



Spring 2013

Dear No-Rosion Customer,

This year's late-spring snowstorms had us all wondering if warm weather would ever arrive. At last, it's finally here. Time to begin preparing your cars for this summer...

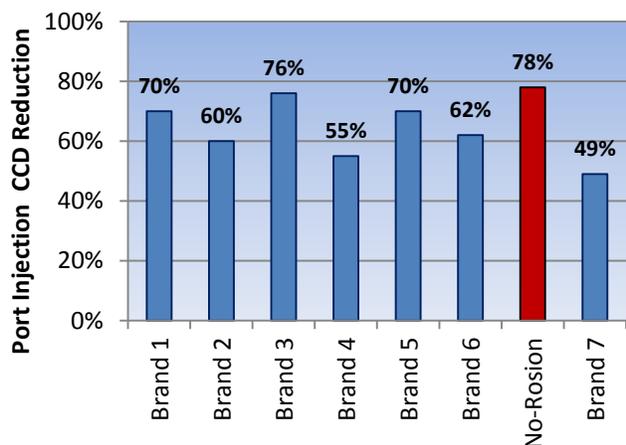
We recently wrapped up a one-year fleet test that compared the performance of our No-Rosion Fuel System Combustion Optimizer to that of some popular brands. In this newsletter, we'll share the results of this testing with you. And we'll also highlight some of the key factors that you should consider when choosing which fuel additive is right for you, and your particular application. It doesn't matter whether you're using it in your old car, or your daily driver, there are some key performance criteria of which you may not even be aware.

Ethanol is the biggest culprit in today's gasoline blends, and the problems only seem to be getting worse. It is chemically unstable, which means that it breaks down to form non-combustible byproducts. These materials accumulate as deposits in cylinders, and throughout the fuel system. For this reason, it is important for you to use a fuel additive that: (1) cleans the fuel system, (2) keeps it clean, and (3) stabilizes fuel when your car is not being driven. Our No-Rosion Fuel System Combustion Optimizer is just such a product – and one of the very few that offers these three key features – all in one product!

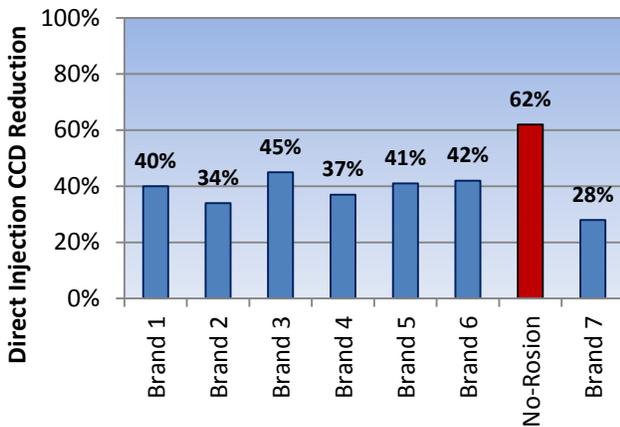
As you are doubtlessly aware, there are many fuel additives available on the market today. They all make strong performance claims, and some are pretty expensive. Standing at the shelf in your local parts store, you'll typically see at least ten of them, all fancily packaged. How do you cut through the noise?

That is exactly what our field testing was designed to do.

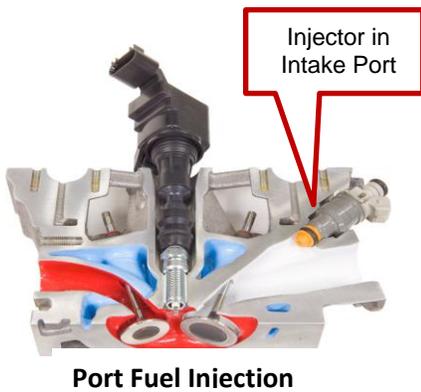
We conducted a controlled field test of No-Rosion Fuel System Combustion Optimizer, versus seven of the leading brands of fuel additives. The test was conducted in Germany, using a commercial fleet of vehicles having Mercedes Port Injection and Audi Direct Injection engines. The goal was to compare the products' ability to remove intake valve and combustion chamber deposits, as well as improve fuel economy. *(As you will note, carbureted engines were not tested because most fleets today run fuel-injected engines.)*



The graph to the left shows the average reduction of combustion chamber deposits in port injected engines for all products tested. The testing was performed by removing the cylinder heads before the test, and using a permascope to measure deposit thickness. Then the vehicles were driven 500 miles with No-Rosion added to the fuel. After this cleanup, the heads were again removed, and deposit thicknesses re-measured. No-Rosion outperformed all brands in removal of combustion chamber deposits in port injected engines.

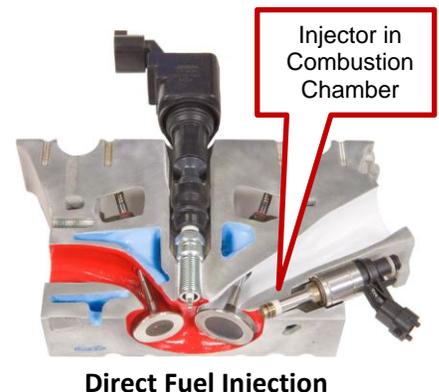


We ran the same tests in engines having direct injection. It is a new technology that is used by OEMs to increase fuel economy, and reduce emissions. No-Rosion contains an entirely new polyether amine detergent technology. It has a higher flash point than detergents in other brands. This allows it to reside in the combustion chamber slightly longer before combustion, achieving better cleanup. It also has a lower viscosity profile, which results in better flow through thinner, higher pressure fuel streams found in today's direct injection engines.

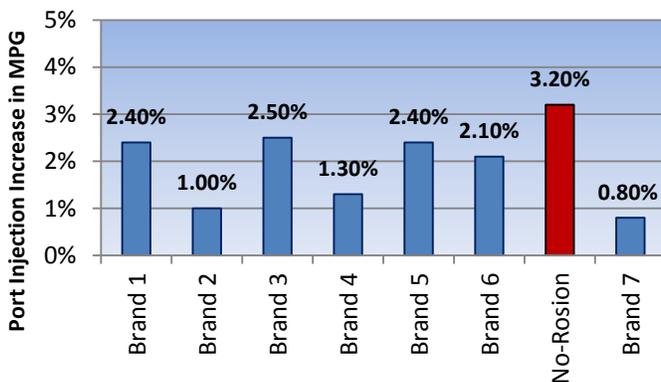


**Port Fuel Injection**

As illustrated at left and right, direct injection differs from port injection in that it delivers fuel directly into the combustion chamber. The higher temps at the injector site cause serious issues with coking and carbon build-up. For this reason, most OEMs now recommend the use of a fuel system cleaner as a means of dealing with this issue.

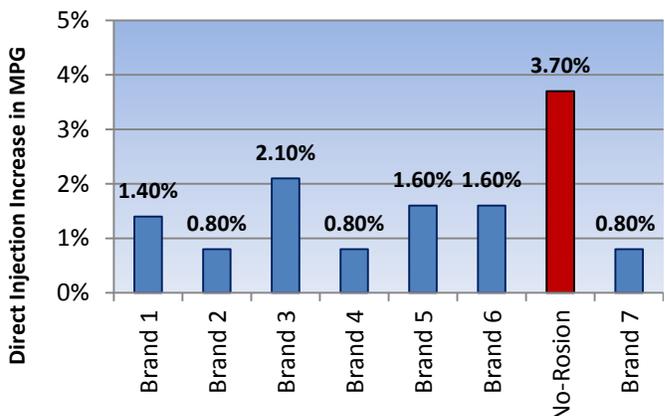


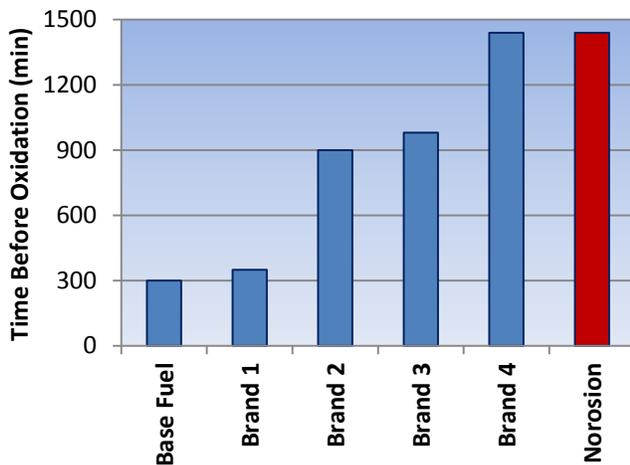
**Direct Fuel Injection**



A cleaner combustion chamber and fuel intake system yields a more efficient delivery and combustion of fuel. This results in enhanced fuel economy, lower emissions, smoother idle, easier starts, and improvements in performance. The graph to the left shows fuel economy increases for engines that were cleaned-up using No-Rosion, versus the seven other products tested in port injection engines. And by the way, clean-up results with No-Rosion in carbureted engines are very similar to results seen in port injected engines.

Because direct injection engines have more problems with carbon buildup than carbureted and port injected engines, they suffer correspondingly higher rates of efficiency loss. This only magnifies the importance of a fuel system cleaner having the ability to effectively clean direct injection engines. As indicated in the graph to the right, No-Rosion increased the fuel economy in direct injection engines by an average of 3.7% - substantially more than all other products tested.





We also ran the four major brands of fuel stabilizer products through **ASTM D525** fuel oxidation tests. In this test, we used E-5 gasoline (5% ethanol) as a base fuel. As illustrated at the left, it begins to oxidize after only 300 minutes. With No-Rosion, the onset of oxidation was delayed until after the test concluded at 1440 minutes. This performance was superior to that of three of the products tested. Only one product, the industry leader, tested on par with No-Rosion. But it is important to note that this product does NOT offer clean-up or keep-clean performance, nor does it increase combustion efficiency or fuel economy. It only stabilizes fuel.

The reason fuel stabilization is so important is that oxidized fuel forms non-combustible byproducts. These are the materials that build-up to form carbon deposits in combustion chambers, and on intake valves. And they interfere with injectors' and carburetors' ability to properly deliver fuel. So by preventing the oxidation of fuel in the first place, the prevention of carbon and deposit build-up will occur, by default.

Through the process of emulsion, moisture from the air makes its way into fuel. This causes corrosion on all metal parts in the fuel system. So we also ran all four brands through **ASTM D665A** tests. In this test, a metal probe is exposed to fuel at 100°F for 24 hours, and the percent rust coverage is evaluated. No-Rosion achieved a rating of "A," which denotes 0% rust. The leading brand achieved a rating of "B+." All other brands scored a rating of "E," which denotes 75%-100% rust. At right, you can see the difference between a rating of "A," and a rating of "E."



"A" rating, with No-Rosion Fuel System Combustion Optimizer



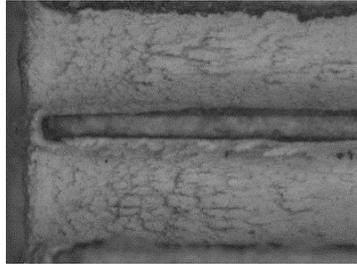
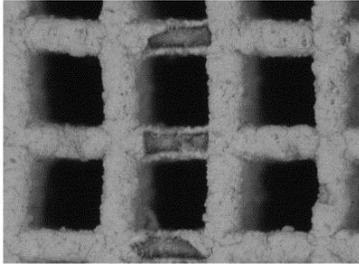
"E" rating, without No-Rosion Fuel System Combustion Optimizer

Whereas other brands spend on advertising and fancy packaging, we invest in research and the quality of the chemical inside the packaging. That's what sets us apart. That's most likely one of the big reasons why you're a customer. And that's precisely what these test results show.

Do your daily drivers have port injected or direct injected engines? They probably do. So be mindful of the fact that using No-Rosion Fuel System Combustion Optimizer in all your vehicles will bring good benefit.

Speaking of your daily drivers, they have catalytic converters. Whether you know it or not, these days many brands of motor oil utilize an anti-wear package that contains phosphorus. This is especially the case with high performance and synthetic oils. The problem is that phosphorus poisons catalysts. As small amounts reach catalytic converters through combustion gases, catalyst efficiency is lost, and emissions increase.

Our No-Rosion Octane Booster solves this problem. The same MMT ingredient that boosts octane offers the secondary benefit of being a phosphorus scavenger. So it will actively clean and remove phosphorus deposits that may already have accumulated in your car's catalytic converters. This will prevent any unwanted surprises the next time you may find yourself at the local emissions test center.



The images above were taken under microscopy, and illustrate the problem with *catalyst poisoning*. At left is a catalyst element that shows only slight buildup – as would be normal from trace quantities of contaminants in fuel. At right is a catalyst element that has been poisoned. Phosphorus coats the working surfaces, encapsulating the catalyst element so it can't contact, and treat, exiting exhaust gases.

But it's your older cars that derive the most benefit from using our No-Rosion Octane Booster. Especially during extreme summer heat – which, by the way, is just around the corner. It prevents detonation of today's low-octane fuel blends, and boosts octane by up to 40 points (4 numbers). This helps your engine run cooler, develop more horsepower, and prevent damaging knock and pinging that can really spoil the fun. And the metallic octane ingredient also protects non-hardened valve seats in older engines from recession.

Our tests also revealed another important finding: There are synergistic benefits to be derived from running both our No-Rosion Combustion Optimizer and No-Rosion Octane Booster at the same time. The Combustion Optimizer creates a cleaner combustion chamber, which eliminates detonation and allows maximum benefit to be derived from octane boosting. And the clean-up process itself is aided by the higher octane fuel created by using the Octane Booster. This enhances the burn-off of deposits that are solubilized by the Combustion Optimizer. The net result is a cleaner burning engine that performs as it was originally designed to perform.

At the end of the day, maintenance of every system and every fluid is the key. If one fails to perform optimally, it only adds stress to the others, increasing the possibility that they will fail as well.

One of our favorite quotes is from Don Garlits: *"If more is better, then too much is just right."* At Applied Chemical, we believe the same can be said regarding engine fluid maintenance. Most engine failures are related to fluids – namely fuel, coolant, and motor oil. For this reason, we offer a full line of No-Rosion products that address specific issues with each one of these fluids.

Thank you for being a customer. We appreciate your support, and look forward to continuing to be of service.

Applied Chemical Specialties, Inc.