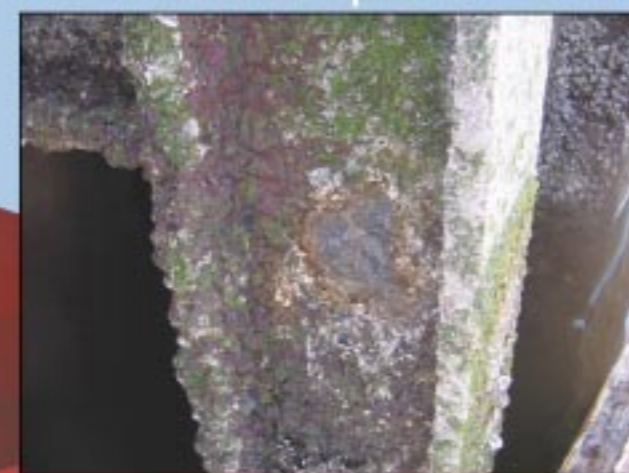
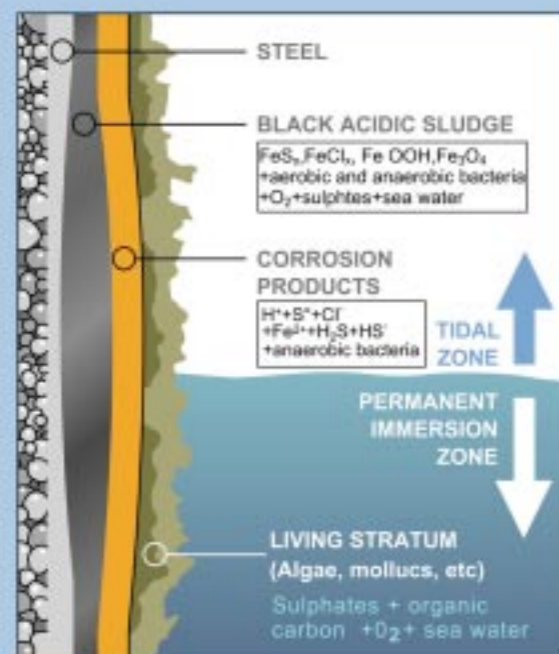




### Jetties & Harbours

It is now evident that piles corrode at rates far in excess of what is known as acceptable due to an increase by the presence of colonies of bacteria caused primarily by Sulphur Reducing Bacteria (SRB). This phenomenon is known as Accelerated Low

Water Corrosion (ALWC). Identified by orange soft organic bacteria (Ferric 3+ oxides), with a black layer (ferric sulphide) hiding bright, pitted steel. Research revealed that Cathodic Protection greatly reduces the corrosion rate. This is thought to result from the generation of hydrogen at the surface and the high pH values which can interfere with cell metabolisms. Sulphate Reducing Bacteria are only active in the near-neutral pH range of 5.5 to 8.5.



### Leisure boats

Corrosion does occur on Wood and GRP vessels and the main areas of concern are the Propellers, Rudders, Shafts, Skegs, Stern Tubes and Fittings. MCPS Ltd offer a full range of Bolt-on, Shaft and Outboard Anodes where Outboard engine anodes are to suit Volvo-Penta, BMW, Bukh, Johnson, OMC, Evinrude, Mercruiser-Mercury, Yanmar, Yamaha, and many more engines.

Shaft anodes are mounted on the shafts of small leisure vessels to protect the exposed steel prolonging the life of the shafts and propellers. Disc anodes are usually mounted on rudders.



L I M I T E D

MCPS Limited objective is to provide you, the Client with a superior quality product and service that the industry demands, at a competitive price, which conforms to your design and contractual requirements, that is why we provide you with:

- Anode specification requirements that meet US Mil. Spec. -18001 for Zinc and of AlZnIn Type for Aluminium.
- Certification to DIN EN 10204, 3.1B and 3.1C if required.
- Technical design complying with BS 7361, DNV RP B401 & NORSOK Standard M-503.
- Quality Assurance complying with ISO 9001:2000

#### ZINC HULL ANODE

CODE	Net Weight Kg	Gross Weight Kg	L mm	B mm	H mm
M55	5.1	5.5	305	114	25
M102	9.5	10.2	350	150	32
ZM76	0.9	1.0	108	76	22
ZM77	1.9	2.1	164	88	44
ZM78	4.0	4.5	305	88	44
ZM78B	3.8	4.0	305	88	44
ZM80	7.5	8.5	305	152	32
ZM72	14.0	15.0	457	120	70
ZM82	20.0	21.0	813	102	38



#### ZINC TANK ANODES

M50T	4.5	5.0	400	47	40
M100T	9.5	10.0	400	70	60
M140T	13.0	14.0	1235	40	40
M225T	20.5	22.5	1235	50	50



#### ALUMINIUM HULL ANODE

M15A	1.1	1.5	220	100	30
M20A	1.5	2.0	305	88	44
M45A	4.0	4.5	370	120	32
M60A	5.2	6.0	600	120	41
M80A	7.0	8.0	640	125	43
M115A	10.5	11.5	600	120	76



#### ALUMINIUM TANK ANODES

M45TA	4.0	4.5	400	70	60
M100TA	9.0	10.0	1235	64	51
M130TA	11.5	13.0	1235	68	58
M160TA	14.5	16.0	1600	70	52
M200TA	18.5	20.0	1600	76	63



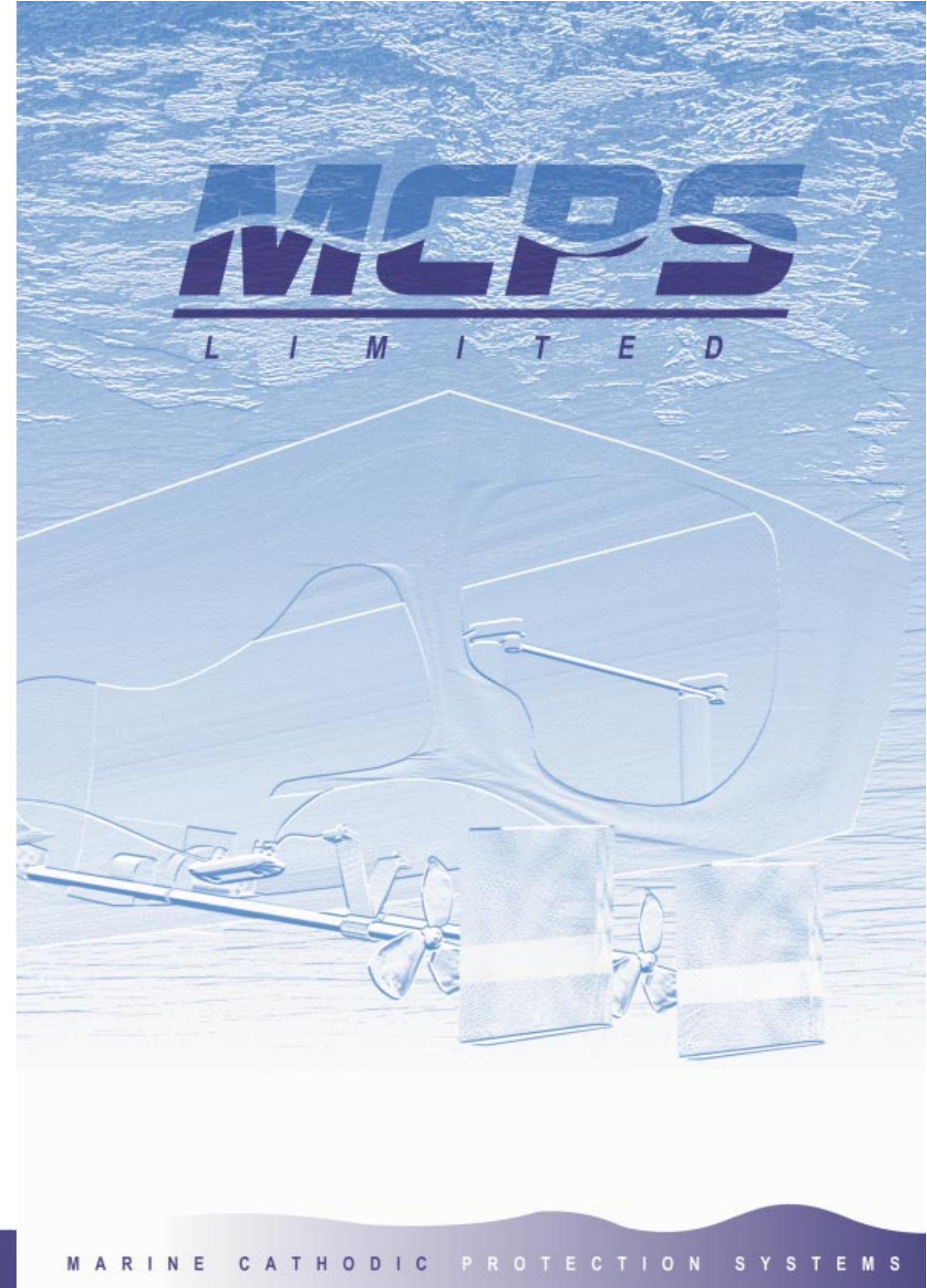
#### ZINC ENGINE ANODES

CODE	Weight Kg	L mm	Dia mm	Thread
MGA 825	0.027	19	16	12-28 NF
MGA 825	0.040	19	21	12-28 NF
375/2"	0.038	51	10	3/8" Whit
500/2"	0.044	51	13	3/8" Whit
625/2"	0.065	51	16	3/8" Whit
750/2"	0.105	51	19	5/8" Whit
1050/2"	0.203	51	26.7	3/4" Whit

Reg No. QAIC/UK/635  
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All weights and dimensions are nominal. All types of anodes are available upon request.



## Introduction

Corrosion is a natural process. Most metals, in their natural state (ores) are combined with other elements such as oxygen to form stable compounds. The ores are refined by man, alloyed for useful properties and ultimately fabricated into structures. Upon exposure to the natural environment, such as the sea, these metals gradually revert to their original oxidized state known as the corrosion process. Owners often mistakenly believe that coating of submerged steel eliminates the need for correctly designed cathodic protection systems.

Undamaged coatings suffer from the presence of microscopic pinholes, which lead to the development of concentrated areas of corrosion. The preferred technique for mitigating marine corrosion is the practice of using the electrochemical reactions to prevent the corrosion of steel structures. This is known as Cathodic Protection and an opposing current more powerful than the corrosion cell forcibly reverses the Galvanic Cell.

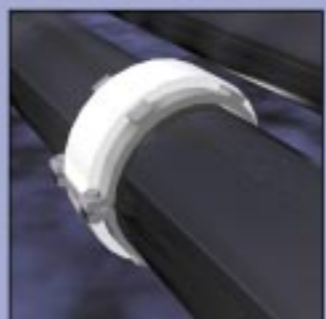
## Company Profile

MCPS Limited have over 15 years experience in providing a comprehensive Anti-Fouling and Cathodic Protection service to the Marine & Offshore Industry. This high level of experience ensures that MCPS fully understands and are able to supply corrosion protection equipment in accordance with the most stringent requirements as demanded by the Marine & Offshore Industry.



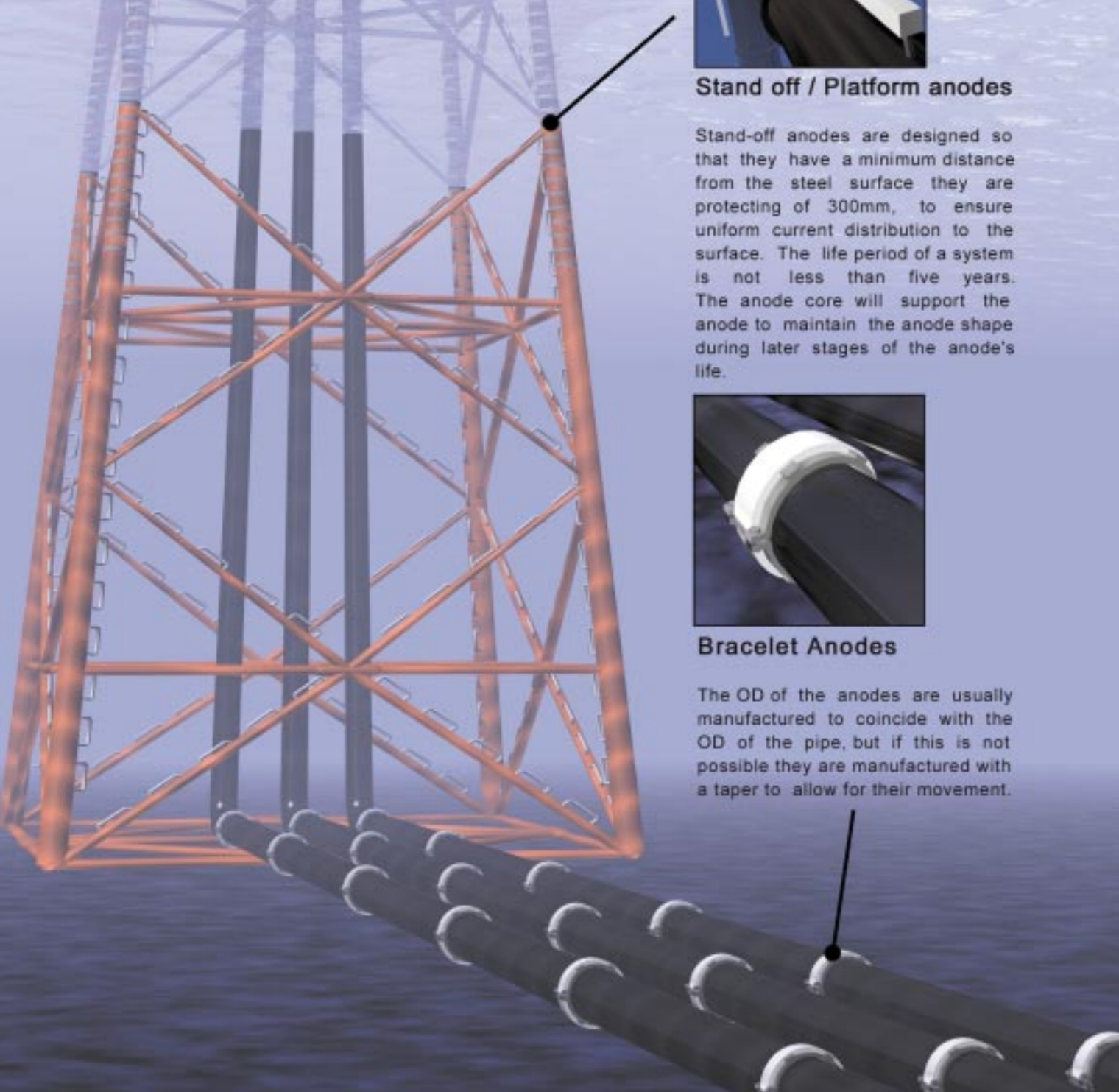
### Stand off / Platform anodes

Stand-off anodes are designed so that they have a minimum distance from the steel surface they are protecting of 300mm, to ensure uniform current distribution to the surface. The life period of a system is not less than five years. The anode core will support the anode to maintain the anode shape during later stages of the anode's life.



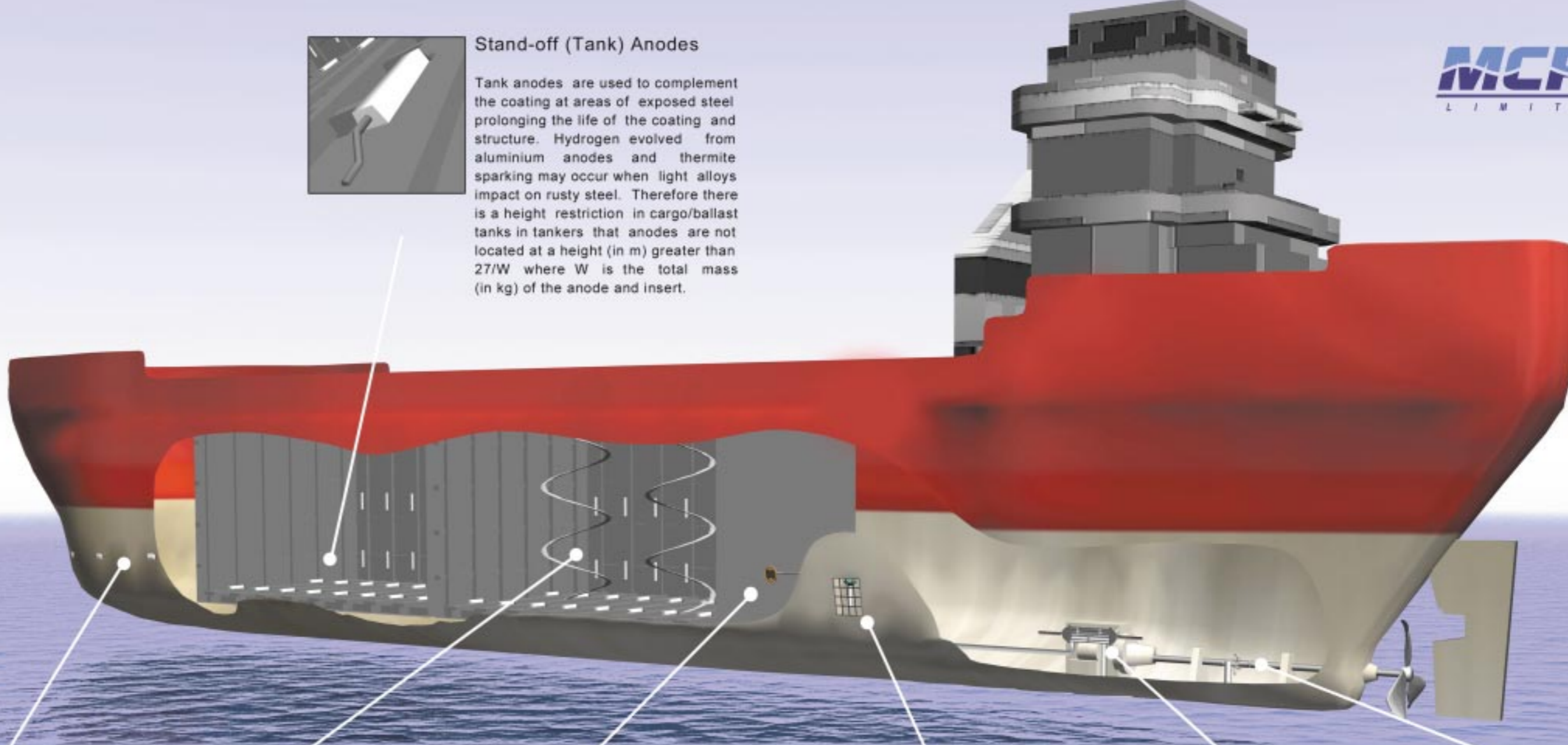
### Bracelet Anodes

The OD of the anodes are usually manufactured to coincide with the OD of the pipe, but if this is not possible they are manufactured with a taper to allow for their movement.



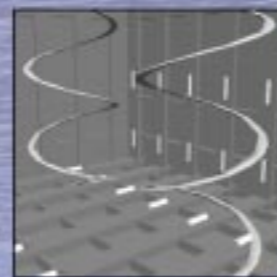
### Stand-off (Tank) Anodes

Tank anodes are used to complement the coating at areas of exposed steel prolonging the life of the coating and structure. Hydrogen evolved from aluminium anodes and thermite sparking may occur when light alloys impact on rusty steel. Therefore there is a height restriction in cargo/ballast tanks in tankers that anodes are not located at a height (in m) greater than  $27/W$  where W is the total mass (in kg) of the anode and insert.



### Flush mounted (Hull) Anodes

Hull/flush mounted anodes are used to complement the coating at areas of exposed steel prolonging the life of the coating. Alloys of Zinc, Aluminium and Magnesium with the necessary trace elements to provide correct performance are used for the manufacturing of Sacrificial anodes.



### Tank Descaling with Magnesium Ribbon

Water ballast tanks are prone to a build up of scale. Magnesium Ribbon is a method of descaling and avoids the need for mechanical labour. Magnesium Ribbon can be easily distributed around a tank. It will take approximately two weeks for the electrolytic process of the ribbon to effectively work on the scale. A white deposit is sometimes left on the steelwork after descaling. It is recommended that this be removed by high pressure washing immediately after de-ballasting.



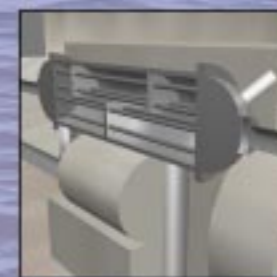
### Impressed Current Cathodic Protection

This type of Cathodic Protection relies on an external direct current source to be forced into the water from an inert non-wasting anode. Platinized Titanium or MMO anodes are in the electrolyte with the structure they intend to protect, and are made more positive than the structure by connecting the DC supply to both the anode and the structure. A zinc reference cell controls the power unit DC output levels ensuring the correct level of cathodic protection.



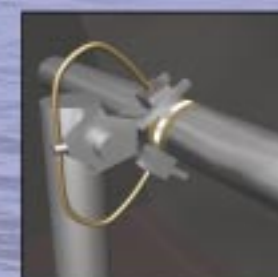
### Anti-Fouling

Marine fouling and biofouling can form at all depths and temperatures and is commonly found in vessel's seawater cooling systems. A common method of fouling prevention is the Anti-fouling system, which consists of two types of anodes, a Copper alloy rod to prevent fouling and Aluminium or Ferrous alloy rod to prevent corrosion. An anti-fouling anode, once fitting requires little maintenance and is not damaging to the environment.



### Engine Anodes

Engine heat exchangers have a common problem of corrosion due to the difference in metal between casing and tube stack. Employing zinc pencil anodes reduces the corrosion. Pencil anodes are designed in various sizes to protect a certain distance and surface area. These can be replaced by removing an external plug.



### Shaft Earthing

When a ship's propeller shaft is rotating, the bearing lubrication oil creates an 'oil wedge' with a high resistance. If the shaft is not earthed the static will build up and eventually discharge by arcing across the lubrication oil known as 'spark corrosion'. Using silver/graphite brushes running on a silver track will provide the best method of maintaining a contact of low resistance that will avoid static build up and ensure protection of the propeller from sacrificial anodes or ICCP.