

# **HEAT TREATMENT OF WEAR PARTICLES OF AUTOMOTIVE ENGINES TO DETERMINE THEIR MATERIALS FROM TEMPER COLOURS**

**O. A. ELHABIB<sup>1</sup>, M. AYAD<sup>1,2</sup>, A. A. ELMASRY<sup>1,2</sup> & ADEL A. OMAR<sup>1,3</sup>**

<sup>1</sup>Faculty of Engineering, Taif University, Al-Taif, Saudi Arabia

<sup>2</sup>Faculty of Engineering, Menofia University, Shebin El-Kom, Egypt

<sup>3</sup>Faculty of Engineering in Benha, Benha University, Al Qalyubiyah, Egypt

## **ABSTRACT**

This work aims to evaluate wear severity of the internal combustion engines installed in the cars and buses running in Saudi Arabia by examining wear particles retained by their oil filters. The photomicrographs of wear particles, illustrated in this work, provide specific information about the severity of wear. The visual inspection of those particles by microscope reveals their wear mechanisms, detects the transfer from one wear mechanism to another and identifies the abnormality of wear.

Through following the temper colours of the tested wear particles the temperatures of the moving surfaces reached a value of 540 °C, during the generation of those particles, which indicate the wear severity and confirm the critical influence of both the lubricant and surface materials. Besides, some of the collected wear particles were heated up to 540 °C to identify their materials and have specific information about their sources. This operation can detect the moving surfaces which suffered from excessive wear and facilitate the maintenance procedure.

Observation of wear particles indicated that most of the engines inspected were suffering from fatigue wear. This conclusion can confirm the importance of developing the lubrication properties of the engine oils as well as the anti-wear additives. Besides the oil filters should be developed to withstand the relatively high sand concentration which has accelerating wear rate of the engine surfaces.

**KEYWORDS:** Temper Colours, Wear Particles, Surface Temperature