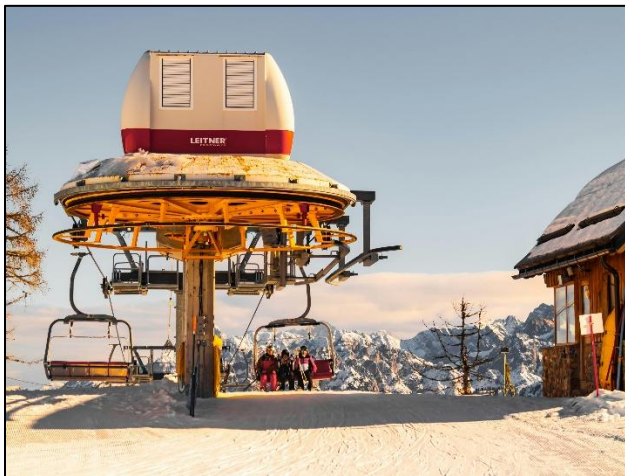


Grease Sampling and Analysis for Lift and Tram Operations

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 lifts. This helps to ensure availability of critical equipment and safety during operation. 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 ski resort lifts 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 ski lifts 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.

Ferrous Debris

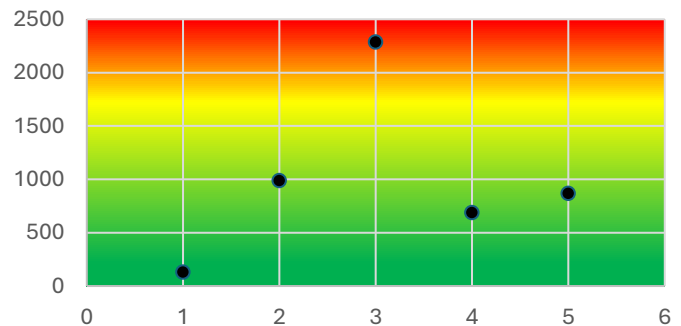


Figure 1. Shows Ferrous data (ppm) for a recent in-service ski lift sample set.

Optical transmission is a second quick and easy screening test that is performed on the in-service grease. Fig. 2 shows recent samples from ski lifts 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 one of the samples from the tested bull wheel bearings indicating that the in-service grease identified could have oxidized or have picked up contamination.



Grease Sampling and Analysis for Lift and Tram Operations

Colorimetry (ΔE)

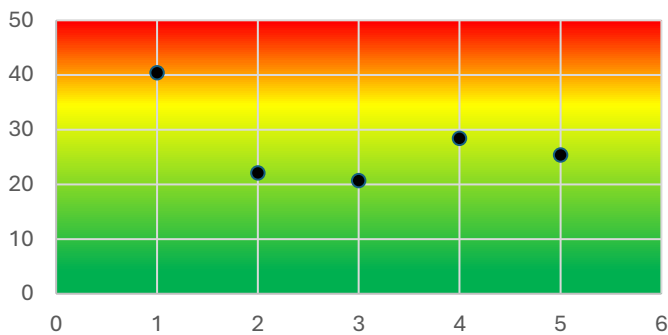


Figure 2. Shows Colorimetry data (ΔE) for a recent in-service ski lift sample set.

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 the value to 1.0 the better the match to the new grease. Fig. 3 shows recent samples from ski lifts with most FTIR confirmations being acceptable. One of the samples was flagged as possible mixed greases, highly oxidized, or heavily contaminated grease.

FTIR Confirmation

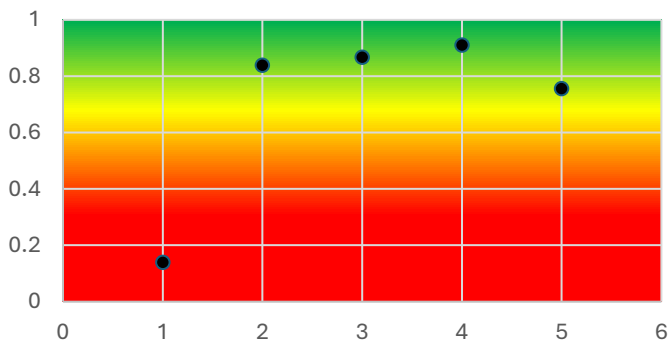


Figure 3. Shows FTIR data for a recent in-service ski lift sample set.

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 the underlying causes of component wear or grease degradation. Samples flagged for Optical Transmission and FTIR can indicate the effectiveness of current greasing practices. Understanding this can help to adjust regreasing intervals to the optimal level for each lift 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 lifts, extend asset life, and prevent costly repairs. Grease screening analysis can test all of the lifts 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 helps correct issues before they lead to failure, preventing costly maintenance repairs and maximizing availability and lift safety.

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.
- Samples can be sent to the lab for further analysis

