



The chemical and product carrier *Calypso* was used for the trial of the coating

Successful ship trial results for barnacle-repellent active agent

CASE STUDY A twelve-month trial of the bio-repellent active agent Selektepe was recently completed on the Laurin Maritime-owned chemical and products carrier *Calypso*. The trial results are presented in this report.

Average global water temperatures are rising. Ships are spending more time idling in subtropical and tropical waters and there is a growing regulatory movement against the transportation of invasive species by ships. This trio of issues, whilst of great concern for shipyards and ship operators alike, is the catalyst for significant innovation in the coatings sector as pressure grows on antifouling products to perform through changing environmental and market conditions.

The issue of biofouling is high on the agenda of some Asian shipyards, with newly launched vessels lying idle in warm waters and suffering the effects of intense

fouling during the three- to four-month outfitting process. This accumulation of biofouling on the hull can impact both the newly applied coating and the performance of a newbuild leaving the yard.

This means that shipyards are pushing for antifouling solutions that ensure static performance during outfitting. In parallel, shipowners are demanding products that ensure good fouling prevention for vessels with differing activity levels, whether they be in constant active service, idle for long periods of time, or at risk of fluctuating between the two.

The need to future-proof antifouling coatings against uncertain vessel operat-

ing patterns is exerting major pressure on coatings suppliers, but is in turn encouraging great innovation and new approaches to the development and trialling of fouling prevention technologies.

In Sweden, biotech innovator I-Tech AB has dedicated over a decade of research and development work to these issues.

Its quest to find, develop and commercialise an alternative fouling prevention technology commenced in the wake of the IMO decision to ban the application of tributyltin (TBT)-based paints on vessels as of January 1st 2003. The result was the organic, non-metal compound named Selektepe.

What the I-Tech research team discovered was a unique pharmacological mode of action that works to prevent barnacle larvae from settling on ship structures by inducing hyperactivity in the barnacle larvae. Selektepe's fouling prevention mechanism works by temporarily stimulating the cyprid larvae octopamine receptor and activating swimming behaviour. The effects of this neurological scrambling are temporary, with the larvae returning to normal functional capacity shortly after encountering the Selektepe present in the ship's hull coating.

With an efficacy that requires just 0.1% of Selektepe in an antifouling coating's overall constituency, this technology offers the opportunity for coatings suppliers to use just a fraction of the active substance needed to achieve performance comparable with using traditional copper-based biocides, the company explained. Selektepe is said to be flexible enough to boost copper-based formulations, but is also powerful enough to replace copper entirely.

The testing of Selektepe-containing formulations by coatings suppliers continues to accelerate at a rapid pace, with a multitude of commercial products making their way to market launch.

Market maturity

The green light for global market deployment was signalled in 2015 when I-Tech received EC recognition for Selektepe, enabling it to be included in anti-fouling products sold throughout the EU as of January 1st 2016, in accordance with the terms of the EU Biocidal Products Regulation. This came in addition to approvals that had already been secured for the use of active agents in Japan, China and South Korea.

Also in 2016 the first commercial, Selektepe-containing coatings for use on ocean-going vessels were launched to the market in addition to ship trials being conducted over a period of twelve months which yielded incredible results.

It was a copper-free coating product inclusive of Selektepe that was applied to the side walls of the 2010-built, 46,067dwt IMO II chemical and products tanker vessel *Calypso* during its first five-year survey at the Singapore yard Sembcorp.

Laurin Maritime's technical director Bertil Andersson said: "It was important that the company selected a coating that can cope with conditions in the "red zones" in which its ships operate, where water temperatures can be high and fouling can

be problematic if a ship is at anchorage for three to four weeks." The *Calypso* operates in several regions including East- and South-Asia, the Americas and Australia, making it the perfect ship for the trials.

"The application of a Selektepe-containing coating comes after several years of strong performance trial results," said Mikael Laurin, chief executive officer of Laurin Maritime.

The hydrodynamic analysis of performance data during the trial was carried out by Propulsion Dynamics, a provider of hull and propeller performance monitoring services. Operating rates were measured by fuel oil consumption and power output. After twelve months, the vessel was found to have increased its resistance to fouling by a total of 3% compared with a benchmark new vessel that would see an increase in resistance of 5-10 %.

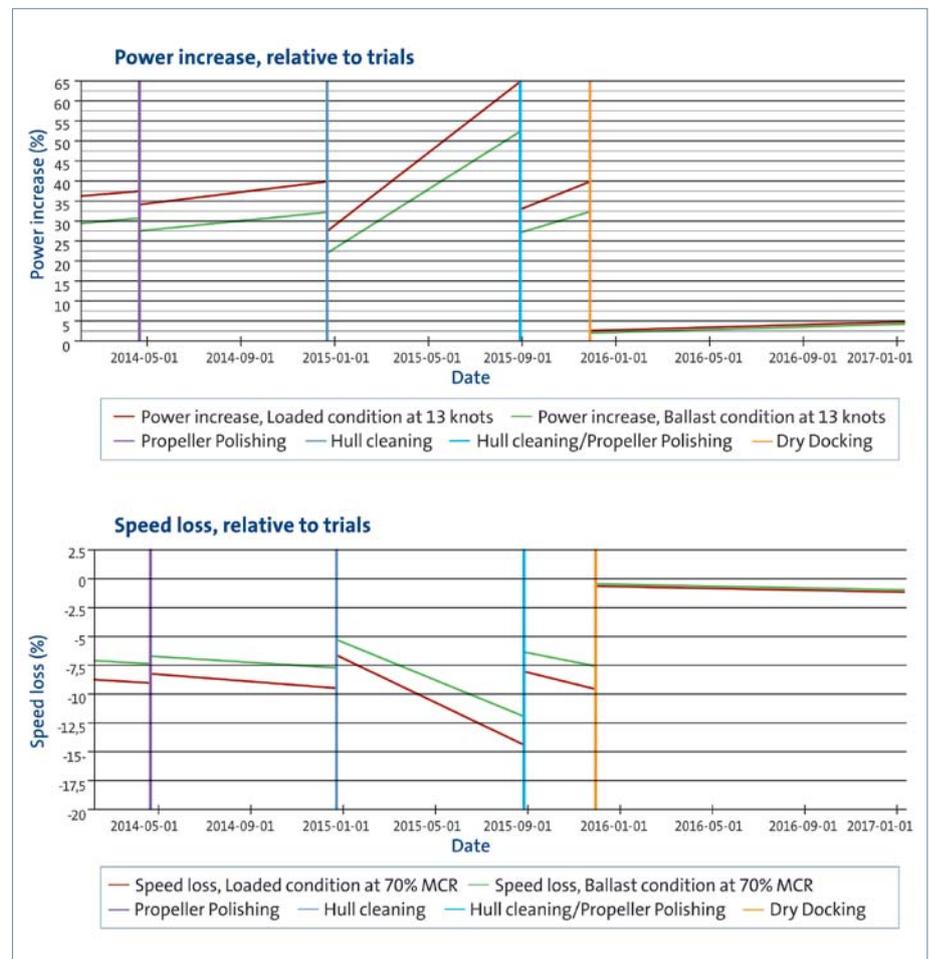
The benchmark is made up of various different vessels with different coatings and draws on the extensive Propulsion Dynamics database. It allows for the comparison of one ship with a large variety of similar ves-

sels, overcoming the fact that it is not possible to compare equivalent ships directly when analysing and contrasting coatings performance.

The trial on the *Calypso* also showed that the increase in resistance came mainly from the propeller, with the remaining resistance being measured on the hull.

"Although there are very convincing long-term performance results from patches, more time is required to confirm the promising results from *Calypso* [and] there would need to be further trials of Selektepe for longer periods so that the long-term effects of the biocide can be measured", said I-Tech chairman Stefan Sedersten.

The trial results were taken from a full year of the ship's operation. They are expected to offer a promising future for Selektepe as a contender to combat not only hard fouling, but also as a powerful solution to the issue of static performance, in addition to supporting the reduction of invasive species transfer and emissions by contributing to cleaner, more efficient hulls.



Indication of power increase and speed loss

Source: Propulsion Dynamics CASPER data