



宸居皓宇 卓尔不凡


CHIEF IN UNIVERSE BEING OUTSTANDING


上海宸宇凡实业发展有限公司

CHIEF INDUSTRY LIMITED

 **上海宸宇凡实业发展有限公司** **Chief industry Limited**

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Carbon

BWTS

公司介绍 ABOUT US

上海宸宇凡实业发展有限公司是一家专注于船舶行业的创新企业，秉承“服务、创新、共赢”的企业精神，致力于为船东提供优质的产品与服务。我们凭借卓越的技术和专业的团队，赢得了越来越多客户和市场的认可。

我们的发展愿景是“持续优化低碳方案”。公司积极响应绿色船舶的要求，致力于推动船舶能效和脱碳业务的开拓与创新。我们提供压载水处理系统、轴带发电机、导流罩、消涡鳍和高效桨等多项低碳环保解决方案，努力推进船舶行业的可持续发展。

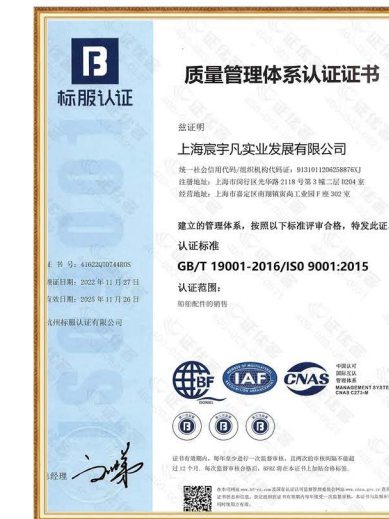
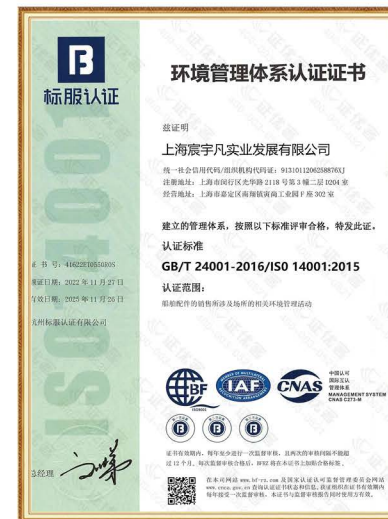
公司与业内知名高等院校、科研机构相合作，展开产学研结合。在市场引导下，在碳相关领域不断探索、推陈出新，推出适合市场需求的、优质高效的产品。

Chief Industry Limited specializes in ballast water treatment system and offer comprehensive ship service. We prioritize "service, innovation, and win-win" in our corporate ethos, earning recognition for our high-quality products and services in the maritime industry.

Our development vision focuses on "continuously optimizing low-carbon solutions". We actively meet the needs of green ships, innovate in ship energy efficiency. We provide low carbon and environmental solutions such as ballast water treatment system, variable frequency shaft generator, pre-shrouded vanes, hub-vortex absorbed fins and high efficiency propeller to promote the sustainable development of the Marine industry.

And collaborate with top-tier educational and research institutions to promote industry-academia cooperation. Guided by market demands, we innovate in carbon-related fields, delivering high-quality, efficient products tailored to market needs.

企业资质 ENTERPRISE QUALIFICATION





LNG/LPG

甲醇 Methanol

生物燃料 Biofuels

氢 Hydrogen

氨 Ammonia



轴带发电机

Shaft generator

变频改造技术

VFD Retrofit

岸电系统

AMP

电加热

Electric Heater

废热回收

Waste heat recovery

碳捕集技术

Carbon capture technology



消涡鳍

Hub-Vortex Absorbed Fins

导流罩

Pre-Shrouded Vanes

高效螺旋桨

High efficiency propeller

气体润滑减阻技术

Air Lubrication

减阻油漆

Drag reduction paint

风能方案

Wind energy solutions



降低航速

Reduce speed

提高船舶利用率

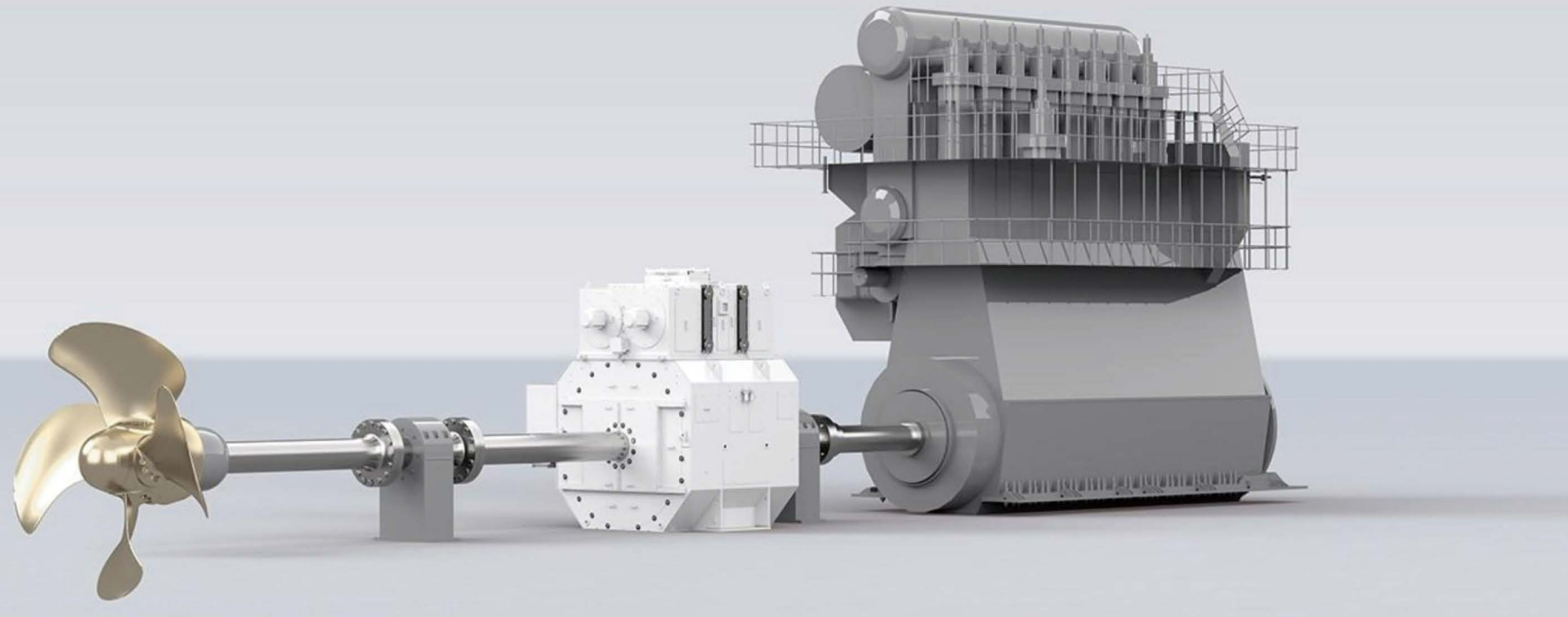
Increase ship utilization

船舶尺度

Ship scale

变更航线

Route alteration



➔ 节省燃油, 减少碳排放, 满足EEXI能效排放措施之一。

抱轴式直驱设计延长了主发电机的维护周期, 减少了润滑油的使用和其他运营成本, 降低了船舶航行期间机舱内发电机产生的噪音污染。
无轴承电机转子直接安装在主机中间轴上, 无需更换原船轴承支架或进行倒角处理。它易于安装在主机中间轴上, 与主机轴系同轴, 不占多余船体空间。
免维护, 便于在狭小空间内安装。
适用于95%以上的船型安装。

➔ This solution saves fuel oil, reduces carbon emissions, and meets one of the EEXI energy efficiency emission measures.

The direct drive design extends the maintenance cycle of the generator and reduces the use of lubricating oil and other operational costs, decreasing noise pollution from the generator during navigation.
The bearingless motor rotor is directly installed on the main engine's intermediate shaft, eliminating the need to replace the original ship's intermediate bearing supports or perform chamfering treatments. It is easy to install on the main engine intermediate shaft, coaxial with the main engine shaft system, occupying no additional space within the hull, maintenance-free, and convenient for installation in tight spaces.
It is suitable for installation on over 95% of ship types.

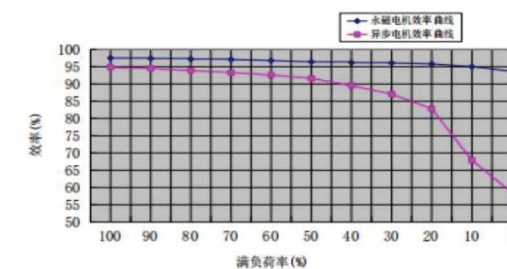
永磁抱轴式轴带发电机的优势 Advantages of permanent magnet shaft generator



永磁轴带发电机与传统的励磁轴带发电机的效率对比, 由图中可以看出, 永磁电机在整个不同负载情况下效率都高于电励磁电机, 并且负载率越低, 永磁电机越省电。这些特点正好符合船舶航行工况。

变频电源采用永磁低频设计, 可满足主机各种转速下的匹配需求(50-140prm)。

The efficiency comparison between permanent magnet shaft generator and traditional Excitation shaft generator shows that, as can be seen from the graph, the efficiency of permanent magnet generator is higher than that of Excitation shaft generator across all different load condition. Moreover, the lower the load rate, the more energy-efficient the permanent magnet motor is compared to the electrically excited generator. These characteristics perfectly match the operating condition of ship navigation.
The variable frequency power supply with permanent magnet low-frequency design meets the speed requirements between 65-120 rpm.



独立变频水冷单元设计。

永磁发电机免维护, 操作简单。

变频柜系统支持长时间并网运行使用。

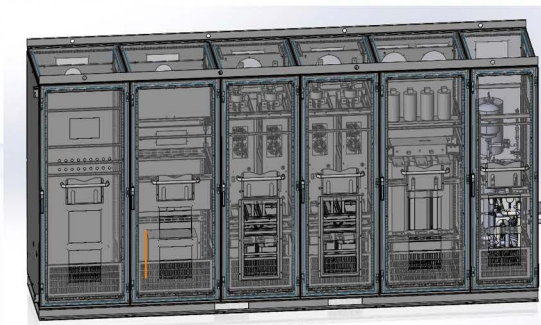
永磁抱轴发电机内部设有自动开关, 确保在不使用时不发电, 不会额外产生燃油消耗和阻力。

永磁抱轴发电机自带内置检测单元, 实时监测转子和定子之间的安全间距, 并在触摸屏上显示间距和报警预警。

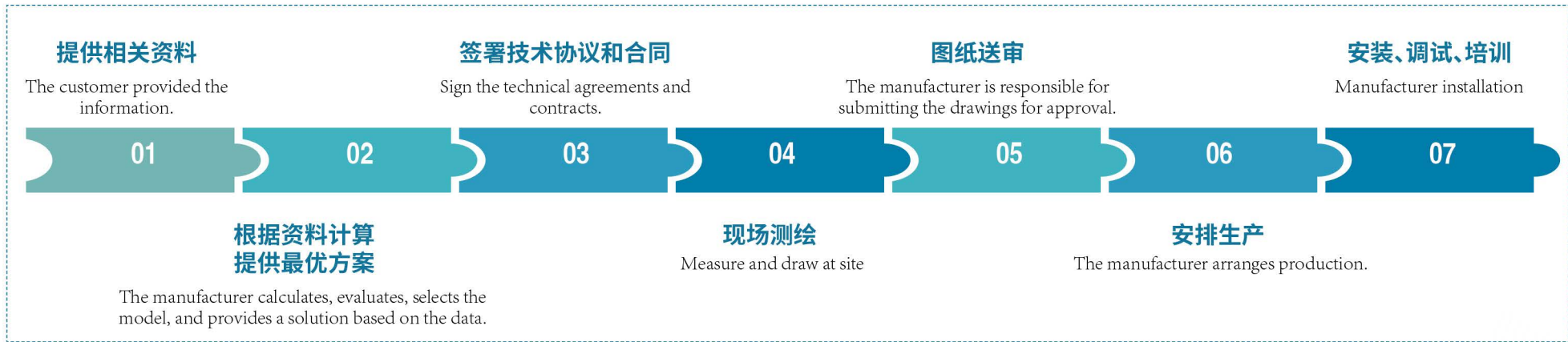
变频控制系统包括一级、二级和三级自动卸载功能, 卸载主配电板上的不重要负载, 确保航行安全。

航行中使用轴发超出自身功率时, 控制系统会自动启动辅机, 自动投入辅机并网使用, 确保航行安全要求。

The unit is designed with an independent variable frequency water-cooling system.
The permanent magnet generator requires free-maintenance, features simple operation.
The variable frequency cabinet system supports long-term grid-connected operation.
The permanent magnet shaft generator has an internal automatic switch to ensure that it does not generate electricity when not in use, avoiding additional fuel consumption and resistance.
The permanent magnet shaft generator comes with a built-in detection unit that continuously monitors the safe distance between the rotor and stator, with a touch screen display for distance and pre-alarm.
The variable frequency control system includes level one, two, and three self-unloading functions, primarily shedding non-essential loads on main switchboard to ensure navigation safety.
When the shaft generator exceeds its own power during navigation, the control system automatically starts the auxiliary generator, integrating it into the main power grid to meet the safety of navigation requirements.



轴发加装流程 The process of installing shafts



船东在初期阶段需要提供以下文件:

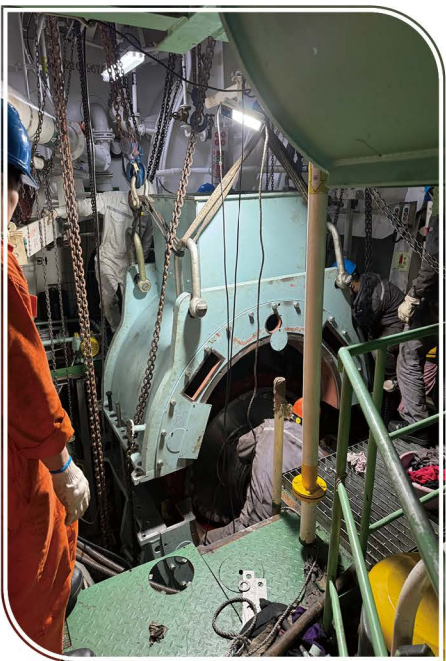
1. (电气) 电力-次系统图,
2. (电气) 电力负荷计算书,
3. (电气) 短路电流计算书,
4. (电气) 电力设备布置图,
5. 机舱设备布置图,
6. 机舱结构图,
7. 轴系布置图,
8. 尾轴尾管总图,
9. 中间轴,
10. 中央冷却水系统图,
11. 扭振计算报告,
12. 轴系校中计算书,
13. 主机台架试验报告,
14. 辅机台架试验报告。

The shipowner provided the following documents in the initial stage:

1. (Electrical) Power - Subsystem Diagram,
2. (Electrical) Power Load Calculation Report,
3. (Electrical) Short-Circuit Current Calculation Report,
4. (Electrical) Power Equipment Arrangement Diagram,
5. Engine Room Equipment Arrangement Diagram,
6. Engine Room Structure Diagram,
7. Shafting Arrangement Diagram,
8. Tail shaft and stern tube general diagram,
9. Intermediate Shaft,
10. Central Cooling Water System Diagram,
11. Torsional Vibration Calculation Report,
12. Shafting Alignment Calculation Report,
13. Main Engine Bench Test Report,
14. Auxiliary Engine Bench Test Report.



实船案例 Project Cases



变频改造技术 VFD Technology



船舶上的风机和水泵数量较多。本应用主要针对机舱风机及海水泵。

风机水泵的容量设计均针对最恶劣的工况

- 泵的容量设计考虑在船舶全速运行, 以及海水温度高的条件之下。
- 风机的容量设计考虑在主、辅机运行在额定功率, 环境温度高(赤道区域)和一台风机故障的条件下。

实际的运行情况:

- 设计工况较少出现。一般情况下, 海水温度和空气的环境温度均未达到极限设计值。
- 船舶降速运行下的节能潜力。

我们的设计原则:

在保障船舶安全运行的前提下, 提高船舶风机、水泵的能效。



Ships are typically equipped with a large number of fans and pumps. This application mainly targets engine room fans and seawater pumps.

The capacities of these fans and pumps are designed based on the most demanding conditions:

- Pumps are sized to operate under full-speed sailing conditions and high seawater temperatures.
- Fans are sized to operate under conditions where the main and auxiliary engines run at full rated power, in high ambient temperatures (e.g., equatorial regions), and with one fan out of service.

Actual operating conditions:

- The design conditions are rarely encountered. In most cases, seawater and ambient air temperatures do not reach the extreme design values.
- There is significant energy-saving potential when the ship is operating at reduced speed.

Our design principle:

- To improve the energy efficiency of ship fans and pumps while ensuring the safe operation of the vessel.



海水泵变频控制系统 Variable frequency control system for seawater pump



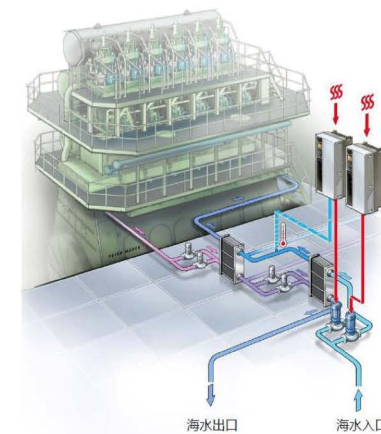
船的冷却系统是针对32°C海水温下的100%负荷设计的, 而不考虑实际水温如何。

- 因为并非所有船舶均在赤道表面水体中或者以最大速度航行, 所以很少会用到最大冷却容量。因此变频器控制泵时的泵流速总是能够适应任何特定时间的需求, 从而能够明显节省能源。
- 海水泵由变频器控制, 淡水单元的出水温度为36-38°C, 以满足实际流量要求。

- 海水泵变频控制系统优化方案投资回报时间通常为12个月

The ship's cooling system is designed for 100% load at 32°C seawater temperature, without considering actual seawater conditions.

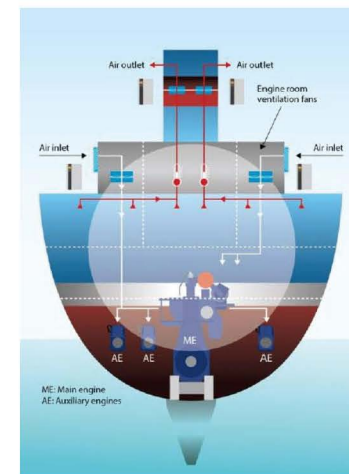
- Since not all vessels operate in equatorial waters or sail at maximum speed, the maximum cooling capacity is rarely utilized. Therefore, when pumps are controlled by variable frequency drives (VFDs), the pump flow rate can always be adjusted to match real-time demand, resulting in significant energy savings.
- The seawater pumps are controlled by VFDs, and the outlet temperature of the freshwater unit is maintained at 36–38°C to meet actual flow requirements.
- The payback period for the seawater pump VFD optimization system is typically 12 months.



机舱风机变频控制系统 Variable frequency control system for ER Fan

- 大多数船舶即使没有对于机舱内通风的温度和压力的自动控制, 依然会运行工作。
- 传统的通风控制就是通过运行/关闭(ON/OFF), 或者高/低/关闭的2个速度风机的控制实现。
- 进口风机必须为主机、涡轮增压器和锅炉提供充足的冷却风量, 同时在机舱内换风。
- 当减速运行时, 所需的冷却风量和主机功率的减少成正比关系。
- 机舱风机变频控制系统的优化方案投资回报时间通常少于18个月。

- Most ships operate the engine room ventilation system even without automatic control of temperature and pressure inside the engine room.
- Traditional ventilation control is achieved through ON/OFF operation or controlling fans at two speeds: high/low/off.
- The intake fans must provide sufficient cooling airflow for the main engine, turbocharger, and boiler, while also ventilating the engine room.
- When running at reduced speed, the required cooling airflow decreases proportionally with the reduction in main engine power.
- The payback period for the engine room fan variable frequency drive (VFD) optimization system is typically less than 18 months.





导流罩 Pre-Shrouded Vanes

- ➔ 导流罩由导管和预旋导叶组成, 其中导管主要负责流场加速作用, 导叶起到流场预旋作用, 二者联合作用下, 可以提高螺旋桨的推进效率。
导流罩可以纠正进入螺旋桨的流量, 从而从本质上减少螺旋桨滑流中的旋转损失, 并增加向螺旋桨内径向的流速。导流罩能够在给定速度下显著节省主机功率, 或在给定功率下使船舶更快航行。
- ➔ The pre-shrouded vanes is composed of a guide tube and pre-rotating guide vanes, where the guide tube is mainly responsible for accelerating the flow field, and the guide vanes play a role in pre-swirl the flow field. Under the combined action of the two, the propulsion efficiency of the propeller can be improved.
it can correct the flow entering the propeller, thereby fundamentally reducing the rotational loss in the propeller slipstream and increasing the flow velocity towards the inner radius of the propeller. This device is specifically developed for slower ships, capable of significantly saving main engine power at a given speed, or allowing the ship to travel faster at a given power level.

消涡鳍 Hub-Vortex Absorbed Fins

- ➔ 消涡鳍安装在船舶螺旋桨的轮毂处, 毂盖上有小鳍片, 可产生反向涡流, 抵消螺旋桨产生的涡流(轮毂涡流), 从而提高推进效率。它的安装方式与原来的凸台帽相同, 并随螺旋桨一起旋转。
涡流鳍是一种安装在船舶螺旋桨上的节能装置, 它打破了旋转螺旋桨后面产生的轮毂涡流或漩涡, 从而减少了燃料消耗。
- ➔ A vortex fin is installed at the hub of a ship's propeller, with small fins on the hub cover that generate reverse vortices to counteract the vortices produced by the propeller (hub vortices), thereby improving propulsion efficiency. It is mounted in the same way as the original boss cap and rotates along with the propeller.
Vortex fins are energy-saving devices installed on ship propellers. They disrupt the hub vortices or swirls generated behind the rotating propeller, reducing fuel consumption.



32000 载重吨散货船在给定速度下的功率预测

Power prediction of 32000 DWT bulk carrier at given speed

- ➔ 一艘32000吨的散货船每年运营280天, 每天消耗大约21吨燃料。这意味着每年大约消耗5880吨燃料。燃料节省情况如下表所示。
- ➔ Fuel Savings Analysis:
A 32,000-ton bulk carrier operates 280 days per year and consumes approximately 21 tons of fuel per day. This means it consumes about 5,880 tons of fuel annually. The fuel savings are shown in the table below.

particulars	PSV+HVAF
Energy saving %	6%
Reduction in fuel consumption	352.8T
Low sulfur cost saving \$600/T	211680\$

fuel load condition	speed	output power No ESD PDT0 (KW)	output power With Eindhoven PDT1 (KW)	PSV savings (D PDT1 = 1-PDT1 /PDT0)	output power With PSV & HVAF PDT2(KW)	PSV savings (D PDT2 = 1 - PDT2 / PDT0)
Size draft	10.5	1506	1425	5.4%	1346	8.1%
	11.5	2003	1900	5.1%	1846	7.8%
	12.5	2625	2490	5.1%	2419	7.8%
	13.5	3418	3241	5.2%	3149	7.9%
	14.5	4372	4166	4.7%	4048	7.4%
	15.5	5674	5408	4.7%	5255	7.4%
	16.5	7462	7114	4.7%	6913	7.4%

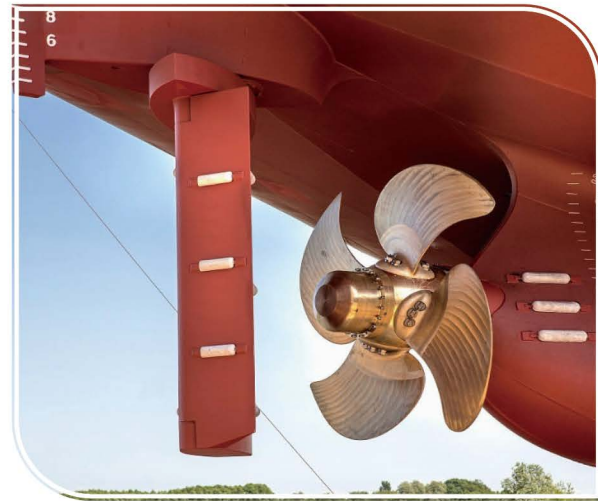
高效桨 High efficiency propeller

换桨 Change propeller

- 由于大多数船舶已经安装了EPL, 其功率受到限制。在正常情况下, 实际航速无法达到原设计航速。而螺旋桨的设计点与原航速密切相关, 因此, 安装EPL后, 原螺旋桨的工作点会偏离, 导致螺旋桨无法充分发挥其效率。
此时, 如果根据EPL的功率和对应的航速重新设计螺旋桨, 新桨设计点将完美匹配船舶的状态, 从而显著提高效率。
- Since most ships have already installed EPLs, their power is limited. Normally, the cruising speed can no longer reach the originally designed speed. The design point of the propeller is closely related to the speed. Therefore, after installing an EPL, the working point of the original propeller will deviate, causing the propeller to be unable to fully utilize its efficiency. At this point, if the propeller is redesigned based on the power of the EPL and its corresponding speed, the new propeller's design point will perfectly match the ship's state, resulting in a significant improvement in efficiency.

削桨 propeller blades edge elimination

- 如果不采用更换高效桨, 又想解决螺旋桨偏重的问题, 可以选择旧桨进行边缘修剪。这种方法通过改变原有螺旋桨的边缘来调整其水动力性能, 从而改善主机和螺旋桨之间的匹配度。削边后, 螺旋桨的效率可能会略有下降, 但由于改善了主机与螺旋桨的匹配关系, 主机的单位油耗降低, 整体燃油消耗也能得到改善。
- If you don't choose to replace the propeller with a more efficient one and want to solve the problem of the propeller being too heavy, you can choose for trimming the edges of the original propeller. This solution involves modifying the edges of the original propeller to change its hydrodynamic performance and improve the match between the main engine and the propeller. After trimming, the efficiency of the propeller may decrease slightly, but since it improves the matching relationship between the engine and the propeller, the unit fuel consumption of the main engine decreases, and overall fuel consumption can also be improved.



施工周期: 1-2 天



2: 螺旋桨削边

高效桨 High efficiency propeller

实船案例 Project Cases

- 根据初步估计, 11.45w吨船在结构吃水状态下, 以11.0节的速度航行时, 新型螺旋桨比旧型螺旋桨能效高出约5.4%, 每天可节省燃料约2吨。
- Based on preliminary estimates, the new propeller is approximately 5.4% more energy-efficient than the old one under a structural draft condition and at a speed of 11.0 knots, saving about 2 tons of fuel per day.

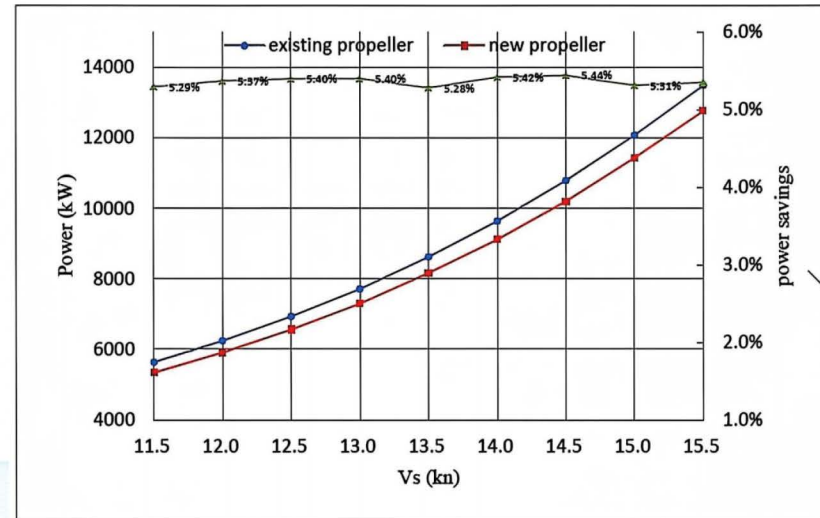


图 1: 各航速下新桨节能效果

新旧桨数据对比 Comparison of new and original propeller data

Summary				
Propeller	Existing	Redesign		
Power (kW)	8963	8478		engine power @vs
Power Savings		5.4%		
DFOC (t/d)	36.8	34.8		daily fuel oil consumption
Fuel Savings (t/d)		2.0		

Details				
	Existing	Redesign	ratio	note
Main Engine				
SMCR (kW)	15820	15820		
N1 (rpm)	105	105		engine speed at SMCR
MCRum (kW)	9096	9096		Engine Power Limitation
Ship				
Draft (m)	15.0	15.0		
VS (knts)	13.0	13.0		ship speed
N (rpm)	84.0	84.7	1.008	propeller speed
LRM	1.3%	4.0%	3.131	light running margin
PD (kW)	7716	7299	0.946	power delivered @VS
Propeller				
Diameter (mm)	7480	7480		
N. Blades	4	4		
weight (kg)	28748	25570	0.889	
Hub				
DA (mm)	1090	1090		diameter, aft end
DF (mm)	1175	1175		diameter, fwd end
LH (mm)	1300	1300		hub length
DS [mm]	600	600		diameter of shaft

船舶能效提升方案

Ship Energy Efficiency Improvement Product Solution

轴带发电机、导流罩、消涡鳍、高效桨。

Shaft generator,pre-shrouded vanes, vortex fins, high efficiency propeller.

船舶能效管理计划编制

Ship Energy Efficiency Management Plan Compilation

提供船舶能效管理计划的准备、船级社数据提交和欧盟MRV报告。

Offering the preparation of Ship Energy Efficiency Management Plans, classification society data submission, and EU MRV reporting.



船舶能效数据管理与分析系统

Ship energy efficiency data management and analysis system

提供船舶能效数据管理与分析软件-凡碳宝。

Provide energy efficiency automation monitoring software - Chief Carbon Solver.

欧盟账户开设与碳交易

EUA Account Opening and Carbon Trading

我们为欧盟提供EUA开户服务,熟悉碳交易规则和系统,通过与国内外机构和政府的合作参与交易。我们为欧洲商业公司提供EU-ETS配额交易和托管服务。

We offer EUA account opening services for the European Union. Familiar with carbon trading rules and systems, we participate in transactions through cooperation with domestic and international institutions and governments. We provide EU-ETS quota trading and custody services for European business companies.



对于欧盟发布的船舶能效管理规范,进行数据采集及智能化处理。

Conduct data collection and intelligent processing for ship energy efficiency management standards issued by the EU.

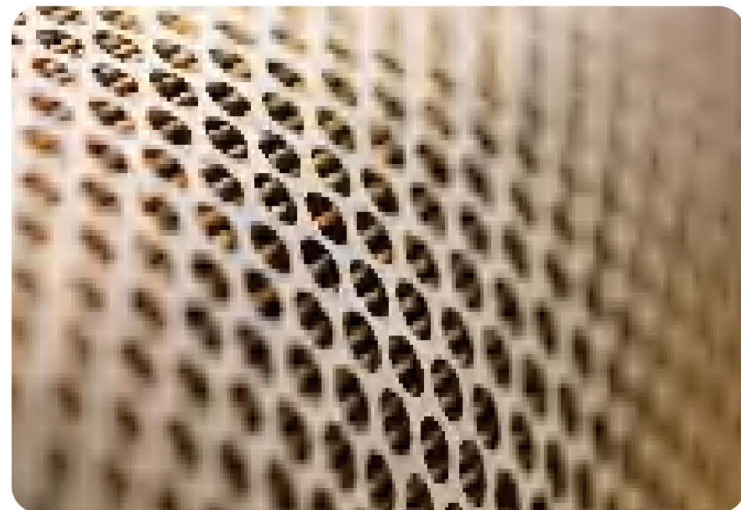
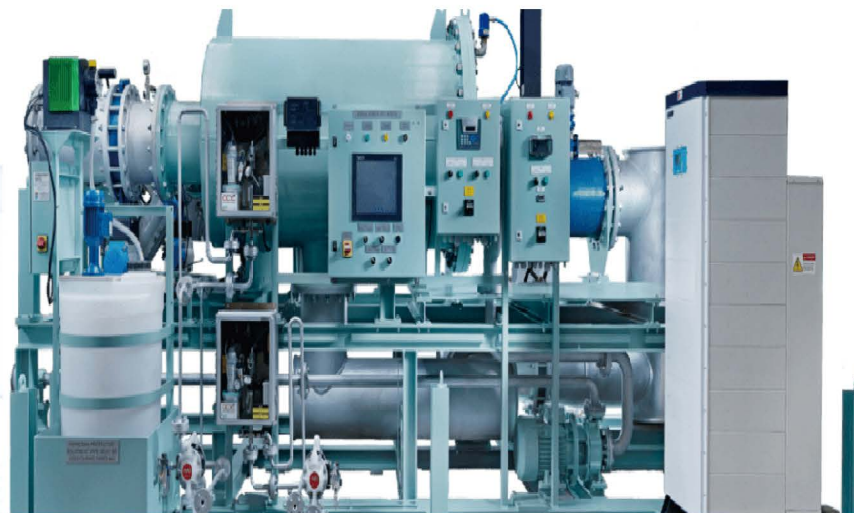
- 适用于船舶航行状态下的数据实时采集与上传,用于编制监测计划及排放报告。
It is suitable for real-time data collection and upload under the ship sailing state. For the preparation of monitoring plan and emission report.
- 对船舶能效及能耗状况进行分析评估,提供能效优化方案。
Analyze and evaluate the energy efficiency and energy consumption of ships, and provide suggestions for energy efficiency schemes.
- CII预估和评级
CII estimates and ratings
- 对于单船所需的碳额度进行预估,提供购买建议
Estimate the carbon credit required for a single ship and provide purchasing advice.

技术维护

Technical maintenance

提供船舶压载水处理系统的故障诊断、维修和保养服务

Provide BWTS technical fault diagnosis, repair and maintenance



滤芯、UV灯管、TRO部件、各类传感器等

Filter elements, UV lamps, TRO parts, various sensors, etc

备品备件

Spare parts

设备年检

Equipment annual inspection

传感器校验、BWTS运行检测

Sensor calibration, BWTS System operation monitoring



提供IMO D-2 &VGP水质取样和化验

Provide IMO D-2 &VGP water quality sampling and testing

水质检测

Water quality testing