Fuel and Lube Oil Additives

ISSUE 64

MEDIA GIBBERISH/FUEL AND OIL ADDITIVES

by Robert Patton

Every now and then (some would say every day) there is e-mail, web site, or print correspondence; telephone or in-person conversation; or television or radio gibberish that makes me cringe.

Have you tried conversing with the television's one-way screen? Did you raise your voice? Did the misinformation make you crazy? Did you wonder how many others were misled?

How about an example close to home? A TDR member points me in the direction of the front page headline at Diesel this-and-that magazine's web site, "Automatic Transmission Fluid Fuel—Used ATF as Fuel? An Under-the-Radar Alternative Fuel Option."

I think to myself, "How darned irresponsible!"

So, I read the article. Bottom line, the writer's use of the "?" in the title and final paragraph warnings saved the text from being totally reckless. Nonetheless, the article told the story of a '02 Ford owner who was having success (I'd want a follow-up article in 20K miles to verify the word success), or should I say, the experience, of using ATF as fuel.

Ridiculous. Along the same lines are the man-on-the-street or new TDR member questions that I (and I'm sure you, too) get asked about fuel additives. "What do you think about Marvelous Mystery's fuel additive?" My short response, "Anything with a product title of 'Mystery' is just that, a mystery. And you want to put a mystery product into your fuel or lube oil? Not in my truck."

Often my answer is too blunt and time is subsequently spent soothing the bruised ego. To do so, I'll point back to TDR Issue 28's article by Kevin Cameron that tells the story in a more agreeable manner. Selected paragraphs from the text follow. You'll find the reread entertaining.

Issue 28's Additive Discussion by Kevin Cameron

"The question of aftermarket oil additives keeps coming up (Steed, Prolong, STP, Microlon, world without end), and it always will. When a person has laid out big money for a shiny, wonderful new Turbo Diesel, that person intends to do more than just drive around in it. That person wants to have a relationship with that truck. The proper care is essential.

"In the old days, the relationship was easy. You changed your own oil every thousand miles, you ground your own valves, and you rotated your own tires. In fact there was more relationship between man and vehicle than most people wanted. That's why today's cars and trucks have become such turn key operations, with extended oil drain intervals and no tune-ups. Just get in and drive.

"This is the 21st century here, a time when people are concerned over things like dietary fat and bad cholesterol. Because we are what we eat, and we want to be good, we have to eat carefully. This applies by analogy to new trucks that have cost us $32,000. Just as we are eating vitamin-C, DHEA, and no-flavor lean beef, so we are also tempted to pour expensive additives into the lubricating oil of our trucks, in hopes that performance will improve and that useful life will be extended.

"I read a wonderful line somewhere, which went like this: 'Vitamins were discovered in 1911. Before that time, people just ate food and died like flies.' Something like this idea seems to drive people today to use additives—ordinary pump diesel fuel and manufacturer-recommended oils can't be enough. Aftermarket additives are, therefore, the 'vitamins' we are tempted to give our vehicles. Never mind the fact that using 'Nosmo King' anti-smoke additive adds seven cents a gallon to the already high price of diesel. Never mind the fact that some highly-advertised 'super' oils cost more per quart than most of us pay for a case.

"The ads are wonderfully persuasive. One I saw recently featured regular guys strolling in a junkyard. They approach a rusty clunker, start the engine, and listen to its assortment of clatters—collapsed tappets, rod knocks, loose wristpins. 'Sounds pretty bad, Bob,' remarks one of the strollers. 'That's right, Bill,' returns another. 'We'll try a bottle of Noo-Life,' Bill confides to the viewer. They pour it into the engine and instantly the clattering goes away (or the technician at the audio mixer cuts the treble way down—it's hard to tell exactly which it is). 'Sounds pretty good now, Bill,' says the pourer, turning to the viewer and holding up the now empty Noo-Life bottle for our inspection of the label graphics. 'Why don't you try a bottle today?'

"In our minds, we know how it's done, but in our soft hearts, we're vulnerable, tempted to try a bottle. Yes, we know that unscrupulous used car dealers have, in the unregulated past, used sawdust to quiet timed-out transmissions, and we know that thick oil or a dose of motor honey (viscosity-index improver additive) will calm the high-frequency rattling of a worn-out engine. But, having laid out those thirty-two thousand ones end-to-end for that beautiful new truck (that's more than three miles of money), it just doesn't make sense to pass up products that might work, right? After all, they wouldn't let 'em say it on TV if it didn't work as advertised would they? Would they?"

Kevin talks about the $32,000 truck. You can tell that Issue 28 is old. It was written in May of 2000. Yet, the desire to fortify your engine or fuel system with the latest vitamins does not diminish. Change the names of the vitamins Kevin mentioned in the first sentence to newer arrivals Slick 50, Z Max, Lucas, etc. and you get the picture.

Fuel Additives, Again

Fuel additive discussion seems to come and go at the various diesel truck web sites. As evidenced by Scott Dalgleish's notes in his Issue 63 column (page 86), the topic is relevant with the writers too.

Yes, we all want to provide the best care for our trucks. The care is well-intentioned, but often unwarranted. So I'll repeat a definitive statement that holds credibility for me. The text comes from Scot's previous fuel additive discussion in Issue 63, page 86.

"Quoting from a previous TDR magazine, 'In several off-the-record discussions with service support staff the discussion has shifted to fuel conditioners as a maintenance practice for the '98.5 to '02 VP 44 fuel pump and the '03 to '07 HPCR injectors. The product recommendations: Cummins Diesel Injector Cleaner/Valvoline SynPower (3164982 – one quart), Racor Diesel Fuel Additive (ADT 1116 – pint), Stanadyne Junior (31417 – pint) Mopar (05191800AA – pint). Wynns makes the Mopar product.

"The message about fuel additives for the '07.5 and newer 6.7 liter engine is **not** the same. Because of the emission controls that are a part of the 6.7 liter engine, fuel additives are **not** to be used.

"No ifs, ands or buts. The answer is ULSD fuel only for the 6.7-liter engine.

"That is the official response. As the 6.7-liter engine is approved for up to 5% biodiesel, I can only imagine that a ULSD-approved, fuel lubricity additive would be okay."

Fuel Additives – The Details

The preceding gives you the guidelines as set forth by Dodge and Cummins. To the cynic, the fact that there were but few products recommended for use comes as no surprise, "Did ya think those guys would recommend anything other than their own branded additives?"

Frankly speaking, no, and (cynic to cynic talking here) why would Dodge or Cummins recommend and test any other manufacturers' additives?

I see a stand-off here.

Additionally, inquiring minds want to know more and perhaps learn about their favorite brand. What is an editor to do?

Just as we did in our lengthy discussion on lube oils, I found a voice of authority.

TDR member Gerald Tobey works at a Bosch Authorized/ Association of Diesel Specialist (see ad, page 55) shop in Salem, Virginia, Blue Ridge Diesel (www.blueridgediesel.com). His credentials: a heavy equipment mechanic back in the 70's, a Pre-Tech Coordinator for Bosch, a trainer for fuel system repairs, builder of all major makes of fuel systems from the 70's on and an Association of Diesel Specialists Certified Diesel Injection Technician.

GTobey's Response to Additives

The following are Gerald's thoughts on fuel additives for diesel engines.

In late December there was much discussion at the TDR website about fuel additives. The editor saw my shoot-from-the-hip response and asked me to take aim at helping the larger magazine audience understand their fuel injection system. The web discussion started with a question about 2-stroke and ATF fluid. Watch out for stray bullets…

I was just wondering, why would you want to put something in your fuel system that wasn't designed to be there? Two-stroke oil was not designed for diesels, and where in *any* application is ATF supposed to be combustible? (And if it combusts, I don't want it in my transmission!). Mineral spirits? (Okay, who poured that gallon of paint in the fuel tank?) And, as for used engine oil, after seeing the oil sample analyses from many, many diesel engines used in over-the-road, industrial, construction, and agricultural engines over the years, I wouldn't put *any* used engine oil in a neighbor's lawnmower.

Back in the late 70's and early 80's, Racor used to sell a filtration cart to "filter and blend" used diesel engine oil into diesel fuel, up to a maximum of 5% by volume. Even then, they recommended that the used oil be tested for presence of antifreeze, and not to blend that oil into the fuel if it was contaminated. But as injection systems developed higher pressures, tighter tolerances, and hydrocarbon emissions were reduced, that practice was discontinued. Most manufacturers also rescinded that practice. By the time you pay to have for an oil analysis to see what the percentages of contamination are in the lube oil (that you really don't want going through your injectors), you could buy the proper diesel fuel additive and use the right thing.

The Stanadyne Performance Formula additive was explicitly designed for your diesel fuel system as are some additives manufactured by other companies. For example, during Operation Desert Storm, our military was experiencing pump and injector failures on the GM HMMWV ("humvee") because they were using JP8 jet fuel. They requested that Stanadyne, a manufacturer of diesel fuel injection equipment, invent a product to allow them to use JP8 in their diesel engines. I guess the old adage "necessity is the mother of invention" is true. Stanadyne's "Lubricity Formula" was invented and it has performed well to this day. If it will add the proper lubrication to JP8 to allow it to be used in a diesel injection system, then it will work wonders for ULSD! We have also found it to work wonders for local airport vehicles where they are allowed to have only jet fuel on the tarmac, and they successfully use jet fuel in those diesel vehicles with the Lubricity Formula.

Regarding the desire to put something in the fuel and protect your investment, here is where my opinion differs. What I wonder about is the methodology that some folks use to choose a specific item to put into their fuel systems. Sometimes, it seems a person has given it proper thought and investigation, and other times only their feelings or pure non-scientific experimentation, and they dump in a dose of "whatever"!

Some of the worst failures we found were from the vehicles that were hauled in on the back of a flatbed truck. They ranged from single cylinder air-cooled diesel engines, to VW Jetta diesels, to Ford E-450 buses. I've seen home-brews that were made with absolutely zero cetane; some liquids that the labs could not identify as fuels; some "fuel imposters" from the internet equipped makers of a bio-fuel; something liquid with a paint like smell that would cloud up at about 45°; methanol flavored diesel/veggie oil mixes; to the commercially produced bio-fuels (although we never saw the ASTM approvals for them). All of these engines experienced some sort of failure ranging from plugged injection nozzles, to failed fuel injection pumps, to leaking hoses, to plugged filters, to stuck rings, to even exploded pistons.

The stories even hit close to home. A neighbor provided the KFC waste vegetable oil (WVO) to a Jetta owner who strained it through a cheesecloth filter and then straight into his tank. (He must've had to strain it to remove the popcorn chicken chunks!) This new car had only a few thousand miles on it, but expired shortly after the WVO was introduced. He lost all of his fuel savings and more in having to pay for the major repairs to the engine and fuel system!

Before we had ASTM standards for biodiesel (Issue 62, page 48, June 2008) several of our local municipalities mandated the use of "green" fuels in their vehicles and equipment, as is trendy in all areas now, so that their administrators can claim that their fiefdom is more eco-friendly than another. Hence, along came the introduction of commercially available bio-diesel into the fuel being used by that municipality. The municipality was using a 2% blend, and most all of these vehicles are sporting the green bumper sticker touting that they are eco-friendly, implying they are saving the planet with the use of bio fuels. After just one quarter of the year, one maintenance department found that they had changed over 400 fuel filters in their diesel equipment, four times their normal usage. To add further insult to injury, they had to purchase 3 new gasoline powered service trucks and trailers to haul the broken down equipment back to the shop. The local taxpayers have to bear the brunt of the increased costs.

Now, I'm not saying that biodiesel fuel can't be used. There is comfort in the fact that there are now ASTM specifications and testing for 5% bio-blends (Issue 62, page 48). Just be careful.

Our shop has experienced first-hand some of the problems with ULSD and we have discussed these issues with some of the tanker drivers in our area. I have also read the posts from other tanker drivers in the forums on the TDR website. They have told us about difficulties in providing the correct amount of lubricity when the fuel is loaded onto the trucks. We understand that the pipeline companies are forbidden to push #2 diesel through the lines if the lubrication has been added at the refinery because the FAA will not allow jet fuel to be contaminated with the lubricity additive residuals from the pipeline. The responsibility of adding the correct lubrication then shifts to the tank farms or to the truckers when they load the fuel into the tanker truck.

Early on in the implementation of the ULSD fuel we had an instance involving two land-adjoining farmers who purchased identical tractors from a dealership on a "two for" deal. They decided to go together to get a load of diesel fuel for their storage tanks to save money by buying in quantity. Oddly enough, within 10 days, we had two failed fuel pumps in our shop, and the tractor dealer was asking for warranty consideration. The hour meters on both tractors indicated less than 100 hours of running time. Careful inspection revealed that both failures occurred due to the lack of lubrication in the fuel, which is not a failure or defect in workmanship or materials. Both pumps exhibited the same failure. The tractor dealer then asked for warranty from his tractor manufacturer, who stated it was the fuel injection equipment manufacturer's problem. The customers just wanted their tractors back and any repairs necessary to be covered under warranty. The fuel distributor stated that they had plenty of lubrication added to their diesel fuel and would not accept any responsibility for the problem. The finger pointing and tempers really get to flaring when this kind of event occurs, putting all parties involved into a difficult situation.

This picture shows the supply pump ring from the internal transfer pump of one of the injection pumps. It visibly shows the damage to the transfer pump liner from lack of lubrication. The transfer pump vanes are in the center of the ring and exhibited major scoring on their sides and ends, and material from the ends of the vanes can be seen transferred to the liner surface.

This sort of failure has abated somewhat since the initial implementation of ULSD, although we do still see it from time to time.

Years ago, the pressures in diesel injection systems were somewhere near 17,000 psi ('98.5-'02 engines). Today, with the advent of common rail fuel injection and piezoelectric fuel injectors, injection pressures are upwards of 27-29,000 psi. These piezoelectric fuel injectors can meter fuel through their fine nozzle holes with extreme precision. Because of the design, they can open and close the orifice four times faster than a solenoid valve actuated injector. This is fast enough to allow up to five discrete needle valve openings over the course of a single injection event. With these types of multiple injection events, the pressure rise in the cylinder is far more gradual, and the result is reduced emissions and noise at every engine speed and load.

Because fuel injection systems are getting more and more precise, proper fuel quality requirements become imperative. Filtration requirements have become more stringent, and Cummins recommends that the 7-micron filter replace the older type cartridges, especially for the common rail engines [use Fleetguard FS19856 for '03 to '07 5.9-liter engines; use the new FS^2 filter (see page 50) for the '07.5 - '09 6.7-liter engine].

Now, here is a story that can be labeled absurd. When 2-micron fuel filter assemblies became available back in the '80s, we would install some on engines that were experiencing pump and injector failures from dirty fuel. Wouldn't you know, the very next complaint was that the fuel filters were "stopping up" too fast! They wanted to go back to the 10 or even 30 micron ratings so they could have longer filter life! Of course this was at the expense of their pumps and injectors, creating the problem that they were trying to avoid. Yes, absurd.

If you wish to fund the experimentation of using products in applications for which they were not intended, and you have the wherewithal to do it, by all means, go for it! But, do it with industry recognized scientific methodology. Have a control group, experiment under controlled conditions and document your findings so that you don't spend that good money for bad. Performing tests in any other manner would be no different than doing the same thing over and over and over, yet expecting different results each time. (Editor's note: Gerald, that's the definition of insanity!) Finally, just because you don't have an instant failure does not necessarily mean you have discovered the cure for a problem.

Gerald Tobey
Blue Ridge Diesel, Salem, Virginia

Conclusion

While the jury may be out for deliberation, the judge (that's me!) has reached a decision.

This is not to say that my opinion has not been influenced. Several years ago we posted an article that showed the benefits of this-and-that fuel additive. But you'll not see those types of analysis using up printed space in the TDR. Should you wish, there are numerous fuel system and lubricity additive studies on the web. Do a search and you will see what I mean. Be careful as you try to determine if the study is biased.

For me, I'll follow the advice of Dodge, Cummins, Kevin Cameron and Gerald Tobey of Blue Ridge Diesel.

Robert Patton
TDR Staff