordon water lubricated COMPAC single key design propeller shaft bearings for strut shaft sizes of 365mm (14 in.). Blohm + Voss also delivered the second in a series of four MEKO 200 Corvettes for the South African Navy, featuring both COMPAC propeller shaft bearings and SXL rudder bearings.

Another German shipyard with a long naval history, Flensburger Schiffbau-Gesellschaft, is building four Ro-Ro 2700 ships for the UK Royal Navy Military Sealift Operation. These vessels will be equipped with SXL rudder bearings.

For the Germany Navy, Lurssen Werft is constructing five corvettes. All will have COMPAC propeller shaft bearings in place.

## Mega-Yachts

Thordon is also featured in ships for the rich and famous such as Microsoft co-founder, Paul Allen, as the latest luxury mega-yacht built by famed custom shipbuilder, Lurssen Werft, is equipped with pollution free, water lubricated COMPAC propeller shaft bearings. 

South Africa Navy MEKO 200 Class Corvette, SAS Amatola, built at Blohm + Voss equipped with COMPAC propeller shaft bearings and SXL rudder bearings



Photo Courtesy of Louis Vosloo

# ASENAV CHILE ORDERS THORDON FOR LARGE AHTS STERN ROLLERS

Since its inception in 1973, Chilean shipbuilder ASENAV has rapidly established itself as one of the most reliable and technologically advanced in South America. A recent order to build two large MOSS 929-design Anchor Handling, Towing and Supply (AHTS) vessels for AP Moller – Maersk Group led them to Roberto Garcia, Thordon Area Sales Manager for South America. “Ultimately,” says Roberto “We were able to provide ASENAV with a solution for their twin 685 tonne capacity stern rollers including Thordon SXL bearings and thrust washers and Thorseal U-cup seals.

Headquartered in Copenhagen, Maersk operates an international fleet of more than 250 vessels. “With more than a century of shipping experience, Maersk is well known for its dedication to maintaining high operational standards through meticulous testing of materials, components and systems” says Peter Schneevoigt of PNE Teknik A/S, the Thordon distributor in Denmark. “They demand the best!” Currently, AP Moller has more than 30 Thordon-equipped AHTS vessels in service throughout the world.

## Rugged conditions. Extreme Loads.

AHTS ships do the tough job of setting anchors for drilling rigs and towing rigs and equipment. Historically they have operated relatively close to shore, however, as the search for oil goes into deeper water farther offshore – the support ships must follow. As distances offshore and chain loads increase, stern roller bearing reliability and performance are even more critical to efficient, profitable operation.

The two AHTS vessels currently under construction at ASENAV are 89 m (292 ft.) long and feature twin 3.0 m (10 ft.) diameter by 3.0 m (10 ft.) long aft stern rollers - among the largest in the world. Peter says, “In deep water operation, as the anchor breaks loose from the seabed, the stern rollers can see shock loads of up to 685 tonnes. At these loads, the high impact strength and resilience offered by elastomeric Thordon SXL is critical to the bearings being able to survive without damage.”

Obviously, the choice of stern roller bearing material was crucial to the ASENAV proposal.

## The SXL Advantage


“SXL provides many important advantages in this difficult bearing



Thordon SXL Stern Rollers

application,” says Juan Carlos Vasquez, President of Productos Servicios e Ingenieria, Thordon’s distributor in Chile. “SXL performs very well under heavy loads and wears very slowly. ASENAV is excited about it.” The design of this stern roller arrangement is similar to the S-type AHTS vessels built at Keppel Singmarine in Singapore in the 90’s. “Although ASENAV looked at other bearing options initially, when they considered the good results AP Moller was seeing on these and other Thordon equipped vessels, they decided to go with Thordon” explained Juan Carlos.

The 1.82 m (6 ft.) diameter SXL axial bearings and thrust washers for the first vessel are due to be installed in January 2005. The ship completion date is set for the following May and, after the second ship, there is still a further option for two additional vessels.

“This is the first time ASENAV has used Thordon SXL in this size range,” says Roberto Garcia, “but I suspect it won’t be their last.” 

Maersk Shipper, AHTS Vessel Equipped with SXL Stern Roller Bearings

