

FFI  
MPG-CAPS™  
Combustion Analysis  
By Jerry Lang

# Jerry Lang

Jerry Lang has more than 40 years of combustion experience and a strong background in refining processes. As the owner and operator of Jerry Lang Combustion Consulting, he is currently designing and overseeing combustion projects for four refineries, including efforts to lower emissions and improve efficiencies.

Mr. Lang has served as a combustion consultant to virtually all of the major oil companies and 95% of the refineries, including ChevronTexaco, Chevron Phillips, ARCO, Shell, Kraft, Exxon, Mobil, and Dow Chemical. At Exxon, Mr. Lang developed ways to improve efficiency by retrofitting the tankers of the company. He also served as the combustion auditor to Chevron on their Richmond Nitrous Oxide (NO<sub>x</sub>) Reduction Project, worth in excess of \$300 million. In addition, Mr. Lang has completed projects in Norway and is currently contributing to an ongoing project in Qatar.

In 1967, Mr. Lang established his own business where he developed and patented several products related to combustion and incineration. He also served as Manager of Combustion Systems for Howe Baker Engineers. Mr. Lang was also recruited by Dr. Edward Teller, the primary developer of the hydrogen bomb, for four years on an alternate fuels project doing combustion tests.

Mr. Lang has extensive experience designing equipment utilized in reducing emissions from stationary sources such as refineries, power plants, and industrial operations. He also contributed to the development of the equipment used during the clean up of the Alaska oil spill. Over the years he has also done work on systems to improve mileage in automobiles, such as installing a vaporizer in the exhaust to vaporize the gasoline prior to intake and working on steam injection in automobiles.

Mr. Lang holds 17 patents, including 13 combustion-related patents.

# Analysis

I became interested in the MPG-CAPS™ being marketed through FFI because of my past 40 years experience in the combustion and refining industry. One of my employees brought the product to me, and I was immediately skeptical because of my past experience with products making similar claims. I have seen and tested numerous fuel additives that claim to clean engines, increase performance, and increase fuel mileage. Many claim to lower emissions in burners. I have been a developer of combustion products for years and have patented several burner and combustion related technologies. My technologies are used extensively in the petrochemical, industrial, and commercial markets worldwide. I have personally tested several ideas with the specific intent of increasing efficiency in gasoline and diesel engines. My initial intent was to disprove the MPG-CAPS™ claims. I have emission test and other equipment in my facility.

I was surprised when I first tested the vehicle of my employee who was using the MPG-CAPS™ and compared it to my identical vehicle without the MPG-CAPS™. I found a surprising reduction of emissions on the vehicle using the MPG-CAPS™. My employee wanted me to use the MPG-CAPS™ in my truck, but I decided to monitor my mileage and emissions to get a baseline first. After closely monitoring my mileage and emissions for about 1000 miles, I started using the MPG-CAPS™ as specified. At the conclusion of 1000 miles, my truck was getting 14% better mileage, and emissions were reduced by almost 75%. This result did get my attention, so I started an extensive research effort on the product. My conclusion based on my own testing, combusting experience, and research is that the product clearly does work and is scientifically and technically sound. The following is my explanation of the product from a combustion expert's viewpoint. I did sign a nondisclosure agreement with the manufacturer and owner of the technology in order to get information for this paper and cannot disclose any trade secrets. I will attempt to describe the product and process in a way that will help to reduce confusion and answer critics.

## What is it?

The basic technology involves combustion catalytic chemistry. Combustion catalytic chemistry dates back to the 1800's when an ethylene complex of Platinum was prepared. The structure and basis of their effectiveness was difficult to deduce using chemical methods of that day. With the 1950's development of the NMR and single crystal X-ray diffraction, methods were available to study the structure

and elucidate the mode of action of these complexes. With the advent of computerization, a rapid growth in the study of combustion catalysts ensued.

The application of these complexes for use in internal combustion engines has always been a scientific goal. As is found in any developing technology, you will find periods of success and times of less activity. The MPG-CAPS™ combustion catalyst is the result of space-age continuation of a proven technology in its' latest stage.

### How Does it Work?

The MPG-CAPS™ combustion catalyst uses the fuel (gasoline or diesel) as a carrier to deliver it into the combustion chamber of the engine where it actually does its' work. The MPG-CAPS™ formulation actually contains the precursor of the active catalyst. The actual MPG-CAPS™ combustion catalyst is activated by the burning of the fuel containing the MPG-CAPS™ and it then develops an ultra thin catalytic coating on the pistons, the head and the spark plugs.

A simple similar example of this is the scorching of a pan when cooking. We are all familiar with how a residue from cooking will form a layer on a pan if the food is overheated. In most cooking cases, the amount of material oxidized is of sufficient quantity to form a heavy film. However, if you scrub the pan many times, the film will get so thin it will be similar in appearance to the catalytic CAP coating we are describing. All you see is discoloration with a film so thin it appears to be part of the pan.

The catalytic coating is **RED** so it is easy for you to tell when you have successfully completed the conditioning period (50 gallons consumed at a dose of 2 MPG-CAPS™ to 20 gallon) required to achieve the 10% MPG increase by simply checking to see if the spark plug is red. Since the temperatures and pressures inside the combustion chamber are so high, it is necessary to continue using MPG-CAPS™, after the conditioning period, at a continuous use rate of one MPG-CAPS™ treats 20 gallons.

Once this catalytic coating is developed on the pistons, the head and the spark plugs by the conditioning dose, it provides several benefits. First and most important, it makes the fuel burn faster early in the combustion stroke (from 6 to 12 crank angle degrees after top center). This directly increases efficiency of the engine and reduces the peak in cylinder temperature. The lower peak temperature is likely to increase engine life because one of the factors causing engine component failure is high temperature fatigue.

A second benefit of this RED combustion catalyst coating is that it prevents carbon and most lube ash deposits from accumulating on the piston and head. This reduces the octane appetite of the engine (allows you to use regular fuel rather than premium to avoid knock and pinging).

A third benefit is the reduction of ring land deposits, which improves ring seal and reduces excessive lube oil consumption. Finally, the catalytic coating also develops in the catalytic converter and on the outer housing of the oxygen sensor. Just like in cylinder, it provides a protective ultra thin catalytic coating that protects both parts from carbon deposits and improves their durability and can provide a long-term improvement in emissions.

In summary, I found many positive effects in using the MPG-CAPS™. I found no negative effects but you must remember that the RED coating is catalytic, necessary to the performance of the MPG-CAPS™ and GOOD. Since most automobile engines burn fuel at over 99% efficiency, it is impossible to improve the completeness of combustion. However, MPG-CAPS™ develop a catalyst coating that makes the fuel burn faster so a more efficient burn is produced.

It is my opinion that the greatest positive effect is the fact that more heat produced by the combustion is being used to drive the wheels. In an automobile not using MPG-CAPS™ as much as 75% of the energy in the fuel you buy at the pump is basically wasted. In my past experiments and testing, I have proven heat recovery to be the only practical way to improve gas mileage with a modern vehicle. The process produced by the MPG-CAPS™ does use more of the heat generated and the catalytic process releases the heat faster. The use of FFI MPG-CAPS™ is a practical way to improve mileage or increase power and extend engine life.

# Jerry Lang Test Procedure

In order to eliminate variables the following procedure was used.

1. I established a baseline miles per gallon number for highway driving. I drove the 1998 Mercedes on highway trips only for 1313 miles.
2. I established a baseline miles per gallon for city or short trip driving. I drove the 1998 Mercedes in city and short trips for 1051 miles.

It was established that my baseline miles per gallon were 26.18 for highway and for city it was 18.72.

3. I conditioned the car for 1620 miles prior to testing.
4. I started my first test with a full tank of gas and drove 273 miles and recorded highway and city driving. (200 highway and 73 city). I added 10 gallons of gas at this point. I repeated this procedure three more times as shown in the chart. I then drove 261 miles as shown and filled the tank. My reason for following this procedure was to minimize the fill up errors.

During this test I drove a total of 1420 miles and used a total of 54.32 gallons of gas. That is an average of 26.14 miles per gallon. In order to compare this to my baseline mileage I used the following procedure.

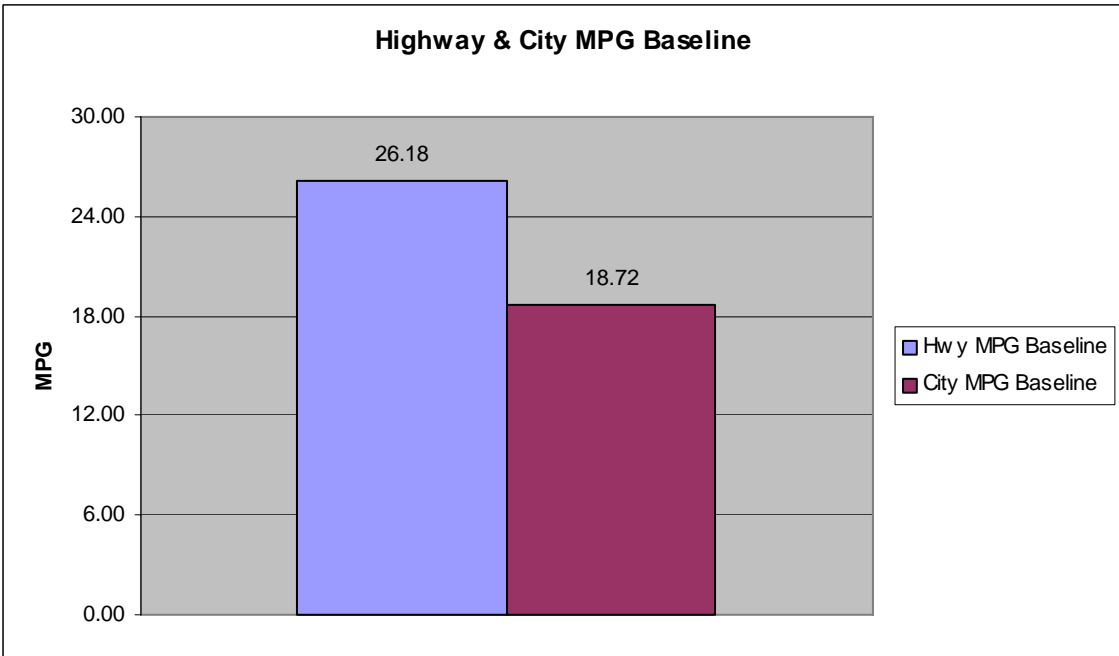
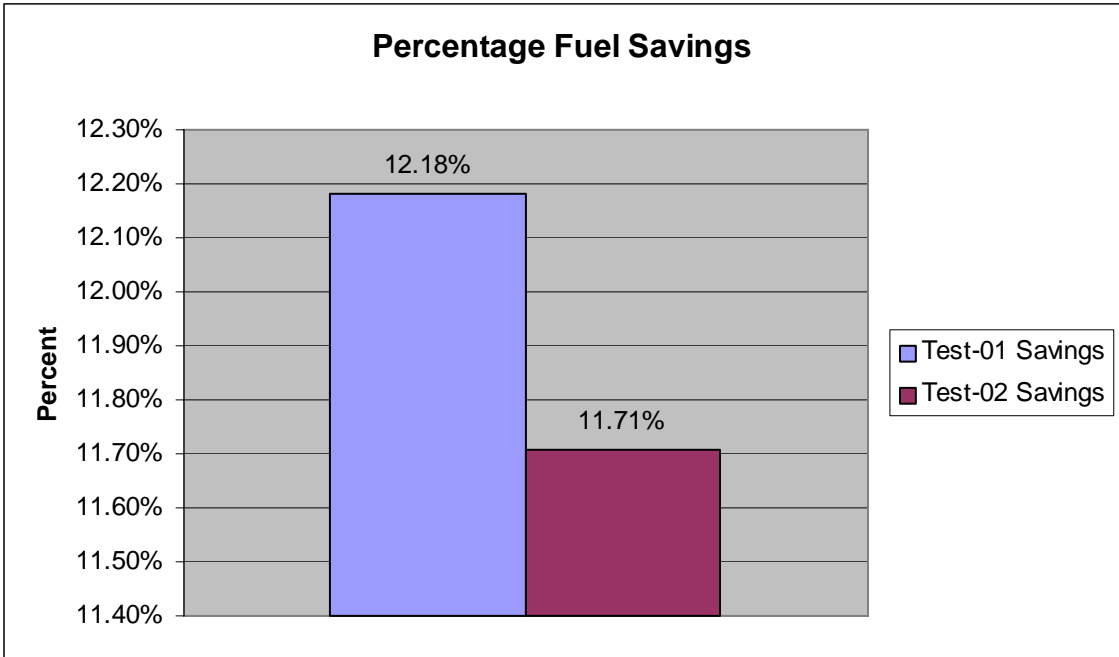
980 miles of the 1420 were highway so 980 divided by 26.18, which was my baseline mileage for the highway, equals 37.43 gallons of gas. 440 miles of the 1420 were city type so 440 divided by 18.72, which was my baseline city mileage, equals 23.50. The total baseline gallons would have been 60.94 without the MPG-CAPS™. The average mileage without the MPG-CAPS™ would have been 23.30 miles per gallon.

The number 2 test was conducted in the same manner. The average miles per gallon was 23.63 but after you do the calculations you still see around 12% savings in fuel or miles per gallon.

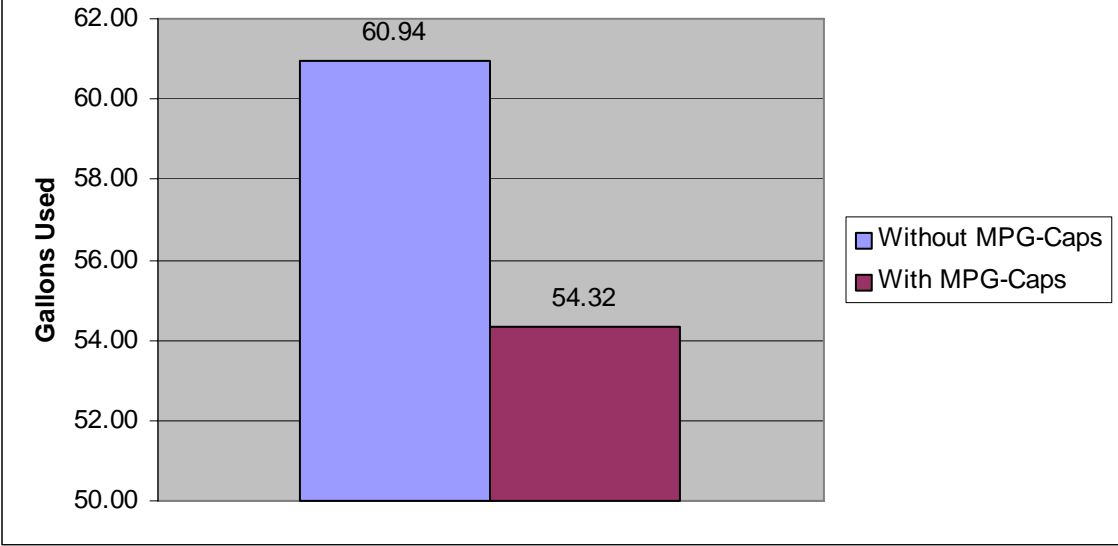
<b>98 Mercedes S-320 Baselines</b>					
Highway Baseline			City Baseline		
Route	Miles	MPG	Route	Miles	MPG
HR-01	631	26.12	CR-01	467	18.64
HR-02	196	26.51	CR-02	231	19.10
HR-03	486	25.91	CR-03	353	18.42
<b>Total Miles</b>	<b>1313</b>		<b>Total Miles</b>	<b>1051</b>	
<b>Hwy MPG Baseline</b>		<b>26.18</b>	<b>City MPG Baseline</b>		<b>18.72</b>

<b>98 Mercedes S-320 Test-01</b>					
Test-01 Miles				Gallon Comparison	
Hwy	City	Combined	Gallons	Without MPG-CAPST <sup>™</sup>	
200	73	273	10	With MPG-CAPST <sup>™</sup>	60.94
200	58	258	10	<b>Test-01 Savings</b>	<b>12.18%</b>
180	130	310	10		
200	118	318	10		
200	61	261	14.32		
<b>980</b>	<b>440</b>	<b>1420</b>	<b>54.32</b>	<b>Total Gallons</b>	
<b>37.43</b>	<b>23.50</b>	<b>&lt; Baseline Gallons Used</b>			

<b>98 Mercedes S-320 Test-02</b>					
Test-02 Miles				Gallon Comparison	
Hwy	City	Combined	Gallons	Without MPG-CAPST <sup>™</sup>	
68	212	280	10	With MPG-CAPST <sup>™</sup>	62.11
54	186	240	10	<b>Test-02 Savings</b>	<b>11.71%</b>
20	210	230	10		
200	64	264	10		
189	111	300	15.6		
<b>531</b>	<b>783</b>	<b>1314</b>	<b>55.6</b>	<b>Total Gallons</b>	
<b>20.28</b>	<b>41.83</b>	<b>&lt; Baseline Gallons Used</b>			



**98 Mercedes S-320 Test-01**



**98 Mercedes S-320 Test-02**

