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Remain cautious

Ship operators and yacht owners must not dismiss piracy risk - it needs to be a paramount consideration

FUTURE POWER
Are battery and hybrid propulsion solutions viable propositions for ships?

THE VIRTUAL PORT OF EUROPE
The e-Compliance project aims to reduce the burden of multiple regulatory sources

A MATTER OF SURVIVAL
Improved technology leads the way in the development of personal safety in marine operations

Smooth running

Mike Garside discusses how an increasing pressure to reduce marine fuel consumption is putting pressure on paint manufacturers

As fuel prices continue to squeeze ship operators margins, the spotlight is falling on hull coatings, which claim to bring down costs by providing smoother hulls. But the paint manufacturers are struggling to satisfy industry demands.

The issue is the added friction caused by marine growth. Fouling, from light slime to heavy barnacle encrustation, costs the shipping industry millions, perhaps billions, in added fuel. A fouled hull can increase fuel consumption anywhere from five per cent to 40 per cent - in fact one US Navy study put the figure as high as 85 per cent. A ship burning 300 tons of fuel a day can face a cost increase of $20,000 to $80,000 for every day at sea.

Manufacturers at a crossroads

The previous go-to solution, tin-based anti-fouling paint, was banned in 2008 on environmental grounds, and no alternative solution has yet gained broad acceptance from operators. Tributyltin (TBT) was found to be the cause of genetic malfunction in species such as whelks, and its long chemical half-life meant that thousands of tons of active biocides were accumulating in sediment outside harbours. Since TBT coatings were 'self-polishing' (meaning that top layers of paint were intended to wear away, to reveal fresh biocides) as much 100,000 tons of biocides were estimated to be entering the worlds oceans annually.

TBT came into use in the 60's and for over 40 years was the standard. It was tough, and it had a potent biocide, which would last five years or more. But the ban, coupled with worldwide recession and spiralling fuel prices, has hit the shipping industry hard.

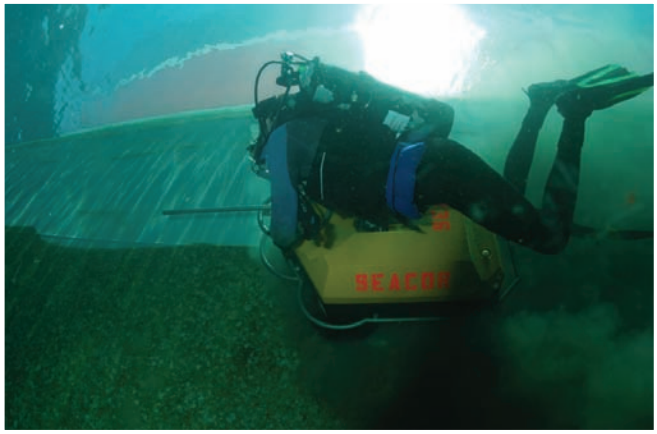
Since TBT has now been gone for five years, operators have had the chance to look properly at the hulls of most ships in drydock, and to assess the efficiency of replacements. Few of them seem to be impressed with the results.

Operators dissatisfied

A recent poll of ship operators by one market research company found that 80 per cent of operators wanted coatings that would last for more than a few years without needing replacement, and 75 per cent wanted coatings to be strong enough to resist normal wear and tear. By far the most important factor though, was a coating, which would reduce fuel consumption, with 92 per cent listing it as 'very important'. Less than 15 per cent were happy that their current anti-fouling or silicone coatings.

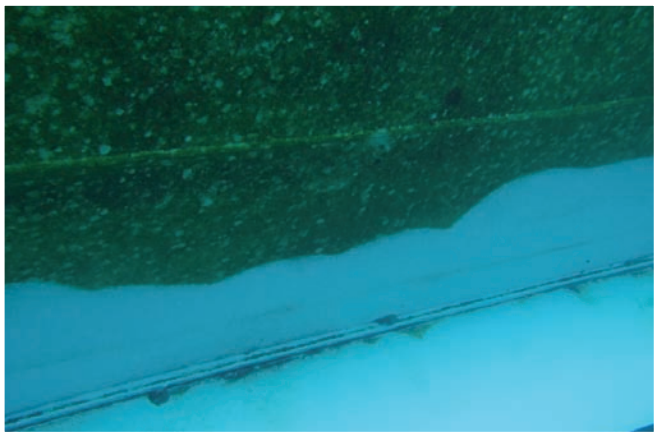
Anti-fouling replacements

Most paint manufacturers currently rely on copper-based anti-fouling paints, while alternative silicone-based 'foul-release' coatings have also gained a significant market share. Copper is a less effective biocide than tin, and the coatings lose effectiveness more quickly than tin. Copper-based coatings are also less durable than those with tin, and surface degradation occurs over time. It is nevertheless still the most common form of hull coating.



Hard coatings require regular cleaning but are now more popular because they last the lifetime of the vessel

Degradation of anti-fouling coatings can add to frictional resistance and fuel bills



Fouling prevents smooth passage through the water and increases fuel bills by as much as 40 per cent

Long-term paint degradation (including blistering, delaminating, cracking and roughness from partial reapplication) afflicts most current coatings and the need to re-coat is common after five or even 2.5 years.

While the cost of re-coating a ship is far from small, it is dwarfed by the cost of extra fuel needed to propel a fouled hull. The effect of paint degradation however, regardless of fouling, also pushes up resistance to water and after five years most anti-fouling coatings are very rough indeed.

Silicone/hydrogel

Alternative silicone-based coatings are designed to shed fouling by being 'non-stick'. They initially looked like being the future – but problems with durability, and difficulties in application have dented the image.

Additionally, since slow steaming has been widely adopted, silicone paints are less effective at shedding fouling as the slower speeds produce insufficient water flow. Some new hybrid solutions have been introduced, such as embedding cuprous biocides into silicone coatings, as contained in a new range by Hempel.

Silicone, however, is much softer than other coatings and generally easily suffers from mechanical damage. 'Touching up' a silicone coating can be tricky - non-stick paint doesn't like to stick to anything, even itself. Maersk trialed silicone coatings but dropped them and returned to copper-based anti-fouling – although no reason has been publicly given, the fragility of silicone seems to have been the problem.

Although both copper-based anti-fouling and silicone have proponents, it is hard to find ship operators who express any real satisfaction with the products on the market.

Durable alternatives

Hard coatings, the third main alternative, have the advantage of lasting for the lifetime of the ship, are gaining converts particularly in colder or icy waters. Fouling accumulates less quickly in cold waters, and durability is more of an issue. Hard coatings don't prevent fouling, but are designed to be rapidly cleaned underwater as needed. Some operators have been put off by the cleaning requirements, but others see it as an advantage since each cleaning effectively restores the hull to shipyard condition, and peak performance.

Ecospeed by Hydrex leads the field in hard coatings, with ships operating in both cold and warm climates. If resistance to the idea of regular cleaning is overcome, the concept of a hard lifetime coating could become very attractive to operators.

Other concepts, such as bio-mimetic sharkskin coatings, or even compressed air streams released beneath the hull, have their proponents but have yet to enter the mainstream, but remain exciting future possibilities.

CO_2 emission targets and environmental legislation limiting the use of biocides may force the issue in the end. Most ports have banned underwater hull cleaning (with the exception of hard coatings), and the forthcoming Polar Code is unlikely to allow strong biocides on ships entering the area.

In the meantime operators have to crunch the numbers as best they can. ❖

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