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RAPP HYDEMA

Specialty Lubricants for Open Gears @ Sea

The positioning of oil rigs and their anchors is the job of anchor handling tug supply (AHTS) ships. In all kinds of weather, these vessels drop and weigh the rigs' anchors with their powerful winches, or they tow the platforms to new positions, and they also supply the rig crews with all materials and equipment needed for offshore operation. In emergencies, they can serve as emergency rescue and recovery vessels (ERRV).

Anchor winches are required to operate with utmost reliability, which inevitably includes also their lubricants. Any anchor winch failure on an AHTS vessel can have severe consequences for the operator. Damage to the gear teeth particularly damaging, as it is almost impossible to replace a gear rim while the ship is at sea, meaning the ship would have to come out of service while replacement parts are found and fitted. In addition to the risk of equipment damage, there is the greater risk that crew members may be hurt. Ultimately, oil majors demand near seamless performance from the vessels that service its offshore oil and gas structures, and out-of-service can mean out-of-contract.

Based on years of experience and research, Klüber Lubrication has developed adhesive lubricants precisely tuned to the operating conditions prevailing in open girth gear drives. A leading Scandinavian ship equipment OEM has gained positive experience with

Klüber's special lubricants for open winch drives and recommends these lubricants to its customers. This pertains to GRAFLOSCON B-SG 00 Ultra, a running-in lubricant, and Klüberfluid C-F 3 Ultra as operating lubricant up to an ambient temperature of 30 °C, or Klüberfluid C-F 3 M Ultra for temperatures above 30 °C as are typical of tropical regions.

The selection of the lubricant for open winch gears is influenced by a number of design- and application considerations. Upon manufacture, the gear flanks still show a high degree of surface roughness. This, and the fact that the gear rim and pinion are often not perfectly parallel-aligned, is the cause why the load carrying area is often no more than 50 or 60%. When in mesh, the load-bearing tooth flanks may therefore suffer partial overloading, which in turn can lead to excessive wear and tooth flank damage. Running-in lubrication plays a vital role in this context.

New girth-gear drives are usually subjected to a specific running-in process, for example with GRAFLOSCON B-SG 00 Ultra, depending on the winch design. During loaded operation, controlled micro-wear is intentionally provoked to smooth the tooth flanks. The consequence is a higher load-carrying area of approximately, 80%, which helps to avoid overloading and gear damage.

Running-in lubricants may only be applied over a

Anchor winches are required to operate with utmost reliability, which inevitably includes also their lubricants.





There are plenty of challenges in offshore oil and gas operations, perhaps none as rigorous as demands placed on deck machinery. In all kinds of weather, AHTS's for example, must drop and weigh the rigs' anchors with their powerful winches, or they tow the platforms to new positions. Based on years of experience and research, Klüber Lubrication has developed adhesive lubricants precisely tuned to the operating conditions prevailing in open girth gear drives.



limited time and must be replaced by the operating lubricant when running-in is completed. Klüber's running-in lubricants and Klüber's operating lubricants have been designed such that conversion to the operating lubricant can be done without cleaning the gears.

Challenges Encountered During Operation

- Large open winch drives on AHTS vessels are subject to strong tensile loads at the anchor chains and shock loads with a high surface pressure. As peripheral speeds are usually low, the drives run frequently under mixed friction conditions. A sufficient hydrodynamic lubricant film is therefore not generated, so the tooth flank surfaces are partly in direct contact. The consequences can be excessive wear and damage to the tooth flanks in the form of pitting. Pitting is caused when the permissible load on the gear material is exceeded locally. Microcracks form near the surface, leading eventually to spalling. This diminishes the load-carrying area of the tooth flanks, encouraging further pitting. A suitable lubricant is, therefore, one that builds up a load-bearing reaction layer also at low peripheral speeds and high surface pressure to

protect the pinion and gear rim flanks reliably against wear.

- The winches are often operated only for a short time during hauling or anchor handling. The gear lubricant is applied by means of transfer lubrication, i.e. only while the drive is in motion. This has to suffice to reliably protect the tooth flanks against corrosion as the open gears are permanently exposed to the aggressive salty air and spray water. It is therefore essential that the lubricant spreads well, adheres firmly to the components and does not drop off.

- AHTS ships operate in a wide variety of climates. The lubricants used have to be pumpable by means of the lubricating systems installed at all temperatures.

Klüber Lubrication developed Klüberfluid C-F 3 Ultra for ambient temperatures up to + 30 °C, and Klüberfluid C-F 3 M Ultra for ambient temperatures above + 30 °C. The lubricants of the Klüberfluid series are transparent, highly viscous adhesive lubricants with good tooth-flank-, wear- and corrosion-protection properties aimed at a long component life. According to the manufacturer, reliable lubrication can be attained with 50% less lubricant.

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