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# Wear Particle Analysis Using Ferrography

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Abstract— The Ferrographic analysis of wear particles contain in used lubricant oil samples. These samples are collected from the engineand gearbox of a Hero Honda Splendor bike. Ferrography analysis and elemental analysis have been employed to selection the material information. These analyzed information is about the physical point of used oil and the wear condition of the parts from gearbox and main engine. The application of wear particle analysis and ferrography in particular is an effective means to identify and respond to maintenance needs of bike engine.

*Index Terms*— Elemental analysis, Ferrographic analysis, Lubricant oil, Wear particles.

## 1. INTRODUCTION

Ferrography is a wear particle analysis utilizing diagnostic and predictive techniques to evaluate the on-line condition of interacting lubricated or fluid powered parts or components. The use of Ferrography to assess a system's condition is to avoid time consuming and potentially damaging hardware teardown and other destructive or interfering inspections. Ferrography can analyze a system's fluid to determine the type of wear it is experiencing and hence, predict the type of system failure and when the failure may occur. Ferrography can provide an established and easily performed inspection method for determining the health of a system and providing an early failure detection method. Ferrographic analysis encompasses wear (metallic and non-metallic), contaminant (crystals, water, and organic and inorganic compounds), and lubricant (friction polymers) monitoring.<sup>[1]</sup>

#### II. FERROGRAPH ANALYSIS APPARATUS

## A. Ferography

The particles are separated on a serve object glass where due to its displacement in a special magnetic field (with a very high field gradiation) causes the particle should be sorted according to size. The largest particles are unloading first while smaller ones travel farther with the flowing oil. The density i.e. the attentiveness of particles at a single location on the ferrogram, is measured with a optical densitometer by allowing light to pass through it. The wear index SA = AL 2AS-2 is obtained by the comparison of the density AL of the large particles and the density as of the small particles.



Fig 1. Ferrograpy<sup>[4]</sup>

#### B. Types of ferrograph instruments

Two basic types of ferrograph instruments are used to assess the wear particles.

- Direct reading ferrograph System
- Analytical Ferrograph system

### 2.1 Direct reading ferrograph System

The direct reading ferrograph, shown in Fig. 2.1.1, measures the concentration of wear particles in a lubrication oil or hydraulic fluid. The particles are subjected to a powerful, magnetic gradient field and are separated by order of decreasing size.



Fig 2.1.1. Direct Reading Ferrography System [1]



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