Non-Ablative Advanced Ceramic Antifouling Coating (AC^2)

- **Industry:** Marine
- **Applications:** Propellers, drive shafts, trim tabs, stabilizers, raw water intakes, seacocks, bow thrusters, rudders, ballast tanks, underwater hydraulic actuators, sea buoy floats, power plant intake/outlet grates, sea walls, piling protectors, anything in or under seawater.

Subject

Micro and macro-biofouling of underwater components has been a challenge to the Maritime Industry for thousands of years. Over 2,000 species of plankton, including barnacles, search for homes amongst the seashores and floating objects in the sea. Attachment to the running gear and hulls of all types of boats is an unfortunate favorite home for plankton. Great effort must be made for the prevention of such growth.

The Problem

Millions of dollars annually are spent on cleaning and recoating underwater components. Hard and ablative paints, polymer coatings and other roll on or spray on antifouling protection systems are slowly removed by cleanings and/or abrasion/cavitation. The antifouling performance of these coatings is adequate however, demand is high for more effective antifouling systems that retain their integrity over a longer period of time.

The Solution

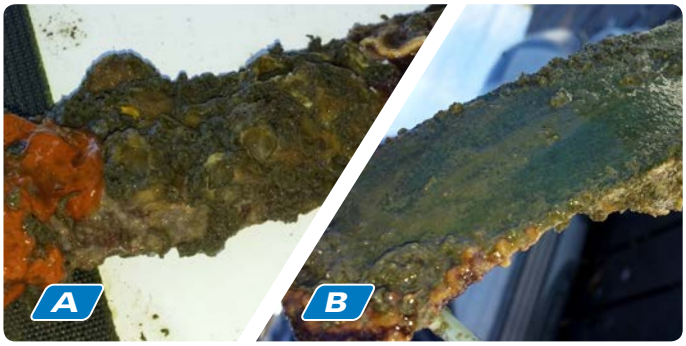
Pyro-augmented particulate spray (PAPS) of advanced ceramic antifouling coating (AC^2).

The coating is applied via a patent pending method by which hard, ceramic antifouling power (AC^2) is introduced into a high temperature jet stream, whereby the particles are plasticized and subsequently sprayed onto a prepared metallic surface. The result is an abrasion and erosion resistant antifouling surface with bond strength in excess of 5,000 psi. Subsequently, the coating is treated utilizing a biocide saturated capillary sealer to impregnate micro-porosity preventing substrate corrosion.

A colony forms opposite the coated side

Coating Performance

Coupons of stainless steel and bronze were coated on one side with 10 mils of AC^2 via the PAPS process and subsequently sealed. These coupons were hung in a canal with relatively good tide flow on July 18, 2013. They were positioned such that they would be partially submerged or fully submerged depending on the tides. After two months in the water, the coupons demonstrated growth on the uncoated side however, the bronze had mild attack. The coated sides showed no signs of growth other than mild slime. After six months, the coated sides were performing phenomenally.



- A: Uncoated side
- B: Coated side after 18 months

Coating Attributes

Hard abrasion and scratch resistant, corrosion resistant, erosion resistant, non-ablative, non-leaching, can be wire brushed and lightly sanded without removal.

The Value Proposition

Fuel economy is crucial to the commerce industry. Fouled propellers can negatively affect this critical cost variable by as much as 30%. Seawater drag caused by fouled hulls also contributes to the issue. Clogging of raw water intakes can affect engine performance or cause failure. Worst of all, the lack of removal causes the formation of massive colonies. Minimizing the expense of cleaning is an obvious value as well.

The photos below depict the coupons after 18 months of exposure demonstrating exceptional coating performance.

A: *Massive attachment to uncoated side of coupon after 18 months submersion*

B: *Stainless steel coupon coated side showed mild barnacle attachment after 18 months*

A: *Uncoated bronze showing less, but still aggressive growth when unprotected with our coating*

B: *Bronze ring coated one face (blackened area) showing resistance to growth*

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