

E10 - The Good, the Bad and the Ugly

The UK Government is planning to introduce petrol containing 10% ethanol (alcohol) next year. This is referred to as E10. Most of what has been written on this subject does not tell the whole story, focussing on the potential damage this fuel can cause. This article aims to allay owner's fears, especially for those with classic vehicles.

It is based on research performed at Manchester University using an engine designed in the late 1930's. For anybody wanting to find out the full story, the results and recommendations have been published in a very readable book, *Classic Engines, Modern Fuel – The Problems, the Solutions*.

(<https://classicenginesmodernfuel.org.uk/>)

The Question - why add ethanol to petrol in the first place? Government policy to reduce carbon emissions from vehicles is the reason. The carbon in the ethanol comes from renewable sources. It is a by-product of the sugar industry. When running on E10 a petrol engine still emits the same amount of carbon into the atmosphere. However, only 90% of it comes from fossil fuel. E10 effectively reduces the carbon load by 10%.

Adding ethanol to petrol is not new. Cleveland Discol was introduced in 1928 and sold until 1968. The good news is, after 40 years of use in what are now today's classic cars, Discol did not appear to cause serious problems.

The Good

Modern petrol is both physically and chemically different from classic petrol. Physical differences include a lower boiling point. Chemical differences include the addition of ethanol. Both of these alter the way a classic engine runs on modern fuel.

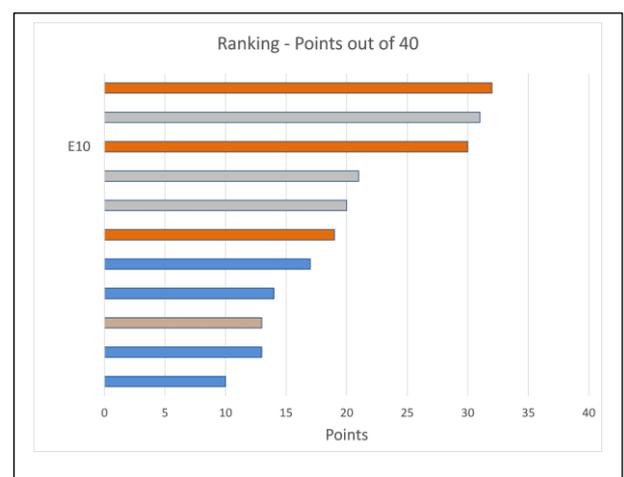
The Manchester tests showed modern fuel increases the severity of a phenomena called Cyclic Variability. Making it worse at the RPM and throttle settings used when driving in normal traffic.

All petrol engines suffer from Cyclic Variability. It reduces power output and increases petrol consumption. Worst still, it can cause serious damage. Burning valves and pistons and destroying the big end bearings. A high level of Cyclic Variability is very damaging for an engine. Modern petrol makes this level worse. The book *Classic Engines, Modern Fuel; The Problems, the Solutions* describes Cyclic Variability and how an engine can be tuned to reduce its severity.

The rankings of the fuels tested at Manchester are shown on the diagram. Three of the top six best performing fuels contained ethanol (shown in orange), the other three (shown in grey) were specialist fuels. Fuels without ethanol (shown in blue) ranked poorly. The test engine ran considerably better on petrol containing ethanol as these reduced the level of Cyclic Variability.

E10 ranked 3rd best, scoring twice as many points as non-blended fuels.

The good news is that E10 promises to reduce potentially very expensive damage to an engine. A positive fact other articles do not make clear.



The Bad

A great deal has been written about the damage ethanol can cause to fuel system components. It rots older non-metallic components such as rubber hoses, seals, diaphragms and plastic floats. Also it contains oxygen which weakens the mixture. E10 makes these problems worse.

Rotting hoses can be a serious problem, especially if they go undetected. Petrol leaks around the engine is the last thing you want. Petrol is highly flammable and leaks are a serious fire risk. Age as well as ethanol causes hoses to rot. In any case, it is worth replacing old hoses, etc. Ethanol proof replacements are now available for most vehicles.

This problem is not as bad as it would first appear. Fitting replacement hoses, etc., is a lot cheaper than rebuilding an engine!

The other problem, that ethanol contains oxygen, is something to be aware of. This causes an engine tuned to run on normal petrol to run weak. Insufficient petrol enters the cylinder. Like Cyclic Variability, weak running can cause serious damage to an engine.

The good news is that variable jet carburettors such as SU and Stromberg only need minor adjustments to offset the effects of E10. Unfortunately, these adjustments are harder with fixed jet carburettors such as Weber and Zenith. These may need new jets or emulsion tubes.

Modern electronic fuel injection systems are able to adjust by themselves.

One interesting result of the Manchester tests was that petrol containing ethanol increased the engine's power output. This is because it reduces the degree of the damaging Cyclic Variability. As a result, classic engines running on E10 will possibly deliver more MPG not less as some authors have suggested.

The bottom line is that E10 does cause some problems. As long as owners are aware, addressing them is neither difficult nor expensive.

The Ugly

The ugly face of ethanol blended petrol is its ability to dissolve metal. The picture below shows two samples. One a piece of steel, the other part of an aluminium float chamber. These were stored in water that had come in contact with ethanol blended petrol. Even after only 4 months, the level of corrosion is severe.



When water comes into contact with ethanol blended petrol it draws the ethanol out of the petrol making the water acidic. It is this acid that attacks the metal components. This problem is as serious with current petrol blends as it will be with E10. All it needs is a single drop of rainwater getting into the fuel system.

Is this something to worry about? Not really. As long as you are **very** careful not to get **any** water into your petrol system. Something easier said than done. Especially with older cars or motor bikes where the filling cap is on the top of the tank. Petrol filling caps or tickler pins in the carburettors can let in water. Especially if driving in heavy rain.

Unfortunately, inhibitors sold to protect against ethanol will not help in this situation. Classic Engines, Modern Fuel – The Problems, the Solutions describes some ways of avoiding this problem.

Conclusion

E10 is not as bad as some people make out. Older engines run better on ethanol blended petrol, reducing the expensive damage Cyclic Variability can cause. While there are some issues, they can be addressed with care and low cost solutions.

Perhaps the forthcoming introduction of E10 is not so bad after all.