Seek expert advice before choosing a stern tube lubricant

Panolin business development manager Philip Cumberlidge considers some of the unanticipated issues surrounding stern tube lubrication

In 2013, the US EPA introduced the Vessel General Permit which focused on 26 "streams" of pollutant discharges, including items such as: fuel bunkering; ballast water; bilge water; deck run-off; greywater; chemicals; and pollution from stern tubes.

An oft-overlooked concern regarding stern tube lubricants involves problems associated with the use of environmentally acceptable lubricants (EAL). It is evident that some EALS are failing to perform, causing stern tube bearing and seal damage and loss of the vessel's operational availability.

It was in mid-2014 that concerns were first raised about failures of stern tube bearings in newbuild vessels during sea trials. These cited shaft misalignment issues and were vehemently denied by the shipyards involved. Recently, EALs have been shown to be failing after only two to three years in use and vessel owners are growing increasingly nervous about:

- increasing oil viscosity – due to poor thermal stability
- decreasing oil viscosity – due to shear instability
- varnish and gumming of the system – due to thermal degradation
- instances of slime and bad smells in stern tubes – due to water contamination, bacterial growth and oxidation

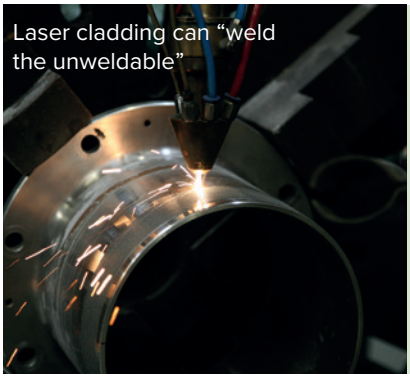
Specifically, shipowners are asking why EALs are failing, when the "good old mineral oils" have performed without problems for years.

Classification society investigations into the operational performance of some EALs under higher dynamic loads – which result in higher specific stern tube bearing pressures due to slow steaming operation with larger, heavier propellers hanging off the end of the propeller shaft – has shown that, on average, EALs exhibit a lower viscosity and hence a lower lubricant film thickness than mineral oil.

This has led to one classification society changing its design rules for shipbuilders, to use a higher viscosity stern tube lubricant than the normal designed viscosity of mineral oil. Other serious issues arising from the breakdown of EALs include: corrosion of equipment internals, due to the hygroscopic nature of the lubricant; and overheating/blistering/cracking of seals, due to increasing lubricant viscosity and incompatibility.

There are five types of base oils that are generally accepted as being biodegradable: vegetable oils; polyalphaolefins; polyglycols; and two types of synthetic esters – the weaker unsaturated esters and the robust, fully-saturated esters. Then there are blends of these base oils, using cheaper base oil with viscosity improvers, or just enough of another base oil, to improve viscosity and biodegradability, to try to lower the price.

In-service experience of synthetic ester-based stern tube lubricants has shown that a saturated ester-based lubricant has provided problem-free operation, whereas unsaturated ester-based lubricants have failed. Incidentally, it is not true that synthetic ester-based oils will turn into "seal eating acid on contact with water" – it depends on which ester is selected for the base oil. TST



Laser cladding can "weld the unweldable"

Restoring damage caused by stern tube lubricant failure

All is not lost if stern tube lubricant failure leads to damage. MarineShaft of Denmark is class-approved to cold straighten propeller shafts, rudder stocks and repair bearings. One of the repair methods used by MarineShaft is laser cladding – a welding carried out by robot.

MarineShaft senior project manager Allan Nielsen says: "With our laser cladding technique we are able to weld on parts that are not normally weldable. We use this technique to weld up seal liners, bearing seats and bearing journals on propeller shafts etc. Our technique is class approved and enables us to repair vital parts with very short delivery time."