

ISO 4407:2002 – Fluid contamination determination with Hound

Introduction

ISO 4407:2002 states that the presence of particulate contamination in liquid interferes with its ability to lubricate and causes wear to components. The level of particulate contamination in the liquid has a direct correlation to the performance and reliability of the system, therefore particulate contamination must be held to an appropriate level.

Methods

100 mL of hydraulic fluid was filtered through a 0.45 µm cellulose nitrate membrane. The particles loaded onto the filter round were imaged, counted and sized by Hound. The integrated dark field and bright field illumination and imaging analysis were able to size and count 2 µm particles with a resolution of 10 pixel/particle. The entire 45 mm membrane diameter was scanned with a resolution of 25 µm with 444 individual fields of view. After this scan, the resolution was switched automatically to 2 µm, and again 444 individual fields were scanned. Without further user interaction, Hound documented and generated reports for the largest 10 particles.

Results

Hound scanned the effective filter area for particles larger than 25 µm in just 7 minutes, identifying 125 particles in this size range (Figure 1). A smaller area of 400 fields (10 x 10 mm) was scanned to find particles larger than 2 µm, which revealed the presence of 4,158 particles (Table 1). The report was generated by the system and documented in an encrypted file format ensuring the validity of the raw data according to the 21 CFR Part 11.

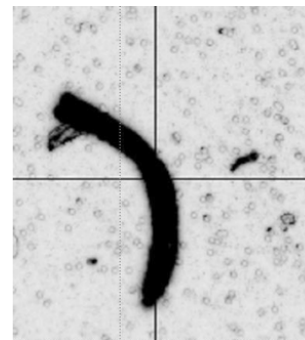


Figure 1: An image of a 175 µm fiber automatically identified by Hound.

Particle count (µm)					
≥ 2	≥ 5	≥ 15	≥ 25	≥ 50	≥ 100
4,158	2,154	478	125	31	9

Table 1: Particles from 100 mL of hydraulic fluid.

Summary

Hound provides fast and easy measurement of the total number of contaminants in hydraulic oil samples. The sample was characterized in just 14 minutes. By applying the statistical counting procedure on a smaller portion of the filter, one can ensure that the size limit of 2 µm of ISO 4407:2002 is met with a sufficient resolution of 10 pixel/particle.



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