



# Naval product portfolio

for the demands of today and tomorrow



Always at the forefront of technological developments, we offer the capability to design, build, deliver and support naval systems tailored to meet specific customer requirements. Our position and reputation for excellence is derived from our ability to deliver the solutions that will meet our customer needs of today, and the demands of tomorrow.

## GAS TURBINES

Our involvement in naval propulsion spans over half a century and we have pioneered some of the most important technical advances in marine propulsion, including the use of aero gas turbines for surface ship propulsion. Today, we supply marine gas turbines in the 3-40MW power range.

We are world leading experts in gas turbine generator capability, providing key naval programs around the world with an efficient and vital source of on-board electrical power to meet the substantial power demands of high-tech warfighting and hotel systems.

Over 200 AG9140 generator sets have been delivered to the US Navy's DDG-51 Arleigh Burke destroyers each providing 3MW of shipboard power. These generator sets are also in operation with the Republic of Korea Navy and Japanese Maritime Self Defense Force.

Building on the pedigree of the AG9140, Rolls-Royce has developed the AG9160RF generator set, as selected for the US Navy's DDG-51 Flight III programme. The AG9160RF offers more power at 4MW to meet future demands.

AG9160RF



The RR4500 harnesses proven industrial and aero gas turbine technology installed in a compact and efficient package. The generator is rated to produce over 4.1 MW of electrical power. Selected as the auxiliary gas turbine generator for the U.S. Navy's all-electric Zumwalt class destroyers, two MT30 main gas turbine generators work together with two RR4500 auxiliary gas turbine generators providing almost 80 megawatts of highly survivable, reliable and instantaneous power for propulsion as well as the ship's complex weapons, advanced air and missile defence radars and other sensor systems.

For hovercraft/landing craft applications, the Rolls-Royce marine gas turbine portfolio also includes its MT7 derived from the AE family of aero technology. Capable of providing up to 4.6MW of power, MT7 offers superior power to weight ratio and through life costs. Powering the US Navy's new Ship to Shore Connector programme, each landing craft will be equipped with four MT7 gas turbines.



Powering the US Navy's all-electric ship  
USS Zumwalt (DDG 1000)



MT30 powered Republic of Korea Navy's  
Daegu Class Frigate



MT30 powered US Navy  
Littoral Combat Ship



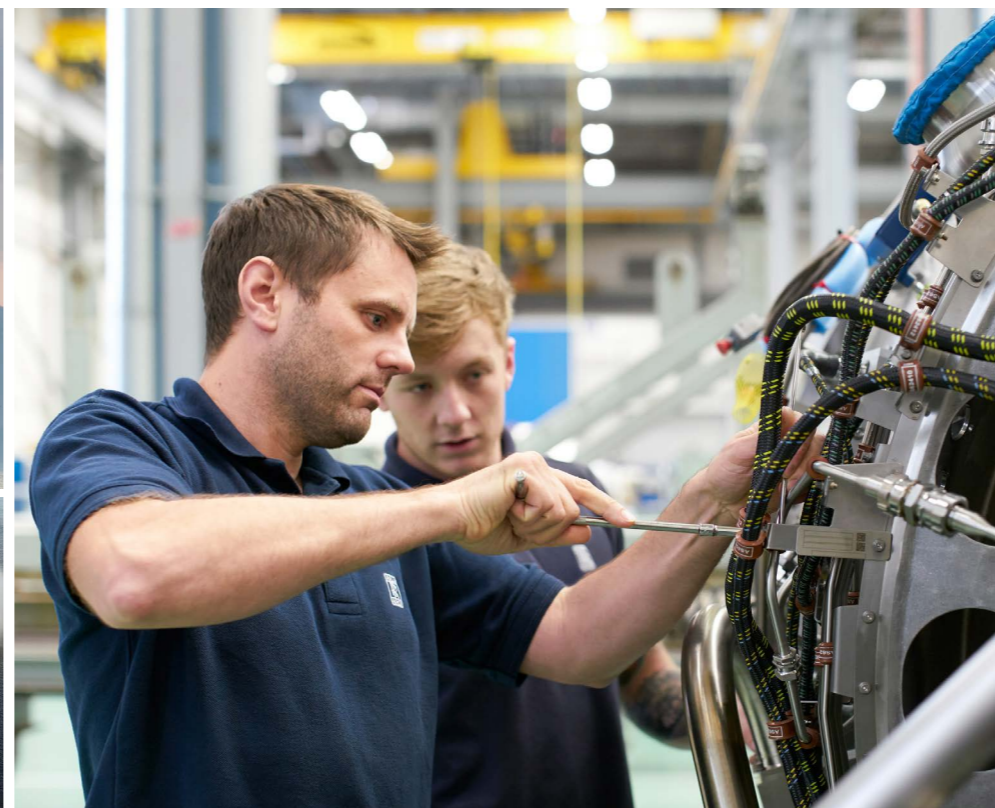
Royal Navy's City Class -  
Type 26 Global Combat Ship



Arleigh Burke-class guided-missile  
destroyer USS Donald Cook (DDG 75)



MT7 - Power for the US Navy's  
future hovercraft



## MT30 POWERING THE WORLD'S FUTURE FLEETS

2008 marked the entry into service for the MT30 powering the US Navy's first Littoral Combat Ship, USS Freedom. The propulsion system features twin MT30 engines and two diesel engines driving waterjets in a sophisticated combined diesel and gas turbine (CODAG) mechanical arrangement. MT30 has demonstrated excellent performance in service, powering the ship to speeds in excess of 40kts.

MT30 generator packages provide the power for the US Navy's all-electric Zumwalt class destroyers and the Royal Navy's new aircraft carriers; HMS Queen Elizabeth and HMS Prince of Wales.

Drawing on the high-power density attributes, single MT30-based hybrid propulsion systems have been chosen for the Republic of Korea Navy's new Daegu class frigates and the Royal Navy's innovative Type 26 City Class. The Type 26 Global Combat Ship's export designs selected for the Australian Hunter class and Canadian Surface Combatant programmes also feature this single MT30 propulsion system arrangement.

The Italian Navy's future flagship, the Landing Helicopter Dock, will be powered by two MT30s. Japanese Maritime Self Defense Force's new 30FFM frigates will also be powered by MT30 in a single gas turbine CODAG configuration.

Now selected for over seven ship types, MT30 has become the gas turbine of choice for many of the World's advanced naval programmes.



Designed for 21st century vessels,  
the MT30 provides maximum  
maintenance flexibility with minimum  
shipboard resources

## DIESELS

Rolls-Royce is a leading designer and developer of high and medium speed diesels and generator sets for naval platforms.

The Rolls-Royce diesel range includes Bergen medium speed engines offering 1,400 to 11,830 kW of power and MTU high speed diesel engines are available from 0.27 – 10.MW. They are suitable for mechanical drive or supplied as packaged generator sets.

MTU Series 4000 diesel generator



## PROPULSORS

Rolls-Royce offers a broad portfolio of propulsors for naval marine vessels. From conceptual design through detailed design, manufacturing, assembly and support through life.

Waterjets for naval applications can be built for special requirements such as signature, shock etc.

The U.S. Navy's Littoral Combat Ship Freedom-variant features four of our advanced Axial Mk1 waterjets, each rated to absorb 22MW of power.

The underlying design of the Rolls-Royce Axial Mk1 waterjet has also been scaled for other research and development activity within the U.S. Navy including Sealion, the Special Operations test craft and for the X-Class USV program MUSCL.

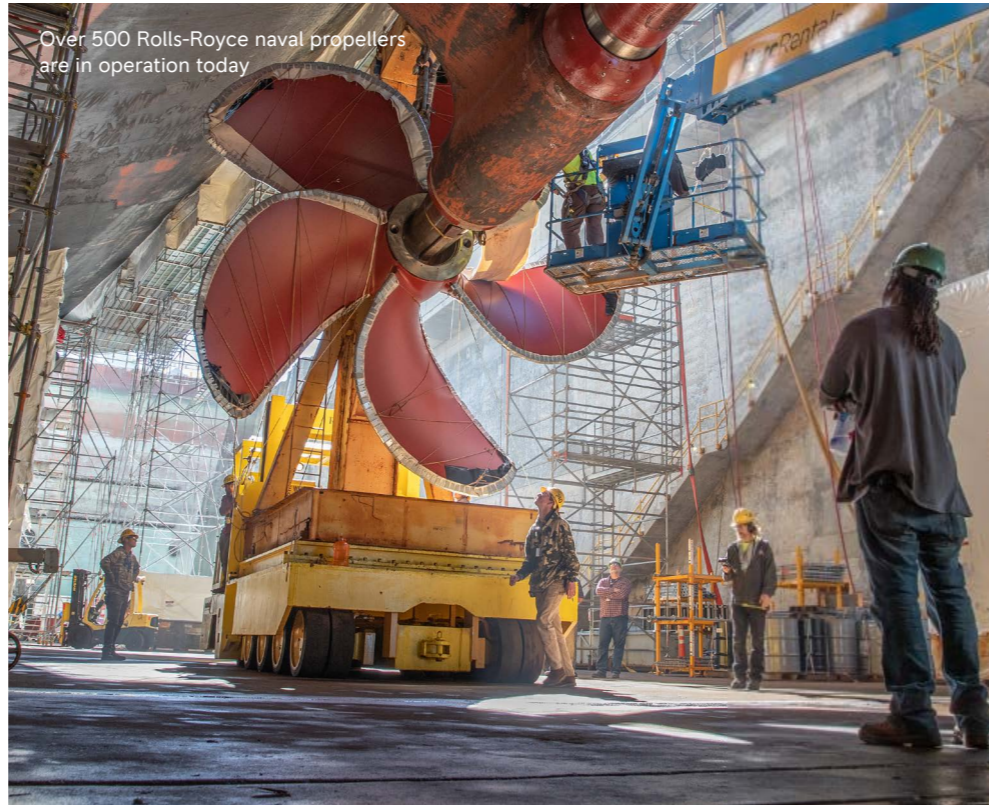
The Rolls-Royce naval propeller range includes Controllable, Fixed and Fixed Bolted options suitable for a variety of applications and operational requirements. With over 50 years of experience, our propellers are well proven and perfected for naval operations, fulfilling naval and military requirements. Rolls-Royce propellers are designed for robustness, reliability and hydrodynamic efficiency ensuring excellent cavitation performance as well as low vibration and noise levels. Today, over 500 Rolls-Royce naval propellers are in operation with U.S. surface combatant ships and Virginia class submarines as well as other navies around the world.

We have our own foundry capable of producing propellers in a variety of materials, to the demanding tolerances required for modern naval platforms.

A fully integrated Rolls-Royce hybrid propulsion system powers the HMNZS Aotearoa



Over 500 Rolls-Royce naval propellers are in operation today



## ELECTRICAL, AUTOMATION & CONTROL

### Specialised Systems Integration Capability

Our proven capability extends to unique electrical solutions, fully complementing our mechanical product range. Application knowledge, modelling and product expertise form the backbone of our systems integration capability.

### Optimised Performance Solutions

Our systems integration capability is based on decades of experience and includes initial concept design to through life support ensuring the delivery of flexible and efficient solutions covering:

- Power & Propulsion Systems
- Automation & Control

As electrical power system integrators, our expertise provides the ideal solutions for hybrid and all-electric naval vessels, optimising performance to satisfy electrical load demands of the future such as advanced sensor, propulsion and combat systems. More recently, Rolls-Royce has provided a hybrid propulsion system at 690V for HMNZS Aotearoa, comprising Rolls-Royce active front end propulsion drives, switchboards, power management system, diesel generators and main engines.

We are experienced providers of low voltage (LV) electrical power distribution systems for a range of warship and submarine applications. The Royal Navy's new Queen Elizabeth Class aircraft carriers feature a complete Rolls-Royce LV electrical distribution system.

Based on years of naval domain experience and presence, our Integrated Platform Management System (IPMS) is in use with many of the world's leading navies, across various vessel types such as frigates, corvettes, ocean patrol vessels and fast attack craft. Utilising COTS hardware, our IPMS has been ruggedised for the naval environment. In addition to being IEC61131-3 compliant, it employs open standards for ultimate compatibility with other systems. The design is modular and highly distributed to minimise vulnerability and maximise survivability. Standard software modules are used through the system.

Our Integrated Platform Management System provides total automation solutions combining traditional machinery controls with the latest operator functionality and integrated ship-wide management systems offering the following functionality:

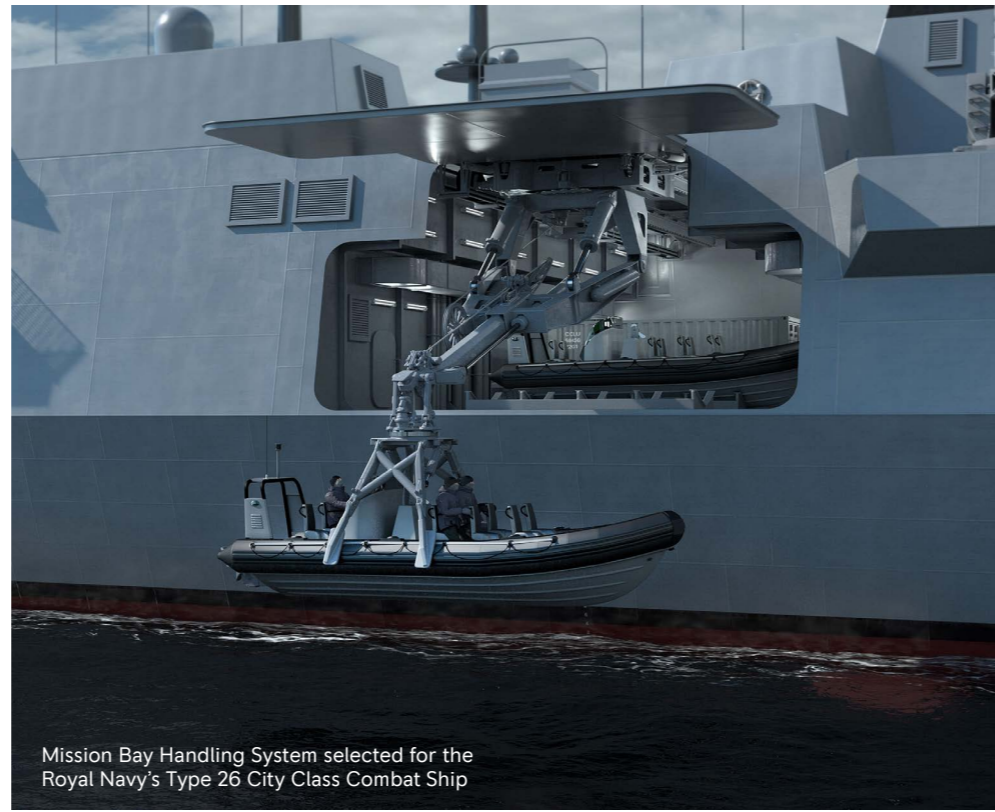
- Propulsion Control
- Electrical Power Management
- Auxiliary Machinery Control
- Safety & Damage Control Systems
- Alarm & Event Monitoring
- On-Board Trainer

## NAVAL HANDLING SYSTEMS

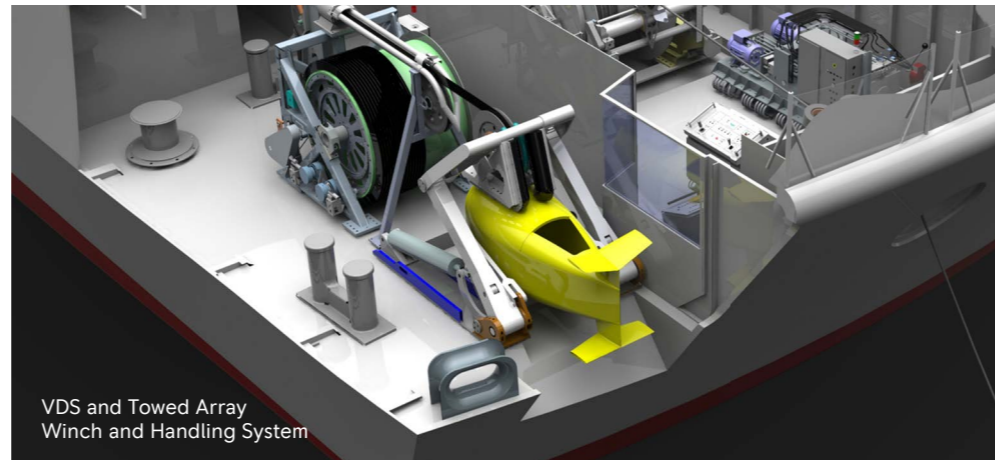
A specialised handling team at Rolls-Royce has been providing system solutions to the naval industry for over 35 years. Towed systems include applications in sonar, torpedo defense, minesweeping in both the airborne and surface ship environments. Several autonomous systems have also been developed.

The next generation surface combatants will require multi-role, multi-mission capability. Our Mission Bay Handling System can handle a wide variety of mission modules, unmanned and manned vehicles, munitions and cargo. This system has been designed to provide an adaptable and flexible integrated solution suitable for a wide range of naval operations for today and tomorrow. The Mission Bay Handling System enables efficient operation from both sides of the ship.

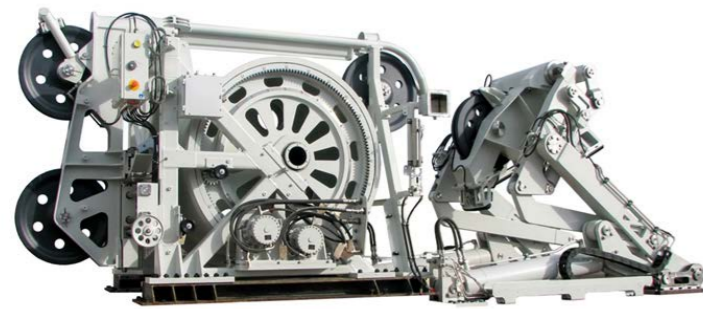
Payloads can be embarked from dockside, as well as providing the specialised launch/recovery function for vehicles while at sea.



Mission Bay Handling System selected for the Royal Navy's Type 26 City Class Combat Ship



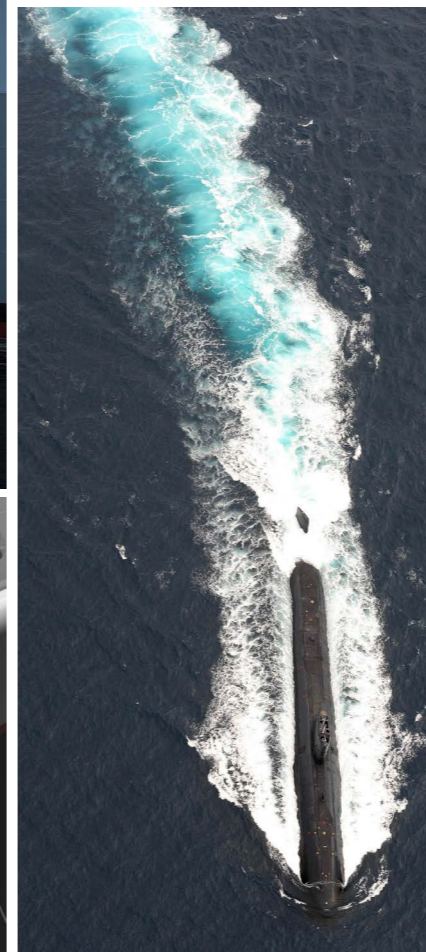
VDS and Towed Array Winch and Handling System



Variable Depth Sonar (VDS) Handling System

## OUR SUPPORT CAPABILITY IS FOCUSED ON SHIP AVAILABILITY

Individual navies have individual support needs, but all search for improved availability at an affordable price. We work in partnership with our customers where we listen, establish requirements and then offer solutions to match. The optimum solution could range from a simple and cost effective equipment maintenance package, through to a fixed price system level availability contract with risk transfer and gain share.



Rolls-Royce is a world leader in submarine propulsion systems and support services incorporating design, procurement, and manufacture. For the last 60 years we have designed and supplied the nuclear propulsion plant, which provide power for all of the UK's nuclear submarines.

## POWERING THE UK'S NUCLEAR UNDERWATER DEFENCE

We are responsible for delivering the Nuclear Steam Raising Plants (NSRP), and parts of the Secondary Propulsion systems to the UK Ministry of Defence, and manage these assets across their full lifecycle. This includes providing frontline support across the world for reactor plant equipment on Royal Navy submarines from our Operations Centre in Derby, and also supporting the submarines when in the Barrow-in-Furness shipyard and the naval bases at Devonport and Faslane.

To achieve this, we employ world class engineers from a variety of backgrounds, and similarly skilled functional staff to provide the customer with safe and timely delivery and cost effective engineering solutions. Our engineers design and substantiate the safety for the NSRP including; the reactor cores, primary systems pipework and valves, major vessels, the electronic control systems, and also parts of the secondary equipment; the turbo-generators and propulsors.



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