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THE REVIEW OF ETHANOL ENGINE

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Abstract

The prices of fuels are rising to new heights day after day. Driving for pleasure has been a thing of past. The need for using some alternatives for gasoline or diesel fuel is the need of the hour. Some alternative fuels like CNG, LPG, LNG, Hydrogen gas, Alcohols, biodiesel etc are through out of after petrol and diesel. One such alternative fuel rate can be use in place of petrol especially is ethanol fuel. Due to differences in the property of ethanol fuel and gasoline fuel, the engine designed for gasoline fuel cannot be used for ethanol fuel directly. There are some modifications that are needed in the engine for use of ethanol fuel. This report tries to explain to such modifications which are necessary in gasoline engine for the use of ethanol fuel. Ethanol engine is a very useful for revolution in the CI engine. Ethanol is highly containing high octane rating. Octane is the measure of fuels ability to resist "knocking", which a driver may detect as a "pinging" noise coming from the engine. Octane numbers of low molecular mass alcohols are high and therefore they have been even use as a octane booster. Ethanol forms azeotropes with hydrocarbon of gasoline, which impact volatility ethanol can be manufactured from fossils or bio-origin feed stocks. Ethanol limits for a weak acidity and strong acidity. Bio-content of a blend can be based on the sellers' declaration. Ethanol reduces the olefins and aromatics content of the gasoline.

Key words: *idle orifice jet, power valve, accelerator pump jets, etc.*

INTRODUCTION

Ethanol is the systematic name defined by IUPAC nomenclature of organic chemistry for a molecule with two carbon atoms, having a single bond between them and an attached -OH group. It is volatile, flammable and colourless liquid. Best known use of ethanol is found in alcoholic beverages, it is also use in thermometer, has a solvent, and as a fuel. In common usages it is obtained refer to simply as a alcohol or a spirits. The molar mass of ethanol is 46.07 g/mol the density of ethanol is 0.785g/cm³. Heat of vaporization is 840kJ/kg. Ethanol has a boiling point of a 78.37 degree c and melting point of -144 degree c the vapour pressure at 20 degree c is 5.95 kpa. Viscosity of the compound at 20 degree c in 0.0012 pa-s Ethanol is a versatile solvent, miscible with water and with many organic solvents including acetic acid, acetone, benzene, carbon tetrachloride, chloroform, ethylene glycol, glycerol, nitro methane, and toluene.

Ethanol water mixtures have less volume than the sum of the individual component at the given fraction. Ethanol has a high self ignition temperature of around 326degree C, as compared to petrol (240-280 degree c) or diesel (210 degree c).

MODIFICATION

The engine which is designed for the use of gasoline fuel cannot be used with ethanol fuel. Ethanol has higher octane rating than petrol. Hence compression ratio to be achieved while using ethanol is more than that while using petrol. Also,

the calorific value of ethanol is less than petrol; hence more fuel is needed to burn to obtain a certain amount of energy, as compared to petrol. Ethanol is cleansing agent. When use in engine, it cleans the dirt and filth is form in engine. This may damage some part of the engine and make them useless.

Taking into account all these properties of ethanol, certain modifications are required in the engine. The modification vary depending on the maker of the engine, technologies used, percentage of ethanol to be used as fuel, etc.

Major areas where modifications are necessary are as follows. large enough, it will not provide the needed amount manifold of air/fuel blend to keep the engine running.

In some engines, it may only needed to loosen the idle mixture the screw at the base of the carburettor in order to provide the correct amount of fuel. In some engines, its possible that the seat itself, into which tapered screw extends, must be enlarged in the order to accomplish the same thing.

In most cases if the seat has to be bored out, it can be enlarge upto 50%. This will allowed a full range of adjustment with the idle screw, even if once wants to go back to gasoline fuel.

As a precaution against the idle screws vibrating loose from its threaded opening, the idle mixture screw spring can be coupled with a couple of small lock washers. This will prevent the screw from turning even if its drawn out further from the seat that it normally would be.

ACCELERATOR PUMP CHANGES

In addition to a power valve, almost all automotive carburetors utilize an accelerator pump. This is a mechanically activated plunger or diaphragm that injects a stream of raw fuel directly down the throat of the carburetor when the accelerator is suddenly depressed.

The reason the accelerator pump is incorporated into modern carburetors is that as the accelerator is pressed and more air/fuel mixture is drawn into the cylinders, some of the liquid particles in the blend tend to stick to the walls of the intake manifold, effectively leaning out of the mixture by the time it reaches the combustion chambers. The extra squirt of fuel that is added by the accelerator pump makes up for this initial lean condition.

In order to adapt the accelerator pump to use alcohol effectively, the size of the injection orifice needs to be increased (anywhere from 10 to 25% is fine).

As an alternative to enlarging the hole, simple adjustment of the stroke length of the pump arm in order to feed more fuel is sufficient. Most carburetors installed on a recent engine already have a provision for seasonal adjustment, so it's just a matter of putting the pump on its reach setting. Other carburetors, too, have threaded rods that can be adjusted to accomplish the same thing.

In effect, suddenly a lot of filth will be floating around in fuel. And it may be enough to clog the fuel filter to the point of not allowing any fuel to pass. Loosened internal engine deposits can foul the spark plugs badly.

In addition to the fact that alcohol is a cleansing agent, it is also a solvent. And this means that certain types of plastic used in the fuel system of the engine may be attacked by it.

FUEL INJECTION SYSTEM

Since some vehicles are equipped with fuel injection rather than carburetor, we will briefly touch on the use of alcohol

with that system. There are two important factors in the fuel injection set up: timing and control jet diameter. Fortunately, since many systems now use an electronically controlled timing sequence, injection timing is not critical in a fuel injected engine. Neither performance nor economy can be improved substantially by either advancing or retarding the injection timing process.

Control jet diameter, on the other hand, is an important factor. If the size of control jet (which are the equivalent of the metering jet in carburetor) is increased, the engine will operate well on alcohol fuel. Increase of 15-20% is all that's necessary to accomplish the conversion.

The interesting feature of the fuel injection system is that it doesn't require any gasoline during the cold weather cold weather starting process to fire the engine up. Since the fuel is injected at a pressure of above 250 PSI, the alcohol fuel is sufficiently vaporized to ignite easily within the combustion chamber.

CONCLUSION

For use of ethanol in engine, with alcohol percentage above 85% some modifications are required. The modification can be summarized as in the following table 1.

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Table-1: Modification

| Ethanol blend | Carburetor | Fuel injection | Fuel pump | Fuel pr. device | Fuel filter | Ignition system | Fuel tank | Motor oil | Intake manifold | Exhaust system | Cold start system |
|---------------|------------|----------------|-----------|-----------------|-------------|-----------------|-----------|-----------|-----------------|----------------|-------------------|
| <=5% | No | No | No | No | No | No | No | No | No | No | No |
| E5-E10 | YES | NO | NO | NO | NO | NO | NO | NO | NO | NO | NO |
| E10-E25 | YES | YES | YES | YES | YES | YES | NO | NO | NO | NO | NO |
| E25-E85 | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | NO |
| E85-E100 | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES | YES |