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Holly,

This letter is written to formally request a meeting to begin a dialog on internal calibration repair standards needed for aftermarket diesel engine injection systems. Presently, OEM's withhold test equipment and the where-with-all to meet current standards, however aftermarket equipment and technology is rapidly maturing to the point where a meaningful discussion of issues could take place. This change would vastly improve the aftermarket product quality, stimulate the aftermarket economy and lower emissions for a greener environment. I have attached a briefing paper that outlines the issues, problem, background and solution for this small business opportunity in the diesel engine injection system repair and overhaul market.

I am requesting your agency to enforce current regulations that may be open to interpretation and establish this necessary industry standard.

Please contact me at your earliest convenience.

Regards,

Omar Cueto

Attachment: **Standardized Aftermarket Diesel Fuel Injector Internal Calibrations**

Standardized Aftermarket Diesel Fuel Injector Internal Calibrations

04/23/10

By: Omar Cueto

Issue: In the case of Mechanical Unit Injectors (MUI), the OEM supported the injector aftermarket allowing the remanufacturing of MUI by supplying the public sector with the required remanufacturing instructions, guidelines and/or staples. Introduction of Electronic Unit Injectors (EUI) in the early 1990's and several changes in EPA regulatory policies caused sharing of industry standards and data to be terminated. The new technology used in EUIs justified a change in order to maintain the integrity of OEM emission tolerance standards. The result of this action has been OEM's expanded control of the vast aftermarket by offering a tightly controlled injector exchange program with prices that far exceeds inflation-indexed cost.

Problem: The cost implications of OEM parts and the size of the lucrative aftermarket, diesel injector remanufacture and repair market has driven smaller repair facilities to repair and remanufacture EUIs without the ability to certify a repair that meets or exceeds OEM and EPA standards. Now more than ever with the newest complex CRI (common rail injector) systems, the aftermarket remanufacturing practices are in need of Internal Calibration data for a "certifiable testing and validation" protocol or program that is environmentally sound and cost effective.

Background: The diesel engine, as a primary power source for on and off highway markets, has long term viability and potentially increased efficiency. Recent emissions strategies mandated in Europe (Euro-V) and the United States (Tier 2 Bin 5), aiming to improve diesel engine fuel efficiency and exhaust emissions, have been met positively by manufactures who have responded with technologically advanced fuel systems.

Fuel economy and lower emission standards have been met with today's new CRI technology, more than ever, Internal Calibration data for a regulatory remanufacturing and testing standard is required. The highly advanced electronic CRI system is required in many cases, to inject fuel several times during the injection event of the power stroke cycle, compared to predecessors which had only one injection event. Recent DPF (Diesel particulate filter) regeneration techniques also depend heavily upon these precise controlled CRI systems for a cleaner environment. These "multi injection events" are termed "shot-to-shot" and are extremely challenging to measure accurately with the testing equipment currently being used in the aftermarket. Injection shot durations can be as little as $200\mu\text{s}$ ($1/5000^{\text{th}}$ of a second), and newest developments are claiming the separation time intervals between shots may be near zero. Injection pressures have increased to a dramatic level 30,000 PSIG or greater while nozzle orifices have decreased down to nearly .003", culminating in a ballistic fuel velocity of nearly 1,600 mph. Measuring shot-to-shot injection events is like attempting to precisely measure the distance between a pair of nose-to-tail fighter jets traveling at over twice the speed of sound, and doing it not just once, but repeatedly at 250 or more times a second. This measurement capability in some cases has surpassed that of aerospace technology.

Lack of OEM Internal Calibration data has driven the aftermarket to focus emission reduction opportunities on exhaust after-treatment solutions using retrofitted product designs. Large grants, focusing solely on the after-treatment technologies, fail to address the problem of improperly remanufactured or serviced fuel injection equipment. With Internal Calibration data to standardized and verify procedures, these after-treatment solutions would have an improved long term effect with fewer emissions generated during the combustion process. The consequential effects of failing to fully appreciate the impact of non-regulated remanufacturing of the current highly sophisticated fuel injection equipment, and their inconsistent testing methodologies, needs to be addressed with an eye toward an environmentally accurate and cost efficient product.

Solution: Injector remanufacturing of diesel engines is in need of OEM Internal Calibration data to provide industry standard that is cost effective and environmentally responsible. CRI systems require an innovative, yet standardized, servicing or testing approach, making data acquisition and verification a new challenge. Non-OEM technology to support these activities is rapidly maturing and cost effective. Providing a standard will go a long way towards lifting the quality of aftermarket repairs and reducing noxious emissions due to diesel engines as well as contribute to small business preservation, the free competitive enterprise and to maintain and strengthen the overall economy of our nation.