

**An Experimental Investigation of the SOMS Green Hybrid Spin-On
Micro-filter System**

By

Steven London

An Abstract of a Thesis Submitted to the Graduate

Faculty of Rensselaer Polytechnic Institute

in Partial Fulfillment of the

Requirements for the degree of

MASTER OF SCIENCE

Major Subject: **AERNAUTICAL ENGINEERING**

The original of the complete thesis is on file
In the Rensselaer Polytechnic Institute Library

Approved:

Dr. Michael Amitay, Thesis Adviser

Rensselaer Polytechnic Institute
Troy, New York

May, 2009
(For Graduation May 2009)

ABSTRACT

Oil filtration is an important feature of automobile performance. Particles in the lubricating oil can lead to inefficient engine performance and damage to components. However, oil filter design has had relatively few advances over many years. This work examines experimentally the effectiveness of a new bypass micro-filter oil filter design by SOMS Technologies.

PIV experiments were conducted in order to observe the flow of oil exiting the micro-filter. Based on the results of these experiments, it was shown that oil does flow through the micro-filter. In addition, an hypothesis was developed to explain how the micro-filter functions at various stages of particle loading.

Pressure measurements were taken over the course of extended mileage tests. The use of a micro-filter element in conjunction with a traditional full-flow filter was shown to extend the life of the full-flow filter by reducing the amount of particles which pass through and damage it.

Variable flow rate experiments were conducted to reproduce a realistic drive cycle. The pressure in the micro-filter design was shown to vary proportionally with flow rate. In addition, the micro-filter was shown to perform predictably over the course of a typical drive cycle.

Finally, microscopic analysis of the micro-filter and full-flow filter elements was conducted. These results verified the findings of the previous experiments, showing that the fibers of the full-flow filter were looser and more damaged when used alone than when used alongside the micro-filter.