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船舶推进及动力定位系统 配套解决方案

Marine Machinery Equipment Solution of
Propulsion and Dynamic Position System

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武汉船用机械有限责任公司

简介 Introduction

武汉船用机械有限责任公司是国内最专业的船舶推进及动力定位系统配套企业，拥有超过三十年的推进及动力系统集成配套的丰富经验，可以为各类船舶提供可调螺距螺旋桨（简称调距桨/CPP）、全回转、侧向推进器、喷水推进器、舵机等五大类全系列产品的配套解决方案。

各系列产品均基于标准化、模块化、系列化的理念设计，产品兼容性好、易于安装和维护。累计投入市场的各类推进器产品及动力系统近千套，配套船型涵盖半潜船、消防船、科考船、各类海工船、自航平台、渔政船、海监船及海军各类水面舰船。

同时，公司具有丰富的集成配套经验，可以提供从主推进柴油机或电动机、齿轮箱、高弹联轴器、调距桨和轴系、全回转舵桨、侧向推进装置、轴带发电机、消防泵、监测控制系统以及动力定位系统等集成设计的完整技术解决方案。

Wuhan Marine Machinery plant Co.,Ltd(WMMP) is the most professional marine machinery equipment company of Propulsion and Dynamic Position System in China, it has rich experience of supporting propulsion and power system integration for more than thirty years. WMMP can provide machinery equipment solution of five major type productions with full series for all kinds of ships, They are Main Controllable Pitch Propeller (CPP) , Azimuth Thruster, Tunnel Thruster, Waterjet, and Steering Gear.

The five major type productions are designed based on the ideal of standardization, modularization and serialization , these productions have good compatibility, and easy to be mounted and maintained. WMMP has invested a total of all kinds propeller products and power system in market nearly 1000 sets, its propulsion system covers semi submersible vessel, fire float, research ship, all sorts of marine ship, self-propelled platform, fisheries administration ship, ocean surveillance ship,and all kinds of navy ship on water.

Meanwhile, WMMP has rich experience of supporting system integration, it can provide complete technology solution of integrated design from main diesel engine or electromotor, gear box, high elastic coupling, CPP and shaft, azimuth thruster, Tunnel Thruster, shaft generator, fire pump, monitoring control system to dynamic position system.

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WP调距桨

WP CPP

WP调距桨和轴系装置由我公司自主研发，获得了2008年度国家重点新产品。设计理念和国外先进技术相当，产品性能达到国外同期先进水平，在国内处于领先地位。

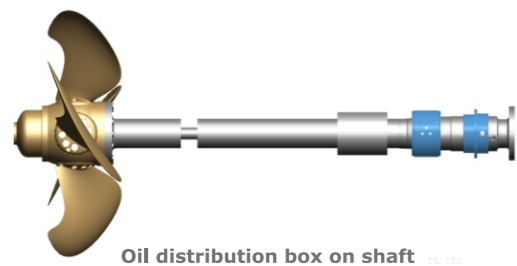
主要特点：

- 规格齐全，系列化产品覆盖了所有类型船舶；
- WP调距桨在功率重量比及承载能力上高出国内同类产品约20%，螺旋桨推进效率高出约5%~8%。
- 具有三种结构型式：推拉杆式、单油管式和双油管式；
- 具有两种安装型式的配油器：齿轮箱前端配油器和轴式配油器；
- 3叶、4叶和5叶调距桨；
- 最大桨毂直径：~2500mm；
- 单桨最大功率：~60MW；
- 可以实现正车稳距和正倒车双向稳距；
- 除常规调距桨外，还可以提供顺桨；
- 可以实现导管内拆装或水下更换桨叶。

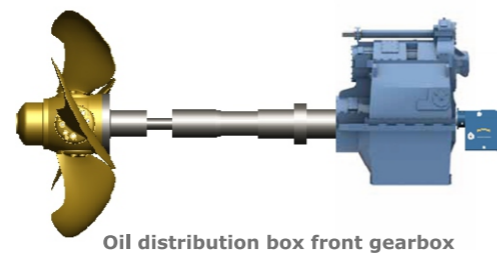
WP CPP and shaft equipment is independently developed by WMMP, and it has acquired the 2008 annual national key new product, its design idea reaches foreign advanced technology, the performance of the product reaches advanced level in abroad, and reaches leading level in domestic.

Main characteristics:

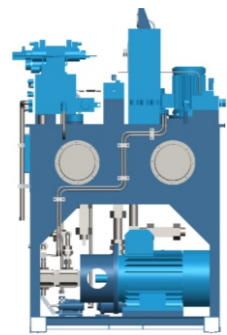
- Full types, serial products cover all kinds of ships;
- WP CPP improved its ratio of power to weight and carrying capacity 20% compare to general products inland, and its propeller efficiency improved 5%~8%;
- Three structural forms: push-pull rod, single tube, twin tube;
- Two installation forms of oil distribution box: oil distribution box front gearbox and oil distribution box on shaft ;
- Three, four, five blades CPP;
- Max. propeller hub diameter: ~2500mm;
- Max. power of Single propeller: ~60MW;
- Can fix pitch at both ahead and astern positions;
- Except CPP, the feather propeller can be provided;
- Can achieve disassembling blade in nozzle or in water.



Oil distribution box on shaft



Oil distribution box front gearbox



Hydraulic system



Control system

WMMP-MAN调距桨

WMMP-MAN CPP

WMMP引进了MAN Diesel&Turbo公司全系列调距桨，是国内唯一一家具有MAN Diesel&Turbo调距桨许可证企业。

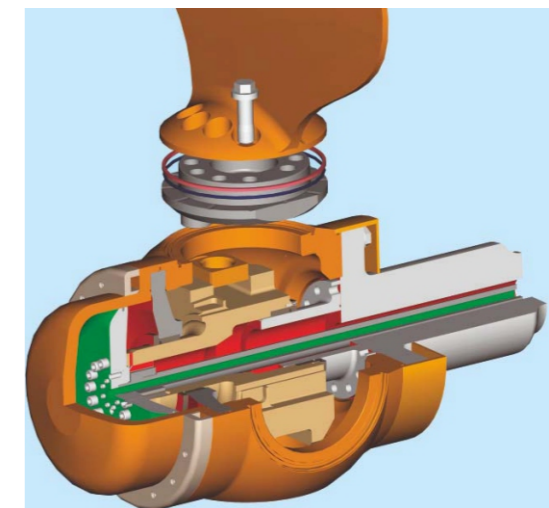
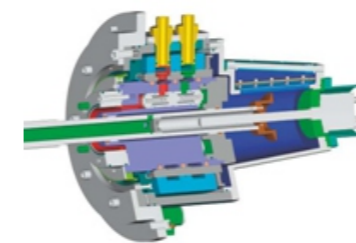
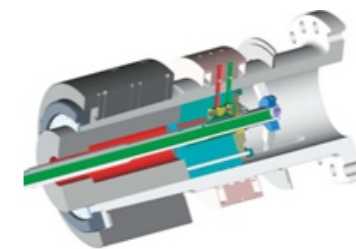
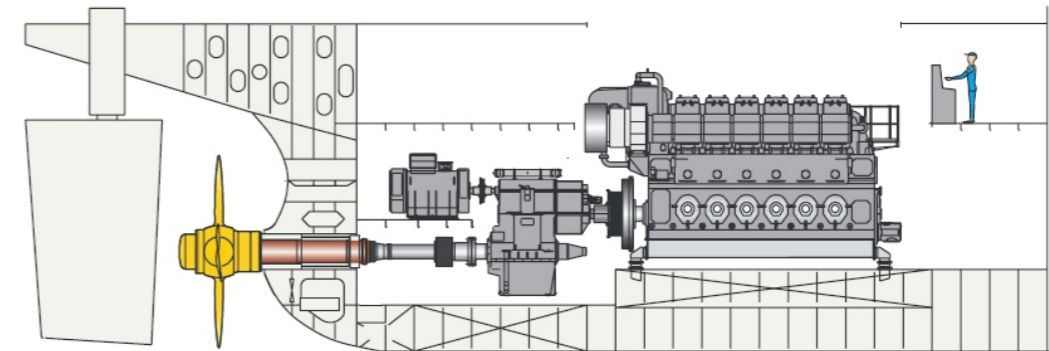
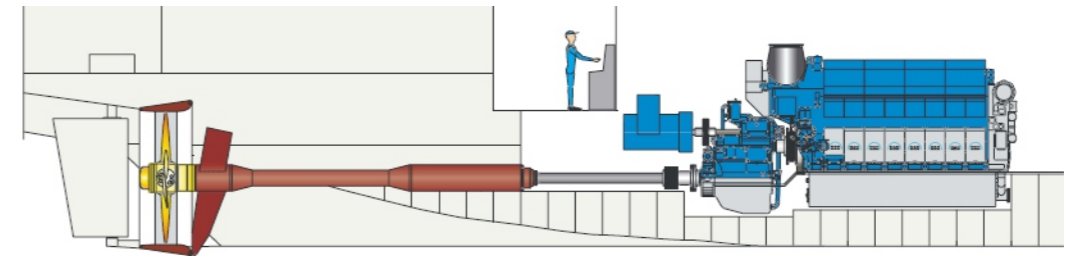
主要特点：

- 桨毂直径范围：640mm~1940mm；
- 单桨最大功率：~30MW；
- 桨叶可采用MAN Alpha Kappel设计，提高效率、减小振动；
- 导管可采用AHT设计，比19A导管增加10%系柱推力。

WMMP introduced Man B&W's full range of CPP, which is the only one domestic company acquired the license of MAN Diesel&Turbo CPP.

Main characteristics:

- Range of propeller hub diameter : 640mm~1940mm ;
- Max power of Single propeller: ~30MW ;
- The blade can use the design of MAN Alpha Kappel, which can improve efficiency and reduce vibration ;
- The pipe can use the design of AHT, can improve 10% bollard pull compare to 19A pipe.



WSP全回转舵桨

WSP Type Azimuth Thruster

WSP全回转舵桨可提供全方位矢量推力, 显著改善船的操作性能, 特别适用于动力定位工程类船舶或平台。

主要特点:

- 两种型式: 可调螺距和定螺距;
- 功率范围: ~5000kW;
- 10~15s内可实现船舶正车推力与倒车推力的转换, 可极大地提高船舶安全机动性;
- 可以实现导管内拆装桨叶;
- 具有艉轴密封与回转密封实时监测功能。

WSP type azimuth thruster can provide all directions of thrust force, can improve vessel's operational performance. Especially adapt to DP vessels and platforms.

Main characteristics:

- Two types: Controllable Pitch and Fixed Pitch;
- Range of power: ~5000kW;
- Can transform ahead thrust to back thrust in 10~15s, increase the security and flexibility of the ship with high limit.
- Can remove and assemble blade in nozzle;
- Can monitor stern shaft seal and rotary seal at the real time.



典型技术参数 Particulars	带导管定螺距型 Fixed Pitch WSP with Nozzle	带导管可调螺距型 Controllable Pitch WSP with Nozzle	不带导管型 WSP without Nozzle
桨叶直径(mm) Blade Diameter	720~3900	900~3900	720~4500
公称输入转速(rpm) Rev Speed	600~2100	600~2100	600~2100
公称输入功率(kW) Input Power	~5000	~5000	~5000
系柱推力范围(kN) Bollard Pull	50~880	50~880	30~700

WTSP牵引式全回转舵桨

WTSP Tractor Azimuth Thruster

WTSP牵引式全回转舵桨良好的均匀性来流和流线型结构使得其相对WSP常规全回转舵桨具有更佳的航行燃油经济性, 它可以与常规主推进系统匹配形成混合式对转桨。

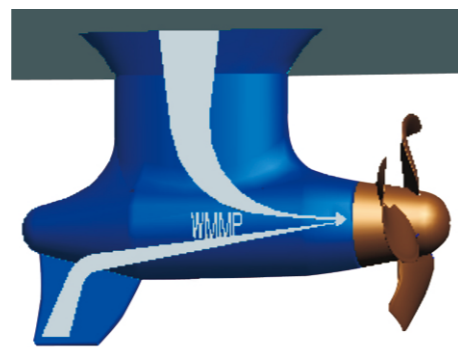
主要特点:

- 持续服务航速可达24kn~25kn;
- 牵引式螺旋桨, 具有较低拖曳阻力和高效水动力性能;
- 具有良好的操作性和航向稳定性;
- 具有低噪声和低振动;
- 与常规定距桨或调距桨匹配形成混合式对转桨, 可以提高推进效率约13~15%。

WTSP Tractor Azimuth Thruster has well even glide and streamline structure, it has better economic oil navigation compared to normal azimuth thruster, and it can form Contra-rotating Propellers when commix with CPP.

Main characteristics:

- Continual service voyage speed can reach 24kn~25kn;
- Tractor propeller has low draging resistance and high hydrodynamic performance;
- Has good operation and stability course;
- Has low noise and low vibration;
- Commixing with FPP or CPP form Contra-rotating Propeller, can increase drive efficiency 13% to 15%.



典型技术参数 Particulars	定螺距牵引式 Fixed Pitch WTSP	可调螺距牵引式 Controllable Pitch WTSP
桨叶直径(mm) Blade Diameter	720~4500	900~4500
公称输入转速(rpm) Rev Speed	600~2100	600~2100
公称输入功率(kW) Input Power	~5000	~5000

WRSP伸缩式全回转舵桨

WRSP Type Retractable Azimuth Thruster

WRSP伸缩式全回转舵桨, 通过将全回转舵桨装置收缩到船舱或伸出船体外部, 实现船舶自由航行减少阻力、动力定位工况辅助推进的多目标需求。

主要特点:

- 具有两种驱动型式: 竖直驱动和水平驱动;
- 水平驱动型式具有驱动轴自动连接、离合功能;
- 可以实现快速液压升降, 升降速度~1.5m/min;
- 具有升降密封实时监测功能。

WRSP Azimuth Thruster constrict its body to cabin or put out of hull, which can realize the ship reducing resistance when free sailing, and assistant push in dynamic position situation.

Main characteristics:

- Two driving models: upright driving and horizontal driving;
- The horizontal driving type has driving shaft automatic connect and depart function;
- Can realize lifting fast by hydraulic, speed about 1.5m/min;
- Can monitor lifting seal real time.



典型技术参数 Particulars	定螺距牵引式 Fixed Pitch WTSP	可调螺距牵引式 Controllable Pitch WTSP
桨叶直径(mm) Blade Diameter	720~3900	900~3900
公称输入转速(rpm) Rev Speed	600~2100	600~2100
公称输入功率(kW) Input Power	~4000	~4000

WSSP折臂式全回转舵桨

WSSP Type Swing up Azimuth Thruster

WSSP折臂式全回转舵桨, 通过将全回转舵桨装置折叠至船舱内或伸出船体外部, 实现船舶自由航行减少阻力、动力定位工况辅助推进的多目标需求。

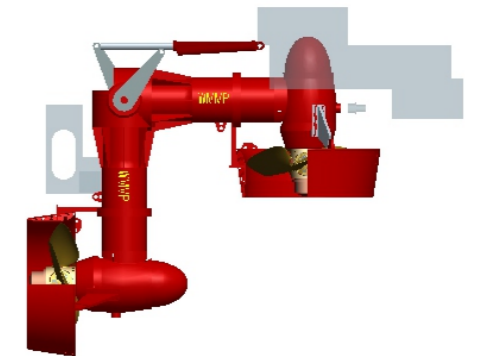
主要特点:

- 可以采用电动机或柴油机驱动;
- 可以实现快速液压折叠, 折叠时间1.0~1.5min;
- 采用整体发货。

The WSSP Azimuth Thruster fold its body to cabin or put out of hull, which can realize the ship reducing resistance when free sailing, and assistant push in dynamic position situation.

Main characteristics:

- The driving power can use electromotor or diesel engine;
- Can realize folding fast by hydraulic, speed about 1.0 to 1.5m/min;
- Whole shipment.



典型技术参数 Particulars	定螺距牵引式 Fixed Pitch WTSP	可调螺距牵引式 Controllable Pitch WTSP
桨叶直径(mm) Blade Diameter	720~2600	720~2600
公称输入转速(rpm) Rev Speed	750~2100	750~2100
公称输入功率(kW) Input Power	~2000	~2000

WCRP对转式全回转舵桨

WCRP Type Azimuth Thruster

WCRP对转式全回转舵桨将推进功率按比例分配,可使水下部分结构尺寸明显减小,且水动力性能更佳。

主要特点:

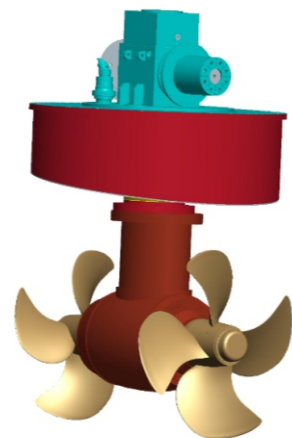
- 前后桨旋转方向相反,避免了螺旋桨尾流的旋转损失,具有尾流平滑,低噪声,低振动的优点。
- 可采用更大的螺旋桨以较低转速运行,减少磨擦损耗,提高了推进效率。
- 相比单螺旋桨效率提高10%~20%。

WCRP Azimuth Thruster distributes propulsion power to every propeller, it can make the underwater part has smaller physical dimension and better hydrodynamic performance.

Main characteristics:

- the fore and aft propeller rotate opposite directions, these can avoid rotation loss of propeller tail flow, get the propeller tail smooth, less noise and vibrations.
- Larger blade dia. in low RPM, reduce grating loss and improve efficiency;
- 10%~20% higher efficiency than any other single propeller.

型号 Type	功率范围(kW) Power	桨叶直径(mm) Blade Dia.	干重(kg) Weight
WCRP110	~280	~1250	1800
WCRP130	~440	~1500	3500
WCRP160	~660	~1700	6000
WCRP180	~960	~2100	13500
WCRP200	~1145	~2300	15000
WCRP240	~1600	~2700	22000



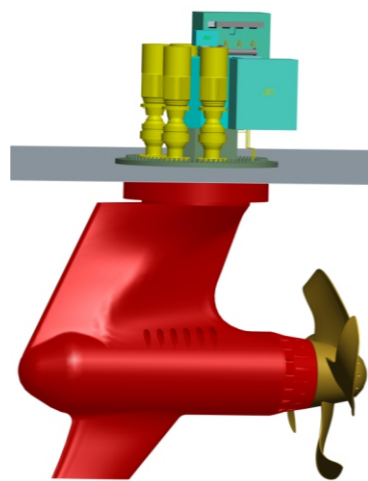
WPod吊舱推进器

WPod Propulsion

WPod型吊舱推进装置可即插即用、快速安装,功率范围~4500kW,可广泛应用于半潜式钻井平台、游船、渡船、三用工作船及平台供应船等。

WPod type propulsion system can be installed and used immediately, its max power can reach 4500kW, and can be widely used in semi submersible platform, yacht, ferry, AHTS and purvey platform ship.

型号 Type	功率范围(kW) Power	桨叶直径(mm) Blade Dia.	安装基座法兰直径(mm) Mounted Flange Dia.	干重(kg) Weight
WPod73-CO	~800	1350~1700	1700	14000
WPod91-CO	~1500	1700~2200	1700	16000
WPod105-CO	~2300	1900~2600	2300	27000
WPod117-CO	~3000	2200~3100	2300	35000
WPod132-CO	~3900	2400~3500	3000	50000
WPod150-CO	~4500	2700~4000	3000	60000



WTT侧向推进装置

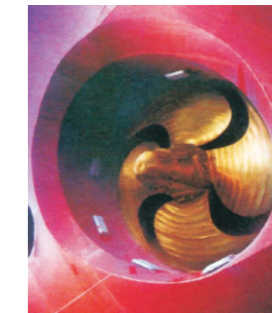
WTT Type Tunnel Thruster

主要特点:

- 可调螺距侧向推进装置采用大侧斜桨叶,减小振动和噪声;
- 定螺距侧向推进装置螺旋桨采用Caplan叶型;
- 可以在不移动驱动电机的情况下更换驱动轴密封。

Main characteristics:

- Controllable pitch tunnel thruster adopt high skew blade, for reducing vibration and noise;
- Fixed Pitch thruster use Caplan type blade;
- Can replace the seal of driving shaft without moving driving electromotor.



桨叶直径(mm) Blade Dia.	最大功率(kW) Max Power		电机转速(r/min) Motor Rev Speed		额定转速(r/min) Thruster Rev Speed		最大名义推力(kN) Max Thrust	
	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz
720	75	75	1450	1750	638	770	13.7	13.3
900	110	110	1450	1750	440	530	20.5	20
1100	310	335	1450	1750	455	550	46.8	47.4
1300	445	480	1450	1750	385	465	66	67.8
1650	710	770	1450	1750	310	370	106.6	108
2000	1150	1000	1450	1190	300	245	164	152
2400	1580	1720	980	1190	211	257	238	242
2800	2240	2010	980	880	223	200	300	305
3300	3500	3500	590	590	169	169	495	495

WDJ喷水推进装置

WDJ Type Waterjet

公司独家引进了与Rolls-Royce、Wartsila、Hamilton、MJP一起并称世界五大品牌的澳大利亚DOEN公司喷水推进装置技术及专利产品,WMMP通过与DOEN公司保持技术合作关系,实现产品技术水平同步发展。

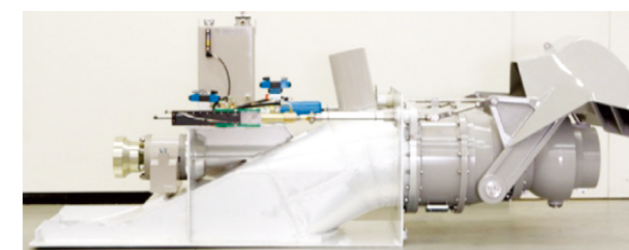
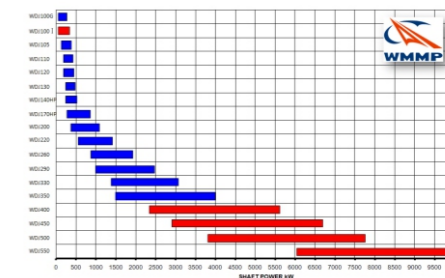
主要特点:

- 配套功率范围广:~10000kW;
- 进流管道可以适应不同材料:玻璃钢、铝制或钢制;
- 与船体连接方式灵活:焊接或螺栓连接。

WMMP exclusive introduced Australia DOEN company's technology and patent of waterjet, who is the five major brands in the world with Rolls-Royce, Wartsila, Hamilton, and MJP. WMMP achieved its technology to advanced level.

Main characteristics:

- Wide range of supporting: ~10000kW;
- The flow inlet pipe can used different material:Glass steel, aluminium, steel;
- Flexible connection with the hull: welding or join with bolts.



WZY转叶式舵机

WZY Rotary Vane Steering Rudder

WZY型转叶式舵机可以广泛应用于各类船舶，满足各船级社规范要求。

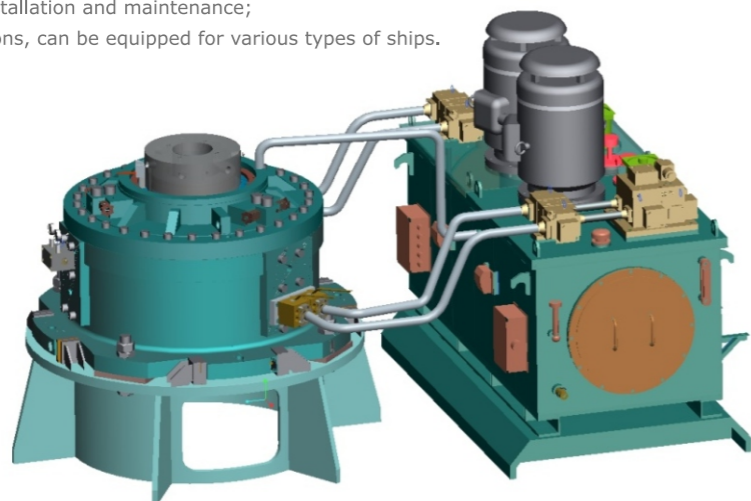
主要特点：

- 转舵机构密封系统性能好，舵机的稳舵精度 $\leq 0.5^\circ/\text{min}$;
- 易于实现大舵角转舵要求，最大可达 $\pm 70^\circ$;
- 运转平稳，无液压冲击，位置精度高；
- 转舵机构集成上舵承，降低船舶舵系成本；
- 集成化程度高，易于安装和维修；
- 适用范围广，可配套于各类船舶。

WZY type steering gear can be widely used in all kinds of ships, it accords with classification society.

Main characteristics:

- Rudder actuator has good sealing performance, the speed of steering gear moved is no more than $0.5^\circ/\text{min}$;
- Easy to achieve large steering rudder angle, the max. angle can reach $\pm 70^\circ$;
- Steering smoothly and no hydraulic shock, with position accuracy;
- The steering gear own rudder bearings, can reduce the cost of rudder;
- High integration, Easy installation and maintenance;
- Widely range of applications, can be equipped for various types of ships.



Particulars	WZY63~WZY2000
最大工作压力 (Mpa) Max Working Pressure	8
最大工作扭矩 (kNm) Max Working Torque	63~2000
转舵角度 (deg) Rudder Turning Angle	$\pm 35^\circ \square \pm 45^\circ \square \pm 65^\circ$
最大舵杆直径 (mm) Max Diameter of Rudder Stock	170~560
基圆直径 (mm) Base Circle Diameter	740~2060
转叶高度 (mm) Rotary Vane Height	425~1290
箱体直径 (mm) Box Body Diameter	600~1650

电动液压舵机

Electro-Hydraulic Rudder

WMMP引进了日本川崎重工技术，配套FE、RV等系列常规电动液压舵机，适用于3000吨~50万吨的各类船舶。

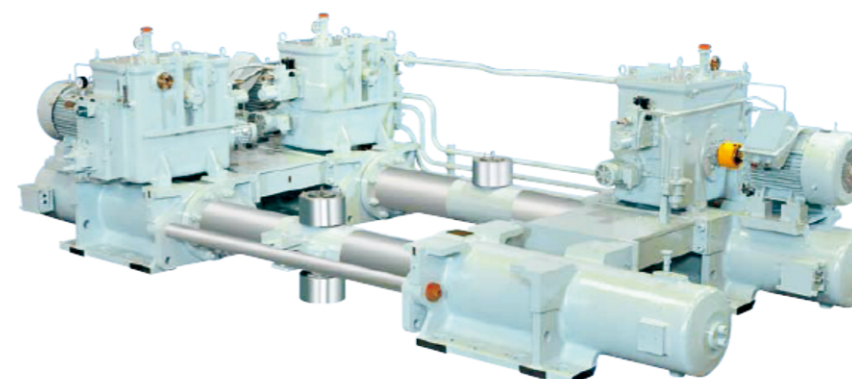
主要特点：

- 配套船舶范围广；
- 运转噪音低；
- 采用舵机专用阀，即使在失电的情况下也能有效防止跑舵；
- 安装简单：所有液压管路出厂前均安装完成。

WMMP introduced Kawasaki Heavy Industries LTD technology, supporting FE RV series traditional electro-hydraulic gears, it can be used in all kinds of ships between 3000 and 500000 DWT.

Main characteristics:

- Wide range of supporting;
- Low movement noise;
- Adopt an oil block valve completely prevents the forced steering even at blackout of electric source;



Typical Particulars	FE21	FE32	FE42	Rv21
最大工作压力(Mpa) Max Working Pressure	19.2~23.5	19.2~23.5	23.5	19.2~23.5
最大工作扭矩(kNm) Max Working Pressure	520~5490	1000~9810	5490~9810	314~844
转舵角度(deg) Rudder Turning Angle	± 35	± 35	± 35	± 35
转舵速度 Rudder Turning Speed	65deg/28s	65deg/28s	65deg/28s	65deg/28s
舵杆直径(mm) diameter of Rudder Stock	385~800	480~960	800~960	310~425
舵柄公称半径(mm) Normal Radius of Tiller Arm	465~925	580~1150	925~1150	465~640
柱塞直径(mm) Ram Diameter	170~355	212~425	355~425	170~236

动力定位系统集成

Dynamic Position System Integration

WMMP可根据用户需求进行推进及动力定位系统集成设计与配套，满足各大船级社规范要求。

WMMP can design and equip propulsion and Dynamic position system integration according to customer's requirement, and it can meet all classification society rules.

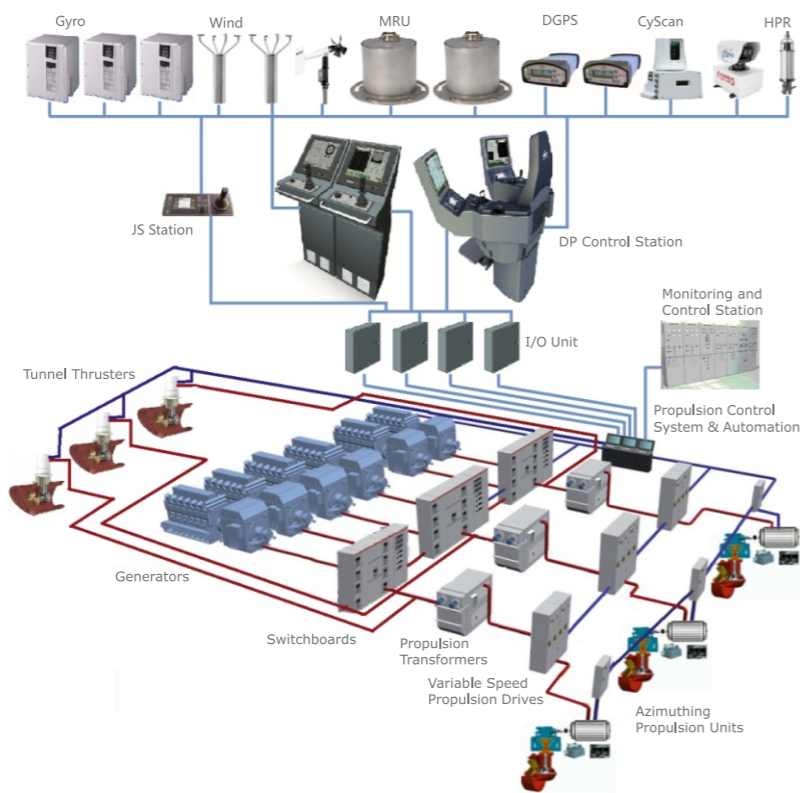
- 2×WSP240-FP-Z全回转舵桨
- 1×WRSP160-FP-Z伸缩式全回转舵桨
- 2×800kW侧向推进器
- 2×1765kW主柴油主机
- 2×1200kW主发电机组
- 1×200kW应急发电机组
- 1×400kW停泊发电机组
- 1×动力定位控制系统
- 船级社:CCS 动力定位等级:DP2

- 3×WSP220-FP-Z全回转舵桨
- 3×1100kW侧向推进器
- 6×1600kW主发电机组
- 1×250kW应急发电机组
- 1×配电系统
- 1×动力定位控制系统
- 船级社:ABS 动力定位等级:DPS2

- 3×WSP220-FP-Z steering Propeller
- 3×1100kW tunnel thruster
- 6×1600kW Main generator set
- 1×250kW emergency generator set
- 1×Distribution system
- 1×DP system
- Classification: ABS DP level:DPS2



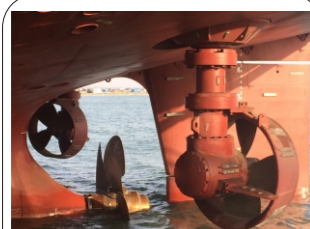
- 2×WSP240-FP-Z steering Propeller
- 1×WRSP160-FP-Z Retractable Steering Propeller
- 2×800kW tunnel thruster
- 2×1765kW main diesel engine
- 2×1200kW Main generator set
- 1×200kW emergency generator set
- 1×400kW harbor generator set
- 1×DP system
- Classification:CCS DP level:DP2



The integration of electric propulsion and DP system

- 2×WSP240-FP-Z全回转舵桨
- 1×9660kW CPP推进系统
- 2×1200kW侧向推进器
- 1×WZY1100-2/65转叶式舵机
- 船级社: ABS 动力定位等级: DPS2

- 2×WSP240-FP-Z steering Propeller
- 1×9660kW CPP propulsion system
- 2×1200kW tunnel thruster
- 1×WZY1100-2/65 Steering rudder
- Classification:ABS DP level:DPS2



- 2×4500kW CPP推进系统
- 1×895kW伸缩式全回转舵桨
- 2×735kW侧向推进器
- 2×WZY160-2/45转叶式舵机
- 2×2163kW轴带发电机组
- 2×715kW发电机组
- 1×95kW应急发电机组
- 1×动力定位控制系统
- 船级社:CCS 动力定位等级:DP2

- 2×4500kW CPP propulsion system
- 1×895kW retractable steering thruster
- 2×735kW tunnel thruster
- 2×WZY160-2/45 Steering rudder
- 2×2163kW Shaft generator set
- 2×715kW Main generator set
- 1×95kW emergency generator set
- 1×DP system
- Classification: CCS DP level:DP2

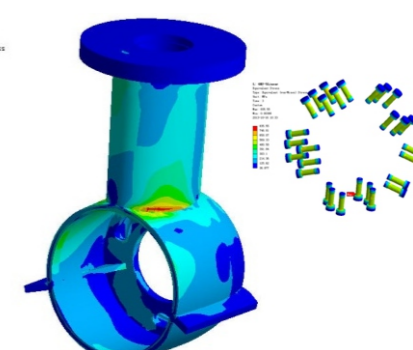
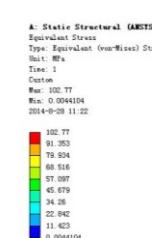
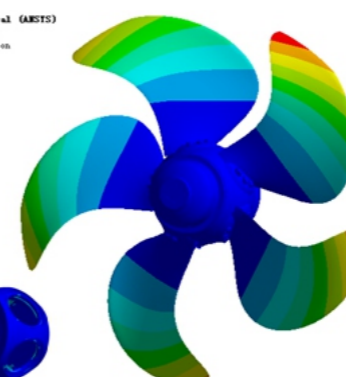
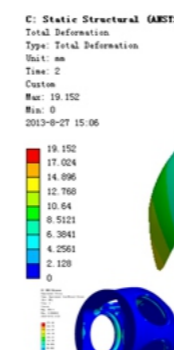
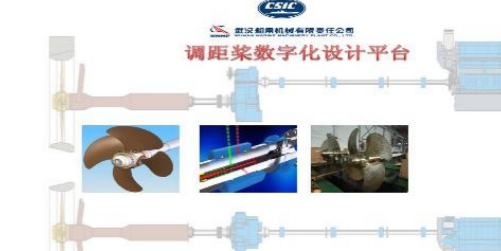
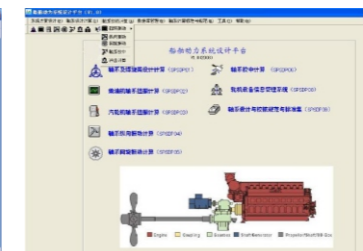
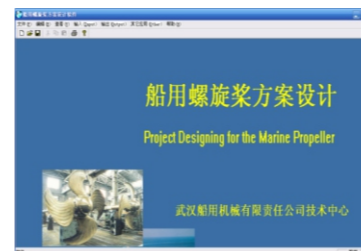


先进的设计开发平台

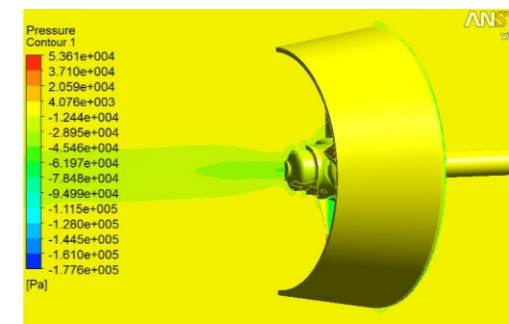
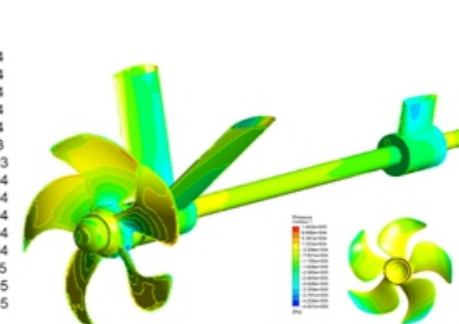
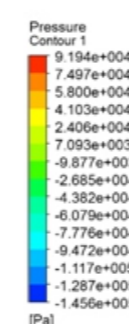
Advanced Design Platform

WMMP拥有CPP方案设计、轴系集成设计分析、CPP数字化设计等一系列数字化设计平台，可快速响应客户对推进系统的需求。

WMMP has a series of digital design platforms, such as CPP selection design platforms, shaft integration analysis



推进系统主要零件结构强度分析
Propulsion system structure strength analysis



推进系统水动力分析
Hydrodynamic analysis for Propulsion system

先进的加工技术

Advanced Manufacture Technology



德国卧式加工中心
Horizontal Machining Center from Germany

公司拥有德国5轴5联动卧式加工中心、8轴5联动数控落地镗铣床、4.5m数控龙门镗铣床等精密加工设备。

WMMP has 5 axis 5 linkage horizontal machining center from Germany, 8 axis 5 linkage horizontal CNC boring and milling floor machine, 4.5m CNC Longmen boring and milling machine precision machining equipment.



长轴系加工
Long Shaft Machining

大型轴系加工能力

单轴长度：26米

轴内深孔加工：18米

Machining capability of Large shaft:

single shaft length:26m

machining capability of hole inside shaft:18m



□□□□
Propeller Hub Flaw Detection



□□□□□□□□
CMM from Germany

公司具有各类零件完善的检验标准、规范及设备，严格控制整个加工、装配、试验过程，产品出厂合格率为100%。

WMMP has completely inspecting standards, rules, and equipments, the process of machining, mounting and experimentation are strictly controlled, the ratio of qualified production is up to 100%.

试验验证条件

WMMP Experiment Conditions



- 1 调距桨动态联调试验
CPP Dynamic Test
- 2 双向稳距配油器部件试验
Component Test of Fixing Pitch for Oil Distribution Box
- 3 全回转动态联调试验
Azimuth Thruster Dynamic Test
- 4 2×3000kNm舵机综合试验台
2×3000kNm Steering Rudder Test Stand

技术支持与保障

Technology Support and Guarantee

WMMP拥有专业的团队进行技术支持与保障。可快速响应用户需求，基于标准化、模块化理念进行最优化方案选型设计，产品以低能耗、高可靠性、高用户体验性为终极目标，不断进行优化、升级。

同时，WMMP具有旧船设备改造、产品维修及升级等项目的丰富经验，最大限度响应用户需求。

WMMP has professional team to get technology supporting and guarantee. It can quickly respond customer's requirement, optimize design of system selection, aim at low consumption, high security, high user experience, the product is optimized and upgraded endlessly.

Meanwhile, WMMP has rich experience of rebuilding or maintaining or upgrading equipment of old ships, maximum to respond customer's requirement.

技术支持电话/Technology Support Phone: 027-68867390 / 027-68867385

技术支持邮箱/Technology Support Email: mancpc@126.com / whcj@wmmp.com.cn

售前服务电话/Before-sale Service Phone: 027-68867334

售前服务邮箱/Before-sale service Email: tjxtyb@wmmp.com.cn

售后服务网络

After-sales Service Network

武汉船机具有完备的产品售后服务系统和快速反应机制，建有全球海外服务网络，开通有免费服务热线，产品售后专业人员国内24小时、国外48小时到达指定地点迅速查明问题原因、及时排除故障、恢复产品功能。

WMMP with a complete product after-sales service system and rapid response mechanism, has a global network of overseas service, launched a free service hotline, after-sale service professionals in 24 hours, 48 hours to reach the designated place abroad quickly to identify the cause of the problem in a timely manner troubleshooting, recover product features.



售后服务热线：400-1111461
After-sale Service

保修Guarantee claim: afterservice-bx@wmmp.com.cn

调试Commission Test: afterservice-ts@wmmp.com.cn

询价Inquiry: afterservice-xj@wmmp.com.cn