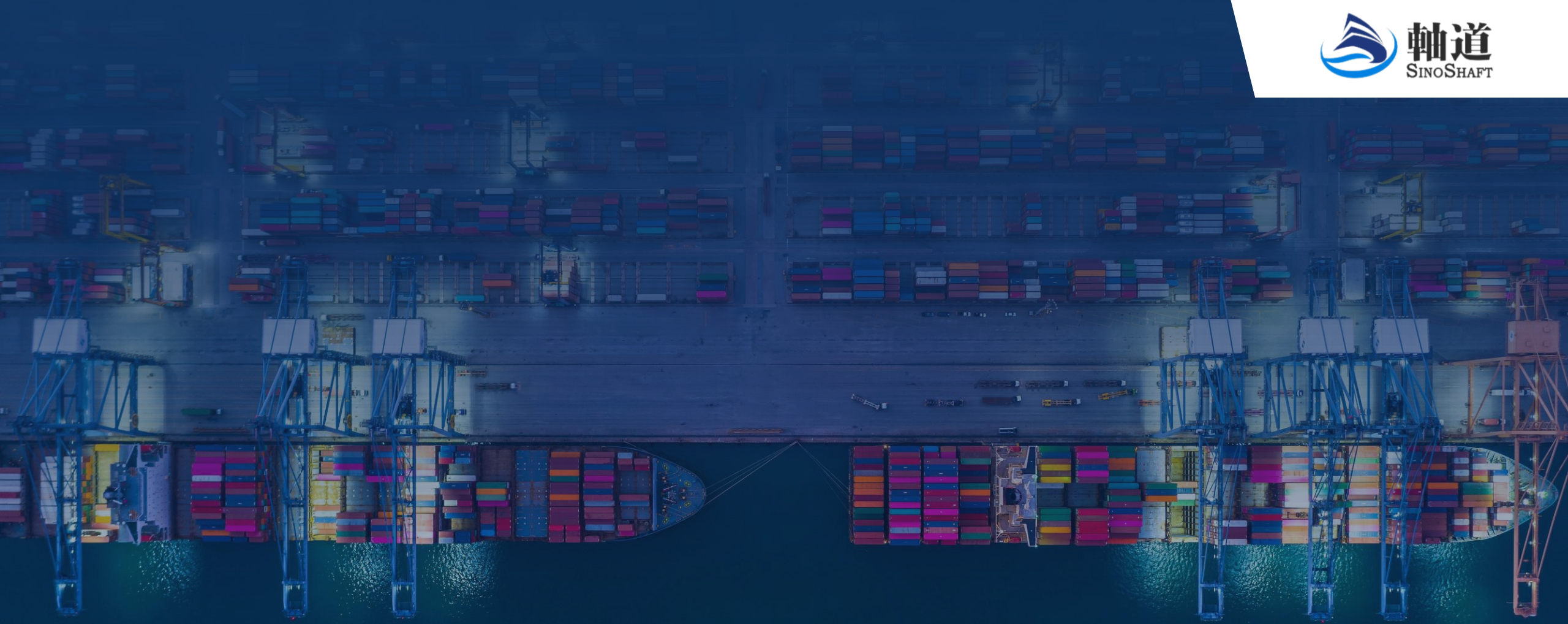
軸道 SINOSHAFT

YOUR TRUSTED PARTNER IN MARINE ESDs & PROPULSION SOLUTIONS

Ben Deng



CONTENTS

SinoShaft - Specializes

A professional marine technical service provider with specializes in providing high-quality spares and services on marine propulsion system, like Stern Tube Seals, Control Pitch Propeller (CPP), Propulsion Shaft and Rudder System etc.

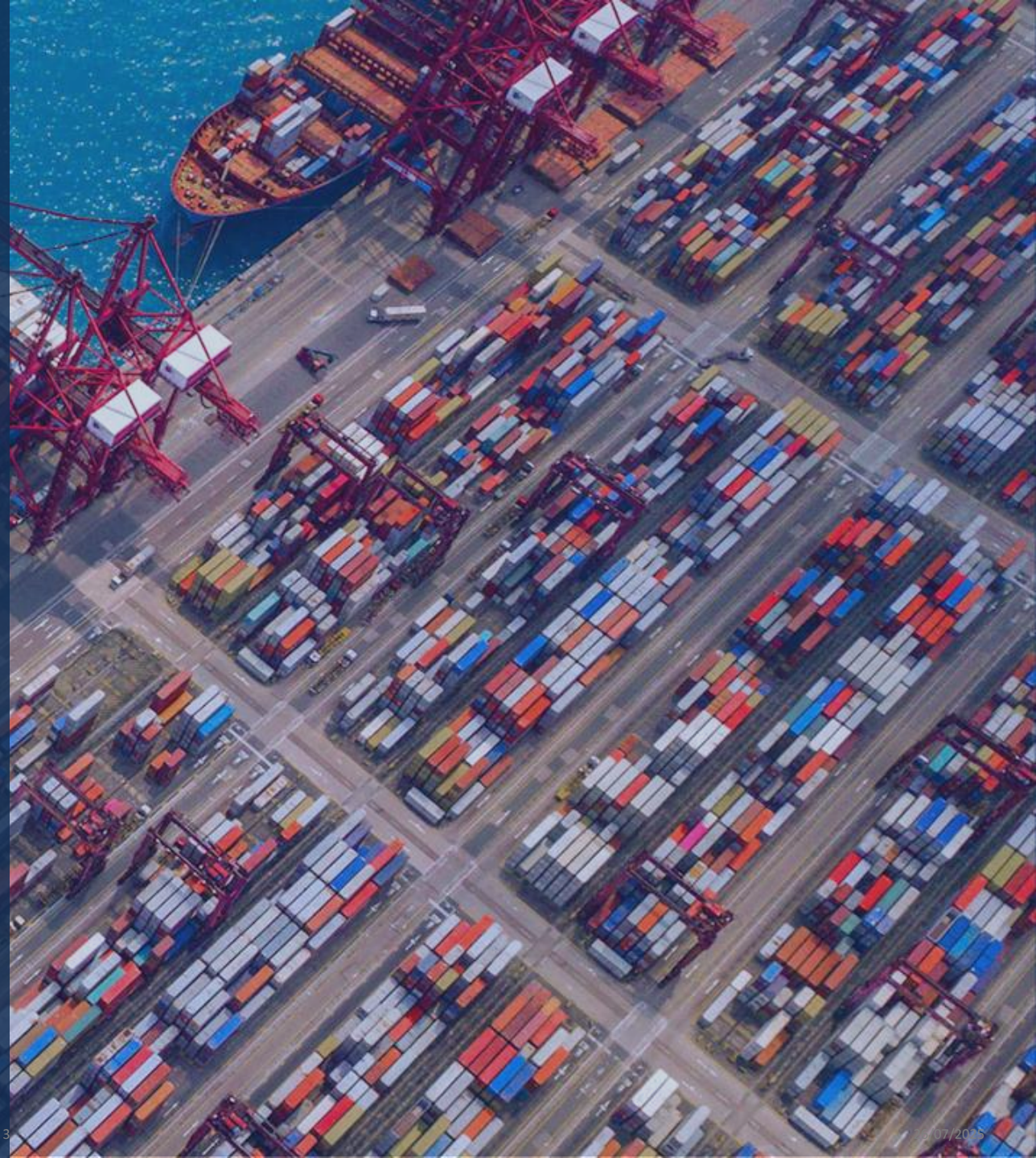
SinoShaft - Value Creation

Always concentrating on creation of the value to our customer via our technical and marketing know-how to meet with their requirements, providing suitable solution and value-added service, fast responded and cost effective.

SinoShaft - Better and Reliable

Based in Shanghai China, active at all Chinese Harbors, Shipyards and around the world. Wide customer base, including leading international shipping companies and global equipment manufacturers.

Our Aim is to be your Better & Reliable Partner.



SinoShaft - Technical Background

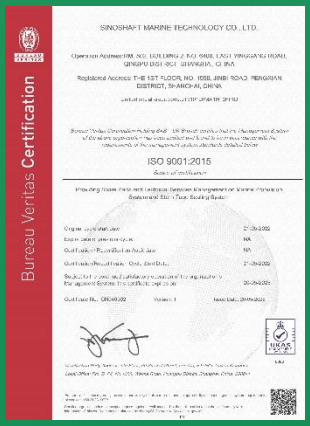
- Composed of a professional technical team consisting of Researchers, Professors, PhDs, Experts, Senior Engineers and Experienced Professionals specializing in Ship Energy Efficiency.stitutions.
- Collaborations with prestigious institutions such as Shanghai Maritime University and Dalian Maritime University of Technology, as well as authoritative Research Organizations, developed multiple independent intellectual properties, patented technologies, copyrights and technological breakthroughs.
- Maintain a leading position in providing ship energy efficiency improvement solutions with distinct competitive advantages.
- Established strong cooperative relationships with major domestic and international Ship Owners, Shipyards, Classification Societies and Testing In

Qualifications & Honors

Honor Certificates

ISO Management Certificates

ISO 14001



ISO 9001

ISO 45001

Customer & Reference

Preface

01
IMO MEPC 81 held at IMO headquarters- 9 official MEPC resolutions adopted atthemeeting-
4 circulars and 1draft amendment to the Convention

02
Meeting Adopts Amendments to 2022 SEEMP Development Guide-Guidelines for Validation of Ship Fuel Consumption Data and Operational Energy Efficiency Authorities in 2022

03
Data studies have provem thatmore than 40% of ships in operation do not meet EEXI requirements-actionable solutions include reducing enginepower, installing energy saving equipment, etc.

04
Tens of thousands of ship operations will be greatly affected by the introduction of a carbon tax levy in 2024

05
Consideration of amendments to mandatory documents, harmful aquatic organisms in ballast water,air pollution, energy efficiency of ships, greenhouse gas(GHG) emission reductions from ships,plastic debris at sea, specialareas,and PSSA designation

06
Adoption by the Conference of shaft/engine power limits for 2021 (MEPC.390(81))-detailing the use of reserve power for ships in emergencies

Impacts of CII

The results of the sampling study show that the three main transport ships on international routes

84% sample tankers

93% sample bulk carriers

95% container ships

Measures need to be taken to maintain their CII ratings atC or better

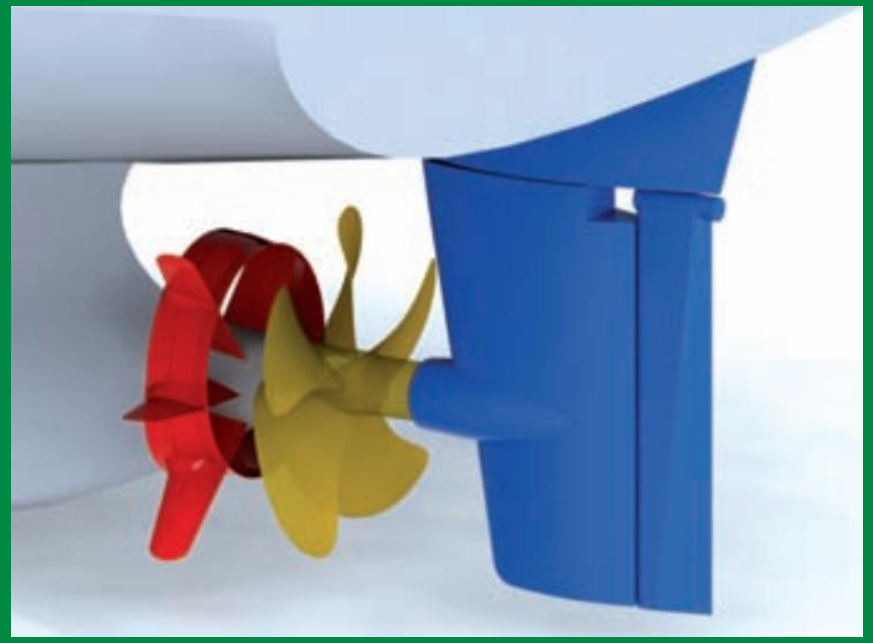
$$CII = \frac{\text{Annual fuel consumption} \bullet CO_2 \text{ factor}}{\text{Annual distance travelled} \bullet \text{Capacity}} \bullet \text{Correction factors}$$

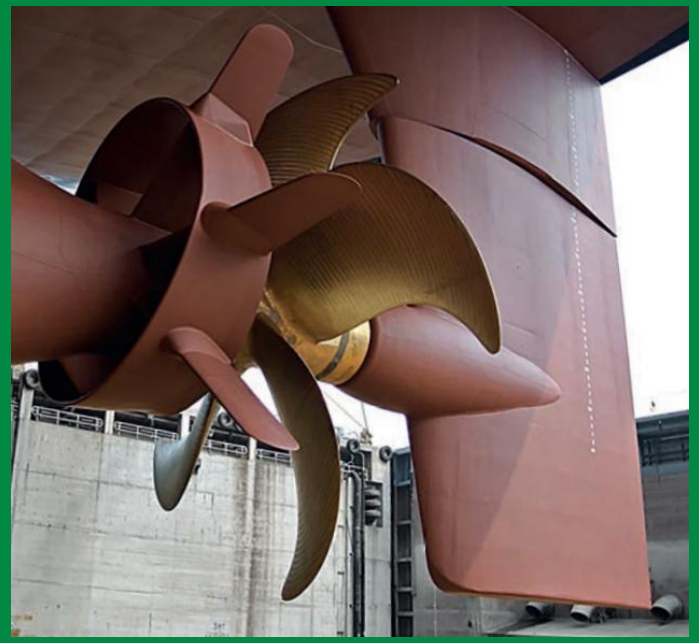
Energy Saving Device Solution(ESD)
Save Fuel, Cut Emission, help with Compliance and Minimizing your OPEX

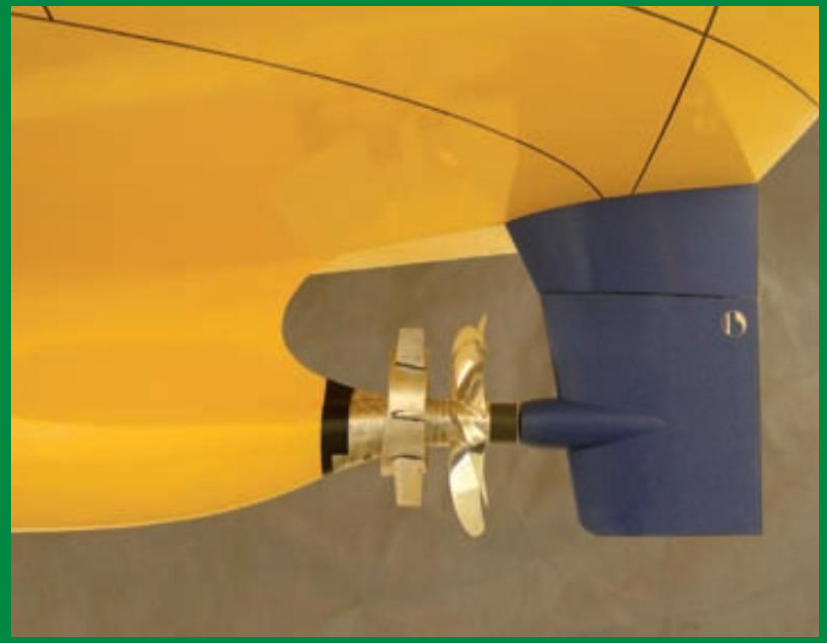
Advantage

IUR (Industry-University-Research) Cooperation with Shanghai Maritime University
Expert Team: professors, senior engineers and chief engineers
Digital Pool Platform
Ship Hydrodynamic Optimization
Other solutions

- Analyze the ship's performance and indexes
- Formulation of computational analysis reports and solutions optimization solutions
- Ship Energy Efficiency Analysis Management System
- Ship hydrodynamic energy saving devices: PFFPFPHC, RD, HEP*
- The other : ORC, SGR, RS, Windwing, AL, CCUS, LED, Winddeflector, Solar Photovoltaic Generation System...







Ship Hydrodynamic Energy Saving Devices

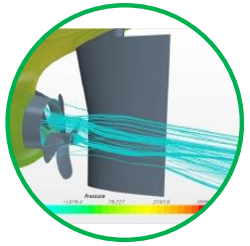
Advantage

- SS-PSF: Pre-swirl Fairing
- SS-BCF: Boss Cap Fin
- SS-RB: Rudder Bulb
- SS-HEP: High-Efficiency Propeller
- SS-PT: Propeller Trimming

Energy-saving effect could reach 5%~20% through installing the energy-saving devices under the designed ship speed and loading condition

CFD Simulation and Sea Trial Verification

Ship Type	Ship Size	Energy Saving
Oil Tanker	320,000 DWT	7%
Bulk Carrier	57,000 DWT	5.4%
Bulk Carrier	180,000 DWT	5.1%
Chemical Tanker	33,000 DWT	5%
Container	5,800 TEU	3.6%



SinoShaft - Hydrodynamic ESDs

SS-PSF (Pre-swirl Fairing):

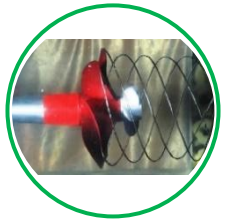
A pre-positioned hydrodynamic energy saving device composed of guide vanes and a duct. Installed directly ahead of the propeller with its axis offset above the propeller shaft, it incorporates 4~5 bladed guide vanes to generate pre-rotational flow. The outer duct improves the uniformity of the inflow to the upper half-plane of the propeller and reduces rotational energy loss in the propeller wake.

Energy Saving Mechanism:

- Produce thrust by duct
- Produce pre-swirled inflow to propeller by pre-swirl vanes and reduce rotational loss in propeller slipstream
- Improve propeller efficiency by equalizing inflow and increasing the flow velocity towards the propeller
- Suppress the flow separation near the stern, and then recover the pressure on the surface of the stern.

Model Test and Sea Trial Verification

Ship Type	Ship Size	Energy Saving
Oil Tanker	298,000 DWT	3.8%
Bulk Carrier	57,000 DWT	3.3%
Fish Ship	77 M	3.9%
Ro-Ro Ship	4,300 PCTC	3.6%
Container	1,700 TEU	3.8%



SinoShaft - Hydrodynamic ESDs

SS-BCF (Boss Cap Fin):

A hydrodynamic energy saving device for marine propulsors that adds small blades (equal in number to the propeller blades) to the propeller boss cap, aiming to eliminate energy loss from propeller hub vortices.

Energy Saving Mechanism:

Rectify the strong downstream from propeller blade trailing edge and break up the hub vortex.

Increase the pressure on the end of cap and root of propeller

Reduce the torque and increase the thrust of propeller.

SinoShaft - Hydrodynamic ESDs

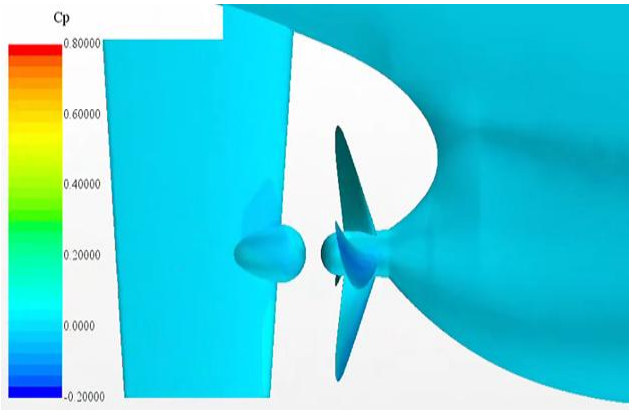
SS-RB (Rudder Bulb):

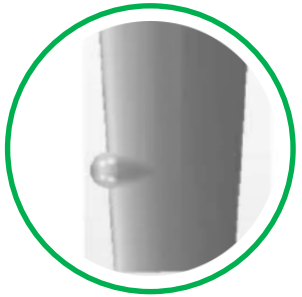
A device that disrupts hub vortices, restores pressure on the rudder bulb and rudder surface, and reduces rotational energy loss in the wake.

Energy Saving Mechanism:

- The rudder bulb fills the space behind the propeller, helping reduce the low-pressure zone along the propeller axis.
- Enhances the rudder's flow-straightening effect, reducing the propeller's circumferential induced velocity and improving circumferential induction efficiency.
- Increases the uniformity of the wake field at the propeller disk, which benefits propeller performance in terms of cavitation, vibration excitation, and other factors.
- The presence of the rudder bulb reduces or even eliminates the hub vortex formed behind the propeller, thereby decreasing viscous resistance caused by the propeller hub.

CFD Simulation
Energy Saving: 1~2.5%





SinoShaft - Hydrodynamic ESDs

SS-HEP (High-Efficiency Propeller):

A customized device designed on an integrated R&D platform based on shipowners' personalized navigation requirements. It features ultra-high propulsion efficiency, highly synergistic with hydrodynamic energy-saving devices, and delivers significant energy-saving and environmental protection effects.

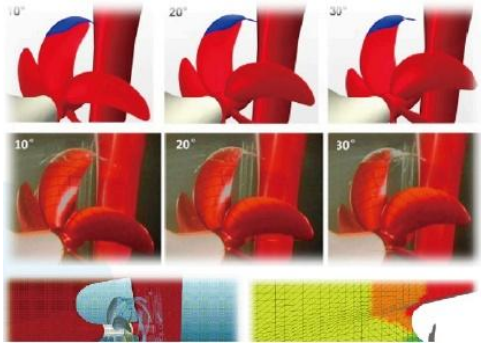
HEP Optimization:

- Optimal diameter, blades number, area ratio, etc.
- Optimal radial load distribution and New foil section
- Optimal skew and rake
- Trade off design among efficiency, cavitation and strength

Self-developed Design and Simulation Software

√ Wake-adapting design
√ Hydrodynamic performance prediction
√ Automatic meshing
√ Cavitation/Fluctuating pressure simulation
√ Strength check/FE analysis
√ New section for delaying cavitation
√ Drawings for manufacturing

CFD Simulation & Model Test
Energy Saving: 3~12%



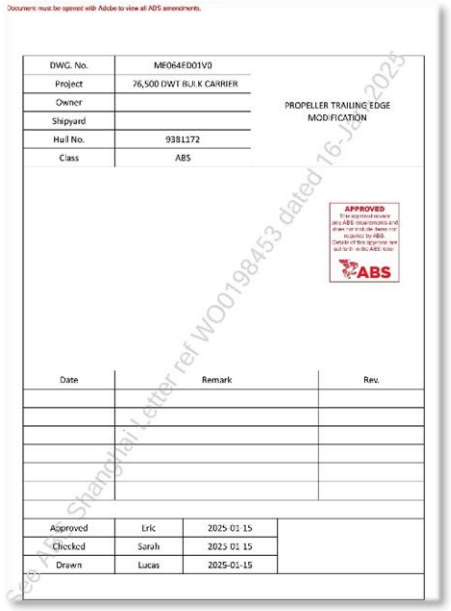
SinoShaft - Hydrodynamic ESDs

SS-PT (Propeller Trimming):

Propeller trimming is primarily performed to increase the Light Running Margin (LRM) of the propeller. Many older vessels currently operate at reduced speeds (EPL), resulting in very low or even negative LRM. The installation of energy-saving devices like ducts further reduces this margin. Trimming the propeller helps restore the LRM, allowing the vessel to return to the optimal engine-propeller matching point.

The Light Running Margin (LRM) of a marine propeller refers to the difference between the propeller's actual rotational speed and its designed rotational speed under specified operating conditions. It reflects the propeller's ability to adapt its rotational speed during low-load or light-load scenarios.

The Light Running Margin is a critical parameter in propeller design. It ensures efficient operation under low-load conditions, protects the main engine, and improves vessel maneuverability.



DWG. No.	MF064FD01V0
Project	76,500 DWT BULK CARRIER
Owner	
Shipyard	
Hull No.	9381172
Class	ABS

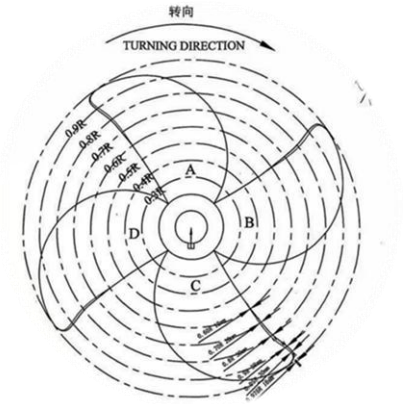
PROPELLER TRAILING EDGE MODIFICATION

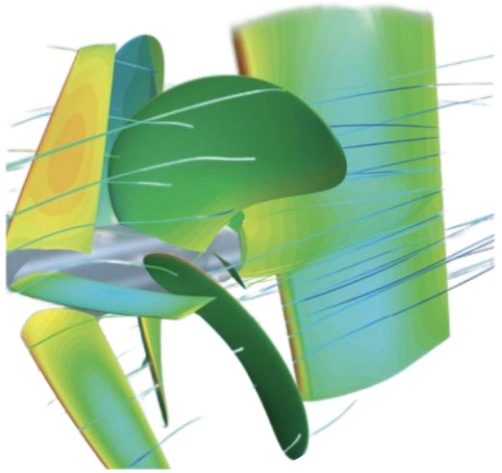
APPROVED

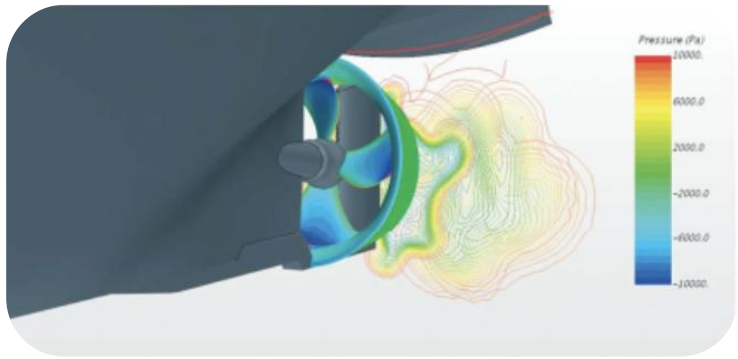
ABS

Date	Remark	Rev.

Approved	Eric	2025-01-15
Checked	Sarah	2025-01-15
Drawn	Lucas	2025-01-15







SinoShaft – ESD Service Scope

Standard scope of supply includes:

- ESDs proposal, design, supply and class certification
- Energy saving evaluation by CFD
- Design interface with shipyard or Class Societies
- ESDs installation drawings and instructions
- Installation supervision by SinoShaft technicians

Optional scope of supply:

- Model Test in case needed by the client
- New EPL report, New OMM, New EEXI report
- Shipyard installation and coating costs etc.
- Surveyor inspection cost for the installation in shipyard

ESD Retrofit Process

① Client input vessel's data
② Preliminary evaluation by CFD
③ Offer & Proposal of ESDs to Client
④ ESDs drawing design & Class approval
⑤ ESDs energy saving evaluation by CFD
⑥ ESDs manufacturing
⑦ ESDs delivery & installation

SinoShaft – ESD Retrofit Reference List (March 2025)

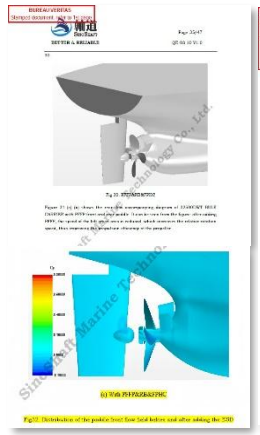
Item	Ship Type	Ship Size	ESDs Installation	Retrofit Location
1	Bulk Carrier	57,000 DWT	PSF+BCF+PT	COSCO Guangzhou Shipyard
2	Oil Tanker	32,0000 DWT	PSF+BCF	Zhouoshan Xinya Shipyard
3	Chemical Tanker	33,000 DWT	PSF+BCF+PT	Shanghai HRDD Shipyard
4	Container	5,800 TEU	PSF+BCF+HEP	Shanghai HRDD Shipyard
5	Container	1,700 TEU	PSF+BCF+HEP	COSCO Shanghai Shipyard
6	Fish Ship	77 M	BCF	Zhoushan NASCO Shipyard
7	Ro-Ro Ship	4,300 PCTC	PSF+BCF+PT	Qingdao Beihai Shipyard
8	Chemical Tanker	60,000 DWT	PSF+BCF	COSCO Zhoushan Shipyard
9	Bulk Carrier	79,400 DWT	BCF+PT	COSCO Dalian Shipyard
10	Bulk Carrier	76,500 DWT	PT	COSCO Dalian Shipyard
11	Bulk Carrier	180,000 DWT	PSF+BCF+RB+PT	Zhoushan Zhongtian Shipyard
12	Bulk Carrier	32,500 DWT	PSF+BCF+RB+PT	Zhoushan Zhongtian Shipyard

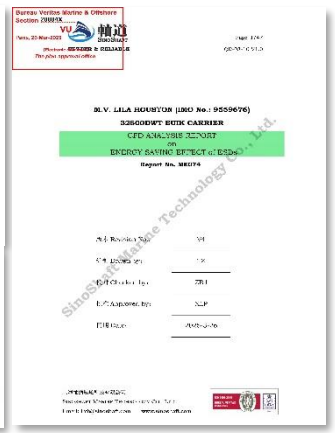
SinoShaft – ESD Retrofit Successful Case

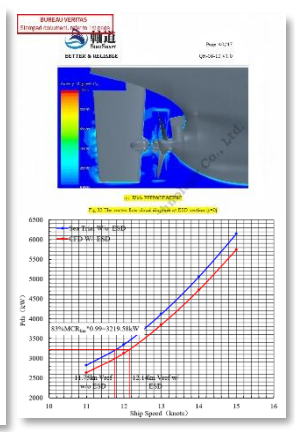
Ship Type & Size:	Bulk Carrier 32,500 DWT
Ship Class:	Bureau Veritas (BV)
ESDs by SinoShaft:	PSF+BCF+RB+PT
Retrofit Location:	Zhoushan Zhongtian SY
Customer Order Date:	31st December 2024
Completion Date:	1st April 2025
Energy Saving by CFD:	6.56%
Energy Saving Sea Trial:	8.10%
Fuel Saving per Year:	248.70 Ton
ROI:	1.2 Year

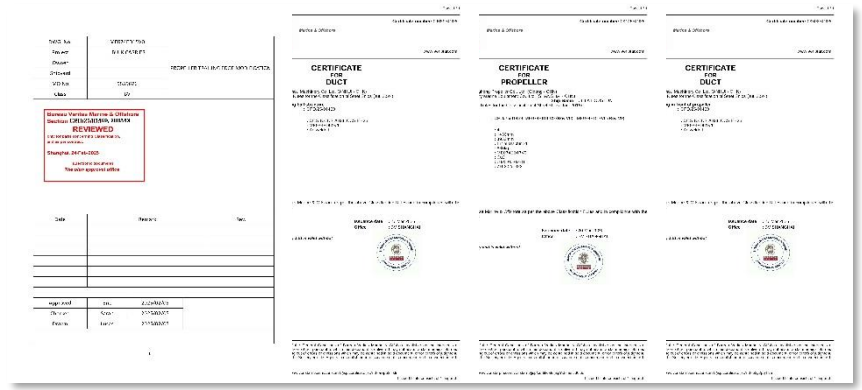
The above earnings from ESDs do not include:

- Additional rental or freight costs resulting from CII upgrades, GHG upgrades due to fuel savings.
- Savings from carbon taxes and carbon index trading due to lower CO2 emissions from fuel savings .







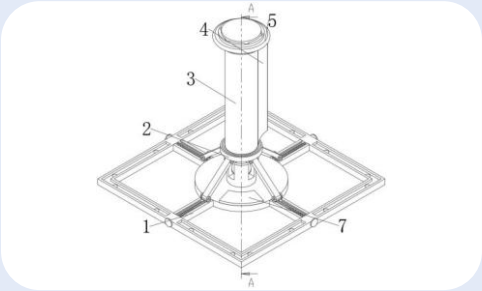


Other Energy Saving & Improvement Solutions

Rotor Sail

Energy Saved5%-15%

- Verified by the real case sthat the Rotor Sail's saving rate is between 5%-15% comprehensively, depending on the ship type and the installation number.
- Installation on deck only, effective and safe
- Half price of the similar equipment overseas, short paybackcycle. High efficiency in design modification and installation,flexible business pattern.



Windwing

Fuel Oil Saved 5%-25%

- Improving the efficiency of energy use and can be adjustedbased on the wind direction so as to maximize the use of windenergy, more suitable for sea navigation.
- Designed for low operating costs and easy to operate, withlow maintenance cost.
- About 3~5 years pay back.
- Various types for ships.

Windshield

reduce wind resistance 25%-30%

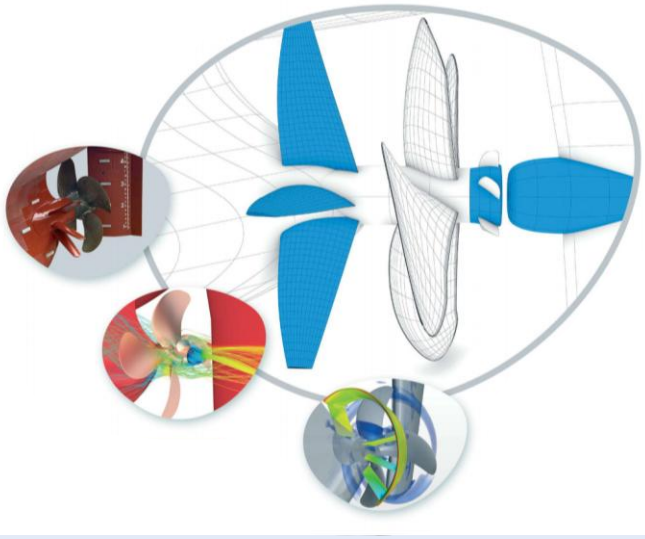
- Reducing fuel consumption. The design of the windshield can effectively reduce the wind resistance of ships during navigation.This design allows ships to reduce 5% fuel consumption. Superior performance for large container ships.
- Reducing carbon emissions. The windshield reduces the ship's carbon emissions indirectly by lower fuel consumption. It is one of the important goals design under the current environmental protection requirements.

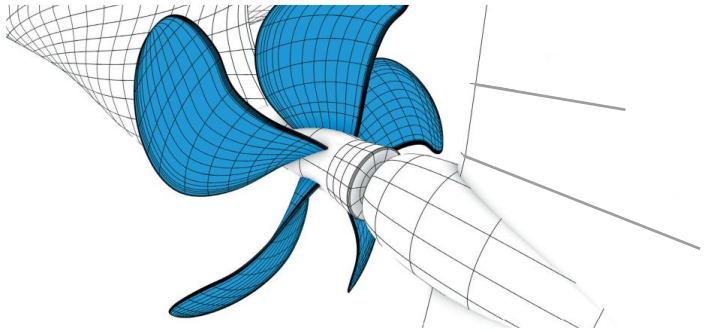
Shaft Generator System (Fuel Oil Saved : 2% to 3% M.E DFOC)

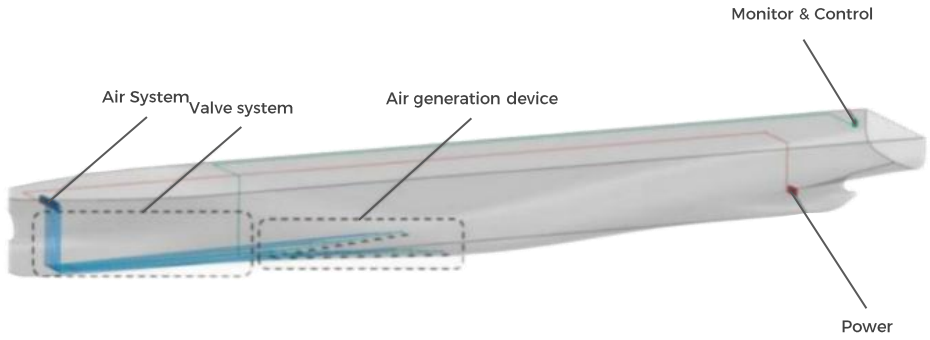
- Shaft generators could improve vessel's energy efficiency and reduce emissions which is driven by the main engine supply power to the vessel's main switchboard by converting variable voltage and frequency input to fixed voltage and frequency output.
- Ocean going vessels such as containers, bulk carriers, tankers,car carriers etc. are usually powered by high-efficiency two-stroke low-speed diesel engines, reducing fuel consumption and emissions are the directions of continuous improvement of their power systems.
- PTO of operating vessels is regarded as a beneficial solution to EPL and CII ratings for many shipowners.

Air Lubricate

- Air Lubricate including air system, valve system, air generation device, power supply system, monitoring and controlling system
- Taking 14000TEU container ship as an example, the gas source system adopts centralized compressor to supply gas, 24 gasgenerators are set up in the bottom of the ship, which are arranged in the form of high-efficiency drag reduction accordingt o the hydrodynamic design, through the pipe valve and monitoring system to implement multi-navigation state intelligent control.
- According to the ship model test and real-scale CFD simulation, the installation of the system has a net energy-saving effect of 5%-12%.







Led Illuminating System

- By comparing with traditional 500W halogen lamps, 50W LED luminaire offer a significant reduction in energy running costso,lower annual depreciation costs and zero bulb replacement costs generating an immediate return on investment. And total cost of ownership (TCO) savings of 35000 RMB over 5 years.

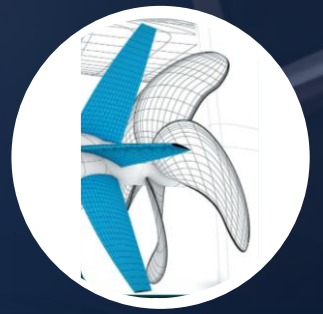
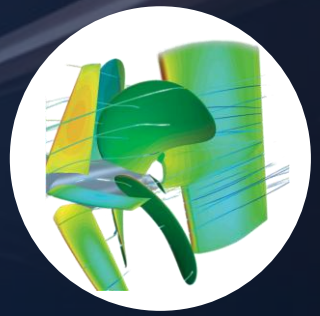
PV System onboard Ships

- PV-Photovoltaic storage system is also called solar panel, which is solar panels on the roof of bridge, converting the sunshine and heat energy into electric energy and storing it in the ship's battery through the intelligent control system,supplying the ship's daily electricity,avoiding the damage for frequently starting the diesel engine. In addition,the intelligent control system can protect the battery, which can greatly extend the life of battery.
- The system with zero pollution, zero noise, meeting the policy requirements of national energy-saving emission reduction, lessinvestment, high returns, making the system become the great choice of new energy generation for ships.

Propulsion Spare Parts

- Stern Tube Seal, Liner and Distance Ring, with Class Approval certificates and Compatible to EAL oil, which fit lip seal systems of all major brands of oil-lubricated systems, including air seals.
- Control Pitch Propeller
- Thruster Parts



Maintenance/Overhaul Services

- Stern Tube Seal Replacement and Bonding
- Control Pitch Propeller and Thruster overhaul
- Rudder and Steering Gear Maintenance




Professional Propeller Repair Service

- Specialize in delivering comprehensive, certified marine propeller repair solutions that meet the highest international standards for safety, durability, and performance. Our process is meticulously designed to restore propellers to optimal functionality while adhering to strict regulatory requirements, ensuring full compliance with classification society guidelines.
- Certified WPS and WPQR approved by leading classification societies (e.g., ABS, DNV, LR etc.), ensuring materials (e.g., nickel-aluminum bronze, stainless steel) match original propeller alloys.
- Qualified Welders, holding valid Class approved Welder certificates, perform precision welding to rebuild eroded or fractured sections, minimizing heat input to prevent distortion.
- Conduct Final NDT, dimensional checks, and balance testing to ensure compliance with ISO 1940 (balance quality) and Classification Society rules.
- Provide Detailed Reports, including material certificates, weld maps, NDT test results, for full traceability.

Stern Tube Seal Bonding for Container “EVER GRADE”

- Service Location: Zhoushan Xinya Shipyard
- Service Period: 2023/11 ~ 2023/12
- Service Scope: Wartsila 4AS 1180 Stern tube seal bonding

Thruster Overhaul for Container “MSC BOSPHORUS"

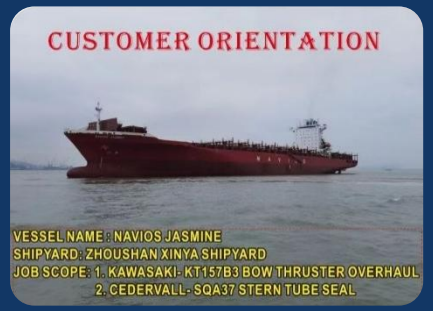
- Service Location: Shanhaiguan Shipyard
- Service Period: 2023/10
- Service Scope: Nakashima TCT240 Bow Thruster overhaul

S/T Seal & Thruster Overhaul for Tanker “NAVIOS JASMINE”

- **Service Location:** Zhoushan Xinya Shipyard
- **Service Period:** 2022/05 ~ 2022/06
- **Service Scope:** Kawasaki KT157-B3 Bow Thruster overhaul
  Cedervall SQA37 Stern tube seal overhaul

S/T Seal & CPP & Thruster Overhaul for BC “MYS SHMIDTA"

- **Service Location:** Zhoushan Zhongtian Shipyard
- **Service Period:** 2023/09
- **Service Scope:** Wartsila CT150 Bow Thruster overhaul
  SKF SC2 Stern Tube Seal overhaul
  MAN VBS1460-MK3 CPP overhaul



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