MARELCO™

60 YEARS OF INNOVATION

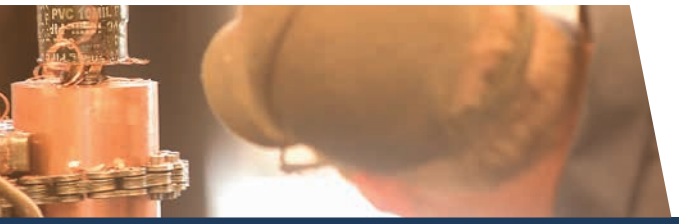
ANTI-FOULING AND ANTI-CORROSION SYSTEMS

CRUISE SHIPS | FERRIES | NAVAL VESSELS | LUXURY YACHTS | OFFSHORE PLATFORMS | TUG BOATS

PRODUCT

CATALOGUE

EMCS INDUSTRIES LTD.



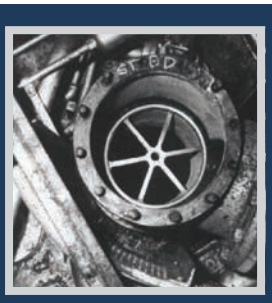
ANTI-FOULING AND ANTI-CORROSION SYSTEMS

INTRODUCTION

Corrosion and marine growth fouling has posed both an operational and financial problem to the marine industry for decades. This includes ship owners, ship builders, offshore operators and many other applications where exposure to salt water is unavoidable.

The MARELCO™ system has provides a highly cost effective method of controlling the effects of this exposure and therefore dramatically reducing operating cost and extending the life of your marine vessel.

Main suction valve without MARELCO™ protection.



Main suction valve of sister ship after 9 months with MARELCO™ protection.

ABOUT BIOFOULING AND CORROSION

BIOFOULING

Biofouling is arguably *the* major challenge faced by the shipping industry and leisure vessels. It is best described as the accumulation of barnacles, mussels, bacteria, algae and other crustaceans on wet surfaces of the Vessel. Biofouling results in sea life blockage of the sea suction, sea chests, fire suction, cross over tanks, sea water piping systems, box coolers, heat exchangers and growth on the exterior of the Hull itself.

Biofouling can shut down critical systems on large ships and luxury boats such as Engine Cooling and HVAC systems that depend on the intake of sea water to function. Biofouling is also responsible for decreasing the speed of the ship due to the drag created by the sea life on the hull and speeding up corrosion. This dramatically decreases fuel efficiency, increases emissions and results in high maintenance costs.

CORROSION

The hulls of large ships are built of steel and steel or metal underwater are subject to corrosion. In order for this to take place the steel needs to be exposed to oxygen, water is a supply of oxygen. Corrosion is also caused by an electrical exchange, especially between metals of different types. Metals are comprised of atoms and since atoms have electrons, metal contains an electrochemical charge.

Corrosion occurs whenever two or more dissimilar metals are grounded. Metals can be grounded by physically touching or through a highly conductive solution such as saltwater, freshwater with high mineral content and polluted freshwater. It is therefore very important that all vessels built with steel hulls must be fitted with anti-corrosion systems.

HOW WE HELP YOU CONTROL BIOFOULING AND CORROSION

There are three Marelco systems to effectively deal with Biofouling and Corrosion:

- The Marelco Electrolytic Anode System will prevent marine growth and Trap Corrosion in sea water piping systems, sea chests, box coolers, cross over tanks and other internal areas exposed to the intake of sea water,
- The Marelco ICCP (Impressed Current Cathodic Protection) System is designed to combat exterior corrosion of the vessel.
- The Marelco Ultrasound System will prevent marine growth in salt and fresh water.

THE MARELCO™ ELECTROLYTIC ANODE SYSTEM

The Copper and Aluminum Anodes produce ions in small concentrations that are carried by the sea water into the exposed areas of the Vessel. In the case of a Copper Anode this results in the food source passing through the system rather than building up on the surfaces and attracting Barnacles and other Crustaceans. The system therefore keeps the Pipes and Pumps protected (See Fig 1). Without anti-fouling protection, pipes become blocked with sea life which reduces the efficiency of the seawater cooling system adding considerable maintenance costs.

Scientifically known as MGPS (Marine Growth Protection System) the MARELCO™ system also eliminates blockages without adding chemicals and is therefore completely environmentally safe. The Aluminum anode ions prevent corrosion in the inside of Seachests and Pipes by creating a film on the internal surfaces , however they also release aluminium hydroxide which acts as a flocculant to the Copper released from the copper anodes. Depending on the composition of the piping system, an Iron Anode is added for increased effectiveness.

A customized system can be added at any time during the life of a vessel and is largely self-managed. The anodes are replaced every few years as they are used up, this can be done by Divers or more commonly during a scheduled Drydock.

MARELCO™ ANODES

MARELCO™ Corrosion Control uses impressed current Copper and Aluminum sacrificial anodes to control corrosion of seawater piping systems. EMCS Industries Ltd. has been continuously improving the MARELCO™ system over time and the solution has proven itself in hundreds of installations throughout the world for the last six decades.

MARELCO™ ANODE CAGES

Used to protect intake pumps and piping systems or submersible pumps, most commonly found on offshore platforms where salt water is pumped from the ocean to cool drilling machinery. The system prevents the intake from the ocean becoming completely plugged with marine life and also serves to protect the entire system from corrosion due to salt water exposure.

MARELCO™ TREATMENT TANKS

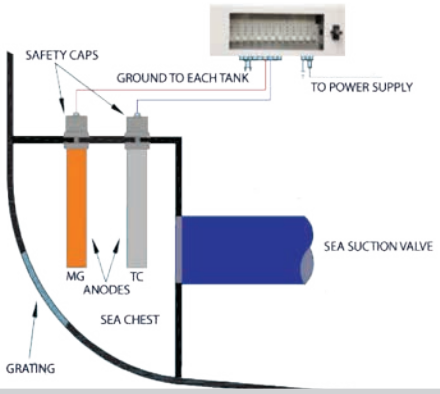
The MARELCO™ Treatment Tank System is a unique innovation. The Treatment Tank is an alternative to having the Anodes installed in the sea chest, crossover fire suction etc. The Seawater is pumped from any area and run through the tank that contains the Anodes. The treated water, now full of ions, is pumped back into the source. The tank can be placed anywhere on deck and is easily accessible for replacing Anodes without dry docking. The Treatment Tank is also used as a Scrubber system where it treats the sea water used to remove soot from the exhaust in the stack. The reduction of emissions is becoming increasingly important in order to create a greener environment.

THE MARELCO™ CONTROL PANELS

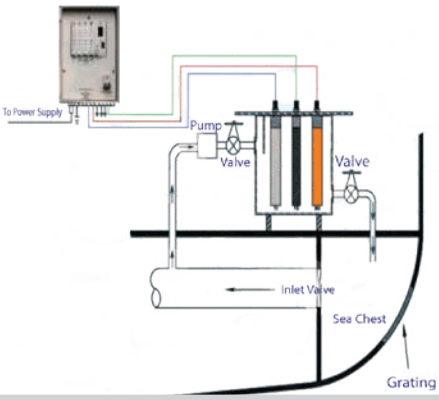
The MARELCO™ Constant Current Control Unit is a high quality steel dust and splash proof cabinet that incorporates all solid state circuitry and heavy duty components produced to meet any specification. Individual anode printed circuit cards regulate the current to the anodes.

Here are some applications where the MARELCO™ system can be used:

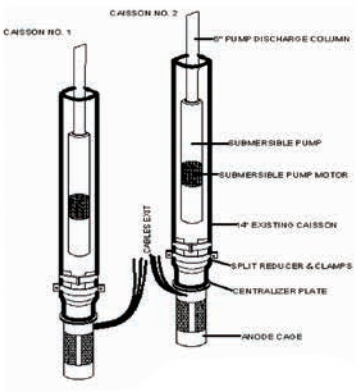
Sea chest system (anodes inside sea chest).



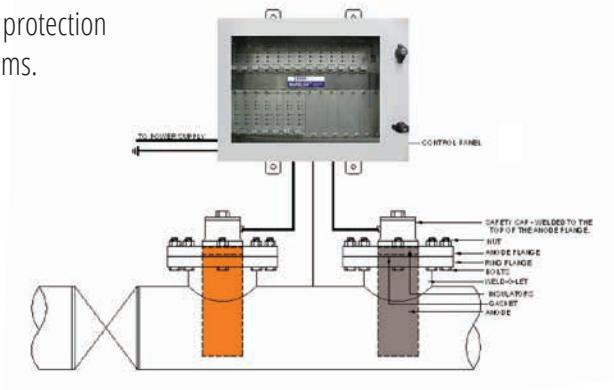
Treatment tank solution used if sea chest too small.



Anode cage protection systems (used on offshore oil platforms and other custom pump applications).



Pipe protection systems.

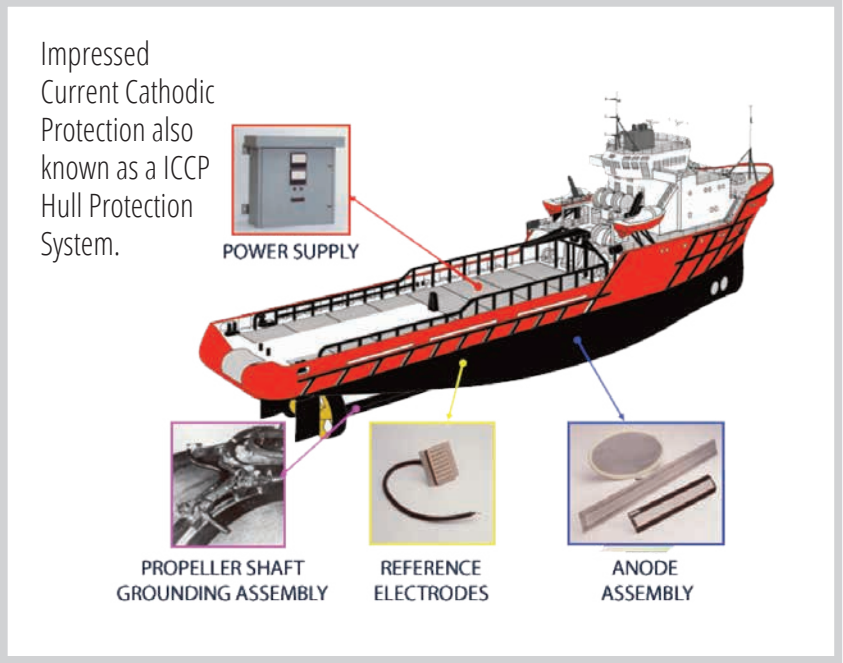


MARELCO™ ICCP HULL PROTECTION SYSTEM (IMPRESSED CURRENT CATHODIC PROTECTION)

For larger structures such as a Hull of a ship, the impressed current is evenly distributed over the entire wetted area of the Vessel. The ICCP System will give adequate corrosion protection to the hull of a ship over the life of the vessel in conjunction with a compatible protective coating system.

Copper and Aluminum anodes cannot economically deliver enough current to provide protection. In these cases, Impressed Current Cathodic Protection (ICCP) systems are used. These consist of anodes connected to a Control Panel that distributes impressed DC power to the Anodes. ICCP systems are only used where Corrosion protection is required, ICCP does not stop Marine Growth.

Cathodic protection reference electrodes are custom manufactured and placed strategically along the Hull. They provide remote monitoring and control of the protection parameters. The output of the ICCP system is optimized to provide enough current to provide protection to the Hull. Our ICCP systems are often designed with multiple independent zones of anodes with separate Cathodic reference electrodes. ICCP can be used for Shaft Grounding preventing spark corrosion in bearings and gear boxes.



DIFFERENCE BETWEEN A MGPS AND AN ICCP SYSTEM

- Anodes located on the exterior hull of the vessel and used in conjunction with a reference cell.
- The anodes are wired through the hull to a control panel and the rudder has a slip ring assembly.
- The Ship's Hull is neutralized to prevent corrosion only.
- Does not provide Marine Growth Protection.

MARELCO™ ULTRASOUND SYSTEM

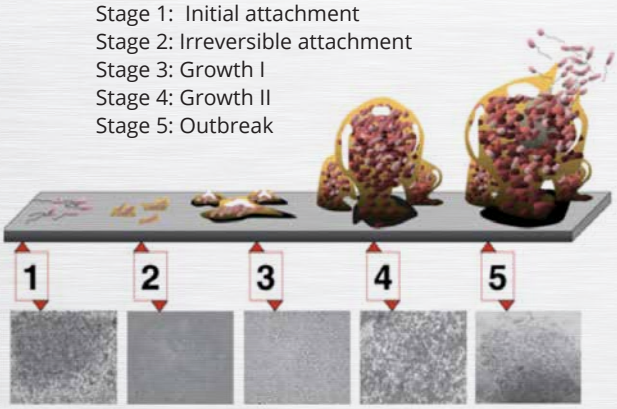
Marelco™ Ultrasound equipment is used for the combating of micro organisms in water. . EMCS Industries Ltd designs unique electronic transmitters that are controlled automatically from a central Control Panel. The Control Panel is installed in a central location but can also be accessed remotely and manages the system automatically. Our Ultrasound systems are applied in various applications. Examples include:

- Combating of micro-organisms found in water (algae, bacteria, fungi or viruses) such as potable water tanks on vessels.
- Anti fouling of the hulls, crossover tanks, sea chests and box coolers of ocean-going and inland navigation vessels.
- Fouling in the lines and heat exchangers of cooling and process water systems.
- The results from installing the Marelco™ Ultrasound are; fuel efficiency due to no drag from fouling on the hull of the vessel, fouling free piping systems, sea chests, cross overs and other salt water storage tanks and bacteria free potable water on the vessels.

The effective principle of this method of combating is based on the creation of high pressure by means of cavitation. The amount of cavitation produced is a measure of the quality of a transmitter. The effects of the cavitation bubbles have been made evident in a number of videos of our transmitters.

REMOVING BIOFILM

Biofilm is a slimy layer found on walls of water reservoirs, such as silo's, tanks, pipes etc. This biofilm contains mostly slime-producing bacteria and other organisms such as fungi and viruses. Biofilm is essential for the multiplying of these organisms. Viruses, fungi and bacteria use the biofilm to multiply. These micro-organisms enter the biofilm and multiply during several stages. This is a continuous iterative process, which can eventually result in high concentrations of these organisms in bodies of water. We must start with a clean situation (see Diagram on right) If biofilm is kept away from Stage 1, it will be impossible for these organisms to multiply. This is very important for the successful anti fouling treatment of many parts of a vessel that require sea water to function. If not monitored properly systems on the vessel can stop working and hulls with fouling create drag and decrease fuel efficiency.



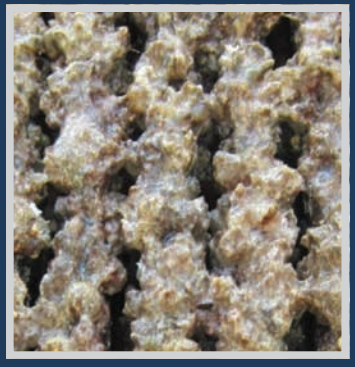
ULTRASOUND PREVENTS STAGE 1 FROM OCCURRING.

CROSS-OVER TANK

Before MARELCO™ Ultrasound

After MARELCO™ Ultrasound

SEACHEST AND BOX COOLER



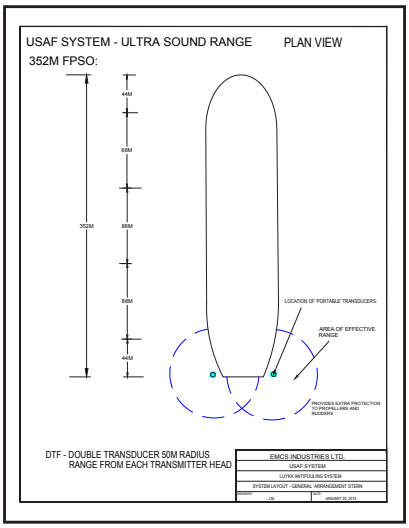
Before MARELCO™ Ultrasound

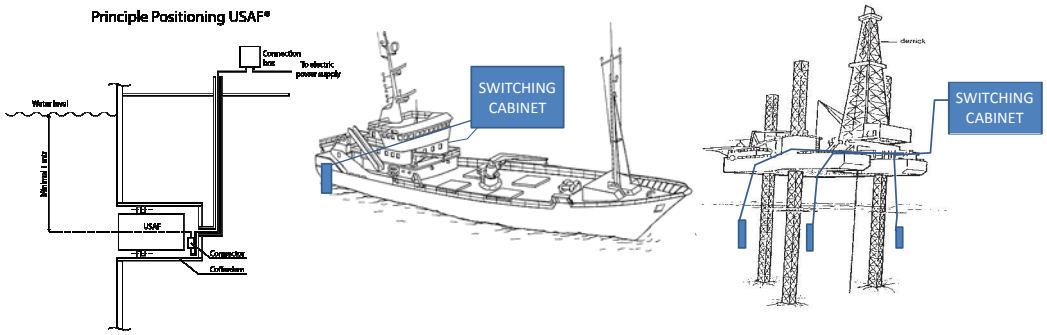
After MARELCO™ Ultrasound

HOW IT WORKS?

Always start with a clean situation!

We start with a clean environment; Ultrasound is a prevention not a cure. The Ultrasound Transducer sends ultrasonic waves into the water creating micro cavitation bubbles. When these bubbles implode it produces local high pressure up to 2000 atmosphere. These shockwaves travel into the water and will prevent larvae from barnacles, mussels, oysters etc. from attaching to the hull or other surfaces. This way the hull will stay completely clean. When larvae have attached themselves for more than two days it is too late for effective treatment. The Ultrasound waves must be present during period alongside in harbours or at speeds of under 5 knots.





SPECIFICATIONS

Transducer Size: 3.5” in diameter (90mm) x 6” – 10” long (150mm to 250mm) and weigh between 4.5Lbs (2kg) and 15lbs (7kg).

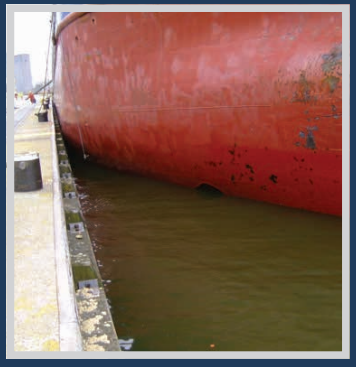
Power Supply: 230 volt 50/60 HZ or 120 volt 50/60 HZ.

Operation: The transducers are effective up to 40’ (15m) below the water level. All transducers are controlled by separate PCB (Printed Circuit Boards) cards in a Control Panel (located in an accessible area) and can therefore be managed separately to suit the application. The integrated system automatically controls Voltage and can adjust to changing conditions. Units are measured every hour (depending on the setting) which ensures the most optimum frequency. The system also compensates for the different depths, water temperature and differences in electric power supply and controls the maximum power level to avoid overload.

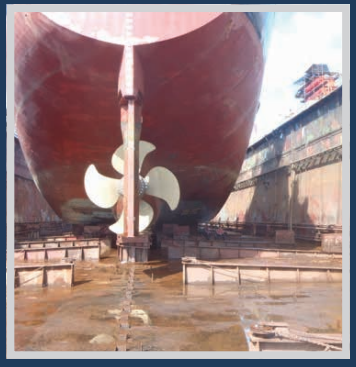
Application: hull of sea and inland vessels.

HULL

Before MARELCO™ Ultrasound



After 9 months using MARELCO™ Ultrasound



After 2 years using MARELCO™ Ultrasound

OUR STORY

EMCS INDUSTRIES LTD.

MARELCO™

EMCS Industries Ltd. was established in 1955 in the beautiful West Coast city of Victoria, BC Canada. The company was established by Frank Chappel and Lauder Ramsay after they had invented a revolutionary seawater protection technology. 60 years later, the company is a division of Environmental Marine World Class Solutions Corp., and oversees all of its own manufacturing and distribution from its brand new facility. EMCS Industries Ltd. has representatives in 18 countries around the world.

Our history began with the invention of the patented Electrolytic Anode product. The product was manufactured and marketed world-wide for several decades under the tradename Cathelco by Electrolytic Marine Corrosion Services which was the original name of the company. In 1983, the company name was changed to EMCS Industries Ltd. and the original anti fouling anti corrosion system was marketed globally under the new tradename MARELCO™.

In order to stay ahead in an ever changing marketplace, EMCS Industries Ltd. has remained at the leading edge of innovation by actively developing specific marine products such as Cathodic Protection (ICCP), Ultrasound and Treatment Tank (Scrubber) systems that all carry the quality MARELCO™ reputation for quality and provide our customers with a comprehensive anti-fouling and anti-corrosion solution designed to save money, reduce energy usage, minimize the carbon footprint and increase the life of our customers Marine assets.

At EMCS Industries Ltd. we are proud of our world class products which solve fouling and corrosion problems for its world class customers in the marine industry.

WORLD CLASS PRODUCTS FOR INDUSTRY LEADING CLIENTS

For the past 60 years EMCS Industries Ltd. has been proudly serving world class customers such as: Carnival Cruise Lines, BC Ferries Corporation, Washington State Ferries Corporation, Princess Cruises, the Canadian and United States Coast Guard, Oceania, Allied Shipbuilders, Seaspan and many others.

"Allied Shipbuilders has undertaken dozens of dry dockings of vessels fitted with EMCS cathodic protection equipment, protecting the most structurally complex, inaccessible and vulnerable parts of the ship - the sea bays and sea chest. Our experience has been the protection provided by these systems is complete. Repairs and maintenance in these areas is virtually non-existent, saving the vessel owners time and money.

The service provided by the company, EMCS has always been outstanding.

Allied is pleased to hear the company continues under new ownership and the key personnel from before remains with the new company.

We look forward to continuing our successful relationship with EMCS."

Chuck Ko
Allied Shipbuilders Ltd.

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