Petrol Perils *– Mike Brown*

One of the club strimmers died a sad death earlier in the year when someone put neat petrol in it instead of 2 stroke (anyone looking guilty?). I have an old strimmer that has not been used much (in fact it was donated to our office where it has sat unused for about 8 years). I was rather sceptical about how it would have survived, but a bit of 2 stroke a quick pump of the carb bulb, and it started second pull – amazing. I did not use it at the time, but a couple of weeks later, Tony Graham asked if it could be used. I told him with great confidence that it started and ran really well. Tony disappeared outside, but re-appeared rather red faced ten minutes later not having had one peep out of the motor. Rather sceptical I went outside to have a go, only to get the same results. It turned out that no petrol was getting to the carb – but why?

Back in the workshop the problem soon became apparent. Where the petrol pipe entered the plastic tank, there was a junction, a second short piece of flexible pipe dangled in the tank with a petrol filter on the end of it. The idea being that whatever the orientation of the strimmer, the filter would always be at the bottom. Unfortunately the flexible section of pipe was now rigid, crumbly, and broken into sections. Some other bits of mangled plastic also emerged from the tank.

Now this turned out to be an easy fix, but the cause of the problem has potential for causing many of us problems.

Parts found in the strimmer petrol tank.

I know through my dealings with old motor bikes that there are a number of issues regarding modern petrol. It has been widely reported by many people that when modern unleaded petrol is left in the tank it often "goes off". Apparently in the first instance this can result in poor starting and reduced power output. In severe cases the petrol turns into a gloopy, smelly mess, and no use whatsoever for internal combustion. Apparently this can happen after even a few weeks. There are a number of credible sources on the web recommending that a fuel should not be used when more than 3 weeks old without adding a proportion of fresh fuel. Many sources are claiming that "old" fuel that would start some older vehicles would not start others. Many people (including myself) have never had a problem yet the anecdotal evidence is quite strong. You can even buy petrol preservative which is recommended for infrequently used vehicles such as motor homes and boats. Certainly, if you are having problems starting a vehicle or an appliance that has been standing for some while, try using fresh petrol.

A more serious potential problem with petrol is the addition of ethanol, a relatively new problem. Ethanol is basically alchohol modified to make it undrinkable. Its chemical formula is C2 H5 OH (often simplified to EtOH). Ethanol is made by fermenting and distilling starch or sugar crops such as sugar cane, sugar beet, wheat or other grains…in fact pretty much any fruit and vegetable matter or waste. Ethanol was widely used in fuel up to the 1920's but the discovery that adding Tetra-Ethyl Lead to petrol significantly improved its

octane rating (leaded fuel), saw ethanol going out of fashion. Now ethanol is making a comeback thanks to our friends in Europe. The EU has decreed that fuel companies are obliged to include a percentage of bio fuel in their combined diesel and petrol sales. This has been easy to do with bio diesel (which does not contain ethanol). However the amount of bio content is on an escalator and increases each year. Thus fuel companies now have no option but to add ethanol to petrol. Standard pump petrol can now contain up to 5% ethanol without being labelled (E5 blend), and it is anticipated that by 2020 that figure will have risen to 10% (E10 blend). (Note that not all petrols will have this much ethanol but they could, and many will.)

So, what is the problem with ethanol? Oxygen is a very active element (in fact it reacts with most things), and ethanol contains a lot of oxygen. Ethanol is also acidic, and this acid can damage a wide range of materials. Natural rubber is quickly broken down by Ethanol; many older vehicles and machines have rubber filler necks or petrol pipes, these can quickly break down and leak. Many older vehicles also have pressed steel fuel tanks in two parts with a sealer in between. Ethanol can break down older sealants causing leaks and contaminating the fuel. Even the metal is not safe, ethanol is hygroscopic and absorbs moisture from the air. In humid countries (like Britain) this means that a significant amount of water can be added to the fuel causing steel tanks to rust.

Ferrous metals are not the only materials to be adversely affected by ethanol. On older vehicles copper fuel pipes, brass fittings etc., are also corroded. Moving parts in fuel pumps (including rubber diaphragms if they have them) may be damaged. Fuel filters are rapidly blocked by the residue of all these reactions. Many plastics once used for fuel pipes can break down and crack. Older carburettors and the jets inside them are also corroded by ethanol. Ethanol also attacks cork (often used as a gasket in older carburettors). The list of materials adversely affected by ethanol include: Zinc and galvanised materials, Brass, Copper, lead/tin coated steel, aluminium, magnesium alloys, Zamak, polyurethane, polymers containing alcohol groups, fibreglass-reinforced polyester and epoxy resins, shellac, ABS, flexible PVC, natural rubber, cork, nitrile rubber etc, etc. The good news is that modern vehicles are designed to withstand Ethanol. However some vehicles built as late as 2007 may have issues, particularly with fuel pumps.

Of course there are many other effects of ethanol on the running of vehicles, but enough is enough. The moral is that any petrol fuel system on a vehicle or machine (or old fuel tin, etc) over 10 years old is suspect and you should be vigilant for any problems.

Now if you have managed to keep awake so far, then congratulations and let's go back to the original problem. It appears that my fuel pipe had survived for over 10 years until exposed to the ethanol that rotted it in just two weeks (I still don't know what the other rotted plastic parts in the tank were, I hope that they were not vital! Fortunately a trip to the Midlands Exhibition provided the solution. There was a stand there selling, amongst other things, clear silicone rubber tubing of small diameter. I asked the vendor if it was suitable for petrol and his answer was very telling. He said he did not know, but he sold most of it to people with broken strimmers!