



FTC AND MULTI-FUNCTIONAL ADDITIVE PACKAGES

The following is a response to a letter received by a customer of our American parent company regarding a multi-functional additive package. The paper discusses the difference between most multi-functional additives and the FTC Combustion Catalysts.

I The Multi-Functional Additive Package

Multi-functional additive packages are typically a combination of two or more of the following; detergent, fuel-stabiliser, lubricity, cetane booster and/or corrosion inhibitor additives. In colder climates an antigel additive may also be part of the package. These are typical fuel additives which can be purchased from a number of manufacturers and private labelled for resale purposes. **These additives are also added to the fuel (except perhaps lubricity additives) by the oil refiners.** These are not unique products unlike FTC. A discussion of each follows:-

1) Lubricity Additives

Lubricity additives are intended to replace the natural lubrication in diesel oils that theoretically are removed in the refining process.

In October of 1993 US government legislation required low sulfur for over-the-road diesel be introduced. Some isolated injector seal failures

created a wave of concern that the refining and blending process to produce the low sulfur fuel was removing the lubricating properties of the fuel. Some lubricity additive vendors used this as a springboard to market their products. However, after studies were done it was determined that fuel lubricity was not the problem but rather the aromatic content of the fuel which reduced the swell of the seal material. The attached letters from independent sources (Phillips 66 and AMOCO) are examples of these studies.

Lubricity additives have no effect upon engine performance and bring no return in terms of fuel cost reductions.

2) Corrosion Inhibitors

Rust and corrosion inhibitors are added to fuel to prevent rust and corrosion to pipelines, fuel storage tanks and vehicle fuel systems. These are particularly useful when the diesel has a high retained water content (molecular water) or where water bottoms are allowed to form in large bulk storage tanks. The use of high quality diesels (low molecular water content) good fuel rotation and tank management methods minimise the need for corrosion inhibitors. These are usually amines and amine phosphates. Corrosion inhibitors have no effect upon engine performance and bring no return in terms of fuel cost reduction.

3) Fuel Stabilizers

Fuel stabilisers are amines or other nitrogen compounds that prevent sediment formation at ambient temperature by interfering with acid-base reactions. These additives are not used in straight run diesel but, if the diesel fuel contains cracked gas oil, a fuel stabiliser might be desirable especially if the fuel is to be stored for a long period of time. **These stabilizers are very specific in their action and need to be selected to suit a particular fuel to be treated.**

These additives are not needed in most high quality fuels. They also bring no return to the end users in terms of fuel cost reduction.

4) Detergents

Detergents are polyglycols and basic nitrogen compounds that control the formation of deposits where they might have a detrimental effect upon engine performance. These chemicals are typically added to the fuel by

the oil refiner or the oil supplier and pertain mostly to lower quality fuels.

Detergents act to remove or prevent gummy deposits that can cause sticking of injector needles. They also remove carbonaceous deposits that build up upon injector tips when poorer quality fuels are used. Carbon deposits reduce the amount of fuel injected and alter the injector spray pattern causing reduced power and increased smoke. When heavy deposits form on injector tips causing power loss and engine smoking the removal of these deposits can restore the engine to designed operation.

Once the initial cleaning has taken place no amount of detergent added to the fuel will add to the performance of the engine, it simply maintains engine performance closer to the designed level.

The use of a detergent can create a reduction in fuel consumption, especially in **certain types of engines** and where engine performance has already been affected by injector tip deposit formation. Laboratory studies by Exxon Chemical International (Automotive Fuels Handbook, Chapter 17, Page 435) using an **indirect-injected** 1.6 litre diesel in a passenger vehicle showed that even with severe injector tip shrouding only a 3.7% fuel saving was realised. This kind of improvement is improbable with today's modern **direct-injected heavy-duty diesels** used commercially in the US.

5) Cetane Boosters

Cetane is defined as the ability of a diesel fuel to auto-ignite, a desirable property in compression-ignition engines, to a point. Faster auto-ignition means easier cold starting, especially in cold climates and reduced engine smoking. Oil refiners add cetane boosters (nitrates and peroxides) to off-spec fuels at 500 to 1,000 ppm to raise the cetane number from 3 to 5 points.

Cetane boosters are expensive and can be detrimental to engine life and emissions if added in excessive amounts. Engine manufacturers do not recommend the use of cetane boosters in diesel fuels that already have cetane numbers of 40 or higher for this very reason.

Cetane boosters generally do not provide cost reducing benefits in terms of improved engine efficiency.

6) Antigels

Diesel fuels tend to thicken as the air temperature becomes colder. If the temperature falls below the gelling point of the fuel it will solidify starving the engine of fuel and bringing the equipment to a complete stop. Getting the fuel and engine moving again is a costly and time consuming operation that all fleet operators want to avoid.

Frequently, the problem is avoided by blending lighter fuels (# 1 diesel, kerosene, and cutting kero) with # 2 diesel to lower the fuel's gelling temperature. Though effective, it is expensive and becoming more expensive with the demand for more low sulfur diesel for the over-the-road market. Antigels can be used to reduce the need for blending winter grade fuels and, therefore, may help reduce the overall cost of winter fuels.

Antigels must be tested to determine effectiveness in different types of fuel, purchase those with proven track records.

II The FTC Combustion Catalyst

1) The Effect of FTC

FTC contains no additives that are already used by the oil refiner or that are unnecessary. **FTC removes carbon deposits and prevents their future build-up through an improved combustion process, therefore, the use of detergent additives beyond the amount already found in the fuel is not necessary.**

If injector tip clean-up is the problem, FTC will not only eliminate this problem but create additional fuel savings through an improved combustion. The combination of the two actions will create much greater fuel cost savings than the detergent additive alone.

Furthermore, in well maintained and/or newer engines, or where higher quality fuels are used, a detergent has little or no effect and FTC will still create fuel savings that more than offset the cost of the catalyst. This fact is well documented in independent laboratory studies using new or like-new engines operating on laboratory or reference grade fuels which are higher quality than commercial fuels.

The emissions reductions claimed by multi-functional additive vendors are also a product of the detergent additive cleaning up the injector tips.

These improvements are no greater than and in most cases are less than those documented in the many tests conducted with FTC. Again, a detergent will produce no improvement in emissions if no injector build-up is present while FTC always reduces exhaust emissions.

2) Independent Testing

Most claims made by private labelled multi-functional additive packages are inflated and cannot be substantiated in the technical literature provided to potential customers. Typically there is no actual test data provided or the data is not from a recognised independent testing institution. Often the claims are supported by testimonials of users who have neither the expertise nor the controls to accurately document product benefits. The reader seldom knows how the data was collected, who collected the data or how much data was collected. In other words, it is impossible for the reader to ascertain if the test was reliable from the information provided.

There are many factors that influence fuel consumption that have nothing to do with the effectiveness of a fuel additive. These include weather changes, driver habits and changes, changes in load and

work cycles, changes in fuel energy content and combustion characteristics, etc. These must be controlled or accounted for or the test is meaningless.

It is because of the many variables typical to the field that laboratory tests were designed. It is the responsibility of the additive vendor to take his product(s) to one or more recognised independent laboratories to conduct recognised test procedures verifying the vendor's product claims. This is the only way the customer can be certain he is getting what he is paying for.

Fuel Technology Pty Ltd and its US parent company have taken FTC to at least ten (10) independent laboratories. The benefits of the product are well documented. These test results are available to all potential customers.

Further, the field test used by Fuel Technology in co-operation with engineers representing the testing company (customer) is an adaptation of

a recognised laboratory test method that controls all variables and produces reliable data regarding the benefits of FTC for that specific customer.

3) Fuel Additive Policy and Cost Comparison

We recommended the attached “Fuel Additive Policy” be adopted by all customers and potential customers. If an additive vendor cannot comply with the criteria outlined in this policy it is likely the claims are unsubstantiated and the cost savings projected by the additive vendor may only be supposition. This being the case, any cost of the additive is an actual cost with no savings to offset the increased expense to the customer’s bottom line. **If that be the case, cost comparisons with FTC are not valid.**

With FTC the customer knows there is a substantial cost saving. Fuel consumption is reduced enough to bring a return on investment several times the cost of FTC. Engine component life is extended. Engine wear is reduced. Emissions are reduced. These are all documented benefits from which a customer can project real and significant cost benefits.

III Conclusions

Much of what the customer is paying in multi-functional additive packages is unnecessary; in fact all of it may be, if the customer is purchasing good quality fuel which already contains these additives. Such additive packages might provide a reduction in fuel consumption when used in poor quality fuel or when used in engines that are older or not well maintained, although this should be substantiated by recognised independent testing before the additive be considered. There will be little or no fuel consumption reductions in new engines with new technology or where good quality fuels are used.

FTC is not added by oil refiners. It is patented and owned exclusively by Fuel Technology Pty Ltd. Where a detergent produces a fuel consumption reduction, FTC will do the same and much more, since the catalyst acts upon the combustion process itself and not upon a symptom of poor fuel quality or engine operation. FTC will reduce fuel cost well beyond the cost of the catalyst in every engine type and application and

in all fuels of all qualities.

An increase in the amount of detergent additive in the fuel after the initial cleaning takes place is a waste of money in those engines where some fuel savings might be realised. FTC is effective under all engine conditions and need not be added in greater concentrations.

In all engines with all diesel and gasoline type fuels the customer can be guaranteed of fuel cost saving reductions and emission reductions.

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Fuel Technology Pty. Ltd. ACN 100 293 490

2 Tipping Road, Kewdale, Western Australia, 6105

Telephone (08) 9353; 1016 Facsimile (08) 9353 1013; Email fueltech@inet.net.au

60 Formation Street, Wacol, Queensland, 4076. Telephone (07) 3271 4138 Facsimile (07) 3271 5739