

Grease Sampling and Analysis for Helicopters

Grease analysis is a reliable, cost-effective way to determine the health of any grease-lubricated equipment. For years grease analysis has been used as an essential tool to monitor the health of in-service greases and optimize grease life, which helps to ensure availability of critical equipment maintaining operations and reducing grease consumption and manpower. It is often found that grease lubricated assets are lubricated more frequently than necessary, creating a waste of resources and manpower. Measuring wear, contamination, consistency, and anti-oxidant levels optimizes regreasing intervals and asset availability.



In this case study approximately twelve hundred H-47 Chinook in-service grease samples were taken for Boeing and the Chinook Worldwide Operators Workshop (CWOW) as part of a lubricant optimization study (LOS). The result of the LOS showed that a majority of the lubrication intervals could be extended, many doubled. This data driven extension provided fewer interruptions to operations and reduced maintenance costs while ensuring aircraft safety. The resulting extension reduced the lubrication tasks from 98 per 1000 flight hours to 56 per 1000 flight hours, or from 20 service interruptions to 10. The maintenance optimization provides an estimated annual saving of \$100,000,000 USD on grease costs and manpower time saved across the CWOW fleet.

Screening Tests

For this Lubrication Optimization Study, the in-service grease samples were taken from select Drive, Rotor, and Landing Gear components. 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 FerroQ Analyzer, grease optical transmission via the Grease Thief Colorimeter, Die Extrusion via the Grease Thief Analyzer, Linear Sweep Voltammetry via RULER, moisture analysis, elemental analysis via Rotating Disc Electrode (RDE) Spectroscopy for wear and contamination, and FTIR analysis. Data from these tests gives insight into the wear rate, consistency, contamination, and anti-oxidant levels remaining in the in-service greases, and can be used to evaluate the condition of the in-service greases.

During the study there were seven parameters that were identified as having an influence on the in-service grease life. Certain wear levels, moisture, Die Extrusion (consistency), and oxidation. For the LOS all parameters were plotted as a function of flight hours since last interval to review degradation parameters. This data was used to establish the optimal service interval where grease would be replenished before degradation.

Further Lab Testing

In-service grease screening analysis gives a cheap, easy, and effective way to monitor the health of helicopters, extend asset life, and prevent costly repairs. Grease screening analysis can test all of the helicopters 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

