

Xtreme Fuel Treatment™

Commercial & Industrial White Paper

This document is intended to introduce Xtreme Fuel Treatment™ to industrial and commercial users in the trucking, transportation, mining, construction and power generation industries globally.



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Xtreme Fuel Treatment™

This document is intended to introduce Xtreme Fuel Treatment™ to industrial and commercial users in the trucking, transportation, mining, construction and power generation industries globally. This product is a multi-purpose and comprehensive fuel treatment which has been extensively tested in various businesses and industries and has proven to result in positive economic, operational and environmental benefits. The use of this product has been deployed on a worldwide basis in multiple sectors of the transportation, mining and power generation industries and has produced significant results in all benefit categories.

Exhaustive testing and subsequent results were aimed at proving four value propositions:

- Operational: Fuel economy and engine efficiency
- Environmental: Non-hazardous solution for reduced emissions
- Maintenance: Decreasing costs and capital expenditures for assets: increasing asset availability
- Economic: Overall net savings directly impacting the bottom line

Although all four areas have been evaluated, the tests were focused mainly on a combination of the quickest and most measurable value propositions that directly impact the bottom line (fuel economy) and the environment (reduced emissions).

Xtreme Fuel Treatment™

Xtreme Fuel Treatment™ was initially developed by a Fortune 500 laboratory to solve the issues surrounding the storage of fuels for stand-by power systems. Engines are often negatively impacted by the quality and variance of fuels. Xtreme Fuel Treatment™ addresses these issues by returning to, or keeping fuels within, international (ASTM and ISO) specifications.

With the addition of the latest in organo-metallic catalyst chemistry to improve overall combustion efficiency, Xtreme Fuel Treatment™ has evolved to meet additional business needs and requirements. The addition of an advanced synthetic lubricity agent to counter the effects of low sulfur fuels on engine components completes the product's applicability to the transportation sector.

The result is a comprehensive, highly tested, patented fuel treatment formulation that can deliver tremendous value to all fuel consuming industries.

Xtreme Fuel Treatment™ occupies a unique position in the market, as it delivers considerably more value than conventional single purpose fuel additives. The following represent the main functional components:

- Combustion catalyst and burn-rate modifier;
- Acts as a cetane improver to lower the ignition point;
- Reduces emissions, including soot, CO, NOX and THC's (total hydrocarbons);
- Demulsifies, moving water from the fuel;

- Acts as a lubricator and detergent;
 - As a dispersant, eliminates any existing solids in the fuel;
 - As a polymerization retardant, prevents the further formulation of solids;
 - Retards internal corrosion and breakdown of fuel tanks;
 - Prevents catalytic oxidation as a metal deactivator;

Xtreme Fuel Treatment™ is soluble in all fuels and fuel oils, is non-hazardous, and requires an extremely low treatment rate, as 4 Litres treats 16,000 Litres of fuel (10 mL treats 80 L of fuel). Treat ratios may vary depending on the fuel quality and type. Detailed product information can be found in Exhibit A – Product information, Exhibit B – MSDS (Material Safety Data Sheet), and Exhibit C – Frequently Asked Questions.

Impact of a “Better Burn”

When evaluating the combustion process, the better the ‘burn’ of the available fuel, the more CO₂ gas results, and the more horsepower is generated. The result is improved fuel economy. Measurements of these combustion bi products can attest to the impact of the burn rate modifier:

Fuel = Carbon Particulate matter (soot) + HC CO CO₂

This process shows that the more complete the burn of the fuel, the further to the right the amounts measured will increase. Fuel breaks down into carbon, which is measured as particulate matter (soot) and unburned hydrocarbons (un-burned fuel). The other gases are increased if the fuel is burned more effectively.

Continual testing includes the measurement of the bi-products before and after the use of Xtreme Fuel Treatment™. Observations were noted regarding the reduction of carbon on key engine components, indicating a better burn. The decrease in particulate matter and unburned hydrocarbons (HC) means better emissions. It is important to note that Xtreme Fuel Treatment™ positively affects the process, and does so at a lower temperature of activation of combustion. This has a secondary effect of decreasing NOX when the engine is properly maintained and the air-fuel mixture is set to the correct specification.

Impact of Lubricity

Recent legislative changes to reduce sulfur content in fuels have meant a decrease in the inherent lubricity of diesel fuels. Experts estimate that as much as 50 percent of today's ULSD (ultra-low sulfur diesel) pool will need a lubricity improver to meet engine manufacturer's specifications and that up to 75 percent of the diesel pool could require treatment as refiners convert to ULSD production in 2006 and beyond.

Xtreme Fuel Treatment™ includes a synthetic lubricity agent that addresses the Engine Manufacturers Association (EMA) preferred diesel fuel lubricity specification, the FQP-1.

The ASTM D-6079 diesel lubricity specification test balances input from engine makers, standards officials, and fuels producers. It says that a “wear scar” no larger than 520 µm (microns) in diameter should result from a standardized wear test. The lubricity agent in XFTM, when analyzed under the ASTM D-6079 test specifications produced a wear scar of only 440 µm, far exceeding the requirements for lubricity specifications required by engine manufacturers.

Fuel in Storage

Xtreme Fuel Treatment™ deals with all of the issues surrounding fuel stability in storage. A number of factors have been identified that lead to the contamination and deterioration of fuel. This means that it will slowly separate out of ASTM specifications, negatively affecting combustion, and contributing to harmful emissions. Xtreme Fuel Treatment™ removes water, prevents molecular chaining of hydrocarbons, prevents catalytic oxidation of the fuel, prevents corrosion of the tanks eliminating particles, and loosens up existing sludge build-up.

Warranty Issues

When considering changes to the combustion process, there is concern regarding the impact on the mechanical operation of the engine, and the OEM warranty. Xtreme Fuel Treatment™ does not affect the mechanical operation of the engine; it deals with the specification and capability that the fuel delivers.

It is standard practice for OEM's to neither endorse, nor condemn the use of after-market treatments or fuel additives. The use of a fuel additive, in itself, does not void any manufacturer's warranty. Several manufacturers offer their own application specific additives, or diesel fuel conditioners. The Magnuson-Moss Warranty Act (US Code – Title 15, Chapter 50, Sections 2301-2312) prevents an engine manufacturer from voiding a warranty on a vehicle due to an aftermarket part or treatment, unless they can prove that the aftermarket part or treatment caused, or contributed, to the failure of the vehicle.

Xtreme Fuel Treatment™ has a history within the transportation sector. Users have reported no negative long-term effects resulting from treating fuel. This includes users of the product over many consecutive years in bussing, locomotive/railroads, transit, ocean-faring ships, mining, and trucking fleets. None has reported an issue surrounding warranty coverage.

Summary

The need to conform to recognized standards has been met by holding Xtreme Fuel Treatment™ up to the scrutiny of extensive laboratory and practical testing.

- Xtreme Fuel Treatment™ has achieved ASTM D975 and ISO fuel specifications;
- The EPA has approved the product through its comprehensive registration and evaluation process (#217020001 per CFR 79.23) (see exhibit D – EPA Registration);
- Under the testing required by the American Trucking Association, the SAE J1321 TMC/SAE Fuel Consumption Test Procedure Type II, Xtreme Fuel Treatment™ achieved an 8.2% fuel economy improvement. This test was conducted by an independent lab under rigid test protocols to ensure a test accuracy of $\pm 1\%$.
- That the inclusion of the lubricity agent has ensured that Xtreme Fuel Treatment™ meets the Engine Manufacturer's standard FQP-1 for lubricity;
Due to the benefits the product offers, and the multiple value propositions that it delivers, organizations that deploy many varying pieces of equipment and require large amounts of fuel would be in a position to recognize the greatest return.

Case Studies

General

Following the initiation of discussions with the test company in the fleet management organization, it became apparent that there was a need to perform tests on varying vehicles to prove the value, and the comprehensive nature, of Xtreme Fuel Treatment™. This resulted in the decision to test different types of vehicles.

Prior to the initiation of the test of Xtreme Fuel Treatment™, time was taken with the appropriate personnel to confirm the validity of the product and its affect on the fuel systems in question. A number of references were contacted, and a methodology was established to offer the best 'over the road' fuel test procedures. A qualified third party technician would be necessary to analyze the effects of the solution on the engine efficiency and would also provide measurements regarding emissions.

Test Procedures

It was decided to test the product on two vehicles operating with different engines, one diesel and the other gasoline powered. In order to measure the effect of Xtreme Fuel Treatment™ on the two vehicles, a baseline mile per gallon was established through analysis of recent fuel records. The drivers and mechanics were also provided an opportunity to offer their feedback.

Findings

The following are the results of the tests conducted on the diesel and gasoline powered vehicles operated under the Fleet Management unit of the test company. As a solution offers a number of value propositions, each has been separated to provide detailed analysis.

- *Fuel Economy and Engine Efficiency:* Starting in January and running for six weeks, Xtreme Fuel Treatment™ was deployed in two roving mechanic's vehicles, one a GM Diesel and the other a Ford gas powered truck. Research indicated that the diesel vehicle averaged 12.4 miles per gallon, and the gas powered vehicle 9.1 miles per gallon. Following compilation of six weeks of test data, it was determined that the vehicles averaged a 12% improvement in fuel economy. This result was achieved despite very poor weather conditions. The drivers also noted that their vehicles started without hesitation compared to others who had difficulties in the same harsh temperatures. During the same period, results for other testing efforts working with Xtreme Fuel Treatment™ included a 9.34% improvement for a long-haul trucking group, a 7.2% improvement for large trash and recycling service, and a 7.0% improvement for a long and short haul freight logistics company. Engine efficiency on the test vehicles improved by 21% as a result of a better burn of the fuel.
- *Environmental:* The Xtreme Fuel Treatment™ is a non-hazardous fuel treatment. Within the composition of the product, there are no carcinogenic chemicals that effect handling, and there is no alcohol that would dry out the chamber and injectors. It can easily and safely be transport, handled and stored.

Regarding the tests, emissions decreased as a results of the amount of fuel being used that was treated with XFT™. As all the tests have proven, the better burn of the existing fuel means better fuel economy, and better emissions. The chemical process with the correct air/fuel mixture would result in lower NOX emissions when the fuel is treated with XFT™.

- *Maintenance:* The composition of XFT™ includes a number of components aimed at improving efficiency by affecting the fuel and cleaning/lubricating the entire fuel system. As a result, the solution assists in lubricating these components to ensure their continue best 'spray'. The ability to hold off on the corrective maintenance and to integrate the use of XFT™ would also assist in decreasing the intervals between preventative maintenance scheduling.

The better the burn, the less black smoke, resulting in less carbon and soot that can damage engine and exhaust components. The decrease in temperature of activation for combustion means less wear and tear on components; extending the service life of these components allows for an increase in the service interval, improving productivity, and increasing maintenance hour for other functions. Other savings would include the cost of spare-parts inventory and the downtime of these assets.

- *Economic:* It has been proven that the use of Xtreme Fuel Treatment™ offers significant benefits in each of the tested areas; indeed, the science would suggest that it would offer similar value to any fuel-operated device.

In assessing the impact of using XFT™, the tests confirm the possible net savings available to fleet management companies with regard to fuel economy alone. As noted, these finding are also indicative of the findings of others in the Transportation sector.

The following areas of concern are not included in the financial impact:

1. Reduced maintenance costs, including, but not limited to, reducing maintenance hours, injector changes, spare-parts inventory, and improved engine life;
2. Reduced life cycle costs (cleaner fuel systems and cleaner engines);
3. Improved asset utilization allowing for increased productivity;
4. Increased serviceability and availability leads to the elimination of capital equipment costs;
5. Possible elimination of the costs associated with using other single-purpose fuel additives currently used;
6. Improved cold starting, smoother idling, and elimination of black smoke; and
7. Improved environmental citizenship.

The overall economic impact evaluation for the testing company was as follows:

Treatment ratio: 1 gallon (US) treats 10,000 gallons (US) or 37,854 liters of fuel

Consumption (Gal/yr)	Savings (%)	Savings (Gal/yr)	Fuel Costs (\$/yr)	Savings (\$/yr)	Net Costs (\$)	Net Savings (\$)
8,778,332	12.0	1,053,400	\$22,823.663	\$2,738,840	\$317,616	\$2,421,224

Deployment Considerations

There are a number of packaging and deployment options that will minimize the expense of implementation, and have minimal impact on logistics expense.

Because of the high concentration of XFT™ and the low treatment ratio (one gallon U.S. to 10,000 gallons of fuel), on-site inventory of the product should remain low, minimizing capital outlay to purchase product in advance. The variety of packaging options also ensures ease of use for the addition directly into the fuel.

The most feasible way for fuel to be treated with XFT™ is to add the product directly to large size fuel storage tanks. It might also be possible to arrange with individual fuel suppliers to treat fuel in the delivery vehicle's tanks. This option will obviously depend on the overall amount of fuel being purchased and the willingness of the supplier to treat the fuel before delivery.

Packaging options are also available to treat quantities as small as twenty (20) gallons at a time. This option can be used with smaller vehicles that do not always refuel at central fueling stations.

Conclusion

Xtreme Fuel Treatment™ has been tested in laboratory and field operations, and is currently in use with a large number of organizations globally. As a result of this ongoing testing, it has been demonstrated that the product offers considerable value. Ongoing use of XFT™ offers significant benefits for any sized organization, the effects of which can be seen in the areas of operational efficiency, environment protection, decreased costs of maintenance and capital outlay, and overall economic savings through reduced fuel consumption, all of which can directly impact the bottom line.

XFT Proprietary Chemistry

The driving component, or primary active ingredient in Xtreme Fuel Treatment™ is an organo-metallic fuel catalyst, which has been evaluated utilizing some of the most stringent testing procedures by reputable and reliable laboratories and government entities.

SAE Paper 900154 – concluded that the active ingredient included in XFT™ improved fuel octane quality, reduced emissions dramatically, while improving fuel efficiency.

U.S. Department of Interior Bureau of Mines Paper RI 9438 – determined that the active ingredient utilized in XFT™ reduces emissions significantly.

Southwest Research Diesel Engine Emission Control Technologies Paper, Appendix B, subsection B.3.5, describes the active ingredient in XFT as a catalyst component that increases cetane and reduces burnout time and temperature requirements in new Diesel Particulate Filters (DPF).

Southwest Research Paper, Hydrocarbon Fuel Chemistry provides documentation that the active ingredient in XFT™ reduces compression ignition emissions as much as 20% and improves fuel efficiency as much as 10%.

NIOSH IC 9642, Department of Health and Human Services Paper, subsection 2.2.3 indicates that the active ingredient incorporated in XFT™ reduces smoke particulate by 25% and reduces burnout time and temperatures in new Diesel Particulate Filters (DPF).

Canadian Environment Protection Agency Paper, subsection 5.2.4.1 determined that the active ingredient utilized in XFT™ reduces Diesel Particulate Filter (DPF) filterable matter by 23% and reduces total particulate matter by 22%.

California Air Resource Board (CARB), 3D Air Quality-Emission Report; appendix b states that the active ingredient contained in XFT™ reduces burnout time and temperature of new Diesel Particulate Filters (DPF). Tests show reductions of particulates by 20% without the DPF and two-fold reductions with DPF.

Olsen Laboratories determined that XFT™ reduced emissions during the EPA Highway Fuel Economy Test (HFET) and Federal Test Procedure (FTP).

There are many more such tests available documenting the performance of the organo-metallic active ingredient which is a vital part of the success of Xtreme Fuel Treatment™. For this reason, critical think entities, such as those mentioned in this document, have evaluated this organo-metallic compound many times to insure qualitative and quantitative performance.