Industry way ahead of antifouling treaty

Although the new IMO Antifouling Convention has not entered into force on the specified date, paint manufacturers have already produced a number of tin-free hull coatings. Furthermore, pressures to refine and improve the new technologies are growing

The scheduled entry-into-force date for the International Maritime Organisation's (IMO) Convention on the Harmful Effects of Antifouling Systems of January 1, 2003 has now passed but the treaty is yet to be signed by a single country.
Ratification has been hindered by delays in completing the three sets of guidelines that underpin implementation of the Convention. Many flag state administrations are reluctant to ratify a treaty before it is clear how it will be enforced and what implementation will cost in terms of manpower and resources.
The Convention is due to come into force 12 months after it has been ratified by at least 25 states representing 25 per cent of the world's gross tonnage. Chief among its provisions is a ban on the application and use of tributyl tin (TBT)-based paint as a hull antifouling coating from January 1, 2003 onwards. Existing TBT-based coatings will have to be either sealed or blasted off by January 1, 2008.

The real world
Although IMO knew these target entry-into-force dates were untenable when the Convention was adopted in October 2001, they were retained in the treaty for political reasons.
Aware of the time it would take for the IMO Convention to achieve the necessary ratifications, the European Union has drafted two instruments dealing with hull antifouling paints. A new EU Regulation prohibits the application of TBT-based paints to ships flying the flags of EU member states from January 1, 2003, while a related EU Directive calls for a ban on the marketing of TBT-based antifouling paints in EU member states.
Industry has been aware of the impending prohibitions on the use of TBT-based antifoulings and has sought to develop and introduce TBT-free paints in advance of the original IMO deadlines. The effectiveness of TBT-based paint as a means of slowing down the buildup of marine growth on ship hulls is so good that it has made the development of alternative products with a similar performance extremely difficult. Trials with some of the new TBT-free products have shown them not to be particularly effective and a number of shipowners have said they will continue to use TBT-based hull antifoulings until the IMO Convention is ratified and enters into force. Whether or not the IMO Antifouling System Convention ever becomes the key driver of a new antifouling regime, as originally envisaged, is a moot point. The bottom line is that paint manufacturers have already done considerable research into new TBT-free paint systems and the performance of these new systems continues to improve.

Old and new incompatibilities
Whereas the market for TBT-based paints was relatively straightforward, with the various formulations of the same generic type, the switch to TBT-free paints has unleashed a plethora of new and diverse technologies based on either synthetic polymers or rosin. As a result, determining the correct antifouling and the appropriate pre-paint procedure is becoming a complicated issue for shipowners.
Jotun Marine Coatings (JMC), a marine paint supplier based in Norway, is advising shipowners to seek the recommendations of coating manufacturers prior to applying TBT-free antifouling treatment to ship hulls. The company sees the main problem as stemming from incompatibilities between existing organotin coatings and the new TBT-free paint which is applied in order to seal in the older coat.

"From now until 2008, thousands of vessels with TBT-based antifoulings will drydock," points out Frank Mohn, JMC director. "The application of new antifoulings to clean, blasted hulls will not present a problem. The real challenge arises when attempting to seal in a TBT-based paint with a TBT-free antifouling. It will be necessary to choose the optimum coating in order to control and limit the presence and extent of a leached layer on an existing antifouling.
"If it is not possible to control the leached layer development when applying a TBT-free antifouling, there will be drastic consequences, such as popping or cracking and detachment of the newly applied coating," continues Mohn. "This gives a surface covered in pinholes, unbroken bubbles and craters that contribute to increasing surface roughness."
Whereas the excellent antifouling performance and smoothing properties of existing TBT-based coatings are taken for granted, not all new TBT-free paints will offer both of these properties. Some may not provide either of them. Also, whereas the best TBT-free antifoulings offer a precise balance between the rate of release of soluble components and the polishing rate, some of the new technologies do give the same degree of control.

600 and counting
In November 2002 Jotun Marine Coatings announced that 600 vessels had been coated with its 2003-compliant SeaQuantum TBT-free antifouling paints prior to the January 1, 2003 deadline laid down in the IMO Convention. The product line has been the recent choice of a number of major shipowners, including BP Shipping Ltd, Shell International Trading and Shipping and Westfal-Larsen.
"With its effectiveness based on a hydrolysis process, SeaQuantum is a unique TBT-free antifouling," says Bjoern Wallentin, JMC antifouling product manager. "Tests performed on the 600 vessels using SeaQuantum show that this hydrolysis-driven coating outperforms all other TBT-free self-polishing antifoulings, with the advantages of no fouling, no increase in hull roughness and no increase in fuel costs compared to TBT-containing antifoulings.
Hydrolysis is the chemical reaction between reactive groups in the binder and the slightly alkaline seawater that takes place in the outermost layer of the paint film - the conversion of an insoluble polymer to a soluble one.
"SeaQuantum provides up to 60 months fouling-free performance," continues Wallentin. "Unlike most other TBT-free antifoulings, which give a soft, sticky paint film, the SeaQuantum film is hard - hard enough for newbuilding applications."
The SeaQuantum paint formulation is protected by patents and the technology is only available from Jotun and its partners in the SeaStar Alliance. In Japan and Taiwan products from the same technology are sold under the name Takata Quantum.

Hempel expands range
In 2002 Hempel's Marine Paints A/S of Denmark augmented its top-of-the-range Globic tin-free paint with the addition of two new IMO 2003-compliant tin-free antifoulings, the Oceanic and Olympic ranges. All are for application during maintenance projects, but whereas Globic enables drydocking intervals of up to 60 months, Oceanic and Olympic require more frequent application.
Both of the new products are self-polishing antifoulings reinforced with Hempel-patented fibres. The drydocking interval for the Oceanic range is up to 36 months for vertical hull plating and 60 months for horizontal bottom plating, while the Olympic drydocking is up to 36 months.
"The fibres in the new antifoulings increase their mechanical strength," explains Kim Schiebel, Hempel newbuilding manager, marine marketing. "Mechanical strength, or lack of it, has been identified as one of the weaknesses of the new generation of tin-free antifoulings in general."

Long Ameron history

Having been introduced onto the market as the first tin-free self-polishing paint in 1983, Ameron International's ABC#3 can lay claim to being the only antifouling coating of this type to have been proven in service over an application period of five years.

ABC#3 releases cuprous oxide in a controlled, engineered manner via the hydrolysis of the superficial antifouling layer in seawater in combination with the polishing action caused by the motion of the vessel through the water. The outer layer continually wears away, exposing fresh layers of antifouling.

"ABC#3 provides a service life up to five years without unreasonable dry film thickness requirements necessitating application of numerous coats of antifouling," states Wim van Leeuwen, marketing manager Europe for Ameron International. "As a result, drydocking and repainting costs are reduced. ABC#3, which is IMO 2003-compliant, also eliminates the existing and anticipated special removal and disposal costs for organotin-contaminated water, paint and grit."

One of the latest of the several hundred ships to be painted with ABC#3 is the VLCC Tijuca sailing in the Barber Shipmanagement fleet. Ameron also supplied ballast tank coatings for the vessel.

International hybrid

International Coatings Ltd (ICL), part of the Akzo Nobel group, also added a new antifouling coating to its tin-free range in 2002. Interswift 655 is a new, patented hybrid incorporating copper acrylate technology that gives a performance midway between its two established products - the Intersmooth Ecoloflex self-polishing copolymer (SPC) and the controlled-depletion polymer (CDP), Interspeed 340.

"Interswift 655 combines the patented copper acrylate SPC technology of Intersmooth Ecoloflex SPC with the rosin-based CDP technology of Interspeed 340," comments Jim Brown of ICL. "The result is an antifouling with the CDP features of surface tolerance and attractive volume solids content and the SPC attributes of polishing rate control, control of biocide release and reduced leached layer size. Performance has also been enhanced by the use of a biodegradable boosting biocide."

Interswift 655 provides up to 36 months in service for the vertical sides and up to 60 months for the flat bottom, the actual time depending on ship service conditions and the specification applied. It is surface-tolerant, enabling it to be applied over existing antifoulings in good condition. in most cases no tie coat is required before application over TBT SPC products.

The database

ICL reports that, according to its Dataplan information resource, Interswift 655 has an expected satisfactory performance rating of 80 per cent in general trading. The ICL Dataplan monitoring system records the application and performance of coating systems on over 30,000 vessels currently in service. Starting with newbuilding data, for each drydocking vessel details, including drydocking interval and coatings performance, are recorded.

Antifouling coatings are assessed for the presence of fouling, i.e. type, severity and extent. Utilising database information, an antifouling performance rating can be calculated.