Smoothly does it

From biofouling to ice resistance or fuel saving, hull coatings play a vital role in the lifetime of a ship, and there are many ways to ensure a polished passage through the water

Hull biofouling is a well-known contributor to the transfer of invasive species, but coatings manufacturers differ on how they believe the problem can be alleviated. For instance, Belgium-based Hydrex professes that applying its vinyl ester-based Ecospeed coating to hulls will limit the transmission, provided regular hull cleaning is undertaken.

An Ecospeed hull is able to be cleaned without this affecting the structure of the coating. "Of course it is an additional effort, but you would be able to keep the hull in the same condition for 20 years," said Manuel Hof, production executive at Hydrex. "If you are able to clean the slime layer off, you will prevent the severe marine growth that causes the invasive species issue."

The other major alternative is to use antifouling, but Hof believes that marine creatures become resistant to these after a few years. "Antifoulings are also not designed to be cleaned, and even if the hull is washed, this can release some of the more toxic properties of the antifouling into the water," he added. "Spot blasting and spot repair increases the frictional resistance and you cannot restore the antifouling coating to its initial condition, unlike Ecospeed."

He also reported that silicone-based foul-release coatings are unable to be properly cleaned, as "you will destroy the paint because it is so soft, and because it is based on a non-stick principle, it is very difficult to repair the coating properly when damaged". High humidity may also adversely affect which regions silicone-based paint can be applied or effective in.

Hydrex specifies that hull surfaces need to be entirely stripped prior to Ecospeed application, which is obviously simpler for newbuildings when a coating is applied for the first time. Hof commented that although the initial paint removal on existing ships would cost more, this would be offset by time saved during drydocking that would otherwise have involved re-coating parts of the hull, as well as fuel savings derived from a smoother passage through the water.

Durability is key

The durability of Ecospeed also relies on glass platelets embedded in the coating – up to 300 layers thick. The glass forms a natural barrier to prevent water penetration to the hull in order to avoid corrosion. "Competitors don't understand why we offer a 10 year warranty, while they would provide a whole new coat during a drydocking and earn more money. But we have a totally different approach," Hof told *MER*.

Ecospeed's durability has been confirmed by DNV as superior corrosion protection and LR as an abrasion resistant ice coating. "As Ecospeed is hard but flexible due to the vinyl ester, it can deal with ice abrasion and avoid hull cracking," according to Hof. He pointed to a research vessel customer, who has been operating in the Antarctic for four years, finding that the coating was still completely intact during a recent docking.

As well as ice-going vessels, the manufacturer is also targeting offshore-related vessels and installations, where structures may be required to be in the water for up to 35 years. "There is a lot of interest from owners where a contract is about competing on quality rather than price," said Hof.

Ecospeed has been confirmed for the underwater hull of the world's first floating LNG production unit, the Caribbean FLNG, under construction in China for Exmar. Exmar's Caribbean FLNG will be deployed offshore Columbia at the end of 2014. "Fouling should not be too much of an issue as the Caribbean FLNG is a fixed installation, so the hull should be protected for at least 15 years," Hof added. "Another major benefit is it's completely non-toxic which is important as locally there is a major fishing area. The hull can be cleaned as needed in the water without damage to coating or harm to the environment."

Rudder protection

Hydrex also produces a product called Ecoshield to protect rudders. This contains more glass platelets for increased protection against cavitation. Container-

Sigma Nexeon 750 antifouling on one of Odebrecht Oil and Gas' newbuild drillships after a long outfitting period

ship owner CMA CGM has already signed up for Ecoshield at every ship docking.

However, Hydrex is going even further in rudder protection, as it is about to launch a filler which is designed to rectify pitting caused by cavitation. With a curing time of one hour, the filler is based on the same resin as Ecoshield, which enables a good match between the bonding of the two systems. The filler also has anti-shrink properties and Hydrex's aim is to supply it along with Ecoshield so that a damaged rudder can be repaired quickly and inexpensively and then given lasting protection from future cavitation damage.

Regulations

Furthermore, Hydrex is in communication with IMO and other authorities, pushing for improved coatings standards. "We hope the IMO will issue requirements which are broadly beneficial to shipowners in terms of greater fuel efficiency and also the marine environment in terms of greatly reduced toxic emissions from ship hulls and prevention of the spread of invasive species via hull fouling," said Hof, adding, "We feel that the use of a hard, non-toxic, cleanable coating along with routine in-water cleaning will accomplish both."

Competitor, International Paint, is also involved with guidelines development through the International Paint and Printing Ink Council – official observers to IMO and its sub-committees. New guidelines which aim to reduce the risk of translocation of invasive aquatic species from biofouling present on immersed areas of ships, were approved and adopted as an IMO resolution at MEPC 62 in July 2011.

International Paint has contributed to the new recommendations on how to minimise biofouling, advocating that owners/operators establish a biofouling management plan and biofouling record book. These would take into account the selection of fouling control coatings and methods of installation and maintenance, in-water inspection and cleaning whilst in service, and design considerations at new construction. The manufacturer itself has a large range of antifoulings and foul release technologies, including Intersmooth copper acrylate, Intersmooth silyl and Intercept Lubyon-based antifoulings and silicone and fluoropolymer-based foul release coatings.

New additions

Its most recent Lubyon-based antifouling, Intercept8000 LPP, was introduced earlier this year. "Intercept8000 LPP has a 'superhydrophilic' surface – when it is immersed, the seawater has a lubricating effect, resulting in less friction. This reduces drag and increases vessel efficiency, giving average fuel consumption and associated emissions savings of 5% annually compared to typical controlled depletion polymer antifoulings," said Jim Brown, International Paint's marketing development manager. "The coating also swells on contact with seawater, helping to smooth out imperfections and potentially further reducing drag. Unlike typical silyl and metal acrylate antifoulings Intercept8000 LPP replicates the linear polishing of the benchmark tributyltin based coatings, meaning total predictability with the polishing rate remaining constant throughout the in service period. Intercept8000 LPP has been applied to 51 vessels with 15 contracted and a further 41 currently in the pipeline, and has seen significant take-up with containerships."

Simultaneously the firm launched Intersleek1100SR, a biocide free fluoropolymer technology which is designed to tackle slime. This product is designed to deliver macro and micro fouling control with good static resistance even in warm waters. Slime that can build up during static periods is released by the movement of the vessel through water.

"The new patented fluoropolymer in Intersleek1100SR has been developed by enhancing the slime resistant polymer groups used in earlier generations of Intersleek technology, creating new surface chemistry that specifically resists the adhesion of slime," explained Brown. Since March 2013, Intersleek1100SR has been applied to 102 vessels with 30 contracted and 24 under negotiation, including container, cruise, LNG, ro-ro, and tanker vessels.

Ice resistance

For ice-going vessels, the company offers Intershield163 Inerta160 to combat ice abrasion and adhesion. Specifically designed for operators that trade in the Baltic Sea region, this epoxy coating has a track record of over 1,400 applications on vessels trading in ice. Solvent free, it can operate in temperatures down to -50°C and it was the first classification society recognised low friction ice resistant coating.

Performance of Intershield163 Inerta160 was demonstrated during a dive inspection of Norilsk Nickel's specialised container/cargo vessel *Monchegorsk* – the first ship to sail the Northern Sea Route without icebreaker assistance during the Arctic winter. The inspection showed no damage or corrosion on the underwater hull or ice belt. Captain Vyacheslav Konoplev, deputy general director of the Murmansk Transport Branch of Norilsk Nickel, commented: "Intershield163 Inerta160 demonstrates outstanding abrasion resistance to the heaviest ice conditions and improves the seaworthiness of ice-going ships, satisfying the high performance standards of our fleet."

Netherlands-based PPG's ice offering is Sigmashield 1200, and according to Sijmen Visser, global marketing manager marine at PPG Protective and Marine

Coatings, this solvent-free phenolic epoxy has a growing recognition in this segment.

Of PPG's offerings, Visser summarised: "PPG's hull protection products, Sigma Syladvance, Sigma Nexeon and Sigmaglide, smooth and polish the ship's hull during the ship's service life and/or support a very smooth hull right from the start. PPG is unique in offering a full range of fuel-saving coatings solutions based on different technologies, from silyl acrylate and copper-free to non-biocidal silicone."

Recent product launches include Sigma Nexeon 710, Sigma Syladvance 700 and Sigmacover 580. Sigma Nexeon 710 is a copper-free antifouling designed to have long-lasting cosmetic properties. It has also been recognised as a low friction antifouling by a major Japanese yard. Sigma Syladvance 700 is a complementary silyl acrylate-based antifouling to the Syladvance 800 – the latter having lately been applied to 13 SCF Unicom vessels. Lastly, Sigmacover 580 is an anticorrosive epoxy and antifouling tiecoat in one layer which is aimed at improving touch-up and repair efficiency during drydockings.

British Antarctic Survey ship *Ernest Shackleton* sailed in ice for four seasons with an Ecospeed coating that did not deteriorate

Furthermore PPG has recently applied 7,000l of Sigma Ecofleet 690 tin-free antifouling on the underwater hull of the *Allseas Solitaire*, the largest pipe-laying vessel in the world. □