

CANOBOLAS DIESEL SERVICES
Fuel Injection Specialists
DIESEL FUEL QUALITY

It is important for today's modern diesel fuel injection systems to operate with clean, filtered fuel to obtain an accepted service life. Contaminants like dirt, water, and algae can lead to expensive repair bills and unnecessary downtime.

The most damaging type of **contamination** to diesel fuel injection equipment is abrasive particles in the 5 to 20 microns. The rotary pumps commonly used today also rely on the diesel fuel inside the pump to lubricate and cool the components.

Water present in the system can be equally damaging from corrosion and its lack of lubrication qualities, resulting in rapid wear or even seizure.

Low sulphur content in-diesel fuel is also a problem with fuel injection components displaying increased wear and the prevalence of 'o' ring leakage.

High altitude, cold climate regions use an 'alpine fuel', or winter mix as it is commonly known. This is a mixture of diesel and heating oil, necessary to lower the waxing point of diesel fuel. When diesel fuel is exposed to extreme cold conditions it can solidify inside filters and supply lines, called waxing, preventing fuel flow to the injection pump.

Algae's are an organism growth within storage tanks and fuel tanks, causing restrictions in the fuel system blocking filters and strainers. If there is evidence of algae, a suitable fuel additive is advisable to cure this~ it presents itself as a slimy, black substance.

Blended fuels are a mixture of diesel, solvents, heating oil and even petrol. Because differing taxes apply to these, it is known for fuel distributors to offer service station outlets cheap fuel by combining these, but the effects on fuel injection systems and engines are disastrous.

The pressure generating elements in the plunger and barrel assemblies, injection nozzles, and distributor hydraulic head assemblies, have been manufactured to an accuracy of thousandths of millimeters and are precisely matched to each other. As wear in these components progress adverse affects on the diesel engines' performance will eventuate. These include,

- High fuel consumption
- Hard starting
- Incomplete combustion- increased smoke emissions
- Reduced engine power

Fuels with higher paraffin (Alkane) content may be more likely to become cloudy at low temperature than more aromatic fuels. This formation of small wax particles can plug filters. Cloudiness of diesel fuels may be minimized by addressing the protection of storage tanks from extremely cold conditions, or by the use of additives containing cloud point depressants. Fuels with the cloud point close to minimum ambient temperatures will often contribute to poor engine performance, and possibly increase exhaust contaminants.

Diesel fuel injection systems relying on fuel for lubrication and cooling, i.e. Cummins PT and VE rotary pumps on common Japanese light diesels will suffer from low sulphur diesel due to its low lubricity qualities. This poor lubrication leads to premature failure of high load points in the injection pumps like cam-plates, rollers and internal cam-rings. Direct injected engines have higher loads placed on the injector pump components than their indirect counterparts due to the higher injection pressures. Wear rates on injectors have also been found to be 'accelerated due to the use of low sulphur fuel. Another problem is the tendency of fuel leaks to be more prevalent.

Red Line fuel additive at work

Since late 1999 we were experiencing extreme wear related problems, and seizures, with fuel pumps from a new mining customer. We were seeing about 3 pumps per month and on average the repair was \$2,000-\$2,500 each plus the downtime of the machine.

The units that were failing were a rotary Stanadyne pump fired to Perkins engines and used in an underground mining application. Some components were coming out blue from excessive heat transfer caused by insufficient lubrication in the fuel.

Underground coal mines in NSW are required by the Dept. of Mineral Resources to use a low sulphur diesel, which the fuel companies produce and market as UMF (underground mining fuel) or as a Low Emission Diesel. This has a very low sulphur content of 0.01-0.05% mass, which has been the key contributor in the reduction of particulate and noxious gas emissions. These injector pumps were seizing head and rotor assemblies or having hard starting complaints due to component failures or excessive wear. The pumps were only lasting approx. 300- 500 hours when a similar engine in an agricultural situation would see 5,000-10,000 hrs and more.

We approached the mine with **Red Line's 'RL2'** as a proposal to solve this, and **Red Line** were the only company to supply us with a US EPA registration certificate for compliance purposes. Only diesel fuel additives which have been registered with the United States EPA may be used.

Since treating the mines 100,000 litre storage tanks with RL2 we have **not seen one failure** in eight months. We inspected one particular unit at about 500hrs and there was still some evidence of heat transfer occurring on rollers so we advised increasing the dosage 5% above initial rates. The results can only speak for themselves.

It seems as though we are about to see some changes in automotive diesel fuel ,with the reduction of sulphur levels to 0.05% max. by 2001 and to 0.005% by 2006, in pursuit of reducing emissions.

Note; no indication of cost detriment to operators or relevant transport industries has been publicly released~ reflecting similar occurrences in the US with dramatic consequence~

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