



# Engine Dynamometer TEST



*Gamma88 Engine Dynamometer Test*  
Conducted April 2009 at Warren CAT  
Odessa, Texas, USA



## ***What is Gamma88?***

Gamma88 is an extremely potent fuel and oil reformulator that has been proven to significantly reduce fuel usage, emissions, and maintenance cost for almost every type of engine. It is a liquid product that greatly reduces harmful byproducts of combustion, while helping to decrease the carbon footprint in the atmosphere, most notably carbon dioxide, through decreased fuel consumption (or increased fuel efficiency). Gamma88 should be added to liquid fuels and motor oils, including gasoline, diesel, bunker C fuel, ethanol, methanol and bio-diesel. The power of Gamma88 comes from its ASTM lab-tested and proven ability to enhance the lubricity and combustion properties of fuels and oils and clean carbon deposits within engines while reducing wear scarring. Through these processes, engine efficiency and operating life can be dramatically increased.

## ***Tested***

Numerous tests – both ASTM lab and independent engineering dynamometers – have been conducted, with results quantitatively proving Gamma88's effectiveness. What follows is one such test, performed April 13-24, 2009, at Warren CAT in Odessa, Texas, to evaluate Gamma88 in a diesel engine. The objective of this series of dynamometer tests was to evaluate the effects of the product on engine performance. Previous tests had shown improvements in engine performance, reduced exhaust emissions and improved engine cleanliness, but had not always been performed under controlled, repeatable, and independently certified conditions.



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## Gamma88 Dynamometer Trials Odessa, Texas

### Scope of Dynamometer Trial

A Caterpillar (CAT) D3508, 900-horsepower engine was tested for 57 operating hours using ultra-low sulfur diesel (ULSD) fuel. Each phase consisted of a three-hour operating segment and a one-hour shutdown segment. During the entire demonstration, engine performance statistics were computer generated and electronically captured. Fuel consumption was measured, recorded and verified. After establishing a baseline, a total of 17 four-hour phases were performed on the engine with Gamma88 added to the ULSD, as noted in this report. This protocol was followed to allow for the absorption of Gamma88 (chemisorption) by the conclusion of the demonstration.

Following is the breakdown of phases:

- Two *baseline* phases – with only raw ULSD and CAT recommended engine oil (no Gamma88).
- 12 *implementation* phases at a 5x rate of Gamma88 introduced into the ULSD (5 times the normal usage amount), and a 1x normal usage rate introduced into the engine oil.
- Two *implementation* phases at a 3x rate of Gamma88 into the ULSD and a 1x normal usage rate into the engine oil.
- Three *sustainment* phases at a 1x normal usage rate of Gamma88 into the fuel and a 1x normal usage rate into the engine oil.

At all times, the engine was controlled by an electronic throttle control and a programmable logic controller (PLC) that maintained the engine at prescribed horsepower and RPM settings. The following identical steps were performed during each individual phase:

- Engine was run at 1217 rpms @ 700 horsepower for five minutes and at 800 rpms @ 300 horsepower for two minutes.
  - This seven (7) minute cycle was repeated throughout the 3-hour operating segment.
- Engine performance data was electronically recorded every 21 minutes at both the high and low rpm settings.
- Every hour the fuel volume was measured.
- 350 gallon (baseline and 5x phases) and 200 (3x and 1x phases) gallon fuel tanks were filled and measured at the conclusion of each phase.





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### Conclusions

At all times, Warren CAT personnel participated in and/or monitored the procedures of this demonstration, as well as the introduction of Gamma88 into the ULSD fuel consumed by the Caterpillar 3508 demonstration engine. Throughout the entire demonstration, a number of positive changes occurred:

1. A computer documented increase in horsepower (Appendix B)
2. A computer documented increase in torque (Appendix B)
3. A visible reduction in carbon buildup in the engine (Appendix D)
4. A measured reduction of fuel consumption while using identical profiles over a 57-hour operating evaluation period.

What can't currently be displayed by this demonstration - although can be deduced from performance increases and photographs (Appendix D) - is that engine life will likely be increased and maintenance will likely be decreased based on the photographs of how the chemisorption and cleansing process of Gamma88 occurs.

At the end of the trial, neither my mechanics nor I detected any negative effects Gamma88 had on the engine or any of its components – in fact they were cleaner than before the demonstration.

Finally, it is our conclusion that by following the Gamma88 company recommended protocol for implementation, ultimately adding Gamma88 to the fuel and oil tanks at the 1x sustainment rate significantly reduced fuel consumption/increased fuel efficiency. **Our study resulted in an average decrease in fuel consumption of 7.59%** compared to the baseline average. Particularly notable is fuel efficiency increase during each sustainment phase - from 4.4% to 6.9% to 11.4%. This demonstrates that the effectiveness of Gamma88 continued to increase throughout the sustainment phase.

Eric Hawkins  
Engine Service Manager

## REPORT HIGHLIGHTS

### IMPLEMENTATION PHASE

### FUEL CONSUMPTION

### AVERAGE SAVINGS\*

*Average 5x*

*90.4 gallons*

*8.5%\**

*Average 3x*

*91.0 gallons*

*7.89%\**

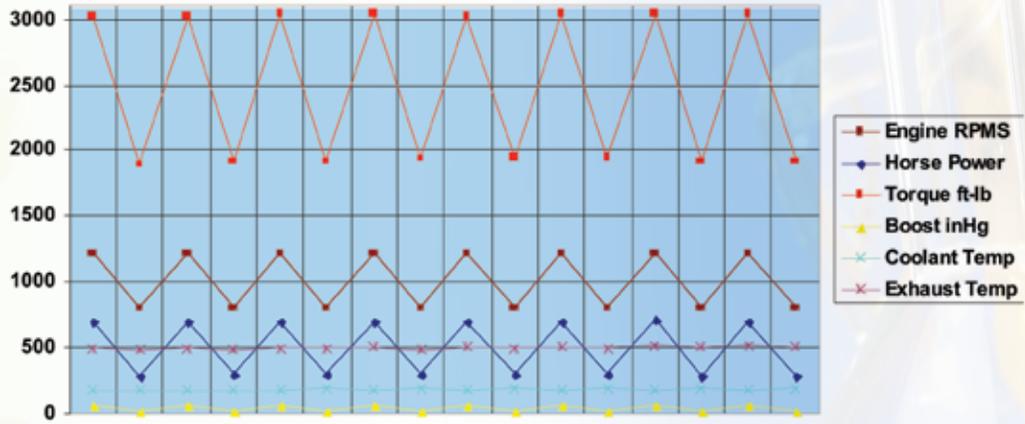
*Average 1x*

*91.3 gallons*

*7.59%\**

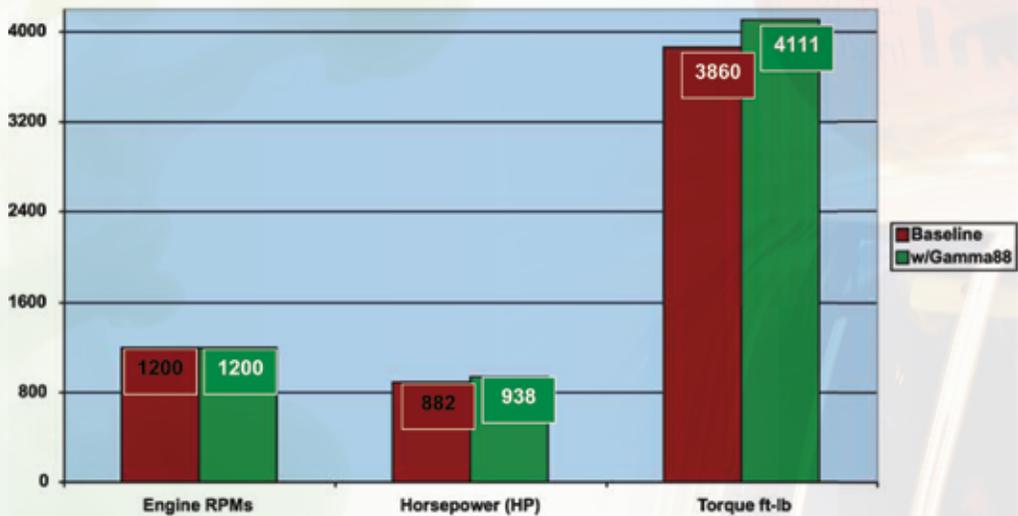
*\*Average Savings Based on Baseline Phase Fuel Consumption of 98.8 gallons*

## Appendix A Dynamometer Report



Engine RPMs	1218	797	1217	799	1217	799	1217	799	1217	799	1217	799	1217	798	1217	798
Horse Power	700	288	700	292	705	291	706	294	699	296	706	297	707	290	704	290
Torque ft-lb	3022	1899	3023	1922	3046	1915	3048	1935	3018	1951	3049	1953	3049	1913	3041	1913
Boost inHg	61	11	60	11	60	11	60	11	60	11	59	11	59	10	59	10
Coolant Temp	178	180	177	180	178	181	179	181	179	181	179	181	179	181	180	182
Exhaust Temp	495	483	494	485	498	488	501	487	503	490	506	496	512	501	514	506

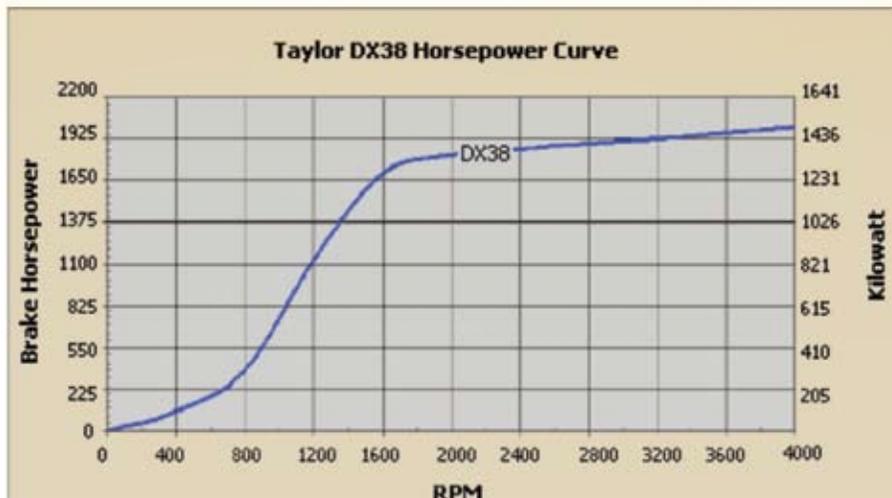
## Appendix B Dynamometer Report



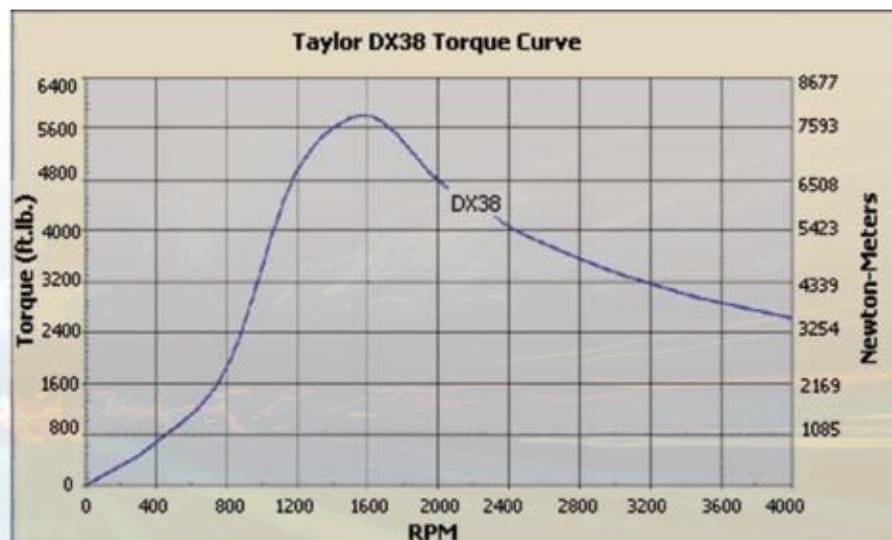
The Bar Graph depicts Gamma88's positive effect on HP and torque. While holding RPM constant and comparing the baseline with raw ULSD (red) and ULSD with Gamma88 added (green), the percentage gain in HP was 6.35% and Torque was 6.50%.

## Appendix C Horsepower Curve

**HP:** 2000 hp (1491 kw)  
**Torque:** 5800 ft. lbs. (7864 Nm)  
**Speed:** 4000 RPM  
**Water Use:** 145 GPM (9.1 L/s) (No Cooling System)  
**Shipping Weight:** 2634 lbs. (1195 kg)



## Appendix D Torque Curve







***Typically Reduces Fuel Costs by 6 to 12%***

***Increased Lubricity 11%***

(Lowered wear scarring from 540 microns to 480 microns) in HFRR tests

***Raises Cetane by 2.5%***

***EPA Registered***

***ASTM Lab Tested for Use in Fuel and Oil***

***99.99976% Clean***

(Ashless upon ignition)

***Non-hazardous***

***Ester-based with a Small Fraction  
of Petroleum Distillate***

***Internationally Used***



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*Gamma88 is available for any size fleet of vehicles or specialized need. Visit our website – [www.Gamma88.com](http://www.Gamma88.com) or call 1-888-6-Gamma88 – for all the details to see how you can put our fuel and oil reformulator to work for you!*