

PERFORMANCE ANALYSIS OF FOUR STROKE SI ENGINE USING OXY-HYDROGEN GAS AS HYBRID FUEL

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Abstract: Global air pollution is one of the major threats of 21st century for the developing and developed countries. The existence of petroleum products is reducing day-by-day and the pollution caused by them is increasing drastically, the demand for the alternate fuel is constantly increasing. One such alternate fuel is Oxy-Hydrogen gas or HHO gas. Running the automobile engine using this HHO gas as an alternate fuel and reducing the hydrocarbon fuel(petrol/diesel) consumption, thereby reducing the atmospheric pollution is the reason behind the development of this project.

Index Terms- HHO, carburetor, electrolysis, hybrid fuel, intake manifold, gasoline engine

INTRODUCTION

With demand for more productive internal combustion engines, our main goal is to outline and make a gadget that will expand engine's effectiveness without imperiling its execution. Such gadget is a HHO Generator. This generator utilizes DC current(electrolysis) to yield hydrogen from water. There are two distinctive approaches to run the hydrogen into the engine. The first and most determined route to this is to send it through the injectors, while stopping the fuel line. This might be done if the framework is self-supported, which means the motorcycle can keep running on hydrogen as it were. In the event that this isn't refined because of thermodynamic confinements, at that point the hydrogen will be brought into the combustion chamber of the engine through the air-intake manifold. We will try to make the generator minimized and cost efficient, with the goal for it to attractive to clients.

PROPOSED DESIGN

In electrolysis, individuals have tried unique strategies to build the yield of fuel while bringing down the electricity supply. A few plans are more successful than others. A few people have tried to enhance the traditional way, called "wet cell", comprising of plates or tubes submerged in water, while others have made and built up an outline called "dry cell" where the water is continually going through the plates. Dry cell outlines are more affordable, on the grounds that they are compact. This design can be altered in shape or size, making in it simple to put in all over the place. The electrode plate is made of stainless steel 316, and makes utilization of consistent elastic o-rings to part them. These styles of cells have water continually flowing through them. This implies a water tank is expected to supply the water, and also, a water pump to supply the water. These additional setup make the cell all the more exorbitant. The wet cell configuration is more convoluted to make. This outline may be more costly as the electrodes and their positioning is all the more difficult to manufacture. To the extent the compartment goes, a material competent to fulfil some essential parameters should be utilized. It needs to oppose high temperatures and weight, since the electrolysis procedure creates a lot of temperature and the pressure developed inside may go up to 60 psi. Also, it must be made out of a dielectric material keeping in mind the end goal to stay away from electrolysis between the tubes and the inner wall of the holder. The adequacy of the wet cell is higher than the dry cell framework since it takes into account greater metal surface region. Albeit more electric current is required, the measure of hydrogen created is higher.

DESIGN ALTERNATIVES

A wet cell system for the generator that has been picked, as earlier specified. However, there are two elective systems of how to inject the HHO gas to the engine. The first is an extremely yearning, yet conceivable design. A hose originating from the generator vessel will be linked with the fuel line while the fuel line will be detached. This implies the engine will run just on hydrogen and air. Be that as it may, the measure of HHO won't be sufficient for the engine to run effectively. The alternator has to deliver enough amps to energize the motorcycle's battery for the electrolysis procedure to happen productively. The generator at that point needs to send HHO gas into the engine relentless all together for the cycle to proceed. On the off chance that eventually of the rotation of the engine

isn't sufficient to run the alternator effectively enough for the cycle to happen, there won't be sufficient hydroxy gas (HHO gas) to be fed to the engine and the motorcycle will stop. One approach to settle this issue is to transform the engine into a half breed by actualizing a prototype that switches between the HHO gas line and fuel line with the use of a switch. For instance if the pressure inside the vessel of the generator begins to diminish, the bicycle will change to gas control. Once the bicycle keeps running on gas, the alternator will have the capacity to send current to the battery of the generator and in the end will have satisfactory pressure development to run the motorcycle again on hydroxy gas. This Hybrid outline includes a few entanglements as there would should be a gadget in which the HHO gas line and the fuel line associate with a valve that switches between the two. In the event that the prototype can't keep running on hydrogen and without gas, at that point Plan B comes in play. Plan B is the other method to make utilization of the generator, which is considerably less complex. The HHO gas will be supplied into the air box of the engine. The motorcycle will keep running on gas constantly, however the blend of air, hydroxy gas, and fuel, will enhance the ignition cycle, making the engine cleaner and more productive, since hydrogen is significantly more combustible than gas. The result of this outline includes more gas mileage and cleaner fume gasses. The two choices achieve the objective of environmental favourable.

DELIVERY SYSTEM

One of the options of this generator was to utilize the HHO gas delivered to run the motorcycle without the need of fuel. woefully, this aspiring try to address one of society's most serious issues was not successful. The thought was to send the HHO gas through the injectors. However, the fuel injectors of the motorcycle were not appropriate to deal with the gas. In addition, the issue was because of motorcycle's ECU. Generally they are modified to work at an air-fuel volume proportion of 14:1. For a engine to work with hydrogen there should be an air-H₂ volume proportion of 2.4:1. As far as rate, 29.6% of the blend must be unadulterated hydrogen gas. The ECU and the injectors are not intended for such a proportion. Moreover, the motorcycle actualized the model generator is a 2002 Kawasaki Boxer, which has an alternator that produces a current of 2.5amps. For security and quality reasons, alternators are intended to work at 30% to 40% of its greatest yield ceaselessly. This implies the greater part of its yield would go to control the HHO generator and not to charge the motorcycle's battery. Without the utilization of fuel, the measure of vitality originating from the generator isn't sufficient to control the motorcycle, turn the alternator, charge the battery, and power the generator itself once more. It's a deadlock, not a steady cycle. Since the principal conveyance prototype fizzled, it was chosen to utilize the gas as an added substance to the air and gas blend in the burning chamber. This was done in an basic manner. The hose conveying the gas from the generator was associated with the air box of the motorcycle. The HHO gas blends with air and is then sucked into the burning chamber where it is blended with fuel and started to make the combustion that moves the cylinder down and eventually turns the crankshaft. Such blast is said to be all the more intense and more clean. To guarantee that the correct blend of air, HHO gas, and gas are going on, a pulse width modulator was adjusted to the motorcycle's ECU. This takes into account a very much adjusted blend and guarantees the motorcycle's effectiveness. Since hydrogen gas is presently a piece of the ignition, there is less requirement for fuel.

VEHICLE IMPACT

Vehicles expend a considerable measure of vitality and utilize a wide range of liquids including sulfuric acid, engine oil, radiator fluid, fuel, and brake oil, transmission oil. in major instance these toxins are hurtful to people and creatures, and can contaminate conduits in the event that they spill from the vehicle or are arranged inaccurately. Numerous vehicle liquids are exposed to heat and oxygen while a engine is running, and experience substance changes. These liquids additionally get heavy metals from engine wear and tear, making them much more prominent toxic to the earth. There is no doubt about the harming natural impacts that are included with vehicles, and it is our obligation as engineers to address these issues. Vehicles are the greatest air quality contaminants in India. They create around 33% of all air contamination. carbon monoxide, the brown haze, and numerous different poisons that are being radiated by vehicles are disturbing in light of the fact that contaminated air straightforwardly hit the regions where people breaths, which is the reason the vehicle discharges a much more prompt health worry than the poisons that are being released by modern industries that is high in the atmosphere.

SAFETY

Utilizing hydrogen as a fuel supplement for transportation applications, for example, ignition engines in motorcycle presents certain potential well being risks for the overall population and buyers. Hydrogen is an odorless, tasteless, colourless, and highly combustible gas. In correlation with gas, hydrogen has higher combustibility. Capacity of hydrogen gas under high pressure acquaints risks with close-by work force in case of lost control from material failure, so along these lines picking the right materials is the way to legitimately keep up the resilience required. The discharged hydrogen is of a combustion danger since hydrogen ignites with an undetectable flame and has a wide combustibility range as said. Hydrogen generators can give a successful strategy of producing

exceedingly unadulterated hydrogen. Since it is three times more effective than fuel, hydrogen generators all things considered keep the hydrogen at low pressure(40-60 psi), reducing the chances of any sudden release of high pressurized H₂ gas. Intermittent upkeep is prescribed to guarantee no parts have been worn off. Since these prototype is moderately basic, most repair works should be possible in a house carport in a convenient way. It is essential to introduce a hydrogen generator with motorcycle. The hydrogen generators for motorcycles require just distilled or de-ionized water. Generators that utilization just water are more alluring as they dispense with the risks related with dealing with extra chemicals.

CONCLUSION

There is a great deal of wariness about HHO generators for vehicles discovered on the web. Our last proposition gives substantial proof that, actually, they do work. It was resolved that keeping in mind the end goal to supplement fuel utilization with hydrogen gas totally, numerous changes should be made to the fuel arrangement of the motorcycle, that were out of our span. Regardless of whether these were proficient, the measure of vitality required for the motorcycle to keep running and in addition to control the generator isn't sufficient without the vitality originating from the fuel. The hydrogen cell created oxygen and hydrogen from water through electrolysis. Minimization the cost was finished by utilizing fiercely accessible materials. When Plan A was not effective, Plan B was actualized. From the after effects of the test it can be reasoned that having a HHO generator, for example, this one, will enhance gas mileage. The discoveries of this thesis advantage nature and society. Since executing the hydrogen generator will deliver less emanations to the air, and, less utilization in oil. In this manner it will decrease greenhouse gasses. Subsequently, less impact on a global temperature alteration on the long run. Also, when you consider that actualizing a hydrogen generator will give more prominent gas effectiveness, it will spare cash for the individuals who will utilize our item. It is difficult to discern whether the generator will keep on being as effective over the long haul, since we couldn't consider alternator wear or battery efficiency. However with standard checkups these elements can be dealt with. The procedure to plan and make was somewhat dull, as we expected to do inquire about on the distinctive kinds of electrolysis and HHO generators. Ordinarily we experienced individuals guaranteeing that such generators are not proficient and that, truth be told, they are a myth and don't work. This was somewhat disheartening once in a while. Yet, we continued working through with the expectation of indicating confirmation of their adequacy. We were extremely satisfied when we procured the outcomes demonstrating a change in gas mileage. As specialists, we felt achieved to realize that such gadget can help ease some of society's greatest issues.

APPENDIX

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