ACETYLENE AS THE ALTERNATE FUEL FOR THE 4-STROKE IC ENGINE

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Abstract: The internal combustion engines is one of the popular engines that are being used in the todays environment, The Internal Combustion Engines which was introduced for High Potential Ratio of the chemical power to the mechanical power. The alternate fuels are used nowadays as the fuels for the combustion of the engines, One of the Alternate fuel which we considered here is the acetylene. The acetylene can be used as the alternate fuel for the IC engines where the throughput and performance ratio of this fuel is high when compared to the other alternate fuels. This paper evaluates the procedural structure of the use of the acetylene as the Alternative Fuel for the IC Engines, The theory wise experimental results proves as it follows the high ratios.

Index Terms: IC Engines, Alternative Fuels, Acetylene.

I.INTRODUCTION

An Internal Combustion Engine is a heat motor where the ignition of a fuel happens with an oxidizer (generally air) in a burning chamber that is an indispensable piece of the working liquid stream circuit. In an inner ignition motor, the development of the high-temperature and high-weight gases delivered by burning applies direct power to some segment of the motor. The power is connected normally to cylinders, turbine cutting edges, rotor or a spout. This power moves the part over a separation, changing substance vitality into valuable mechanical vitality.

The term inside ignition motor as a rule alludes to a motor in which burning is irregular, for example, the more commonplace four-stroke and two-stroke cylinder motors, alongside variations, for example, the six-stroke cylinder motor and the Wankel revolving motor. A below average of inner burning motors utilize nonstop ignition: gas turbines, stream motors and most rocket motors, every one of which are inside burning motors on indistinguishable standard from already described. Firearms are additionally a type of inward ignition engine.

Interestingly, in outside burning motors, for example, steam or Stirling motors, vitality is conveyed to a working liquid not comprising of, blended with, or sullied by ignition items. Working liquids can be air, high temp water, pressurized water or even fluid sodium, warmed in a heater. Frosts are generally controlled by vitality thick energizes, for example, gas or diesel fuel, fluids got from petroleum products. While there are numerous stationary applications, most ICEs are utilized in portable applications and are the overwhelming force supply for vehicles, for example, autos, flying machine, and water crafts.

Commonly an ICE is encouraged with non-renewable energy sources like flammable gas or oil based commodities, for example, gas, diesel fuel or fuel oil. There is a developing use of sustainable energizes like biodiesel for CI (pressure start) motors and bioethanol or methanol for SI (flash start) motors. Hydrogen is now and again utilized, and can be gotten from either petroleum derivatives or sustainable power source.

The look for an elective fuel is one of the requirements for reasonable improvement, vitality preservation, proficiency, the board also, ecological conservation. In this way, any endeavor

to lessen the utilization of petroleum and diesel conceivable elective energizes is for the most part ideal. Many research exercises were created so as to ponder the Internal Combustion Engines with option powers. Acetylene is one of the tried fills. So we attempted to discover progressively reasonable approach to make it safe and work. And furthermore an approach to filtration and better approach to evacuate water or dampness.

II.RELATED STUDY

he principle explanations behind clients to consider elective fills are rising fuel expenses and strain to decrease the natural effects of non-sustainable fuel ignition Segments with high Green House Gas (GHG) outflows are under more noteworthy strain to decrease their ecological effect. Until the center of nineteenth century, creature constrain was the driving wellspring of transportation. The mechanical transformation that pursued was started by the development of the inward ignition motor, promising to convey self-governing capacity to singular vehicles, along these lines discharging their proprietors from the need to utilize animals. Be that as it may, with the present difficulties forced by environmental change, and the sum of carbon dioxide discharged in the air by copying fuel through the motor of a vehicle, our present methods of transportation never again appear practical approaches to live reasonably.

In any case, disposing of an arrangement of dispersion that incorporates a substantial system of filling stations and refineries is a long way from the most productive approach to guarantee that more vehicles will be controlled via carbon-impartial sources. The common successor of fuel is the still moderately new biofuel – fuel got from biomass, for example, agrarian harvests – that can be utilized in current burning motors with no requirement for adjustments. As of late, scientists from the Oak Ridge National Laboratory have grown hereditarily built switch grass with an end goal to create a plant with a higher vitality thickness and a less complex transformation process.

Most biofuels, similar to ethanol, are created by discharging sugars from put away starches in farming items, for example, corn or sugarcane.

This is practiced by the strategy for catalyst processing, which separates polymeric macromolecules into their littler structure squares. The sugars are left to mature, and afterward refined and dried – a long procedure requiring a great deal of vitality. The Oak Ridge specialists had the capacity to constrain the measure of lignin – a concoction compound found in the cell mass of plants – by encoding a bit of RNA that would constrain 75% of the lignin creation and putting it into the switch grass' DNA. Since lignin is the primary component that keeps the cells together, diminishing the creation makes it simpler to get to the sugars that are caught inside plants.

Subsequently, the transformation rate from biomass to fuel shoots up essentially, with up to a 40 percent improvement.

Be that as it may, is it conceivable to totally supplant the petroleum derivatives utilized in transportation with biomass items? Dangers related with the transformation to biomass incorporate a potential change in biodiversity, since a greater part of land would should be utilized to develop the fitting plants. As indicated by the Millennium Ecosystem Assessment, changing over land for bio fuel generation would interpret into a gigantic burst of ozone harming substances. The change of a hectare of prairie land could free as much as 300 tons of carbon dioxide, and this number goes as much as 1,000 tons if a timberland is expelled to account for bio fills.

At that point there is the subject of the vitality proficiency of biofuels. For certain horticultural items, the vitality investment funds can shift from around 25 to 70 percent, and for other people –, for example, corn – there are no vitality investment funds when contrasted with customary fuel. Ethanol, then again, is generally blended with fuel since its vitality thickness – the measure of vitality put away in a unit of volume is 34 percent lower, yet this is made up by its higher octane rating,

which makes it generally speaking progressively effective.

Another main consideration in picking a bio fuel substitution will be its capacity to lessen ozone depleting substance outflows. There is a 75 for every penny net decrease in outflows when utilizing ethanol rather than gas, and a 90 percent decrease when contrasted with diesel outflows. In any case, as indicated by the International Energy Agency, the bio energizes would need to represent 26 percent of worldwide fuel delivered so as to constrain the environmental convergence of carbon dioxide to 450 sections for each million by 2050.

With regards to hereditarily changed yields, the questionable idea of GM sustenance's without a doubt turns into a factor, and numerous ranchers are as yet continuing with alert. The test of making environments with hereditarily changed yields can appear to be overwhelming, as there have been numerous instances of customary harvests being sullied by GM ones. This may then put the whole bio fuel advertise in the hands of a couple huge makers of hereditary yields who have licensed the lignin-lessening innovation. In the coming years, ethanol and other bio energizes will inarguably be a piece of the elective energies investigated for use in the transportation industry. Bio fuel generation has the capacity to circulate vitality sources topographically, yet given the underlying carbon outflows related with changing over land into bio fuel crops – alongside the decline in space accessible for nourishment creation another fuel source may need to supplant biofuels as leader in the elective vitality race. For what reason is there a requirement for elective fills?

Subsequently, gases from non-renewable energy source outflows have caused and are proceeding to make extraordinary harm the air, (for example, the nursery impact and corrosive downpour) The utilization of elective energizes to control our vehicles, transports, and trucks would fundamentally diminish our reliance on remote oil.

Elective powers, known as non-customary and propelled energizes, are any materials or substance that can be utilized as fills, other than customary fills like; non-renewable energy sources (oil), coal, and gaseous petrol) just as atomic materials, for example, uranium and thorium just as counterfeit radioisotope powers.

An elective fuel vehicle is a vehicle that keeps running on a fuel other than conventional oil energizes and furthermore alludes to any innovation of fueling a motor that does not include exclusively oil.

For what reason are elective powers vital to find out about? Frequently, they produce less contamination than gas or diesel. Acetylene is created locally from calcium carbide stone. It produces less Green House Gas(GHG) discharges than gas or diesel.

III.PROPOSED ALTERNATE FUEL

Acetylene

Acetylene (C_2H_2) isn't just an air gas yet additionally a blend gas for the most part created from the response of calcium carbide with water.

It was scorched in "acetylene lights" to light homes and mining burrows in the nineteenth century. A vaporous hydrocarbon, has a solid garlic smell, it is dismal, is insecure, exceptionally ignitable, and produces a hot fire (over 5400°F or 3000°C) when joined with oxygen.

Acetylene is for the most part created by responding calcium carbide with water. The response is ceaselessly happening and can be led with no refined gear or contraption. Such created acetylene has been used for lighting by road sellers, in mine regions and so forth. Individuals frequently call such lighting sources "carbide lights" or "carbide light" Industrial employments of acetylene as a fuel for engines or lighting sources, in any case, have been about nonexistent. In present day times, the utilization of acetylene as a fuel has been to a great extent restricted to welding-related applications or acetylene lights for welding. In most such application, acetylene is utilized in

arrangement structure, for example, acetylene disintegrated in CH3)2CO.

Production of Acetylene from the Natural Gas

Nowadays acetylene is primarily fabricated by the fractional burning of methane or shows up as a side item in the ethylene stream from high temperature splitting of hydrocarbons. The feed stock can be an assortment of hydrocarbon, for example, regular gas, LPG, naphtha, fuel oil, even raw petroleum and so on. Warmth for the splitting activity is created by incomplete oxidation of the feed stock with oxygen. The warmth developed breaks the abundance hydrocarbon to acetylene. After quick extinguishing with water, the acetylene is isolated from the gas stream by assimilation desorption in an appropriate dissolvable. The procedure is known as Sachasse process utilizing normal gas as crude material. the responses are as per the following.

$CH4 + 2O2 = CO2 + H2O$

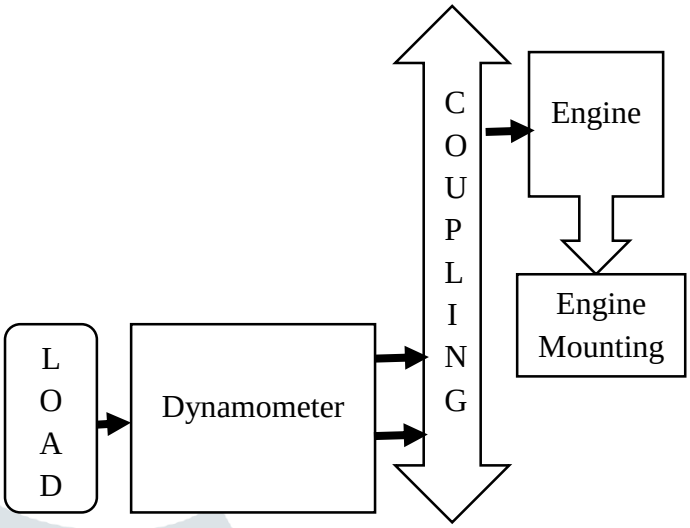
$2CH4 = C2H2 + 3\ H2$ Delta H= + 79.8 kcals

Pyrolysis is carried out in the Wolff regenerative furnace which is a rectangular steel box filled with refractory bricks checker work. Yield of acetylene (98.5 % to 99.3 % purity) varies with the hydrocarbon feed stock used. The off-gas is principally ethylene, carbon monoxide, hydrogen and methane

IV. UTILIZATION OF ACETYLENE IN IC ENGINE

This section discusses about the utilization of the acetylene in the IC Engines for the calculation of the performance. The 4 Stroke petrol engine is considered here for the experiment. The Engine Specification are as follows

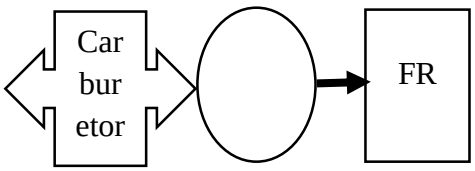
Fuel Type	Petrol
Cooling System	Air Cooled
Cylinders	Single
Stroke	4 Stroke
Arrangements	Vertical
Cubic Capacity	150CC

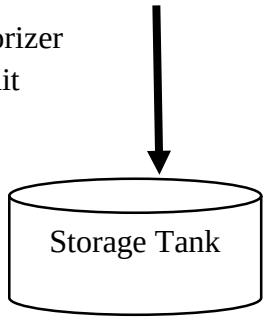


We need the other components for the assembly of the engine and also to check the performance, the assembly kit is as follows,

1. Engine
2. Engine mounting
3. Rope brake dynamometer
4. Universal Coupling
5. Vaporizer kit
6. Gas Production tank
7. Digital tachometer
8. Filter & Regulator (FR)
9. ON/OFF Valve
10. Battery

The above mentioned components are assembled to a 150CC engine to check the various performance ratio of the fuel which is used. First we check the performance ratio of the Petrol which is the actual fuel of the engine which is being taken. Then induce the alternate fuel Acetylene into the 150CC engine and list out its performance. Then the Performance of the two fuels are compared with respect to its torque to find which is the high performing fuel





Calculation:

Calculation of the Performance Testing Procedure

A) Brake Torque (N-.m):

Braking Torque = (X-T) ×S_C

Where,

X=Gross weight in Newton (N)

T=Balancing Spring Reading (N)

S_C=Radius of Brake Drum(A/2)

B) Brake Power(X):

C_O=(X-T) × S_C ×2πN/60

C) Expected Power (X):

Jq=(imep)LAnK/60

Where,
Jq = indicated power (kW)
Imep = indicated mean effective pressure (kN/m2)
L = length of stroke (m)
A = cross section area of piston (m2)
n = number of power strokes
n = N / 2 for four strokes, and N = for two strokes
N = crankshaft speed (revolutions per minute)
K = number of cylinders

D) Mechanical efficiency:
η m = bp / ip

E) Speed (m/s):
V=rpm×(2π rad) / rev x (r/rad)

S.No	Gear Position	Load (Kg)	Spring Load (kg)	Rpm/(rad/s)	Torque (N-m)	Brake Power (W)	Speed (m/s)	Exp Pwr (W)	Mech Eff
1	1	10	1	450	11.0324	519.88	5.89	549	94%
2	4	7	2	1100	6.1291	706.02	14.88	1344	52%
3	5	6	1.5	1270	5.5162	733.62	16.61	1552	47%

Table 1: Petrol as the Fuel Performance Ratio in 150CC Four Stroke IC Engine

S.No	Gear Position	Load (Kg)	Spring Load (kg)	Rpm/(rad/s)	Torque (N-m)	Brake Power (W)	Speed (m/s)	Exp Pwr (W)	Mech Eff
1	1	10	1	600	9.8066	616.16	7.84	733	84%
2	4	7	2	1050	6.7420	741.32	13.73	1283	52%

V.CONCLUSION

In this paper we study about the inner ignition motors is one of the prevalent motors that are being utilized in the todays condition, The Internal Combustion Engines which was presented for High Potential Ratio of the substance capacity to the mechanical power. The substitute powers are utilized these days as the energizes for the burning of the motors, One of the Alternate fuel which we considered here is the acetylene. The acetylene can be utilized as the substitute fuel for the IC motors where the throughput and execution proportion of this fuel is high when contrasted with the other interchange energizes. This paper assesses the procedural structure of the utilization of the acetylene as the Alternative Fuel for the IC Engines, the hypothesis shrewd trial results demonstrates as it pursues the high proportions.

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