With an STC coating in place, regular in-water cleaning can be done in-situ with no ill effect on coating or the environment

Green hull coatings for the offshore sector

Steven Ferry, on behalf of Hydrex, looks at the importance of choosing the right hull coating system and maintenance regimen for vessels in the offshore oil and gas industry.

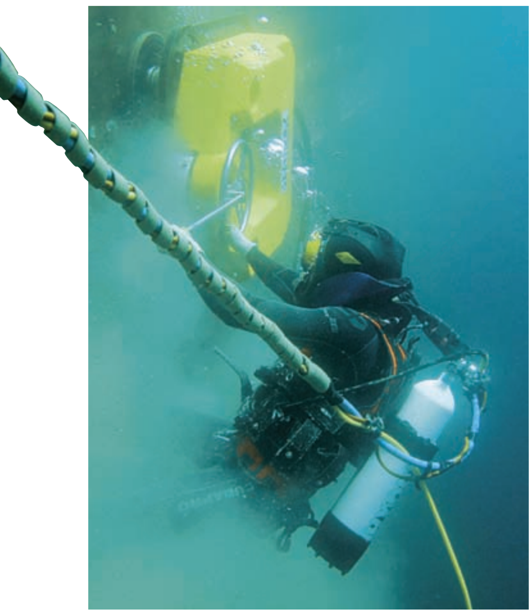
While the shipping industry as a whole is experiencing a slump in terms of newbuilds, one maritime sector is bucking that trend: the offshore exploration and drilling industry. The offshore industry is a shining light in the maritime sector: capital outlays and discoveries, production and profits are all healthy. One area where significant improvements still can be made is in the mitigation of the lost production from, and high costs of, maintenance of ships and equipment, working as they are so remotely and in generally very challenging environments.

It is projected that world energy consumption (the majority of which is oil based) will grow by 53% from 2008 to 2035. Much of the growth in energy consumption occurs in non-OECD nations, where demand is driven by strong long-term economic growth. Projected energy use in non-OECD nations will increase 85% by 2035, compared with an increase of 18% for the OECD economies.

The prediction is for new discoveries of oil to be near zero by 2050, or, in the words of ExxonMobil executive William J Cummings: "All the easy oil and gas in the world has pretty much been found. Now comes the harder work in finding and producing oil from more challenging environments and work areas."

EXPLORATION

The huge Tupi underwater oil field was discovered by Brazil in 2008. It is estimated to hold the equivalent of 5-8 billion barrels of light crude oil. And when Royal Dutch Shell sank five wells off Alaska recently, it was the first drilling in US Arctic waters in decades. Encouraged by high commodity prices and shrinking sea ice, not only oil exploration, but the cruise and fishing industries as well, among others, are gearing up to tap the Arctic's riches, previously inaccessible because of the year-round ice. Shrinking summer Arctic ice is opening new, and shorter shipping lanes, an open invitation to general shipping to chart Arctic courses.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The US Geological Survey estimates that nearly 13% of the world's undiscovered oil reserves, and 30% of its undiscovered gas reserves, are to be found north of the Arctic Circle. That's 90 billion barrels of oil and 1,670 trillion ft3 of natural gas. And these estimates don't include so-called unconventional oil and gas deposits, such as hydrocarbons found in shale rock, or methane hydrates on the sea floor.

While Arctic oil exploration is more challenging technically than any other environment, continuing high oil prices and advances in technology combine to fan the petroleum industry's interest in the region, with countries such as Canada, Russia, Norway, and Denmark (Greenland), whose northern areas all extend into the Arctic, being likely targets for future exploration.

It is clear that the migration to offshore exploration and production that has already begun will only gain momentum. It is also clear that, as it does, the demand for vessels and rigs will also continue to rise.

However, an unfortunate reality with these developments is that the farther from shore—such as into the Arctic (or Antarctic)—exploration and production takes oil companies, the farther vessels and rigs will find themselves from drydock for cleaning and servicing as needed—meaning significant downtime and lost production.

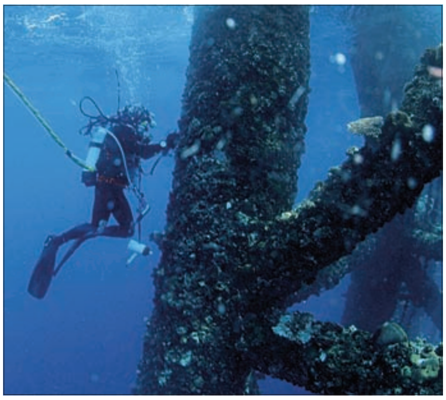
Keeping a ship's hull free of even a small degree of accumulated fouling (slime) and ensuring that the coating is in good, smooth condition can save about 20% of fuel consumption; while a heavily fouled hull can require as much as 80% more power to propel the vessel at the same speed. In other words, it is very good business, both economically and environmentally, to ensure that hulls of both oil-exploration service vessels and tankers are kept as smooth as possible.

Keeping the hulls of exploratory vessels and rigs clean makes business sense as well, but for a different reason. Since these are stationary vessels, kept in place by thrusters or tethers, the fouling problem is not one of increased hull friction, but one of increased hull weight as a result of heavy biofouling. This fouling not only reduces the deck loads commensurately, but, over time, will also have a damaging effect on the hull itself.

Stationary vessels are open invitations to both micro and macro fouling, especially considering that conventional biocidal antifoulants require flowing water to work. These factors allow stationary vessels to accumulate fouling to almost hard-to-believe levels in a relatively short time.

In fact, a large vessel can accumulate as much as 5,000t of fouling in a couple of years, which will, if not addressed, not only have a detrimental effect on the hull itself, but will also reduce the vessels' effective deck loads. It is also well worth noting that in order for a vessel to be approved for underwater inspection in lieu of drydock (UWILD) by the classification societies, the hull must be sufficiently clean to permit inspection by divers under the supervision of a classification society inspector.

Since biocidal antifouling coatings – like the effective but now banned TBT and its copper-based replacements – need to move through water to work, on stationary vessels such as drillships these coatings are largely ineffective. Biocidal antifouling paint problems have been compounded recently by research findings that show existing heavy-metal-based anti-foulings have the potential of worsening rather than preventing invasions of non-indigenous (alien) aquatic species, as these become tolerant of the copper and other biocides in the coatings.



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Hence, a good, long-term solution for cleaning hulls rules out paints that have a leaching function or other such active ingredients.

A possible solution to this problem would be a hard hull-coating, free of active ingredients. This coating would be as inert and long-lasting as possible, and would provide excellent hull protection. It would also be easy to keep clean of fouling. It would improve in smoothness and performance over time.

A coating known as Surface Treated Composite (STC) answers all aspects of the problem when properly applied and maintained. It combines a hard, durable, non-toxic hull coating with advanced in-water hull cleaning technology. It is wholly environmentally safe, and it can save shipowners and operators millions of dollars annually in operational costs. Such STC coatings also ease the much dreaded drydock curse by permitting vessels to be cleaned and maintained in-situ by divers using special equipment.

The highest single expenditure for any shipowner in maintaining a ship, after delivery of the vessel from the builder, is the cost of drydocking. Today, shipowners and operators run on tighter budgets and margins, meaning the costs of hull protection and maintenance must be balanced carefully against fuel savings. Docking is expensive, difficult to schedule, and disrupts operations for a protracted period of time.

When it comes to stationary vessels, drydocking grows even more complex and time-consuming, since many such vessels are equipped with multiple non-retractable thrusters that must be removed before entering drydock and replaced afterwards.

A vessel should not need to see drydock more frequently than is required to keep it in class. The primary reason more frequent drydockings are necessary is unchecked fouling build-up, something a properly applied and maintained STC coating can circumvent. Designed to last the life of the hull, and cleanable offshore, an STC-coated vessel would only have to drydock in accordance with class requirement, never for coating repair, replacement or cleaning.

As oil exploration and production expands to the Polar regions, the STC gains further relevance

Environmentally, the Polar regions are particularly sensitive to pollution and environmental damage. The emission of toxic heavy metals and biocides, the atmospheric pollution resulting from the burning of extra fuel to overcome hull friction, and invading alien species can easily cause greater havoc than they would in less pristine areas.

Recognising this, the IMO is debating a Polar Code, likely to include:

- A ban on the use of toxic antifouling systems that leach biocides or emit other highly toxic substances into the water;
- Measures to reduce atmospheric pollution from GHG, black carbon and other emissions; and
- A cleaning regime ensuring that ships sailing in polar waters are cleaned of biofouling before voyaging into these areas in order to prevent the invasion of non-indigenous species.

IMO Report (DE 56/25) to the MSC, dated 28 February 2012, recommends: "10.17.4 — The Polar Code should include a provision to ensure that hard and inert AFS coatings, suitable for ice operations and certified to be resistant to ice, should be used when there is any risk of hull contact with ice, since these coatings are generally non-toxic, more suitable for such operations, more economically viable, and environmentally less impactful."

As any icebreaker operator will confirm, ice is not good for a hull's coating. In fact, few if any elements will destroy even the sturdiest of conventional coatings more rapidly than ice-laden waters. The optimum coating solutions must withstand this element as well, which is exactly what the glass-reinforced coating provides.

The STC system combines a glass reinforced coating and regular in-water cleaning to keep ship hulls operating at maximum performance, and other underwater surfaces free of fouling. Such a coating is applied once, either on a new-build or in drydock when a ship's hull needs repainting, and lasts the lifetime of the vessel with only minor touch-ups and is guaranteed for ten years.

Initial application of an STC coating is comparable in cost to other high quality underwater hull paint but it is easier than others to apply in that it requires only two coats on bare metal with a three-hour drying time between coats, and extended maximum overspray time. It is simultaneously conditioned and cleaned underwater, resulting in a progressively smoother surface over time.

Through regular inspection of the ship hull and in-water cleaning of slime build-up, the ship is kept at optimum performance. In fact, the coating improves with regular underwater cleaning, skin friction reducing with each cleaning. In-water cleaning of the largest vessels can be accomplished in 12 hours and can usually be carried out without adversely interrupting a ship's normal operations.