

CASE STUDY

A NEW AND COST-EFFECTIVE APPROACH TO MONITOR BLENDING OF NEW LUBRICANTS IN REAL TIME

Introduction

The manufacture of lubricants requires accurate blending of performance additives with base oils. The selection and quantity of additives directly influences the type, viscosity, performance, and cost of the finished lubricant. Batch to batch variability due to *mis*-dosage of any specific additive may lead to adverse effects on the entire blend. Additionally, most commercial additives are sold pre-diluted with a carrier fluid. Therefore, any change of supplier or error in the additive formulation may also influence overall quality of finished products.

Objectives

- Monitor and control in-line blending of lubricant oils in real time
- Ensure batch-to-batch consistency and quality in the manufacturing process

COAT[®] Technology

An FTIR (Fourier Transform Infrared) based analytical device was designed and built by Thermal-Lube Inc. to monitor Thermal-Lube's real-time blending process of automotive motor oils, and industrial gear, compressor, and hydraulic fluids. This portable system was employed directly on the plant floor and was wheeled from mixer to mixer where data was extracted.

Analytical Approach

- Pre-analyze each additive concentrate to determine an accurate level of active ingredients
- Record infrared spectra of all targeted additives at their pre-established concentrations (i.e., anti-wear, viscosity improver, anti-oxidant)
- Compile a comprehensive infrared database library of finished lubricant products
- Monitor lubricant formulation during production and set *minimum* and *maximum* alarm levels (Figure 2)
- Create a data feedback loop to production and formulation personnel and advise of real-time additive levels (Possible automation as in Figure 1)



FIGURE 1:
Thermal-Lube's COAT[®] (Continuous Oil Analysis and Treatment) Technology

Results and Discussion

- Results obtained from lubricant formulation monitoring demonstrate that FT-IR spectroscopy is an effective method for monitoring formulations.
- FTIR technology virtually eliminates the necessity for weight and volumetric dosing of additives in blending procedure.
- Quality and batch-to-batch control may be maintained at a spectral level thereby optimizing production cost and product efficiency.
- Pre-analysis of each performance additive also acts as a screening device to verify supplier's product and quality
- Reduces Human error due to miscalculation or introduction of incorrect additives.

FIGURE 2:
Spectral depiction of a lubricant performance additive in solution at various levels

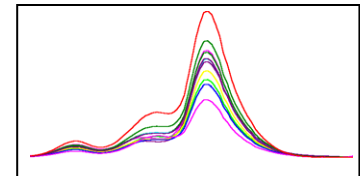


FIGURE 3:
COAT[®] System automatically controls batch additive dosage through interpreting the lubricant's spectral signature during the blending process.

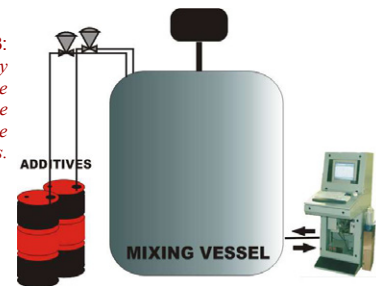


FIGURE 4:
Actual additive dosage level versus the level predicted by the COAT[®] System. Correlation is nearly 100%

