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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

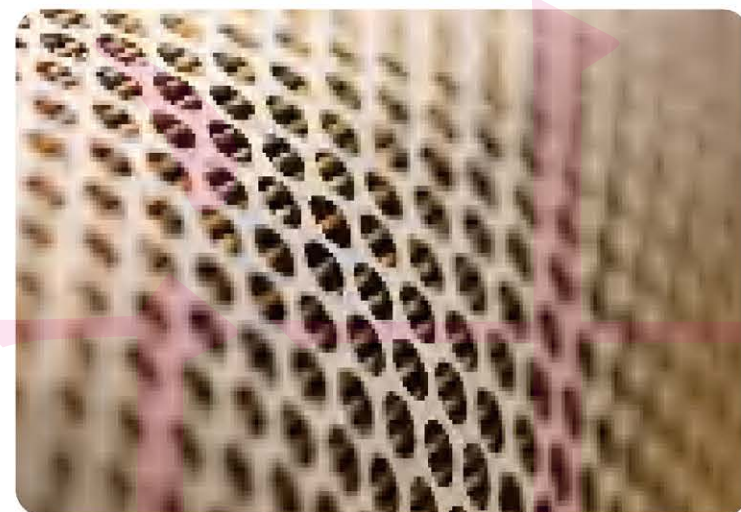
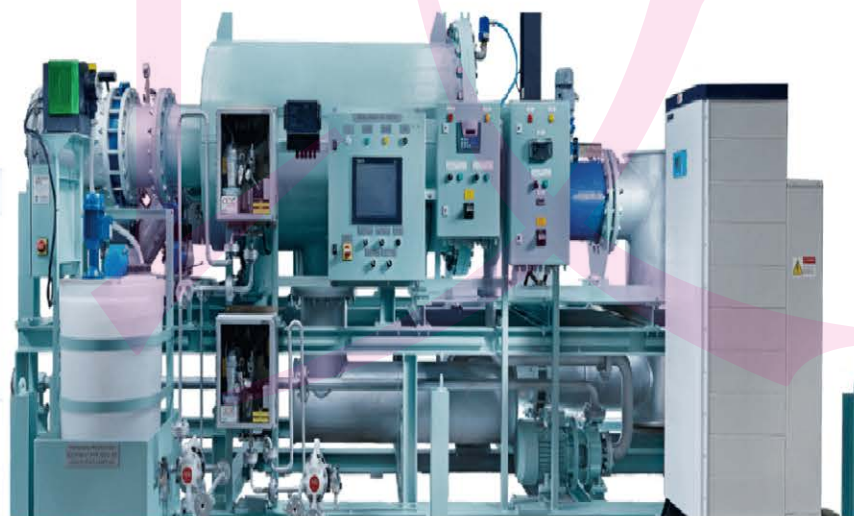


技术维护

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

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.



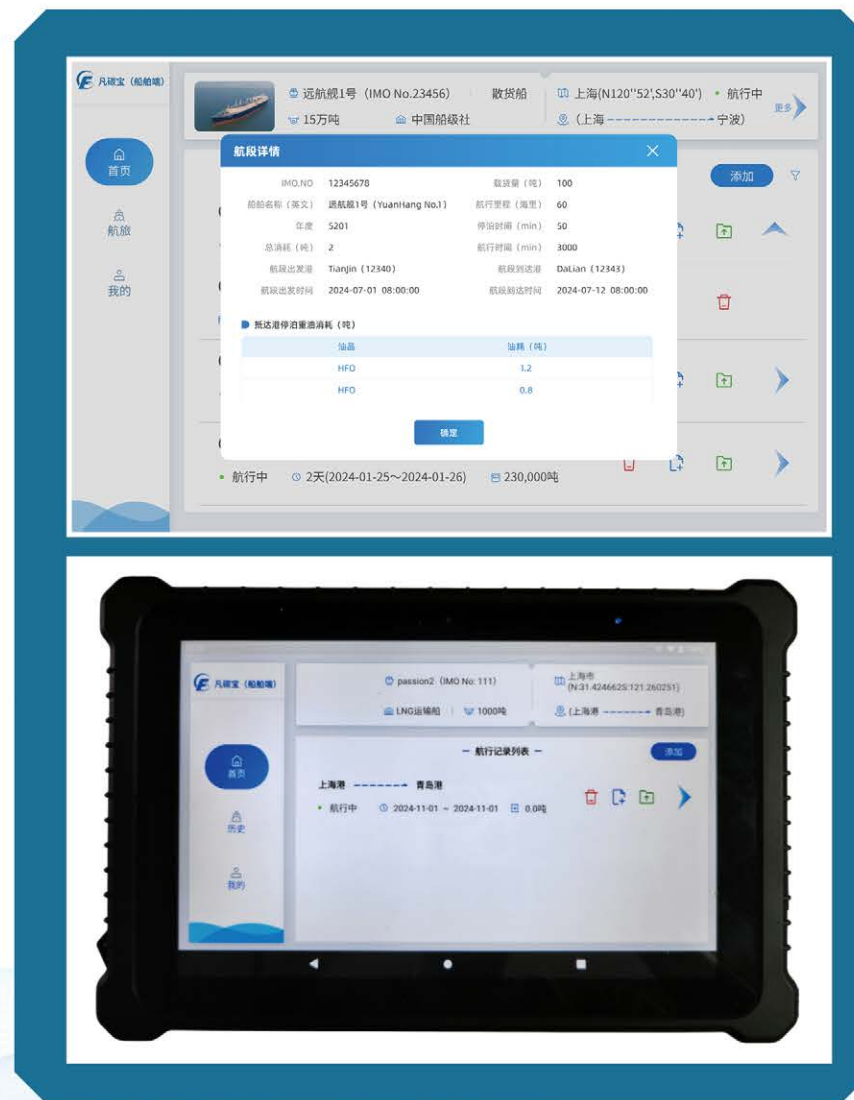
船舶能效数据管理与分析系统
Chief Carbon Solve Ship energy efficiency
data management and analysis system

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.

凡碳宝—船舶能效数据管理与分析系统
Chief Carbon Solve Ship energy efficiency data management and analysis system



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.

船舶能效等级提升合规整改措施

ENERGY EFFICIENCY IMPROVEMENT PRODUCT SOLUTION



燃料和能源 Fuel and energy

LNG/LPG

甲醇 Methanol

生物燃料 Biofuels

氢 Hydrogen

氨 Ammonia

机械设备 Machinery

轴带发电机

Shaft generator

碳捕集技术

Carbon capture technology

变频改造技术

PWM Technology

废热回收

Waste heat recovery

岸电系统

AMP

电加热

Electric Heater

流体力学 Hydrodynamic

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

数字化 Digitization

降低航速

Reduce speed

提高船舶利用率

Increase ship utilization

船舶尺度

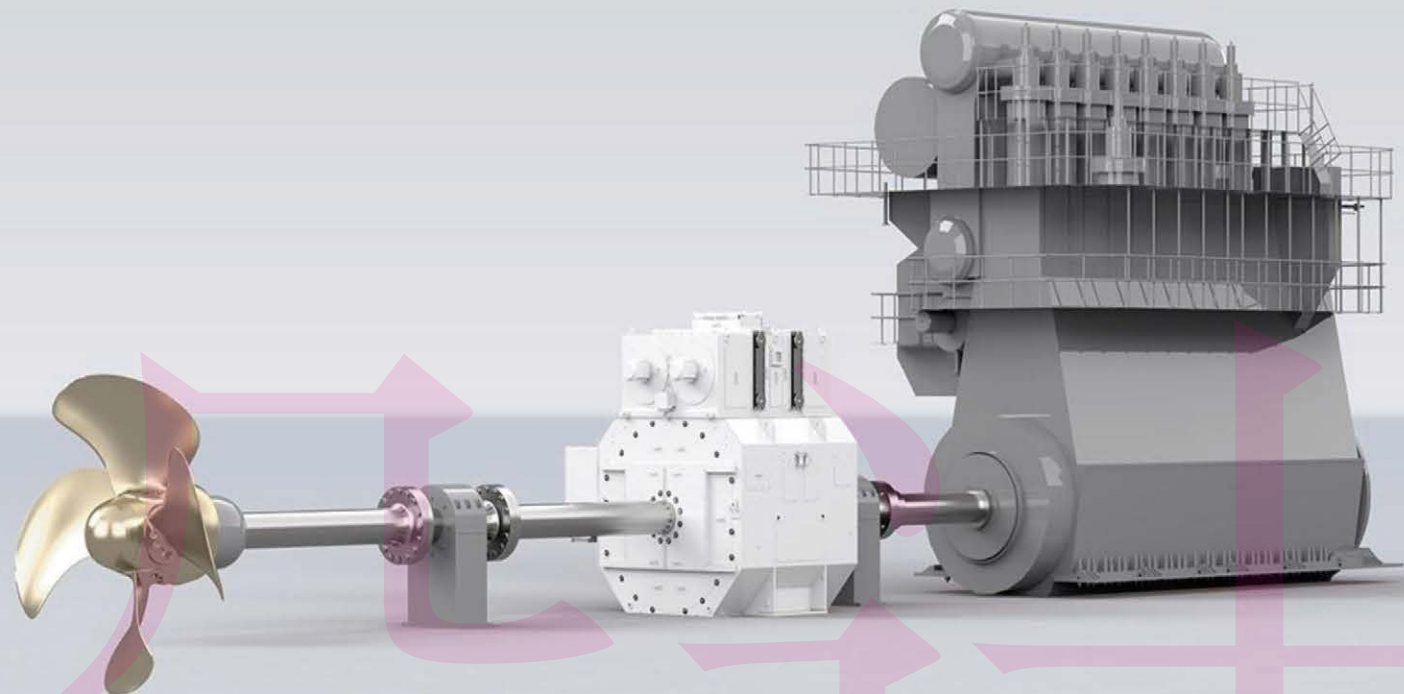
Ship scale

变更航线

Route alteration

永磁抱轴式轴带发电机

PERMANENT MAGNET SHAFT GENERATOR



- ➔ 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

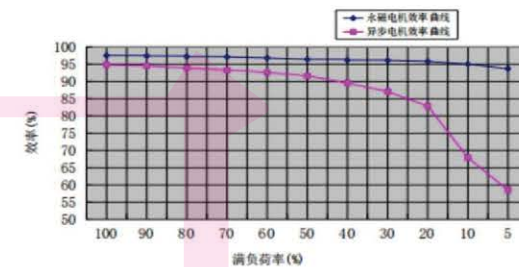


永磁轴带发电机与传统的励磁轴带发电机的效率对比, 由图中可以看出, 永磁电机在整个不同负载情况下效率都高于电励磁电机, 并且负载率越低, 永磁电机越省电。这些特点正好符合船舶航行工况。

变频电源采用永磁低频设计, 满足65-120转/分钟的转速要求。

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.

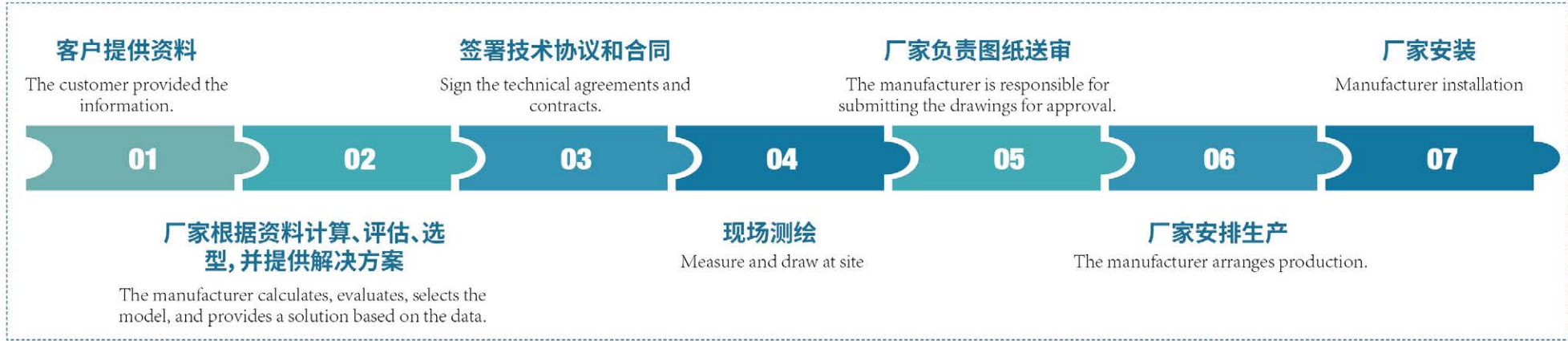
The permanent magnet shaft generator comes with a built-in detection unit that continuously monitors the safe distance between the rotor and stator, with a touch screen display for distance and pre-alarm.

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



岸电系统 AMP



- 岸电系统是指在船舶正常运营靠港期间, 向船舶供电的系统, 包括船载装置和岸基装置。
- 岸电系统的工作原理是将岸上供电系统(即岸基装置)通过船岸交互部分将电力送至船舶受电系统(即船载装置)。
- The shore power system refers to the system that supplies electricity to ships from ports during their normal operations while docked. This includes both ship-mounted and shore-based equipment.
- The working principle of the shore power system involves transferring electricity from the onshore power supply system (i.e., the shore-based equipment) to the ship's receiving system (i.e., the ship-mounted equipment) through the interface between ship and shore.

我们的优势 Our Advantages

完全集成、预设计和预接线

Fully integrated, pre-designed, and pre-wired

CSC安全认证

CSC safety certification

制造时间短
(2个月以内)

Short manufacturing time (within 2 months)

易于运输和安装

Easy to transport and install

根据船况定制设计

Customized design according to ship conditions

岸电系统 AMP

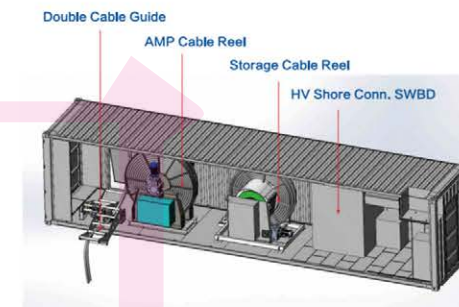


高压输出AMP容器

- ※ 40英尺高立方集装箱
- ※ 尺寸(长度)12192 x (宽度)2438 x (高度)2896毫米
- ※ AMP电缆卷轴(电缆长度可达55米)
- ※ 高压岸接线总机
- ※ 控制和监控面板
- ※ 火警探测系统
- ※ 灭火器
- ※ 照明
- ※ 加热
- ※ 存储电缆卷轴(可选)

High-Voltage Output AMP Container

- 40-foot High Cube Container
- Dimensions (Length) 12192 x (Width) 2438 x (Height) 2896mm
- AMP Cable Drum (Cable length up to 55 meters)
- High-Voltage Shore Connection Box
- Control and Monitoring Panel
- Fire Detection System
- Fire Extinguisher
- Lighting
- Heating
- Storage Cable Drum (Optional)

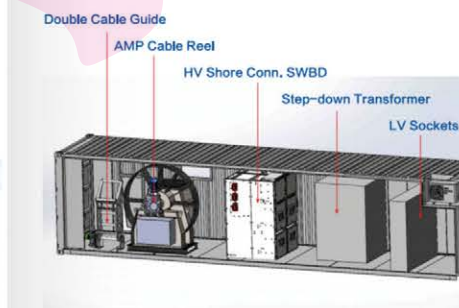


低压输出AMP容器

- ※ 40英尺高立方集装箱
- ※ 尺寸(长度)12192毫米 x (宽度)2438毫米 x (高度)2896毫米
- 内置组件:
- ※ AMP电缆卷轴(电缆长度可达55米)
- ※ 高压岸接线总机
- ※ 控制与监控面板
- ※ 火警探测系统
- ※ 灭火器
- ※ 照明
- ※ 加热
- ※ 降压变压器
- ※ 冷却系统(可选)

AMP Container with Low-voltage Output

- 40-foot High Cube Container
- Dimensions (Length) 12192 x (Width) 2438 x (Height) 2896mm
- Built-in Components:**
- AMP Cable Reel (Cable length up to 55 meters)
- High Voltage Shore Connection Box
- Control and Monitoring Panel
- Fire Detection System
- Fire Extinguisher
- Lighting
- Heating
- Step-down Transformer
- Cooling System (Optional)





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

- ➔ 燃料节省分析
一艘32,000吨的散货船每年运营350天, 每天消耗大约21吨燃料。这意味着每年大约消耗7,350吨燃料。燃料节省情况如下表所示。
- ➔ Fuel Savings Analysis:
A 32,000 ton bulk carrier operates for 350 days per year and consumes approximately 21 tons of fuel daily. This amounts to about 7,350 tons of fuel annually. The savings in fuel are shown in the table below.

| particulars | PSV+HVAF |
|-------------------------------|----------|
| Energy saving % | 6% |
| Reduction in fuel consumption | 441 |
| Low sulfur fuel cost saving | 308700 |

| 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% |

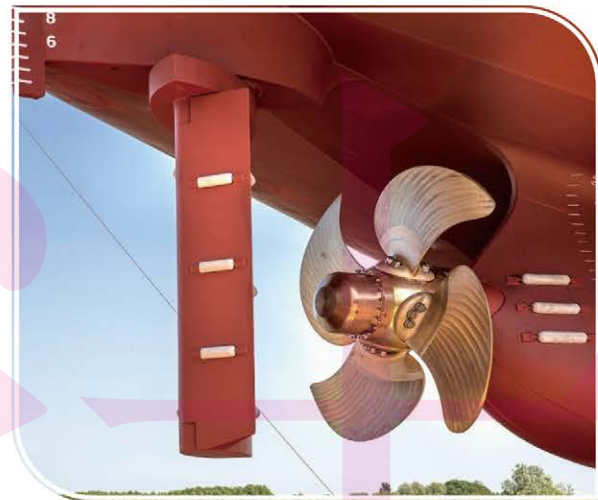
高效桨 High efficiency propeller

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13.0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 13.0 knots, saving about 2 tons of fuel per day.

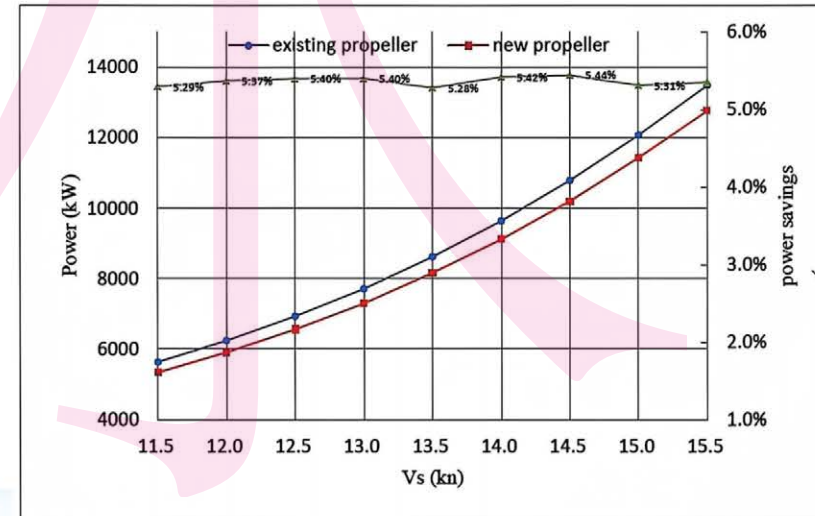


图 1: 各航速下新桨节能效果

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 |