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STEEL SHIELD TECHNOLOGIES

# Plastic Manufacturing **Applications**

Serving the Industry since 1985

Expert of Enterprise Cost Savings



# PART 1: The Introduction



## Content

Steel Shield stands out from all premium brands of lubricants in the aftermarket for its unique ABF Technology.

We are the Champion, Let's make yours!

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## Making A Difference In Lubrication: Our Visions

**"It is our conviction that to be the best is not sufficient, we are here to make a new World Standard in Lubrication."**

**S** Steel Shield Technologies sole purpose is to manufacture premier quality metal treatments, additives, greases and lubricant oils that have been tested to exceed the normal parameters of extreme pressure and anti-wear products in the aftermarket, hereby offering matchless performance and unsurpassed protection against wear while saving maintenance costs, downtime, energy and improving overall functionality of your machineries.

Steel Shield, Not Just Oil, It's Technology which makes a difference to the World of Lubrication.

Steel Shield aims at helping customers to achieve the highest return on investment (ROI). Steel Shield is committed to strengthening business and global commerce through manufacturing and distributing, World-wide, the full line of ABF Technology products made in the USA, Singapore and Hong Kong.



Place of Unique ABF Technology Production



## The Corporation & Facilities

**Steel Shield Technologies (Asia Pacific) Limited was incorporated in 1996 in Hong Kong to provide distribution and technical support for the entire Asia-Pacific Rim.**

Steel Shield Technologies Inc. (USA) with its history traced back to 1985 when in USA, Pennsylvania the scientist Dr. George C Fennell in the research & development of high-end specialty lubricants invented the unique ABF Formula: Ionic Levitation. In the same year Muscle Product Corporation trading as MPC was founded by George Fennell, brother Jay Fennell and father, Richard Fennell and the purpose was to market his invention MT-10. In 2006 at a board meeting held on 22<sup>nd</sup> May George resigned all his duty from MPC. In the same year George found STEEL SHIELD TECHNOLOGIES INC and renamed

his invention MT-10 as Steel Shield. As of then MPC and its products are no longer being supported by George either in performance or quality.

The Company's blending and manufacturing capabilities are state of the art and the ability to produce limitless volume of product is unsurpassed as well as the product quality. The equipment is all stainless steel including the flow lines, pipes and couplers. All pumps and gauges are digitally interpreted and of the highest quality and accuracy to ensure production of the most superior quality lubricants.

## Inventor Scientist

**Father of ABF Technology, Doctor of Astronomy and Astrophysics**



### Accreditations:

- SAE (Society of Automotive and Aerospace Engineers) Member
- ASNE (American Society of Naval Engineers) Member
- NCMA (National Contract Management Association) Member
- STLE (Society of Tribologists and Lubricant Engineers) Member

 Scientist

 Doctor

## Dr. George C Fennell

In 1986, Dr. George C Fennell, a former scientist in Astronomy and Astrophysics doing consulting and contract work in advanced lubrication and surface Tribology, formulated a revolutionary metal treatment oil additive which can activate "ABF" (Advanced Boundary Film) through a proprietary and unique "electro-chemical ionization" (ECI) process. He has been known in the industry as the "Father of ABF Lubrication".

On the basis of ABF technology, a series of specialty lubricants have been developed to meet the stringent requirements of various purposes and working conditions, as to date is still the most advanced formula in lubrication.

Over the years, there have been countless people trying to resemble Dr. Fennell's unique formula and advanced chemistries, none was found even remotely close. To this date, Dr. Fennell is still the leader in tribology and lubrication.



# The Birth Of Steel Shield Technology

## BIO-ORGANO LUBRICATION TECHNOLOGY



During World War II, the German Science and Technology Research Institute was commissioned to develop a new lubricant technology in meeting the stringent demand for heavy duty military application such as artillery, armored vehicles, tanks, battleships and fighter-aircrafts to avail them in performing their maximum fighting capacity with minimal maintenance.

The scientists proposed the concept of Zero friction, i.e. Farady's Law Like-Charge-Repel.

Shortly after WW II, a great number of intelligent scientists migrated to the United States from Europe. One of them was the grandfather of Dr. George Fennell, who came to USA along with him a large volume of research data and material about Zero friction. The old scientist continued to pursue his scientific research and eventually in 1986 his grandson Dr. George Fennell came with a breakthrough in the technology. Through Electro Chemical Ionization (also known as Reactive Chemical Bonding) Dr. Fennell was able to realize Maglev between two metallic surfaces and to achieve a close to Zero Friction Coefficients.

The great accomplishment was the result of relentless efforts of 3 generations scientists over half a century. In recognition of the excellent contribution of Fennell's family to the country, the US Government has named the street outside their old factory Fennell Avenue as a compliment.

# PART 2: The ABF Technology

**nanoschematic**  
The nanoschematic is a 3D model of a molecule, showing the arrangement of atoms and the bonds between them. It is used to visualize the structure of a molecule and to study its properties.



## Uncover The Secrets Of Steel Shield's Unique ABF Technology



The Full Explanations of the  
Core Technology

# ABF Technology Theory

## Boundary Film Lubrication Through Advanced Halogenation Techniques: Oxirane Acid Scavenging And Organo-Metallic Substitution, "By George C. Fennell"

Steel Shield Technologies' mechanism of operation is based upon Tribology methods that improve lubricity and load carrying capacity by improving surface characteristics and creating a stable chemical, corrosion controlled halide-based boundary film. Steel Shield's active components react with each other and the contacting asperities of the metallic surfaces to provide five mechanisms of improvement.

1. Advanced chemical boundary film formation through reactive chemical bonding.

2. Ring opening, oxirane acid scavenging and advanced corrosion inhibition.
3. Organo-metallic substitution of surface metal and free radical reactionaries.
4. Improved surface smoothness and rolling out of irregular contacting asperities.
5. Re-conditioning and molecular reconstruction of the original contacting metal surfaces.

The process of advanced boundary film formation is accomplished with an advanced combination of halogens that are controlled and rendered non-corrosive to the base metals of the system and

pose no threat to the ozone layer or waste oil recovery systems due to their origins and long chain molecular lengths. These halogens initially react under thermal conditions with the organo-metallic reagents to form surface attaching compounds, thereby limiting and controlling the formation of halides from the base metals themselves. These surface attaching reagents or "electro-negative compounds" seek out and affix themselves to the lower surface areas referred to as micro-pores and fissures, as all metals are crystalline in structure and exhibit a lattice type matrix. This complex process also incorporates Van der Waal forces and dipole-dipole surface reactions. During this process, surface lapping and asperity (irregular microscopic contacting and opposing surfaces) roll-out is also achieved, yielding improved spread characteristics of the surfaces themselves. Due to the increase of film strength by the filling of the micro-pores and fissures, along with thermal modification of the asperities, the resulting effect is a gradual rolling out or flattening of the metal asperities rather than a breaking off or chip-away process, which would create metallic debris in the lubricant leading to abrasive wear from wear metal particles. The resulting improvement in the opposing metal surfaces further increases the fluid film strength, which is dependent on the degree of surface roughness and viscosity.

Viscosity, however, is a lesser consideration when incorporating boundary additives or halogenation techniques.

In general, boundary friction and wear consists of two components, a shear or adhesion component and a plowing or deformation component. Considering the following equation:

$$F_s = SA_r$$

Where  $F_s$  is the shear component, which predominates except when asperities sink too deeply into a boundary lubricant film or a soft opposing surface. When movement or sliding occurs, the shear friction force depends on the shear resistance per unit area,  $S$ , of any "boundary film" in the real load-supporting area between asperities. Dividing by the load,  $W$  gives the shear contribution to the friction coefficient, becoming independent of total load and apparent area of contact:

$$f_s = S * A_r / W = S / P_p \text{ or } S / P_e$$

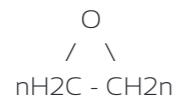
The boundary film shear resistance,  $S$ , is assumed equal to the plastic flow shear stress,  $T_p$ , of an ideal elastic, plastic solid. Such a solid gives shear stress independent of strain and strain rate at strains sufficiently large enough to cause plastic flow. The conditions that produce the "glass transition" from liquid to plastic-like behavior are dependent on the viscosity of the material at normal temperatures and pressures and the variation of viscosity with temperature and pressure. In other words, glass transition depends strongly on chemical composition.

These results show that liquid lubricants act like plastic solids in the films between asperities. Therefore,  $S=T_p$  in the previous equation and the friction coefficient is  $T_p/P_p$  or  $T_p/P_e$ . Since  $T_p$  is a weak function of temperature and pressure, and  $P_p$  or  $P_e$  are independent of apparent contact load, the frictional coefficient for a given combination of lubricant and sliding surfaces tends to be independent of operating conditions.

Elasto-hydrodynamic lubrication (ELH) on an asperity scale deposits film material between sliding surfaces in "micro-rheodynamic" (micro-RHD) lubrication. As one surface slides, each asperity carries with it an aggregation of SST additive. Sufficient pressure and temperature is developed within the film to elastically deform the asperity and to force the extreme pressure reagent between the surfaces or into the micro-pores and fissures. During this time, high thermal conditions involving pressure and asperity contacts initiate a re-conditioning of the surfaces utilizing the existing oil to quench and cool the surfaces in the same process. A thermal restructuring of these asperity contact areas creates a deviation from the normal crystalline structure of the metal, expanding it into an austenitic crystalline pattern, which is more evenly structured and allows the SST additive to bond to the actual lattice of the metal, endowing it with new and unique properties upon cooling.

Organo-metallic substitution is a technique developed and designed to inhibit the process of halide formation from the base metals of the system under reaction. For example, instead of the halogen reacting with the iron in the system to form iron halides, a boundary surface salt, it reacts with a reagent having very similar properties to the iron atom itself, thereby forming an organo-metallic complex without scavenging the target metal surface itself, and depleting the metal in a chemically corrosive wear syndrome.

The process is very similar or analogous to the saponification of organo-metallic compounds in the manufacturing of greases. During this reaction or saponification, compounds react at a certain catalytic temperature and exchange characteristic components to form new compounds. These new chemical compounds are then used to aid in a boundary regime by providing an added protection to the actual surfaces being lubricated. Ring opening oxirane acid scavenging and corrosion inhibition is another chemical technique used to neutralize acids and inhibit oxidation and corrosion. This technique involves the use of specifically engineered complex ethylene oxide; oxirane rings, that possess reactive reagents which will cause a cleavage of the ring when encountering acids or strong alkaline. These reactions occur in the presence of both anionic and cationic-type catalysts. Anionic catalysts can include alkoxide ions, hydroxides, metal oxides, and some organo-metallic derivatives while Lewis acids and protonic reagents initiate cationic reactions.



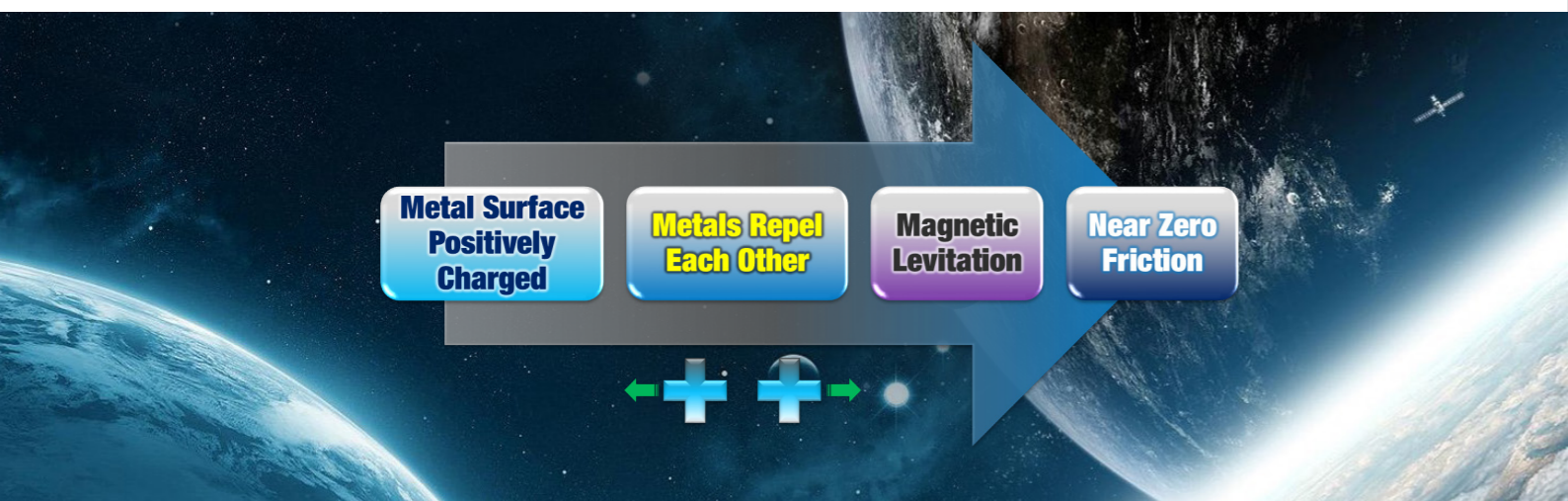
The lubricity, load carrying capacity, surface improvement, and wear reduction are greatly improved while corrosive aspects of halogenation are virtually eliminated.

**References:**

- CRC "Handbook Of Lubrication, Theory And Practice", Volumes 1 & 2, by E. Richard Booser, Ph.D., Society of Tribologists and Lubrication Engineers (STLE), copyright 1992, Eighth Printing.
- "Organic Chemistry" 4th Edition, by Robert Morrison, Ph.D. and Robert Boyd, Ph.D., copyright 1983 by Allen & Bacon.
- "Lubrication - A Tribology Handbook", edited by M.J. Neale OBE, BSc(Eng), published by Society of Automotive Engineers (SAE), copyright 1993, Butterworth-Heinemann, Ltd.
- CRC "Handbook Of Chemistry and Physics", 1986 Edition, by CRC Press, edited by David R. Lide, copyright 1986 by CRC Press.

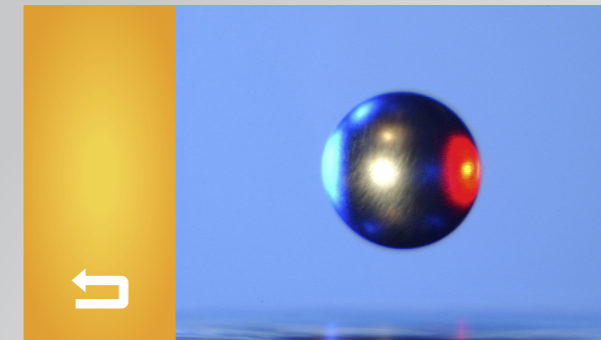
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## RCB Electrochemical Ionization Advanced Levitation Technology



Positively Charged Metal Surface Repel Each Other

# Major Breakthroughs In Lubrication Technologies



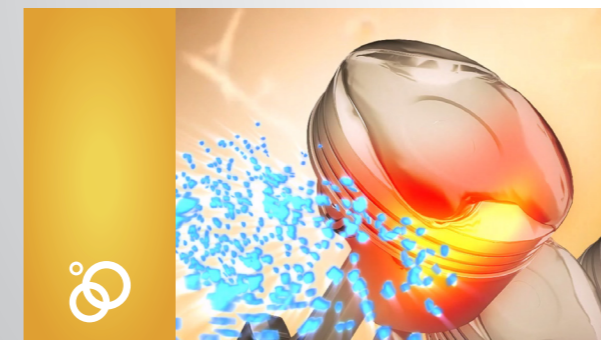
## Virtual Zero Friction: RCB Ionic levitation

Faraday's Law like-charges Repel & Dipole-Dipole Reaction; Eliminate system dysfunction



## Dynamic Heat Transfer

Lubricant accumulates at the hot spot automatically



## Non Corrosive Cleansing

Metal sludge repelled via induction and removed



## Metal Surface Re- hardening

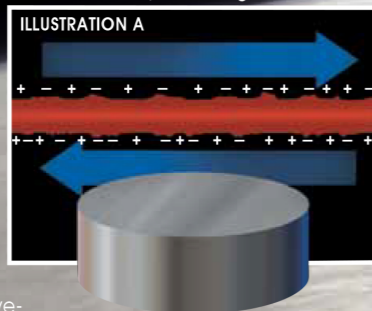
From Shear Friction to Surface Lapping

# Steel Shield Technologies Has Redefined Lubrication.

Webster's Dictionary defines lubricants as substances capable of reducing friction, heat and wear when introduced between two solid surfaces. From the initial development and use of lubricants, chemical technology has constantly advanced to make them more effective. From changes in refinement processes to the development of additives, the concentration has always been to increase the ability of the lubricant to reduce the friction, heat and wear. **Steel Shield Technologies** has changed the approach to lubrication and, in essence, given new definition to the term. First, there are a few points to consider.

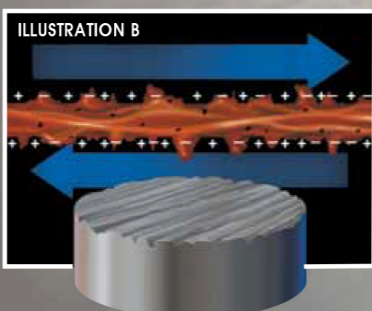
## Metal Against Metal

The structure of all metals creates a surface characterized by a series of sharp peaks and valleys, some microscopic and some larger. As two metal surfaces contact each other and move in opposite directions, friction is caused, producing heat and metal deterioration. This friction-causing physical dynamic is heightened by the electromagnetic field created on the surfaces of each metal. The sharp peaks, known as asperities, and valleys, referred to as micro-pores and fissures, have opposite electro-magnetic charges. **Illustration A** shows a new metal with positive-charged asperities and negative-charged micro-pores and fissures. The constant interaction of these opposite-charged features works to weaken the structure of the metal, causing eventual deterioration of the surface of the part.



## Normal Lubricants Help

All lubricants help to slow this process to different degrees. **Illustration B** shows the results after a period of time of use of a typical oil lubricant. The constant friction and electro-magnetic interaction has caused the weakened metal to break off or chip away creating metallic debris in the lubricant leading to abrasive wear from wear metal particles. This fact is evidenced in the need to change the engine oil of automobiles frequently as the lubricant "breaks down" due to the heat and metallic debris.

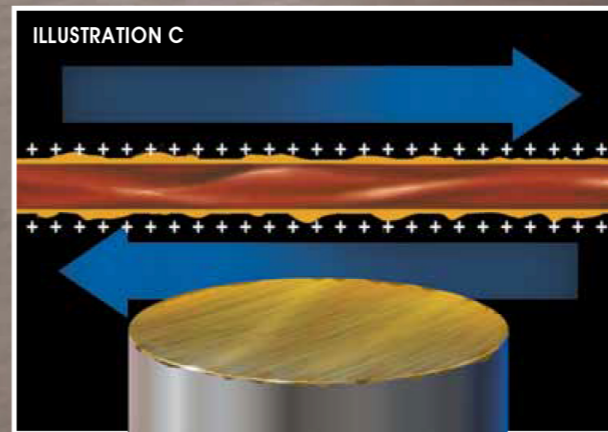


## Advanced Boundary Film Technology- There Is No Better Protection Against Wear.

**S**teel Shield Technologies has redefined lubrication by breaking away from the standard approach to making the lubricant more effective through adjusting the refinement process or through the use of additives. Instead, **Steel Shield Technologies** approaches lubrication by improving the surface characteristics of the metal through the process of **Advanced Boundary Film** formation. This technological breakthrough is accomplished by addressing the naturally formed asperities, micro-pores and fissures and the electro-magnetic charges they create.

**Steel Shield** products consist of an advanced combination of halogens which react under thermal (heated) conditions to form electro-negative surface attaching compounds. They seek out and affix themselves to the lower surface areas, filling the micro-pores and fissures. As this process is working, the thermal conditions are effecting the asperities. Instead of breaking off because of a weakened metal state, the asperities gradually roll out or flatten. So while the micro-pores and fissures are filling up, the asperities are flattening for an end result of a metal surface that is greatly improved. Created in this process is a total positive state of polarity. When the metal surface polarity becomes uniform in charge, there is a reduction in friction due to the Faraday reaction of like-charges. This electrochemical process continues at the molecular level to form an **Advanced Boundary Film** on the surface of the metal. **Illustration C** shows the end result of the production of the **Advanced Boundary Film** and the resulting uniform positive polarity.

Another aspect of this advanced technology is the organo-metallic substitution which is the chemical process designed to inhibit halide formation. Here, the



halogens used to form the surface attaching compounds react with reagents having similar properties to the iron atom. The halogens, therefore, do not scavenge the target metal surface to find iron with which to react, forming halides and creating a chemically corrosive wear syndrome. Instead, an organo-metallic complex is formed as the basis of the **Advanced Boundary Film**.

## Industrial Success Comes To The Consumer

**Steel Shield Technologies** is now bringing this breakthrough technology to the consumer after great success on the industrial level. The level of commitment to the Steel Shield product in the railroad industry is an indication of its performance in the most extreme conditions imaginable. This same technology is now available to you.

UNTREATED  
Wear On  
Unprotected  
Bearing



TREATED  
ABF Technology  
Protects From  
Wear

See  
Extreme Condition  
Lubrication Test At  
[www.steelshieldtech.com](http://www.steelshieldtech.com)

As has been explained, the **Advanced Boundary Film Technology** is a redefining approach to lubrication which provides outstanding benefits to the user.

## Practical Elimination Of Metal-To-Metal Wear

**Steel Shield Technologies** addresses the three areas that cause the weakening and deterioration of the metal surfaces:

- The physical friction of rough surfaces
- The opposite electro-magnetic charges that exist on the metal surface
- The chemical reactions that produce corrosive agents.

**Advanced Boundary Film Technology** instead strengthens the metal and practically puts an end to metallic debris in the lubricant.

## Reduced Operating Temperatures

Friction is reduced so significantly that the operating temperature in treated mechanisms is notably reduced. The end result is a stronger metal that maintains its original specifications and performance level. An example of the reduction of operating temperatures is found in the independent tests that show a drop of an average of 30 Fahrenheit degrees in treated automobile engines.

## Increased Effectiveness Of The Lubricant

Whatever lubricant is used as the carrier of the **Steel Shield Technologies** additive, that lubricant is allowed to perform at its maximum efficiency. Lubricant flow will be enhanced with the elimination of rough metal surfaces; the reduction of heat and elimination of metal debris will protect the lubricant from "break down."



# Advantages & Targets



## Concepts

- Van der Waals Forces
- Dipole-Dipole Surface Reactions



## Advantages

- Reduces Friction and Wear
- Provides Smoother Operation
- Improves Lubrication
- Non-Toxic and Helps Build Green Environment
- Improves Machinery Functionality
- Improves Fuel Economy
- Reduces Operating Temperatures
- Protects Moving Metal Parts
- Eliminates Cold Start Problems
- Reduces Maintenance & Downtime
- Extends Component Reliability & Parts Life



## Targeted Industries

- Automotive and Racing, Airlines, and Ground Equipments,
- Rail & Mass Transit, Shipping
- Gas, Oil & Energy Industries, Mining & Drilling
- Lifts, Air Conditioning & Cold Storage Systems
- Industrial, Agriculture, Construction & Naval Engineering
- Military & Law Enforcement units



# PART 3: Plastic Plant Lubrications

We keep your plastics business productive while helping to lower your total operation cost.

## Benifits From Steel Shield

- ✓ Reduce Operation Costs: Energy, Downtime, Maintenance, much more
- ✓ Produce More Value-Added Products, Less Products Failures Due To More Reliable Machines
- ✓ Maximize Overall Equipment Effectiveness (OEE)
- ✓ Reduce Relubrication Intervals And Lubricants Costs
- ✓ Protect Machines, Extend Service Life And Slowdown Machine Depreciations
- ✓ Ensure Operational Safety Due To Lesser Machine Failures ( Overheat, Malfunctions, etc.)

## Why Use Steel Shield?

Unlike other premium lubricant brands, Steel Shield utilizes ABF Technology instead of relying on additives. This technology aims to solve the root causes of any metal-to-metal wears without any adverse effects.

Plastics industries are playing an indispensable role in the world. The plastic manufacturers have to play attention to the qualities of their products while cutting unnecessary costs in order to run their plants as competitive as possible.

Steel Shield lubricants with ABF Technology provide you with the best solution you have ever used. Whether your products are produced in small tailor made quantities, or huge standardized mass productions, we always have solutions for you to minimize operation costs, machine downtimes, and

parts failures, and maximize productivities, machine life and efficiencies.

Our products are trusted by the U.S. Army, The Department of Defense of the U.S., the Siemens, the Union Pacific Railroad, the Port Authority, and many other users. In addition, the Southwest Research Institute (SWRI) reports revealed that Steel Shield lubricants are supreme to other top brands in the market. Our industrial lubricants and support programs are designed to help keep your plastics business growth and become more and more aggressive.

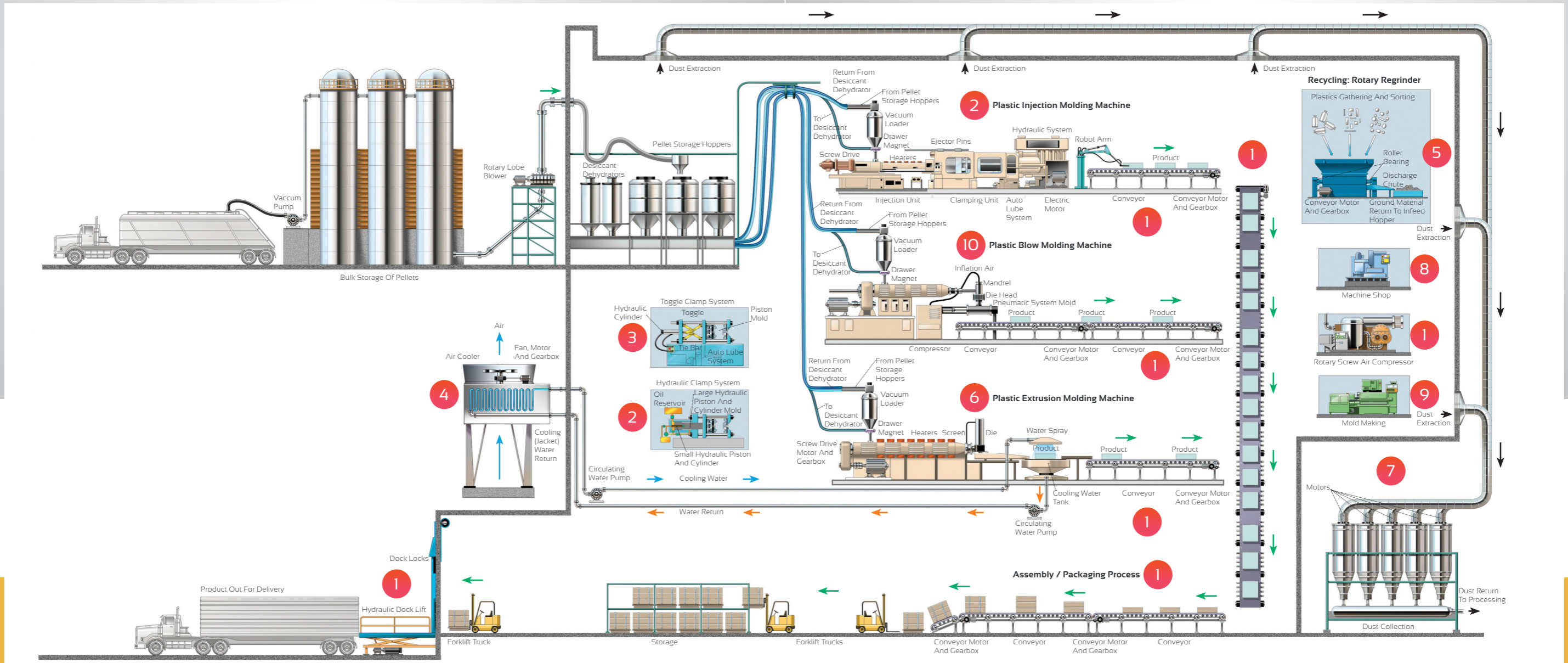
## Our Products For Plastics

- Steel Shield EPA : The ultimate concentrate for any desire for lubrications
- Lithi Shield : Premium synthetic greases for demanding applications
- Drill & Tap Shield : The best machining lubricant & fluid for machine workshops
- Strike Shield : Can free thousands of the frozen mechanisms
- Tool Shield : Provide extra power & protection to mechanical tools
- ECI Air Compresso : High performace air compressor oil for prolonged operation
- ECI Hydrualic Oils : Groundbreaking performance for any hydraulic systems
- ECI Gear Oils : Premium synthetic circulating & gear oils for critical applications

# Plastic Plant Lubrications



Note: Schematic and product recommendations are intended as a guide only. Products are typically the product series names. Please refer to equipment builder manuals for final lubrication recommendations or consult Steel Shield for additional products. NOT TO SCALE.



## Steel Shield Recommended Products And Lubrication Points

### 1. Handling Equipments

- **Air Compressors (rotary screws):** Steel Shield EPA, ECI Air-Compresso
- **Dock Lifts:** Steel Shield EPA, Steel Shield Hydraulic Oils
- **Conveyors (gear drive):** Steel Shield EPA, Steel

- Shield Gear Oils
- **Conveyors Bearings:** Lithi Shield
- **Gearbox:** Steel Shield EPA, Steel Shield Gear Oils
- **Hydraulic System:** Steel

- Shield EPA, Steel Shield Hydraulic Oils
- **Electric Motor:** Lithi Shield
- **Auto-Lube System (grease):** Lithi Shield
- **Auto-Lube System (oil):** Steel Shield EPA
- **Ejector Pins:** Lithi Shield

- **Screw Drive:** Steel Shield EPA, Steel Shield Gear Oils
- **Air-Powered machine (air line):** Steel Shield EPA
- **Toggle Machine (subset of PIM)**
- **Auto-Lube:** Steel Shield

EPA, Steel Shield Gear Oils, Lithi Shield

### 4. Cooling Tower

- **Gearbox:** Steel Shield EPA, Steel Shield Gear Oils

### 5. Regrinding

- **Motor Drive:** Lithi Shield

### 6. Extrusion Molding Machine

- **Gearbox:** Steel Shield EPA, Shield Shield Gear Oils
- **Motor Drive:** Lithi Shield
- **Bearings:** Lithi Shield
- **Feed Roller Gears:** Shield Shield EPA, Sheld Gear Oils

### 7. Dust Collectors

- **Motor:** Lithi Shield

### 8. Maintenance Area

- **Machine Shop:** Drill & Tap Shield, Steel Shield EPA, Lithi Shield

### 9. Mold Making

- **EDM Machine:** Drill & Tap Shield, Steel Shield

### 10. Blow Molding Machine

- **Compressor:** Steel Shield EPA, ECI Air-Compresso
- **Motor:** Lithi Shield
- **Gearbox:** Steel Shield EPA, Shield Shield Gear Oils
- **Air Line (Oil):** Steel Shield EPA

# PART 4: Steel Shield Products



## The State-Of-The-Art Lubricants For Plastic Industry

# Steel Shield USA Lubes

## Steel Shield EPA

**STEEL SHIELD Extreme Pressure Anti-Wear (EPA) is the ultimate protection for the moving metal parts for industry**

Utilizing the most Advanced Boundary Film (ABF) Technology, it protects moving metal parts from heat, friction and wear in engines, transmissions, differentials, transfer cases, hydraulic pumps and motors, gear boxes, and other enclosed lubrication systems, due to boundary conditions of frictional

abrasion, extreme pressure torque, dry startup and shutdown. Increased performance and greatly reduced maintenance and downtime are the results. These performance goals are achieved through ABF Technology by lowering the operating temperatures, extending the life of component parts and increasing reliability.

### Advantages

- Dramatically reduces wear
- Extends parts life and component realibility
- Improves lubrication
- Protects moving metal parts
- Reduces friction
- Reduces maintenance and downtime
- Reduces operating temperatures
- Smoother operation

### Applications

- All Engines, Transmissions & Differentials
- Hydraulic Systems
- Open Gears
- Gear Boxes
- Gear Reducers
- Gear Couplings
- Electric Motors
- Heavy Machinery
- Weapon Systems

### Directions of Usage

- **Sasoline And Diesel Engines:** Add 2 oz. per quart of oil.
- **Auto Transmissions:** Add 1 oz. per quart of fluid.
- **Manual Transmissions & Differentials:** Add 2 oz. per quart of gear lube/oil.
- **Gear Boxes:** Add 2-3 oz. per quart. Hydraulics: Add 1 oz. per quart of fluid.
- Contains no volatiles or solvents. Contains synthetic hydrocarbons and advanced chemical additive technology. Non-toxic and environmentally friendly.

Properties	Standard	Unit	Result
Flash Point		°C	226
Boiling point		°C	238
Evaporation rate			<0.01
Vapor pressure			<1@25 °C
Specific gravity			1.07

# Lithi Shield (Grease)

**LITHI-SHIELD is the ultimate in extreme pressure anti-wear lithium complex grease**

Lithi Shield exceeds all other lithium complex greases due to the addition of ABF (Advanced Boundary Film) Technology, extreme pressure and antifricion additives added to its formula. LITHI-SHIELD treats, seals and smooths metal surfaces to dramatically reduce friction, as well as friction related heat and wear.

LITHI-SHIELD's unique formulation allows it to exceed the performance of other greases while using smaller quantities. In fact, LITHI-SHIELD exhibits great oxidation resistance, over twice that of its nearest competitor.

## Advantages

- Maximum Protection Against Wear And Extreme Pressure
- Adheres To Metal Exhibiting Top Performance In Roll Stability
- Provides Constant Lubrication To All Areas
- Offers The Maximum In Friction Reduction
- Resists Water Washout

## Applications

- All Extreme Pressure Applications
- Axles, Bearings, CV Joints, Universal Joints, Chassis Fittings, Conveyors, Pumps, Rotating Machinery
- Boat Trailers And Marine Applications
- Heavy Equipment, Mining Equipment, Railroad Equipment

Properties	Standard	Unit	Result
NLGI Grade			No. 2
Penetration, Worked, 60s	D-217		265 - 295
Penetration, Unworked	D-217		265 - 295
Thickener Type	D-217		Lithium Complex
Thickener, %	DI28		8 - 11
Color	DI28		Light Amber
Texture	DI28		Smooth
Dropping point	D-2265	°C	500
Viscosity @ 40°C	D-445	cSt	220
Viscosity @ 100°C	D-445	cSt	19
Viscosity Index	D-2270		95
Flash Point	D-92	°C	464
Fire Point	D-92	°C	550
Timken OK load	D-2509	lbs.	60

Properties	Standard	Unit	Result
Rust	D-1743		Pass
Copper Corrosion	D-4048		1B
4-Ball Wear Test	D-2266	mm	0.68
4-Ball EP Weld Test	D-2596	Kg Min.	800 / Pass
Oxidation Induction time @210°C	D-5483	min	11.47
Water washout @ 79°C	D-1264		0.027
Mobility at 77°C	US Steel Mobility Test	g/min	576
Mobility at 60°C	US Steel Mobility Test	g/min	275.4
Mobility at 40°C	US Steel Mobility Test	g/min	86.6
Mobility at 20°C	US Steel Mobility Test	g/min	15.3
Mobility at 0°C	US Steel Mobility Test	g/min	1.6

# Drill & Tap Shield

**DRILL & TAP SHIELD is the ultimate protection for metal working tools.**

Utilizing the most Advanced Boundary Film (ABF) Technology, it protects cutting tools from heat, friction and wear. It works by the application of multiple metal working technologies that include ionic bonding agents, metal film strength reducers and lubricity enhancement agents. This, along with unique

extreme-pressure additives and the addition of ABF (Advanced Boundary Film) Technology, produces proven results that surpass all other products in the marketplace.

## Advantages

- Direct Cutting Lube / Coolant
- Additive To Improve Performance Of Insoluble Oils
- Broaching
- CNC
- Cutting
- Drilling
- Machining
- Milling
- Sharpening
- Tapping
- Wet Grinding

## Applications

Any metal-working workshops equipments

## Directions of Usage

- Drill & Tap Shield can be used as a direct replacement for currently used cutting fluids and lubrication/coolants in a 100% undiluted application.
- NOTE: Drill & Tap Shield is not compatible with water glycol compounds or triphenol butylated phosphate oils
- Contains no volatiles or solvents. Contains synthetic hydrocarbons and advanced chemical additive technology. Non-toxic and environmentally friendly.

Properties	Standard	Unit	Result
Flash Point		°C	226
Boiling point		°C	238
Evaporation rate			<0.01
Vapor pressure			<1@25 °C
Specific gravity			1.07

# Strike Shield (Available as spray cans)

**This ultimate lubricant can free thousands of the frozen mechanisms**

**S**TRIKE SHIELD is the ultimate penetrant to rapidly pierce rusted and corroded metal surfaces using a distinctive spreading action to break loose frozen mechanisms while at the same time applying an advanced lubricating film to the surfaces of the metal delivering the highest quality lubrication available in penetrating oil.

STRIKE SHIELD leaves a unique layer of film on surfaces that helps prevent rust and corrosion along with driving out and dispersing moisture on ignition wires, electrical contacts, circuit boards and other electrical connections to provide protection against future corrosion in extremely tough conditions.

### Advantages

- Offers extremely fast penetration and lubrication into remote rusted /corroded areas especially for industrial and marine applications that have seized metal mechanisms
- Provides a quick durable long lasting lubricating film to a variety of different areas including mechanisms in extreme salt water environments
- Inhibits rust and oxidation on metal contacts and surfaces in all weather conditions
- Maximizes performance as a moisture displacement on wet electrical switches/boards and electronic systems
- Helps start damp engines by dispersing moisture on ignition wires and electrical systems
- Protects circuit boards from corrosion in all weather conditions including salt spray
- Repels dirt and dust build-up
- Mild and pleasant fragrance

### Applications

- Frozen or scaled nuts and bolts
- Sticky locks
- Squeaky hinges
- Sliding doors
- Wheels
- Conveyors
- Cables
- Linkages, Shafts, Bushings
- Sliding parts and mechanisms
- Any automotive, marine, farming industrial or commercial application that requires a fast acting penetrate, lubricant and moisture displacement all combined in one product
- Contains no volatiles or solvents. Contains synthetic hydrocarbons and advanced chemical additive technology. Non-toxic and environmentally friendly.

### Directions of Usage

Spray to any frozen mechanisms

Properties	Standard	Unit	Result
Flash Point (PMCC)		°C	61
Boiling point		°C	186 - 201
Evaporation rate			<0.01
Vapor pressure			<1@25 °C
Specific gravity			1.02

# Tool Shield

**Provide extra power & protection to your tools**

**T**OOL SHIELD is the ultimate protection for the moving metal parts for automotive and industrial tools. Utilizing the most Advanced Boundary Film (ABF) Technology, it protects moving metal parts from heat, friction and wear due to boundary conditions of frictional abrasion, extreme pressure torque, air line moisture

and internal dirt. It works in all piston and rotarytype air tools, stationary and hand-held power tools and many hand tools. Increased power and performance and greatly reduced wear while removing dirt from tool are the results. TOOL SHIELD contains ABF (Advanced Boundary Film) for increased lubricity and boundary film lubrication.

### Advantages

- Cleans & Removes Internal Dirt
- Dramatically Reduces Metal-To-Metal Wear
- Extends Tool Life
- Improves Tool Power & Performance
- Lubricates, Cleans & Protects
- Protects Moving Metal Parts
- Repels Air Line Moisture
- Smooths Tool Operation
- Stops & Inhibits Rust

### Applications

- Air Cutting Tools, Air Drills, Air Grinders, Air Nailers, Air Ratchets, Air Sanders, Air Staplers
- Automatic Oilers
- Hand Tools
- Impact Wrenches
- Piston & Rotary Type Air Tools

### Directions of Usage

- Use in accordance with tool manufacturer's instructions.
- Tools may need to be lubricated daily, or several times a day, depending on the frequency and prolonged use of the tool.
- Contains no volatiles or solvents. Contains synthetic hydrocarbons and advanced chemical additive technology. Non-toxic and environmentally friendly.

Properties	Standard	Unit	Result
Flash Point (PMCC)		°C	61
Boiling point		°C	186 - 201
Evaporation rate			<0.01
Vapor pressure			<1@25 °C
Specific gravity			1.02

# Steel Shield Hydraulic Oils

**Steel Shield Hydraulic Fluids transmit pressure & energy. They can also minimize friction and wear, sealing close-clearance parts from leakage, removing heat, minimizing system deposits, flushing away wear particles and contamination, and protecting surfaces from rust and corrosion.**

In the hydraulic systems, erratic operation of valves and actuators due to inadequate oil performance properties such as oil degradation (oxidation) that causes deposits to form in critical clearance areas, can lead to huge losses in production. With

the close clearances, different metallurgies, various elastomers, and high pressures and temperatures, service life and performance of all the system components depend on proper selection and maintenance of the hydraulic fluids.

## Advantages

- Unique ABF Technology treats metal surface
- Excellent viscosity control
- Highly stable viscosity index (VI)
- Excellent in wear protection, oxidation stability, antifoaming and air separation characteristics
- Demulsibility (water-separating characteristics)
- Rust protection
- Good compatibility of different materials
- Environmentally friendly, bio-degradable



“Much Higher Efficiency,  
Much Lower Operation Costs”

## ECI TV T-Power

### Premium Hydraulic Oils

**S**ST ECI TV T-Power Hydraulic Oil is a premium quality anti-wear hydraulic oil intended for industrial and mobile service application where anti-wear lubricants are required. The oils are formulated with enhanced ABF technology and high quality base oils that results in products that provides many features to improve and prolong equipment life.

### Applications:

- Most of the hydraulic systems under light to moderate operation conditions, particularly for older machines that oil change is more often
- System employing gear, vane, radial and axial piston pumps where anti-wear hydraulic oils are required
- System requiring a high degree of load-carrying capability and anti-wear protection
- System containing gears and bearings where mild and anti-wear characteristics are required

## ECI HD-AP

### Heavy Duty Hydraulic Oils

**S**ST ECI HD-AP Hydraulic Oil is a Heavy Duty general purpose anti-wear hydraulic oil formulated with enhanced ABF technology. The oils possess good anti-wear, anti-corrosion and anti-oxidation properties and meet Park Denison HF-O, HF-2 and DIN 51524 Part I, II specifications.

### Applications:

SST ECI HD Hydraulic Oil is recommended for use in most of the hydraulic systems, particularly for older machines that oil change is more often. They are not suitable for use in systems with silver plated components.

Model	SST ECI TV T-POWER				SST ECI HD-AP							
	ISO Grade	32	46	68	100	32	46	68	100	150		
Properties	Standard	Unit										
Density @ 15 °C		Kg/L		0.872	0.874	0.881	0.89					
Kinematic Viscosity @ 40 °C	ASTM D445	cSt		30.4	46	68.5	98.5	30	45	67	98	145
Kinematic Viscosity @ 100 °C	ASTM D445	cSt		5.23	6.75	8.7	11	5.3	6.7	8.6	10.9	14.5
Viscosity Index	ASTM D2270			100	100	99	97	99	99	98	97	96
Flash Point (COC)	ASTM D92	°C		219	225	230	239	212	220	228	245	250
Pour Point	ASTM D97	°C		-20	-20	-18	-15	-12	-12	-10	-10	-10

# Steel Shield Gear Oils

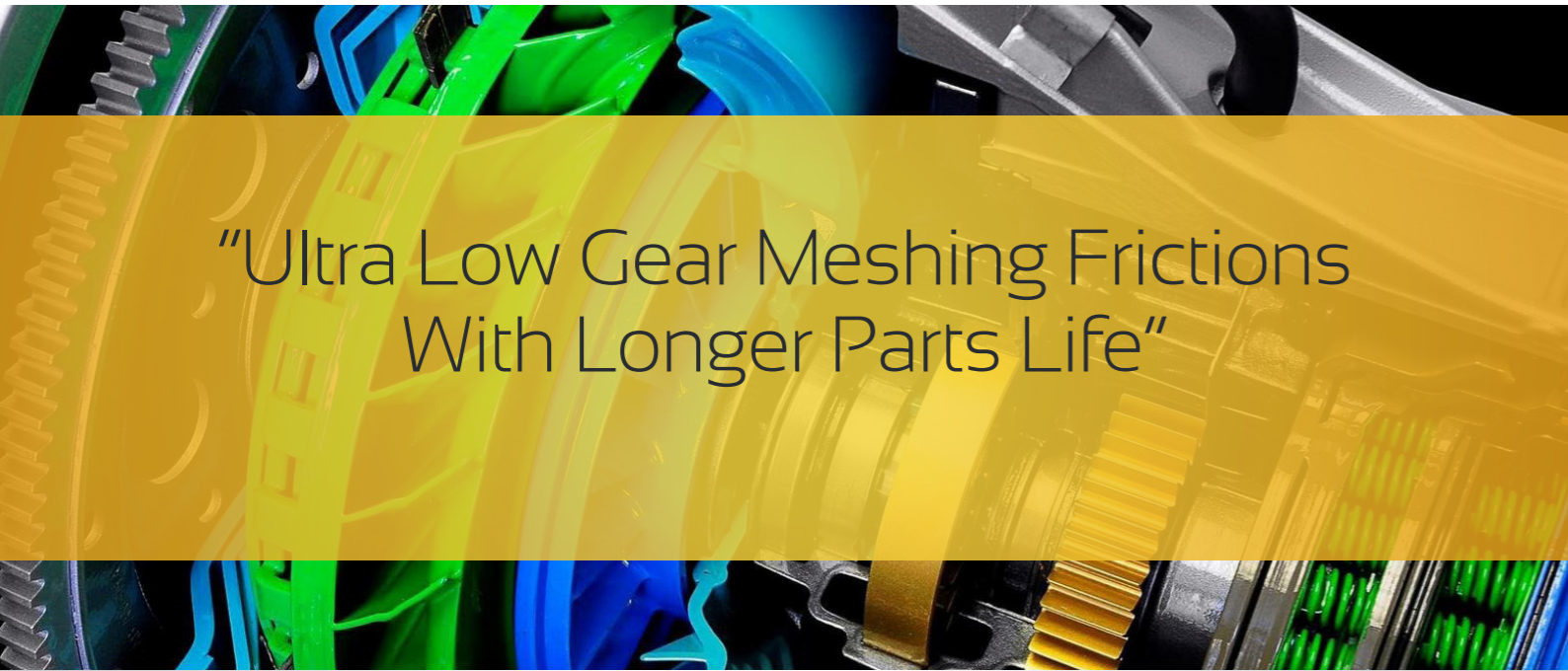
## Dramatically Increase Gear Life & Outstanding Smoothness In Transmissions

Steel Shield Gear Lubricants are highly recommended over other brands because they have unique ABF Technologies which treats the metal, not the oil. Also, they have the following outstanding characteristics:

### Advantages

- Excellent viscosity index over the operating temperature to ensure even distribution of oil on all contact surfaces and create protective oil films at various speeds and pressures
- Excellent cold start ability due to low temperature fluidity which allows oil circulations at low temperature
- Outstanding chemical stability to prevent

- oxidation under high temperatures operations and agitation in the presence of air which greatly extend lubricant life
- Outstanding demulsibility which allows rapid water separation and prevent the formation of harmful emulsions
- Excellent rust-prevention characteristics that protect gear and bearing surfaces from rusting due to water, moisture, or humid atmospheres
- Steel Shield lubricants are non-corrosive, and therefore they will NOT cause chemical attack any metals
- Excellent foam control to prevent the formation of foam in reservoirs and gear cases
- Compatible with system parts like seals, paints, and any gear metallurgy



“Ultra Low Gear Meshing Frictions  
With Longer Parts Life”

## ECI POWER-AP PAG

### Premium Worm Gear Oils

SST ECI POWER-AP PAG Gear Oils are high performance synthetic gear oils blended with polyglycols and special additives. The oils of natural extremely high viscosity index, and low pour point possess excellent high and low temperature performance and long term hydrolytic stability, exhibit superior anti-oxidation, anti-wear, and anti-corrosion properties. Enhanced with Steel Shield ABF Technology of low coefficient of friction reduces power consumption and operation temperatures effectively. It outperforms any of the aftermarket gear oils.

### Applications:

SST ECI POWER-AP PAG Gear Oils are recommended for worm reduction gear boxes under high temperature, high loads and wet working conditions. The oils are incompatible with most mineral and synthetic oils.

Model	SST ECI POWER-AP PAG				SST ECI T-SHC AP EP			
	ISO 150	ISO 220	ISO 320	ISO 460	SAE 75W90	SAE 75W140		
<b>Grade</b>								
<b>Properties</b>	<b>Standard</b>	<b>Unit</b>						
Kinematic Viscosity @ 40°C	ASTM D445	cSt	150	220	320	460	110	193
Kinematic Viscosity @ 100°C	ASTM D445	cSt	23	34	51	72	15.5	26.3
Viscosity Index	ASTM D2270		185	202	220	230	154	171
Flash Point (COC)	ASTM D92	°C	225	225	225	230	200	200
Pour Point	ASTM D97	°C	-30	-30	-30	-27	-57	-36
FZG Fail Loading Stage	DIN 51354-2		12+	12+	12+	12+		

## ECI T-SHC AP EP

### Outstanding All-Round Gear Oils

SST ECI T-SHC AP EP are all season high performance synthetic extreme pressure industrial gear oils fortified with sulphur-phosphorous and ashless dispersant additives and with ABF Technology to enhance anti-oxidation, anti-corrosion, demulsification, anti-wear and anti-foam properties. These oils meet the performance requirements of API, GL-5, MT-1 and SAE J2360, MIL-PRF-2105E, Scania STO 110, Mack GO-J, etc and particularly for hypoid gears under severe operating conditions.

### Applications:

SST ECI T-SHC AP EP are recommended for all types of industrial gear both enclosed and open as well as automotive hypoid gear in manual transmissions, rear axles, differentials, transfer cases, overdrive units, oil lubricated wheel bearings, oil lubricated universal joints, steering gear boxes, etc particularly under low temperatures and critically severe conditions.

# ECI T-GEAR AP EP

## Ultimate Extreme Pressure Gear Oils

**S**ST ECI T-GEAR AP EP are premium extreme pressure industrial gear oils containing anti-oxidation, anti-corrosion, anti-wear and anti-foam inhibitors. These oils meet the performance requirements of ISO 12925-1:1996 Category CKD, AISE 224, ANSI/AGMA 9005-E02, DIN 51517 Part 3, Cincinnati Lamb P-59 series, Textron David Brown S1.53 IO1 and pass FZG 12th stage test, etc.

### Applications:

SST ECI T-GEAR AP EP are recommended for all types of industrial gear both enclosed and open. Also suitable for lubrication of systems containing worm gears, bearings, sliding parts, etc.

Model			SST ECI POWER-AP PAG						
ISO Grade			150	220	320	460	680	1000	1500
Properties	Standard	Unit							
Kinematic Viscosity @ 40°C	ASTM D445	cSt	150	220	320	460	680	1000	1500
Kinematic Viscosity @ 100°C	ASTM D445	cSt	14.8	19	24	30	38	44	61.2
Viscosity Index	ASTM D2270		95	95	95	95	90	90	90
Flash Point (COG)	ASTM D92	°C	240	245	247	250	250	252	255
Pour Point	ASTM D97	°C	-10	-9	-9	-9	-6	-3	-3
Copper Corrosion	ASTM D130		1B	1B	1B	1B	1B	1B	1B

# ECI HD-AP PTF

## Premium Power Transmission Fluids

**S**ST ECI HD-AP PTF is a premium power transmission fluid designed for transmission and Drive Train Oil. The oil enhanced with ABF Technology possesses outstanding anti-wear, anti-rust and anti-oxidation properties, exhibits excellent friction control, less brake noise, good elastomeric compatibility. SST-ECI HD-AP PTF meets and complies with specification requirements of Caterpillar TO-4, Caterpillar TO-4M, Allison C-4, Komatsu 07.868.1, ZF TE-ML O1, O3C and API CF, CF-2, etc.

### Applications:

SST ECI HD-AP PTF is recommended for use in modern Caterpillar transmissions, final drive, oil immersed brake and hydraulic systems fitted to heavy-duty off-road equipment. It can also be used as hydraulic fluid in some automatic systems and Vickers pumps.

Model			SST ECI POWER-AP PAG				
SAE Grade			10W	30	40	50	60
Properties	Standard	Unit					
Kinematic Viscosity @ 40°C	ASTM D445	cSt	42	97	141	228	318
Kinematic Viscosity @ 100°C	ASTM D445	cSt	6.5	11.3	14.7	19.2	24
Viscosity Index	ASTM D2270		105	98	97	95	95
Flash Point (COG)	ASTM D92	°C	205	210	215	225	230
Pour Point	ASTM D97	°C	-30	-25	-25	-9	-9



# SST Air Compressor Oils

## Dramatic Decrease In Maintenance Cost But Skyrocketed Efficiency

The excellent thermal oxidative stability of Steel Shield Gas Compressor Oils are effective to eliminate the deleterious by-product of oxidation, resulting in extended service life of the plant equipment, saving resource cost continuously. Effectively, the companies can do more for less.

On top of these benefits, the Steel Shield Air Compressor Oil's natural detergency and dispersing capabilities are able to remove internal deposits which make sure smooth running, and keep the system clean. Steel Shield are environmentally friendly product and provide biodegradable properties. The high level of operational safety is achieved by Steel Shield's high flash points. With the applications of Steel Shield Air Compressor Oils and intelligent maintenance strategies, the gas manufacturer can gain much higher

benefit from efficient operations. Steel Shield Air Compressor Oils have high-quality viscometrics, high-temperature stability and sealing capabilities to keep the compressors at the best performance level. Also, Steel Shield are helping the customers to achieve their business goals for many years.

### Advantages

- Energy Saving average 5-12%
- Excellent chemical stability & demulsifiability
- Excellent thermal stability
- Extend oil change interval
- Extend the life of all metal parts
- Good anti-oxidation and anti-rust properties
- Improve efficiency
- Less downtime and save maintenance cost
- Reduce noise
- Resistance to sludge deposit

## ECI AP Compresso Low Ash 0.5

### Premium Air Compressor Oils

SST ECI AP Compresso Low Ash 0.5 are air compressor oils blended with highly refined mineral base oils together with Steel Shield ABF advanced technology additives. The oils reduce internal friction, protect metal parts, exhibit good oxidation stability, excellent rust and corrosion protection and demulsification properties, meet the requirements of DIN 51506 VD-L.

### Applications:

AP COMPRESSO are recommended for the lubricating of rotary sliding vane, screw air compressors as well as reciprocating air compressors.

Model			SST ECI AP Compresso Low Ash 0.5				
ISO Grade			32	46	68	100	150
Properties	Standard	Unit					
Kinematic Viscosity @ 40°C	ASTM D445	cSt	29	46	68	97	150
Kinematic Viscosity @ 100°C	ASTM D445	cSt	5.4	6.8	8.5	11	14.8
Viscosity Index	ASTM D2270		108	105	97	97	97
Flash Point (COC)	ASTM D92	°C	215	220	230	245	248
Pour Point	ASTM D97	°C	-15	-12	-10	-10	-9

"Your Systems Become Cleaner, Run Smoother With Lesser Energy"

# Part 5: Test Reports & Testimonies



## Southwest Research Institute Test Reports

“Steel Shield lubricants with ABF Technology is proven to be superior to any other top-class lubricants in the world.”

## Steel Shield Outperforms Yamamoto And Atlas Greases

Petroleum Products Research Department  
Test Summary Report  
Steel Shield Technologies  
Purchase Order # 114  
October 25, 2013

Swft	Sample ID:	20003	20004
Code:	Sample Identification:	Litho Shield	Yamamoto EP grease
D1264	Water Washout of Grease		
	Avg. Grease Washed Out	Wt % 1.32	0.66
	Test Temp.	°C 79	79
	Dry Temp.	°C 77	77
D1742	Oil Separation from Lubricating Grease	mass % 2.04	* Note
D2265	Dropping Point	°C 258	307
	Oven Temp.	°C 388	316
D2266	Wear Characteristics (Four-Ball Method)		
	Scar Diameter	kgf 0.75	0.47
D2596	Four-Ball Extreme Pressure Properties		
	Corrected Load	kgf 851.1	501.68
	Load-Wear Index	kgf 92.27	66.73
	Weld Point	kgf 800	315
	LNSL	kgf 80	63

\* No oil separation occurred for grease sample "Yamamoto EP grease", therefore, sample is considered "outside the scope of the method".

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Page 3 of 3

Petroleum Products Research Department  
Test Summary Report  
Steel Shield Technologies  
Purchase Order # 114  
October 25, 2013

Swft	Sample ID:	20005
Code:	Sample Identification:	Atlas Chisel Lube
D1264	Water Washout of Grease	
	Avg. Grease Washed Out	Wt % 1.11
	Test Temp.	°C 79
	Dry Temp.	°C 77
D1742	Oil Separation from Lubricating Grease	mass % ** Note
D2265	Dropping Point	°C 302
	Oven Temp.	°C 316
D2266	Wear Characteristics (Four-Ball Method)	
	Scar Diameter	kgf 0.71
D2596	Four-Ball Extreme Pressure Properties	
	Corrected Load	kgf 302.79
	Load-Wear Index	kgf 41.23
	Weld Point	kgf 315
	LNSL	kgf 50

\*\* No oil separation occurred for grease sample "Atlas Chisel Lube", therefore, sample is considered "outside the scope of the method".

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Test Items	Four-Ball Extreme Pressure Properties	Steel Shield Lithi Shield	Yamamoto EP Grease	Atlas Chisel Lube
Loading Ability	Corrected Load	↑ 851.1	501.68	302.79
Anti-Wear Ability	Load Wear Index	↑ 92.27	66.73	41.23
High Temperature Loading	Weld Point	↑ 800	315	315
High Pressure Loading	LNSL	↑ 80	63	50



Fig. 1: Steel Shield (right) and Atlas (left)

Table 1: Grease test report summary

Steel Shield Lithi Shield is superior to Yamamoto EP Grease and Atlas Chisel Lube in Loading ability, Anti-Wear Ability, High Temperature Loading and High Pressure Loading.

# Steel Shield vs. Shell And Mobil One

## Steel Shield Outperforms Shell And Mobil One Lubricants

The test reports from the Southwest Research Institute have clearly stated that Steel Shield Technologies products are the winners.

Timken Test is designed to test the performance of lubricants with viscosities lower than 5000 cSt@40°C. Temperature reflects the coefficients of friction of lubricants. By testing the maximum loading of lubricants within a specific temperature range (38 ~ 39°C), the degree of Load-Wear Index can be obtained. The results are compared as follows:

Steel Shield Super-XL 5W30 and Mobil 5W30 have scored 45 and 12 pound respectively in the Okay Load, and scored 50 and 15 pound respectively in the Score Load. Therefore, **Steel Shield is superior to Mobil by 350% in loading and anti-wear abilities.**

Steel Shield XHD-7 15W40 and Shell R-3T 15W40 scored 35 and 21 pound respectively in the OK Load, and scored 40 and 24 pound respectively in the Score Load. Therefore, Steel Shield is superior to Shell by 170% in loading and anti-wear abilities. These results proved that Steel Shield products have excellent performance in heavy loading

conditions and have outstanding anti-wear abilities. Steel Shield can greatly improve the efficiencies of mechanical systems.

The 4-Ball Test tests high viscosities lubricants, and anti-wear additives. The 4-Ball Tests have proved that the anti-wear and high loading performance of Steel Shield products without high viscosities can be as excellent as greases. The most important indexes of 4-Balls Test are LWI and Weld Point which the majority of people believe indexes with larger numbers are better. But traditional lubricant formulas achieve anti-wear abilities by high viscosity. The higher the viscosity, the lower the efficiency. The Corrected Loads of Steel Shield Super-XL 5W30 and XHD-7 15W40 are 228Kgf and 139Kgf respectively. They are much higher than Mobil One (53Kgf) and Shell (55Kgf). The LWI are 47Kgf verse 42Kgf, and 40Kgf verse 42Kgf which appear similar. However, the **Weld Point of Steel Shield are 315Kg and 250Kg which are higher than 200Kg (Mobil One and Shell).** This tells us the truth.

Steel Shield Technologies have demonstrated its ultimate performance.

# Gas Engine Oils & Compressor Oils Tests

Products of the same class

SwRI Lab No.	24564	23728	23252	23727	25250	25251
<b>ASTM D2782 Measurement of Extreme-Pressure Properties of Lubricating Fluids (Timken Method)</b>	<b>SST Gas Engine Oil SAE 40 Ashless Without EPA</b>	<b>Steel Shield Gas Engine Oil GECAT SAE40 Low Ash With EPA</b>	<b>Steel Shield EPA</b>	<b>Steel Shield Compressor Oil ISO #100 / 150</b>	<b>Mobil Pe-gasus 805 SAE 40 Gas Engine Oil</b>	<b>Mobil Pe-gasus 801 SAE 40 Gas Engine Oil</b>
Volume (Gallon)	1	1	1	1	1	1
OK Load (lbs)	40	40	75	55	9	9
Score Load (lbs)	45	45	80	60	12	12
Temperature (°C)	38	38	38	38	38	38

**Table 2: Steel Shield Wins In Timken Test (ASTM D2782)**

- The SwRI Timken Test report clearly testified Steel Shield products are FAR Superior than Mobil products of the same classes
- Steel Shield outperforms Mobil in OK LOAD parameter by 444 % and in SCORE LOAD by 375 %**

Products of the same class

SwRI Lab No.	24564	23728	23252	23727	25250	25251
<b>ASTM D2783 Measurement of Extreme-Pressure Properties of Lubricating Fluids (4-Ball Method)</b>	<b>SST Gas Engine Oil SAE 40 Ashless Without EPA</b>	<b>Steel Shield Gas Engine Oil GECAT SAE40 Low Ash With EPA</b>	<b>Steel Shield EPA</b>	<b>Steel Shield Compressor Oil ISO #100 / 150</b>	<b>Mobil Pe-gasus 805 SAE 40 Gas Engine Oil</b>	<b>Mobil Pe-gasus 801 SAE 40 Gas Engine Oil</b>
Volume (Gallon)	1	1	1	1	1	1
Corrected Load (rgf)	70	109	NA	1	136	74
Load Wear Index (rgf)	35	46	NA	48	34	35
Weld Point (rg)	200	250	>800	250	200	200
Last Non Seizure Load (rg)	80	100	80	100	63	80

**Table 3: Steel Shield Wins In 4-Balls Test (ASTM D2783)**

- The SwRI 4-Balls Test testified Steel Shield products are superior than Mobil products of the same classes
- Steel Shield outperforms Mobil in the Weld Point (oil strength in resistant to EP) parameter by 129 % and in the Last Non Seizure Load (wear performance in respect to load) by 159 %.**
- \*\*\* Remarks: 4-ball test is normally for heavy weight oil and grease.

THE TEST REPORT FROM SOUTHWEST RESEARCH INSTITUTE - Timken ASTM

Test Report  
15<sup>th</sup> May, 2013  
Steel Shield Technologies

Test Report No.: 17274 · 17276

ASTM D2782 Standard Test Method for Measurement of Extreme-Pressure Properties of Lubricating Fluids (Timken Method)	Steel Shield 5W-30 Standard: 1 Gallon	Mobil 1 5W-30 Standard: 1 Gallon
Okay Load, lbs	45	12
Score Load, lbs	50	15
Temperature, °C	39	38



Test Report No.: 17275 · 17277

ASTM D2782 Standard Test Method for Measurement of Extreme-Pressure Properties of Lubricating Fluids (Timken Method)	Steel Shield SAE 15W-40 Standard: 1 Gallon	Shell SAE 15W-40 Standard: 1 Gallon
Okay Load, lbs	35	21
Score Load, lbs	40	24
Temperature, °C	38	38



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www.swri.org

THE TEST REPORT FROM SOUTHWEST RESEARCH INSTITUTE - 4-Ball ASTM

Test Report  
1<sup>st</sup> July, 2013  
Steel Shield Technologies

Test Report No.: 18051 · 18049

ASTM D2783 Standard Test Method for Measurement of Extreme-Pressure Properties of Lubricating Fluids (4-Ball Method)	Steel Shield 5W-30 Standard: 1 Gallon	Mobil 1 5W-30 Standard: 1 Gallon
Corrected Load, kgf	228	53
Load Wear Index, kgf	47	42
Weld Point, kg	315	200
Last Non Seizure Load, kg	80	100



Test Report No.: 18502 · 18050

ASTM D2783 Standard Test Method for Measurement of Extreme-Pressure Properties of Lubricating Fluids (4-Ball Method)	Steel Shield 5W-30 Standard: 1 Gallon	Mobil 1 5W-30 Standard: 1 Gallon
Corrected Load, kgf	139	55
Load Wear Index, kgf	40	42
Weld Point, kg	250	200
Last Non Seizure Load, kg	80	100



THE SOUTHWEST RESEARCH INSTITUTE  
www.swri.org



# Insurance Certificate

## Confirmation Of No Insurance Claim: Over USD 2,000,000 Insurance

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PRODUCER: Best Insurance Agency, 340 S. Main St., P.O. Box 670, Butler, PA 16003-0670

CONTACT NAME: Jamie McDonald, PHONE: (724)283-5670, FAX: (724)283-1160, E-MAIL: jamie@bestinsurancebutler.com

INSURER(S) AFFORDING COVERAGE: INSURER A: Cincinnati Insurance Companies

INSURED: Steel Shield Technologies Inc, 3351 Industrial Blvd / Bethel Park, PA 15102

CERTIFICATE NUMBER: 001 2014 - 15 REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL(SUBR) INSR (LTV)	POLICY NUMBER	POLICY EFF (MMDDYYYY)	POLICY EXP (MMDDYYYY)	LIMITS
A	GENERAL LIABILITY <input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR		ENP04242014	4/24/2014	4/24/2015	EACH OCCURRENCE \$ 1,000,000 DAMAGE TO RENTED PREMISES (EA nonpersonal) \$ 100,000 MED EXP (Any one person) \$ 5,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMPOP AGG \$ 2,000,000
A	UMBRELLA LIAB <input checked="" type="checkbox"/> EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> OCCUR <input type="checkbox"/> RETENTION \$		ENP04242014	4/24/2014	4/24/2015	EACH OCCURRENCE \$ 1,000,000 AGGREGATE \$
	WORKERS COMPENSATION AND EMPLOYERS LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NY)					WC STATE - OTH-LIMITS \$ E.L. EACH ACCIDENT \$ E.L. DISEASE - EA EMPLOYEE \$ E.L. DISEASE - POLICY LIMIT \$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

CERTIFICATE HOLDER: Steel Shield Technologies Inc, 3351 Industrial Blvd, Bethel Park, PA 15102

CANCELLATION: SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE: *Jamie McDonald*

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Fig. 1: Original Certificate Of Liability Insurance

- No client ask for claim throughout the history of Steel Shield !

Best Insurance Agency  
340 S. Main St., P.O. Box 670  
Butler, PA 16003-0670  
(724)283-5670 (724)283-1160 Fax  
Email: Ray@Bestinsurancebutler.com

September 18, 2013

Steel Shield Technologies (Asia Pacific) Limited  
22<sup>nd</sup> Floor, W. Business Centre  
4 Kam Hong Street  
North Point, Hong Kong

To Whom It May Concern:

Please be advised that Steel Shield Technologies Inc, manufacturer of specialty lubricants and greases, located in Bethel Park, Pennsylvania, USA, has had no claims, claim related incidents or notices of loss under any General Liability policy issued by our office. We have provided them with General Liability coverage continuously since April 24, 2008

If you have any questions or need further information please feel free to contact me. I will be happy to be of further assistance.

Sincerely,  
*Raymond A. Rosenbauer*  
Raymond A. Rosenbauer  
Vice President

Fig. 2: Confirmation Letter Of No Insurance Claim

- Steel Shield had NEVER been claimed: A letter from the insurance company

# Steel Shield vs. Others In Plastic Industry Greases

Why Should We Use Steel Shield Instead Of Others? The Following Comparisons Tells You The Truth

Test Items		Winner	Mobilgrease XHP™ Series	Mobilith SHC™ Series	Chevron Moly Grease EP	
		Steel Shield Lithi Shield	220, 221, 222, 223, 222 Special	007, 100, 220, 221, 460, 1500	1000 Special	NLGI 2
<b>4-Balls Extreme Pressure Test (ASTM D2596)</b>	Corrected Load, kgf	851.1	Unknown	Unknown	Unknown	Unknown
	Load Wear Index, kgf	92.27	Unknown	Unknown	Unknown	Unknown
	Weld Point, kgf	↑ 800	315	250	650	315
	LNSL, kgf	80	Unknown	Unknown	Unknown	Unknown
<b>Timken Test (ASTM D2509)</b>	OK Load, lbs	↑ 60	40	Unknown	Unknown	50

Table 1: Grease Performance Comparisons For Plastic Manufacturing Industry



Fig.1: Lithi Shield Grease

**Warning!**  
Greases contain Moly can damage your precious engines in the long-term!

Chevron RPM Arctic Grease	Castrol Ball Bearing Grease Range	Castrol LCG 2 Grease™	Castrol XMG Grease	SBX Grease 2	Shell Gadus S3 V460	Shell Gadus S5 V220
NLGI 1	EPL2 NLGI 2	NLGI 2	NLGI 2	NLGI 2	NLGI 2	NLGI 2
Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Unknown	440	320	400	800	400	764
Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
45	55	Unknown	45	45	Unknown	Unknown

Steel Shield is the champion in the field. It does not contain Moly or any solid additives because its ABF Technology is superior to any chemical additives in lubrication aspects. With better weld point and better surface treatments, Steel Shield helps you to save energy and component costs.

# Authoritative Compliments

## Compliments From The US Armed Forces

**“Formalized respectful compliments to STEEL SHIELD by the most renowned Corporations in the World. IN STEEL SHIELD, WE TRUST! ”**

Mark W. Pushnick  
President & CEO  
Steel Shield Technologies, Inc.  
3351 Industrial Blvd  
Bethel Park, PA 15102-2543

07 May 2008

Mark,

I wanted to take time to express my sincere thanks to you and Steel Shield Technologies, Inc. for your support while I was deployed overseas in support of the Global War on Terrorism.

Your product, Weapon Shield, was truly a “life saver”.

In my first combat tour to Afghanistan in late 2003, not knowing much about your product, I began to use it for my personal weapon and my crew-served vehicle weapon as a just another oil that I received in my care packages from home. I soon became educated on how this product was head and shoulders above the rest.

In the grueling conditions of southwestern Afghanistan, our weapons were subject to severe heat, dust, and even potential rust due to the humidity in the area. Compared to the other oils that we received, Weapon Shield was the only product that stood up to the battlefield environment and did not cause the bolt of the weapons to become “gummy” or “sticky”. Weapon Shield actually acted as a “shield” and as a dust repellent.

When I found out that I was deploying back to Iraq in 2007, one of my first calls was to my father to get my hands on Weapon Shield. While conducting pre-deployment training at Fort Bragg, I introduced my soldiers to this product. When it comes to selling to a tough audience, young enlisted men are some of the toughest to buy into a new idea. Within days, all of the men were carrying this product and were even hoarding bottles within their packs.

When we got to Iraq, Weapon Shield bottles became a part of the combat packing list as assigned by my Detachment Sergeant. Weapon Shield was now the Standing Operating Procedure, a small bottle on each man and tube of grease in each truck.

Weapons Shield brought us through over 25 fire fights with great success when other soldier’s from different unit’s weapons failed. On one occasion on patrol with another unit, their .50 cal machine gun jammed. One of my gunners tossed a bottle of Weapon Shield to them. They broke down their weapon, applied the shield and quickly got back into the firefight. In our mission after action review, my soldiers quickly commented on how their weapons would only be treated with this product.

The bottom line is this... In two combat tours to both Afghanistan and Iraq, weapons treated with Weapon Shield, NEVER jammed. That saved lives. As a unit commander, my most important job was to complete this mission while bringing all of my soldiers home. Weapon Shield was a great contributor to my unit accomplishing that mission. In combat, the only option is perfect. If you are not, you can die. Weapon Shield was PERFECT every time.  
Victory!

Craig A. Hickerson  
MAJOR, Infantry  
USAR



**Fig. 1 (Left): Letters of Thanks and Compliments from the US Army**

- The letter stated that “Weapon Shield was truly a life saver”
- “Weapon Shield was PERFECT every time.”

**Fig. 2 (Right): U.S. Soldiers Holding Steel Shield Banner**

- Steel Shield has high reputation and won a lasting place in the U.S. Army and many other national forces

## Compliments From The Siemens

**Steel Shield Products Are Great Contributors To Siemen’s Success**



December 10, 2008

Mark W. Pushnick  
President & CEO  
Steel Shield Technologies, Inc.  
3351 Industrial Blvd.

Mark,

I would like to take this opportunity to thank you for introducing us to Steel Shield Technologies line of lubricants and Metal Treatment products. The performance of your products has been overwhelmingly superior to any other lubricants or metal treatments we have used in the past.

We are currently using the Lithi-Shield grease in our shop and it has proven to work very well in our high temperature applications. We have experienced absolutely no down time due to bearing failure on our high temp furnace since we began using the Lithi-Shield grease. In the past all bearings were replaced on a quarterly basis causing a significant amount of downtime and material cost. We also use the grease in our automated welding equipment and anywhere else frequent greasing is needed. It has out performed our previously used grease in every application and we use it as often as possible.

Because of the performance of the Lithi-Shield grease we started using Steel Shield EPA in all of our metalworking equipment. Since its introduction to our machines we have not experienced a significant breakdown of any kind and it has left them running smoother and quieter than ever. The Steel Shield Drill and Tap fluid is also used our shop and has significantly decreased our tooling costs and become a favorite of most of our machinists. The Spray Shield product is used by our maintenance department and it is proving to be superior to anything used here in the past. We are very happy with the cost and performance of Steel Shield Technologies products and I highly recommend them. I am continually looking for ways to reduce costs and downtime Steel Shield products have been a great contributor to our success.

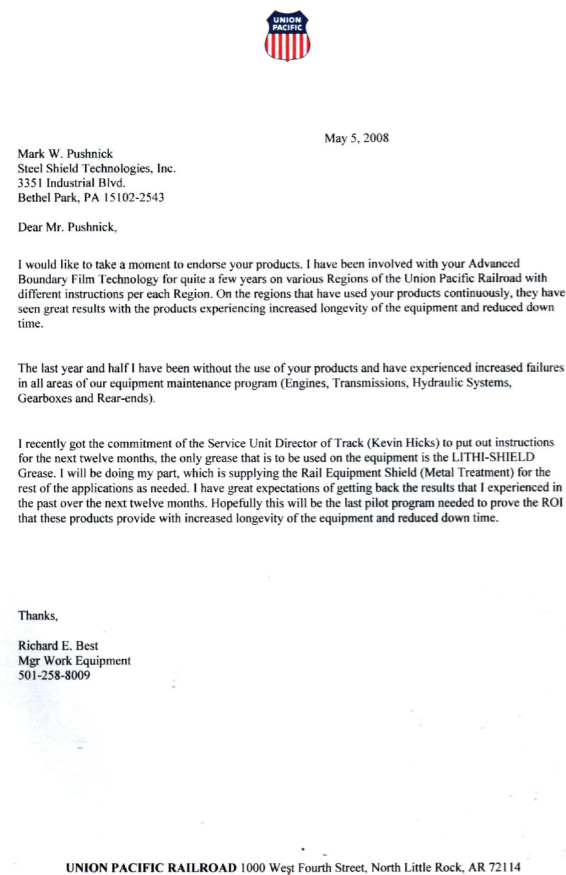
Bob Cavill  
Maintenance Department Supervisor  
Siemens VAI Services, LLC  
2901 Industrial Blvd.  
Bethel Park, PA 15102  
412-851-6700

**Fig. 3: The Original Letter Of Compliment From Siemens**

- “Spray Shield product is used by our maintenance department and it is proving to be superior to anything used here in the past.”
- “We are happy with the cost and performance of Steel Shield Technologies products.”
- “Steel Shield products have been a great contributor to our success.”

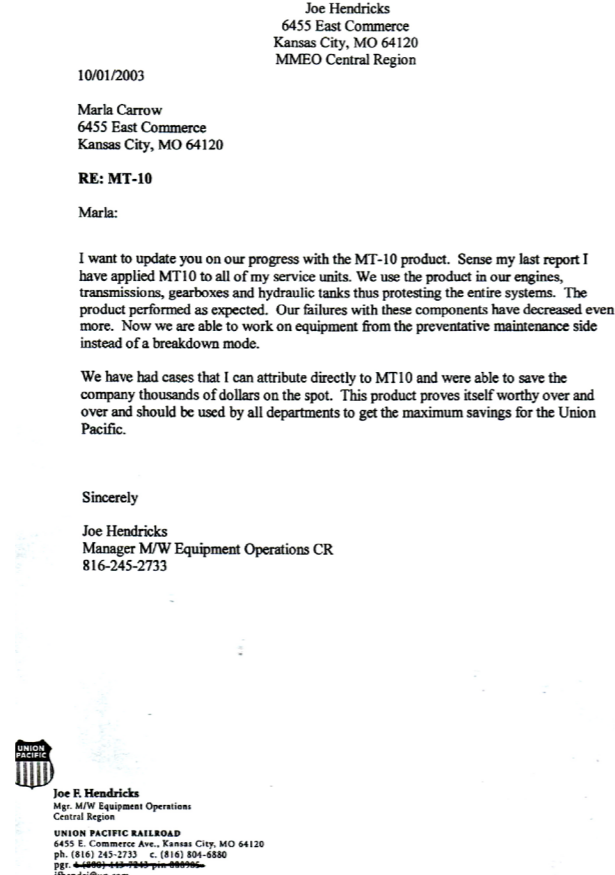
# Compliments From Union Pacific Railroad

## Union Pacific Railroad Uses Steel Shield Product Extensively. Steel Shield Has Been Proved To Be Functional And Cost-Effective, And Are Highly Recommended



**Fig. 4: Original Letter From Mr. Richard E. Best, The Manager Of The Work Equipment**

- "... great results with the products experiencing increased longevity of the equipment and reduced down time."



**Fig. 5: Original Letter From Mr. Joe Hendricks, The Manager M/W Equipment Operations CR**

- "... able to save the company thousands of dollars (US) on the spot."
- "This product proves itself worthy over and over and should be used by all departments..."

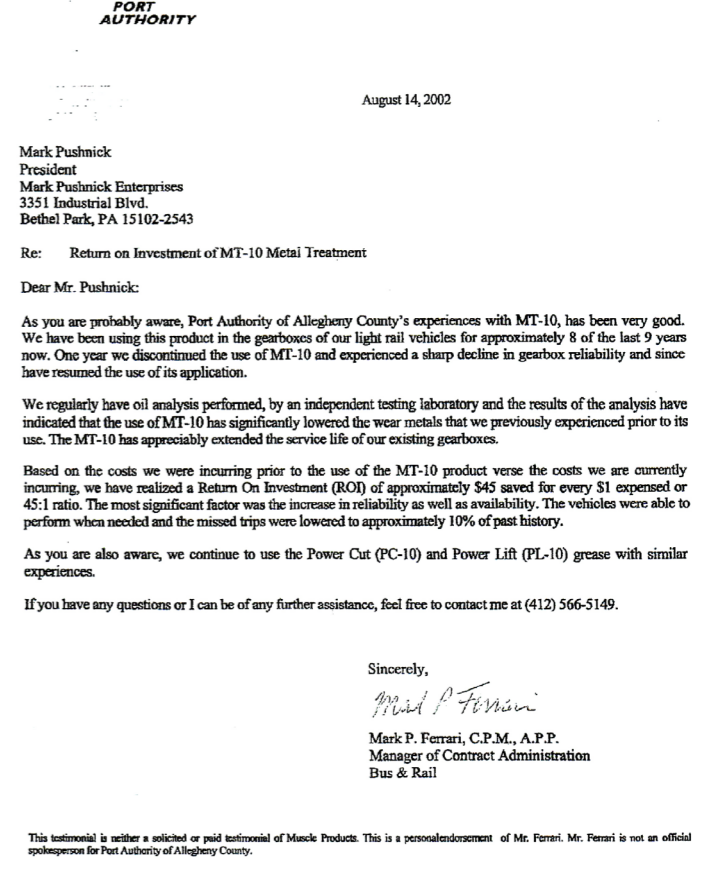
# Compliments From The PA Port Authority

## "Saved Around USD 45 In Maintenance Cost For Every USD ONE DOLLAR Investment In Steel Shield Products. Also, The Vehicles Malfunctions Drop To Around 10%"



**Fig. 6: Original Letter From Mr. Mark P. Ferrari, C.P.M., A.P.P., Manager Of Contract Administration Of Bus & Rail**

- "... we have realized a Return On Investment (ROI) of approximately \$45 saved for every \$1 expensed or 45:1 ratio."
- "... the missed trips were lowered to approximately 10% of past history."



This testimonial is neither a solicited or paid testimonial of Muscle Products. This is a personal endorsement of Mr. Ferrari. Mr. Ferrari is not an official spokesperson for Port Authority of Allegheny County.



# Compliments From Volvo China

## The Horsepower Of Volvo Vehicles Increased By 8% To 12% After Using Steel Shield Products

中沃汽车有限公司



致：美国离子能源有限公司  
香港荃湾德士古道 188-202 号  
立泰工业中心二期 11 楼 K 室

感谢 贵司提供神盾润滑油予我司作汽车马力输出测试。于是次测试当中，我司将神盾润滑油使用于 4 辆沃尔沃 Volvo 汽车 [型号：沃尔沃 S80 ]，并将 4 辆汽车分别放上汽车马力输出测试机 (Dyno-Shaft On-Vehicle Dynamometer) 进行测试。测试结果显示，4 辆进行测试的沃尔沃 Volvo 汽车在使用神盾润滑油之后，所输出的马力比起未使用之前增加了 8%-12%。我司非常乐意向客户推荐神盾润滑油。

顺祝  
商祺



地址：杭州市滨江区江南大道 3688 号通策广场 2 幢 1613 室 电话:0571-86852031  
Http://www.sinoworldcar.com

Fig. 7: Original Letter From Volvo China

Volvo Car Corporation

8th November, 2013

To: Steel Shield Technologies (Asia Pacific) Limited  
Unit K, 11/F, Leader Industrial Centre, Phase 2,  
188-202 Texaco Road, Tsuen Wan, H.K.

Dear Ms. Eva Lam,

We would like to express our gratitude to Steel Shield Technologies (Asia Pacific) Limited for providing Steel Shield lubricants for our vehicle horse power tests. In this test, our company applied Steel Shield lubricants to 4 Volvo cars (model: Volvo S80). We mounted the 4 cars on the horse power testing machines (Dyno-Shaft On-Vehicle Dynamometer) and conducted the tests individually. The results indicate that, the 4 Volvo cars which had Steel Shield lubricants applied got horse power boosted by 8% - 12% compared with the same 4 cars without Steel Shield lubricants. Our company will be pleased to recommend Steel Shield to our customers.

Sincerely,

Volvo Car Corporation

R/M 1613, 2th Phase, Tongce Square, 3688 Jiangnan Road,  
Binjiang, Hangzhou, China  
Tel.: 0571-86852031 www.sinoworldcars.com

Fig. 8: The English Translation From The Original Letter Of Volvo

- "... 4 Volvo cars which had Steel Shield lubricants applied got horse power boosted by 8% - 12%."



# Part 6: Cost Savings Reports



## Real Enterprise Cases In Huge Cost Reductions

# Union Pacific Railroad

## Rail Equipment Shield With Advanced Boundary Film Technology

- Advanced methods of tribology that improve lubricity and load carrying capacity
- Reacts chemically under thermal conditions with the contacting metal surfaces, to form a complex surface-attaching film of protection
- Surface smoothing is accomplished resulting in improved spread characteristics of the surfaces themselves
- Increases fluid film strength resulting in greatly reduced wear while imparting extreme pressure properties (EP)

## Benefits Of Using Rail Equipment Shield Metal Treatment

- Increases Train Velocity
- Improves On-Time Train Performance
- Extends Parts Life and Component Reliability
- Reduces Maintenance and Downtime
- Reduces Metal-To-Metal Wear
- Reduces Fuel Consumption
- Reduces Operating Temperatures
- Provides Smoother Operation
- Protects Moving Metal Parts

More Production, Less Down Time.  
Steel Shield with ABF Technology is  
the Solution

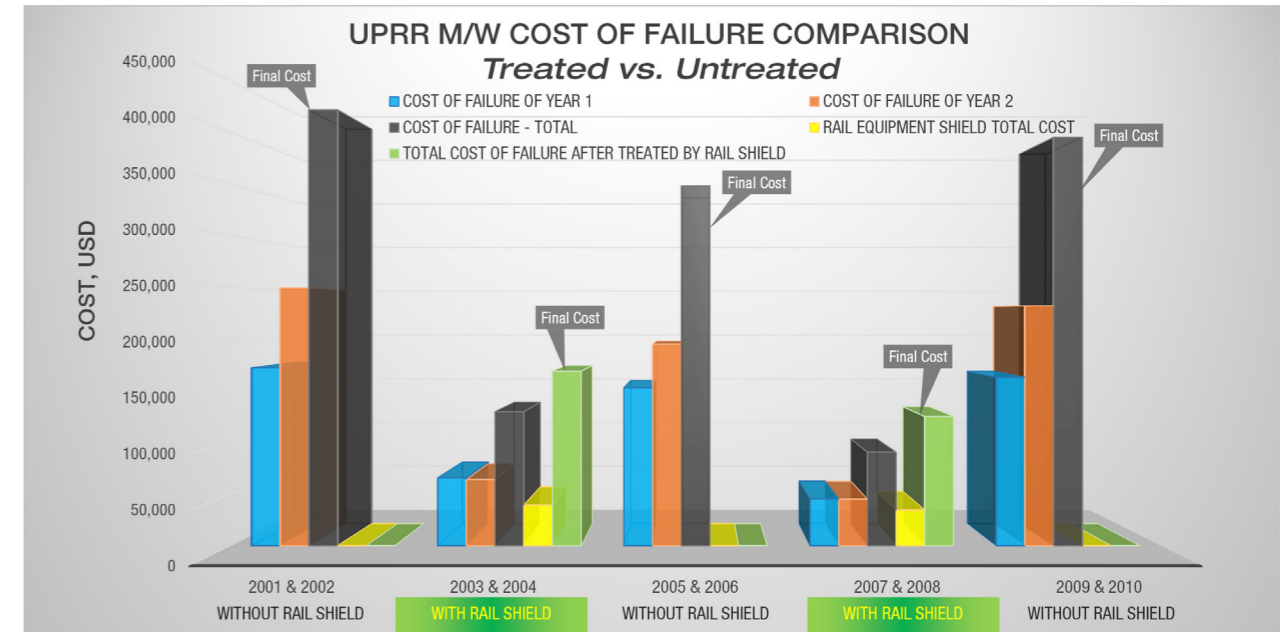


Fig.1: UPRR M/W Cost Of Failure Comparison (2001-2010): Treated Vs Untreated

## Case Study 1

### M/W Equipment Central Region (Power Units Only)

- Rail Equipment Shield-Metal Treatment was not used in Power Units or any other M/W components in 2001 and 2002
- In January 2003 Rail Shield was added to the Power Units as well as transmissions, hydraulic systems, gearboxes and differentials
- In 2004, Rail Shield was used in the same capacity as 2003
- Rail Shield was purchased and added to M/W equipment components even though Case Study 1 is only showing the savings for Power Units

Table.1: Cost Saving Comparison of Union Pacific Railroad During 2001-2004

2001 & 2002 (Without Rail Shield)	2003 & 2004 (With Rail Shield)
Cost of Failures = \$172,296 + \$249,476 = \$421,772 (average \$210,886 per year)	Cost of Failures = \$65,722 + \$64,021 = \$129,742 (average \$64,871 per year)
	Cost of Rail Shield = \$21,195 + \$18,000 = \$39,195 (average \$19,598 per year)
	Total Cost to Union Pacific = \$168,937 (average \$84,469 per year)
(Note 1: This savings does not include man hours, rentals, downtime costs or delays)	Savings to Union Pacific = \$252,835 (average \$126,417 per year)
(Note 2: Return on investment: $\frac{\text{savings} - \text{cost}}{\text{cost}} = \text{ROI}$ )	= $\frac{\$252,835 - \$39,195}{\$39,195}$ = 5.45 <b>(545% Returned)</b>



# Case Study 2

## UPRR Cost Saving Analysis From 2005 To 2008

- On January 1st of 2007 UPRR began using Rail Equipment Shield-Metal Treatment
- The following analysis is the data collected from UPRR (New Construction) 2007 and 2008 when Rail Equipment Shield-Metal Treatment was used in contrast with 2005 and 2006 when it was not

- Note:
- All repair cost are averaged due to core damage and applications
  - All repairs are due to poor lubrication and excessive wear
  - Repair costs do not include man hours, downtime, rentals or delays

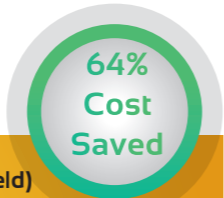


**Table.2: Total Cost of Units per Year of Union Pacific Railroad During 2005-2008**

Units repairs To	Cost per Unit	Units Repair 2005		Units Repair 2006		Units Repair 2007		YTD Units Repair 2008	
		Units	Costs	Units	Costs	Units	Costs	Units	Costs
Engine	12,000	4	48,000	6	72,000	1	12,000	0	0
Transmissions	11,000	3	33,000	4	44,000	0	0	1	24,000
Differentials	1,300	2	2,600	4	5,200	1	1,300	0	0
Hydraulic Pumps	4,000	10	40,000	8	32,000	4	16,000	5	14,000
Valve Failures	935	3	2,800	3	2,800	0	0	2	2,100
Hydraulic Cylinders	600	12	7,200	15	9,000	6	3,600	5	38,000
Hydraulic Motors	2,500	8	20,000	12	30,000	5	12,500	1	1,200
<b>Total Cost of Repair per year</b>			153,000		195,000		↓ 45,400		↓ 45,100

**Table.3: Cost Saving Comparison of Union Pacific Railroad During 2005-2008**

2005 & 2006 (Without Rail Shield)	2007 & 2008 (With Rail Shield)
Cost of Failures = \$153,000 + \$195,000 = \$348,000 (average \$174,000 per year)	Cost of Failures = \$45,400 + \$45,100 = \$90,500 (average \$45,250 per year)
	Cost of Rail Shield = \$20,394 + \$14,100 = \$34,494 (average \$17,247 per year)
	Total Cost to Union Pacific = \$124,994 (average \$62,497 per year)
(Note 1: This savings does not include man hours, rentals, downtime costs or delays)	Savings to Union Pacific = \$223,006 (average \$111,503 per year)
(Note 2: Return on investment: $\frac{savings - cost}{cost} = ROI$ )	= $\frac{\$223,006 - \$34,494}{\$34,494}$ = 5.46 <b>(546% Returned)</b>



# Summary

- Rail Equipment Shield has increased train velocity, improved on-time train performance, extended parts life and component reliability and reduced maintenance and downtime by treating the metal surfaces to reduce friction, heat and wear
- After more than 8 years of use experience shows that Rail Equipment Shield has had no negative or detrimental effects
- Rail Shield helps UPRR save 60-64% maintenance cost per year

We Successfully Helped Union Pacific Railroad Save Their Costs As Large As **64%**,  
Let's Make Yours And Save More !

[www.steelshieldtech.com.hk](http://www.steelshieldtech.com.hk)

**Not Just Oil, It's Technology**

# STEEL SHIELD TECHNOLOGIES

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11 Kin Fat Street, Tuen Mun, N.T., HK

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Weibo: [www.weibo.com/steelshield](http://www.weibo.com/steelshield)

