



ABOUT US

Our founders, who have been serving the Turkish maritime industry with more than sixteen years of experience, laid the foundations of our company in Istanbul in 2015. Our company, which has foreseen the continuity of quality in production, timely and low-cost production as its main purpose since its establishment, has been the symbol of quality and reliability for five years with its expert and well-equipped staff.

We are currently providing services under the following main headings in our workshop located in Istanbul - Tuzla, Shipyards Region:

1. New Construction
 - A. Propulsion and Manoeuvre Systems
 - I. Propeller shaft system
 - II. Rudder blade
 - III. Bow Thruster
 - B. Lifting Systems
 - I. Gantry crane
 - II. Service crane
 - III. Offshore crane
2. Maintenance and Repair Services
 - A. Propulsion and Manoeuvre Systems
 - I. Conventional system
 - II. Azimuth system
 - III. Rudder blade and steering gear
 - IV. Bow thruster



Propulsion and Manoeuvre Systems

Fors Propulsion Systems produces ideal systems for ships where the highest efficiency and durability is a priority. Our products are designed for the longest distance cruising near maximum Propulsion efficiency. However, fixed blade propeller systems are also produced for smaller yachts and workboats.

Our controllable pitch propeller systems, which are under research and development, offer optimum solutions that meet the challenges of many different applications, with high propulsion efficiency, minimum vibration and noise levels, fuel savings and reduced emission levels.

Both blade design and hub design optimization are carried out with the right hydrodynamic solutions and hydrodynamic analysis (CFD) with ship-specific model tests.

The propeller blades are optimized with computer aided design (eg FEM) and strength calculations in terms of both design load and fatigue.



Propulsion and Manoeuvre Systems

Benefits



Lowest total cost of ownership:

Operational savings are achieved with a highly efficient design with minimum wearing parts on the system - it was designed with optimum quality for high safety and long life.



Minimum fuel consumption and emission levels:

It provides maximum propeller efficiency, less fuel consumption and reduction in exhaust gas emission levels.



Efficiency optimized by design:

High efficiency is provided by the modern and minimum hub diameter/propeller diameter ratio.

Propulsion and Manoeuvre Systems

2x1930 Hp-2200 rpm Main Engine
ø1200 mm Propeller Diameter,
1530 mm Pitch-5Blade Cu-3 760 rpm



Propeller Shaft Systems

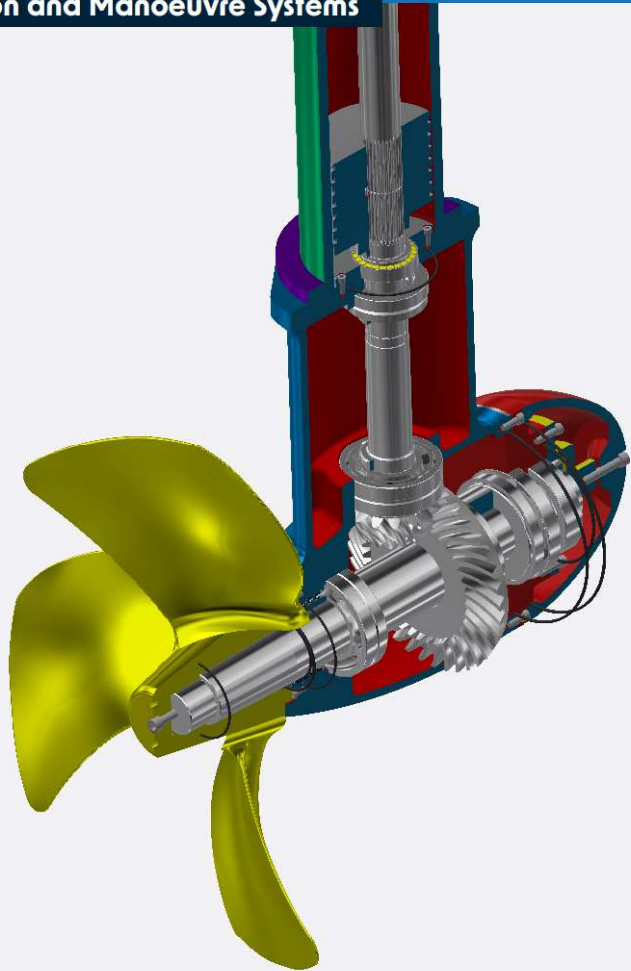
Conventional System

Fixed pitch propeller applications for submarines, floating platforms and oceanographic vessels can offer significant advantages in terms of logistics support, material quality and hydrodynamic performances.

In the production of Fors ship fixed pitch propellers, possible vibration/noise levels and cavitation values are kept at the lowest level with products optimized with high technology and designed individually for propeller efficiency specific to each ship.



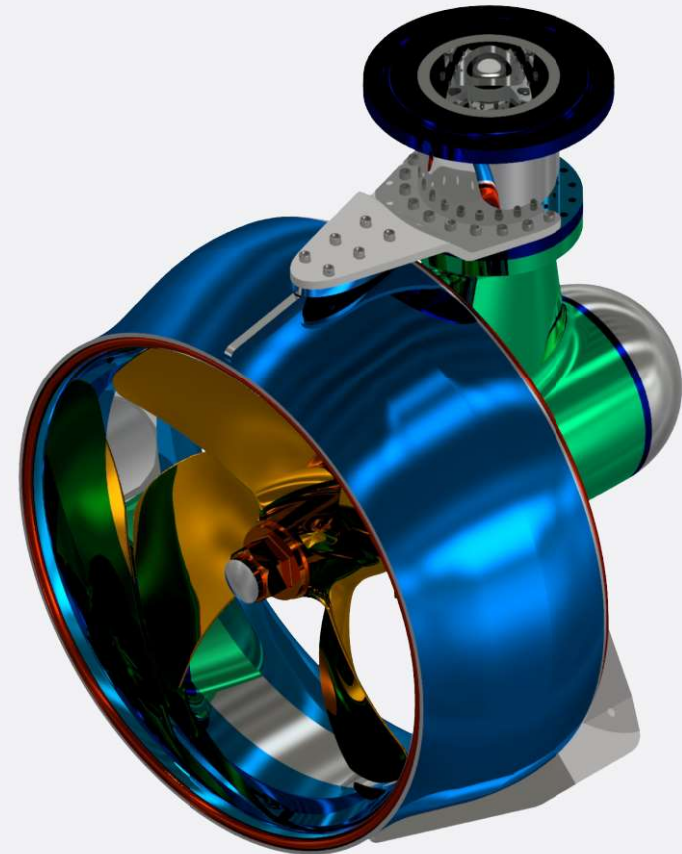
2x1930 Hp-2200 rpm Main Engine
Propeller Brackets ve Coupling



Propeller Shaft Systems: Azimuth System

All main equipment is placed on a single chassis, the installation of the system on the ship is completed in a very short time. In order to keep the propeller efficiency at the highest level, there are hydraulic cylinders that provide the up and down movement of the propeller. By means of the same hydraulic cylinders, the propeller is lifted above the water line, providing ease of maintenance.

Force Propulsion and Manoeuvring Systems are divided into 3 main groups as electrical, hydraulic and mechanical driven. The system is designed in accordance with electrical-mechanical and hydraulic-mechanical driven hybrid systems.



Propeller Shaft Systems: Azimuth System

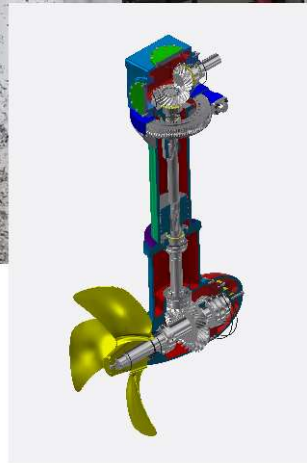
Advantages of the System

- Modular design suitable for all types of ships
- Autopilot system can be integrated
- Commissioning of the system is provided in a very short time
- Ease of use and maintenance
- 360° high manoeuvrability
- Hydraulic or electric driven units for emergencies
- High quality equipment suitable for the hardest sea conditions
- Minimal vibration and low noise level
- Design and production in accordance with all international classification societies

Propulsion and Manoeuvre Systems



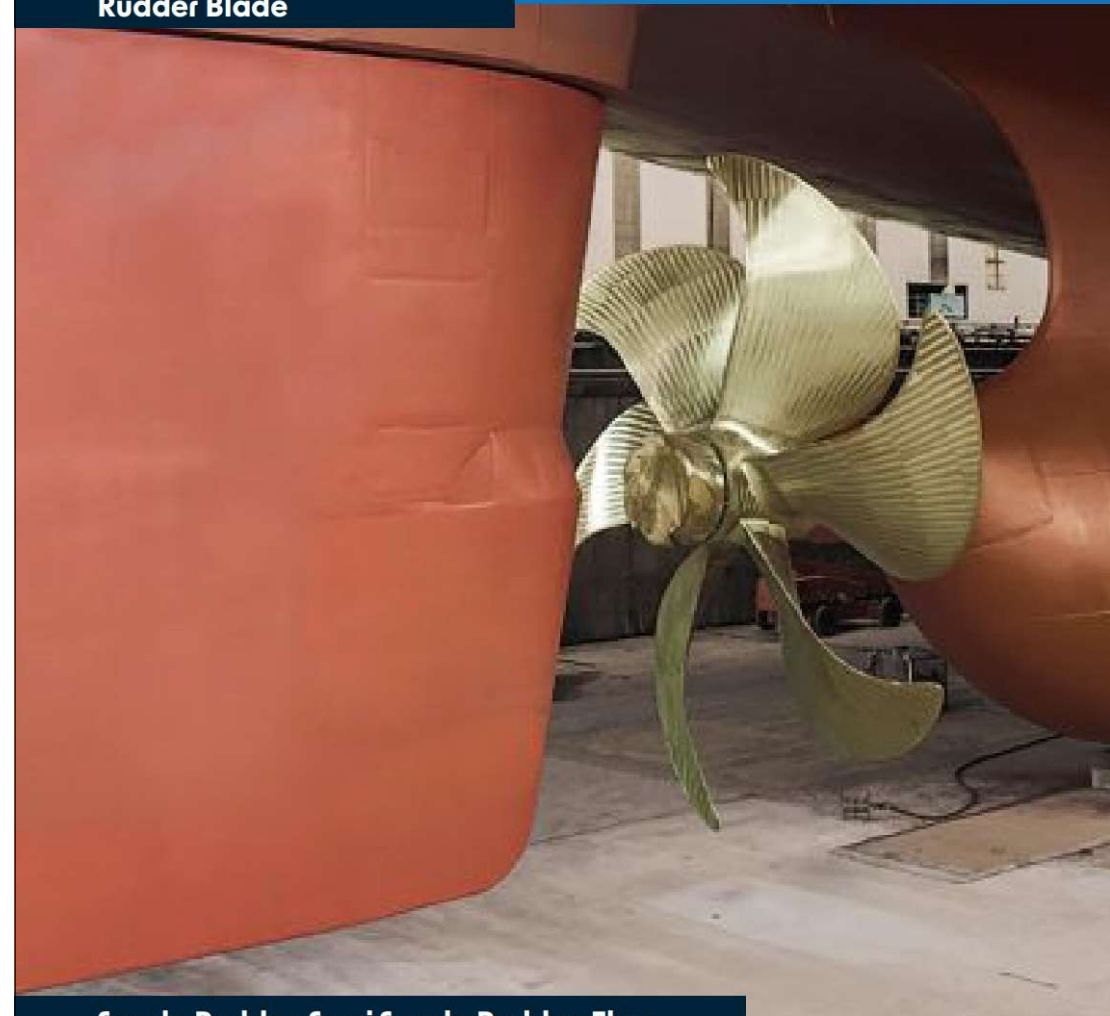
560 kW Azimuth System
(Government Assistance)



Propeller Shaft Systems: Azimuth System

Model	Input Power (kW)	Input Speed (rpm)	Propeller Diameter (mm)
FGAT 220	220	1800-2300	650-850
FGAT 280	280	1800-2000	900-1100
FGAT 350	350	1800-2000	1100-1250
FGAT 530	530	1600-1800	1250-1400
FGAT 780	780	1200-1600	1400-1600
FGAT 920	920	1000-1200	1600-1850
FGAT 1400	1400	750-1000-1200	1850-2100
FGAT 1650	1650	750-1000-1200	2100-2300
FGAT 1800	1800	750-1000-1200	2300-2450
FGAT 2200	2200	750-1000-1200	2450-2600
FGAT 2500	2500	750-1000-1200	2600-2800
FGAT 2850	2850	750-1000-1200	2800-3000

Rudder Blade



Spade Rudder, Semi Spade Rudder, Flap Rudder, Twisted Rudder, Kingspot Rudder

The rudder blade is one of the most heavily resisted components on a ship. Water flowing faster and at a slight angle over the rudder blade will increase fuel consumption under certain conditions and cause erosion and cavitation on the rudder surface.

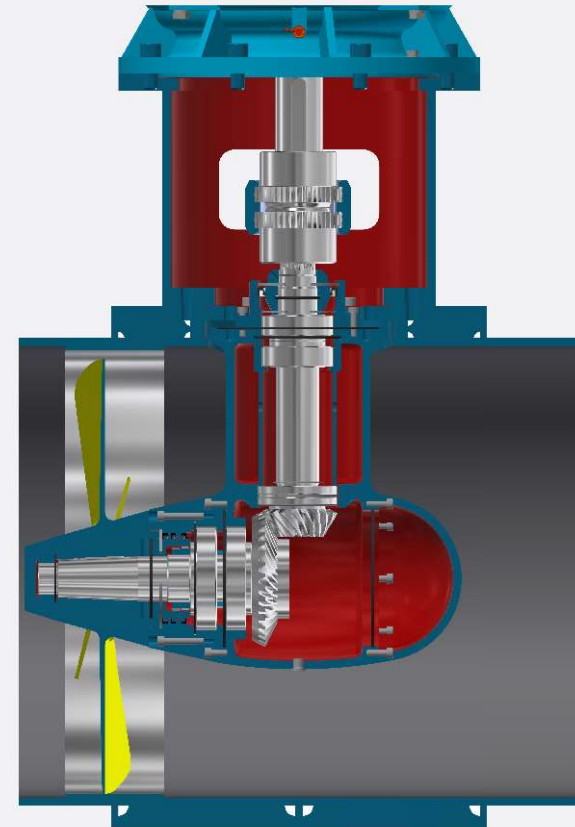
Conventional rudders are placed behind the propeller with the rudder section arranged symmetrically in the vertical rudder centre plane. The twisted rudder blade equalizes the pressure distribution over the rudder blades to minimize cavitation and maximize manoeuvrability.

Rudder Blade

2x1930 Hp-2200 rpm Main Engine
316 L SS Rudder Blade
Al 6082-T6 Rudder Boss



Bow Thruster



Hydraulically Driven, Electrically Driven, Mechanically Driven

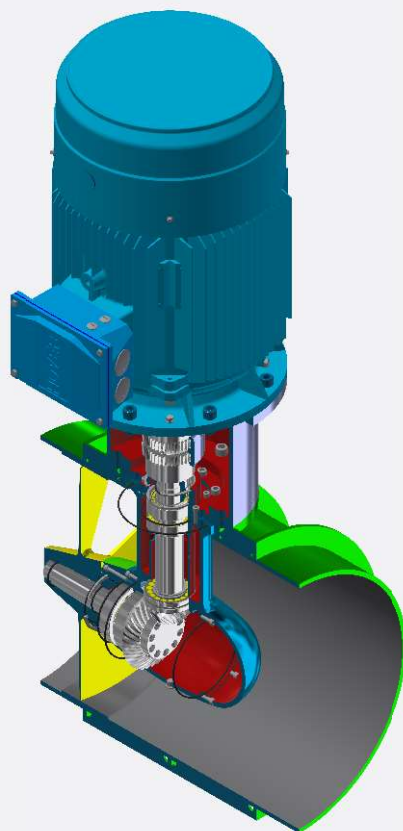
Bow thrusters are a type of propeller-shaped system attached to the bow (forward) and stern (known as the stern thruster) of the ship. Its dimensions are smaller than that of the ship's propeller, helping the ship better manoeuvre at lower speeds.

Bow thrusters are often used to manoeuvre the ship into coastal waters, close to canals, or when entering or leaving a port when bad currents or headwinds are experienced.

Having bow thrusters on a ship eliminates the need for two tugboats when leaving and entering port, resulting in further savings.

Ships today have both bow and stern thrusters, making them independent of tugs for manoeuvring at port boundaries (unless port regulations mandate the use of tugboats).

Bow Thruster



Hydraulically Driven, Electrically Driven, Mechanically Driven

Advantages of the System

FORS offers fully integrated solutions with bow thrusters, drive motors, hydraulic power units, control, alarm, and monitoring system.

Each thruster system can be optimized to meet ship-specific manoeuvring needs.

It provides significant performance and safety gains by extending the service life of the gearbox with the bevel gear pair used in the system. Calculation methods are used to achieve a highly efficient, robust and safe gear pair with ideal gear geometry.

Bow Thruster



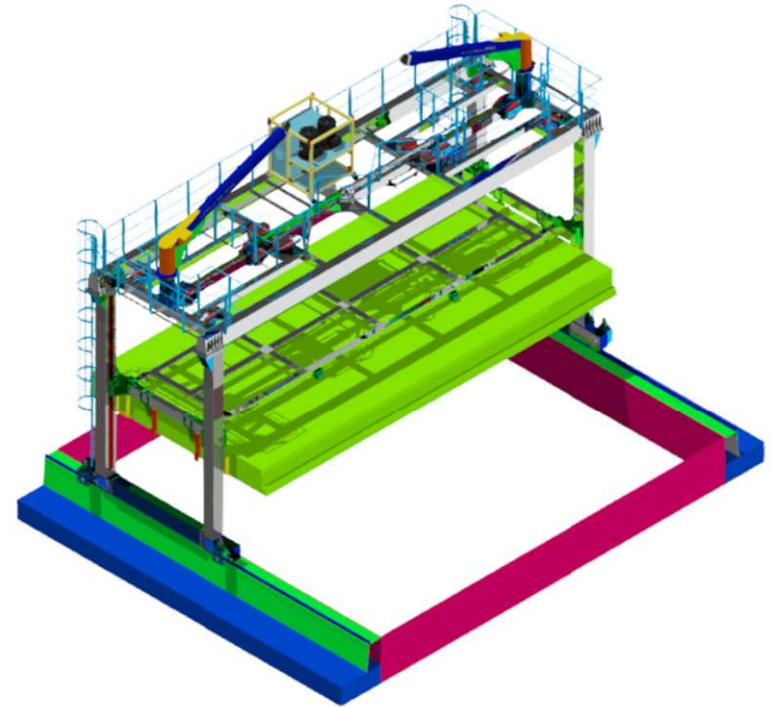
55 kW Bow Thruster

Hydraulically Driven, Electrically Driven, Mechanically Driven

Model	Nominal Thrust Force (kN)	Input Power (kW)	Input Speed (rpm)	Propeller Diameter (mm)
FGTT 400	4	22	980-1450	450
FGTT 700	7	45	980-1450	550
FGTT 900	9	55	980-1450	650
FGTT 1200	12	75	980-1450	650
FGTT 1400	14	90	980-1450	700
FGTT 1800	18	110	980-1450	800
FGTT 2100	21	132	980-1450	850
FGTT 3000	30	185	980-1450	950
FGTT 4000	40	250	980-1450	1050
FGTT 5000	50	315	720-980	1200
FGTT 6400	64	400	720-980	1300
FGTT 8000	80	500	720-980	1450



NEW CONSTRUCTION



Lifting Systems

Fors cargo cranes are designed for a wide variety of lifting applications. The product range consists of standard and special designs with SWL over 20 tons.

Cranes are designed and manufactured to meet all ILO and other relevant authority requirements and can be certified by any recognized classification society.

Fors cargo cranes are designed for heavy-duty, continuous use in hardest marine environments. All components and materials have been carefully selected to ensure long and trouble-free operation.

- o Gantry crane
- o Service crane
- o Offshore crane
- o Overhead crane



Lifting Systems

Basic Design Features

- Welded box boom for low maintenance. Robust design with low boom deflection allows operator to position cargo faster and more accurately.
- Independent unit with integrated hydraulic power unit
- Braking system to make all movements safe (load holding valves etc.)
- Fully enclosed and equipped, air-conditioned driver's cabin
- Dual pump system with separate hydraulic circuits for lift and lower/turn to ensure efficient cargo handling
- The proportionally controlled winch automatically adjusts to the highest possible speed for the load.



Lifting Systems

Standard Equipment

- Design in accordance with the requirements of the specified classification society and flag state to ensure safe operation.
- Standard height pedestal ready for installation and welding on the ship's body
- Boom and body mounted floodlights
- Oil cooler for continuous use
- Limit switches for automatic stop of hook movement in upper and lower position
- Steel structure made of certified steel and sandblasted to Sa 2.5 before painting
- All platforms and stairs are hot dip galvanized.
- Hydraulic hand pump for brake release on hoist winch and swing gear
- Replacement filters for one year of normal operation.
- Remote control
- Load indicator
- Air-conditioned cabin
- Telescopic boom
- Twin cranes



General Cargo Vessel



General Cargo Vessel



NEW CONSTRUCTION

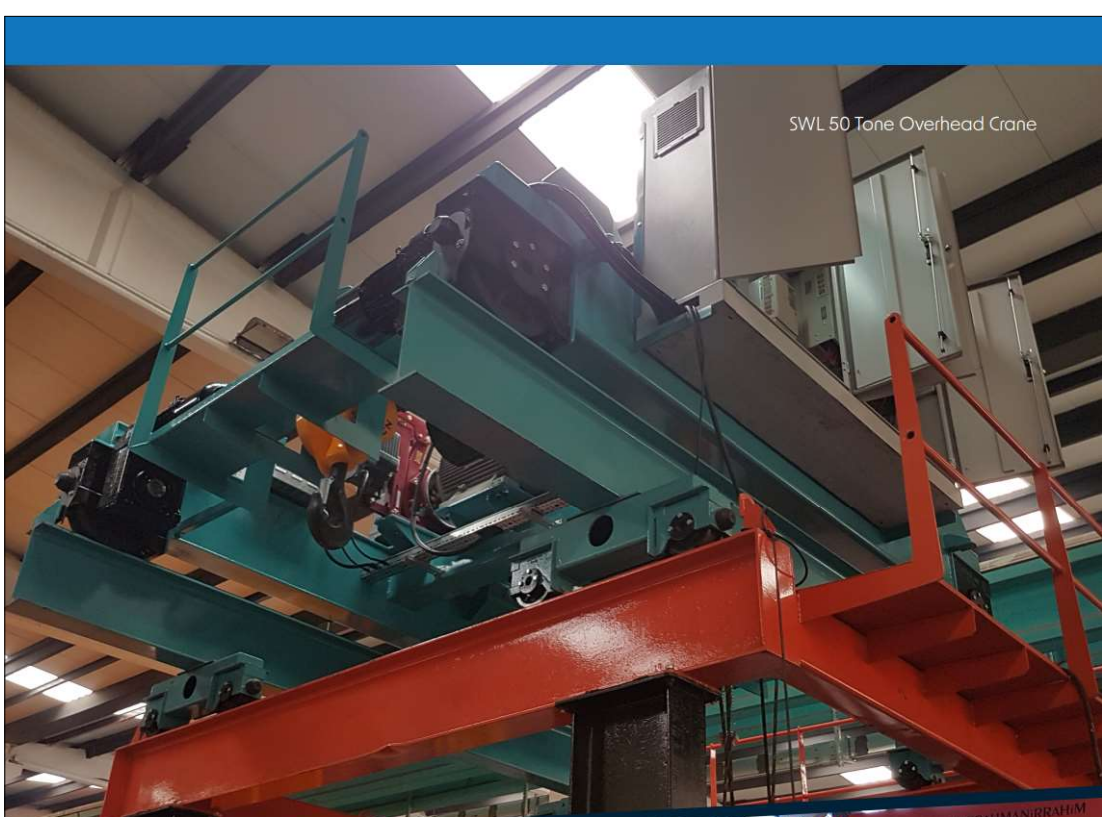
SWL 10 Tone Overhead Crane

Lifting Systems

Operations have enough pump capacity to handle multiple movements simultaneously without significant speed drop.

Fors designs and supplies a wide range of standard cargo cranes and works to minimize costs without sacrificing safety and quality.

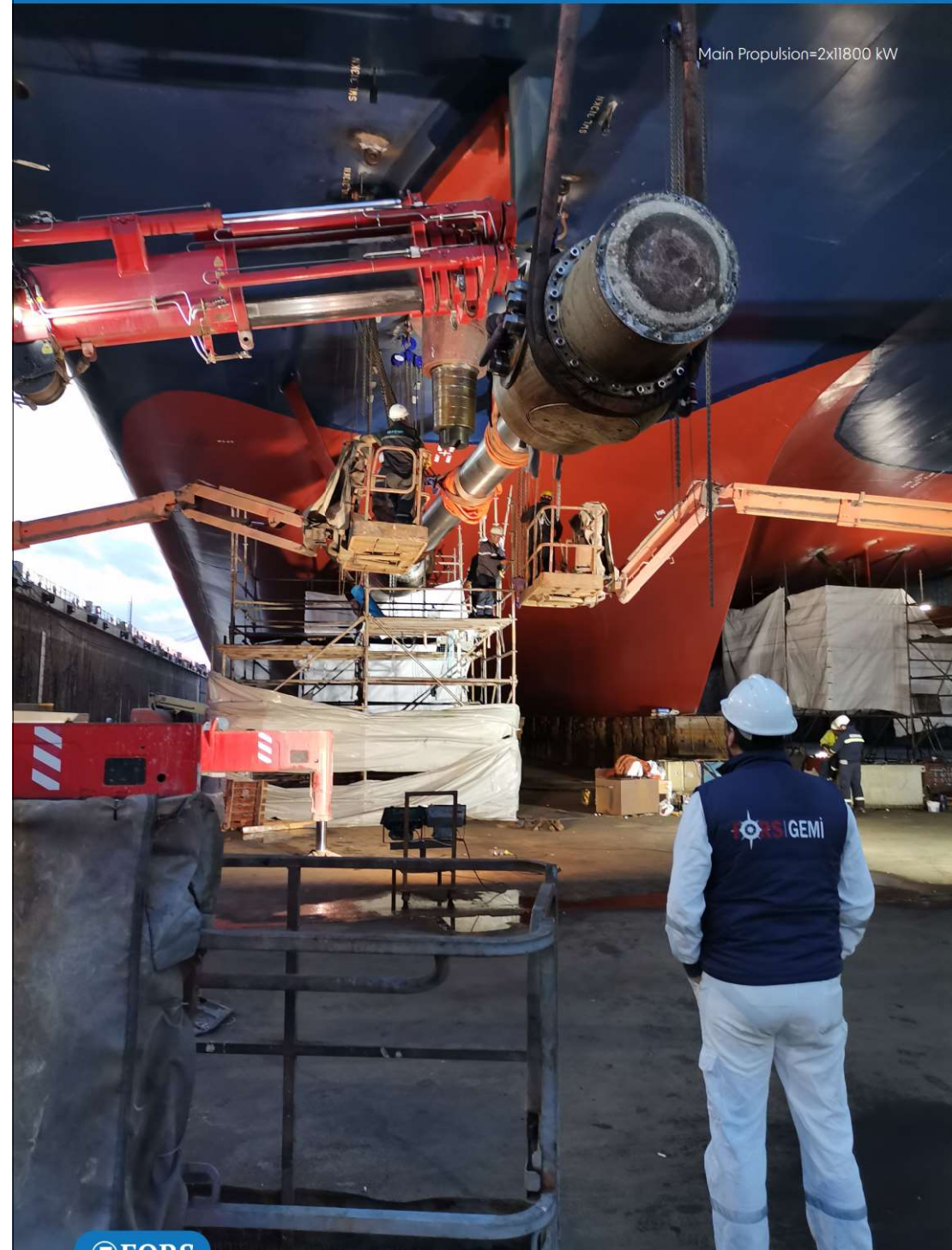
However, where a custom design is required, we are highly experienced in building cranes to suit the specific requirement. Special application requests are always welcomed by our expert engineers and optimum solutions are produced.





Propulsion and Manoeuvring Systems

- Propeller shaft systems
 - Conventional system
 - Crack test of propeller blades
 - Crack test of propeller shaft
 - Forward and aft bearing change
 - Forward and aft bearing measurement and control
 - Forward and aft bearing sealing system replacement (simplex, cederval, wartsila etc..)
 - Removing the propeller shaft
 - Propeller shaft deflection control
 - Removing the intermediate shafts
 - Propeller polishing
 - Pitch control system maintenance and repair
 - Pressure testing and adjustment of safety valve and proportional valve
 - Replacing hydraulic hoses of hydraulic oil distributor and hydraulic power unit
 - Adjustment of zero pitch, full forward, full reverse positions.
 - Maintenance and repair of intermediate shaft coupling

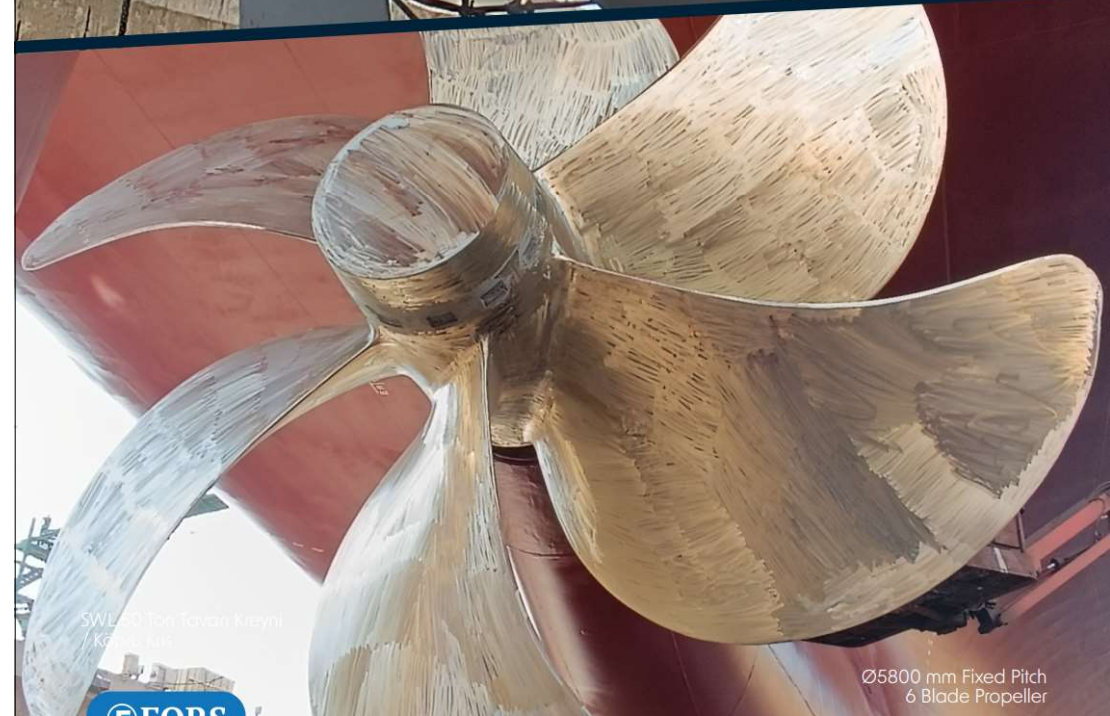
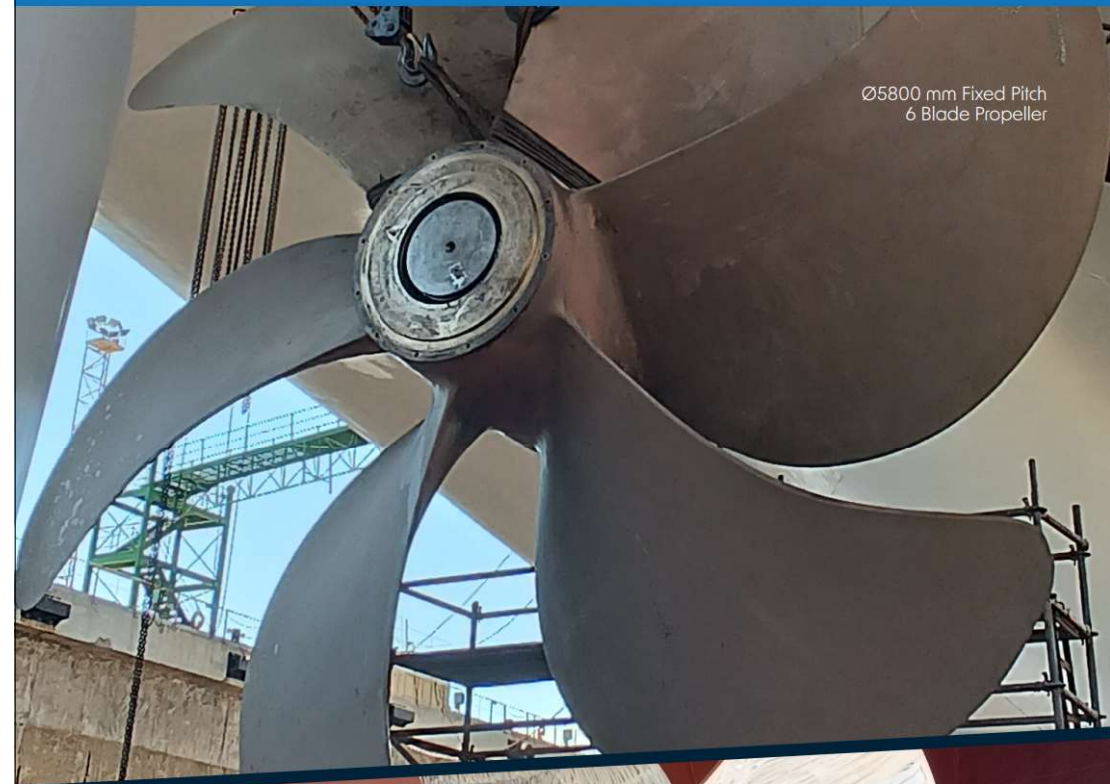




Propulsion and Manoeuvring Systems

In the propeller shaft system, which rotates in water hundreds of times per minute, the probability of the propeller coming into contact with ropes, sand, rocks and sunken debris is very high. Contact forces with foreign objects are very large and can cause structural damage to the propeller.

A phenomenon known as cavitation can occur when the Propulsion system is not fully optimized. As the propellers rotate rapidly in a fluid (sea), low pressure builds up on them and because of this **low pressure**, **sea water starts to boil at low temperatures**, during this boiling, **micro-mini bubbles** (water vapor and other molten gases) are formed, these **bubbles make both noise** (propeller noise) and **physical damage to the propeller when bursting**. Submarines solve this noise problem by using **multi-bladed propellers that spin at a lower speed**.



MAINTENANCE AND REPAIR SERVICES



Propulsion and Manoeuvring Systems

In controllable or variable pitch propellers (CPP), the propeller blades are connected to the hub and their pitch can be changed via a hydraulic system. The blades are removable so if they get damaged they can be repaired without disassembling the entire system.

CPP repairs will mostly be performed at sea or at the shipyard, but we can offer you all the options: At the shipyard, our propeller specialist will do or supervise all necessary work on your propeller. An excellent repair team will perform the maintenance and repair of the propeller in our fully equipped workshop. All our repair procedures are created in close contact with the classification society and are followed up with detailed reports.



MAINTENANCE AND REPAIR SERVICES

Yavuz Drill Ship
7 pieces 5000 kW
DP Azimuth System



Azimuth System

- Slew bearing maintenance and repair
- Replacement of inner roller bearings
- Internal and external sealing system replacement (simplex, cederval, wartslia etc.)
- Maintenance and repair of bevel gear pair
- Replacing the bevel gear pair
- Setting the backlash of the bevel gear pair
- Propeller polishing
- Pitch control system maintenance and repair

Yavuz Drill Ship
7 pieces 5000 kW
DP Azimuth System





Yavuz Drill Ship
7 pieces 5000 kW
DP Azimuth System



2 Pieces 25 Ton
Flap Rudder System

Rudder Blade and Steering Gear

- Change of lower and upper bearings
- Upper and lower sealing system replacement
- Deflection control of the rudder shaft
- Blade maintenance and repair
- Steering gear complete maintenance and repair

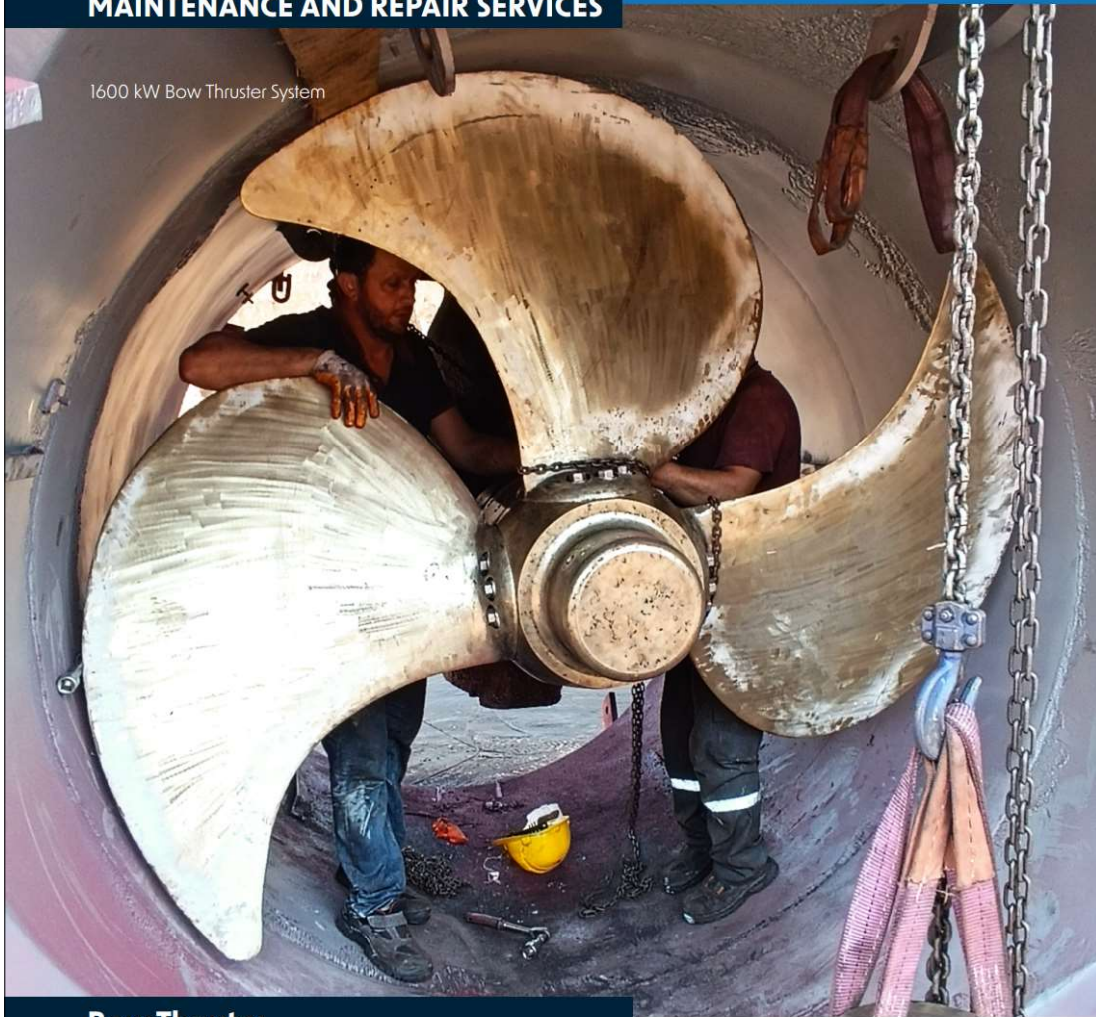
2 Pieces 25 Ton
Flap Rudder System



2 Pieces 25 Ton
Flap Rudder System

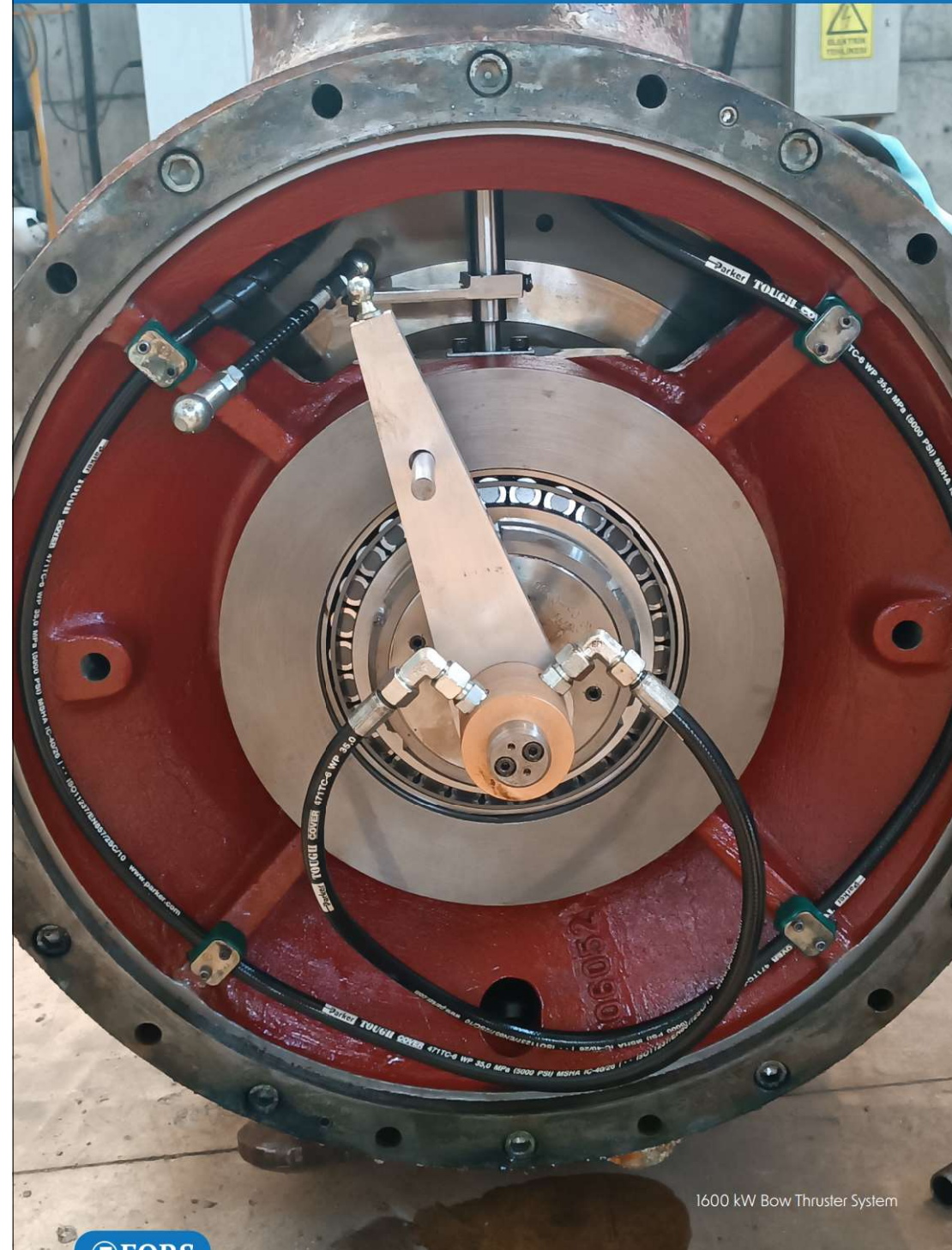


1600 kW Bow Thruster System

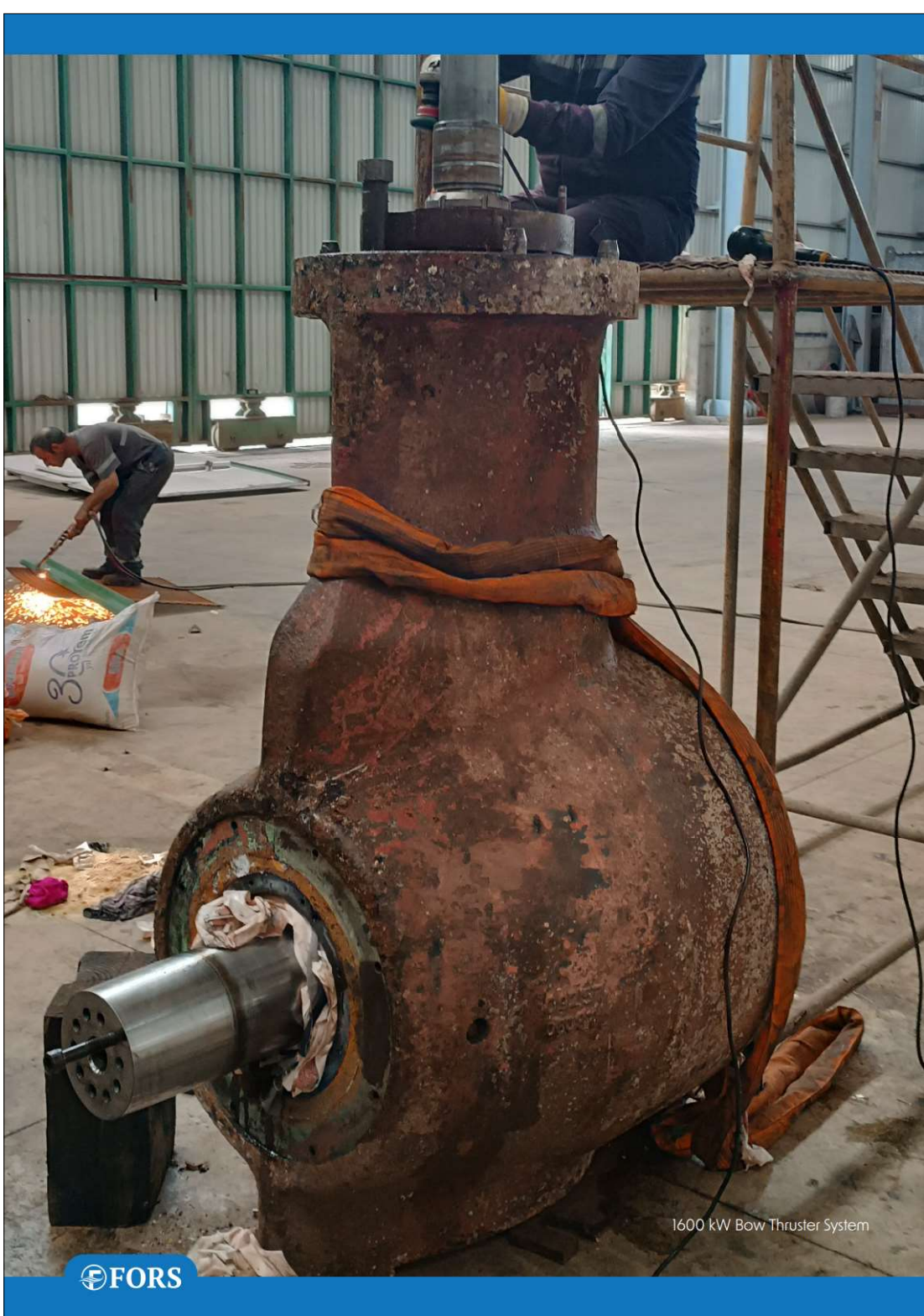


Bow Thruster

- Replacement of inner roller bearings
- Internal and external sealing system replacement (simplex, cederval, wartslia etc.)
- Maintenance and repair of bevel gear pair
- Replacing the bevel gear pair
- Setting the backlash of the bevel gear pair
- Propeller polishing
- Pitch control system maintenance and repair



1600 kW Bow Thruster System



No.	Client	Shipyard	Vessel Name	Power/ Dwt	Description	Class
1	TRIO	İÇDAŞ A.Ş	TROY SEAWAYS RO-RO	11300 kW x2 Set	Twin Pitch Control Propulsion System	LR
2	TRIO	İÇDAŞ A.Ş	EPHESUS SEAWAYS RO-RO	11300 kW x2 Set	Twin Pitch Control Propulsion System	LR
3	TRIO	İÇDAŞ A.Ş	ZIM VANCOUVER	50.530 DWT	1600 kW Bow Thruster	CLASS NK
4	TQ SHIPPING	HAT-SAN SHIPYARD	SEVERNAYA ZEMLYA	23.250 DWT	Propulsion System	RINA
5	ÖZATA SHIPYARD	ÖZATA SHIPYARD	M/V HAK	13.280 DWT	Propulsion System	-
6	ÖZATA SHIPYARD	ÖZATA SHIPYARD	LADY ZONA	3.000 DWT	Propulsion System	-
7	FEYZAN DENİZCİLİK	GİRGINKAL E SHIPYARD	M/V ENA-S	2060 DWT	Propulsion System	-
8	EVRİM MARITIME	GİRGINKAL E SHIPYARD	M/V BANU	1400 DWT	Propulsion System	-
9	FEGA REPAIR	HİDRODİNA MİK SHIPYARD	NEVA LEADER-2	7154 DWT	Rudder System	RMR
10	FEGA REPAIR	DENTAS SHIPYARD	NEVA LEADER-5	7140 DWT	Rudder System	RMR
11	TUNA MADENCİLİK	GİRGINKAL E SHIPYARD	FAHRIYE ANA	1905 DWT	Propulsion System	-
12	CİNDEMİR SHIPYARD	CİNDEMİR SHIPYARD	LDR SAKİNE	5400 DWT	Bow Thruster	BV
13	ÖZATA SHIPYARD	ÖZATA SHIPYARD	15 TEMMUZ HEALTH CONTROL		Complete New Rudder System	TL
14	ÖZATA SHIPYARD	ÖZATA SHIPYARD	HURDOĞAN HEALTH CONTROL		Complete New Rudder System	TL
15	ÖZATA SHIPYARD	ÖZATA SHIPYARD	KIYEM-6		Complete New Rudder System	TL
16	DERYA GROUP	NUH YAT SANAYİ	FIRE FIGHTING VESSEL		Swl 1 ton New Service Crane	-
17	CONCEPTUM İKE	GREECE	PRIVATE BOAT		55 kW New Bow Thruster	-
18	İYİDERE DENİZCİLİK	TRABZON	PASSENGER BOAT		55 kW New Bow Thruster	-
19	OFFICIAL INSTITUTION	İSTANBUL	PASSENGER FERRY		165 kW New Bow Thruster	-
20	YEKE DENİZCİLİK	MALTA	YOUR FAITH (PASSENGER FERRY)	2x1930Hp	New Manufacturing Twin Propulsion System	BV
21	YEKE DENİZCİLİK	TURKTER SHIPYARD	YAVUZ (DRILLING VESSEL)	35000 kW	5000 kw Power Rolls Royce Thruster Maintenance & Repair(7pcs)	DNV-GL
22	YAĞCI DENİZCİLİK	ĞİŞAN SHIPYARD	M/V RAHMİ YAĞCI	7121 DWT	SWL 25 Ton New Gantry Crane	RINA
23	BURAK SAVUNMA AŞ	GÖLCÜK NAVAL SHIPYARD	SUBMARINE VESSEL		Torpedo handling jig SWL 3Ton	DNV-GL
24	BURAK SAVUNMA A.Ş	DESAN-ÖZATA SHIPYARD	CHEMICAL OIL TANKER		55 kW New Bow Thrusters (4 pcs)	TL
25	BURAK SAVUNMA A.Ş	DESAN-ÖZATA SHIPYARD	CHEMICAL OIL TANKER		New Rudder Systems (8pcs)	TL

