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ON THE LINE: The future's cloudy **IN FOCUS:** Antifoulings in the dock **SPOTLIGHT ON THE MIDDLE EAST:** Seatrade ME is here! **LEGISLATION COUNTDOWN:** Combating Emissions

IN FOCUS: THE GREAT ANTIFOULING DEBATE

As fuel costs rise, some ship owners hanker for the old days when anti-fouling coatings (AFCs) containing the biocide Tributylin (TBT) quickly killed the weeds and molluscs trying to make a home on their hulls, slowing their performance.

Environmental concerns over toxic build-up as these biocidal coatings leached into the oceans resulted in an international ban and the industry is still looking for an effective replacement. Now growing pressure for further restrictions is causing a polarization of views within the marine coatings industry, with three approaches battling for the lucrative market.

September's Shipbuilding Machinery and Maritime Technology trade fair in Hamburg brought the controversy over biocides in hull coating into sharp focus. Drydock's sister magazine, Protective Coatings Europe (PCE) hosted a conference within the fair which provided the platform for a livelier debate than might have been expected.

BANNED BIOCIDES

The ban on TBT coatings by the International Maritime Organisation (IMO) fully came into effect in 2008. Three different attempts to fill the vacuum have emerged, with new AFCs containing replacement biocides ranged against biocide-free silicon technology and non-toxic hard coatings - each adopting alternative approaches to the expensive problem of fouling.

There are high stakes. Fouling on ship hulls can increase fuel costs by as much as 40%, a massive increase for operators whose larger ships consume upwards of 300 tons per day.

The arguments involve not only fuel costs and toxic additives: Kyoto CO_2 emissions targets are impacted by higher fuel consumption, while further concerns include the transmission of invasive marine species from port to port if not killed by toxic coatings or otherwise removed from ship hulls.

Use of the toxin-based AFCs, however, is under increasing attack. The volume of toxins leeched into the oceans and gathering in potentially high concentrations around ports and harbours is provoking legislative efforts to ban their use altogether. Estimates of the volume of biocidal agents leeched into the marine environment annually are as high as 100,000 tons, a matter of great concern to ports and

With fouling on ship hulls increasing fuel costs by as much as 40% choosing an antifouling coating that works for you is a high stakes business. By Mike Garside

harbours struggling to meet water quality targets.

DIFFERENT APPROACHES

The new AFCs generally use compounds of Cuprous and Zinc Oxides, with the herbicide Diuron and the algicide Irgarol amongst other active constituents. These biocidal agents are gradually exposed as surface paint wears off, giving the coatings an active life of 2 to 5 years. Some ship operators compare their anti-fouling effectiveness unfavourably to the old TBTs, and they are highly unpopular with environmental campaigners. Studies and counter-studies about their toxicity to marine life reflect the controversy, but increasing restrictions in their use seem inevitable.

Also on offer are Fouling Release coatings (FRCs) based on silicon technology. These offer low surface resistance to which growths cannot easily adhere. When steaming at over 15 knots the fouling is removed by water pressure against the hull. Some FRCs also contain active biocides. While they have made inroads into the market the silicon coatings suffer from criticism that they are fragile, and that even without active biocides the silicon is toxic to marine mammals.

At the green end of the spectrum are completely non-biocidal approaches including long-lasting hard coatings, which can be regularly and rapidly cleaned underwater to maintain peak efficiency. Hard coatings are already popular in icy waters where their robustness removes the need for frequent repainting, and they are now gaining traction in areas of high environmental sensitivity. Since hard coatings lasts for the lifetime of the ship, expensive drydocking time is much reduced.

Disney Cruise Lines recently adopted such hard coatings. Their vice-president of new ship engineering Frank de Heer says “We tried it on the Magic and were pleasantly surprised with the fuel savings. It’s a 20-year product that does not need to be re-applied.”

MAERSK’S MOVE FROM SILICON

Jotun paints favour AFCs and have won major contracts from Maersk shipping, who tried International Paints’ silicon coatings, but have since been removing them and going back to copper-based biocidal AFCs. The decision affected at least 60 large container vessels. Maersk had been keen

to lead the industry in dropping biocides, but after 58 ships had been coated and put into operation, the decision was reversed. An expensive programme of stripping off the silicon coating and replacing it with anti-fouling is still underway: Maersk blamed the development of a slime layer and fast decrease in efficiency. Such a move has undoubtedly been a major blow to silicon technology.

Jotun's Vice-President for Marine Coatings Geir Boe says the debate on biocidal damage misses the point, and that it is relatively unimportant compared to the need to reduce CO_2 emissions. Tom Evensen, his Sales Director for Hull Perfomance Solutions, says they have attracted ship owners by guaranteeing performance targets. Jotun also highlight their initiative for an industry standard measuring system to allow a straight comparison between the efficacies of different coatings. While they are researching other possibilities, AFCs remain their main offering.

All the manufacturers are under pressure from ship operators to provide reliable and robust ways of keeping the ship hulls clean. International Paints representative Joe Wilsher summarised the economic equation facing ship operators: the cost of cleaning regularly versus the cost of light fouling, and the cost of time out the water for repairing damage to softer coatings.

DIFFERENT OFFERINGS

Paint manufacturers at the SMM exhibition were displaying their ranges and promoting competing claims of efficiency savings. Most have both silicon-based Fouling Release Coatings (FRCs) and biocidal AFCs in their range, and some have hard coatings available. When asked their recommendation for a Panamax bulk carrier (a typical cargo vessel) sailing a typical route between SE Asia and N Europe, sales reps on the respective stands suggested as follows:

International Paint: *Their Intersmooth range (AFC)*
Jotun: *Their Sea Quantum range (AFC) based on silyl methacrylate*
PPG: *Their Ecofleet (AFC,) or their Sigmaglide biocide-free FRC*
CMP: *Their Sea Grandprix (AFC)*
Hempel: *Their Globic (AFC), or their Hempasil FRC alternative*
Nippon: *Their new LF-Sea range, a low-friction copper based (AFC)*
Hydrex: *Their glass-flake based Ecospeed, the only company to suggest a hard coating (non-biocidal).*

RESTRICTIONS

All sides of the debate seem to acknowledge a sense of inevitability that copper based anti fouling agents will themselves run foul of environmental legislation before too long. Against a backdrop of financial problems on every side, what goes on beneath the waterline is at a crossroads.

PCE PANEL DISCUSSION

The PCE-sponsored panel discussion at the Hamburg Fair featured representatives of the main manufacturers and was unexpectedly dominated by pollution issues.

In discussions about the size of the pollution problem, Hydrex CEO Boud Van Rompay revealed that the Port of Rotterdam had been forced to abandon plans to dredge its harbour due to the high levels of toxins in sediment. Although that toxicity was largely the result of the TBT era, Van Rompay said the industry needed to stop adding to the problem and move on from the biocide era altogether. He suggested that hard coatings and frequent underwater cleaning answered the three problems of hull performance, toxic damage, and transfer of invasive species. In-water cleaning has been restricted by ports, who are concerned about both invasive species and toxins from AFCs. However, they are now allowing ships with hard coatings to carry out such operations. With a frequently scrubbed hull, the ships always operate at their peak efficiency.

While other toxin-free approaches were briefly discussed, none of the major manufacturers was willing, understandably, to share the secrets of their research laboratories.

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LIMITED FUTURE

Nippon representative Nobuhiko Kawabe agreed that copper based AFCs have a limited future. Japan had banned TBTs over 10 yrs before the rest of world and their Government gave financial backing for research into alternatives, resulting in Nippon's new product range of hydrogel low friction coatings. These are still based on common AFC compounds, however.

Meanwhile time may be running short for the biocide approach: legislation has already been proposed in California, Washington, and Canada to restrict or ban the active agents in AFCs. Diuron and Irgarol are both targets of environmental campaigners internationally. Australia and New Zealand are tightening restrictions designed to prevent the spread of non-indigenous marine species.

For both the paint and shipping industries it remains a Gordian knot of a problem: environmental damage in every direction, spiraling fuel costs, ships sitting idle or slow steaming and thus inviting heavy fouling, and more time in drydock repainting damaged or exhausted hull coatings.

As the Chair of the PCE discussion concluded, TBTs were a wake-up call for the industry, which now has to deal with the regulatory burden. We all hope that the industry will step up and deliver both economically and environmentally sustainable solutions.