

Friction Solutions, LLC.

ULTRALUBE™

Molecularly bonded LUBRICITY.
Any size - any shape - any material.

7427 E 46 Place • Tulsa, OK 74145-6305 • 918-622-8989 • Fax 918-622-1476 •
www.ultralube.com

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A problem solver ... in the most demanding applications

MECHANICAL ULTRALUBE™ has significantly extended both life and performance characteristics of numerous mechanical devices such as bearings, Cams, Slides, Engine and motor parts, Power Train Assemblies, Gear Pins and Bushings.

ULTRALUBE™ provides a clean and harmless inert lubricity to high speed and heavy duty sliding, rolling, or moving parts and assemblies - wherever heat and friction induces mechanical failure or reduces mechanical efficiency. Wherever clean, non toxic, inert lubricity is required in equipment relating to the manufacture of human consumptive products - excellent application results are obtained in virtually all SIC industries of Agriculture, Horticulture, food processing, Pharmaceutical and textile. Especially where non toxic, non corrosive ambient or environments are not only desired, but legally required.

UNIQUE APPLICATIONS In use on Metalworking Dies and Molds, The ULTRALUBE™ process greatly reduces seizure and galling of Pins, Bushings and moving Die Parts that are under high heat or high load conditions. Productivity and quality of Aluminum Extrusion is significantly improved when Dies are processed with ULTRALUBE™. Plastic injection molding, Die Cast Dies, Alignment Pins, resist normal seizure problems that tie up and reduce productivity of these high heat automated machines. Seamer and Forming Rolls are another strikingly successful application for ULTRALUBE™ lock Components, Firearm Mechanisms, Chain Saws and Zippers work better and longer. Oil Burner Caps resist carbon build up when processed with ULTRALUBE™.

TRANSPORTATION VEHICLES The ULTRALUBE™ Process is ideal for thrust, ball, roller and other anti-friction bearings. Valves, Cams, Bearing Journals and Truck Mechanicals - wherever heavy and prolonged torque loads or high speed moving parts require long reliability of function. Universal Joints, Automatic Transmission and Gear boxes of all types have shown unusual resistance to wear and friction load when Processed with ULTRALUBE™. Distributors, Alternators, Timing Chains and Power Accessories are also excellent applications.

PRODUCTION MACHINERY Industrial Equipment with moving parts, whether custom or standard. - for all industries of manufacturing or product handling - utilize ingenious concepts for speeding and quality repeating the mass produced items. Failsafe, low maintenance and trouble free life, dependability or reliability is of prime importance to maximize profitability of the production process by eliminating production stoppages. Integral system components such as Hydraulic Pumps, Cylinders, Pistons and Sector Valves, Conveyors, Compressors, Chucks and Collets, etc. are also perfect applications for ULTRALUBE™.

EXTENSIVELY PROVEN The ULTRALUBE™ process has been used successfully for over thirty years on a wide range of applications - wherever friction reduction would improve performance or extend product life. The ULTRALUBE™ process may also be the solution to similar problems that may now be confronting your firm's products, equipment or machinery. Let us help you! Please give us a call

ULTRALUBE™

Your Permanent Solution For Low-Friction High-Speed Performance!

For Race Cars, Motorcycles, Marine Engines, Snow mobiles, Etc.

It is on the racetrack now; perhaps you are not informed, but you don't always reveal your technical edge to the competition and the users of ULTRALUBE™

We, as the manufacturer, now feel that it is time to present our product and what it can do to improve your overall performance by reducing friction. We have an edge and want you to know about it ... a leading speed equipment company does... a leading motorcycle does... and some of your competition does.

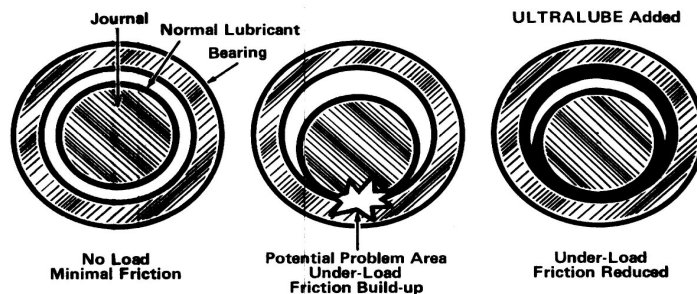
What happens to an engine and the gear train when it is exposed to extremely high torque demands?

- All moving parts are placed under extreme load, sometimes to the point of blow-up.
- Operating temperatures at the point of friction increase.
- Lubricants change their viscosity and their effectiveness decreases.
- Rotating parts run off center, lubricants are forced out and galling takes place.
- The result: *REDUCED PERFORMANCE* and damage to moving parts.

ULTRALUBE™ process provides you an edge and is additional insurance that your equipment will have significantly improved chance to operate through these demanding conditions running smooth.

ULTRALUBE™ Process is a dry film lubricant that permanently bonds itself to a part and provides amazing friction reduction. It does not interfere with conventional lubricants but rather aids the overall lubricating process ... the key to improved performance.

HOW ULTRALUBE™ WORKS...



ULTRALUBE™ Process when applied to a crankshaft journal and bearings, for example, reduces friction and potential galling and thus improves horsepower and extends life. When an engine is in an unloaded state, the normal bearing fit to allow for tolerance build-up, coefficient of expansion of metals and lubricant film is approximately 0.001 to 0.0015 of an inch. The moving parts will normally ride on this film of lubricant. When the engine is loaded, run at high RPM, and tremendous torque's are required, the moving part will be forced off center and the wet lubricant at the point of contact will be significantly reduced... thus, an increase in friction, operating temperature and the results can be galling, reduced life and performance.

Friction in high performance speed equipment is a serious subject. The information presented here on ULTRALUBE™ could be the difference between:

- Engine blow up or smooth running extended life performance.
- Whether you hit the pit and stay or finish the race
- High engine overhaul cost or minimize these costs with ULTRALUBE™

ULTRALUBE™ process provides the lubrication to pass through these rigorous demands. When the normal wet lubricant becomes inefficient, ULTRALUBE™ takes over and performance is improved.

WHERE ULTRALUBE™ WORKS...

Where can ULTRALUBE™ be applied to your equipment?

- ✓ Crankshaft and bearings
- ✓ Valve stems
- ✓ Timing gears
- ✓ Piston skirt
- ✓ Piston pins
- ✓ Transmission gears and bushings
- ✓ All moving part points
- ✓ Camshaft bearings
- ✓ Valve guides
- ✓ Timing chain
- ✓ Piston ring grooves
- ✓ Piston pin bushings
- ✓ Differential gears and bushings

When you disassemble your engine for the maintenance that is required every few races, give ULTRALUBE™ a thought because it could prevent a problem. When your engine didn't quite make it through that last race due to a malfunction or heat build-up, give ULTRALUBE™ a thought again..

ULTRALUBE™ DRY FILM LUBRICANT PROCESS

It's Tough ... Reduces Wear

ULTRALUBE™ is an extremely wear resistant dry film lubricant that molecularly bonds with the substrate without heat, resins, or any other binders. The molecular bond established is so complete that only removal of the substrate can ever affect the lubricity, which has been built into the substrate by the ULTRALUBE™ process.

It's Super Slippery ... Reduces Friction

Capable of withstanding loads up to 350,000 PSI (24132 bar) and temperatures ranging from -350°F to 1000°F in normal atmosphere (in excess of 2000°F in a controlled atmosphere), ULTRALUBE built-in lubricity yields a coefficient of friction of only 0.030. By comparison, the coefficient of graphite is .074, more than double.

It Does Not Alter Dimensions ... Makes Component Redesign Unnecessary

Transmigration of ULTRALUBE™ into the molecular structure of the substrate maintains dimensional integrity at 15 to 20 millionths of an inch.

It Expands Engineering Capabilities ... Permits Cost Saving Designs

Where surface characteristics such as friction, resistance, wear and protection against galling and seizure are important, ULTRALUBE™ can open the door to new dimensions in design, new techniques in engineering and new cost cutting processes in manufacturing.

It's Easy to Use ... Ready for Immediate Use

No stress inducing heat, no distortion. All materials can be processed with ULTRALUBE™ at room temperature. Finished parts are ready for immediate assembly. No limitations. Compatible with chrome and any other plated surfaces. ULTRALUBE™ can be utilized on any grade surface finish, with no change in the finish grade / quality.

It's Compatible ... Fail Safe Protection Against Galling

All lubricants such as petroleum, synthetics, silicones, hydraulic fluids and oil/water coolants are compatible and may be used with ULTRALUBE™. In the event of lubrication failure, ULTRALUBE™ provides a unique margin of protection against scoring and seizing.

It's Clean ... Does Not Contaminate Environment

ULTRALUBE™ is non toxic, inert, insoluble, non-corrosive and unaffected by radiation. It is impervious to chlorinated solvents, jet fuels, and engine developed fuming acids.

It's Economical ... Prolongs Product Performance

While the ULTRALUBE™ process of parts is in itself a relative inexpensive process to have done, the major economies are realized from exceptional resistance to wear, protection against galling and seizure, as well as down time related to failure or part replacement. ULTRALUBE™ provides fail safe insurance against the potential destructiveness of unanticipated metal to metal contact.

CUSTOMER SPECIFICATIONS

MILITARY SPEC. LUBRICANT, DRY FILM THIN, MOLECULAR BONDED, NON-CURING	DOD-L-85645(A) TYPE I
WALTER KIDDE / GENERAL ELECTRIC DRY LUBRICANT COATING	255409
ROCKWELL INTERNATIONAL LUBRICANT, DRY FILM, TUNGSTEN DISULFIDE	MB0140-009
GARRETT PNEUMATIC SYSTEMS DIV.- ALLIED SIGNAL COATING, DRY FILM, TUNGSTEN DISULFIDE	GPS 3214-1
GENERAL ELECTRIC COATING, THIN LUBRICATING FILM, TUNGSTEN DISULFIDE, IMPINGMENT	F50TF57
GARRETT - AIRESEARCH MFG CO.- ALLIED SIGNAL BOUNDARY LUBRICANT, INERT DRY FILM (TUNGSTEN DISULFIDE)	EMS 52437
AUTONETICS - NORTH AMERICAN LUBRICANT, DRY FILM, TUNGSTEN DISULFIDE, IMPINGMENT	ST0140AB0015
AMERICAN INSTRUMENTS PROCESS, DRY FILM, SOLID LUBRICANT	PS-12
OTIS ENGINEERING - HALLIBURTON COATING SPEC - ULTRALUBE™	ES-C-47
MCDONNELL DOUGLAS AEROSPACE CORP. LUBRICANT, TUNGSTEN DISULFIDE, ULTRALUBE™	QLP DMS 2405

ULTRALUBE™ MEETS OR EXCEEDS ALL THE ABOVE SPECIFICATIONS

ULTRALUBE™

by Friction Solutions, LLC..

21st Century Friction Shielding Technology

<i>Application</i>	<i>Operating Areas</i>	<i>Operating Conditions</i>	<i>Results Using ULTRALUBE™</i>
Splined shaft 17-4 stainless steel	Engine driven aircraft hydraulic pump	Rotating under high load, subject to high frequency vibration	ULTRALUBE™ eliminated severe fretting corrosion that caused frequent overhaul replacement
Regulator valve 440C Stainless steel/hard chrome	Missile system	Helium atmosphere. High frequency vibration and Temperature extremes.	ULTRALUBE™ process greatly increased operating life with consistent metering by stopping all galling and seizing.
Spur gear assembly 440C	High vacuum optical system	Rotational. Temperature variation from -85 to +185F	No more teeth scuffing, high friction or drag after using ULTRALUBE™ application
Splined torque ring 6160 aluminum	Aircraft actuator mechanism	High torque. Temperature range from -65 to +600F	Prompt cure of costly fretting corrosion and excessive friction by use of ULTRALUBE™
Cam shafts & crank shafts	Automotive engines	Racing engines developing high torque	Temperatures greatly reduced, engine wear cut by 60%. Engine ran better and much longer with ULTRALUBE™
Cams, followers, follower bearings, valve stems	Automotive engines	Racing car engines	Removed start-up galling, after storage periods, by treating with ULTRALUBE™
Seaming rolls stainless steel	Automated closure machines	Rotational, high load, high speed	Down-time cut by 50%, greatly increased steaming roll life, improved seam quality.
Guides, transport rollers, ball and journal bearings, sliding surfaces	Food processing machines	Steam cleaning for sterilization. No lubricant.	ULTRALUBE™ wiped out high maintenance cost. Eliminated seizing and galling. No contamination.
forging heads, carbon steel	Hot forming	Extreme temperature and pressure.	Increased wear resistance and greatly reduced re-work time.
Cable pulley CRES 321 steel	Jet engine nozzle control	Extreme high temperature. Rotational and intermittent motion	ULTRALUBE™ eliminated seizing and galling. Reduced wear caused by high temperatures.
Camroll bearings	Satellite linkage and actuators	Low temperature, high vacuum. Rotational and intermittent motion	Absolutely eliminated lubricant outgassing and subsequent galling by using ULTRALUBE™

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The ULTRALUBE™ process is solving friction problems in a vast array of applications, from aircraft to computers. The ULTRALUBE™ process is invaluable for all applications where friction reduction will improve performance or increase life. Below are typical applications collected over the past 30 years where the ULTRALUBE™ process has been effective. New applications are continually being developed, and with the ULTRALUBE™ process. You are only limited by your imagination.

<i>Applications</i>	<i>Operating Areas</i>	<i>Operating Conditions</i>	<i>Results Using ULTRALUBE™</i>
Tracer tool ways	Machine tools	Sliding friction. No lubricant except cutting fluid	Reduced sliding friction. Increased wear life of machine ways
Ball bearing in drive assembly	Aircraft jet engines	7400 rpm, light loads, 350F	Constant lubrication during loss of oil. ULTRALUBE™ increased bearing life 40%
Bronze, aluminum, and stainless steel shafts	Space instrument	High vacuum (10-8 TORR), radioactive atmosphere, temperature from 75F to 750F	Total lubrication in vacuum. ULTRALUBE™ eliminated seizing and galling.
Miniature bearings 440C stainless steel	Transducers	Low torque, wide temperature range	Excellent bearing function at all temperature extremes and ranges with ULTRALUBE™
U-joint Rc 38 steel	Power transmission disconnect	High rubbing velocities Low loads. Temperatures from -65F to +250F	ULTRALUBE™ treatment brought maximum performance at extreme low temperatures. Reduced wear 55%
Roller bearing 52100 steel	Aircraft transmission	High load. Oil lubricated 6000 rpm	Great lubrication performance by ULTRALUBE™ when a weakness caused loss of oil and greases.
Reciprocating drill head support surface	Machine tools	Operate with 5% water based coolant	Increased reliability and wear life 47%. No seizing or sticking with ULTRALUBE™
Transmission bearings	Trucks	High loads generate high temperature	35% longer operating life. Reduced high temperatures. Eliminated excessive wear
Fasteners	Various	Unlubricated	Provided non-destructive, re-use life increase with ULTRALUBE™
Reduction gear boxes and bearings	Press drive on paper making machinery	40 to 60 Pound load for water extraction	Immediate Temperature reduction. Increased wear life 50% with ULTRALUBE™
Roller chain	Drum mechanisms	High Load. Intermittent action. Poor lubrication	Cut repair costs, 30% performance increase, reduced chain elongation

ULTRALUBE™ is available from Friction solutions, LLC. Contact one of our Factory Representatives, or call us direct to find out about our no cost test sample.

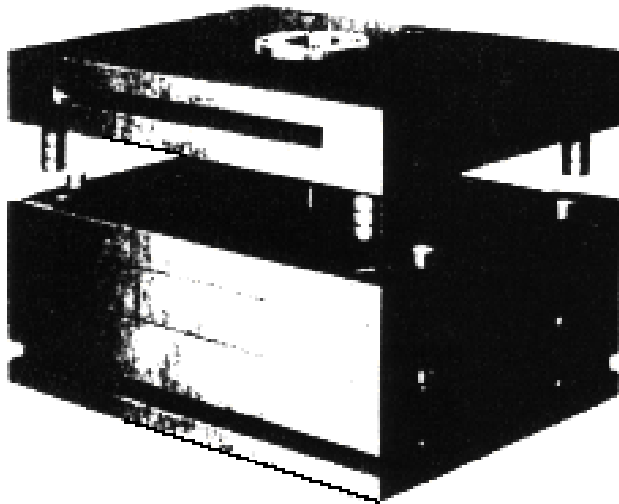
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ULTRALUBE™

By Friction Solutions, LLC.

Friction Shielding Technology for The Plastic And Mold Industry

The ULTRALUBE™ process can improve the performance of plastic molding and pultrusion.



The results include:

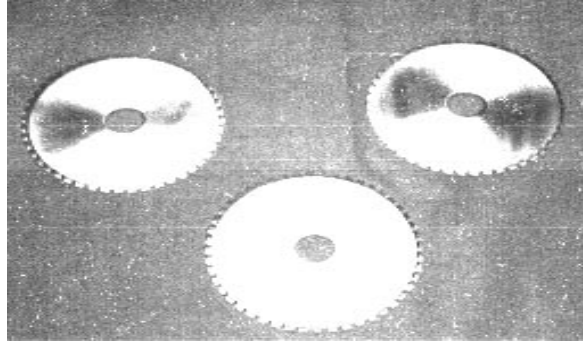
- ✓ Reduction in Friction
- ✓ Increase in Productivity
- ✓ Better Cycle Times
- ✓ A Better Finish on Parts
- ✓ Decrease in Reject Parts
- ✓ Increased Mold Life
- ✓ Elimination of Potential Galling
- ✓ Reduce or Eliminate Spray Release
- ✓ Inhibit Corrosion

Since ULTRALUBE™ is only an even and controlled 1/2 micron thick, and follows the contour of the mold surface, no redesign is required. ULTRALUBE™ can be applied to the molding surface as well as slides, ejector pins, core pins, sleeves, spruce bushings, spreaders, and all other moving parts. ULTRALUBE™ will form a molecular bond to virtually any surface. ULTRALUBE™ has been used in the plastic molding industry from pultrusion to injection. Our formula utilizes a modified tungsten disulfide formula that will not chip or peel. ULTRALUBE™ will become part of the substrate, lubricate and inhibit corrosion until the substrate is removed. Using the ULTRALUBE™ process in your application can result in decreased costs and increased profits.

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Saw Blade Technology



ULTRALUBE™, 21st Century Friction Shielding Technology™
By Friction Solutions, LLC.

Reduce your cost and raise your profits! Our circular saw blade customers are doing just that. Cancel that order for six additional saw blades now! Order one saw blade, have it processed with ULTRALUBE™, and complete as many cuts as the six saw blades would have. At the same time eliminating the down time and costs associated with replacing the cutting blade six times. This is just one example of our customers savings.

Currently ULTRALUBE™ has extended the life of one customers saw blades from 3 days to 30 days in a wood working operation. A customer in Houston was getting 20,000 pipe cuts from a TIN coated saw blade. After having a standard non TIN coated saw blade processed with ULTRALUBE™, the saw blade made 90,000 pipe cuts and is still going. A Missouri customer installed an ULTRALUBE™ processed saw blade backwards. This saw blade made several cuts perfectly before the operator realized his error. All standard saw blades mistakenly installed backwards in this application previously have exploded on the initial cut. An Ohio customer has used one set of saw blades for 5 years. These saw blade have been re-sharpened and re-processed with ULTRALUBE™, saving the customer the price of purchasing new saw blades.

ULTRALUBE™ is a proprietary product and process of Friction Solutions, LLC. ULTRALUBE™ is a unique method of molecularly bonding a 1/2 micron (20 millionth of an inch) of a dry film lubricant to the substrate (saw blade) surface. There is no dimensional change in your tooling. ULTRALUBE™ operates from -350F to +1000F. Our purpose it to reduce friction, lower heat created by friction and extend life. ULTRALUBE™ has been proven to increase life in any cutting application from 2 to 12 times the normal life span of a tool.

TECHNICAL INFORMATION

Composition	Altered Tungsten Disulfide
Hardness	1-1.5 Moh's Scale
Molecular Weight	248.02
Appearance	Metallic silver-gray when first applied, burnishing changes to a polished rhodium
Coefficient of Friction	0.030 Maximum - inclined plane
Adhesion	Molecular Bond
Carrier	Dry - no binders or adhesives
Cure Time	None - Applied at room temperature
Thickness	1/2 micron (.5 micron) - 0.000020 inch
Density	7.4 GMS per CC
Substrates	All metals, plastic, fiberglass, rubber, porcelain, ceramic, and most man made materials
Temperature Range	Lubricates from -350°F through 1000°F (To 2400°F in vacuum of the 10 ⁻¹⁴ torr
Chemical Stability	Inert and non toxic
Corrosion Resistance	Delay's corrosion
Lox Compatibility	Insensitive to detonation by, or in the presence of, liquid oxygen
Load Capacity	Same as substrate up to 350,000 PSI - 24132 bar
Magnetism	Non magnetic
Vacuum Environment	10 ⁻¹⁴ Torr
Degradation	Will not cause distortive stress, additional stress, or degradation to any surface
As a Substrate	Will accept most paints, some plating and it compatible with solvents, fuels and oils

Friction Solutions, LLC can also provide solutions to your other friction needs.

Currently we can apply other dry film lubricants to meet the following Specifications:

MIL-L-23398 Type I and Type II

MIL-L-46010

MIL-L-8937

Nato Code S-1738

Friction Solutions, LLC
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ULTRALUBE™ ORDER FORM

- Testing the ULTRALUBE™ process lubrication in your application is as easy as sending prototype parts to Friction Solutions, LLC.
- No charge for 5.0 square inches or less, in exchange for written test results on company letterhead within 30 days.
- Orders will be returned within 40 working hours, with a quote on specified quantities of any part.
- The following information will assist us in solving your friction problems.

FROM: _____

DATE: _____

RETURN TO THE ATTENTION OF: _____

TITLE: _____

PHONE: _____

FAX: _____

PART DESCRIPTIONS: _____

USAGE: _____

OPERATING CONDITIONS: (load, speed,
temperature range, atmosphere, criteria of failure)

DIMENSIONS: _____

QUANTITY: _____ FINISH: _____

BASE MATERIAL: _____

SKETCH OR PRINT: _____

NORMAL LOT PRODUCTION: _____

ESTIMATED ANNUAL USAGE: _____

SPECIAL INSTRUCTIONS: _____

CRITICAL AREAS: _____

FREIGHT INSURANCE VALUE: _____

DESIRED RESULTS USING ULTRALUBE™: _____

ULTRALUBE™ the 21st century friction shield is only available at:

Friction Solutions, LLC.

7427 East 46th Place, Tulsa, OK 74145-6305

(918) 622-8989 FAX (918) 622-1476

FS Contact: _____