



ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 6, Special Issue , August 2019

International Conference on Recent Advances in Science, Engineering, Technology and
Management at Sree Vahini Institute of Science and Technology-Tiruvuru, Krishna Dist, A.P

Duel Fuel Car

M.Muttaiah, V.Ramachandrarao, CH.Venkateswararao

Assistant professor, Sree Vahini institute of science and technology (SVIST), Tiruvuru
Assistant professor, Sree Vahini institute of science and technology (SVIST), Tiruvuru
Assistant professor, Sree Vahini institute of science and technology (SVIST), Tiruvuru

ABSTRACT: Automotive technology has been day by day, because the working conditions and capabilities are upgrading. Different types of cars with different types of brands are available in now a days .Maximum number of cars available with high cost .In automobile sector ,the need for Alternative fuel as replacement of conventional fossil fuel ,due to its depletion and amount of emission has given way for new technologies like eco friend vehicles. Still a lot of advancement has to take place in these technologies for commercialization. The gap between the current fossil fuel technology and zero emission vehicles can be bridged by hybrid technology .Hybrid vehicles are those which can run on two or more powering sources.

This technology maximizes the advantages of two fuels and minimizes the disadvantage of the same. The best preferred hybrid pair is CNG and fossil fuel. This increases the mileage of the vehicle twice the existing and also reduces the emission to half.

In order to avoid the problems like pollution and low mileage, we have designed and fabricated a new car with less cost and which can run by petrol and CNG as well. This project contains brief details of design and fabrication of four wheeler by CNG as a fuel .Here we should use petrol also a fuel but to reduce the pollution we have moved with CNG as a fuel and the total details of the car as followed b y this report.

I. INTRODUCTION

Automobile Technology has been developing from so many years, because the world is getting globalized. Even cost of maximum cars is very high. Because every company and every brand of car has its own cost. It is somewhat difficult to middle class people. And from other side, by the combustion of fossil fuels, the green house gaseous emission has been increasing. It's the major problem to everyone as well as to the world. In order to reduce the cost of car as well as greenhouse gaseous emission we have designed and fabricated a car run by CNG as well as Petrol. We have arranged a bike engine to four wheeler. So it can run by petrol and we have modified the fuel by CNG. So it should run by Petrol as well as CNG. That's why we have been calling it as Dual Fuel Vehicle. The process of engine by petrol has already existed and here we have just concentrated on the Process of CNG and its installation. And, earlier considered as just a by-product of crude oil production, has now gained significant importance as a valuable source of energy internationally. Natural gas is now gaining prominence as the fuel of the future as it meets clean fuel requirements and is cost effective for major industries, as compared to traditional fuels such as coal and naphtha. Gas assets in India did not receive much attention till few years back. However, mounting oil bills and need for cleaner fuels has necessitated the country to explore its gas potential. Supply deficit has long been a significant feature of India's gas market.

II. OVER VIEW OF CNG & ITS ARRANGEMENT TO VEHICLE

A. PHYSICAL PROPERTIES Non toxic

Natural gas being lead sulphur free its use substantially reduces harmful engine emissions. When natural gas burns completely, it gives our carbon dioxide and water vapor the vary components we give our while breathing.

Lighter than air

Natural gas being lighter than air will rise above ground level and disperse in the atmosphere, in case of a leakage.

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 6, Special Issue , August 2019

International Conference on Recent Advances in Science, Engineering, Technology and Management at Sree Vahini Institute of Science and Technology-Tiruvuru, Krishna Dist, A.P

Colorless :Natural gas is available in the gaseous state, and is colorless.

Odorless:The gas in its natural form is odorless, however ethyl mercaptan is later added as odorant so detect its leakage.

B. CNG AN ALTERNATIVE FUEL

CNG is a safe fuel. Being lighter than air, it disperses easily into the atmosphere and does not form sufficiently rich mixture for combustion to take place. CNG is 130 octanes, which is considerably higher than 93 octanes for petrol; consequently, CNG vehicle is more energy efficient. Higher octane rating allows high's compression ratios and improved thermal efficiency than diesel. Compared to petrol or diesel, CNG vehicles emit 40% less of nitrous oxide (a toxic gas that creates smog), 90% less of hydrocarbons (which carry carcinogens), 80% less of carbon monoxide (a poisonous pollutant), and 25% less of carbon dioxide (a major greenhouse gas). Further, noise level of CNG engine is much lower than that of diesel. According to the World Health Organization, diesel exhaust is 'probably carcinogenic', while the United States Environmental Protection Agency declared it 'likely to be carcinogenic'.

Diesel Exhaust Has A High Fraction Of Polycyclic Aromatic Hydrocarbons (Pahs) And Suspended Particulate Matter (Spm) That Cause Cell Mutations That May Ultimately Lead To Cancer. High Quality Diesel With Low Sulphur (Or Ultra – Low Sulphur Diesel, UlSD) Emits Very Minute Particles, Which Can Even Penetrate Deep Into The Lungs. According To German Federal Environmental Agency's Estimate A Conventional Diesel Bus Is Roughly 100 Times More Harmful Than A Cng Bus, While Diesel Engines With Particulate Filters (Euro Iv) Still Being More Harmful Than Cng Engine By A Factor Of 6. However, A Thorough Comparative Study, With Pound Cons Of UlSD Is Not Yet Available.

C. Economics of Cng

The Growth Of Cng Vehicle In The Year 2002 Was Primarily Because Of Economic Advantage Of Cng With Regard To Petrol, Diesel

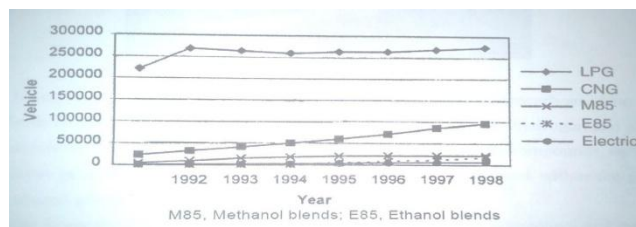


Figure: 2.1 Economics of Cng

D. Environmentally Friendly

Cng Cars Are Also Environmentally Friendly In Terms Of Emissions As The Following Figures Illustrate.

Natural Gas Vehicles Reduce Co₂ Emissions By Approximately 25% Compared To The Equivalent Petrol Vehicles And Reduce Particulate Matter (Pm) Emissions To Practically Zero. Furthermore, Natural Gas Vehicles Reduce Nitrogen And Carbon Monoxide Emissions By About 55% Each And Ozone Emissions By About 60%.

E. Cng Cylinder Modification

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 6, Special Issue , August 2019

International Conference on Recent Advances in Science, Engineering, Technology and
Management at Sree Vahini Institute of Science and Technology-Tiruvuru, Krishna Dist, A.P



Fig: 2.2 Modification Of Cylinder

A Fire Extinguisher, Flame Extinguisher, Or Simply An Extinguisher, Is An Active Fire Protection Device Used To Extinguish Or Control Small Fires, Often In Emergency Situations. It Is Not Intended For Use On An Out-Of-Control Fire, Such As One Which Has Reached The Ceiling, Endangers The User (I.E., No Escape Route, Smoke, Explosion Hazard, Etc.), Or Otherwise Requires The Expertise Of A Fire Department. Typically, A Fire Extinguisher Consists Of A Hand-Held Cylindrical Pressure Vessel Containing An Agent Which Can Be Discharged To Extinguish A Fire. In The United States, Fire Extinguishers, In All Buildings Other Than Houses, Are Generally Required To Be Serviced And Inspected By A Fire Protection Service Company At Least Annually. Some Jurisdictions Require More Frequent Service For Fire Extinguishers. The Servicer Places A Tag On The Extinguisher To Indicate The Type Of Service Performed (Annual Inspection, Recharge, New Fire Extinguisher) And When There Are Two Main Types Of Fire Extinguishers: Stored Pressure And Cartridge-Operated. In Stored Pressure Units, The Expellant Is Stored In The Same Chamber As The Firefighting Agent Itself. Depending On The Agent Used, Different Propellants Are Used. With Dry Chemical Extinguishers, Nitrogen Is Typically Used. Water And Foam Extinguishers Typically Use Air. Stored Pressure Fire Extinguishers Are The Most Common Type

Cartridge-Operated Extinguishers Contain The Expellant Gas In A Separate Cartridge That Is Punctured Prior To Discharge, Exposing The Propellant To The Extinguishing Agent.

This Type Is Not As Common, Used Primarily In Areas Such As Industrial Facilities, Where They Receive Higher-Than-Average Use. They Have The Advantage Of Simple And Prompt Recharge, Allowing An Operator To Discharge The Extinguisher, Recharge It, And Return To The Fire In A Reasonable Amount Of Time. Unlike Stored Pressure Types, These Extinguishers Use Compressed Carbon Dioxide Instead Of Nitrogen, Although Nitrogen Cartridges Are Used On Low Temperature (-60 Rated) Models. Cartridge Operated Extinguishers Are Available In Dry Chemical And Dry Powder Types In The Us And In Water, Wetting Agent, Foam, Dry Chemical (Classes Abc And Bc), And Dry Powder (Class D) Types In The Rest Of The World. Fire Extinguishers Are Further Divided Into Handheld And Cart-Mounted, Also Called Wheeled Extinguishers. Handheld Extinguishers Weigh From 0.5 To 14 Kilograms (1 To 30 Pounds), And Are Hence, Easily Portable By Hand. Cart-Mounted Units Typically Weigh 23+ Kilograms (50+ Pounds). These Wheeled Models Are Most Commonly Found At Construction Sites, Airport Runways, Heliports, As Well As Docks And Marinas

For Our Project We Have Taken A 4.5kg CO₂ (Abc) Cylinder, And Fire Extinguisher Which Withstands Of 220 Bars Of Pressure. Normally Cng Gas Exhausts About 220-240 Bars Of Pressure.

E.1 Filling Of Cng Gas To The Cylinder

As There Is No Filling Of Cng Gas Into Such A Small Cylinder As The Gas Contains High Pressure, We Have Made An Idea Of Filling It With Some Pipe Connections From A 50kg Cylinder To The Small 2kg Cylinder. Due To Pressure Differences Only 250gms Of Gas Has Been Fitted In The Cylinder.

F. Carburetor Adjustment

Too Much Fuel In The Fuel-Air Mixture Is Referred To As Too Rich, And Not Enough Fuel Is Too Lean. The Mixture Is Normally Adjusted By One Or More Needle Valves On An Automotive Carburetor Or A Pilot-Operated Lever

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 6, Special Issue , August 2019

International Conference on Recent Advances in Science, Engineering, Technology and Management at Sree Vahini Institute of Science and Technology-Tiruvuru, Krishna Dist, A.P

On Piston-Engined Aircraft (Since Mixture Is Air Density (Altitude) Dependent). The (Stoichiometric) Air To Gasoline Ratio Is 14.7:1, Meaning That For Each Weight Unit Of Gasoline, 14.7 Units Of Air Will Be Consumed. Stoichiometric Mixtures Are Different For Various Fuels Other Than Gasoline. No Of Ways To Check Carburetor Mixture Adjustment Include Measuring The Co₂, Hydrocarbon And Oxygen Content Of The Exhaust Using A Gas Analyzer, Or Directly Viewing The Colour Of The Flame In The Combustion Chamber. And It Through A Special Glass-Bodied Spark Plug Sold Under The Name "Colortune"; The Flame Colour Of Stoichiometric Burning Is Described As A "Bunsen Blue", Turning To Yellow If The Mixture Is Rich And Whitish-Blue If Too Lean. The Mixture Can Also Be Judged By Removing And Scrutinizing The Spark Plugs. Black, Dry, Sooty Plugs Indicate A Mixture Too Rich; White To Light Gray Plugs Indicate A Lean Mixture. A Proper Mixture Is Indicated By Brownish-Gray Plugs. Mainly The Air-Fuel Ratio Is Been Decreased With The Help Of Carburetor Working. So That Some Alterations Are Been Carried Out To Decrease The Gas Fuel Ratio To The Engine. We Have Altered Two Holes In Opposite Direction On The Top Side Of The Carburetor. One Hole Is At The Inlet Of The Air-Fuel And The Other At Outlet Of The Air-Fuel Passage .At The Inlet The Hole Is Made Of An Angle Of 45° Degrees With The Hand Driller. By Making This Alteration The Gas Is Passed Through The Carburetor As The Combustion Of Ignition Is Been Carried Out.



Fig: 2.4 Modification Of Carburetor

III. WORKING PRINCIPLE

A. Otto Cycle

The First Person To Build A Working Four-Stroke Engine, A Stationary Engine Using A Coal Gas-Air Mixture For Fuel (A Gas Engine), Was German Engineer Nikolaus Otto. This Is Why The Four-Stroke Principle Today Is Commonly Known As The Otto Cycle And Four-Stroke Engines Using Spark Often Are Called Otto Engines

A.1 Description:

An **Otto Cycle** Is An Idealized Thermodynamic Cycle Which Describes The Functioning Of A Typical Spark Ignition Reciprocating Piston Engine, The Thermodynamic Cycle Most Commonly Found In Automobile Engines The Isentropic Processes Of Compression And Expansion Implies No Loss Of Mechanical Energy Due To Friction And No Transfer Of Heat Into Or Out Of The System During Those Processes, Hence The Cylinder, And Piston Are Assumed Impermeable To Heat During Those Processes. Heat Flows Into The Loop Through The Left Pressurizing Process And Some Of It Flows Back Out Through The Right Depressurizing Process, And The Difference Between The Heat Added And Heat Removed Is Equal To The Net Mechanical Work Generated.

The Processes Are Described By: Consists Of Isentropic Compression, Heat Addition At Constant Volume, Isentropic Expansion, And Rejection Of Heat At Constant Volume. In The Case Of A Four-Stroke Otto Cycle, Technically There Are Two Additional Processes: One For The Exhaust Of Waste Heat And Combustion Products At Constant Pressure (Isobaric), And One For The Intake Of Cool Oxygen-Rich Air Also At Constant Pressure; However, These Are Often Omitted In A Simplified Analysis. Even Though Those Two Processes Are Critical To The Functioning Of A Real Engine, Wherein The Details Of Heat Transfer And Combustion Chemistry Are Relevant, For The Simplified Analysis Of The Thermodynamic Cycle, It Is More Convenient To Assume That All Of The Waste-Heat Is Removed During A Single Volume Change The System Is Defined To Be The Mass Of Air That Is Drawn From The Atmosphere Into The Cylinder, Compressed By The Piston, Heated By The Spark Ignition Of The Added Fuel, Allowed To Expand By Pushing On The Piston, And Finally Exhausted Back Into The Atmosphere. The Mass Of Air Is Followed As Its Volume, Pressure And Temperature Change During The Various Thermodynamic Steps. As The Piston Is Capable To Move Along The Cylinder, The

Volume Of The Air Changes With The Position Of The Piston In Cylinder. Valve Opened, The Gaseous Mixture Is Vented To The Atmosphere And The Process Starts Anew.

Details on the present state of CNG	
CNG fuel is very much in vogue in India	
Particulars	Details
CNG Compression capacity	29.11 lakh Kg/day
No. of stations	191
No. of CNG vehicles in Delhi	3,34,924
No. of domestic customers	1,70,000+
No. of large commercials	52
No. of small commercials	285

Source: Indraprastha Gas Limited

Fig: 3.1.1 Present State Of Cng

Fixed-Venturi

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 6, Special Issue , August 2019

International Conference on Recent Advances in Science, Engineering, Technology and Management at Sree Vahini Institute of Science and Technology-Tiruvuru, Krishna Dist, A.P

In Which The Varying Air Velocity In The Venturi Alters The Fuel Flow. This Architecture Is Employed In Most Carburetors Found On Cars.

Variable-Venturi

In Which The Fuel Jet Opening Is Varied By The Slide (Which Simultaneously Alters Air Flow). In "Constant Depression" Carburetors, This Is Done By A Vacuum Operated Piston Connected To A Tapered Needle Which Slides Inside The Fuel Jet. A Simpler Version Exists, Most Commonly Found On Small Motorcycles And Dirt Bikes, Where The Slide And Needle Is Directly Controlled By The Throttle Position. The Most Common Variable Venturi (Constant Depression) Type Carburetor Is The Sidedraft Su Carburetor And Similar Models From Hitachi, Zenith-Stromberg And Other Makers. The Uk Location Of The Su And Zenith-Stromberg Companies Helped These Carburetors Rise To A Position Of Domination In The Uk Car Market, Though Such Carburetors Were Also Very Widely Used On Volvos And Other Non-Uk Makes. Other Similar Designs Have Been Used On Some European And A Few Japanese Automobiles. These Carburetors Are Also Referred To As "Constant Velocity" Or "Constant Vacuum" Carburetors. An Interesting Variation Was Ford's Vv (Variable Venturi) Carburetor, Which Was Essentially A Fixed Venturi Carburetor With One Side Of The Venturi Hinged And Movable To Give A Narrow Throat At Low Rpm And A Wider Throat At High Rpm. This Was Designed To Provide Good Mixing And Airflow Over A Range Of Engine Speeds, Though The Vv Carburetor Proved Problematic In Service.



Fig: 3.1.2 Four-Barrel Carburetor

B. Description Of Four Wheeler

Four Wheelers Are Common Automobiles Nowadays For The Different Types Of Purposes. And Here We Have Designed A Four Wheeler By Our Self And With Own Plan And Limited Dimensions. Everything We Have Arranged, Which Should Be Reflected As A Car. The Overview Of Our Car As Follows.

International Journal of Advanced Research in Science, Engineering and Technology

Vol. 6, Special Issue , August 2019

International Conference on Recent Advances in Science, Engineering, Technology and
Management at Sree Vahini Institute of Science and Technology-Tiruvuru, Krishna Dist, A.P



Fig: 3.2.1 The Four Wheeler

Basically All The Types Of Vehicles Works On The Principle Of Internal Combustion Processes Or Sometimes The Engines Are Called As Internal Combustion Engines. Different Types Of Fuels Are Burnt Inside The Cylinder At Higher Temperature To Get The Transmission Motion In The Vehicles. Most Of The Automobiles Are Internal Combustion Engines Vehicles Only. Automobile Can Also Be Defined As A Vehicle Which Can Move By Itself. It Self The Power Is Generated By The Combustion In Internal Combustion Engine.

The Components Of Four Wheeler Should Be Explained As Follow

IV. COMPONENTS OF THE AUTOMOBILE

The Automobile Can Be Considered To Consist Of Four Basic Components. They Are

- (A) The Engine
- (B) The Frame And Chassis
- (C) The Transmission System
- (D) Accessories Including Light, Horn, Signal And Parking Lights

V. RESULTS AND CONCLUSION

Totally The Connections Are Been Set To The Bike And Later The Testing Of Vehicle Is Been Carried Out.

During Testing Several Disturbances Are Been Occurred. The Processing Of Testing As Follows:

The Cylinder Arrangement Has Been Set To The Vehicle.

By Releasing The Pressure Valve Of The Cylinder The Gas Has Been Passed To The Vaporizer Through Pipes.

Then The Engine Is Started, But Due To The Heavy Flow Of Gas In To The Engine, There Was A Starting Trouble.

Then The Vaporizer Valve Is Adjusted To Reduce The Flow Of Gas.

Again Another Trail Is Made To Start The Engine, And The Engine Has Started But Due To The Heavy Mixture Of Air And Fuel In The Carburetor, Huge Amount Of Smoke Has Being Released At The End Of Exhaust Stroke.

To Reduce The Smoke A Small Modification Is Made In The Air Chamber.

We Have Placed A Small Conical Shaped Hard Rubber Piece Into The Air Chamber.

Once Again Checked The Condition Of The Vehicle, By Adjusting The Rubber Piece In The Air Chamber. By This Modification The Air -Fuel Mixture Has Been Adjusted.

Now The Ratio Of Air And Fuel Has Adjusted And The Normal Condition Of Combustion Has Been Achieved.