CASE STUDY

LOW-MAINTENANCE LUBRICATION AND LASTING ANTI-CORROSIVENESS

VESSEL BBC ARAMIS BRIESE SHIPPING HATCH COVER SYSTEM

PRODUCTS TESTED

Archoil AR8200 NLT High Performance Grease

BACKGROUND:

As of August 2011, Briese Shipping started to use Archoil AR8200 Nano-Borate Grease #2 on one of its ships, the BBC Aramis, with the aim of resolving several issues. The shallow, seagoing ship did have a paint/coating to protect against corrosion and another company's grease had been used, but neither were able to prevent rust from forming on the axles of the (slide) bearing constructions in the hatch cover systems and on the rolling tracks (rails). As a result, the bearings mounted on these shafts became damaged by the rust on the axles and the oxidized metal particles (fly-rust). Furthermore, temperature extremes caused the existing grease to under perform in other ways. For example, when the ship travelled in sub-zero ambient temperatures, the grease did not perform well. In higher temperatures, the grease dripped onto the ship's deck and cargo, contaminating it.

PRODUCTS USED:

Based on the issues at hand, it was anticipated that Archoil's AR8200 Nano-Borate grease would resolve the problems.

WHY ARCHOIL AR8200?:

At the beginning of the 1990's it was discovered that boric lubricants were one of the most slippery in existence. Earlier tests showed that thin films or bulk powders of boric acid can provide friction coefficients as low as 0.02 to 0.05, which is one-fourth to one-sixth the value of other, more expensive solid and liquid lubricants. Recently, Archoil's patented nano-boric liquid media additives containing special boron compounds have proved to work even better. This is especially true when used as solid dispersion or liquid media additives in lubricating mineral and synthetic base oils. In those cases, the additives were able to reduce friction by 50 to 90 percent (depending on the concentration) while under a wide range of boundary-lubricated sliding conditions. These additives also were able to enhance the lubricity of sulphur-free and ultra-low sulphur diesel fuels. They reduced wear-scar diameters by as much as 50 percent in high-frequency reciprocating and ball-on-three disk fuel lubricity tests.

The Archoil nano-borate formulation represents the second generation in boron tribology. It has reduced the boron size down to the more efficient 'nano' level and delivers it in a naturally occurring, fatty acid ester matrix carrier. This Archoil proprietary ester carrier is specially formulated to facilitate the migration of the protective boron nanoparticles to surface metal. The unusual mechanism of nano-boric lubrication in these fluids, oils and fuels is controlled by its chemical structure and its ability to form a strongly bonded protective boundary film on surfaces. The compound is crystallized in layers in which the atoms are tightly bonded to each other. The layers themselves are weakly bonded and when stressed, they shear and slide over one another

LOW-MAINTENANCE LUBRICATION AND LASTING ANTI-CORROSIVENESS

VESSEL BBC ARAMIS BRIESE SHIPPING HATCH COVER SYSTEM

easily, so friction is low. The strong bonding between the layers prevents direct contact between sliding parts, minimizing wear.

The surface created also prevents oxidation. These bonds are so strong that pre-existing dirt, rust and carbon varnishes are displaced. These virtually indestructible bonds literally change the metal surface's characteristics and create a self-healing friction barrier. This translates to an extremely low-friction coefficient (under 0.038) between the platelets and the metal surfaces they separate. This friction barrier is nearly permanent for the life of the metal treated.

The key ingredient is hydrated boron, a nonmetallic element also known as sassolite or borofax. Molecular hydrated boron is super slippery. Ultra fine particles are reduced to less than one micron (.000039 inches) by a revolutionary jet-milling process at sub-zero temperatures. The sub-micrometer hydrated boron particles can invade microscopic spaces and actually chemically BOND to metal surfaces.

THE APPROACH TO THE SITUATION:

To handle the situation onboard the BBC Aramis, BLP International chose to use nano-borate lubricants. Archoil AR8200 Nano-borate Grease #2 forms a molecular bond with the metal surface, developing a lattice structure with strong anti-corrosive properties and reducing the friction between metal surfaces significantly compared to conventional lubricants and greases. The bond eventually provides a dry surface, attracting no dust or dirt. Once in place, the lattice structure no longer depends on the carrier and remains in the metal, even as the grease slowly gets washed away. The metal now is protected for a long time from seizure (shearing), thread-welding (galling) or corrosion (pitting). Wear of the parts is reduced by the lattice structure that provides a coefficient of friction of <0.038 and can withstand pressures of up to 4,000 kg per cm^2.

The carrier of the chemical process is a calcium-sulphonate-based complex grease. Calcium sulphonate has very good anti-corrosion properties and is completely stable. There is no loss of viscosity. This provides much longer lubrication intervals, which is especially advantageous in bearings or where no change or re-treatment is possible.

This Archoil base grease has an extremely high dropping point. In addition, it offers a water-washout of 0.05 and water-spray protection. It does not hold solids and in combination with the nano-borate formulation keeps the dirt and heat outside. Lastly, the calcium sulphonate is non-toxic and non-acidic. This also is an advantage as today we see many EP-packaged greases and oils – such as PTFE, molybdenum, sulphur, graphite, phosphorus, lead, antimony and phenols – that are heavily contaminating the environment they work in.

CASE STUDY

LOW-MAINTENANCE LUBRICATION AND LASTING ANTI-CORROSIVENESS

VESSEL BBC ARAMIS BRIESE SHIPPING HATCH COVER SYSTEM

BRIESE COMMENTS AFTER SEVEN MONTHS OF USE:

The project at Briese Shipping on BBC Aramis was supervised by Geerlof Jukema, technical superintendent. The BBC Aramis is a general cargo coaster of 3500 DWT. The sailing area covers the North Atlantic, Baltic Sea, North Sea and Mediterranean Sea.

"After removal of previously used grease, paint and coating on the faces of the rollers and rails, all bearings, shafts, rotating parts and threads and rails were greased with Archoil AR8200," Jukema said. "Also, the deck cranes are treated with the Archoil grease at all lubrication points."

"After seven months, we see that the Archoil grease is operating at very low ambient temperatures (-20° C), does not become solid, does not crumble or show other undesirable properties," Jukema added. "At high ambient temperatures (40°C) the grease does not drip. This is very desirable as this increases security on deck and the cargo remains clean."

Jukema also pointed out that Archoil AR8200 remains very firmly in place and, in combination with the nano-borate formulation, keeps the treated parts free of dirt and corrosion even when they are subject to spray, waves, sun and wind. Because the moving parts remain well-lubricated, Jukema expects that the wear of these parts will be less. The grease has proven itself to be very water-resistant.

Plus, there is less work involved with using Archoil AR8200: *"There are much reduced lubrication intervals and also there is much less grease needed,"* Jukema said.

As a result of the test, the captain of the BBC Aramis wishes to utilise more AR8200. Jukema also wants to use Archoil AR8200 on several more ships to gain insight on the advantages and disadvantages of the Archoil nano-borate grease.

"Overall, our findings so far have been largely positive," Jukema said. "Although Archoil grease is more expensive compared to conventional greases, the results relating to lubrication, corrosion and durability in all weathers and situations are all reasons to continue use of nano-borate grease. I guess you can say that nano-borate cannot be compared to conventional grease."

For further information please contact BLP International, +31 252-746011 and ask for Rob van Hoorn, Project Manager.