



# Naval Bearings



**Michell Bearings**



## History and Experience

As the inventor of the hydrodynamic bearing over 100 years ago, we have continued to meet the changing needs of the Naval industry and we are proud to have products currently installed with 41 World Navies on over 500 active vessels.

A unique reference list that demonstrates our long proven history in Naval propulsion systems involving extensive applications with the UK Royal Navy and other strategic countries such as Italy, France, Netherlands, Spain, USA, Japan, South Korea, Singapore, India, Australia, New Zealand, and Saudi Arabia.

Our focus is continuing to be a world leader in hydrodynamic bearing technology to support future generation propulsion systems for both surface and underwater vessels, working in some of the harshest environments, providing stealth, efficiency and reliability.

Originally founded in 1920 in the UK, we have facilities in Newcastle upon Tyne (UK), MB Inc established in the USA during 2021 in Sioux Falls, South Dakota and Philadelphia, Pennsylvania, and Michell Bearings India founded in 1995 in Bangalore, India.

As a world leading designer and manufacturer of hydrodynamic whitemetal (or babbitt), PEEK and PTFE lined bearings, we produce Naval products for ship propulsion systems:

- Thrust Blocks
- Lineshaft Bearings
- Propulsion Motor & Generator Bearings
- Gearbox Bearings
- Bulkhead Seals

Our long history dates back to the 1920s with key examples of recent major naval references including:

- UK Astute Class Submarines
- USA Freedom Class Littoral Combat Ships.
- UK Queen Elizabeth Class Aircraft Carriers
- Spanish S-80 Isaac Peral Class Submarines
- Saudi Arabia Multi Mission Surface Combatants
- South Korean Incheon Class Frigates
- UK Type 26 City Class Frigates
- South Korean KDX3 Class Destroyers
- UK Dreadnought Class Submarines
- USA Constellation Class Frigates
- USA Sentinel Class Polar Security Cutters

Our technology and experience will lead us into future worldwide collaborations such as the AUKUS program, a trilateral partnership with the United States, the UK and Australia, helping Australia to acquire nuclear-powered submarines.

The Michell Bearings Inc. office, based in Philadelphia, holds the International Traffic in Arms Regulations (ITAR) registration by the US Department of State and is fully compliant with US export control laws and regulations.

In addition to our established manufacturing sites in the UK & India, we have also developed a manufacturing facility and capable supply chain in the USA.



# Bearing Technology

We are committed to supporting future generation propulsion systems for both surface and underwater vessels to provide stealth, efficiency and reliability.

Our products for naval applications have been created with years of proven experience and are each designed around the specific projects requirements. The products are available with various oil cooling solutions, a unique edge being the supply of self-contained water cooled bearings giving significant advantage in terms of uptime of Naval vessels.

We use advanced bearing materials which can significantly reduce the size and mass of bearing

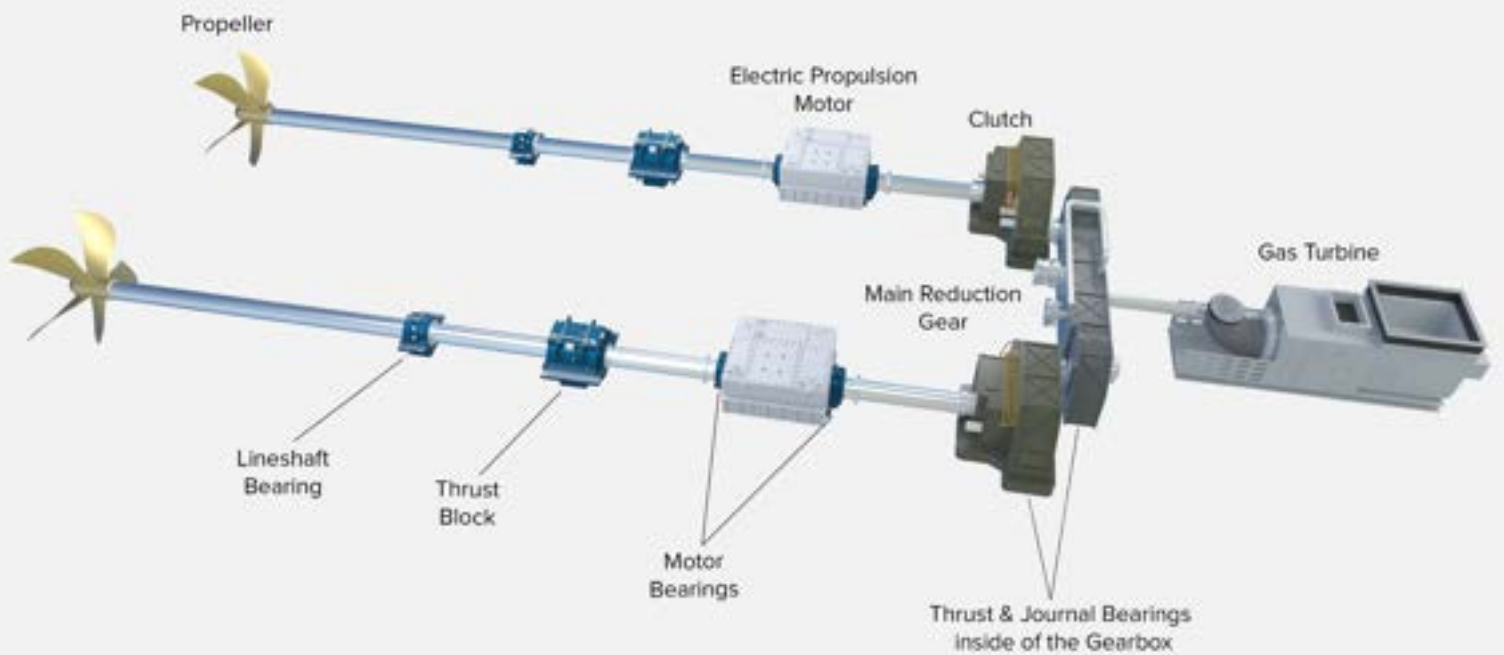
products and allow unlimited slow speed journal bearing operation. This is particularly relevant for submarine propulsion systems where noise reduction (signature), size reduction and slow speed operation are key. This technology allows for increased loading, allowing for bearings to be smaller and lighter, coupled with a higher factor of safety.







Michell Bearings Thrust Blocks, Bulkhead Seals and Lineshaft Bearings

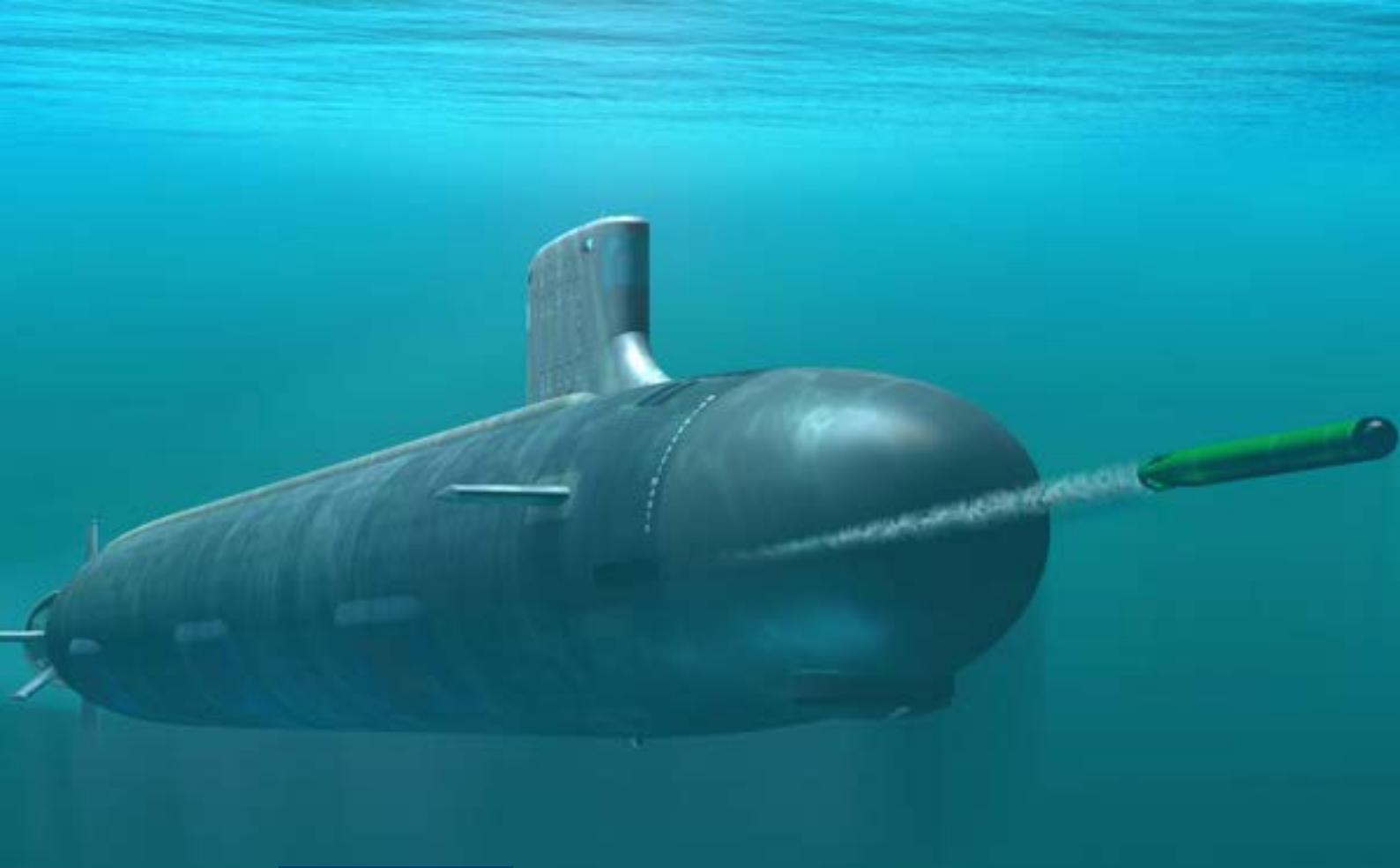


Representation of a Ship Propulsion System

# Major Mitchell Bearings Naval References 2000 - 2023

2023	SG - Multi-Role Combat Vessel (MRCV) Frigate (6 ships)	SKO - KDX III Batch II Sejong the Great Class (DDG) Destroyer (1 ship)	SKO - FFX Batch III Chungnam Class (FFG) Frigate (2 ships)	US - Constellation Class (FFG) Frigate (3 ships)				
2022	UK - Type 26 Batch II (Global Combat Ship) Frigate (5 ships)	JP - Taigei Class (SSK) Submarine (1 boat)	SKO - KDX III Batch II Sejong the Great Class (DDG) Destroyer (1 ship)	SKO - FFX Batch III Chungnam Class (FFG) Frigate (1 ship)	US - Constellation Class (FFG) Frigate (2 ships)			
2021	IT - Bergamini Class (FFG) Frigate (2 ships)	JP - Taigei Class (SSK) Submarine (1 boat)	UK - Dreadnought Class (SSBN) Submarine (1 boat)	USA - Polar Security Cutter Class (PSC) Icebreaker (1 ship)				
2020	JP - Taigei Class (SSK) Submarine (1 boat)	SKO - KDX III Batch II Sejong the Great Class (DDG) Destroyer (1 ship)	SKO - FFX Batch III Chungnam Class (FFG) Frigate (1 ship)					
2019	JP - Soryu Class (SSK) Submarine (1 boat)	SKO - ASR-II (ASR) Submarine Rescue Ship (1 ship)	US - Freedom Class (LCS) Littoral Combat Ship (1 ship)					
2018	JP - Soryu Class (SSK) Submarine (1 boat)	QA - Doha Class (FFG) Frigate (4 ships)	QA - Fast Attack Craft (FAC) (2 ships)	SA - Multi-Mission Surface Combatant (MMSC) Frigate (4 ships)	UK - Dreadnought Class (SSBN) Submarine (1 boat)	US - Freedom Class (LCS) Littoral Combat Ship (2 ships)	US - National Security Cutter (NSC) Patrol Boat (1 ship)	
2017	UK - Type 26 (Global Combat Ship) Frigate (3 ships)	TW - Mine Counter Measure Vessel (MCMV) (1 ship)	US - National Security Cutter Class (NSC) Patrol Boat (1 ship)	JP - Soryu Class (SSK) Submarine (1 boat)	UK - Dreadnought Class (SSBN) Submarine (1 boat)	SKO - FFX Daegu Class (FFG) Frigate (7 ships)		
2016	IT - FREMM Bergamini Class (FFG) Frigate (2 ships)	JP - Soryu Class (SSK) Submarine (1 boat)	US - Freedom Class (LCS) Littoral Combat Ship (1 ship)	SKO - Morado Class (LPX-II) Amphibious Assault Ship (1 ship)	SKO - ATX Training Ship (1 ship)			
2015	FR - Barracuda Class (SSN) Submarine (1 boat)	JP - Soryu Class (SSK) Submarine (1 boat)	SKO - AOE-II (AOE) Fast Combat Support Ship (1 ship)	US - National Security Cutter Class (NSC) Patrol Boat (2 ship)	US - Freedom Class (LCS) Littoral Combat Ship (1 ship)			
2014	FR - FREMM Aquitaine Class (FFG) Frigate (2 ships)	IT - FREMM Bergamini Class (FFG) Frigate (2 ships)	JP - Soryu Class (SSK) Submarine (1 boat)	SKO - FFX Daegu Class (FFG) Frigate (1 ship)	UK - Astute Class (SNN) Submarine (1 boat)	US - Freedom Class (LCS) Littoral Combat Ship (2 ships)	US - National Security Cutter Class (NSC) Patrol Boat (1 ship)	
2013	JP - Soryu Class (SSK) Submarine (1 boat)	SKO - FFX Incheon Class (FFG) Frigate (1 ship)	SKO - Nampo Class (MLS) Minelaying Ship (1 ship)	UK - Astute Class (SNN) Submarine (1 boat)	US - Freedom Class (LCS) Littoral Combat Ship (2 ships)			
2012	FR - Barracuda Class (SNN) Submarine (1 boat)	FR - FREMM Aquitaine Class (FFG) Frigate (1 ship)	JP - Soryu Class (SSK) Submarine (1 boat)	SKO - Cheon Wang Bong Class (LST) Amphibious Landing Ship (3 ships)	SKO - FFX Incheon Class (FFG) Frigate (2 ships)	SKO - Tongyeong Class (ATS) Salvage and Rescue Ship (1 ship)	US - Freedom Class (LCS) Littoral Combat Ship (2 ships)	US - National Security Cutter Class (NSC) Patrol Boat (1 ship)
2011	FR - FREMM Aquitaine Class (FFG) Frigate (2 ships)	SKO - Cheon Wang Bong Class (LST) Amphibious Landing Ship (1 ship)	SKO - FFX Incheon Class (FFG) Frigate (2 ship)	SKO - Tongyeong Class (ATS) Salvage and Rescue Ship (1 ship)	UK - Astute Class (SNN) Submarine (1 boat)	US - Freedom Class (LCS) Littoral Combat Ship (2 ships)	US - National Security Cutter Class (NSC) Patrol Boat (1 ship)	
2010	FR - Barracuda Class (SNN) Submarine (1 boat)	FR - FREMM Aquitaine Class (FFG) Frigate (1 ship)	IT - FREMM Bergamini Class (FFG) Frigate (4 ships)					
2009	EG - FREMM Tahya Mist Class (FFG) Frigate (1 ship)	FR - FREMM Aquitaine Class (FFG) Frigate (2 ships)	JP - Soryu Class (SSK) Submarine (1 boat)	MR - FREMM Mohammed VI Class (FFG) Frigate (1 ship)	SKO - FFX Incheon Class (FFG) Frigate (1 ship)			
2008	FR - Barracuda Class (SNN) Submarine (1 boat)	UK - Queen Elizabeth Class (CVF) Aircraft Carrier (2 ships)	UK - Astute Class (SNN) Submarine (1 boat)	US - National Security Cutter Class (NSC) Patrol Boat (1 ship)				
2007	JP - Soryu Class (SSK) Submarine (1 boat)	SP - S-80 Isaac Perat Class (SSK) Submarine (4 boats)	US - Howard O Lorenson (TAGM-25) Missile Range Instrumentation Ship (1 ship)					
2006	FR - FREMM Aquitaine Class (FFG) Frigate (1 ship)	IT - FREMM Bergamini Class (FFG) Frigate (2 ships)	US - Freedom Class (LCS) Littoral Combat Ship (1 ship)	US - National Security Cutter Class (NSC) Patrol Boat (1 ship)				
2005	JP - Soryu Class (SSK) Submarine (1 boat)	US - National Security Cutter Class (NSC) Patrol Boat (1 ship)						
2004	SKO - KaDX III Sejong the Great Class (DDG) Destroyer (3 ships)	US - Freedom Class (LCS) Littoral Combat Ship (1 ship)						
2003	SKO - Dokdo Class (LPX) Amphibious Assault Ship (1 ship)	US - National Security Cutter Class (NSC) Patrol Boat (1 ship)						
2002	FR - Horizon Class (FFG) Frigate (2 ships)	IT - Orizzonte Class (FFG) Frigate (2 ships)	SG - Formidable Class (FFG) Frigate (6 ships)	SKO - KDX II Chungmu-gong Yi Sun-sin Class (DDG) Destroyer (3 ships)	UK - Type 45 Daring Class (DDG) Destroyer (6 ships)			
2001	FR - Le Triomphant Class (SSBN) Submarine (1 boat)	ZA - Valour Class (FSG) Corvette (4 ships)						
2000	AU - Anzac Class (FFG) Frigate (2 ships)	ID - Bung Tomo Class (FSG) Corvette (2 ships)	IT - Commandante Class (OPV) Offshore Patrol Vessel (3 ships)	SA - Al Riyadh Class (FFG) Frigate (1 ship)	UK - Astute Class (SNN) Submarine (3 boats)			

Contact us if you require further information or for references prior to 2000.



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