

BOUNDARY LUBRICANT FOR ENGINES PROVIDES ADVANCED LUBRICATION TECHNOLOGY FOR TODAY

NNL 690

Power Up **NNL 690** is a unique boundary lubricant which is specifically formulated to solve many of today's tribological problems in high pressure boundary conditions where metal to metal contact is inevitable. **NNL 690** works by forming a wear reducing, protective film which is capable of withstanding extreme pressures as high as 200,000 lbs per sq. inch. **NNL 690** provides critical engine parts, such as the ring zone, cam lobes and turbocharger, with boundary lubrication protection far exceeding that of conventional oils. **NNL 690** is a carefully balanced, complete additive package which contains anti-wear and extreme pressure additives, detergent/dispersants, viscosity index improvers, corrosion inhibitors and acid neutralizers.

Primary Benefits of NNL 690:

- Strong film affinity maintains lubrication at start-up.
- By reducing the generation of large wear particles, the efficiency of the oil filter is improved.
- High base number helps neutralize acids that cause corrosion.
- Reduces friction and metal to metal contact in high load areas of the engine.
- Extends equipment life and increases equipment availability.
- Has a powerful detergent which cleans and suspends sludge and varnish.

"Since adding NNL 690 to my truck engine my fuel economy has improved 1/2 mile to the gallon from 5.9 miles per gallon to 6.4 miles per gallon. In the past, on cold mornings, I had problems with the truck starting up. Now with the addition of NNL 690 it starts right up every morning, even in temperatures as low as 0°F."

Kevin Lovell, K&S Trucking - Yuma, Colorado



POWER UP FOR ENGINES



NNL 690 is specifically designed for use in engines calling for medium to high ash oils (1.0% or more) and is suitable for use in most other lubricated equipment using non-E.P. oils. **NNL 690** provides engines with exceptional anti-wear protection and also contains a superb detergent/dispersant package, viscosity index improvers and excellent anti-corrosion additives. **NNL 690** is a balanced additive package that provides complete lubrication when used with good quality mineral based and synthetic oils.

The primary benefit of **NNL 690** is friction reduction at the boundary lubrication regime (metal to metal contact). This includes the ring zone, turbocharger and camshaft lobe areas in engines, and the pump, cylinder rods and valves in hydraulics.

Secondary Benefits of NNL 690:

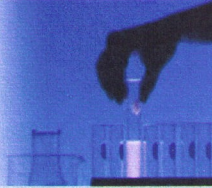
- Reduces ultrasonic wear noise which relates directly to component wear.
- Helps prevent sludge and varnish formation.
- Lowers operating temperatures by reducing friction.
- Provides an improved seal around the ring zone area, improving combustion efficiency and reducing smoke opacity and blow-by.
- Reduces fuel and/or electrical power consumption.
- Improves filtration efficiency by reducing the generation of large wear particles.
- Extends equipment life and increases equipment availability.
- Reduces friction and lowers temperatures in critical bearing and ring zones.

POWER UP>NNL 690: SCIENTIFICALLY VERIFIED TO IMPROVE FLUID ANTI-WEAR CHARACTERISTICS

Decreasing operating expenses, longer machinery life and remarkable fuel conservation are some of the benefits enjoyed by using **NNL 690**. This means that your vehicles and equipment will last longer, operate more efficiently and save you money. **NNL 690** reduces metal to metal contact like no other product. **NNL 690** cleans, protects and reduces operating temperatures.

OUR TESTS PROVE IT! Check for yourself.

TEST CONCLUSIONS

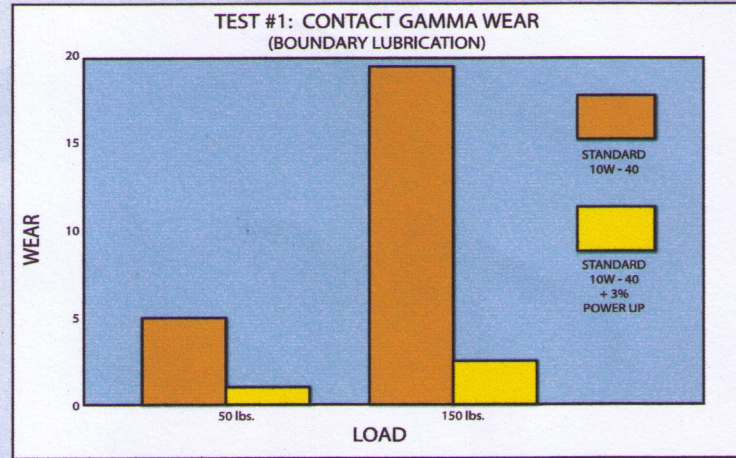


Testing by Fluid Engineering Services Inc., in Stillwater, Oklahoma, with over 80 years of fluid power engineering experience, concluded that "test results reveal that the Power Up>NNL-690 has an SLI (Service Life Improvement) of 2.5 over regular oils alone." This means when>NNL 690 was tested with conventional oils it increased the component life at least 2 1/2 times longer than oils that were not treated.

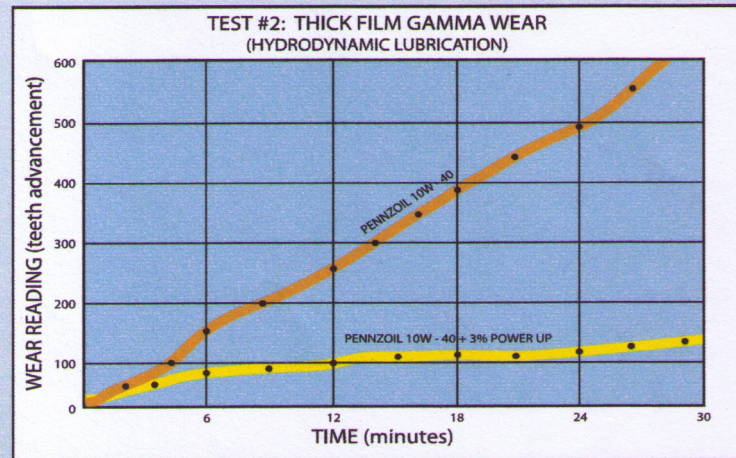
- **High Film Strength**
- **Better Protection at High Temperatures**
- **Protects Against Dry Start Up Wear**
- **Improves Oil Flow in Cold Weather**
- **Keeps Parts Clean and Moving Freely**
- **Reduced Fuel Consumption**
- **Protects Against Water and Antifreeze Contamination and Diesel Dilution**

"The motor is a custom Perkins V8 that is 640 cu.in. making over 3000 horsepower. That kind of power is real hard on the internal motor parts but when I use>NNL 690 in my oil, I see a much longer life out of the parts. I also use>NNL 690G in the rear end of the tractor because with the front end of the tractor off the ground all the time I have to steer it down the track with the brakes and with>NNL 690G it frees up the rear end so I do not have to use the brakes as much as I did before."

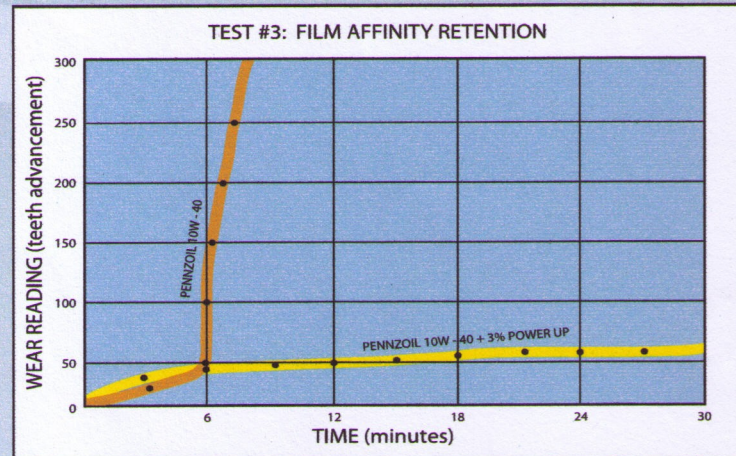
Robby Crutchfield, Massey Ferguson SS Pull Tractor, Liberty, NC



In two test pairs, after the addition of Power Up>NNL 690, under heavily loaded conditions, the amount of wear was reduced between 39% and 87% depending on the load.



An average of 18.9% wear reduction was recorded after the addition of Power Up>NNL 690 even under hydrodynamic lubrication conditions.



Fluid film retention performance is improved as much as 300% by using Power Up>NNL 690 as demonstrated when oil supply is removed.

NNL 690 PAYS LONG TERM DIVIDENDS IN INCREASED SERVICE LIFE AND REDUCED EQUIPMENT REPAIRS

NNL 690

EXTREME LUBRICATION PROTECTION

In independent Contact Gamma wear tests, **NNL 690** significantly reduced the amount of wear generated when an engine oil alone was used. Calculated estimates based on wear reduction (up to 86.9%) suggest that the use of **NNL 690** can extend equipment life **over 7 times** by reducing typical friction losses that occur in normal day to day operations.

A series of dynamometer and ultrasonic noise tests were carried out by an independent consultant to determine the effect of **NNL 690** on a diesel highway tractor engine. The application of 3% **NNL 690** increased the horsepower and torque, while reducing fuel consumption, ultrasonic wear noise and emissions. Some of the computer controlled and corrected dynamometer results are given in Figures 1 and 2.

POWER UP
FOR ENGINES

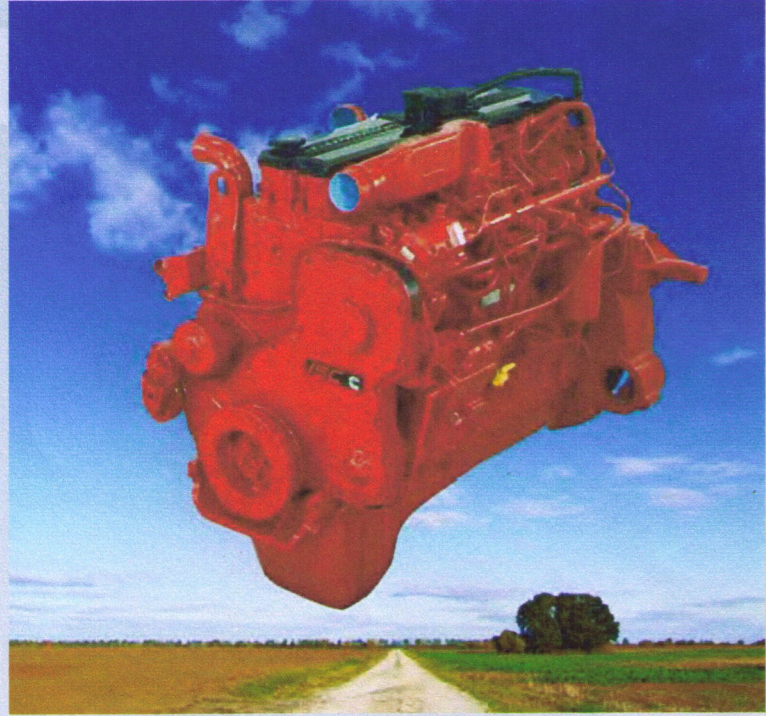


FIGURE 1: CORRECTED WHEEL HORSEPOWER VS. RPM

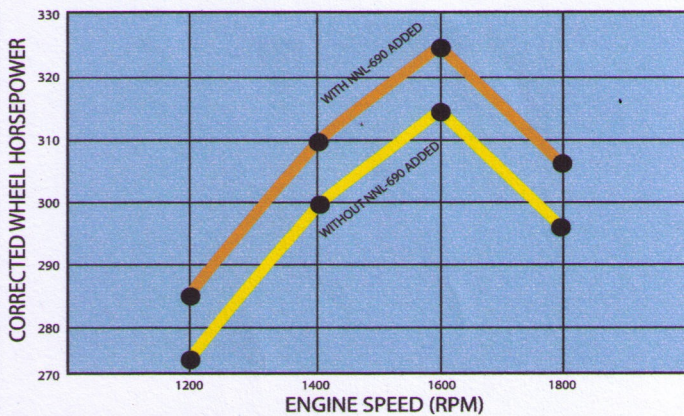
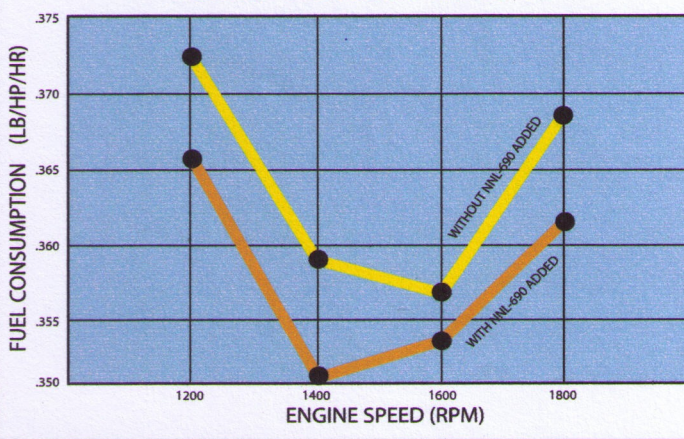


FIGURE 2: FUEL CONSUMPTION VS. RPM



"With oil sampling showing reduced wear counts after using Power Up NNL 690 in the engine, it was not a difficult decision to use Power Up products in rest of the drive train in my dozer. The transmission temperature dropped significantly and there are no more metal filings on the final drive magnetic drain plug. I have put on over 4,000 hours on this machine since I started using Power Up and have had no power train down time. It pays to use Power Up Lubricants."

Patrick Culhane with Culhane Contracting - Waterville, Minnesota

