


# POWER UP

## LUBRICANTS

PRICEWATERHOUSECOOPERS 

ISO 9001: 2000





**BOUNDARY LUBRICANT FOR ENGINES PROVIDES ADVANCED LUBRICATION TECHNOLOGY FOR TODAY**

# NNL 690

**POWER UP**  
FOR ENGINES

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.



**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.

"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 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.**

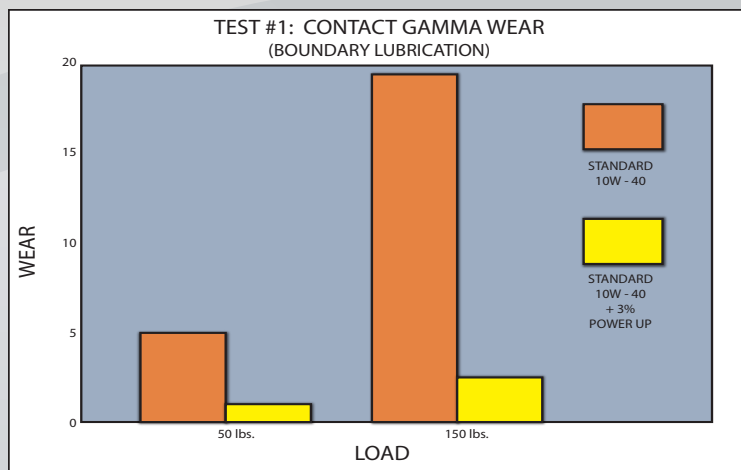
## TEST CONCLUSIONS

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.

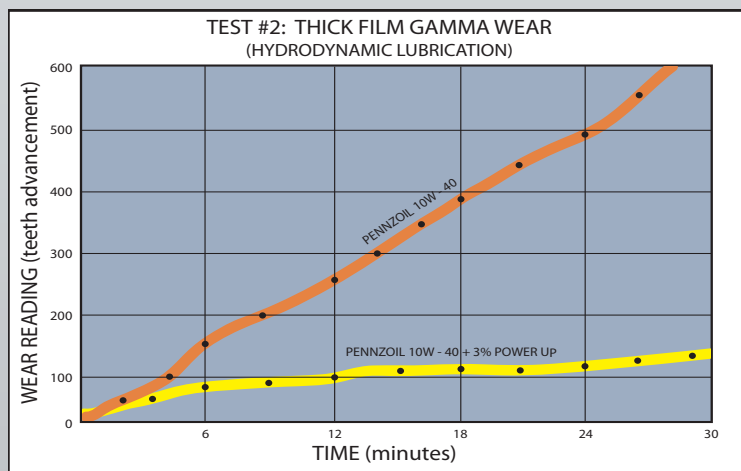
- **High Film Strength**
- **Better Protection at High Temperatures**
- **Protects Against Dry Start Up Wear**
- **Improves Oil Flow in Cold Weather**
- **Keeps Parts Clean and Moving Freely**
- **Reduced Fuel Consumption**
- **Protects Against Water and Antifreeze Contamination and Diesel Dilution**

"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."

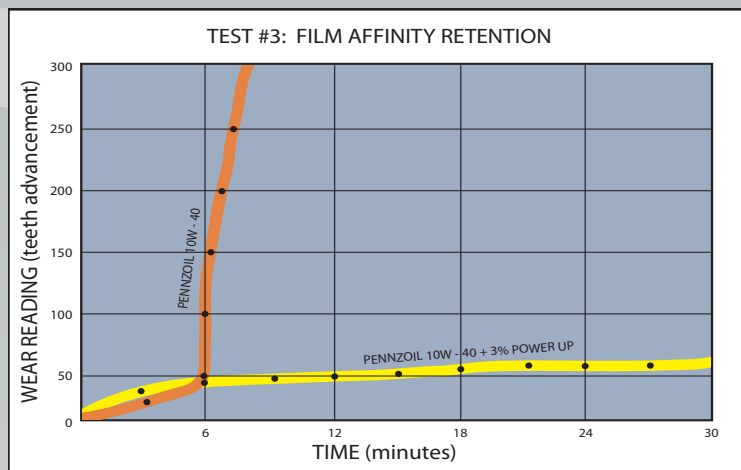
**Robby Crutchfield, Massey Ferguson SS Pull Tractor, Liberty, NC**



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.

FIGURE 1: CORRECTED WHEEL HORSEPOWER VS. RPM

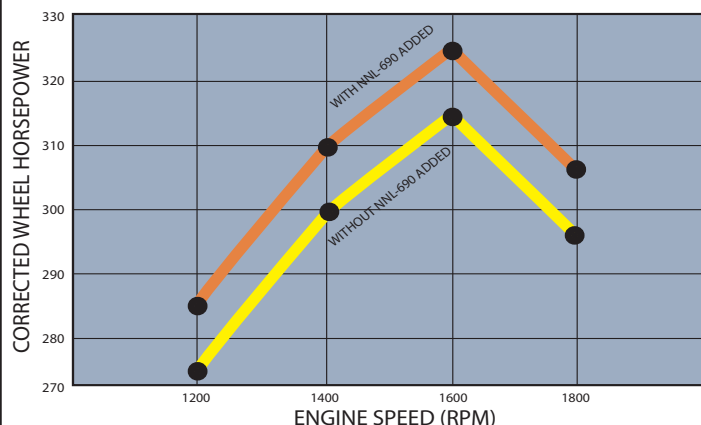
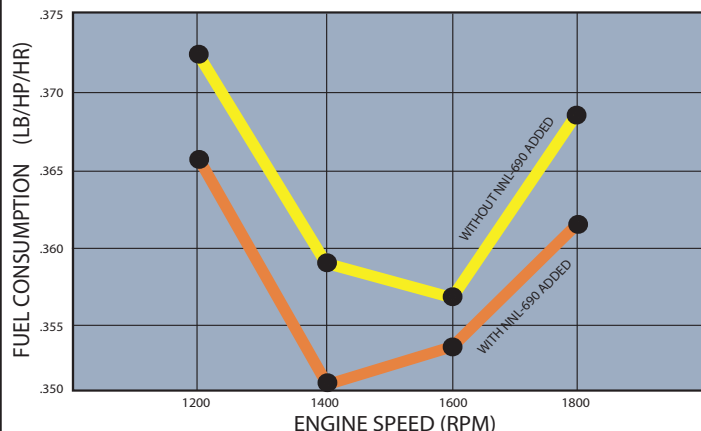


FIGURE 2: FUEL CONSUMPTION VS. RPM



**POWER UP**  
FOR ENGINES



"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**



## NNL 690 PROVIDES YOU WITH A TOTAL PREVENTATIVE MAINTENANCE PROGRAM

Typical Properties of NNL 690		
Property	Method	Result
Appearance		Clear, light amber liquid
Color	ASTM D1500	L 2.5
Viscosity @ 40°C (104°F) @ 100°C (212°F)	ASTM D445	69 cSt 9 cSt
Viscosity Index	ASTM D2270	105
Specific Gravity	ASTM D941	1.00 (H2O =1)
Density @ 68°F (20°C)	ASTM D941	1.00 g/mL
Pour Point	ASTM D97	-6°F (-21°C)
Flash Point	ASTM D92	383°F (195°C)
Acid Number	ASTM D664	0.4 mg KOH/g
Zinc and Lead Content		nil
Colloidal Suspension (Solid particles, PTFE, graphite, MoS2)		none

Special Notations on NNL 690	
Viscosity:	A 5% application of NNL 690 in typical SAE 30 to SAE 50 weight oil results in little or no change in viscosity or viscosity index of the oil.
Pour Point:	NNL 690 is formulated to have a negligible effect on the pour point of typical engine oils.
Alkaline Reserve:	Power Up NNL 690 is blended with an acid scavenger to neutralize blow-by gases and acidic oil degradation products. The addition of 3% NNL 690 will increase the base number of engine oils by about 0.5 mg KOH/g.
Application:	NNL 690 is intended for use in engine crankcases at 3% of the oil volume, each time the oil is changed. It can also be used in automatic transmissions at an application rate of 1%, power shift transmissions at 3% and in circulating systems at 3% to 5%, depending upon operating conditions. NNL 690 is compatible with all mineral oils and polyalphaolefin and diester based synthetic oils. NNL 690 is not recommended for use with water based fluids, phosphate esters or polyglycol fluids.

Test Data on NNL 690		
Property	Method	Result
Copper Strip Corrosion (266°F (130°C) x 2 Hours)	ASTM D130	1b
Rust Preventing Characteristics (100% NNL 690) - Distilled Water - Synthetic sea water	ASTM D665	Pass Pass
Elastomer Compatibility (3% in 10W-30 oil) • Nitrile • Neoprene • Fluorocarbon	ASTM D4289 (Modified)	Pass Pass Pass
Contact Gamma Wear @ 150 lb. load 10W-30 oil with NNL 690		592 teeth 77 teeth



"I have been using Power Up products for over 10 years. I use NNL 690 in my engines, Hydra Maxx in my hydraulics, NNL 690G in my gear boxes, Gen 49D in my diesel fuel, and grease every bearing and every thing that turns with Thixogrease. One of my tractors, a John Deere 4640 recently had a cracked head bolt that allowed water and antifreeze to get into my engine but because of NNL 690, the John Deere mechanics were completely amazed at how good of shape the internals of the engine were in and how clean the engine was internally. I was expecting a total loss of the engine and the John Deere mechanics told me that we just needed to replace the head bolts and the engine would then be suitable for use again. I would not hesitate to recommend the use of Power Up lubricants to anyone that is looking to save money and extend their equipment life."

**Maurice Trites Jr., Maurice Trites Jr. Farms - Gillette, Arkansas**

### Product Application:

NNL 690 is intended for use in internal combustion engine crankcases at 3% of the oil volume, each time the oil is changed. It is also suitable for use in automatic transmissions at an application rate of 1%, in power shift transmissions at 3%, and in circulating systems at 3% or 5%, depending on the severity of service. NNL 690 is compatible with mineral based and synthetic oils based on polyalphaolefins and diesters. At recommended application rates, engine oil viscosity ratings and typical engine seal materials remain unchanged.

### Available in the following convenient sizes:

150 ml (5 oz.) Bottle  
1 Liter (35 oz.) Bottle  
5 Liter (1.4 Gallon / 175 oz.) Jug  
10 Liter (2.75 Gallon / 350 oz.) Jug  
20 Liter (5.5 Gallon / 700 oz.) Pail  
205 Liter (56.05 Gallon / 7,175 oz.) Drum



## NNL 690G: A BREAKTHROUGH IN WEAR REDUCTION FOR EXTREME PRESSURE GEAR OILS

# NNL 690G



Power Up **NNL 690G** has been developed to greatly enhance the lubricating properties of extreme pressure gear oils. Changing industry technology dictates improvements and demands specialization. Power Up has met this challenge head on.

### Primary Benefits of NNL 690G:

- Reduced friction
- Extremely high film strength
- Increased Energy Efficiency
- Improved lubrication
- Reduced dry starts
- Increases component life and equipment availability.
- Reduced operating temperatures
- Reduced maintenance costs and downtime

### Applications for NNL 690G:

Recommended wherever EP (extreme pressure) oils are used at 5% rates. Including but not limited to:

- Gear Reducers
- Bearing Housings
- Chain Drives
- Standard Transmissions (except synchromesh at 3% rates)
- Bull Gears and Pinions
- Mud Pumps
- Differentials (except limited slip or positrac)
- Final Drives
- Low Ash Engines
- Cone and Jaw Crushers
- Rotary Tables
- Tube and Ball Mills
- Drop Boxes

The primary benefit of **NNL 690G** is to reduce the friction caused by asperity (metal to metal) contact in the boundary lubrication regime. It is designed for lubricated systems which call for extreme pressure (EP) oils and engines requiring low ash-content oils.

### Secondary Benefits of NNL 690G:

- Reduces ultrasonic wear noise which relates directly to component wear.
- Reduces dry start-ups.
- Lowers operating temperatures and slows oil degradation.
- Decreases wear in cold temperature applications (conventional EP additives are very dependent upon temperature to chemically react with the wear surfaces). The high film strength protection provided by NNL 690G is less dependent on temperature.
- Reduces fuel and/or electrical amperage consumption in gearbox or reducer applications.
- Improves filtration efficiency by reducing the generation of large wear particles.
- Non toxic.

"When we did our inspections on our mudpumps prior to using your product we would always find a lot of metal flake on the magnets that we placed in the bottom of our oil reservoirs. Since adding NNL 690G to our gear oil, we have dramatically reduced the amount of these metal particles found thus increasing the life of our mudpumps. The increase in the life of our mudpumps along with an effective oil analysis program to monitor the oil condition changes have saved us thousands of dollars in wear related costs.

**Pat Burns, General Manager, Energy Drilling - Natchez, Mississippi**

## BOUNDARY LUBRICANT FOR GEAR OIL

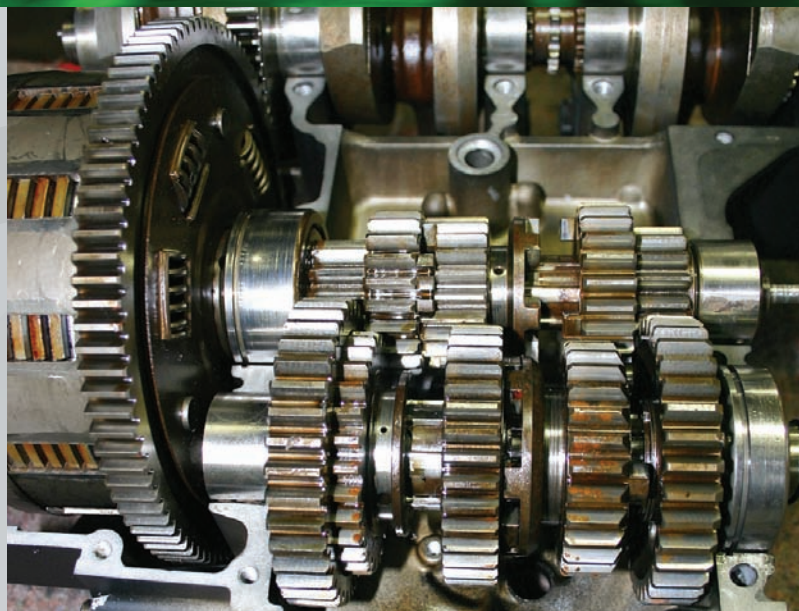
Power Up **NNL 690G** is specially formulated for use in all types of mobile and industrial equipment where Extreme Pressure (EP) oils are called for (API GL-3 or greater). Specific applications include gear reducers, bearing housings, differentials (except posi-trac or limited slip), cone and jaw crushers, pulverizing equipment, final drives, conveyor drive gear boxes, standard transmissions, drop boxes, rotary tables, tube and ball mills, chain drives, mud pumps, bull gear and pinion sets, etc.



# NNL 690G: INSIST ON THE MOST TECHNOLOGICALLY ADVANCED GEAR LUBRICANT AVAILABLE

Typical Properties of NNL 690 G		
Property	Method	Result
Appearance		Clear, light amber liquid
Color	ASTM D1500	Less than 1.5
Viscosity @ 40°C (104°F) @ 100°C (212°F)	ASTM D445	70 cSt 10 cSt
Viscosity Index	ASTM D2270	129
Specific Gravity	ASTM D941	0.96 (H2O =1)
Density @ 68°F (20°C)	ASTM D941	0.96 g/mL
Pour Point	ASTM D97	-31°F (-35°C)
Flash Point	ASTM D92	349°F (176°C)
Acid Number	ASTM D664	1.5 mg KOH/g
Zinc Content, ppm		nil
Lead Content, ppm		nil
Colloidal Suspension (Solid particles, PTFE, graphite, MoS2)		none

Special Notations on NNL 690G	
Viscosity:	A 5% application of <b>NNL 690G</b> in typical 90 weight gear oil results in little or no change in viscosity or viscosity index.
Pour Point:	<b>NNL 690G</b> is formulated to have a negligible effect on the pour point of typical gear oils.
Ash Content:	Power Up <b>NNL 690G</b> has a very low total ash content (less than 0.2%). It is therefore suitable for use in the crankcase of engines that require a low ash or ashless oil.
Application:	<b>NNL 690G</b> is intended for use in gear boxes using extreme pressure (API GL-3 or greater) oils. It should be added with each oil change at 5% of the gear oil volume. In engine crankcases, <b>NNL 690G</b> should be added at 3% of the oil volume each time the oil is changed. It can also be used in automatic transmissions at an application rate of 1%, power shift transmissions at 3% and in circulating systems at 3% to 5%, depending upon operating conditions. <b>NNL 690G</b> is compatible with all mineral oils and polyalphaolefin and diester based synthetic oils. <b>NNL 690G</b> is not recommended for use with water based fluids, phosphate esters or polyglycol fluids.



Test Data on NNL 690G		
Property	Method	Result
Copper Strip Corrosion (266°F (130°C) x 2 Hours)	ASTM D130	1a
Rust Preventing Characteristics - NNL 690G - 5% NNL 690G in ISO 220 gear oil	ASTM D665	Pass Pass
Foaming Tendency - 5% NNL 690G in ISO 220 gear oil Sequence 1 Sequence 2 Sequence 3	ASTM D892	Nil Nil Nil

## Product Application:

NNL 690G is intended for use in all types of mobile and industrial equipment where EP oils are called for. NNL 690G should be applied with each oil change at 5% of the gearbox capacity. With gear oils heavier than ISO 320, NNL 690G should be used at 3%. In internal combustion engine crankcases using low ash or ashless oils, NNL 690G should be used at 3% of the oil volume with each change. It is also suitable for use in automatic transmissions at an application rate of 1%, in power shift transmissions at 3%, and in circulating systems at 3% or 5%, depending on the severity of service. NNL 690G is compatible with mineral based oils and with synthetic oils based on polyalphaolefins and diesters. At recommended application rates, it will not effect typical gear or engine oil viscosity ratings or seal materials.

## Available in the following convenient sizes:

150 ml (5 oz.) Bottle  
1 Liter (35 oz.) Bottle  
5 Liter (1.4 Gallon / 175 oz.) Jug  
10 Liter (2.75 Gallon / 350 oz.) Jug  
20 Liter (5.5 Gallon / 700 oz.) Pail  
205 Liter (56.05 Gallon / 7,175 oz.) Drum

## NNL 690G GREATLY ENHANCES GEAR OILS





**INTRODUCING...THIXOGREASE, A REVOLUTIONARY NEW GENERATION OF MULTI-PURPOSE GREASE**

# ThixOgrease

**THIXOGREASE**, the new generation, multi purpose grease from Power Up, provides superior protection in the boundary lubrication regime. **THIXOGREASE** is ideal for applications where high loads, extreme pressure or high temperature cause serious metal to metal contact and wear. Superior water wash resistance and rust corrosion inhibition allow **THIXOGREASE** to excel in areas where conventional greases fail. **THIXOGREASE** is made of a unique base which offers minimal oil separation or hardening and demonstrates excellent compatibility with many traditional soap oil greases.

The primary benefit of **THIXOGREASE** is to reduce the friction caused by asperity (metal to metal) contact in the boundary lubrication regime. It is designed for grease filled applications where high temperature, extreme pressure, water and corrosion are common conditions.

## Primary Benefits of THIXOGREASE:

- **Thixogrease reduces ultrasonic wear noise which relates directly to lower component wear.**
- **The high dropping point (570°F) and temperature pumpability of Thixogrease allow for a wide operating temperature range of 0°F to 480°F (-18°C to 250°C).**
- **Thixogrease is formulated with rust and corrosion inhibitors to withstand contamination and protect critical components.**
- **Exceptional water wash resistance allows Thixogrease to work in marine, pulp and paper, and similar applications.**
- **Thixogrease has outstanding shear stability, minimizing relubrication requirements.**
- **Thixogrease is ideal for use in centralized lubricating systems due to its excellent pumpability.**

This new product from Power Up Lubricants is formulated entirely of a Thixotropic complex and unlike conventional grease, offers virtually no chance of oil separation or hardening.

## **SUPERIOR PERFORMANCE IN MAXIMUM TEMPERATURE RANGE APPLICATIONS**

**THIXOGREASE** will not melt down into fluid at temperatures approaching 570°F (300°C), outperforming most soap-based greases by 20%. It maintains its soft, smooth and greasy texture even when cooled and will not harden. It remains highly effective at 0°F (-18°C) and withstands low temperature torque tests to -40°F (-40°C).



**POWER UP**  
MULTI-PURPOSE GREASE



## **REDUCED EQUIPMENT WEAR**

Comparison tests of pressure performance and wear protection show **THIXOGREASE** to have unsurpassed EP lubricating properties, withstanding over 5 times greater pressure and up to a 45% reduction in scoring of metal surface, maximizing life expectancy of bearings. A microscopic layer of **THIXOGREASE** has proven effective in heavy unit loading up to **200,000 PSI**, which means exceptional protection.

**THIXOGREASE** has the unique ability to maintain its integrity and effectiveness even in the presence of contaminating soap-based greases. Results from ASTM's Salt Spray test showed water resistance of up to 20 times greater than conventional greases.

"Using our old grease, we were having an abundance of kingpin and u-joint failures. Since switching to Thixogrease we now grease our trucks every 25,000 miles and have virtually eliminated kingpin and u-joint replacement."

**Ed Szarmack, CalArk Trucking - Little Rock, AR**





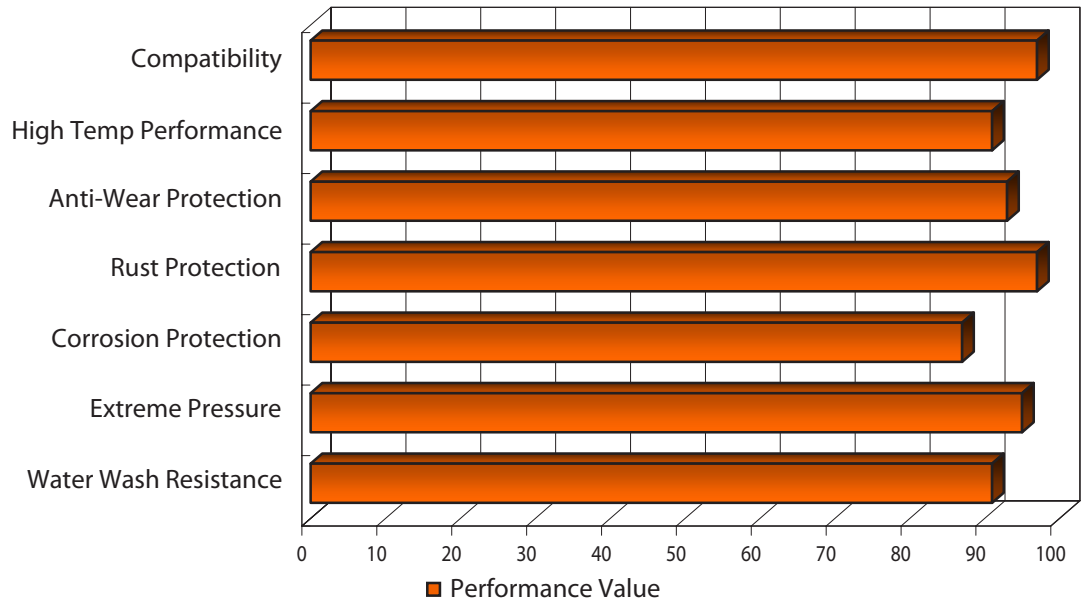
# GIVE YOUR EQUIPMENT THE ADVANTAGE OF THE LATEST IN GREASE TECHNOLOGY

## SUPERIOR GREASE PERFORMANCE

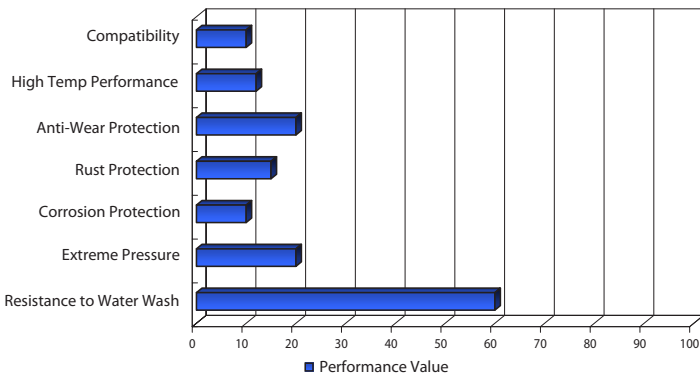
These graphs illustrate that Power Up Thixogrease (right) and its' proprietary Overbased Calcium Sulfinate formula outperforms Aluminum, Lithium, Calcium, Bentonite (clay), and Poly Urea base or complex greases (below) in all major categories of compatibility, high temp performance, anti-wear protection, rust protection, corrosion protection, extreme pressure and resistance to water wash. Power Up Thixogrease gives you the flexibility of using a complete formulated multi-purpose grease no matter what the application.

## Thixogrease

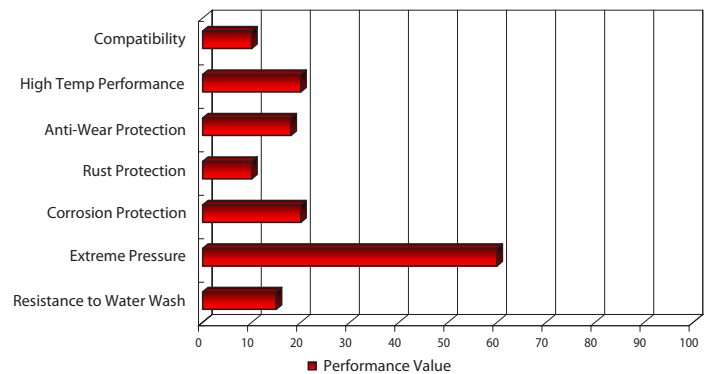
### A FULLY FORMULATED MULTI-PURPOSE GREASE



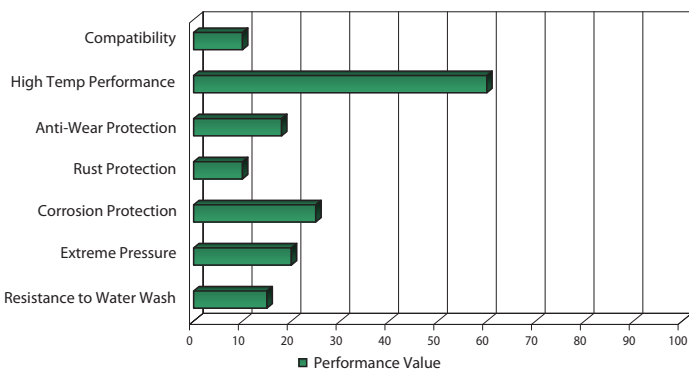
### Special Purpose Marine Grease



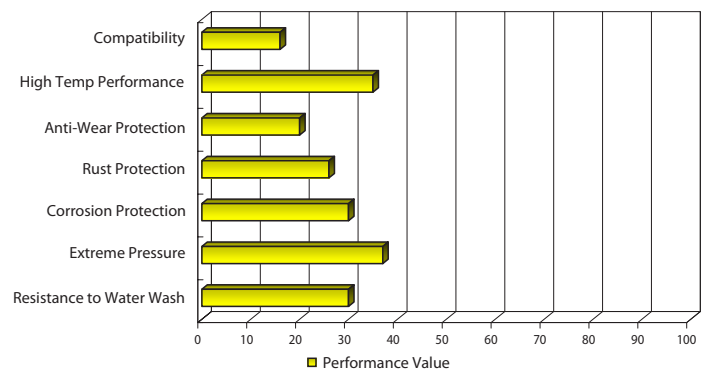
### Extreme Pressure Grease



### Extreme Temperature Grease



### Multi-Purpose Grease



**THIXOGREASE PROVEN THROUGH INDEPENDENT TESTING TO BE THE SUPERIOR GREASE SOLUTION**

# Thixogrease



Independent tests have concluded **THIXOGREASE** to be superior in all categories. These tests were regulated by NLGI, the National Lubricating Grease Institute and ASTM, the American Society for Testing Materials. They confirmed that **THIXOGREASE** is highly efficient for use in centralized grease systems and offered superior performance in applications including industrial, automotive, marine, farming and mining.

## Test results prove it!

- **Proven effective in heavy unit loading up to 200,000 PSI**
- **Superior performance at elevated temperatures**
- **Maintains consistency over extended use, extreme pressure and heat**
- **Highly compatible with residual greases**
- **Excellent resistance to water and oxidation**
- **Minimal contamination risk**

High Temperature Capabilities				
Grease Type	THIXOGREASE	Lithium* Complex	Aluminum* Complex	Poly* Urea
NLGI Grade	2	2	2	2
Dropping Point D566	570+°F (300+°C)	570°F (300°C)	550°F (288°C)	463°F (239°C)
Wheel Bearing Leakage D1273 Modified at 163°C Grams	0.2	3.1	1.2	0.8
Lubrication Life D3336 at 300°F (149°C), No. 204 Bearing, 10,000 RPM Hrs. to Failure	800	580	97	420
Reversibility	Yes	No	Yes	No

\*Data reprinted from Lubrication Engineering

Shear Stability				
Grease Type	THIXOGREASE	Lithium* Complex	Aluminum* Complex	Poly* Urea
NLGI Grade	2	2	2	2
Pen at 25°F, D217mm/10 Pen Worked 10,000 60X	+1	+10	+15	+15
100,000 60X	+2	+30	+45	+60
Roll Stability D1831				
Worked Penetration as Received	290	N/A	N/A	N/A
After 2 Hours at Ambient	302	Liquified	Liquified	Liquified
After 100 Hours at 150°F	296	Liquified	Liquified	Liquified

Resistance to Water			
Grease Type	THIXOGREASE	Lithium* Complex	Poly* Urea
NLGI Grade	2	2	2
100,000 with 50% Water 60X	+5	N/A	N/A
Water Wash Out D1264 at 70°C Loss	2.7	N/A	N/A
Shell Roll D1831 as Received	290	N/A	N/A
After 2 Hours Rolling with 50% Water (77°F)	279	N/A	N/A
Rust Test D1743 Rating	Pass	Pass	Pass
ASTM B117-73 Salt Spray Test Hours to Failure at 1.5 mil	950	48	48

Extreme Pressure Performance and Wear Protection				
Grease Type	THIXOGREASE	Lithium* Complex	Aluminum* Complex	Poly* Urea
NLGI Grade	2	2	2	2
Timken OK Load D2509 Lbs	270	65	60	70
4-Ball EP Test D2596 LWI Weld Point Kg	>95	45	45	80
4-Ball Wear Test D2266 [mm] Scar 40 Kg, 1200 RPM, 75 °C 1 Hour	0.30	0.50	0.55	0.35

Picture 1: Steel balls welded together in standard 4 ball EP wear with traditional Lithium complex grease

Picture 2: Steel balls coated in Thixogrease remain unmarked and moving freely in 4 ball EP wear test with 4 times the load of the previous test.





# THIXOGREASE REDUCES FRICTION CAUSED BY ASPERITY (METAL TO METAL) CONTACT

Typical Properties of THIXOGREASE		
Property	Method	Result
Color Texture		Brown Smooth, buttery
NLGI Grade		NLGI #2
Penetration	ASTM D217	280
Dropping Point	ASTM D2265	> 570°F (300°C)
Kinematic Viscosity @40°C (104°F) @100°C (212°F)	ASTM D445	130 cSt 13 cSt
Viscosity Index	ASTM D2270	95
Pour Point	ASTM D97	-5°F (-15°C)

Special Notations on THIXOGREASE	
Operating Temperature Range:	Power Up Thixogrease has been proven to be suitable for applications at temperatures from 0°F to 480°F (-18°C to 250°C). It is easily pumpable at extremely low temperatures and has a dropping point greater than 570°F (300°C), allowing its use in applications with brief excursions to 500°F (260°C).
NLGI Specifications:	Power Up Thixogrease meets or exceeds the specifications of the NLGI GB-LB classification for heavy duty chassis lubrication and medium wheel bearing applications.
Compatibility:	Where possible, it is always recommended that the old grease be cleaned out of any bearing prior to the application of a different type or grade of grease. The grease compatibility chart provided is a general guide only and may not be true for all brands of the given greases.

Test Data on THIXOGREASE		
Property	Method	Result
Timken OK Load	ASTM D2509	> 70 lbs (31kg)
4 Ball E.P. - LWI - Weld Load	ASTM D2596	75 1,100 lbs (500kg)
4 Ball Wear	ASTM D2266	0.37mm
Corrosion Preventative Properties	ASTM D1743	Pass
Oil Separation	ASTM D1742	0.27%
Water Washout	ASTM D1264	0.10% loss
** Typical Properties and Test Data of NLGI #0 Available on Request		



"In our Letourneau 800 we were having repeated failures on our bucket tilt pins. After switching to Thixogrease, we went an entire year without any failures saving us over \$100,000 per year on this one application in part replacement, maintenance costs and downtime. We also cut our grease consumption down 67% because Thixogrease does not separate."  
**Maintenance Supervisor, Obied Mountain Coal - Alberta, Canada**

## HIGH FILM STRENGTH IN HIGH PRESSURE APPLICATIONS



**THIXOGREASE PROVIDES SUPERIOR PROTECTION  
WHERE RELIABILITY IS MOST CRITICAL**

**THIXOGREASE** is currently available in following grades:

NLGI No. 0 - Most suitable for centralized grease systems, this grease is readily pumpable and will not bleed excessively or age harden.

NLGI No. 2 - A multi-purpose grease when superior lubrication performance is required. **THIXOGREASE** No. 2 is successfully used in the industrial, automotive, marine, farming, mining, forestry and construction industries.

Thixo Tak 2 - Also available is a tackier version of Thixogrease for high speed applications where grease retention is required.

Available in the following convenient sizes:

10 Tube Carton - 400 gram (14.1 oz.) Cartridges  
60 Tube Case - 400 gram (14.1 oz.) Cartridges  
17 kilogram (37.4 lb.) Pails  
55 kilogram (121 lb.) Kegs  
180 kilogram (396 lb.) Drums

**GEN49D SAVES YOU MONEY....A ZERO COST SOLUTION FOR HIGH PRICED FUEL**

# Gen49D

**Diesel Fuel System Treatment**  
**Now with Cetane Improver**  
**with AntiGel**

**Gen49D** is an alcohol free lubricant formulated to separate water and provide complete diesel fuel system performance improvements. **Gen49D** is specifically formulated to meet all manufacturers requirements including GM, Caterpillar, Cummins and Detroit Diesel.

**Primary benefits of using Gen49D are:**

- Increased Fuel economy
- Improved combustion
- Power Increase
- Increase Cetane Number
- Reduced engine wear
- Cleaner components
- Lower maintenance costs
- Reduced emissions
- Winter fuel / AntiGel protection
- Excellent for Biodiesel
- Cold Start Performance



## INCREASES CETANE OF FUEL



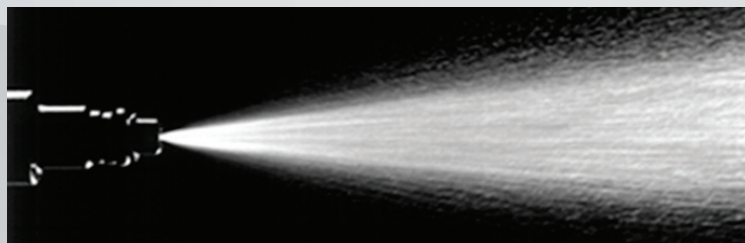
Higher cetane means better ignition quality. Gen49D will increase the cetane number of your diesel fuel by 2 to 3 numbers, which is important for efficient engine operation and emission control. Cetane number is a measure of its ignition quality. High cetane number fuels will start to burn earlier in the compression stroke, important for efficient engine operation and emissions.

**Cetane Improvers provide:**

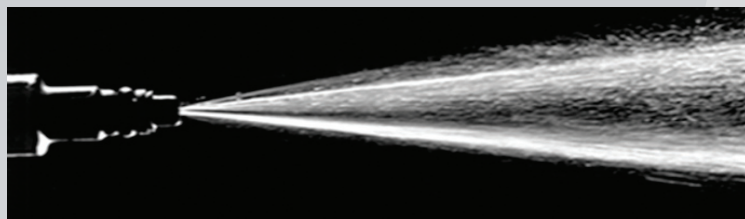
- Improved cold start performance
- Reduced fuel consumption
- Reduced engine noise
- Improved engine durability
- Decrease in Particulates, Nitrogen Oxides (NOx), Carbon Monoxide, and Hydrocarbon Emissions
- Reduce white and black smoke production

## POWER UP FOR DIESEL FUEL

Poor injector spray patterns result in poor combustion and fuel economy while injectors treated with Gen49D remain clean with a good spray pattern insuring optimal performance.



Good Spray Pattern With Gen49D



Poor Spray Pattern Without Gen49D



Gen49D   High Detergency   LAC Detergency   No Additive

"Prior to using Gen 49D, we were using an average of 900 gallons a day of diesel fuel per drilling rig. With the addition of Gen 49D we now are averaging 810 gallons per day per drilling rig. As an added bonus, due to the lubricating properties of Gen 49D, we now get extended fuel pump life and through the detergents present in the additive, our injectors are far cleaner."

**Pat Burns, General Manager, Energy Drilling - Natchez, Mississippi**





# GEN49D....THE SOLUTION FOR ULTRA LOW SULFUR DIESEL FUEL ISSUES

Ultra Low Sulfur Diesel is the hot topic these days as the transportation industry prepares for the new regulations that have lowered the amount of sulfur in diesel fuel 97% from 500 ppm to 15 ppm effective Sept 15, 2006.

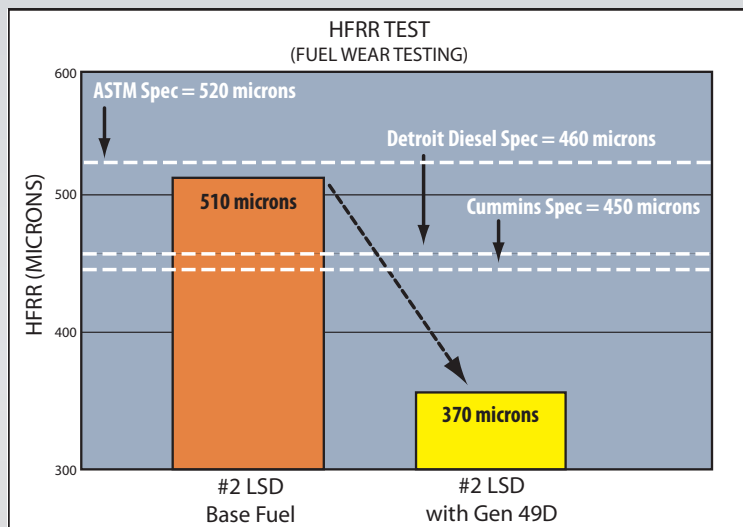
The new ULSD specs are driven by the demand for reduced pollution. Sulfur is good in diesel fuel – not so good for the air we breathe. This will greatly reduce environmental toxins which affect air quality around the world.

## Ultra Low Sulfur Diesel Fuels Adversely Impact Fuel Properties

- **Lubricity** - The processing required to reduce sulfur 97% also removes naturally-occurring lubricity agents in diesel.
- **Cold Flow** - The conversion of aromatics to paraffins will affect the cold flow of S15 fuel adversely. We can expect the cloud point and pour point of the fuel to be worse than with LSD (500 ppm).
- **Energy Content** - In general, the processing required to reduce sulfur to 15 ppm also reduces the aromatics content and density of diesel fuel, resulting in a reduction in energy content (BTU/gal). This expected reduction may negatively affect fuel mileage.

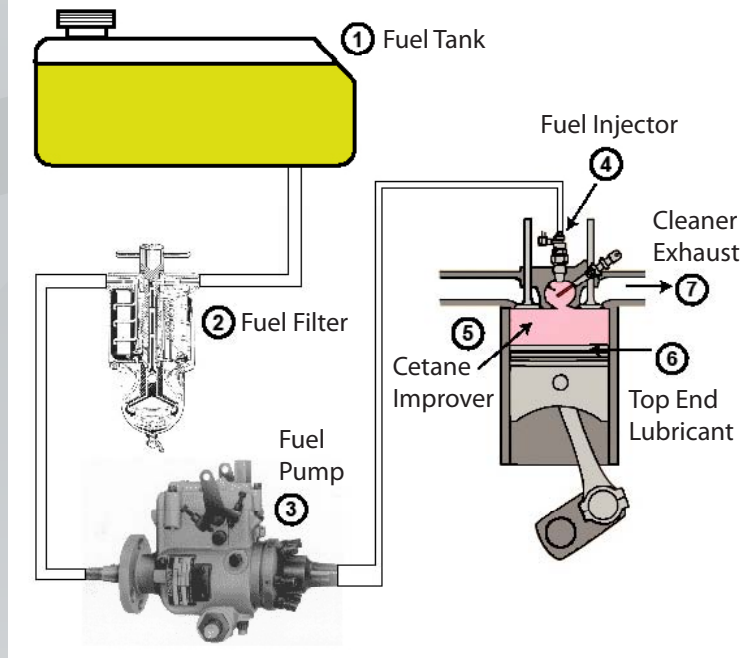
Gen49D with Cetane is the additive that addresses any and all concerns related to the reduction of sulfur in diesel fuel! It does this by first addressing the price at the pump. In repeat studies by a variety of users, Gen49D consistently offers fuel savings from 6% to 15%.

A High Frequency Reciprocating Rig (HFRR) is a machine used to test lubricity of fuel. Typical fuels measure approximately 510 microns of wear – failing to pass the standard of 460 microns. With Gen49D added, wear is reduced to 370 microns – well below the standard of 460.



Gen49D is alcohol free and specifically formulated to meet all manufacturers' requirements including GM, Caterpillar, Cummins and Detroit Diesel and brings the fuel much closer to the specifications requested by the OEM's.

With the price of diesel expected to escalate, along with wear and tear on engine components due to ULSD, Gen49D with Cetane offers the results operators are looking for.



## 7 CRITICAL FUNCTIONS OF GEN49D

1. **FUEL TANK** - Gen49D begins working in the preflame zone of the fuel system by putting a protective coating inside the fuel tank and lines and stabilizes the fuel which prevents water from causing rust and corrosion.
2. **FUEL FILTER** - By cutting down on rust and corrosion, fuel filters last longer. Note: Gen49D may cause fuel filters to become dirty when used for the first time as it will clean the system as it protects. This may require a quick filter change (especially in old or high mileage equipment).
3. **FUEL PUMP** - The only lubricant in the fuel pump is the fuel itself. Gen49D adds an environment friendly lubricant to the fuel to prevent excessive wear and premature failure of pumps and injectors.
4. **FUEL INJECTOR** - Gen49D is formulated with an injector cleaner that dissolves carbon and other power robbing deposits from the spray nozzle. This generates a better mist improving fuel combustion efficiency and cleaner emissions.
5. **CETANE IMPROVER** - Increasing the Cetane rating of diesel fuel will cause the fuel to atomize and ignite quicker. This creates a cleaner burn, more power and less smoke. Gen49D is equipped with Cetane Improvers and combustion enhancers that will increase the Cetane rating of diesel up to 3 numbers.
6. **TOP END LUBRICANT** - Creating a seal around the top ring is critical in preventing power loss and less blow by of gases into the engine oil. Gen49D creates this lubricating film on the fire side of the piston giving you a better explosion and more bang for your buck. This results in better fuel economy and improved horsepower.
7. **CLEANER EXHAUST** - In addition to reducing emissions and engine smoke, Gen49D will lower exhaust temperatures which shows that the fuel is burning up in the cylinder head, where it is supposed to, and not in the tail pipe.

# GEN49D WITH CETANE: YOUR COMPLETE FUEL SYSTEM TREATMENT FROM FUEL TANK TO PISTON

## COLD STARTING PERFORMANCE

Starting your equipment each day can seem to be the easiest of all tasks....that is until it won't start. All the proprietary components of Gen49D working together ensure exceptional starting efficiency especially in cold conditions. Gen49D will save unnecessary strain on starters and high stress on batteries. One of the first benefits our customers report is how much easier their equipment fires after applying Power Up Gen49D for the first time.

## **SAVES UP TO 15% ON FUEL COST**



**Gen49D** contains a powerful synthetic lubricant package which reduces friction and wear in the top end of the cylinder, injectors and fuel pump. Poor fuel lubricity is commonly seen in new low sulphur fuels. **Gen49D** is approved for and surpasses the new standards for diesel fuel and exhibits wear and friction reduction significantly below typical levels. Poor fuel lubricity results in increased maintenance costs, downtime and poor fuel economy.

## TRAIN CYLINDER HEADS COMPARISON



Untreated cylinder head shows hardened carbon deposits in control unit #4203 severely inhibiting engine performance.



Cylinder head is clean with very small amounts of soft residue.

*Gen49D protects your fuel pump, the injectors and top end of the engine from premature wear and failure, reducing costs and increases life over straight diesel fuel.*

The preflame region before fuel enters the combustion chamber is only a small part of the complete lubrication protection offered by **Gen49D**. **Gen49D** is designed and formulated to lubricate the top end of the combustion chamber where the severe stresses of burning new, dry low sulphur fuels are causing premature wear and poor performance. Fuel injectors, intake and exhaust valves and piston rings are being subjected to more extreme conditions than ever before.

## TESTS SHOW POSITIVE PROOF

New generation diesel fuels are now required to contain less than 0.05% sulphur and less than 35% aromatic content (10% in California). This new, dry fuel has been implicated in increased wear of fuel system components, especially pumps and injectors.

Using a modified ASTM D5001 Ball on Cylinder Lubricity Evaluation (BOCLE) the lubricity of diesel fuel can be measured. The test consists of a hardened steel ball bearing wearing against a rotating steel bearing race. Poor diesel fuel lubricity will result in increased wear on the steel ball.



**Figure 1 - .63 mm**

The photograph in Figure 1 is a magnified picture of the wear scar left when only low sulphur diesel fuel is lubricating the wearing surfaces. The actual size of this scar is 0.63 mm across.



**Figure 2 - .36 mm**

The photograph in Figure 2 shows the wear spot left on the ball bearing when 0.08% **Gen49D** is added to the same low sulphur diesel fuel. The fuel's lubricity is improved dramatically. The wear spot with **Gen49D** is only 0.36 mm across. The area of the scar is more than three times smaller than with diesel fuel alone. It is also obvious that there is a lot less scoring of the worn area!

**Gen49D** protects your investment, prevents fuel system component wear and will improve your equipment's performance and service life!

## ANTI-GEL PROTECTION

**Gen49D** fights water and gelling the leading problem with winter fuel. Cold flow is improved up to 27°F (15°C). This gives your fuel the very best chance of flowing in extreme cold conditions. Gen49D contains a powerful deicer that lowers the freeze point of water and prevents ice crystals from forming that may plug filters and cause misfiring. Additionally the antigel characteristic keeps crystal molecules from collecting or clumping to ensure problem free winter operation.

**Gen49D** adds an excellent stabilizing package to your diesel fuel. High temperature stress on fuels results in degradation products such as particulate solids which may lead to injector damage and filter plugging. Gen 49D also fights the effects of oxygen and water in stored fuel, neutralizing the effect of water.



# GEN49D REDUCES FUEL CONSUMPTION AND SAVES MONEY GUARANTEED

## GEN49D GREAT FOR BIODIESEL

Biodiesel is fuel produced from organically derived oil combined with alcohol in the presence of a catalyst. It can be made from soybean, canola, waste vegetable oils or animal fats.

Although there are plenty of environmental benefits to using biodiesel there are still a few challenges such as:

- Lower energy content compared to petroleum diesel
- Cold weather performance
- Increased nitrogen oxide (NOx) emissions
- Short shelf life/Fuel stability

Gen 49D with Cetane Improver is a multi-functional diesel fuel additive that can help with these challenges.

- Gen 49D contains a cold flow improver that can help lower the pour point of diesel fuel
- Gen 49D contains cetane improver that will improve the combustion and performance of the fuel. Increasing cetane can also reduce NOx emissions.
- Gen 49D contains a fuel stabilizer that will improve the life of the fuel.
- The lower energy content of biodiesel refers to the btu's. Unfortunately, there is no additive that exists that can improve the btu's of biodiesel.

There are also some additional benefits that Gen 49D can provide:

- Fully synthetic lubricity improver for ULSD fuel
- Diesel detergent to keep the engine clean
- Corrosion inhibitor
- Wax Anti-settling additive

Overall, the use of Gen 49D with Cetane Improver in diesel fuel or a biodiesel blend would benefit the performance and life of the engine.



"I have a Volvo with a Series 60 Detroit Diesel. When I started using NNL 690 and Gen49D, the truck had 697,000 miles on it. The first thing I noticed was my fuel economy increased. Prior to using NNL 690 and Gen49D in my truck, my worst fuel economy was 4.8 mpg and the best was 6.5 mpg. After running NNL 690 and Gen49D my worst fuel economy was 5.4 mpg and the best was 7.8 mpg. I had such great success with my fuel economy that I decided to try the NNL 690 in my power steering pump as well as my transmission in both differentials. By adding 5 oz of NNL 690 to my power steering pump the truck was far easier to steer. I have a 754 CR Allison transmission and I had a temperature drop of at least 20 degrees. My truck now has 1,163,000 miles on it and it doesn't use any more oil today than it did at 697,000 miles.

**John Couch, Owner, Couch Trucking - Wagoner, Oklahoma**

### Product Application:

Gen49D with Cetane Improver should be added with each fuel fill at the rate of 0.08%. This is equivalent to 1 ounce of Gen49D per 10 gallons of diesel fuel. The treatment ratio is 1 part Gen49D added to 1250 parts of diesel fuel.

Gen 49D Diesel Lubrication Blend Ratio	
Application Rate 1 oz of Gen49D to 10 Gallons of Diesel Fuel (1:1250)	
Gen49D	Fuel
1 Ounce ( 30ml)	10 Gallons (40 Liters)
12 Ounces (355 milliliter bottle)	120 Gallons (450 Liters)
35 Ounces (1 Liter Bottle)	350 Gallons (1320 Liters)
175 Ounces (5 Liter Jug)	1,750 Gallons (6,625 Liters)
350 Ounces (10 Liter Jug))	3,500 Gallons (13,250 Liters)
700 Ounces (20 Liter Pail)	7,000 Gallons (26,500 Liters)
7,175 Ounces (205 Liter Drum)	71,750 Gallons (271,600 Liters)

**Gen49D** is available in the following convenient sizes:

- 12 oz. Bottle
- 1 Liter (35 oz.) Bottle
- 5 Liter (1.4 Gallon / 175 oz.) Jug
- 10 Liter (2.75 Gallon / 350 oz.) Jug
- 20 Liter (5.5 Gallon / 700 oz.) Pail
- 205 Liter (56.05 Gallon / 7,175 oz.) Drum

GEN49D...THE ULTIMATE BIODIESEL ADDITIVE



# HYDRA MAXX PROVIDES LONG TERM PREVENTATIVE MAINTENANCE FOR ALL HYDRAULIC APPLICATIONS



**HYDRA MAXX** is the first hydraulic treatment specifically designed to maintain maximum operating efficiency of your hydraulic system. This unique hydraulic system treatment from Power Up Lubricants works with your existing oil to provide long term protection for pumps, motors, valves, cylinders, seals and hoses. **HYDRA MAXX** is formulated with anti-wear and extreme pressure additives to reduce friction and wear and dramatically improve the hydraulic oil's ability to withstand heavy loading, shock and vibration. **HYDRA MAXX** also contains additives to improve corrosion inhibition, cold temperature flow and water separability.

- Improves cold weather flow of fluid
- Reduces wear of hydraulic pumps and motors
- Inhibits rust and corrosion of internal metallic surfaces
- Improved film strength provides EP protection
- Replenishes depleted additives

## LOWERS OPERATING TEMPERATURES



In independent Contact Gamma wear tests, **HYDRA MAXX** significantly reduced the amount of wear generated when a premium hydraulic oil alone was used. Calculated estimates suggest that the use of **HYDRA MAXX** will extend equipment life 2.39 times by reducing wear up to 58%.

## COLD WEATHER FLUID FLOW

**HYDRA MAXX** was mixed at 5% with typical R&O and AW hydraulic oils to determine its effect on the pour point of the oil. The results in Table 1 show that **HYDRA MAXX** lowers the pour point of these oils by up to 18°F (10°C).

Table 1 - Fluid Pour Point Data

Fluid	Neat Oil	+5% Hydra Maxx
A ISO 22	-69°F (-56°C)	-76°F (-60°C)
ISO 32	-44°F (-42°C)	-58°F (-50°C)
ISO 68	-36°F (-38°C)	-51°F (-46°C)
B ISO 32	-4°F (-20°C)	-22°F (-30°C)
ISO 68	-4°F (-20°C)	-20°F (-29°C)
ISO 100	-6°F (-21°C)	-18°F (-28°C)
C ISO 32	-26°F (-32°C)	-44°F (-42°C)
D ISO 32	-31°F (-35°C)	-47°F (-44°C)
E ISO 32 (HVI 36)	-54°F (-48°C)	-67°F (-55°C)



## INHIBITS RUST AND CORROSION

Rust and corrosion contamination causes many premature pump failures. **HYDRA MAXX** dramatically enhances a fluid's ability to fight rust and corrosion formation. **HYDRA MAXX** has an excellent copper corrosion rating of 1b in the ASTM D130 Copper Corrosion test. A mixture of 5% **HYDRA MAXX** in straight paraffinic oil easily passes the ASTM D665 Rust Prevention Characteristics test.

## QUICKLY DEMULSIFIES IN WATER

**HYDRA MAXX** improves a fluid's ability to demulsify water more readily, allowing water to be separated from the lubricant. The effect that **HYDRA MAXX** has on the water separation properties of typical hydraulic fluids was evaluated using ASTM method D1401. The improvements in demulsibility are given in Table 2.

Table 2 - ASTM D1401 Water Separability

Fluid	Neat Oil	+5% Hydra Maxx
W	41-39-0 mL (15 min.)	42-38-0 mL (5 min.)
X	40-37-3 mL (25 min.)	40-38-2 mL (15 min.)
Y	41-39-0 mL (15 min.)	40-38-2 mL (5 min.)
Z	No Separation	40-37-3 mL (25 min.)

These results provide the volume of oil-water-emulsion phases (and the time required) for separation.

## EXTREME PRESSURE PROTECTION

**HYDRA MAXX** demonstrates an incredible lubricating film strength capable of withstanding loads of up to 200,000 PSI.

## REDUCES OPERATING TEMPERATURES

Friction reduction dramatically lowers operating temperatures, adding life to pumps, seals and hoses.

## EMULSIFIES TRACE WATER CONTAMINANTS

**HYDRA MAXX** allows a fluid to emulsify trace water, maintaining full lubrication of metal surfaces without film rupture.



# PROVIDES LONG TERM PROTECTION FOR PUMPS, MOTORS, VALVES, CYLINDERS, SEALS AND HOSES

Typical Properties of Hydra Maxx		
Property	Method	Result
Appearance		Clear, light amber liquid
Color	ASTM D1500	1.7
Viscosity @ 40°C (104°F) @ 100°C (212°F)	ASTM D445	42 cSt 6 cSt
Specific Gravity	ASTM D941	0.98 (H <sub>2</sub> O=1)
Density @ 68°F (20°C)	ASTM D941	0.98 g/mL
Pour Point	ASTM D97	-22°F (-30°C)
Flash Point	ASTM D92	284°F (150°C)
Base Number	ASTM D4739	1.5 mg KOH/g
Acid Number	ASTM D664	0.5 mg KOH/g
Zinc and Lead Content		Nil
Colloidal Suspensions (Solid particles, PTFE, graphite, MoS <sub>2</sub> )		None

Test Data on Hydra Maxx		
Property	Method	Result
Copper Strip Corrosion (130°C x 2 hours)	ASTM D130	1b
Rust Preventing Properties	ASTM D665	PASS
Elastomer Compatibility (5% in ISO 32 Paraffinic oil)	ASTM D4289 (Modified)	
• Nitrile • Neoprene • Fluorocarbon		PASS PASS PASS
Hydrolytic Stability (5% in ISO 32 Paraffinic oil)	ASTM D2619	
• Viscosity change • Copper weight loss • Copper appearance • Acid number change		Negligible 0.67 mg/cm <sup>2</sup> 1b - 2b, shiny 0 mg KOH/g

Special Notations on Hydra Maxx	
Viscosity:	A 5% application of HYDRA MAXX in typical ISO 32, 46 and 68 hydraulic oils results in little or no change in viscosity or viscosity index of the oil.
Pour Point:	HYDRA MAXX imparts a positive influence to the pour point of most hydraulic oils. A typical ISO 32 oil with a pour point of -22°F (-30°C) improved to -36°F (-38°C) with the addition of 5% HYDRA MAXX.
Demulsibility:	HYDRA MAXX improves an oil's ability to separate water. A typical ISO 32 oil which normally requires 25 minutes for complete separation (using ASTM D1401) improved to only 15 minutes when 5% HYDRA MAXX was mixed with the oil.
Application:	HYDRA MAXX is recommended in hydraulic system applications where gear, piston and vane pumps are used to circulate oil and transmit power. HYDRA MAXX should be applied at 3% (30mL/L or 4 oz./gal.) of the circulating oil volume in operating conditions over 32°F/0°C/ and at 5% (50 mL/L or 6 oz./gal.) of circulating oil volume in operating conditions where the temperature may drop below 32°F/0°C. HYDRA MAXX is recommended for use with mineral oils and polyalphaolefin and diester based synthetic fluids.

## HYDRA MAXX PROVIDES LONG TERM RELIABILITY



"Before using Hydra Maxx in our automatic transmissions, we were going through 30 transmissions annually. Now with the addition of Hydra Maxx, we go through less than 5 transmissions per year. On top of that, we have now gone from 3000 to 6000 miles on an oil change and at our old oil change rate were were losing engines every year. Now I can't remember the last time we lost an engine."

**John Heard, Caddo Parish Sheriffs Department - Shreveport, LA**



### Product Application:

**HYDRA MAXX** is recommended in all hydraulic circulating systems at a 3% ratio for ambient temperatures above 0°C (32°F) and a 5% ratio in operating conditions where the temperature may drop below 0°C (32°F). **HYDRA MAXX** is recommended for use with mineral oils and polyalphaolefin and diester based synthetic fluids. **HYDRA MAXX** is not recommended for use with water based fluids, phosphate esters or polyglycol fluids.

### HYDRA MAXX is available in the following convenient sizes:

- 1 Liter (35 oz.) Bottle
- 5 Liter (1.4 Gallon / 175 oz.) Jug
- 10 Liter (2.75 Gallon / 350 oz.) Jug
- 20 Liter (5.5 Gallon / 700 oz.) Pail
- 205 Liter (56.05 Gallon / 7,175 oz.) Drum

**LHP-454 IS THE COMPLETE MULTIFUNCTIONAL PERFORMANCE ADDITIVE FOR UNLEADED GASOLINE**

# LHP-454

**POWER UP**  
FOR GASOLINE



LHP-454 is a one-shot multifunctional performance additive for use in gasoline engines. It improves performance by:

- Reducing Intake Valve Deposits
- Keeping Port Fuel Injectors clean
- Improving fuel economy
- Reducing exhaust emissions
- Minimizing Octane Requirement
- Enhancing Corrosion Protection
- Reducing maintenance of the fuel system and emissions control equipment
- Optimizing drivability by preventing rough idling, stalling and surging
- Improves moisture absorption and reduces fuel line freeze-up

**SAVES  
UP TO 15%  
IN FUEL**

"After applying LHP-454 to my BMW 540i, I reset the onboard computer that I use to monitor fuel consumption. It went from 23.9 mpg to 26.7 mpg in just under 100 miles of driving. On top of that, it seemed to have a lot more power driving around town."

**Shelie Cleveland - McKinney, Texas**

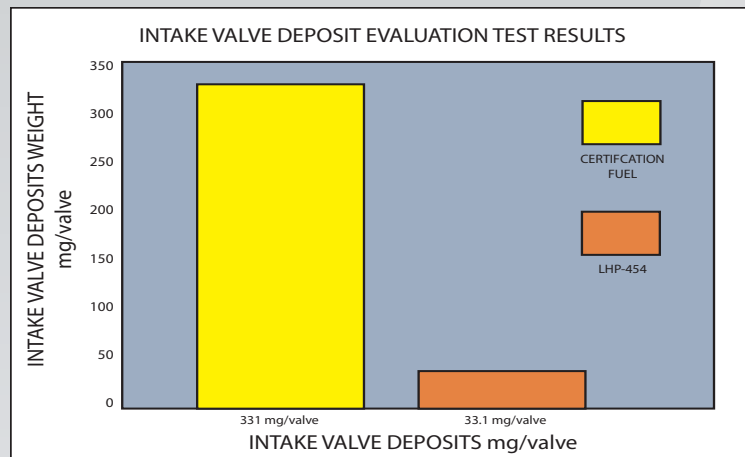


## Corrosion Protection

LHP-454 provides additional protection against corrosion for all engine components.

## Performance Testing

Intake valve deposit testing was performed using the standard ASTM D5500 test procedure for the evaluation of intake valve deposit formation. This method uses a 1985 BMW 318i, driven in a driving pattern comprising 10% city, 20% urban and 70% highway driving for 10,000 miles.



## Intake Valve Deposit Clean Up

The clean up performance of LHP-454 as evaluated in the Ford 2.3L. The testing comprises two 100-hour cycles the first of which is performed with base fuel to allow for deposit formation. The fuel is then treated for the second cycle.

LHP-454 provides superior intake valve detergency and meets EPA compliance performance criteria!

## LHP-454 Product Application:

At the recommended treat rate of 12 oz. in up to 20 gallons, LHP provides complete engine protection and improves performance. It is registered according to US-EPA certification standards. LHP-454 meets performance requirements specified by both the EPA and CARB.

**LHP-454** is available in the following convenient size:  
12 oz. (350 ml) One Shot Bottle



# PROTECT AND PROLONG EQUIPMENT LIFE AND PROVIDE HEAVY DUTY PENETRATION OF RUSTED PARTS



R.C.L. 1000 is a revolutionary thin film, high load lubricant that protects and prolongs the life of equipment.

## R.C.L. 1000's primary benefits:

1. Resists rust & corrosion
2. Designed for thin film, heavy load lubrication.
3. Greatly reduces friction and drag
4. Reduces metal wear by forming a high strength boundary film
5. Prolongs operating life
6. Is compatible with typical seals, except EPDM
7. Is designed to withstand corrosive environments
8. Speeds drilling and tapping; cutting edges remain sharp longer
9. Displaces water



## Ideal for:

- **Rapid Penetration of Rusted and Seized Parts for Easy Separation**
- **Works Even in Wet Conditions**
- **Pleasant Aroma**
- **Prevents Rusting and Oxidation**

Typical Properties of R.C.L. 1000	
Appearance	Light Amber Translucent
Viscosity	8 cSt @ 40°C
Density	0.86 g/ml (20°C/68°F)
Flash Point	266°F (130°C)
Pour Point	-33°F (-36°C)

**R.C.L. 1000** is available in the following convenient sizes:

17 oz. Aerosol (482 gram) Spray Can  
500 Milliliter (16.9 oz.) Bottle  
5 Liter (1.4 Gallon / 175 oz.) Jug  
20 Liter (5.5 Gallon / 700 oz.) Pail

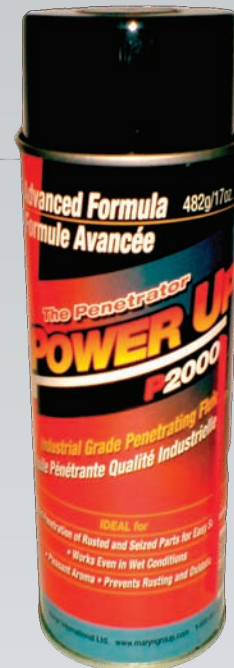
Aerosols contain no ozone depleting ingredients.



Penetrating Fluid 2000 is a specifically designed for heavy duty penetration of rusting parts, even in wet conditions.

## Penetrating Fluid 2000's primary benefits:

1. Heavy duty performance
2. Designed for rapid, deep penetration of rusted or seized parts
3. Excellent surfactancy
4. Penetrates in wet conditions
5. Water soluble
6. Reduces shear strength of rust particles at metal interface, minimizing the amount of force needed
7. Easily mistable
8. Pleasant aroma



## Ideal for:

- **Rapid Penetration of Rusted and Seized Parts for Easy Separation**
- **Works Even in Wet Conditions**
- **Pleasant Aroma**
- **Prevents Rusting and Oxidation**

Typical Properties of Penetrating Fluid 2000	
Appearance	Light Amber Translucent
Viscosity	4 cSt @ 40°C
Density	0.83 g/ml (15°C/59°F)
Flash Point	226°F (108°C)
Pour Point	-6°F (-21°C)

**Pen 2000** is available in the following convenient sizes:

17 oz. Aerosol (482 gram) Spray Can  
500 Milliliter (16.9 oz.) Bottle  
5 Liter (1.4 Gallon / 175 oz.) Jug  
20 Liter (5.5 Gallon / 700 oz.) Pail

Aerosols contain no ozone depleting ingredients.

# POWER UP MAKES YOU MONEY....8 WAYS POWER UP PRODUCTS PAY FOR THEMSELVES

## 1. Extended Service Life

Power Up can increase component life up to 2.5 times longer. Nobody prevents wear like Power Up! What is your equipment worth to you?

## 2. Insurance

Preventing major breakdowns and repairs (Overheating, anti-freeze leaks, loss of oil, etc.)

## 3. Retention Agent

Establishes a protective film on metal parts. No more cold or dry starting. Great for winterizing.

## 4. Extended Oil Intervals

Magnifies your additive package 10 to 15 times and boosts TBN.

## 5. Pour Point

Prevents cavitation and shudder. Dramatically decreases wear and stress on hydraulic pumps and motors during cold operating conditions (57°F degrees).

## 6. Downtime

This can be the most costly expense to your operation. POWER UP WILL HELP!

## 7. Better Fuel Economy

Less frictional drag in engines with NNL 690 and up to 15% saving in fuel using Gen 49D or LHP-454.

## 8. Peace of Mind

Knowing that you are getting the best protection that modern technology can provide.

**Power Up Products Application Quick Reference Chart**

Component	NNL-690	NNL-690G	Hydra Maxx
Gasoline Engines	3 - 5%	3 - 5%	
Diesel Engines	3 - 5%	3 - 5%	
Engines requiring Low-Ash / Ashless Oil		3 - 5%	
Small, air or water cooled two-stroke engines	3% (in 2-stroke oil)	3% (in 2-stroke oil)	
Automatic Transmissions	1%	1%	1%
Standard Transmissions Using EP Gear oil		5%	
Standard Transmissions Using ATF	5%	5%	5%
Standard Transmissions Using engine oil	5%	5%	5%
Differentials / Transfer cases using EP Gear oil		5%	
Differentials / Transfer cases using ATF	5%	5%	5%
Power Steering Pumps	3%	3%	3 - 5%
Gear Drives (w/EP Gear Oil)		5%	
Hydrostatic Drives	3%	3%	3%
Powershift Transmissions	3%	3%	3%
Ag-tractor TDH systems		3%	3%
Hydraulic Systems	3%	3%	3 - 5%
Compressors	3%	3%	3 - 5%
Hydraulics/Compressors with Water separators			3 - 5%

## DISTRIBUTED BY

Telephone:

(214) 707-8322

Fax:

(972) 347-5611

Email:

scott.minor@aisullc.com