

Grease Sampling and Analysis for Marine Crane Applications

Grease analysis is a reliable, cost-effective way to determine the health of grease-lubricated equipment. For years grease analysis has been used as an essential tool to monitor the health of greases and optimize grease life for cranes. This helps to ensure availability of critical equipment and reduce grease consumption and manpower by avoiding unnecessary maintenance actions. MRG Laboratories helps asset owners to optimize grease life. It is often found that grease lubricated assets are lubricated more frequently than necessary, creating waste of resources and manpower. Measuring wear, contamination, consistency, and anti-oxidant levels optimizes regreasing intervals and asset availability.

Asset



In this case study, the grease samples were collected from shore to ship cranes for screening analysis to evaluate the grease condition. To ensure that a representative sample was obtained, grease sampling was performed per ASTM D7718 and samples were analyzed per ASTM D7918. The grease screening test slate, which includes ferrous wear analysis via the FerroQ Analyzer, grease optical transmission via the Grease Thief Colorimeter, and FTIR analysis identifies outlier samples for further analysis at the laboratory. Data from these three tests gives insight into the wear rate, and any contamination of in-service greases. Action levels are

determined by trending the results from an asset over time or comparing similar assets in a fleet.

Screening Tests

Ferrous content screening is a non-destructive test that can be performed while the grease is still in the sampling device. Grease differs from oil samples in that it accumulates wear until purged with new grease. Fig. 1 shows recent samples from shore to ship cranes with most ferrous levels being acceptable. The screening analysis identified one outlier sample for further analysis from this data set, and a few other samples were noted as nearing elevated levels for the application, representing about 1% of the tested bearings.

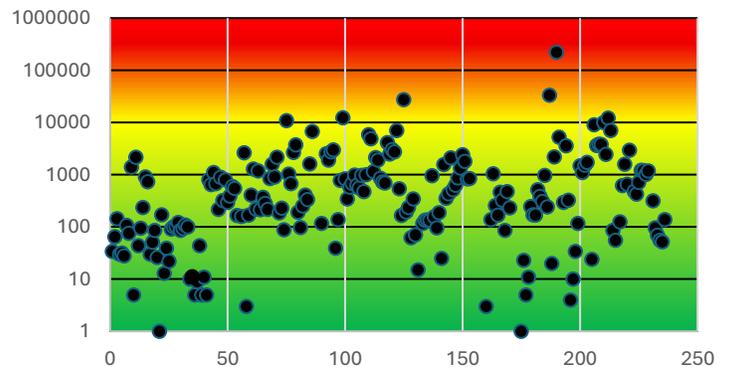


Figure 1. Shows Ferrous data (ppm) for in-service shore to ship crane samples.

Optical transmission is a second quick and easy screening test that is performed on the in-service grease. Fig. 2 shows recent samples from the shore to ship cranes that most colorimetry responses are acceptable. As grease ages, accumulates wear or becomes contaminated the color changes creating a larger ΔE value compared to the referenced baseline. The screening analysis flagged just over 10% of samples from the tested bearings indicating that some of the in-service greases sampled could have oxidized or have picked up contamination, since we know only 1% of samples were flagged for high ferrous wear in the set.



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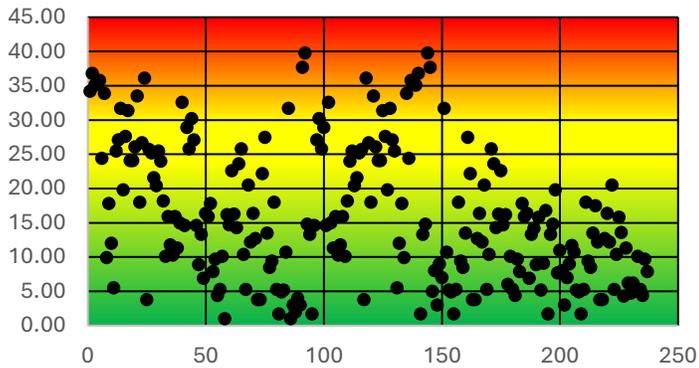


Figure 2. Shows Colorimetry data (ΔE) for in-service shore to ship crane samples.

Lastly FTIR was performed on the in-service greases, and the spectra were compared to the reference baseline to complete the screening testing. The FTIR confirmation can identify samples that have deviated from the expected response and can confirm contamination in a sample. The closer to 1.0 the less has changed compared to the referenced baseline. Fig. 3 shows recent samples from shore to ship cranes with most FTIR confirmations being acceptable. About 5% of the samples were flagged as possible mixed greases, highly oxidized, or heavily contaminated grease.

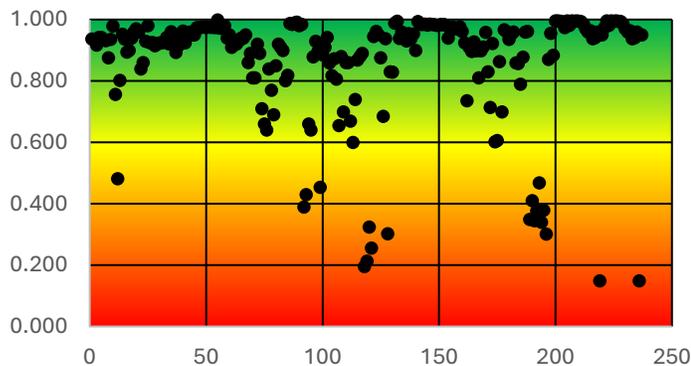


Figure 3. Shows FTIR data for in-service shore to ship crane samples.

Further Lab Testing

In-service greases that have high ferrous wear identified via FerroQ can be candidates for further

analysis in the laboratory to understand the wear present better. Determining the root cause or type of wear can help to determine which cranes may need maintenance or an adjustment to the lubrication frequency. Samples flagged for Optical Transmission and FTIR can indicate greases that have accumulated wear, aged, or are contaminated and can be further analyzed as well to understand the origin of the contamination, or the severity of oxidation. Understanding this can help to adjust regreasing intervals to the optimal level for each crane based on its unique case versus a traditional time-based interval.

In-service grease screening analysis gives a cheap, easy, and effective way to monitor the health of cranes, extend asset life, and prevent costly repairs. Grease screening analysis can test all of the cranes of a site quickly and inexpensively. Periodic scheduled sampling can help to understand how the components are aging over time and develop maintenance best practices. Screening analysis leads to identification of potential problems, and further lab analysis can be performed on these identified outlier samples in order to recognize and correct issues before they lead to failure, helping to prevent costly maintenance repairs and maximizing availability and crane productivity.

Grease Thief® Benefits

- Remote site or location – screening can be done on-site with field testing instruments leased by MRG Laboratories.
- Representative in-service grease samples per ASTM D7718 are easily and quickly screened with Pocket-Lab.
- Outlier samples can be sent to the lab for further analysis

