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Taking the rough with the smooth

Dear Reader,

We know that sea trade cycles normally follow the same cycles we see in world GDP. But when we look back on 2013 we see that seaborne trade performed marginally better; Looking forward in 2014 we can see that trade will exceed 10 billion tonnes for the first time ever. These are positive signs, but it’s still not plain sailing for the shipping industry – three major challenges must still be addressed...

Supply continues to outstrip demand, and freight rates remain low and volatile because of surplus capacity in the global fleet; Fuel costs represent up to 50-60% of operating costs and we are all under increasing pressure to comply with evolving regulations and become cleaner and greener.

In this issue of Marine News we would like to share with you how Hempel are helping ship owners deal with these challenges by improving performance through corrosion control and innovative antifouling solutions. It may not be plain sailing for our industry, but smooth sailing is within reach and can help us all on a course to recovery.

In the spirit of optimism, enjoy your read.

Kind regards

Christian Ottosen
Group marine marketing director
A fouled hull increases both the hydrodynamic volume of a vessel and the frictional effects – leading to increased drag of up to 60%. This drag increase has been seen to decrease speeds by up to 10%, which can require up to a 40% increase in fuel to compensate.

Applying antifouling coatings to hulls is one of the available ways to reduce these fuel costs. With fuel typically comprising up to half of marine transport costs, new antifouling methods are estimated to save the shipping industry around $60 billion per year. But currently, when specifying a new antifouling coating it is difficult to be sure you can achieve maximum fuel efficiency – because even though all paint suppliers offer fuel savings, their available approaches are difficult to compare – as are the figures they claim.

As a response to this, an ISO standard is now being developed in a joint effort by performance monitoring technology providers, classification societies, ship paint and propeller manufacturers – as well as ship owners, to provide a transparent and reliable method of measuring hull performance. Making valid comparisons and choosing the most effective antifouling coating is going to be significantly easier. We are looking forward to this increased transparency.

How do you handle slow steaming and idle periods?
A study published by the European Commission (EC) in 2012 reported that operating ships at lower speeds is the best solution to reduce GHG emissions but at the same time it “dramatically changes the economics of implementing other GHG solutions”. This is also true for hull coatings. During periods of no or slow movement, the natural cleaning effect from water’s circulation around the hull is minimized, so fouling builds up. Returning to normal speeds (which is unlikely based on current market conditions) would not be enough to remove fouling.

During previous big lay-up periods, antifouling was not a big issue because hull coatings contained extremely effective tributyltin compounds (TBT), which are now banned due to the negative side-effects it had on the marine environment. Some of the tin-free coatings available today will not provide the level of protection needed by a deactivated ship laid up in warm waters. We can also see that some antifouling coatings are not effective at low or no speed. There is a clear need then for flexible solutions that will retain their effectiveness when
switching between slow and fast steaming anywhere in the world.

Environmental protection is an innovation driver
Increasingly stringent environmental regulations are pushing innovation in the market and the ban on the use of TBT has led to a variety of innovations that has actually advanced the performance of antifouling coatings.

As a ship owner you are increasingly aware of the environmental impact of the products used. Furthermore, regulations on this matter are increasing, demanding products with low VOCs, high solids and very effective biocides. A technology such as Fouling Defence, which takes the best features of the antifoulings and the silicones is therefore increasingly being adopted as it offers reduced fuel consumption, reduced emissions and very low leaching of biocides into the sea – an important consideration when, according to a survey by Frost & Sullivan, green awareness is expected to have an even larger impact long-term.

Translating challenges to shared advantages
We are fully aware of the issues that are affecting our increasingly difficult market. But by considering the challenges posed by changing trends in the shipping environment as drivers that motivate us, rather than hurdles that hold us back, we are able to continue creating and delivering increasingly efficient, effective, flexible and eco-friendly solutions to drive our industry forward. The recent addition of HEMPAGUARD® is a testament to our mission of helping our customers to improve their efficiency at sea, while diminishing the impact on the environment.

Want to win an iPad? Test your knowledge with this quick quiz and email us your answers at marine@hempel.com with iPad mini in the subject line. Good luck!

1) How many ships have now been successfully coated with HEMPAGUARD®?
   a) 30 b) 60 c) 100

2) What is the next most important feature to initial design that determines a ship’s effective life span?
   a) Effective corrosion control in segregated water ballast spaces
   b) Regular maintenance of T-bars and supports
   c) Avoiding high abrasive and high impact sailing conditions

3) Which type of vessel benefits most from a silicone fouling release coating?
   a) Cruise ships
   b) Container vessels
   c) All vessels

4) What should we be aware of when comparing hull roughness measurements?
   a) Metric or imperial unit measurements
   b) A lack of common standards
   c) The weather during measurement
Since its market release, HEMPAGUARD®, our new hull coating concept, has been in great demand all around the world. After just nine months of being available, it had already been applied to 100 full ships of different class types. This has given us a chance to see how our new fouling defence system performs in real life under very different climatic conditions and when it is subjected to various levels of activity. The results are remarkable.

The most flexible antifouling system

HEMPAGUARD® was developed as a response to global fleet owners and operators’ needs for a new hull coating concept that could make a difference to their business. In the wake of the 2009 financial downturn and the turbulence of the global market, the shipping industry is still facing radical changes to trading patterns. A more flexible fouling defence system can therefore make a considerable difference to the manoeuvrability of their operation, allowing them to better utilise their resources.

Normally, a fouling defence system is specified on the basis of the vessel’s travelling pattern. A vessel steaming at high speed for a fast turnover needs a coating optimised for high activity, while a vessel steaming at lower speed to reduce fuel consumption requires a different type of coating. Water temperature also has an influence. As water temperature rises, the system’s biocidal effect rises to counter the increase in fouling intensity. To cater for this, thicker coats are specified in warmer waters. Another parameter is intervals of activity and duration of idle periods. With the introduction of HEMPAGUARD® it is no longer necessary to take such issues into consideration.

Top performance under any conditions

What’s really interesting is that, with the treatment of the first 100 full ships, we can absolutely confirm that outstanding fouling protection is achieved even under the harshest conditions. But it is deeply satisfying to see our studies brought to life in the unpredictable and challenging real-life environments of warm water, slow steaming and extended docking.

Several of the ships that have been coated with new HEMPAGUARD® fouling defence system, are operating – and idling – in aggressive waters. These conditions have proven to be no extra challenge to HEMPAGUARD®, and its unique antifouling system performs optimally regardless of water temperatures.

Simple and efficient application

Something else we’ve been able to monitor is how simple it has been to apply HEMPAGUARD® to ships in dry dock – even in unpredictable real-life weather situations. Like all other types of coating systems, weather conditions have to be favourable during application of the coating. However, as HEMPAGUARD® combines a silicone coating and antifouling agent into one product, only one coating is necessary under most conditions. This has proven to be an advantage in several cases. Even though docking times can be planned, if the weather decides to act up during that period, it can be hard to get a time slot long enough to complete the work. With only one coat required, we have seen an example of the job being completed in as little time as 2 1/2 days.

Satisfaction guarantee

On HEMPAGUARD®’s release we were so confident about the performance of the product that we offer a satisfaction guarantee along with the contract. If customers are not satisfied with the performance we would pay for the conversion back to a conventional fouling defence system. So far, nobody has asked for that, which is perhaps the best proof that we could ask for. HEMPAGUARD® is more than living up to its promise!

Significant fuel savings

HEMPAGUARD® offers significant fuel savings and outstanding fouling resistance during both slow and fast steaming, as well as during extended idle periods of up to 120 days. This is particularly valuable for larger container vessels and tankers that may wish to increase speed on one route to meet schedules and slow speed on another to achieve extra fuel savings.
Heavy Load Carrier after 53 idle days in Singapore

These are images from a bulker having rested for 42 idle days in the Gulf of Guinea (Africa).
Rust never sleeps
Keeping your ballast tanks ship-shape

“Effective corrosion control in segregated water ballast spaces is probably the single most important feature, next to the integrity of the initial design, in determining the ship’s effective life span and structural reliability.”

Lloyds Principal Surveyor
During a storm off the coast of Galicia in Spain, a crack appeared in the hull of the 26 year old “Prestige”, a tanker carrying 70,000 tonnes of industrial fuel. Hours later, the ship split in two and sank, with devastating consequences for Spain’s most important fishing region.

The sinking restarted debate over the inspection of seafaring vessels and the enforcement of international shipping laws.

In the last ten years we’ve seen a number of legislative changes regarding corrosion prevention in seawater ballast tanks, which have led to enhanced survey guidelines. Simultaneously, with the introduction of safety legislation requiring new builds to have double hull construction and to be be coated according to the IMO PSPC standard introduced in 2008 – areas to maintain and inspect grew by 300%. Ballast tanks were suddenly a major economic liability for ship owners as the IACS got tough on substandard shipping.

Intermediate surveys were promoted to level of special surveys; steel thickness measurements were to be monitored more closely, and every ship more than 20 years old now has to undergo a special or intermediate survey if they change class.

**Sea-water poses major maintenance challenges**
These days a ship owner has to pay critical attention to the condition of the ballast tanks, checking regularly for corrosion. Ballast tanks are particularly vulnerable to corrosion. The optimum conditions for corrosion are all present, with water, salt and oxygen in plentiful supply – exacerbated by thermal stress from heating – creating an extremely aggressive environment. The corrosion rate of steel actually reaches its maximum close to the normal ionic content of seawater. It’s an area of major concern.

**Challenges with ballast tank maintenance**
Ballast tanks can be difficult to get into. Because of their structural use in reinforcing the hull, they are packed with T-bars and supports, giving many awkward surfaces. This makes it extremely difficult to apply protective coatings and can lead to both holidays (low dry film thickness areas) and possible over application on corners, welds and erection joints. One of the most important areas for regular checks and maintenance is the balance tank – it’s an area that takes in seawater, which is extremely corrosive.

As if life was not difficult enough for maintenance crews, maintaining ballast tanks is always an extremely time-sensitive job. By their nature, ballast tanks are rarely completely empty – especially while en route. This means the windows for inspections, repairs and maintenance are extremely small.

Combine this need for speed with an atmosphere which is at the best, extremely humid – and at the worst, semi-submerged and you have a uniquely challenging environment in which to create safe, lasting results.

*More on next page >>>*
Rust never sleeps...

The solution is ready
At Hempel, we’re experts in providing the best solutions for challenging applications – and ballast tanks are no exception. HEMPADUR MULTI-STRENGTH 45540 is the perfect application meet the demands and physical difficulties of ballast tank coating.

Fast immersion one-coat protection
Originally designed for use in off-shore splash-zone maintenance, such as tidal doors, and jetty sheet pilings, HEMPADUR MULTI-STRENGTH 45540 is ideal for coping with tidal movements and surges, where you have a small window between tides to complete application, because it can be re-immersed in water in just 4 hours. There is no need to wait for it to dry after performing a freshwater wash for surface preparation and cleaning. These conditions are very similar in nature to those found in ballast tanks.

Paint on damp surfaces
Add to this, the fact that HEMPADUR MULTI-STRENGTH 45540 is surface tolerant and may be applied to slightly damp surfaces and you get a solution that provides excellent corrosion and abrasion resistance, delivering long-term protection in just one quickly applied coat.

Quick to apply
To speed up the time used in application, HEMPADUR MULTI-STRENGTH 45540 can be applied by airless spray. This makes it ideal as sea stock for emergency repairs in the ballast tank between dry docking intervals and for larger repairs during drydockings. Even with a low-pressure membrane pump, which most ships carry on board, the results are excellent and quick. Repairs can even be made in harbor while off-loading cargo and HEMPADUR MULTI-STRENGTH 45540 makes an excellent supplement to the brush quality HEMPADUR EM 35740.

Safer to use
Working in confined spaces does not just prove physically challenging. Inside the balance tank, when you’re effectively crawling with your nose up against the paint, excessive inhalation of solvent vapour can be an issue. HEMPADUR MULTI-STRENGTH 45540 does not have as much solvent as other older solutions, making it much better for confined areas. With its lower VOC it is safer for both the painter and the environment.
Protecting your hull and
your fouling control system
A well-designed anticorrosion system will provide excellent abrasion and impact resistance for both the hull and fouling control system. It will also be tolerant of any installed cathodic protection systems. For the best long-term results and minimum maintenance costs, an optimum anticorrosion coating system should be chosen for the hull already at the newbuilding phase.

A complete range of anticorrosion coatings
Hempel’s range of anticorrosion coating systems covers any vessel design and operating conditions. As well as versatile universal primers designed for shipyard efficiency, it also includes tailor-made specialist coatings for particularly harsh service environments, such as ice-trading and other high impact and abrasive conditions.

Ask a Coating Adviser
Smoothness is a key factor in reducing drag. The subsequent impact on fuel economy of reduced drag is crucial to a vessel’s efficiency. We asked our coating advisor how best to measure the smoothness of a hull, to be able to assess its real-life smoothness profile.

Q: When measuring hull roughness, what distance should I use to give a good Average Hull Roughness measurement?

A: We recommend measuring over a surface area of at least 50 cm on the hull of the ship. This distance gives a reading that takes into account the longer roughness contours as well as the smaller surface disturbances.

Q: Where should I take these measurements?

A: You need to map as much of the surface as possible – and as equally as possible over the entire hull; we know, for example, that the bottom of the hull often gives a lower roughness value than the sides as it is prone to less mechanical damage.

Q: How many measurements would I need to take to give a statistically relevant measure?

A: The hull of a ship can tell many stories. To get the full picture, you need to map as much of the surface as possible. We’d normally recommend around 100 measurements per ship, depending on size.
HEMPAGUARD®
is ideal for all ships

From container vessels, to cruise ship, new HEMPAGUARD® is proving to be a major success

Third coating for HYUNDAI GENERAL
The container vessel HYUNDAI GENERAL has now been coated with Hempel’s silicone fouling release coating for the third time.

Back in February 2009 the vessel was fully blasted to the bare steel at Sembawang Shipyard in Singapore. After applying an anticorrosive system, Hempel’s 2nd generation Fouling Release system HEMPASIL 77500 was applied.

Impressive fuel savings
During a docking in 2011, HYUNDAI GENERAL received a standard repair of its coating system from anchor damage and on fender areas. But this time our 3rd generation silicone based Fouling Release coating HEMPASIL X3 was used as top-coat and applied directly on top of the 2nd generation coating. This created a very smooth low friction surface, which used 5-10% less fuel than standard anti-fouling systems.

Excellent performance
In January 2014, the vessel docked again, showing an excellent performance in both the silicone system applied five years earlier and the areas which had been repaired three years earlier. After high pressure fresh water washing at Chengxi Shipyard in China the coating looked glossy, fine, shiny and almost brand new.

During this docking the areas damaged by mooring and anchors were repaired as normal – using HEMPASIL NEXUS X-TEND repair tie-coat.

And again Hempel’s latest development in silicone coatings, the new Fouling Defence coating HEMPAGUARD X7, was applied to the entire underwater area.
When Royal Caribbean International’s Vision of the Seas dry-docked in September 2013, its vertical sides, flat bottom, boot top and topsides received new full coatings of Hempel paint. The areas below the waterline, including the boot top, were full blasted prior to the application.

Royal Caribbean International selected HEMPAGUARD® X7 for its newly updated vessel, based on the benefits of flexible trading, fuel savings and Fouling Defence at any speed or during idle periods.

Chosen for its 60 months of extremely efficient fouling defence, HEMPAGUARD® X7 also delivers a fuel performance guarantee and a product performance guarantee for the entire 60 months period, including up to 120 idle days of fouling resistance.

**Great for the environment**

HEMPAGUARD® X7 is based on a silicone-hydrogel and biocide science and releases 95% less biocide than a standard SPC antifouling coating. The biocide is retained at the surface, so the need for polishing is eliminated. The surface of the vessel has the same smoothness as conventional biocide-free silicone-based fouling release coatings.

By using HEMPAGUARD®, Royal Caribbean experience fuel savings due to the high protection against fouling organisms, which keep the surface in perfect condition.

**Remarkable fuel savings and excellent performance throughout the 5 year docking interval are premium goals for us**

**HEMPAGUARD® is an environmentally friendly product. Because it lowers fuel consumption, CO2 emissions are reduced during the entire service interval**

**Application List:**

See the complete list at hempel.com

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Hull roughness...

**Why is it not a good idea to compare roughness numbers between various companies’ products?**

**DIEGO:** Even when we’re talking about measuring a panel in the lab, our results will depend very much on the condition of the substrate. Taking a measurement in the drydock, the condition of the substrate can vary so dramatically that comparative measurements are virtually meaningless. At the very least we have to consider the blasting profile, mechanical damages, pitting and corrosion.

**CLAES:** And then there’s application conditions to consider too... the pump pressure, hose length, nozzle distance to the substrate, the nozzle type and tip size – and even the wind speed on the day of application.

**DIEGO:** And don’t forget the product itself – there’s also the degree to which the paint has been thinned and mixed – the choice of the thinner used and the age of the paint all have to be taken into consideration. The variables are enormous.

**But once these variables have been taken into consideration, can we then compare the data?**

**DIEGO:** Not necessarily. There are several types of “roughness”; for example micro and macro roughness and these can be reported in different ways by different companies. There are no common standards, which we can use to get any real sense from this type of data.

**CLAES:** Basically it’s not a very good idea that customers compare coatings based on roughness numbers reported in various brochures. It’s very misleading – especially when you think of the consequences these choices can have on overall fuel efficiency in the long term.

**So how important are initial roughness numbers?**

**DIEGO:** Well, assuming that we’ve sorted out the variables we just mentioned, we can say that initial roughness is only relevant for coatings whose surface does not change immediately after it has been immersed – that’s pretty obvious.
CLAES: And that’s a problem… Well-designed self-polishing and copper based products must start reacting with sea-water immediately after immersion, so lab made roughness measurements for self-polishing coatings and the like are invalid after only a few hours after outdocking. This is not the case for Fouling Release or Fouling Defence coatings. Nevertheless, you also have to take into consideration that coating roughness is only relevant as long as the hull is clean. Fouling can have a much bigger effect than any initial difference in friction.

DIEGO: You are right, but do remember that the change in roughness with exposure may also be for the better. For SPC AFs, for example, the good ones actually become smoother in the first period when they are still not too scratched, damaged and fouled. In fact, both things can happen simultaneously: the coating becomes rougher in the microscale due to seawater reactions, but can sometimes become smoother in the macroscale via smoothening of e.g. application defects. Again, it is all about which roughness scale we are discussing. No doubt, coating roughness is still important when we consider the big picture, especially since top quality coatings can remain largely fouling free for extended periods of time.

In the real world, we see a variety of substrates, from fully blasted hulls to 10 year-old coating systems. Doesn’t that make a difference to the roughness of the coating?

CLAES: Of course – the actual average hull roughness for a ship is primarily determined by the average hull roughness of the substrate prior to the application of the new coating system.

DIEGO: And what’s really interesting is that different coating technologies behave very differently when applied on rougher substrates.

CLAES: Take HEMPAGUARD®; we’ve measured that it leads to a significantly lower final Average Hull Roughness compared to self-polishing acrylate based antifouling coatings when applied on identical substrates.

DIEGO: HEMPASIL® does the same. They’re both true self-leveling coatings.
Hempel Events 2014
Planning on attending one of these exhibitions? Make sure to drop by our stand.

NOR-FISHING
Trondheim, Norway 19-22 August, Stand D-356
Nor-Fishing is a biennial event and is currently regarded as one of the leading international fisheries trade shows.

SMM
Hamburg, Germany 9-12 September, Stand B5-214
With a record number of exhibitors, SMM has once again confirmed its position as the most important and prestigious event in the maritime industry calendar.

IMPA
London, UK 17-18 September, Stand 60
IMPA represents the interests of the purchasing profession within shipping. Its aim is to promote close co-operation and understanding between buyer and suppliers in the global maritime business.

DANISH MARITIME FAIR, Stand 048
Copenhagen, Denmark 6-10 October
Exhibitors from around the world will present their latest products, knowledge and competencies, with a focus on shipping, innovation, and sustainable sailing.

PACIFIC MARINE EXPO (PME)
Seattle 25-27 November
The largest commercial marine tradeshow on the West Coast, serving all aspects of the market, including commercial vessels owners, commercial fishermen, boat builders and seafood processors.

THE INTERNATIONAL WORKBOAT SHOW
New Orleans, Louisiana 3-5 December
From large fleet owners to independent vessel/owner operators, you will find them all here. Last year was the largest show on record, it’s a major opportunity to get connected.

HEMPEL was founded in 1915 and is today one of the world’s leading suppliers of marine and industrial paints. Our 5,000 employees work from 4 main and 6 regional R&D centres, and 25 production plants situated in strategic locations across six continents. Our global sales and service organisation operates from more than 150 stock points in over 80 countries, providing our customers with expert assistance at all stages of the contract.