Are copper hull coatings wearing thin

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Anti-fouling legislation looks set to bring about the demise of copper-based hull coatings, but what might replace it? *Mike Garside* reports

Copper-based anti-fouling technology is nearing the end of the line, according to key players in the coatings industry, and will inevitably go the same way as tributyl tin (TBT).

A recent briefing from Conrad Keijzer, Akzo Nobel Executive Committee member, said the company was preparing for a future ban on all biocidal hull coatings. Their marine paint brand, International, have already put considerable resources behind technologies such as ‘non-stick’ silicone hull coatings.

Tin-based anti-fouling was banned six years ago, after 40 years as the standard for hull coatings. Copper-based biocides took over, but have never satisfied either ship operators or environmentalists: operators feel

that copper lacks the potency to prevent the growth of fouling, and environmentalists consider it only slightly less damaging than tin.

There are high stakes for the paint companies and the marketing war is intense. International's non-biocidal 'Intersleek' was recently specified for the Shell *Prelude* FLNG, the longest ship in the world, requiring 40,000 litres of paint. But only two years ago the industry was rocked by Maersk's decision to drop silicone coatings and revert to copper. Rumoured reasons were silicone's reputation for fragility, and the advent of slow steaming, which reduced its effectiveness.

Meanwhile, anti-copper legislation is starting to bite. California AB 425, 'Antifouling Paint Registration and Mitigation' came into effect last year. It prompted LA's Regional Water Quality Control Board to order a 70% reduction in copper content at the world's biggest small boat harbour, Marina Del Ray. Across the State, copper discharge from boats has to be cut by 85% within 11 years. The law applies to non-commercial boats but is widely viewed as an opening shot against copper.

Restrictions already exist in Canada, Denmark, the Netherlands, and Sweden. The US Environmental Protection Authority is reviewing the use of copper, and restrictions are in place for US government vessels. The proposed IMO Polar Code is also expected to contain moves against anti-fouling.

International are not the only manufacturer to prepare for a copper-free future. Sigma/PPG recently released the Nexeon copper-free antifouling range, using Zinc as a replacement, commenting: "With this innovation, PPG shows that it is taking the lead in preparing for a copper-free antifouling future."

Hempel released the Hempaguard range of anti-foulings last September, combining biocides with silicone hydrogel. A major claim is 95% reduction in biocide content.

International Paints, in addition to promoting silicone technology, released a range of copper-free coatings for the leisure and small boat market, coinciding with enactment of the Californian law.

"The (paint) manufacturers still have room to improve the products on the market. From the perspective of reducing fuel consumption and CO_2 emissions, which we take very seriously, we are still waiting for coatings which can match the TBT coatings," Jorn Kahle, Head of Paint/Oil & Underwater Services at Maersk Maritime Technology, told *IHS Maritime*.

He added: “We have not ruled out the silicone-based coatings, but we would say that we hope the manufacturers are able to produce these in a form which is sufficiently durable.”

IMO mandate

An international ban on copper would need to come from the IMO’s Marine Environment Protection Committee, which issued the ban on TBT. Committee chairman Arsenio Dominguez said there are no immediate plans for a copper ban, but ‘harmful anti-fouling systems for ships’ remains on their agenda.

If silicone could shed its image of fragility it would benefit from a copper ban. But in a latest twist, environmental scientists are reporting that tin compounds used in the production of silicone coatings are being found in the final coatings. Since all tin compounds are banned, this could be a serious setback.

Other technologies that would benefit from restrictions on copper include glass-flake hard coatings, which last the lifetime of the ship. They are already popular for ice-going vessels. Ecospeed, the leader in this category, argue that toxic anti-fouling can’t go on forever, and that a hard coating with regular cleaning gives the best economy and performance.

Other intriguing ideas remain mostly on the fringes: polymers that prevent fouling growth by twitching like living skin, micro-fibres to prevent organisms settling on the hull, and attempts to mimic shark skin. There are even ultra-sonic devices that dislodge fouling available for small boats.

The hull coatings market is expected to hit $10Bn by 2018 – a fraction of the fuel savings that ship operators hope for, but a big prize for any manufacturer who could satisfy all players.