U.S. DEPARTMENT OF ENERGY

Fuel Savings Test

"Fuel Efficiency Test showed improved Fuel Economy"

ABSTRACT

Experiments conducted at the U.S. Department of Energy, Bartlesville, Oklahoma, Energy Technology Center to design and evaluate a procedure for evaluating the fuel efficiency characteristics of crankcase lubricants using the driving cycles of the 1975 Federal Test Procedure and the Highway Fuel Economy test.

Three crankcase lubricants and five oil supplements, as well as a baseline lubricant, were used in eight 1980 model-year vehicles of identical make. The vehicles were operated at 75° F in closely controlled chassis dynamometer tests designed to detect small changes in fuel efficiency.

Results from the test showed measurable increases in fuel economy of 0 to 6 percent with the test lubricants when compared to a common SAE 30 grade oil.

INTRODUCTION

The rising cost of gasoline and the increased demand for fuel efficient automobiles have led to new trends and developments in the automotive industry which, since 1974 have resulted in a 55% increase in fuel economy or a savings of 500 million barrels of oil.

The use of energy-conserving lubricants is especially appealing because it can be easily applied to the existing car population and therefore, can have an immediate impact on the nations transportation energy demands. If a fuel economy increase of **5%** for the entire existing fleet could be achieved, approximately **100 million barrels of fuel would be saved annually**.

Several oils, containing either soluble friction modifiers or solid materials present as colloidal suspensions, and oil supplements containing primarily polytetraflouroethelene (PTFE), have recently become commercially available. The manufactures claim reduced engine friction and increased fuel economy when these products are used in passenger cars and trucks. The claims for fuel economy benefits range from a moderate (2 to 5%) to extremely high 20 to 25%. A reasonable upper limit for fuel economy gain by minimizing boundary friction is about 7%. By minimizing boundary and hydrodynamic friction, an estimated **10 percent increase in fuel economy** is possible.

Synthetic oils have been commercially available, but the major claims emphasize extended drain intervals, better performance, and improved fuel economy when compared to mineral oils under extreme temperature conditions. However, a low viscosity synthetic lubricant has shown potential for improved fuel economy under various driving cycles and conditions.

VEHICLES

Eight 1980 model year American made front wheel drive vehicles were used in this study.

CRANKCASE LUBRICANTS

1. An SAE 30 grade mineral API service SE/CC (base lubricant)
2. An SAE 5W20 synthetic, API service SE/CC;
3. An SAE 10W40 mineral with graphite in colloidal suspension, API service SE/CC;
4. An SAE 10W40 mineral with a soluble friction modifier, API service SE
5. Three oil supplements using a lubricant as a carrier; and
6. Two oil supplements containing primarily primarily polytetraflouroethelene and a synthetic as a carrier.

The procedures used to perform this test meet the **Federal Guidelines** set forth for this type testing.

Excerpts from letter sent to manufacturer upon conclusion of testing.

Department of Energy
Bartlesville Energy Technology Center
P.O. Box 1398
Bartlesville, Oklahoma 74003

As per your telephone request of July 30, 1980, the following is a brief summary of the results of our work with Formula 101 using a 1980 Pontiac Phoenix (2.5l, 4 cylinder, auto trans, and a/c) in the Federal Test Procedure.

Fuel Economy, mpg	Base Oil	Base Oil + Formula 101	Percent Change
Urban	18.98	20.30	+6.95
Composite	22.43	23.86	+6.38
Highway	28.83	30.36	+5.31

These results are based on duplicate testing with 0.5% repeatability in fuel economy measurement. As per your recommendation, the vehicle was conditioned for 3,000 miles on Formula 101 prior to testing

Sincerely,

Ted M. Naman
Mechanical Engineer
Division of Utilization