

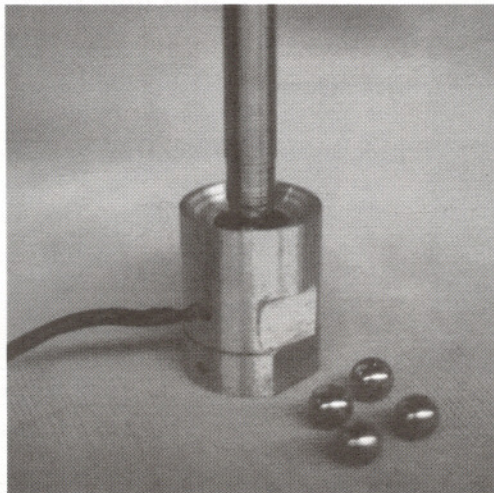
The Truth About Teflon® In Motor Oil

Several years ago I ran a series of comparison tests on lubricants. The test used was a small four-ball apparatus rigged to record the self generated heat caused by friction. I wrote it up and it was published in a major lubrication journal. My test device appears on one of their covers (ref.2). The test is elegantly simple, and the results easily understood: the lower the heat generated, the lower the friction. Tufoil beat them all; not only with the lowest heat, but also an amazingly low surface friction of .029. This was confirmed by a major federal laboratory (NIST, formerly The National Bureau of Standards) (ref.3).

There has been a proliferation of lubricants containing PTFE (Teflon®) particles in the last few years. Customers often ask which is the best. The only way to find out was to re-run the tests and let the data speak for itself.

Sadly, the claims made for some products do not stand up to close scientific scrutiny. One of those products we tested has been fined twice by the Canadian Government for false advertising. Unfortunately, outrageous claims are often believed by a surprising number of people. Some of these products are widely advertised and attractively packaged, proving the old adage, "You can't judge a book by its cover".

In one of my articles (ref.2), I mentioned, "PTFE cannot just be stirred into an oil to make a satisfactory lubricant". That's still true. The technology is complex. So far we've been awarded 11 International and U.S. Patents on our efforts.



NIST scientists report that their 4-ball lubrication testing apparatus correlates well to real-world engine performance. Here is a photo of our miniature version.

In the mid 80's, several manufacturers claimed that their product could be used once and would last the life of the engine and that the PTFE would bond to the metal surfaces. These claims are untrue! Both are miraculous processes without any physical, or chemical basis. At the time, we were running full page 4-color ads in Popular Science and Popular Mechanics. We stated that there wasn't a shred of scientific evidence to back up such a claim. The manufacturers then dropped the claim to

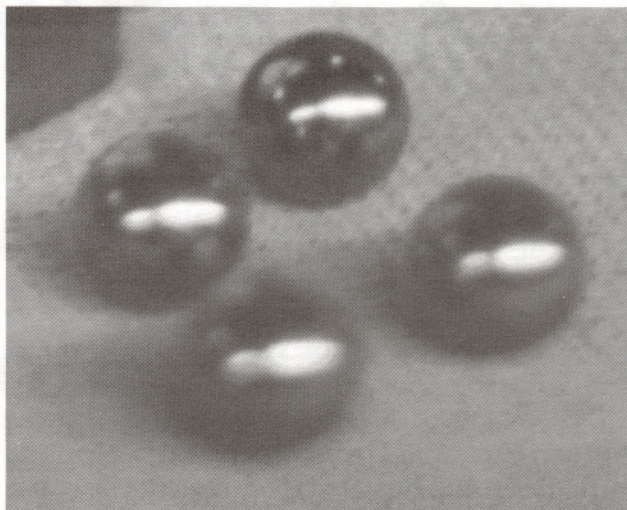
100,000 miles. We restated our case. They then dropped it to 50,000 miles, and are now offering "booster" treatments.

The following data includes some well known lubricants that do not contain PTFE. We felt that they should be included since the public sees their advertisements and frequently asks us for comparisons.

F.G. Reick, President

WHY DO WE USE THE 4 BALL TEST?

There are many methods for testing lubrication oils ... each is used for a different purpose. Some tests are good for gear oils, some are good for testing cutting oils, and others are best for testing engine oils. The National Bureau of Standards (NIST) scientists published several papers showing that the 4 ball test correlates with engine oil performance (ref.5). If another type of test was shown to be useful for this purpose, we would use it. I have seen the pin and V-block test (the old Falex test) used with a torque wrench on some TV infomercials. An extremely misleading test. It measures EP (extreme pressure) characteristics of an oil only. If you want to drill holes in steel, then this is the test to use. Many lubricants that



Close-up of 3/8" steel balls used in our test.

look good in this test would be disastrous in your engine. The additives used are destructive to the rubber seals in the engine and damage the exhaust catalyst.

I divided the test results into three groups based on the wear seen on both the rotor and stator balls:

1. HIGH WEAR
2. MEDIUM WEAR
3. LOW WEAR

The data generated by the 4 ball test is graphed as time/temperature curves. All products were tested for one hour, with the temperature rise monitored by thermocouple and recorded on a strip chart.

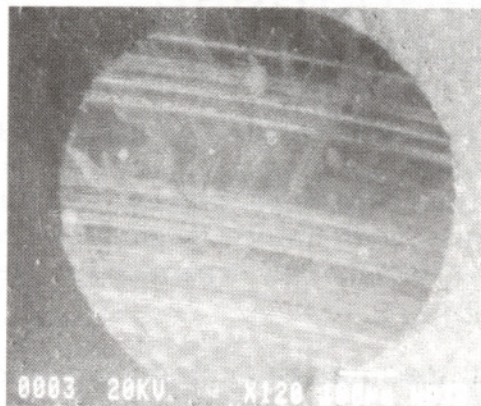
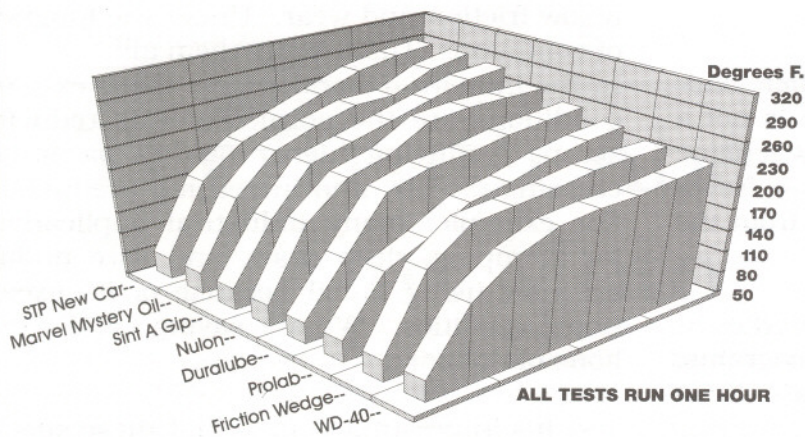
The lower the temperature at the end of the test, the lower the friction. When you get very low wear and very low friction, you have the best of both worlds and the best possible lubricant. Low wear and low friction means cooler running and longer lasting engines ... exactly what Tufoil users all over the world have been reporting to us for years.

LUBRICATION PRODUCTS WE TESTED

Amsoil
Castrol GTX
Castrol Syntex
Duralube
Friction Wedge
Havoline Formula 3
Marvel Mystery Oil
Mobil 1
Nulon
Nu Power
Prolab
Protect

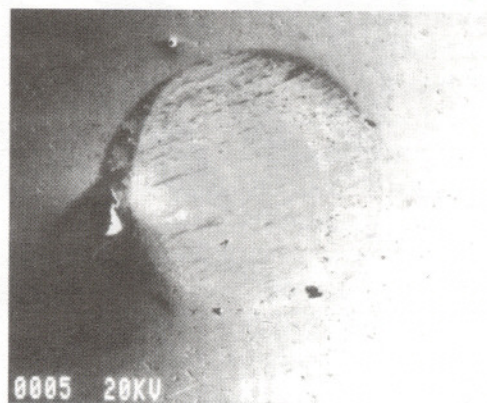
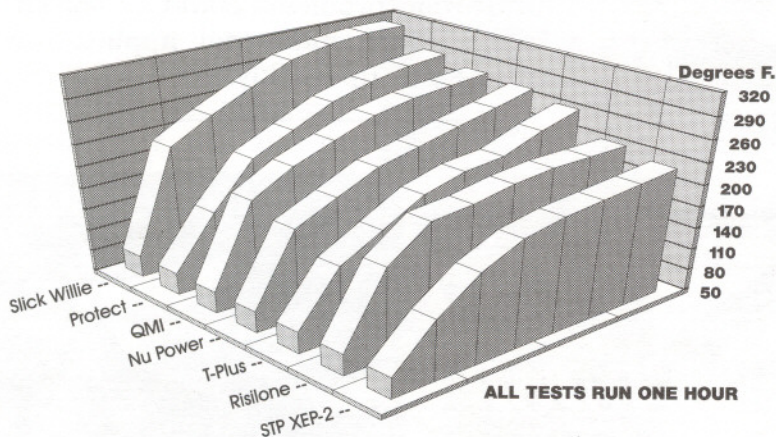
QMI
Quaker State HD-30
Risilone
Sint A Gip
Slick Willie
STP New Car Treatment
STP XEP-2
T-Plus
Tufoil for Engines
US Slick 50
WD-40

HIGH WEAR



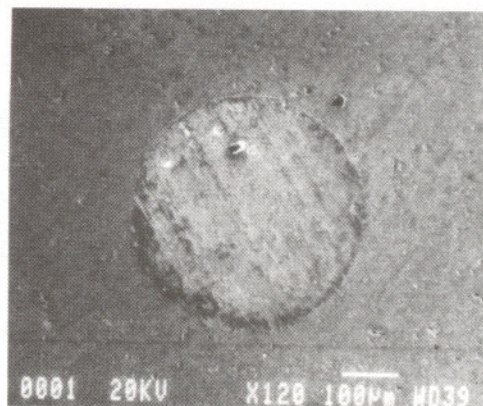
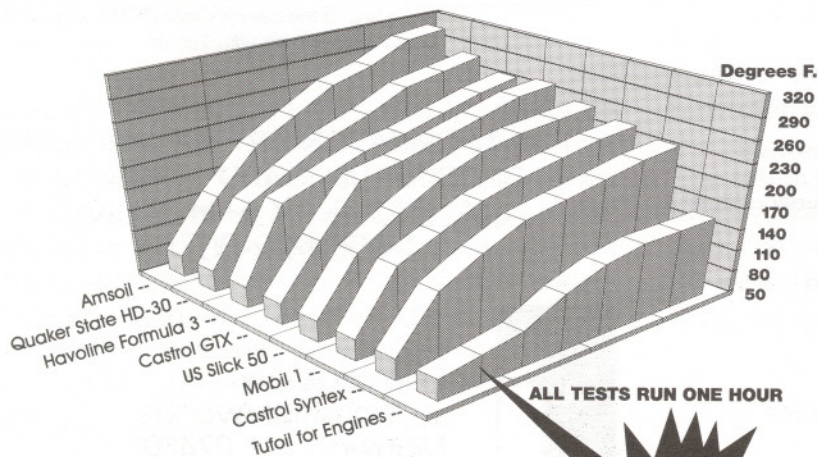
MICROPHOTOGRAPH OF TYPICAL ROTOR & STATOR BALL SHOWING HIGH WEAR

MEDIUM WEAR



MICROPHOTOGRAPH OF TYPICAL ROTOR & STATOR BALL SHOWING MEDIUM WEAR

LOW WEAR



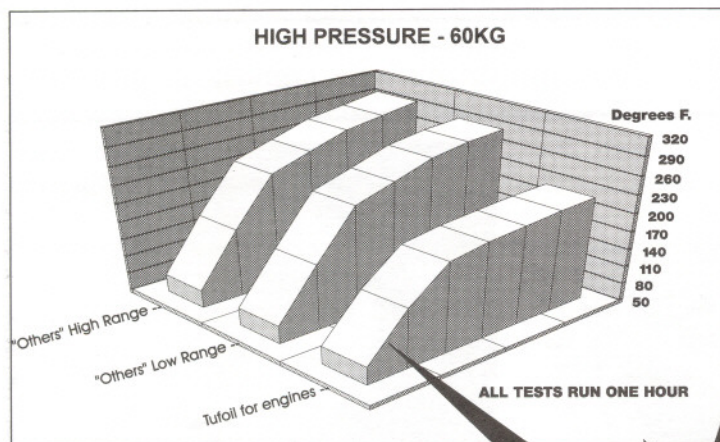
MICROPHOTOGRAPH OF TYPICAL ROTOR & STATOR BALL WHEN USING TUFOIL

Tufoil

INDUSTRIAL APPLICATIONS

I ran another series of tests at higher loading (60 Kilograms). In a sense, this is not a realistic test for engines since few engine parts work under these pressures. Never the less, it really separates the men from the boys.

All the lubrication products tested earlier at 30 Kilograms, when tested at 60 Kilograms, fall into the range listed as "Others". Even



under these extreme conditions, Tufoil stands out from all the rest with exceptionally low friction and wear. Under the toughest of conditions, Tufoil beats them all!

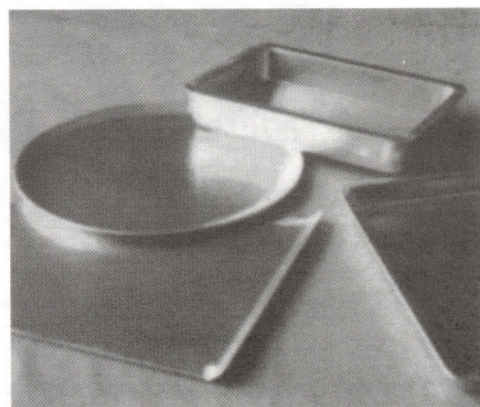
In the industrial world, where these extreme conditions are the norm, Tufoil is reducing scrap, producing higher quality parts, increasing die life, and increasing production. For example: many industrial applications for stamping, deep draw, and wire pulling are now using Tufoil because of its exceptional qualities. We are saving OEM's millions of dollars.

It's interesting to note that these special industrial applications are called to our attention by engineers working for these companies. They got such great results using Tufoil in their cars, that they quickly realized that many of their industrial lubrication problems could be solved with Tufoil. New industrial applications for Tufoil show up weekly!

Tufoil

References:

- (1) Reick, F.G., "Stable PTFE Colloids for Lubricating Oils Microscopy (Part 1); Lab Tests (Part 2)" *Amer. Lab Mag.* (June, '77-March, '78).
- (2) Reick, F.G., "Energy Saving Lubricants Containing Colloidal PTFE". *Lubr. Eng.*, 38,10, pp 635-646 (1982).
- (3) Milton, B.E. and Carter, E.A. "Fuel Consumption & Emission Testing of an Engine Oil Additive Containing PTFE Colloids". *Lubr. Eng.* 39, 2, pp 105-110 (1983).
- (4) Stotter, J.A. and Gutman, E.M., "The Influence of Oil Additives on Engine Friction and Fuel Consumption." Technion (Israel Institute of Technology) ASLE, 84-AM-7D-1 (May 1984).
- (5) Gates, R.S. and Hsu, S.M., "Development of a four-ball Wear Test Procedure to Evaluate Automotive Engine Oils". *Lubr. Eng.* 39,9, pp 561-569 (1983).
- (6) Hsu, S. et al., "Energy Conservation and Utilization Technologies



Increased die life, less scrap, and deeper draws are a few of the benefits that OEM's around the world are realizing with Tufoil!

FOR INFORMATION OR HELP WITH YOUR
DIFFICULT LUBRICATION PROBLEM
CALL OUR TECH HOTLINE
1-800-922-0075



Fluoramics Inc.
18 Industrial Avenue
Mahwah, NJ 07430

Let me explain the table below.

On the left are the products that were tested. Depending on where you live, many of them will be familiar to you. The column marked "Time Till Smoking" tells how many **MINUTES** it took on the 4-ball test apparatus until the lubricant went up in smoke with a 90kg load. (You'll notice that none of them took very long!) The third column tells you the temperature of the product (in Celsius) at the time of burn-out.

Look at Tufoil! We couldn't measure the time with a clock. We had to use a calendar. It took 16 days before a puff of smoke was visible!

PRODUCT	TIME TILL SMOKING(IN MINUTES).....	TEMPERATURE ° (CELSIUS)
BARDAUL #2	6 MINUTES	65
BITRON	6 MINUTES	90
DR. DETROIT	13 MINUTES	115
DURALUBE	10 MINUTES	110
FIN 25	7 1/2 MINUTES	90
FLUOROCOTE	8 MINUTES	120
FORMULA TX-7	7 1/2 MINUTES	110
HYPER LUBE	3 1/2 MINUTES	50
LUBRIFILM	4 MINUTES	60
LUBRILON	7 MINUTES	80
NULON	6 MINUTES	160
OEM	6 MINUTES	80
PETROTECH	10 MINUTES	60
PROLONG	10 MINUTES	160
QMI	6 MINUTES	90
SINTACID	4 MINUTES	60
SINTO RACING	6 MINUTES	110
SLICK-50	7 MINUTES	80
SLICK WILLIE	5 1/2 MINUTES	80
STP XEP	12 MINUTES	95
T-PLUS	7 MINUTES	130
TUFOIL® FOR ENGINES	* * * 16 DAYS * * *	60
WHIZ	5 MINUTES	75
WYNNS FORMULA 85	5 MINUTES	70

Obviously, the Guinness Book of World Records agreed!

It took about two years but the only engine treatment ever recognized by the Guinness Book of World Records is Tufoil for Engines! They claim it is "The World's Most Efficient Lubricant!"

We think it is, too! We think you'll agree!