THE RELATIONSHIP BETWEEN CLEAN DIESEL AND PRODUCTIVITY

THE ISSUE

We are all aware of the negative media publicity associated with the supply of wet or contaminated fuels. Supply of fuel that is not fit for purpose from a retail outlet typically attracts great media attention as a succession of private vehicles stop a short distance down the highway.

The loss of productivity and vehicle availability is well recognised. Reduced engine efficiency and performance through exposure to lesser amounts contamination are less well reported or understood.

The root cause of the issue is simple. Engine manufacturers are adopting ranges of new technologies to comply with ever tightening emissions regulations. Numerous manufacturers are now promoting advanced technology: highly efficient, environmentally sound equipment producing lower emissions.

FUEL SYSTEM DEVELOPMENT

One of the many tools that engine manufacturers have adopted to achieve these targets is the High Pressure Common Rail (HPCR) fuel injection system. Typically these operate at extreme pressures, 27,000 to 45,000 psi, and are effective at reducing noise and emissions levels whilst providing increased power from a lower fuel burn.

The downside for the engine owner being that HPCR systems are expensive to repair or replace and have a dramatically reduced tolerance to dirt or water when compared to their predecessors.

In reality particles as small as the lower end of the size range of bacteria (bacteria ranges in size from 1 to 3 micron) are directly linked to premature fuel system wear. Analysis that has recently been publicly released identifies that particles in the 2-3 micron range directly contribute to premature fuel component failure.

The demand from OEM engine manufacturers for enhanced fuel system protection has inadvertently created additional concerns. Modern fuel filters are highly efficient and effective at preventing the passage of very small particles. When exposed to the right circumstances, tight fuel filter medias are capable of removing a range of organic compounds from the fuel source including additive packages that were intentionally placed in the fuels, but at some point became insoluble and therefore "filterable".

CHANGES IN FUEL SPECIFICATIONS

The drastic reduction of sulphur from fuel supplies has resulted in need for additive or detergency packages to replace the lubricity that was lost through the hydrodesulphurization process (sulphur removal).

Additives (including detergents) are surfactants, meaning that the water removal from modern fuels cannot be addressed by the same process commonly used for many years.

The chemistry of modern ULSD fuels being the removal of sulphur and associated non-wax species and the subsequent inclusion of varied complex additive packages has impacted upon diesel fuel storage life.

Fuel typically degrades with aging to a point at which it may no longer be fit for purpose, resulting in engine performance and reliability concerns.

Widespread use of Bio or Bio blend fuels has created another level of complex contamination and water removal considerations.

COST TO THE BUSINESS

Non-warranted failures have occurred from the use of less than an on vehicle tank of contaminated fuel. The costs of repair varies greatly, frequently common 4WD vehicles are up to AUD12,000.00, while some of the larger engines common to Australia are now in excess of AUD120,000.00 in components plus labour costs and down time to rectify.

The expense associated with premature failures presents as an unacceptable burden to consumers.

The implications of critical diesel powered standby systems failing to function when required is difficult to measure.

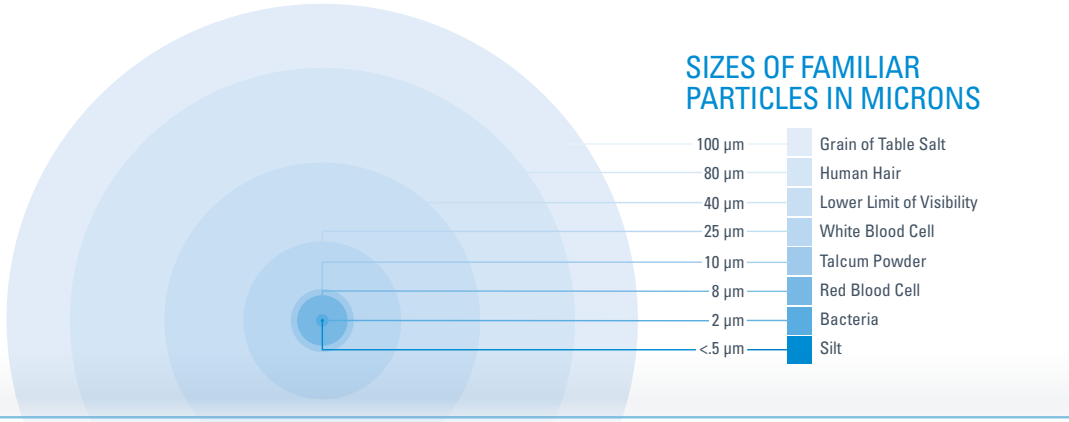
Reduced engine efficiency and increased emissions are direct costs that often remain un-documented.

INDUSTRY STANDARDS

Global fuel sources and supply are subject to incredible variation.

In theory diesel fuels are to conform to the World Wide Fuel Charters contamination and moisture expectations among other parameters.

Charter cleanliness expectations include an ISO4406 Cleanliness code that denotes the number of particles at 4, 6 and 14 micron or larger in a known amount of fuel. It is of little surprise that many of the world's leading diesel engine manufacturers have built their engines to operate with fuel that complies with the global charter.



Filtration is often misunderstood by the consumer, there remains a perception that if a consumer has fitted a 2 or 10 micron filter that the filter will stop every particle at that size. Therefore the use of that filter guarantees protection. This simply isn't true, every filter will have an efficiency (often reported as a Beta Ratio) at a given particle size and will generally pass a quantity of particles in the size range known to create damage. Engine manufacturers understand this phenomenon and often incorporate a series of filters that will ensure that only fit for purpose fuel reaches the HPCR when the vehicle is supplied with fuel that meets the WWFC cleanliness expectations.

Fuel cleanliness and quality vary from one supplier to another and the standard of what appears acceptable differs from country to country. Many regions enjoy self-regulated fuel providers that pride themselves on dispensing fuel ex their terminals at a cleanliness level that is acceptable for modern equipment without engine warranty or performance implications.

Issues develop and are rapidly compounded by the use of blended fuels, presence of free water, cooler temperatures, multiple transfers, or the use of aged or inappropriate tanks and infrastructures. Every time the fuel is transferred it is exposed to greater levels of contamination.

Substandard engine service and maintenance process' can instantly negate any upstream contamination control practices.

SUMMARY

Understand the fuel cleanliness expectations of your equipment.

Assess your on-site fuel storage and management processes with the view of providing the ideal environment to maintain or improve the cleanliness level of delivered fuels.

Audit site service and fluid handling practices and minimise known sources of water or contamination ingress.

Frequently drain or pump free water from bulk storage and on vehicle tank bottoms.

Before considering the long term storage of diesel fuels consult your fuel provider with respect to anticipated storage life.

Modern or blended fuels typically degrade in a shorter period than we experienced with high sulphur fuels.

Diesel fuel must be used while "fit for purpose" as degraded fuel may not be reclaimable.

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