

Fuel & engine research identifies ways to lower diesel particulate matter

SkillPro Services have been researching diesel engines and their emissions for well over a decade. The most recent work has focussed on diesel engines and fuels used by underground coal mines.

Diesel exhaust particulate matter (DPM) is a highly topical subject, especially amongst industry workers in direct or intimate contact with diesel exhaust emissions; typically, underground miners and civil tunnelling contractors. Except for isolated occurrences, DPM does not engender a high degree of interest from the general public, however operators of public transport appear to have some interest in the subject, especially in already heavily polluted city environments.

SkillPro engineers have collaborated with scientists from Queensland University of Technology (QUT) to demonstrate large reductions in potentially toxic diesel exhaust particulate matter (DPM) are possible. DPM emissions have been shown to be highly variable, with major contributors being engine design (including fuel injection technology), speed and load, and fuel type.

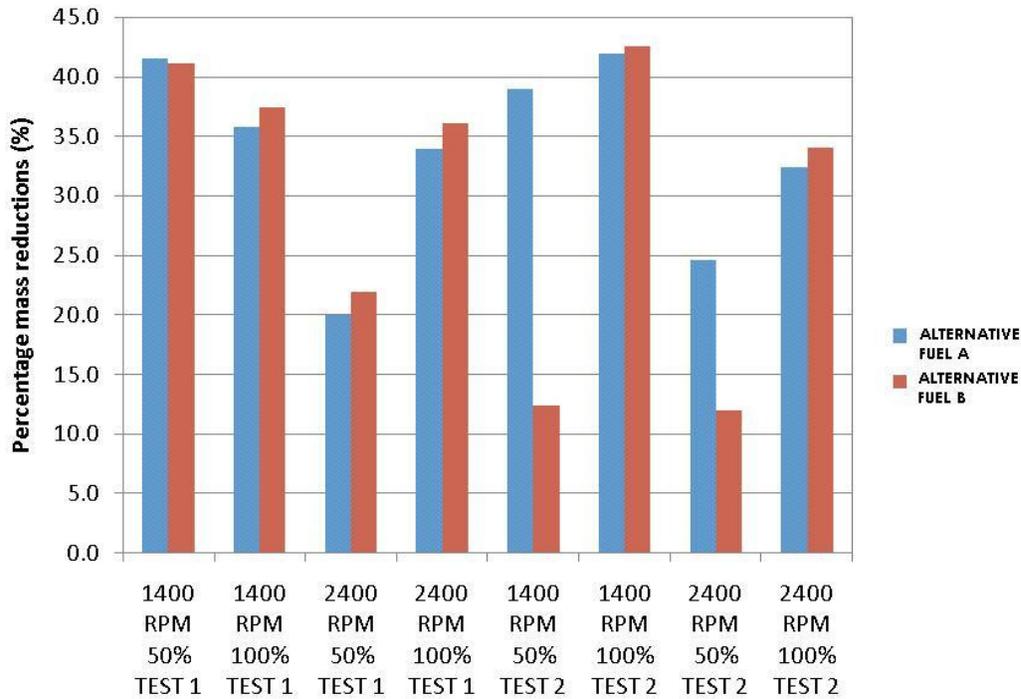
The size of DPM is such that parts of it can readily enter the human intestines with some fractions being so small as to be able to migrate across organs into the blood stream. The health risk occurs because some components are known or suspected carcinogens,

Highly specialised emissions testing equipment and computer controlled engine dynamometers are used to assess gaseous and DPM emissions under pre-determined duty cycles. SkillPro have custom programmable engine management computers that allow our engineers to re-tune modern common-rail electronic diesels to lower emissions and/or change engine performance.

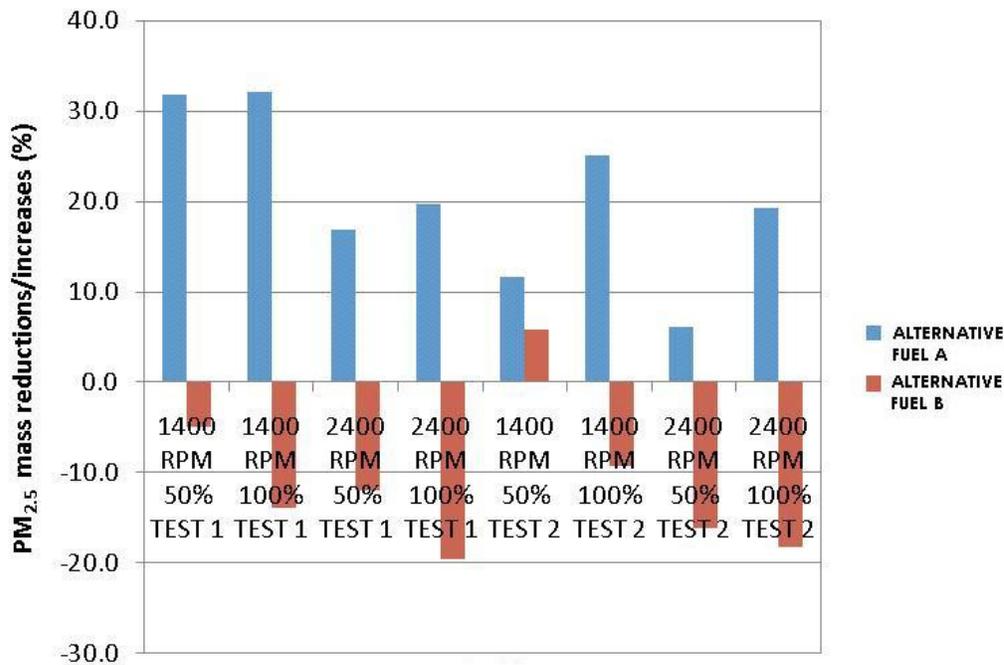
Testing in 2009 showed DPM mass reductions of up to 40% are possible at selected load points, just by changing diesel fuel type. This work has been unable to accurately assess all the possible risks associated with DPM, however it has identified issues associated with the number and size of DPM particles and this needs a lot more research, which will progress in 2010. The international scientific community does not yet have a consensus view on the net risk from DPM emissions, but locally the focus is on measuring and minimizing their mass.

The thrust of 2010 onwards research is into various bio-fuels and additives that will significantly lower the mass of DPM without unduly sacrificing engine performance. International research has already identified both the origin and concentration of bio-diesel play a role in final emissions, but only the outline of this work is directly transferrable to local fuels. To deal with this, work in 2010 will examine at least 3 different bio-origins; Tallow, Soy and Canola. Bio concentrations from 20% to 100% will be tested. All fuels will be readily available in the Australian market to maximize the benefit to local suppliers and users.

For further information contact Terry O'Beirne , 0417-687161



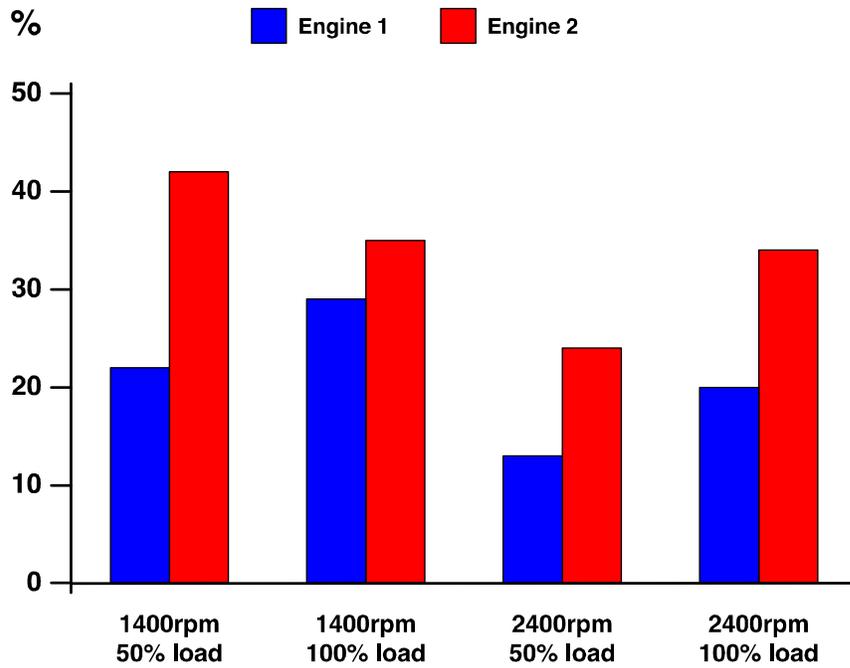
PM_{2.5} mass reductions (presented as a percentage) for the Common Rail engine configuration



PM_{2.5} mass reductions (presented as a percentage) for the Direct Injection engine configuration displayed as a graph. Note well: a negative mass reduction implies that a mass increase occurred.

Fuel A

PM_{2.5} (mass of particulates < 2.5 μ m) reduction



Fuel B

PM_{2.5} (mass of particulates < 2.5 μ m) reduction

