



PLATINUM COMBUSTION CATALYST



Pumps-Volumeters
FUEL AND FLUID MEASURING



BYPASS OIL FILTRATION SYSTEMS



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OUR MISSION IS TO PROVIDE
YOU WITH THE BEST AVAILABLE
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WE CAN HELP YOU DEVELOP:

**“SOLUTIONS FOR FUEL,
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MANAGEMENT”**

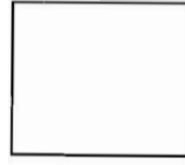


Exhibit "E"
Port Commission Special
Meeting of Feb. 10, 2009

ECO★STAR COLLABORATIVE

the new look of Diesels

COLLABORATIVE

THE COMBUSTION CATALYST SYSTEM... HOW IT WORKS!!

The burning of diesel fuel in an engine is a process which has some major inefficiencies. In particular a significant amount of the fuel enters the exhaust system without being burned or benefiting the engine. These unburned exhaust gases are mostly complex hydrocarbons plus other pollutants.



The ideal fuel to air ratio, while agreed upon by most, leaves out the fact that only a portion of the oxygen in the air goes from stable to a radical state. Only oxygen in the radical state can enter into the combustion/burn process.

Research has shown that platinum in its pure state can dramatically increase the percentage of oxygen that goes into the required radical state. By introducing platinum into the combustion process of a diesel engine, it is possible to increase the percentage of the fuel burned in the engine significantly.

The most popular methods tried to achieve this process are to coat parts of the combustion chamber with platinum, or to mix platinum with the fuel. These methods are not satisfactory for any extended term for obvious reasons.

There is an efficient method where platinum is delivered into the engine in a pre-combustion condition through the air induction system.

Coming into the engine via the air intake system as an inert compound allows it not to be affected on most engines as it is transported to the combustion chamber. As the rising piston compresses the air and heats the chamber the platinum compound is transformed into pure platinum and a harmless salt by-product that is consumed in the burning process.

This platinum is pure before the fuel even reaches the injector and begins to break down soot particles that line the various parts of the chamber. Soot is like sandpaper in that it creates friction, accelerates wear, and generates excessive heat. This cleansing action eliminating the soot makes the engine far more efficient and extends its life. It also makes the lubricating oils more effective as they are not contaminated nearly as quickly. These actions are unique and predictable.



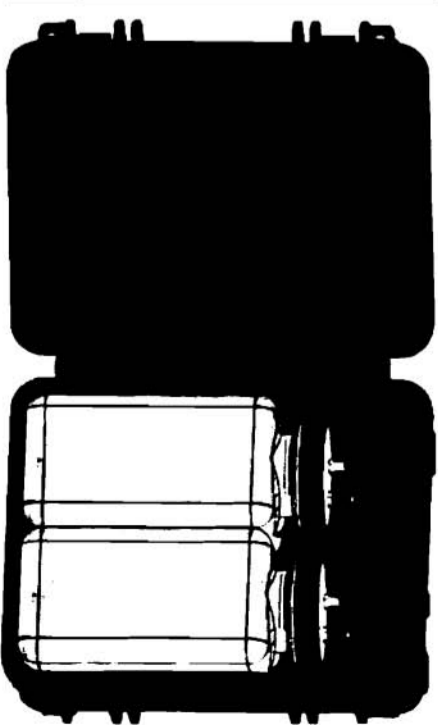
Platinum's reaction to the hydrocarbons in the fuel break some of the more complex chains into simple chains making them more burnable. The secondary process of this catalytic reaction is to create oxygen radicals which also increase the percentage of fuel burned.

When more of the fuel is burned in the combustion stroke, less is burned in the exhaust stroke. Less fuel is required to do the same amount of work.

It also lowers the exhaust temperature which is the culprit in creating the Nitrous Oxides that are so harmful to our lungs. The lower the temperature of the exhaust and the lower the expulsion of hydrocarbons, the less ozone is created at ground level.

Finally, the most noticeable effect is the reduction of black smoke from the air. This unburned particulate matter is the cause of smog and odor and affects everything that lives.

How would you like to SAVE MONEY by reducing your



"CATALYSTS INCREASE THE SPEED OF CHEMICAL REACTIONS AND REDUCE THE AMOUNT OF ENERGY REQUIRED TO ACTIVATE A REACTION WITHOUT BEING EXPENDED IN THE PROCESS".

BENEFITS OF THE PLATINUM COMBUSTION CATALYST:

SAVES MORE IN FUEL THAN IT COSTS:

6-11% REDUCTION IN FUEL CONSUMPTION

SUBSTANTIAL REDUCTION IN EXHAUST TEMPERATURES:

INCREASES ENGINE LIFE AND EXTENDS REBUILD INTERVALS

A DIRECT REDUCTION IN NOX EMISSION

CALL US FOR YOUR SOLUTIONS: 360 794-9100 or at: info@pjm-ecostar.com



TEST PROTOCOL SUMMARY REPORT

Customer: **Miles Sand And Gravel**
Location: Roy, Washington
Machine: Caterpillar **988G S/N: BHN01373**
Engine: Caterpillar 3456 DITA ATAAC TIER II CERTIFIED
Rated: 475 Net Flywheel Horsepower

Report:

The Eco Emissions Systems Catalyst Unit was installed on this machine, **June 26th, 2008**. At the time the machine had total frame hours of 9,178.8.

We conducted a baseline test on this machine prior to the start up of the EES unit to determine the amount of fuel burned in a 2 hour period. The test protocol used was the EPA test referred to as "The Stationary Test of a Mobile Diesel Engine" These tests were performed using approved S.A. E. methodology.

The test requires that the engine on the machine be brought up to operating temperature. At that point the fuel tank is filled as required up to a point where the refill can be absolutely duplicated.

The next step is to bring the engine to high idle and lock in the throttle. This operation is to continue for exactly two hours. At the end of the test period the engine is brought back to low idle and stopped. At this time the fuel tank is refilled to original mark established prior to the test. And the amount of fuel burned is recorded. Recording exhaust temperatures is also done concurrently while the test is running. This will give exhaust temperature readings at the tip of the Exhaust Stack as well as at the Turbocharger Exhaust Housing.

The purpose of this test protocol is to bring the engine to an operating level that can be duplicated for the follow-up test procedure. This methodology precludes the influences of the machine operator and eliminates any load on the engine, the result being, a test that totally isolates the engine

performance at it pertains to fuel consumption rates, and exhaust temperatures.

At the completion of the E.P.A. fuel test, we also ran tests on engine opacity (Smoke Density). This is done by using a Department of Transportation approved opacity meter.

At the completion of these three test procedures the Eco-Emission unit was turned on and the Platinum based catalyst was introduced into the engine via the air intake System.

The EES system continued to run on this machine through the summer and fall of 2008. On November 17, 2008, after operating for 1084 hours of continued use, we conducted the same E.P.A. test protocol described above to determine the effects and acquire the results from having used the catalyst system.

The results of the completed test procedures are shown on the following page. The highlights of those results are as follows:

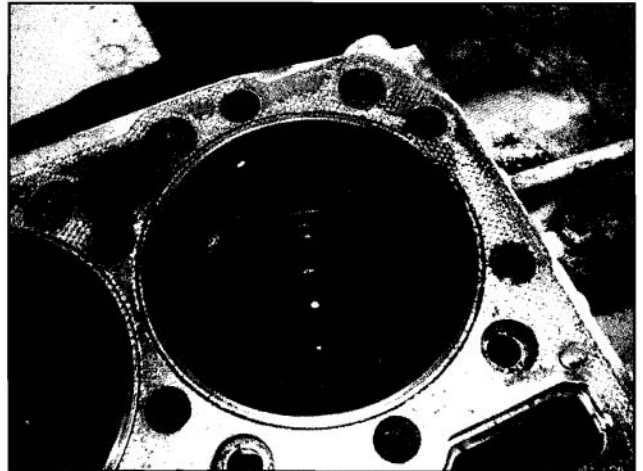
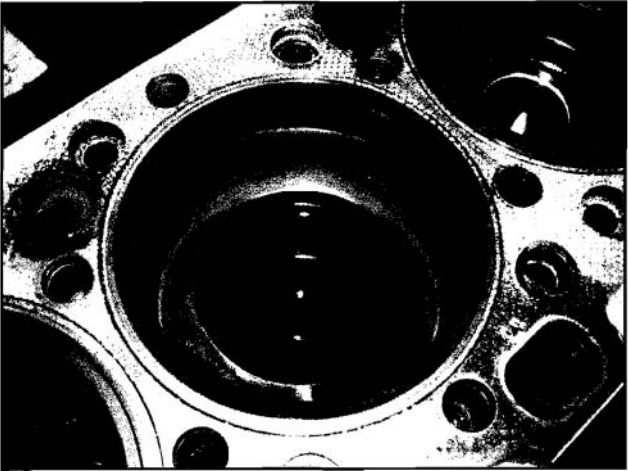
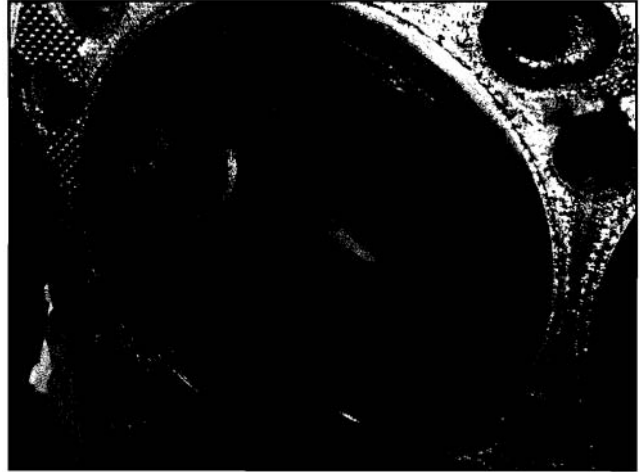
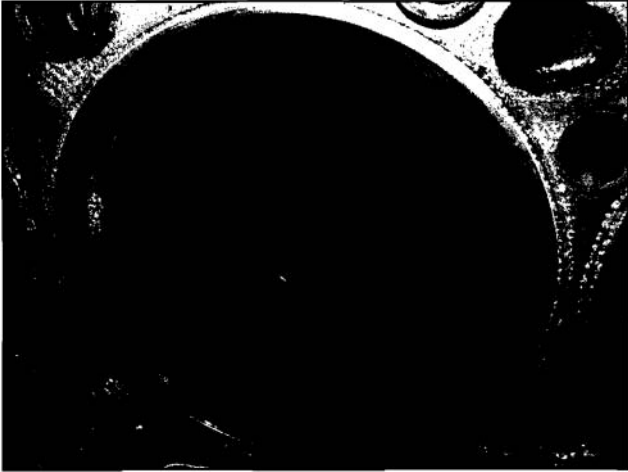
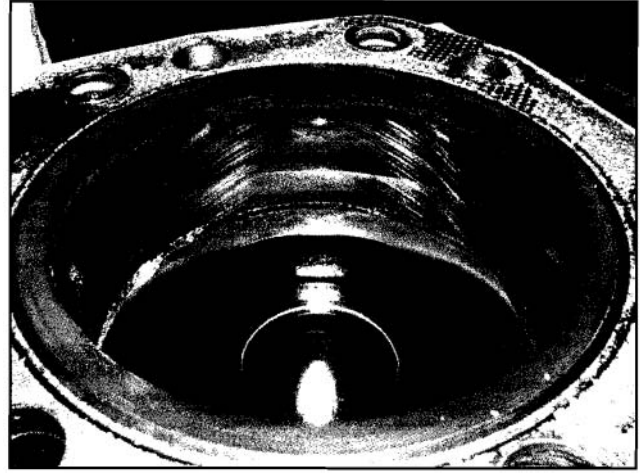
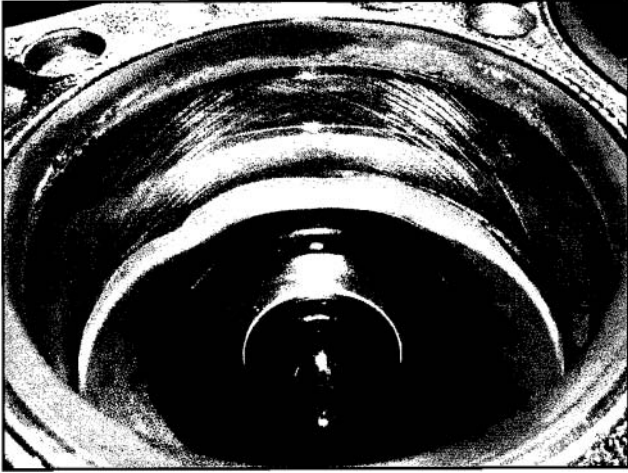
| TESTED ITEMS: | BASELINE TEST | TEST#2 @ 1084 HR | |
|-----------------------------|----------------------------|-------------------|----------------|
| DATE OF TEST: | June 26 th 2008 | November 17, 2008 | |
| EXHUAST TEMPERATURE | | | |
| STACK TIP | 398F | 364F | DECREASE 34F |
| TURBO HOUSING | 634F | 576F | DECREASE 58F |
| | | | |
| SMOKE OPACITY | 15.7% | 12.3% | DECREASE 21.6% |
| | | | |
| STD EPA FUEL TEST - 2 HOURS | 16.55 | 15.00 | DECREASE 9.4% |

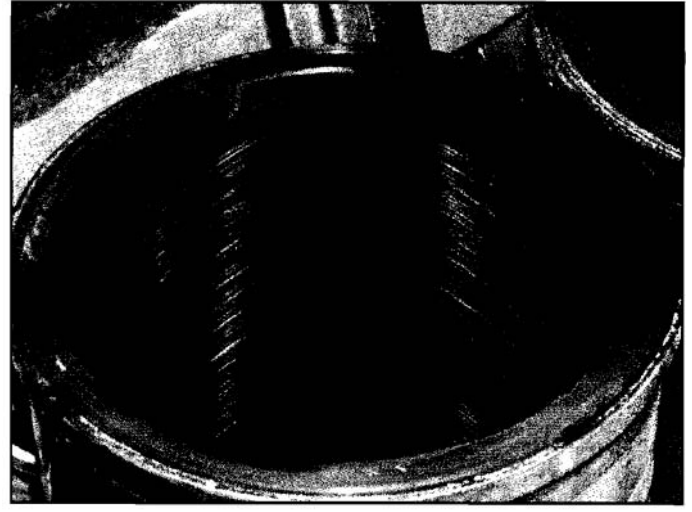
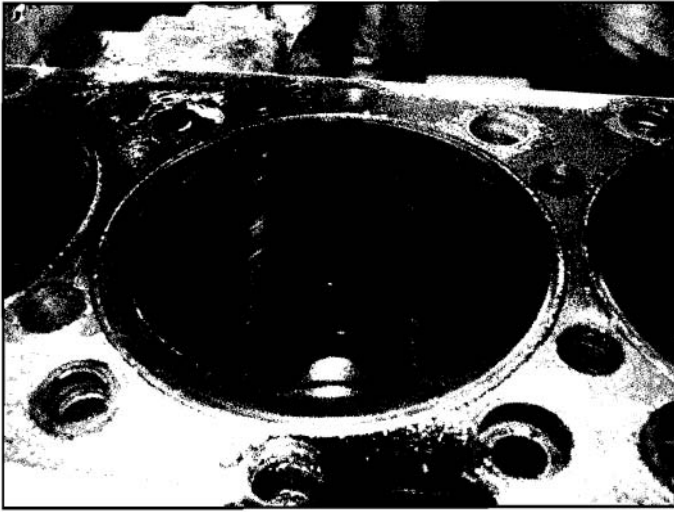
This machine had been scheduled for a engine rebuild in accordance with the company's equipment maintenance policies. In early December the machine was transported to NC Machinery (Cat Dealer) where the engine was removed. The engine was disassembled December 16, 2008 with just over 10,405 hours.

In talking with the lead mechanic, Doug Ryan and the shop Supervisor, Paul Meersman, they were both very impressed at how clean the inside of the engine appeared. Doug commented that the liners "looked like new" since you could still see the original crosshatching marks in the liners.

■ have included pictures of the liners, pistons, heads, injectors and the turbo on the following pages.

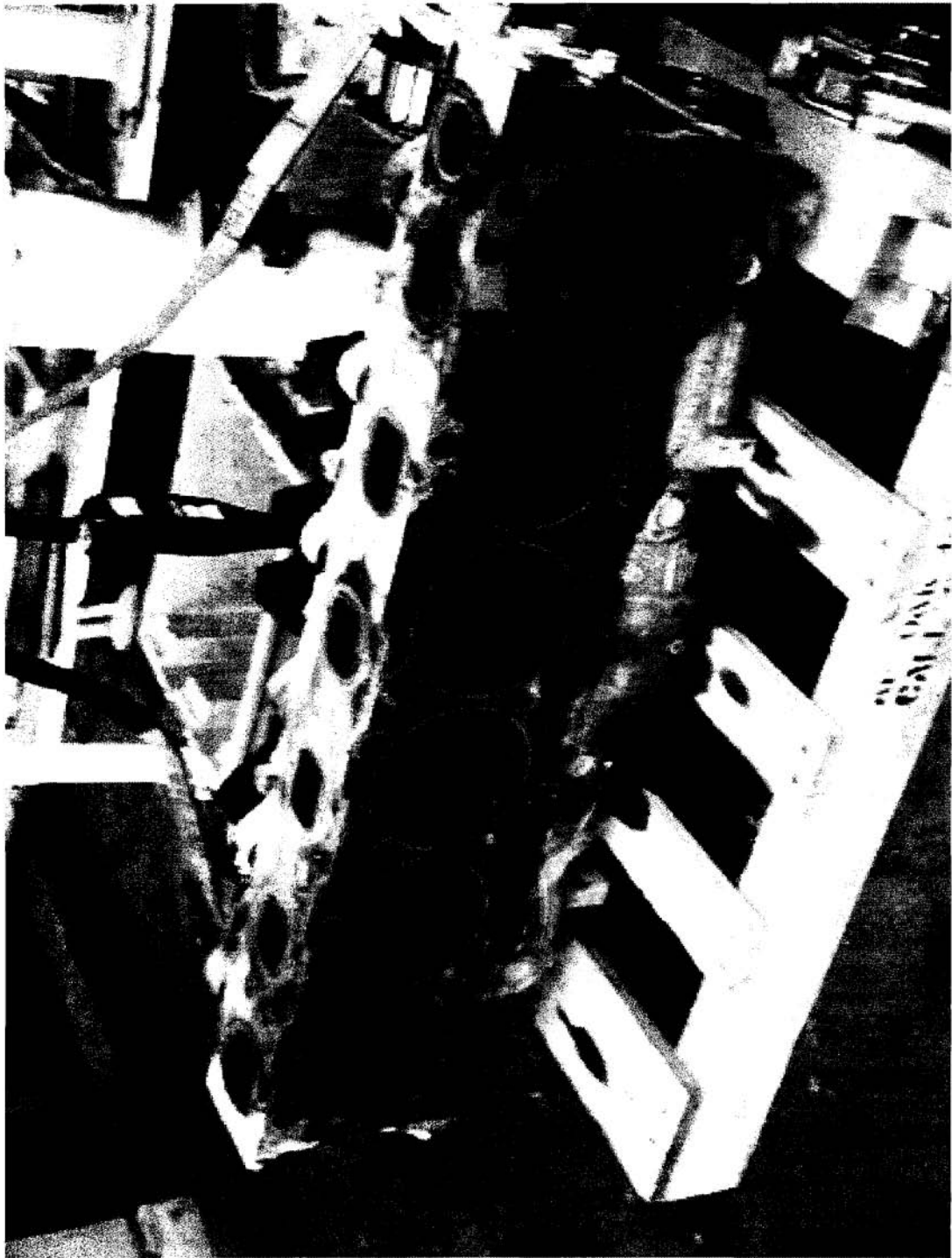
Even though we view this as the results we knew we would achieve, it is extremely gratifying to have achieved these results in the Pacific Northwest with well respected local companies.





The photos shown above were taken by NC Machinery in their shop during the disassembly of the Cat 3456 DITA ATAAC Tier II Engine removed the Caterpillar 988G Wheel Loader s/n BHN01373.

As shown, the photos indicate the cleaning effects of the EES Platinum Catalyst that occurred inside the engine during operations. The net result of this change in engine efficiency **confirms** that the reduction in carbon soot will reduce Diesel particulant matter by over 50%. A cleaner more efficient burning of fuel at the top of the cylinder is giving us an increase in torque, as well as a reduction in exhaust temperature and **NOx** since more fuel is burned at the time of combustion. It further confirms that a by-product of the removal of the carbon soot is leading to a reduction in overall fuel consumption; in this case over 9.4%. Basically the fuel savings is allowing this company to become a positive contributor to the reduction of their carbon footprint and green house gases through the normal course of operations.





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TEST RESULTS FOR MILES SAND & GRAVEL

MACHINE: CAT 988G LOADER SIN: BHN01373
ECO-EMISSION UNIT: E.E.S-12 SIN: 6015003005852
CAT ENGINE: CAT 3456 TIER II SIN: BTN02417

| DESCRIPTION | BASELINE TEST | 400 HOUR TEST | % OF CHANGE |
|-----------------------------|-----------------|-----------------|----------------|
| MACHINE MAKE: | CATERPILLAR | CATERPILLAR | |
| MACHINE MODEL: | 988G LOADER | 988G LOADER | |
| MACHINE SERIAL NUMBER: | BHN01373 | BHN01373 | |
| MACHINE FRAME HOURS: | 9178.8 | 9178.8 | |
| ENGINE MAKE: | CATERPILLAR | CATERPILLAR | |
| ENGINE MODEL: | 3456 TA TIER II | 3456 TA TIER II | |
| ENGINE HOUR SINCE REBUILD: | 9178.8 | 10262.1 | |
| TEST CONDITIONS: | | | |
| DATE OF TEST: | 6-26-2008 | 11-17-2008 | |
| TIME OF TEST: | 10:15 AM | 6:10 PM | |
| HOURS RUN ON E.T.I. UNIT: | 0 | 1084 | |
| AMBIENT AIR TEMP | 79.5F | 52.3 | |
| RELATIVE HUMIDITY | 39.8% | 63.6% | |
| EXHUAST TEMPERATURE | | | |
| STACK TIP | 398F | 364F | DECREASE 34F |
| TURBO HOUSING | 634F | 576F | DECREASE 58F |
| SMOKE OPACITY | 15.7% | 12.3% | DECREASE 21.6% |
| STD EPA FUEL TEST - 2 HOURS | 16.55 | 15.00 | DECREASE 9.4% |
| | | | |
| | | | |

Note: Please note that the Standard EPA Test for a Mobile Diesel Engine consists of starting with your fuel at a mark that can be duplicated. The engine is run for two hours at high idle, no load, no operator. This is done to remove the human influence on operations. At the conclusion of two hours the fuel is replaced and the amount used is recorded. So that it can be used to measure against future tests. Once load is introduced reduced fuel consumption may improve up to a efficiency rate determined by the engine.



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TEST RESULTS FOR: Miles Sand & Gravel

MACHINE: MACK BULK HAULER UNIT 334 CXN613

ECO-EMISSION UNIT: E.E.S-12 6015003005644

| DESCRIPTION | BASELINE TEST | 500 HOUR TEST | % QF CHANGE |
|---|----------------|----------------|--------------------------------|
| MACHINE MAKE: | MACK CX VISION | MACK CX VISION | |
| MACHINE MODEL: | CXN10 | CXN10 | |
| MACHINE SERIAL NUMBER: | 016403 | 016403 | |
| MACHINE FRAME HOURS: | 4909.2 | 5307.3 | |
| TRUCK MILEAGE | 134741.2 | 146106.62 | |
| ENGINE MAKE: | MACK | MACK | |
| ENGINE MODEL: | CXN613 | CXN613 | |
| ENGINE HOUR SINCE REBUILD: | 4909.2 | 5307.3 | |
| TEST CONDITIONS: | | | |
| DATE OF TEST: | 3-08-2008 | 06-10-2008 | |
| TIME OF TEST: | 11:00 AM | 12:45 PM | |
| HOURS RUN ON E.T.I. UNIT: | 0 | 398.1 | |
| AMBIENT AIR TEMP | 62.1 | 58.3 | |
| RELATIVE HUMIDITY | 42.4% | 68.8 | |
| EXHUAST TEMPERATURE | 279F | 252F | Decrease 27F |
| SMOKE OPACITY | 7.35 | 5.28 | Decreased 32.6% |
| STD EPA FUEL TEST - 2 HOURS | 6.26 Gallons | 5.06 Gallons | Decreased 18.9% |
| An adjustment for Seasonal Fuel Change: | | 2.5 to 3 % | Overall Decrease: average: 16% |
| | | | |
| | | | |

Note: Please note that the Standard EPA Test for a Mobile Diesel Engine consists of starting with your fuel at a mark that can be duplicated. The engine is run for two hours at high idle, no load, no operator. This is done to remove the human influence on operations. At the conclusion of two hours the fuel is replaced and the amount used is recorded. So that it can be used to measure against future tests. Once load is introduced reduced fuel consumption may improve up to a efficiency rate determined by the engine.

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ON HIGHWAY TRUCK

MACK VISION TRUCK CXN613 ENGINE - ANALYSIS OF COMBUSTION CATALYST SYSTEM

| | (BREAK-EVEN) | | | | |
|--|------------------------|----------------|-----------------|-----------------|-----------------|
| ANALYSIS PER ENGINE: | 5% REDUCTION | 8% REDUCTION | 9% REDUCTION | 10% REDUCTION | 11%REDUCTION |
| FUEL CONSUMPTION: | 2.90 / GALLON | 2.90 / GALLON | 2.90 / GALLON | 2.90 / GALLON | 2.90 / GALLON |
| | 6.5 GPH | 6.5 GPH | 6.5 GPH | 6.5 GPH | 6.5 GPH |
| EES SYSTEM REQUIRED: | ONE EES -12 PER ENGINE | | | | |
| CATALYST REQUIRED: 1 BOTTLES / UNIT | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| CATALYST LIFE PER BOTTLE: | 500.00 | 500.00 | 500.00 | 500.00 | 500.00 |
| HOURS OF OPERATION / YR | 2000.00 | 2000.00 | 2000.00 | 2000.00 | 2000.00 |
| NUMBER OF BOTTLES / YEAR | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 |
| CATALYST COST PER BOTTLE | 250.00 | 250.00 | 250.00 | 250.00 | 250.00 |
| CATALYST COST PER YEAR | 1000.00 | 1000.00 | 1000.00 | 1000.00 | 1000.00 |
| CATALYST COST PER HOUR @10 GPH (note \$0.875 per 12 gph) | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |
| TOTAL FUEL BURNED / YEAR HRS X GAL | 13000.00 | 13000.00 | 13000.00 | 13000.00 | 13000.00 |
| FUEL REDUCTION: | 0.05 | 0.08 | 0.09 | 0.10 | 0.11 |
| FUEL CONSUMPTION PER HOUR: | 6.50 | 6.50 | 6.50 | 6.50 | 6.50 |
| GALLONS SAVED PER HOUR | 0.34 | 0.52 | 0.59 | 0.65 | 0.72 |
| GALLONS OF FUEL SAVED | 682.50 | 1040.00 | 1170.00 | 1300.00 | 1430.00 |
| COST PER GALLON | 2.90 | 2.90 | 2.90 | 2.90 | 2.90 |
| VALUE OF FUEL SAVED: | 1979.25 | 3016.00 | 3393.00 | 3770.00 | 4147.00 |
| COST TO SAVE FUEL: | | | | | |
| CATALYST COST PER YEAR | 1000.00 | 1000.00 | 1000.00 | 1000.00 | 1000.00 |
| DELIVERY UNIT COST TOTAL (1 UNIT @ \$950.00 DELIVERED | 950.00 | 950.00 | 950.00 | 950.00 | 950.00 |
| TOTAL FUEL SAVINGS LESS COST PER ENGINE IN FIRST YEAR | 29.25 | 1066.00 | 1443.00 | 1820.00 | 2197.00 |
| FIRST YEAR INCLUDES AMORIZING DELIVERY UNIT | | | | | |
| TOTAL FUEL SAVINGS LESS COST PER ENGINE IN SECOND YEAR | 979.25 | 2016.00 | 2393.00 | 2770.00 | 3147.00 |
| TOTAL FUEL SAVINGS LESS COST PER ENGINE IN THIRD YEAR | 979.25 | 2016.00 | 2393.00 | 2770.00 | 3147.00 |
| TOTAL FUEL SAVINGS LESS COST PER ENGINE IN FOURTH YEAR | 979.25 | 2016.00 | 2393.00 | 2770.00 | 3147.00 |
| TOTAL FUEL SAVINGS LESS COST PER ENGINE IN FIFTH YEAR | 979.25 | 2016.00 | 2393.00 | 2770.00 | 3147.00 |
| TOTAL SAVINGS AFTER 5 YEARS: | 3946.25 | 9130.00 | 11015.00 | 12900.00 | 14785.00 |



Issue Date: Issue #120 Dec/Jan 2009

Low sulfur fuel raises new issues for diesel operators

Brian Rhoades and Dr. David Daniels

Ever since the first professional mariners went to sea, they have learned to adapt to changes. The introduction of the internal combustion engine and more advanced control systems brought both benefits and challenges. The latest challenge is the impact of emissions regulations and subsequent changes in fuels needed to meet those emission standards. Mariners who need to deal with these dramatic changes may have very little knowledge of how they can impact operations, costs and equipment.

The Clean Air Act has mandated that sulfur levels be reduced to less than 15 parts-per-million (ppm) in distillate fuels. A good source for information on the implementation dates of these changes can be found at www.clean-diesel.org. The Northeast and Middle Atlantic region are already at 500 ppm in marine diesel fuels. The remaining regions will switch to 500 ppm sulfur fuel by June 2010. All regions are scheduled to switch to Ultra Low Sulfur Diesel (ULSD), with a sulfur content of 15 ppm or less, in June 2012. One exception to these rules is California, which has already switched to ULSD fuel in many non-road applications. Although some of these dates are still well into the future, the reality is that refiners are now making ULSD which can be downgraded to LSD.

The process of removing sulfur has caused changes in many other properties of the fuel. On-road fuels have already made the switch to ULSD, and the problems caused by the changes in the fuel characteristics are well known. Fortunately, solutions are known and

already proven. Bringing the experience and lessons learned from on-road fuels to marine applications requires knowing what problems to look for. Some of these changes have already arrived in the marine market. For example, fuels with 19 ppm sulfur can be downgraded and sold as an LSD (500 ppm) fuel. This fuel would have the properties and problems associated with ULSD.

The methods used in most refineries in North America to remove the sulfur are known as hydrotreating. These methods are very efficient at removing sulfur, but also make other physical changes to the fuel's chemical composition. The consequences of sulfur reduction include removal of natural lubricity compounds, natural conductivity properties and changes in combustion properties.

Fuel serves three major functions in a diesel engine. It is the lubrication for fuel pumps and injectors, a coolant for the injectors and the energy source to drive the engine. The reduction in natural lubricity compounds leaves no protective barrier between metal surfaces, resulting in damage to vital engine components. This would be similar to, but not quite as drastic, as replacing lube oil with a solvent. Imagine the damage. For this reason ASTM, an international standards organization, put a lubricity specification on all D975 middle distillate fuels in 2005 in order to keep the fuels fit for purpose and protect consumers. A special fact to keep in mind is that the current lubricity test was developed to protect rotary fuel pumps and may not be the best indicator for modern fuel injectors or barrel and piston type pumps where clearances are smaller.

Without the use of lubricity additives, most fuel would not have the lubricity required to protect the fuel injection systems. The ASTM specification requires that the wear scar from the lubricity test be 520 microns or less. There are many original equipment manufacturers that recommend a wear scar of 460 microns or even lower, and that is the European specification. The only way to determine if enough lubricity additive has been added to the fuel is having the fuel tested using ASTM D6079. If it is determined that more lubricity is needed, there are several chemistries of lubricity improvers that have

been used. With the higher treat rates needed for ULSD fuels, some of these additives have been found to cause problems. Mono acids, amides and dimer acids additives may react with water, caustic carryover or other additive packages that may be present in the fuel or lube oil. Fully synthetic esters do not cause these problems.

The removal of sulfur and other compounds has decreased the fuel's conductivity, creating a potentially dangerous situation. A static charge can readily build up in the fuel while it is being pumped and/or going through fine filtration. Unfortunately, ultra low sulfur fuels no longer have the ability to dissipate the charge without an additive. This can lead to sudden arcing or sparking in the vapor phase, often with catastrophic results. Static dissipater additives are required for ULSD fuels and most LSD fuel. These are added most often at the terminal. The ASTM specification for conductivity of a D975 fuel is 25 picosiemens/meter at time and temperature of loading. This specification is not found in marine fuels, which may lead to more dangerous incidents occurring.

Another important word of caution when selecting a lubricity additive is that many lubricity additives have been proven to disarm the static dissipater additive over time. This can cause the conductivity of a fuel to drop to far riskier levels and result in the danger of ignition from static electricity.

Fully synthetic esters have the least effect on static dissipater additives.

Sulfur is antagonistic towards microbial growth, meaning that its presence helps control the reproduction and growth in fuel storage tanks and systems. The removal of the sulfur and phenolic compounds makes an ideal situation for microbial growth to occur. Biocides have been necessary in diesel fuel for years when the fuel is stored in certain regions. With the addition of B2 and B5 biodiesel blends into the fuel distribution network, the use of biocides may become a necessity. The Bxx blends can hold more water molecules in suspension, which spreads out where microbial, fungal, and yeast growth will occur. Proper housekeeping and the use of a biocide that works in both the water phase and the

fuel phase is the only way to ensure that microbial problems are kept at a minimum.

If light cycle oil (LCO) is added to the marine distillate fuel supply there can be serious stability issues and other problems. LCO tends to degrade rapidly and turn to sludge. It may look like diesel fuel when it is new, but without stabilizers, it can clog fuel filters and lines. LCO also has a low cetane number between 20 and 25, so it can contribute to rough starting, rough idling, poor combustion, deposit formation and very high emissions. Additives containing a cetane improver can help to avoid these combustion problems and help to reduce emissions.

The switch to LSD and then to ULSD can be a smooth transition if the proper steps are taken. Knowing what problems may occur and how to treat the fuel to avoid these problems is an important step. The maritime industry is under pressure to reduce emissions and improve efficiency. Maintaining engine reliability, while switching to these cleaner fuels is imperative for the clean and safe operation of vessels. The use of fuel treatment is present at the refineries and terminals, but to ensure vessel reliability it may be necessary to take additional steps.

Brian Rhoades is Eastern regional marine manager for Innospec Fuel Specialties and holds a chief engineer license from the U.S. Coast Guard. Dr. David Daniels is a director of research and development for Innospec and has almost 30 years of experience with middle distillate fuels.



HOW THE EES SYSTEM WORKS

The burning of diesel fuel in an engine is a process which has some major inefficiencies. In particular a significant amount of the fuel enters the exhaust system without being burned or benefiting the engine. These unburned exhaust gases are mostly complex hydrocarbons plus other pollutants.

Over the years the addition or subtraction of air has been a major factor in deciding how to get the most out of a particular engine in the most efficient manner. The ideal fuel to air ratio, while agreed upon by most, leaves out a major part of the process. Not considered normally is the fact that only a portion of the oxygen in the air goes from stable to a radical state. Only oxygen in the radical state can enter into the combustion/burn process.

Research has shown that platinum in its pure state can dramatically increase the percentage of oxygen that goes into the required radical state. By introducing platinum into the combustion process of a diesel engine, it is possible to increase the percentage of the fuel burned in the engine significantly.

The most popular methods tried to achieve this process are to coat parts of the combustion chamber with platinum, or to mix platinum with the fuel. These methods are not satisfactory for any extended term for obvious reasons. Coating lacks durability over time and temperature and to replace the used catalyst is very difficult. Mixing the platinum in fuel is difficult as it must remain inert in the very fuel it is trying to affect until it reaches the temperature of combustion, and if left in a tank, must be remixed or turbulent to get even distribution.

There is an efficient method where platinum is delivered into the engine in a pre-combustion condition through the air induction system. The primary benefit is the effect it has on the engine prior to the combustion process. Coming into the engine via the air intake system as an inert compound allows it not to be affected on most engines as it is transported to the combustion chamber. As the rising piston compresses the air and heats the chamber the platinum compound is transformed into pure platinum and a harmless salt byproduct that is consumed in the burning process.

This platinum is pure before the fuel even reaches the injector and begins to break down soot particles that line the various parts of the chamber. Soot is like sandpaper in that it creates friction, accelerates wear, and generates excessive heat. This cleansing action eliminating the soot makes the engine far more efficient and extends its life. It also makes the lubricating oils more effective as they are not contaminated nearly as quickly. These actions are unique and predictable.

As the engine becomes cleaner, the platinum begins working on the fuel. Diesel fuel is made of simple and complex hydrocarbons. The simple hydrocarbons burn easily and at somewhat lower temperatures. The more complex hydrocarbons generally require a higher temperature to burn and, therefore, become a part of the exhaust. Platinum's reaction to the hydrocarbons in the fuel break some of the more complex chains into simple chains making them more burnable. The secondary process of this catalytic reaction is to create oxygen radicals which also increase the percentage of fuel burned.

In a diesel engine fuel begins burning in the combustion stroke. There is a considerable amount of burning still taking place during the exhaust stroke and, if not properly treated, continues out the exhaust and into the environment. When more of the fuel is burned in the combustion stroke, less is burned in the exhaust stroke. Less fuel is required to do the same amount of work. Normally the cost of the system is far less than the cost of the fuel saved.

Fuel burning in the exhaust stroke expands and pushes against the piston that is trying to expel everything in the chamber. This creates an engine vibration that is harmful and noisy. It occurs in all diesel engines. Lessening the effect adds life and efficiency to any engine. It also lowers the exhaust temperature which is the culprit in creating the Nitrous Oxides that are so harmful to our lungs. The lower the temperature of the exhaust and the lower the expulsion of hydrocarbons, the less ozone is created at ground level. These gases are normally discharged at the same level air conditioners collect their air and therefore the health factors are huge.

The systems provided by EcoEmissions Systems also add other inherent components that have a positive effect on the odor of the diesel exhaust and further reduce the Nitrous Oxides.

Finally, the most noticeable effect is the reduction of black smoke from the air. This unburned particulate matter is the cause of smog and odor and affects everything that lives. In a society trying to leave a better environment for future use, this is one of the most basic ways of doing so.

The most interesting aspect of this system is that it basically costs nothing. It save more in fuel costs than it costs to use, and the byproduct is a engine that lives longer, runs quieter, and an environment that is certainly healthier in which to live for ourselves and our children.





"BEST AVAILABLE CONTROL TECHNOLOGY"

"MAXIMUM DEGREE OF REDUCTION IN THE DISCHARGE OF AIR POLLUTANTS(EMISSIONS) ACHIEVEABLE THROUGH THE CURRENTLY AVAILABLE METHODS, SYSTEMS, AND TECHNIQUES WHILE TAKING ECONOMIC, ENERGY, ENVIRONMENTAL, AND OTHER COSTS INTO CONSIDERATION."

THE PERFECT PRODUCT IS THAT WHICH CAN TAKE THE MOST AIR POLLUTANTS OUT OF THE EXHAUST AT NO COST AT ALL.

THE EES PROCESS CLEANS THE SOOT OUT OF AN ENGINE AND CAUSES THE FUEL TO BURN MORE EFFICIENTLY WHICH ELIMINATES A VERY **HIGH** PERCENTAGE OF:

PARTICULATE MATTER, **NO_x**, HYDROCARBONS, AND CARBON MONOXIDE ALL WHILE **REDUCING BLACK SMOKE** FROM THE EXHAUST. ONE PRODUCT ACHIEVES ULTIMATE BACT:



EES SYSTEMS COSTS LESS TO USE THAN WHAT IT SAVES IN FUEL. IT **WILL** ACTUALLY ACCOUNT FOR A PROFIT. ALL **THIS** WHILE MAKING A MAJOR REDUCTION IN YOUR ENGINE'S TOTAL POLLUTION AND CARBON FOOTPRINT.

IT IS CALLED BACT!!!

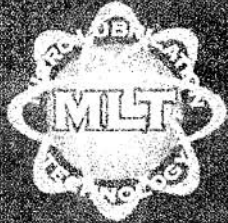
P.O. BOX 1318 MONROE, WA 98272 PH*: 360 794-9100 FAX*: 360 805-8565

WEBSITE: WWW.PJM-ECOSTAR.COM

SUPERIOR
BESTLINE
LUBRICANTS

DIESEL FUEL TREATMENT

With Sulfur Replacement Technology-SRT®



PREMIUM SYNTHETIC

- Reduces Wear by Over 25%
- Improves Mileage and Performance
- Reduces Harmful Emissions and Soot
- Cleans and Lubricates Fuel System

Registered with the US EPA: 209120002

SYNTHETIC DIESEL FUEL TREATMENT

with

Sulfur Replacement Technology (SRT)™

BestLine SRT™, the Ultimate Synthetic Diesel Fuel Protection:

- Maximizes Power and Compression
- Improves Mileage and Performance
- Reduces Harmful Emissions and Soot
- Cleans and Lubricates Injectors, Pumps and Valves
- Provides Quicker Starting in Cold Weather

Sulfur Replacement Technology (SRT)™ is the science behind BestLine's advanced Synthetic Diesel fuel Treatment. SRT™ is designed to improve the operational efficiencies of both older (pre-2006) and new diesel engines (2 stroke or 4 stroke). SRT's superior lubrication will reduce the premature wear that may result from the reduction in lubricity in Ultra Low Sulfur Diesel (ULSD) (15ppm sulfur). The HFRR Test (ASTM D-975) demonstrated that ULSD, with BestLine's SRT™ added, displayed a reduction of over 25% in wear in metal to metal contact over ULSD without BestLine's SRT. BestLine's Diesel Fuel Treatment, with SRT™, is the most advanced diesel fuel treatment available. It contains cetane enhancers, an anti-gel, algacides and superior lubricants. SRT™ is registered with the EPA (Environmental Protection Agency) under 40-CFR 79.23. SRT™ is compatible with all types of diesel fuel, including bio-diesel, summer, winter and arctic grades. Regular use of SRT™ will assure maximum engine efficiency, performance and moisture protection. BestLine's SRT™ Synthetic Diesel Fuel Treatment will clean and lubricate the injectors for the most efficient combustion spray and burn. SRT™

in diesel fuel will clean and lubricate the fuel pump and valves and seats. SRT™ will extend the life of the fuel pump and injectors to their maximum. SRT™ impedes algae from developing in storage and standing tanks. Regular use will dramatically improve engine performance, economy and reduce emissions and soot particulates.

Directions: For the most effective results add 3 oz to 10 gallons (90ml to 40 Liters) for the initial treatment. Use 1 to 2 oz per 10 gallons (30ml to 60ml per 40 Liters) thereafter. When fuel has been left standing it may slowly decompose, losing its ability to meet peak performance standards, and in this case it may be necessary to add 2 oz per 10 gallons (60ml per 40 Liters) to improve performance. Available in 16 oz, 1/2 gallon, 1 gallon, 2.5 gallon, 5 gallon, 55 gallon and volume shipments.

Material Safety Data Sheets are available on request.

BestLine International Research Inc. www.bestlinelubricants.com Made in USA 19736

Available in sizes from 16 oz to 55 gallon drums



FOR DIESEL ENGINES



PREMIUM SYNTHETIC

The Ultimate Engine Protection
Compatible with All Types of Oil



PREMIUM SYNTHETIC

Compatible with All Types of Oil



**SYNTHETIC
DIESEL ENGINE TREATMENT**

with
Micro Lubrication Technology (MLT)™

The Ultimate Synthetic Diesel Engine Protection

Exceeds Performance Standards for:

- Reduced Friction, Temperature and Wear
- Improved Fuel Economy
- Improved Performance
- Reduced Emissions
- Maximized Engine Durability

BestLine's Diesel Engine Treatment, with **Micro Lubrication Technology (MLT)™**, is the most advanced diesel engine oil treatment on the market today. This product has been tested in a variety of synthetic and mineral based engine oils using the most severe testing methods, with exceptional results. **Micro Lubrication Technology (MLT)™** provides layer of polarized molecules that ionically bond to the engine's metal surfaces and resist metal-to-metal contact experienced during cold starts and under load. Extensive testing has demonstrated that, when added to diesel motor oils, either mineral or synthetic, BestLine's Diesel Engine Treatment substantially reduces friction, temperature and wear. Severe engine-stand tests have demonstrated that motor oil containing **BestLine's Diesel Engine Treatment** will maintain viscosity, improve fuel consumption, and substantially reduce metal wear, sludge and varnish.

Directions: Add 15% by volume to the diesel engine oil for. Thereafter, for each oil change, use **BestLine's Diesel Engine Maintenance**. **BestLine's Diesel Engine Treatment** can be added to either synthetic or mineral based oils. Available in: 16 oz, 1 quart, 1 gallon, 5 gallon and 55 gallon drums.

Material Safety Data Sheets are available on request.

BestLine International Research Inc. www.bestlinelubricants.com Made In USA, 19736

**SYNTHETIC
DIESEL ENGINE MAINTENANCE**

with
Micro Lubrication Technology (MLT)™

The Ultimate Synthetic Diesel Engine Protection

Exceeds Performance Standards for:

- Reduced Friction, Temperature and Wear
- Maximizing Engines Performance and Fuel Efficiency
- Ultimate Protection While Reducing Emissions

BestLine Diesel Engine Maintenance™ with **Micro Lubrication Technology (MLT)™**, is designed to be added to your oil with each oil change. After your diesel engine has been treated with **BestLine Diesel Engine Treatment™**, adding **BestLine Diesel Engine Maintenance™** with each oil change will maintain **ALL** of the protection, economy and performance obtained from **BestLine Diesel Engine Treatment™**. It will maintain the layer of polarized molecules that resists metal-to-metal contact experienced during cold starts and under load.

BestLine Diesel Engine Maintenance™ with **MLT™** will:

- Maintain the viscosity of your diesel engine's oil, even under the most severe running conditions;
- Protect the inner components of your diesel engine from friction and wear;
- Prevent hot spots and protect your diesel engine from extreme temperature;
- Clean ring grooves for increased compression; and
- Reduce both sludge and varnish.

Directions: To provide the best protection for your diesel engine, add 12 oz (356 ml) to every oil change. **BestLine Diesel Engine Maintenance™** may be added to either synthetic or mineral based oils. For engines using more than five quarts of oil, add Diesel Engine Maintenance to equal 10% by volume. Available in: 12 oz, 1 gallon, 5 gallon and 55 gallon drums.

Material Safety Data Sheets are available on request.

BestLine International Research Inc. www.bestlinelubricants.com Made In USA, 19736

Available in sizes from 16 oz to 55 gallon drums

Available in sizes from 12 oz to 55 gallon drums

SUPERIOR
BESTLINE
LUBRICANTS

POWER-TRAIN LUBRICANT

MICRO LUBRICATION
MLT™
TECHNOLOGY



PREMIUM SYNTHETIC

The Ultimate Power-Train Protection

- **Automatic Transmissions**
- **Standard Transmissions**
- **Power Steering**
- **Differential**
- **Water Pump**

SYNTHETIC POWER TRAIN TREATMENT

with

Micro Lubrication Technology (MLT)™

The Ultimate Power Train Treatment:

Exceeds all Performance Standards to Reduce Friction, Heat and Wear:

Automatic Transmissions

Standard Transmissions

Transfer Cases

Power Steering

Differential

Water Pump Lubricant

The Ultimate Drive Line Protection:

BestLine's Synthetic Power Train Treatment, is the most advanced product on the market today and will perform equally as well with synthetic or mineral based fluids and lubes. **BestLine's Power Train Treatment** substantially reduces friction, temperature and wear, while improving the efficiency of driveline, which can relate to long term reduced repair costs and fuel consumption. Lubricates the water pump for longer trouble free life

Automatic Transmission: Cleans valve body and plates allowing for a more efficient shift and cooler operating temperature.

Standard Transmission/Differential: Treats the gears, bearings and Syncro-plates with a protective coating that resists wear while allowing for quicker and more efficient operation.

Power Steering: Enhances the efficiency of the power steering pump, ram and any restrictive fittings, while reducing overall friction, wear and temperature.

Water Pump: Enhances the efficiency of the pump, lubricate the bearing(s) while coating the radiator with a protective coating to reduce oxidation while improving and the flow of coolant.

Directions: Automatic Transmission 6oz/180ml., Standard Transmission 4 oz/120ml, Power Steering 2 oz/60 ml, Water Pump 2oz/60 ml, Differential 2oz/ 60ml. Transfer Case Lube 4 oz. Custom packaging on request.

Warning: Do Not Add To Brake Fluid

Available in: 16 oz, 1 quart, 1 gallon and 55 gallon drums.

Material Safety Data Sheets available on request

BestLine International Research Inc. www.bestlinelubricants.com Made in USA 19736

Available in 16 oz, 1/2 gallon, 1 gallon, 2.5 gallon, 5 gallon, 55 gallon and volume shipments



PENETRATING LUBRICANT



PREMIUM SYNTHETIC
MLT 101
PREMIUM SYNTHETIC
PENETRATING LUBRICANT

With Micro Lubrication Technology MLT™

SYNTHETIC MLT 101® PENETRATING LUBRICANT

with
Micro Lubrication Technology (MLT)™

BENEFITS:

- Penetrates Rust and Corrosion
- Lasting Lubricant
- Loosens Sticky Mechanisms
- Lubricates as it Penetrates
- Displaces Moisture
- Cleans and Retards Electrical Corrosion
- Treats and Maintains Metal Cutting Edges
- 1001 Uses as Lubricating Penetrant

MLT 101® is a synthetic industrial multi-purpose penetrating lubricant with patent pending **Micro Lubrication Technology (MLT)™** MLT. BestLine's **MLT 101®** is the most advanced multi-purpose industrial penetrating lubricant in the market. **MLT 101®** was formulated to work in the most extreme conditions to quickly penetrate rust and corrosion while providing a protective barrier of lubricant. **MLT 101®** is designed to meet the needs of the professional in an industrial setting, or in the shop or garage. **MLT 101®** will penetrate rust while lubricating most everything mechanical, including electric and air tools. **MLT 101®**, with its superior dielectric strength, can be used to clean electrical contacts and

APPLICATION:

- Unlimited Industrial Applications
- Automotive and Garage
- Drilling and Tapping
- Electric and Air Tools
- Electrical Contacts
- Rusted Bolts and Mechanisms
- Air Tools

prevent oxidation and corrosion. **MLT 101®** is the most advanced product for drilling, tapping, lathing or cutting metals.

#1 ENEMY OF RUST and #1 in LUBRICATION!

Available in: 14oz Safety Pump, Aerosol, 1-gallon, 5 gallon and 55 gallon drums.

Material Safety Data Sheets available on request.

BestLine International Research Inc.
www.bestlinelubricants.com Made In USA 19736

14oz Safety Pump to 55 gallon drums

BestLine Credentials:

BestLine has been granted a license from the American Petroleum Institute (API) to produce and sell its own energy conserving motor oils. This license was granted because of the rigorous third party testing that has been performed on BestLine's products.

Both BestLine's Diesel Fuel Treatment and BestLine's Gasoline Conditioner have been registered with the United States Environmental Protection Agency. This registration proves that the EPA has reviewed all the components of these fuel additives and found, from an environmental point of view, that the components are compliant to the most recent EPA standards. (Note - there is no similar registration process for BestLine's other products.)

BestLine supports the monitoring and review of its test data by the American Chemistry Council of Arlington, VA.

On the 29th of August 2005 BestLine successfully passed an industry accepted "Sequence VIB" test at South West Research Institute in San Antonio Texas. The tests of BestLine's products were monitored and registered with The American Chemistry Council and the American Petroleum Institute (API).

On the 4th of October 2005, BestLine successfully passed a Sequence VIBSJ at Southwest Research Institute.

On the 24 March 2006 BestLine successfully passed the industry accepted "Sequence VIII" test at Intertek Automotive Research (formally EG&G - Perkin Elmer) also in San Antonio Texas.

On the 8th of September, 2006, BestLine completed the HFRR (High Frequency Reciprocating Rig) Test, performed at Intertek Caleb Brett, at their California laboratory which demonstrated that BestLine's Diesel Fuel Treatment, when added to Ultra Low Sulfur Diesel (ULSD) fuel, was able to reduce wear by over 25% from what is deemed acceptable to use ULSD in 2006 or older diesel engines.

BestLine has completed a number of third party non-bias Beta tests, involving racecars, passenger cars, Class 8 trucks, locomotives, etc., all with outstanding results. BestLine will continue to formulate, blend and package its products at an Ohio production facility. BestLine is dedicated to producing a full line of energy conserving products for the consumer and industry alike.



MARINE ENGINE

CAT 3516 PROPULSION ENGINE - ANALYSIS OF COMBUSTION CATALYST SYSTEM

| ANALYSIS PER ENGINE: | (BREAK-EVEN) | | | | |
|--|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| | 4% REDUCTION | 6% REDUCTION | 7% REDUCTION | 8% REDUCTION | 9%REDUCTION |
| FUEL CONSUMPTION: | 2.50 / GALLON 60 GPH | 2.50 / GALLON 60 GPH | 2.50 / GALLON 60 GPH | 2.50 / GALLON 60 GPH | 2.50 / GALLON 60 GPH |
| ETI UNITS REQUIRED: | TWO - E.E.S.-36 UNITS | | | | |
| CATALYST REQUIRED: 3 BOTTLES / UNIT | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 |
| CATALYST LIFE PER BOTTLE: | 500.00 | 500.00 | 500.00 | 500.00 | 500.00 |
| HOURS OF OPERATION / YR | 4500.00 | 4500.00 | 4500.00 | 4500.00 | 4500.00 |
| NUMBER OF BOTTLES / YEAR | 54.00 | 54.00 | 54.00 | 54.00 | 54.00 |
| CATALYST COST PER BOTTLE | 450.00 | 450.00 | 450.00 | 450.00 | 450.00 |
| CATALYST COST PER YEAR | 24300.00 | 24300.00 | 24300.00 | 24300.00 | 24300.00 |
| CATALYST COST PER HOUR @10 GPH (note \$0.875 per 12 gph) | 5.40 | 5.40 | 5.40 | 5.40 | 5.40 |
| TOTAL FUEL BURNED / YEAR HRS X GAL | 270000.00 | 270000.00 | 270000.00 | 270000.00 | 270000.00 |
| FUEL REDUCTION: | 0.04 | 0.06 | 0.07 | 0.08 | 0.09 |
| FUEL CONSUMPTION PER HOUR: | 60.00 | 60.00 | 60.00 | 60.00 | 60.00 |
| GALLONS SAVED PER HOUR | 2.46 | 3.60 | 4.20 | 4.80 | 5.40 |
| GALLONS OF FUEL SAVED | 11070.00 | 16200.00 | 18900.00 | 21600.00 | 24300.00 |
| COST PER GALLON | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 |
| VALUE OF FUEL SAVED: | 27675.00 | 40500.00 | 47250.00 | 54000.00 | 60750.00 |
| COST TO SAVE FUEL: | | | | | |
| CATALYST COST PER YEAR | 24300.00 | 24300.00 | 24300.00 | 24300.00 | 24300.00 |
| DELIVERY UNIT COST TOTAL (2 UNITS @ \$1,650.00 EA DELIVERED AI | 3300.00 | 3300.00 | 3300.00 | 3300.00 | 3300.00 |
| TOTAL FUEL SAVINGS LESS COST PER ENGINE IN FIRST YEAR | 75.00 | 12900.00 | 19650.00 | 26400.00 | 33150.00 |
| FIRST YEAR INCLUDES AMORIZING DELIVERY UNIT | | | | | |
| TOTAL FUEL SAVINGS LESS COST PER ENGINE IN SECOND YEAR | 3375.00 | 16200.00 | 22950.00 | 29700.00 | 36450.00 |
| TOTAL FUEL SAVINGS LESS COST PER ENGINE IN THIRD YEAR | 3375.00 | 16200.00 | 22950.00 | 29700.00 | 36450.00 |
| TOTAL FUEL SAVINGS LESS COST PER ENGINE IN FOURTH YEAR | 3375.00 | 16200.00 | 22950.00 | 29700.00 | 36450.00 |
| TOTAL FUEL SAVINGS LESS COST PER ENGINE IN FIFTH YEAR | 3375.00 | 16200.00 | 22950.00 | 29700.00 | 36450.00 |
| TOTAL SAVINGS AFTER 5 YEARS: | 13575.00 | 77700.00 | 111450.00 | 145200.00 | 178950.00 |



TEST RESULTS FOR HOS BROS CONST
MACHINE: KOMATSU PC400LC-7 #3134 W/ TIER II ENGINE

| DESCRIPTION | BASELINE TEST | 500 HOUR TEST | 1100 HOUR TEST | % OF CHANGE FROM BASELINE |
|-----------------------------|-----------------|------------------|------------------|---------------------------|
| MACHINE MAKE: | KOMATSU | | | |
| MACHINE MODEL: | PC600LC-7 | | | |
| MACHINE SERIAL NUMBER: | 20170 | | | |
| MACHINE FRAME HOURS: | 2417 | 2815 | 3535 | |
| ENGINE MAKE: | KOMATSU | | | |
| ENGINE MODEL: | SA6D140E3 T-II | SA6D140E3 T-II | SA6D140E3 T-II | |
| ENGINE HOUR SINCE REBUILD: | 2417 SINCE NEW | 2815 SINCE NEW | 3535 SINCE NEW | |
| TEST CONDITIONS: | | | | |
| DATE OF TEST: | 3-26-2008 | 7-28-2008 | 11-17-2008 | |
| TIME OF TEST: | 1:20 PM | 9:45 AM | 1:45 PM | |
| HOURS RUN ON E.T.I. UNIT: | 0 | 398 | 1134 | |
| AMBIENT AIR TEMP | 57.8F | 70.3 | 53.3 | |
| RELATIVE HUMIDITY | 69.1 | 41.7 | 67.5 | |
| EXHUAST TEMPERATURE | | | | |
| STACK TIP | 341F | 309F | 301F | DECREASE 40F |
| TURBO | 401F | 363F | 346F | DECREASE 55F |
| SMOKE OPACITY | 12.9% | 11.7% | 10.3% | DECREASE 20.1% |
| STD EPA FUEL TEST - 2 HOURS | 7.2 GAL / 2 HRS | 6.55 GAL / 2 HRS | 6.45 GAL / 2 HRS | DECREASE 10.4% |
| | | | | |
| | | | | |

Note: Please note that the Standard EPA Test for a Mobile Diesel Engine consists of starting with your fuel at a mark that can be duplicated. The engine is run for two hours at high idle, no load, no operator. This is done to remove the human influence on operations. At the conclusion of two hours the fuel is replaced and the amount used is recorded. So that it can be used to measure against future tests. Once load is introduced reduced fuel consumption may improve up to a efficiency rate determined by the engine.



P.O. BOX 1318 MONROE, WA 98272 PH#: 360 794-9100 FAX#: 360 805-8565

TEST RESULTS FOR BUSE TIMBER

MACHINE: CATERPILLAR 988B LOGGER SIN: 50W01260

EMISSION TECH UNIT: 6015003005614

| DESCRIPTION | BASELINE TEST | 500 HOUR TEST | % OF CHANGE |
|---|---------------------------|---------------------------|----------------|
| MACHINE MAKE: | CATERPILLAR | CATERPILLAR | |
| MACHINE MODEL: | 988B LOGGER | 988B LOGGER | |
| MACHINE SERIAL NUMBER: | 50W01280 | 50W01280 | |
| MACHINE FRAME HOURS: | 540 (NEW METER) | 1160 HRS IND. | |
| | 30,000 PLUS HRS | 30,000 PLUS HRS | |
| ENGINE MAKE: | CATERPILLAR | CATERPILLAR | |
| ENGINE MODEL: | 3408 | 3408 | |
| ENGINE HOUR SINCE REBUILD: | UNKNOWN | UNKNOWN | |
| TEST CONDITIONS: | | | |
| DATE OF TEST: | AUG 14 TH 2008 | OCT 15 TH 2008 | |
| TIME OF TEST: | 3:30 PM | 4:30 PM | |
| HOURS RUN ON E.T.I. UNIT: | -0- HOURS | 570 HRS | |
| AMBIENT AIR TEMP | 75.6F | 59.9F | |
| RELATIVE HUMIDITY | 54.2 | 78.7% | |
| EXHUAST TEMPERATURE -TURBO | 615F | 525 | 90F REDUCTION |
| EXHAUST TEMPERATURE- TIP | 481 | 392 | 89F REDUCTION |
| SMOKE OPACITY | 94.2% | 39.4% | 58.3%REDUCTION |
| STD EPA FUEL TEST - 2 HOURS | 19.6 | 16.1 | 17.9%REDUCTION |
| NOTE: ENGINE WAS OVERFUELING AT BEGINNING OF TEST - SINCE CORRECTED | | | |

Note: Please note that the Standard EPA Test for a Mobile Diesel Engine consists of starting with your fuel at a mark that can be duplicated. The engine is run for two hours at high idle, no load, no operator. This is done to remove the human influence on operations. At the conclusion of two hours the fuel is replaced and the amount used is recorded. So that it can be used to measure against future tests. Once load is introduced reduced fuel consumption may improve up to a efficiency rate determined by the engine.



P.O. BOX 1318 MONROE, WA 98272 PH#: 360 794-9100 FAX#: 360 805-8565

TEST RESULTS FOR: NORTHWEST CONSTRUCTION

MACHINE: KOMATSU PC600LC-7
ECO-EMISSION UNIT: E.E.S-12 SIN: 6015003005823

| DESCRIPTION | BASELINE TEST | 400 HOUR TEST | % OF CHANGE |
|-----------------------------|------------------|------------------|-----------------|
| MACHINE MAKE: | KOMATSU | KOMATSU | |
| MACHINE MODEL: | PC600LC-7 | PC600LC-7 | |
| MACHINE SERIAL NUMBER: | 20170 2001 YR | 20170 2001 YR | |
| MACHINE FRAME HOURS: | 5633 | 6018 | |
| ENGINE MAKE: | KOMATSU | KOMATSU | |
| ENGINE MODEL: | SA6D140E3 | SA6D140E3 | |
| ENGINE HOUR SINCE REBUILD: | 5633 SINCE NEW | 6018 SINCE NEW | |
| TEST CONDITIONS: | | | |
| DATE OF TEST: | AUG 28,2008 | NOV 15,2008 | |
| TIME OF TEST: | 2:30 PM | 2:45 PM | |
| HOURS RUN ON E.E.S. UNIT: | -0- HRS | 385 - HRS | |
| AMBIENT AIR TEMP | 81.6F | 52.3F | |
| RELATIVE HUMIDITY | 44.2 | 91.3 | |
| EXHUAST TEMPERATURE | | | |
| AT EXHAUST TIP: | 494 | 429 | DECREASE: 65F |
| AT TURBO: | 564 | 495 | DECREASE: 69F |
| SMOKE OPACITY | 56.2 | 40.3 | DECREASE: 28.3% |
| STD EPA FUEL TEST - 2 HOURS | 10.4 GAL / 2 HRS | 8.65 GAL / 2 HRS | DECREASE: 16.8% |
| | | | |
| | | | |
| | | | |

PLEASE NOTE: THE EXCESSIVE BLACK SMOKE APPEARS TO HAVE BEEN REDUCED QUITE A BIT AS VERIFIED BY THE REDUCTION IN OPACITY. THE ENGINE STILL APPEARS TO HAVE AN EXHAUST LEAK BETWEEN #5 & #6 CYL

Note: Please note that the Standard EPA Test for a Mobile Diesel Engine consists of starting with your fuel at a mark that can be duplicated. The engine is run for two hours at high idle, no load, no operator. This is done to remove the human influence on operations. At the conclusion of two hours the fuel is replaced and the amount used is recorded. So that it can be used to measure against future tests. Once load is introduced reduced fuel consumption may improve up to a efficiency rate determined by the engine.



P.O. BOX 1318 MONROE, WA 98272 PH#: 360 794-9100 FAX#: 360 805-8565

TEST RESULTS FOR: RED-E-TOPSOIL, INC

MACHINE: CAT 980G S/ N 2KR02762

ECO-EMISSION UNIT: E.E.S-12 SIN: 6015003005612

| DESCRIPTION | BASELINE TEST | 500 HOUR TEST | % OF CHANGE |
|-----------------------------|-----------------|-----------------|----------------|
| MACHINE MAKE: | CATERPILLAR | CATERPILLAR | |
| MACHINE MQDEL: | 980G | 980G | |
| MACHINE SERIAL NUMBER: | 2KR02762 | 2KR02762 | |
| MACHINE FRAME HOURS: | 20433 | 20950 | |
| ENGINE MAKE: | CAT | CAT | |
| ENGINE MODEL: | 3406TA | 3406TA | |
| ENGINE HOUR SINCE REBUILD: | 2940 | 3457 | |
| TEST CONDITIONS: | | | |
| DATE OF TEST: | 2-15-2008 | 5-15-2008 | |
| TIME OF TEST: | 11:30 AM | 6:40 AM | |
| HOURS RUN ON E.T.I. UNIT: | 0 | 517 | |
| AMBIENT AIR TEMP | 39 F | 48 F | |
| RELATIVE HUMIDITY | 53.5% | 57.8% | |
| EXHUAST TEMPERATURE | 579 F | 483F | DECREASED 96 F |
| SMOKE OPACITY | 12.7 | 10.6 | DECREASED 17% |
| STD EPA FUEL TEST - 2 HOURS | 14.1 | 12.8 | DECREASED 9.3% |
| | | | |
| | | | |
| | | | |

Note: Please note that the Standard EPA Test for a Mobile Diesel Engine consists of **starting** with your fuel at a mark that can be duplicated. The engine is run for two hours at high idle, no load, no operator. This is done to remove the human influence on operations. At the conclusion of two hours the fuel is replaced and the amount used is recorded. So that it can be used to measure against future tests. Once load is introduced reduced fuel consumption may improve up to a efficiency rate determined by the engine.



TEST RESULTS FOR: WATSON ASPHALT

MACHINE: 980G II AWH02459 #60

ECO-EMISSION UNIT: E.E.S-12 6015003005641

| DESCRIPTION | BASELINE TEST | 500 HOUR TEST | % QF CHANGE |
|--|----------------|----------------|---------------|
| MACHINE MAKE: | CATERPILLAR | CATERPILLAR | |
| MACHINE MODEL: | 980G SERIES II | 980G SERIES II | |
| MACHINE SERIAL NUMBER: | AWH02459 | AWH02459 | |
| MACHINE FRAME HOURS: | 6077 | 6489 | |
| ENGINE MAKE: | CATERPILLAR | CATERPILLAR | |
| ENGINE MODEL: | 3406TA Tier II | 3406TA Tier II | |
| ENGINE HOUR SINCE REBUILD: | 6077 | 6489 | |
| TEST CONDITIONS: | | | |
| DATE OF TEST: | 1-16-2008 | 8-12-2008 | |
| TIME OF TEST: | 10:40 AM | 2:20 pm | |
| HOURS RUN ON E.T.I. UNIT: | 0 | 412 | |
| AMBIENT AIR TEMP | 34F | 86.2 F | |
| RELATIVE HUMIDITY | 74.2 | 38.5 | |
| EXHUAUST TEMPERATURE | 449 F | 381 F | Decrease 68 F |
| SMOKE OPACITY | 27.39% | 20.8% | Decrease 24% |
| STD EPA FUEL TEST - 2 HOURS (HIGH IDLE - NO LOAD) | 9.7 GAL / 2 HR | 8.8 GAL / 2 HR | Decrease 9.3% |
| | | | |
| | | | |

Note: Please note that the Standard EPA Test for a Mobile Diesel Engine consists of starting with your fuel at a mark that can be duplicated. The engine is run for two hours at high idle, no load, no operator. This is done to remove the human influence on operations. At the conclusion of two hours the fuel is replaced and the amount used is recorded. So that it can be used to measure against future tests. Once load is introduced reduced fuel consumption may improve up to a efficiency rate determined by the engine.



P.O. BOX 1318 MONROE, WA 98272 PH#: 360 794-9100 FAX#: 360 805-8565

TEST RESULTS FOR WATSON ASPHALT

MACHINE: CAT 980G SIN: 9CM02088 UNIT#: 59

ECO-EMISSION UNIT: E.E.S-12 SIN: 6015003005618

| DESCRIPTION | BASELINE TEST | 500 HOUR TEST | % OF CHANGE |
|-----------------------------|-----------------|-----------------|----------------|
| MACHINE MAKE: | CATERPILLAR | CATERPILLAR | |
| MACHINE MODEL: | 980G | 980G | |
| MACHINE SERIAL NUMBER: | 9CM02088 | 9CM02088 | |
| MACHINE FRAME HOURS: | 10033 | 10536 | |
| ENGINE MAKE: | CATERPILLAR | CATERPILLAR | |
| ENGINE MODEL: | 3406TA | 3406TA | |
| ENGINE HOUR SINCE REBUILD: | 10033 | 10536 | |
| TEST CONDITIONS: | | | |
| DATE OF TEST: | 1-16-2008 | 5-13-2008 | |
| TIME OF TEST: | 9:35 AM | 11:40 AM | |
| HOURS RUN ON E.T.I. UNIT: | 0 | 503 | |
| AMBIENT AIR TEMP | 34.2 F | 56.8 F | |
| RELATIVE HUMIDITY | 66.3 | 74.2 | |
| EXHUAUST TEMPERATURE | 487 F | 393 F | DECREASE 94F |
| SMOKE OPACITY | 42.7 | 38.7 | DECREASE 9.3% |
| STD EPA FUEL TEST - 2 HOURS | 12.6 GALLONS | 11.55 GALLONS | DECREASE 8.30% |
| | | | |
| | | | |
| | | | |

Note: Please note that the Standard EPA Test for a Mobile Diesel Engine consists of starting with your fuel at a mark that can be duplicated. The engine is run for two hours at high idle, no load, no operator. This is done to remove the human influence on operations. At the conclusion of two hours the fuel is replaced and the amount used is recorded. So that it can be used to measure against future tests. Once load is introduced reduced fuel consumption may improve up to a efficiency rate determined by the engine.



P.O. BOX 1318 MONROE, WA 98272 PH#: 360 794-9100 FAX#: 360 805-8565

TEST RESULTS FOR: MILES SAND & GRAVEL

MACHINE: CAT 980H SIN: JMS00839 UNIT 586

ECO-EMISSION UNIT: E.E.S-12 SIN: 6015002003005625

| DESCRIPTION | BASELINE TEST | 500 HOUR TEST | % OF CHANGE |
|-----------------------------|---------------|---------------|-----------------|
| MACHINE MAKE: | CAT ERPILLAR | CAT ERPILLAR | |
| MACHINE MODEL: | 980H | 980H | |
| MACHINE SERIAL NUMBER: | JMS00839 | JMS00839 | |
| MACHINE FRAME HOURS: | 5948.5 | 6614.7 | |
| ENGINE MAKE: | CATERPILLAR | CATERPILLAR | |
| ENGINE MODEL: | C15 ATAAC | C15 ATAAC | |
| ENGINE HOUR SINCE REBUILD: | 5948.5 | 6614.7 | |
| TEST CONDITIONS: | | | |
| DATE OF TEST: | 3-8-2008 | 5-14-2008 | |
| TIME OF TEST: | 1:45 PM | 4:05 PM | |
| HOURS RUN ON E.T.I. UNIT: | 0 | 666.2 | |
| AMBIENT AIR TEMP | 44.3 F | 56.7 F | |
| RELATIVE HUMIDITY | 68.4 | 63.2 | |
| EXHUAST TEMPERATURE | 415 F | 349 F | DECREASED 66 F |
| SMOKE OPACITY | 9.63% | 6.86% | DECREASED 39.6% |
| STD EPA FUEL TEST - 2 HOURS | 11.4 GALLONS | 10.35 GALLONS | DECREASED 9.2% |
| | | | |
| | | | |
| | | | |

Note: Please note that the Standard EPA Test for a Mobile Diesel Engine consists of starting with your fuel at a mark that can be duplicated. The engine is run for two hours at high idle, no load, no operator. This is done to remove the human influence on operations. At the conclusion of two hours the fuel is replaced and the amount used is recorded. So that it can be used to measure against future tests. Once load is introduced reduced fuel consumption may improve up to a efficiency rate determined by the engine.



Demonstration Sheet

Emissions Technology Inc. • 3620 E. Wier Ave • Phoenix, Arizona 85040 • (602) 288-0111 • <http://www.emissionstech.com>

- 12 – 7 Freightliner
- 2004 DD Series 60 Engine



**Arizona Materials
Phoenix, AZ**

✓ Fuel Savings of 12.3%

- ✓ Fuel Consumption before.....5.0 mpg
- ✓ Fuel Consumption after.....5.6 mpg
- ✓ Catalyst Run Time of 400 hours
- ✓ Approx. Annual NET Savings..\$4,500
- ✓ Driver Comment – *“I went more miles and drove faster uphill (with greater ease) with less fuel”*



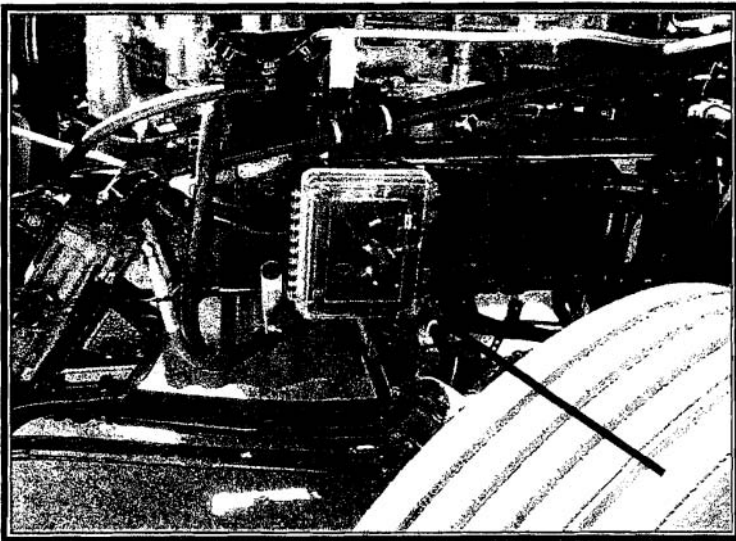
Field Results Supplied by

Emissions Products International, LLC. • 7400 W Detroit St Ste 150 • Chandler, AZ • 85226 • (877) EPI-INTL



Emissions Products International, LLC

DC-100 OTR Application
Heritage Trucking – Phoenix, AZ
August/October 2005



- Two Kenworths
- Engines: Cat. & Cummins
- AVG. Fuel Consumption before –**4.93 mpg**
- AVG. Fuel Consumption after –**5.50 mpg**
- Percent Fuel Savings.....**10.6%**

➤ **Gallons Saved in 400 Hours287 gallons**



Emissions Products international, LLC

7400 W. Detroit Street #150, Chandler, Arizona 85226 USA ♦ (480) 705-4444 or (877) EPI-INTL ♦ e-mail: info@epi-intl.com

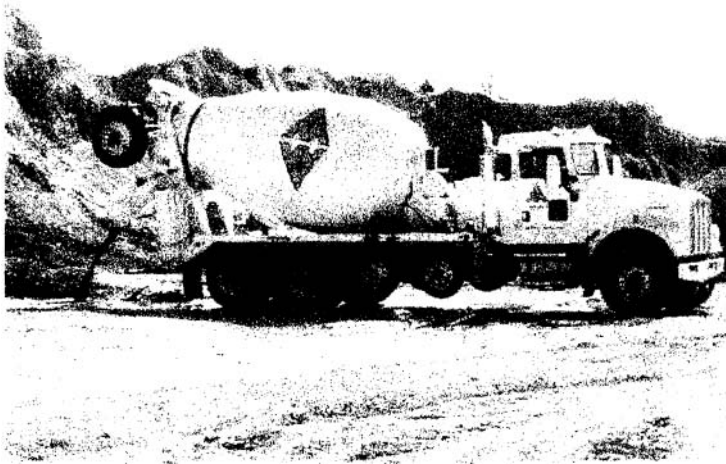
EMISSIONS TECHNOLOGY

Demonstration Sheet

Emissions Technology Inc. • 3620 E. Wier Ave • Phoenix, Arizona 85040 • (602) 288-0111 • <http://www.emissionstech.com>

- SAE J1321 Test Performed
- 2005 Kenworth Mixer
- Cummins ISM
- 335HP

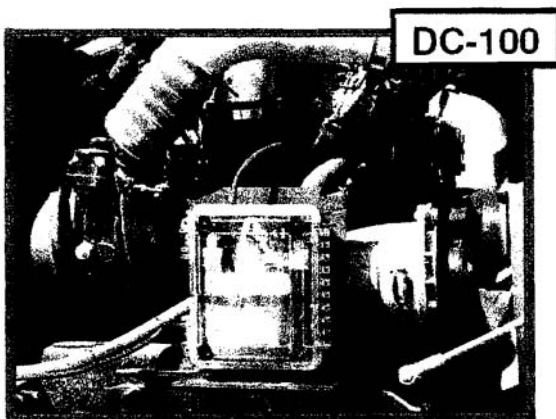
✓ Fuel Savings of 11.3%*



- Fuel Consumption before .4.13 mpg*
- Fuel Consumption after....4.60 mpg*
- Fuel Savings0.47 mpg*
- Fuel Saved in 400 Hours
.....203 Gallons*
- Approx. Annual NET Savings
.....\$1550

*

Numbers Based off of SAE J1321 Test



Field Results Supplied by

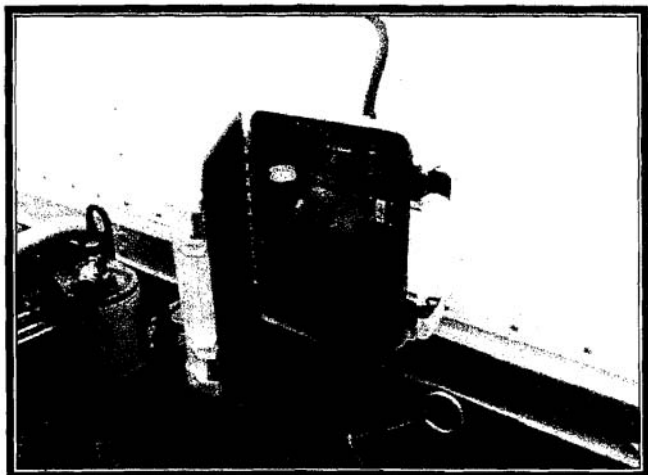
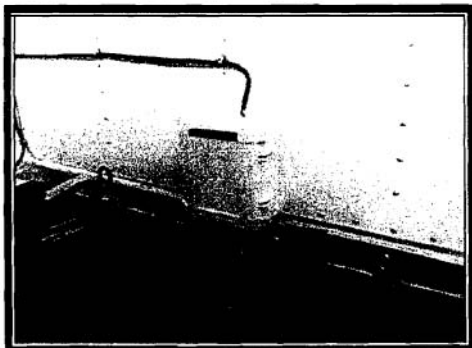
Emissions Products International, LLC. • 15024 S. 21st Place • Phoenix, AZ • 85048 • (877) EPI-INTL

DC-100 OTR Application
Desert Fleet-Serv – Phoenix, AZ
June - November 2005

10.7%



- Isuzu Cab-over
- Fuel Consumption before – ...
.....8.97 mpg
- Fuel Consumption after
.....9.92 mpg
- 3 Percent Fuel Savings.....
.....10.7%**
- Fuel Saved.. = **0.5 gallons/hour**
- Gallons Saved in 400 Hours
.....200 gallons



Emissions Products International, LLC

7400 W. Detroit Street #150, Chandler, Arizona, 85226 USA ♦ PHN: (877)EPI-INTL ♦ e-mail: info@epi-intl.com

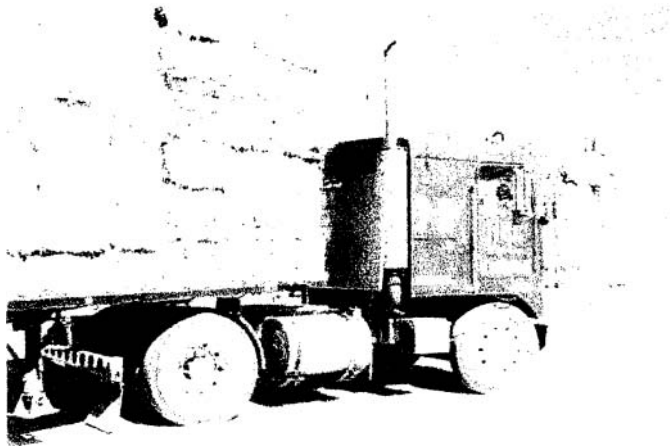
EMISSIONS TECHNOLOGY

Demonstration Sheet

Emissions Technology Inc. • 3620 E. Wier Ave • Phoenix, Arizona 85040 • (602) 288-0111 • <http://www.emissionstech.com>

Kenworth On-Road Truck
Cummins Big Cam 2 400
• **400 HP**

✓ **8.5% Fuel Savings**



- ☑ Fuel Consumption before5.44 mpg
- ☑ Fuel Consumption after4.98 mpg
- ☑ Fuel Savings48 mpg
- ☑ Approx. Miles Driven per Year 100,000
- ☑ Approx. Gallons Saved/Year1700
- ☑ Current Price of On-Road Fuel\$2.80
- ☑ Estimated Savings/Year\$4760

H & E

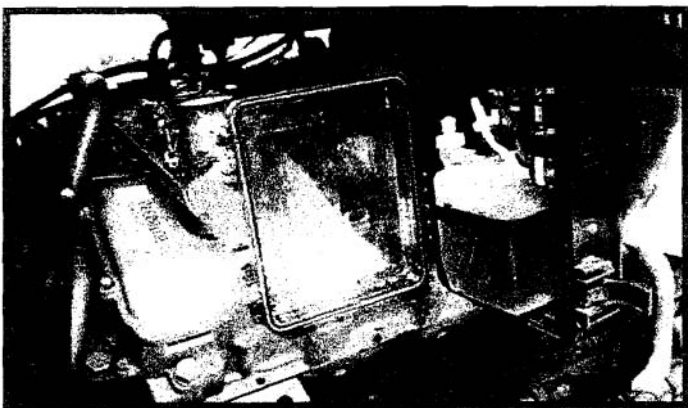
TRUCKING

Field Results Supplied by
AgFuel Technologies. • PO Box 5748 • Mohave Valley, AZ 86446 • 928-330-3402



Emissions Products International, LLC

DC-100 Tub Grinding Application S. M. Smith & Son, Inc., Charlotte, NC



- **Hogzilla TC1564P Tub Grinder**
- **CAT 3412@1,000hp**
- **Twin turbo**
- **Fuel Consumption before**
..... **28 gph**
- **Fuel Consumption after**
..... **22 gph**
- **Fuel Savings....., 6 gph**
- **Percent Fuel Savings.....22%**
- **Catalyst Run Time of 400 Hours**
x 6 gph saved = app. 2,400
gallons saved

Emissions Products International, LLC

15024 S. 21st Place, Phoenix, Arizona, 85048 USA ♦ 602-549-7935 ♦ e-mail: info@epi-intl.com



Engine Technologies

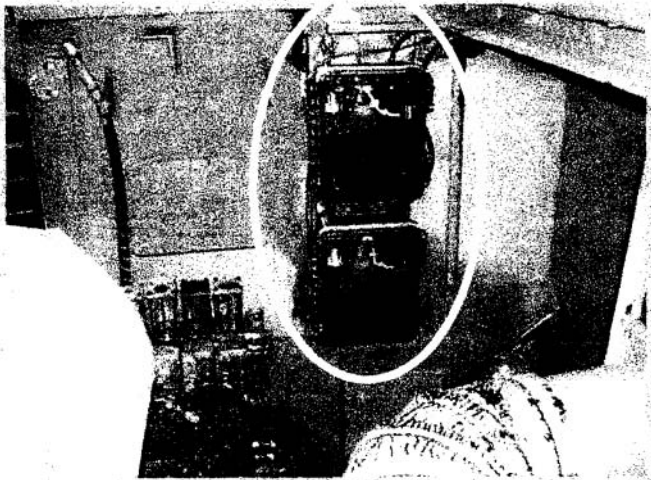
Fuel, Oil and Emission Reduction Technology for Diesel Engines

DC-100 Pavement Profiler Application Delta Contracting, Haw River, NC



CMI Terex PR 500 C Pavement Profiler

**CMI Terex PR500C Roto Mill
 CAT 3408@530 hp
 Fuel Consumption before..... 16.6 gph
 Fuel Consumption after.....14.1 gph
 Fuel Savings.....2.5 gph
 Percent Fuel Savings.....15 %
 Catalyst Run Time of 440 hours x 2.5
 gph saved = app. 1,100 gallons saved**



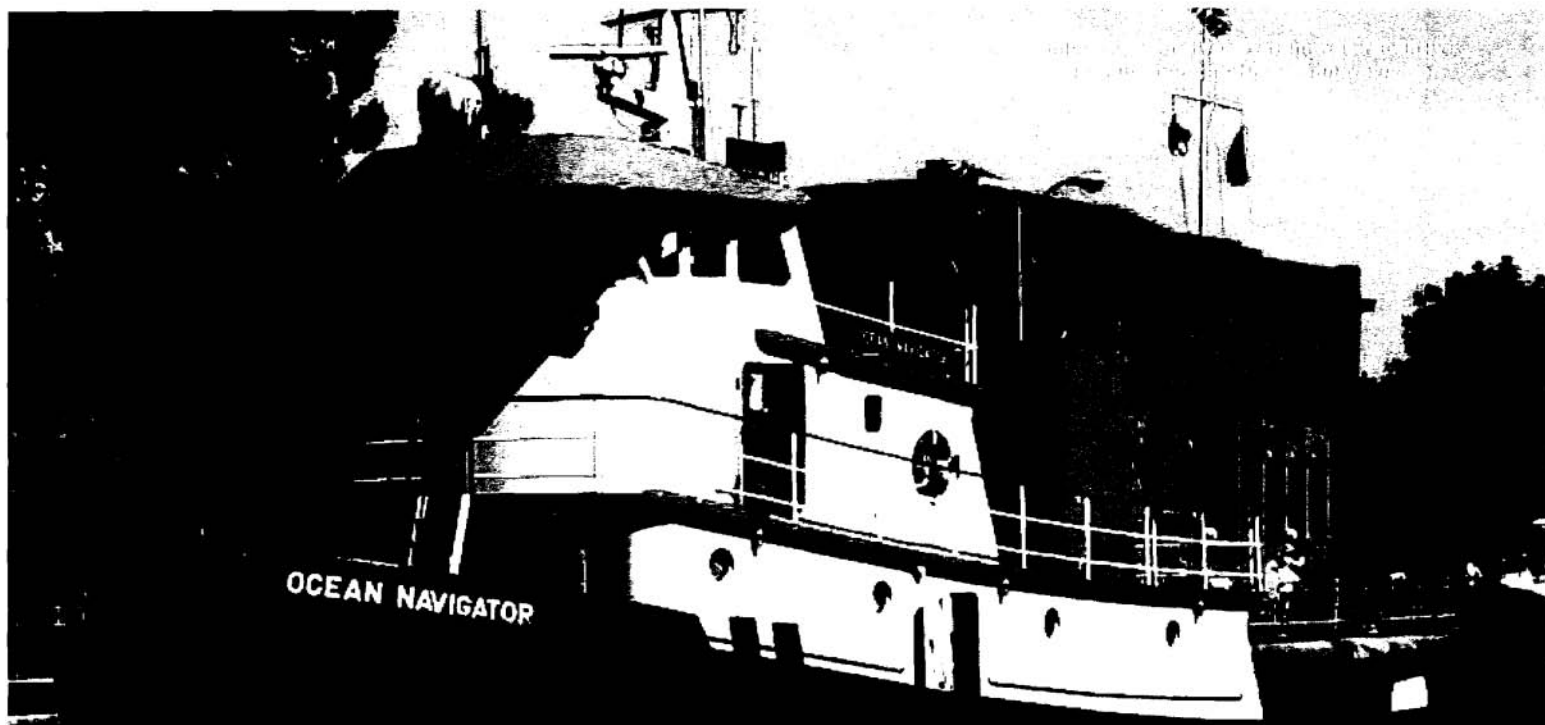
DC 100 Mounting inside engine compartment



Air intake fittings from DC 100

Member of NCTA, NCGWA and WEDA

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Burning Sensation

Add-on catalyst system should make fuel consumption cleaner and more efficient.

By MICHAEL CROWLEY, CORRESPONDENT

Ever since Western Towboat's *Ocean Navigator* was built in Seattle in 1986, the engine room installation of its two 1,550-hp Caterpillar 3516 engines was similar to hundreds of other conventionally powered tugs. Late this summer, however, a new device was attached to panels behind the tug's starboard engine with a feed connected to the engine's intake.

Two black cases on the panels hold several clear bottles containing finely ground platinum held in suspension in propylene glycol and distilled water. Above the bottles are pumps with hour meters.

These items are the key ingredients of the Eco Emissions combustion catalyst system from Eco Star in Monroe, Wash. If things work as planned, the *Ocean Navigator's* Cat engines should see a drop in fuel consumption along with an improve-

ment in air emissions, said Eco Star's Paul Masson.

Over 5,000 of the combustion catalyst systems have been installed on land-based engines, including trucks, off-highway earth moving machinery and generators. "But this is the first major marine client," said Masson, who added that the equipment hasn't had to be adapted for marine engines. "It's treated just like a normal installation."

NOT A FUEL ADDITIVE

Masson emphasized that the combustion catalyst system is not a fuel additive. It's not mixed with the fuel in any way.

The platinum-based catalyst is injected as a vapor into the engine intake. At low speeds and idling, the pumps provide the vapor, but as the

\$
Eco

turbo boost spins up, the "engine overcomes the pump, drawing out what it needs to satisfy itself," Masson said.

When the engine's intake valve closes, the catalytic vapor is trapped in the cylinder prior to the combustion process. As the piston is driven up into the cylinder, the air in the cylinder is heated and the platinum catalyst starts giving off oxygen oxides that ensure a better burn and more complete fuel consumption when ignition takes place.

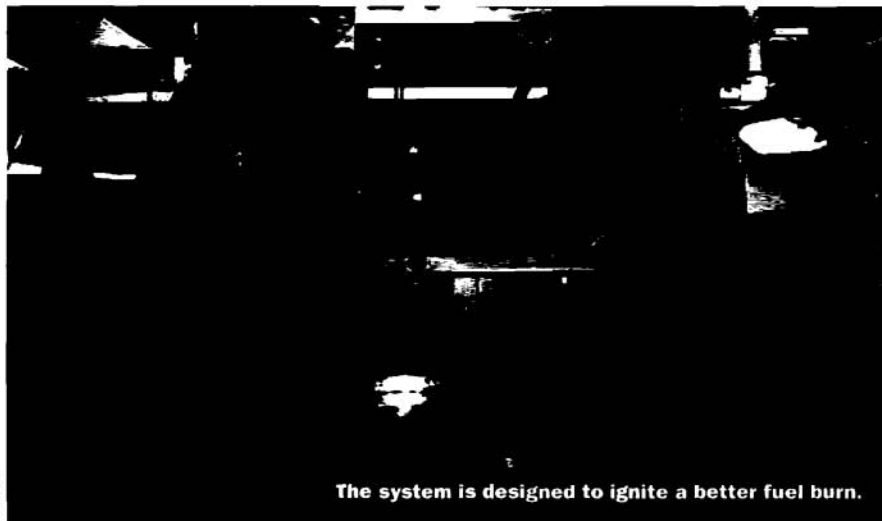
Along with a more complete burn, a couple of other things also occur. First, the layer of soot in the engine from unburned hydrocarbons is burned up, which cleans up the top of the piston, the face of the head, cylinder walls and piston rings. This cuts friction.

Second, with not as much unburned fuel in the exhaust, the exhaust temperature is lowered, which has a tremendous effect on engine longevity. Masson said it helps extend the time between engine rebuilds from 20 percent to 30 percent.

A more complete fuel burn, less soot, lower exhaust temperature — take all those things together and you have a much more efficient engine.

"Depending on the engine and its application, you could reduce the fuel consumption by six to 14 percent," Masson said.

Another benefit is improved air emissions. There will be a 50 to 60 percent



The system is designed to ignite a better fuel burn.

drop in NOx emissions and particulate matter, according to Masson.

FUEL SENSORS

Needing accurate fuel consumption by the two Cat diesels, Masson equipped each engine with an Austrian-made **Kral** flow meter system. The problem with most electronic monitoring systems on modern diesels, Masson said, is "they just take readings that are constant averages," whereas the Kral flow meter system "is spot specific."

"It takes whatever that moment is, under whatever the load factor is. It tells how much fuel is going through sensor A — and notes the temperature — and tells how much is coming back through the return sensor. You get a true burn rate and a true gallon consumption."

Masson added that Eco Star paid to have the Kral system and its sensors ISO 9000 certified, which guarantees "all the sensors have an accuracy within one-tenth of one percent," he said.

Between Aug. 25 and Sept. 2, the *Ocean Navigator* made a nine-day trip that allowed Masson to establish base lines on the two engines for fuel and temperature readings. The combustion catalyst system was not used on either engine during this trip.

On the next three trips, the starboard engine will have the combustion catalyst system engaged while the port engine will be operating without it. Relative fuel consumption will be carefully monitored. The first 10-day trip began on Sept. 5. "This trip will burn out the soot and clean up the engine. On the next two, we should see differences in fuel consumption and see the engine stabilize with the unit on it. We'll get more accurate numbers of what is happening," Masson said.

Another thing the three trips will show is how much catalyst is required for a Cat 3516 in a marine application. The combustion catalyst system is on about 80 land-based gensets with Cat 3516s, but since the gensets aren't pushing a hull through the water, the catalyst requirements will undoubtedly be different for a tug.

Once the catalyst requirement is determined, a canister will replace the box with the bottles and pumps. Masson wants the system to be nearly invisible once it is finally mounted in the *Ocean Navigator*.

"We'll end up with a canister with each turbocharger. It will be sized to match the oil-change interval. So when they change the oil and filters, they will change the canister," Masson said.

It all sounds convenient and cost-effective, but the "after" numbers have yet to be tabulated. We'll report on the results in an upcoming edition.



Each engine is equipped with a Kral flow meter system.