Removal of Surfactants Using Rubber Granules as an Adsorbent

Neel Joshi[1], Bhalodiya Vishnu[2], Gujaria Mahesh[3], Unmil Pandya[4], Nikhil Aghera[5], Hit Vora[6]
[1] Prof LDRP-ITR R,
[2,3,4,5,6] Student LDRP-ITR

***Abstract-* In this manuscript, research on hydrogen internal combustion engines is discussed. The objective of this project is to provide a means of renewable hydrogen based fuel utilization. The development of a high efficiency, low emissions electrical generator will lead to establishing apath for renewable hydrogen based fuel utilization. A full-scale prototype will be produced in collaboration with commercial manufacturers. The electrical generator is based on developed internal combustion engine technology. It is able to operate on many hydrogen-containing fuels. The efficiency and emissions are comparable to fuel cells (50% fuel to electricity, ~ 0 NOx). This electrical generator is applicable to both stationary power and hybrid vehicles. It also allows specific markets to utilize hydrogen economically and painlessly**

I INTRODUCTION

The internal combustion engine has domination the automotive vehicles market for over 100 years. Although remarkable improvements have been made over the past 30 years to reduce fuel consumptions, air pollution to nearly zero and almost double the vehicle efficiency. Increase in global warming and energy securing are pushing vehicles toward even greater efficiency improvement. Adding a high power electric motor and electric storage capacity to an internal combustion engine offers significant fuel savings. The engine can be shut off[8-16] at idle to avoid wasting fuel and the engine can be driven in reverse when braking to capture more energy is boost from the electric motor. The boost from the electric motor allows use of more efficient smallest engine. In the early days of the automobiles (20th century) there was spirited competition between vehicle powered by electricity and by internal combustion engines.[6-10] The Vinternal combustion engine is dominating because of the high amount of energy in liquid fuels. The efficiency of the petrol engine can be increased by simply grinding the bore or head of the engine. By grinding the bore or head of the engine there will be change in the length of the volume of stroke. But due to grinding there will be some drawbacks. There will be detonation in the engine. The detonation can be decreased by providing anti knocking agent. There are various anti knocking agent in the markets. But each anti knocking agent has its drawbacks.

II.LTERATURE REVIEW

In SAE Journal paper titled Increased Efficiency through Gasoline Engine Downsizing," By authors Neil Fraser, Hugh Blaxill, Grant Lumsden , Michael Bassett, They have mentioned that,In order to achieve the required future CO_2 reduction targets, significa further development of both gasoline and diesel engines is required. One of the main methods to achieve this with the gasoline [34] engine in the short to medium term is through the application of engine downsizing, which has resulted in numerous downsized engines already being brought to production. It is, however, considered that there is still significant further CO_2 reduction potential through continued development of this technology [11-15]. This paper considers the future development of gasoline engine downsizing in the short to medium term and the various technologies that can be applied to further increase the efficiency of operation. As such this paper covers, among other areas, fundamental engine layout and design, alternative boosting systems, methods of increasing part-load efficiency and vehicle modeling, and uses analysis tools and engine test results to show the benefits achievable. In BIT Journal paper titled Performance Improvement of 4-Stroke S.I. Engine Using Vapour Fuel Technology, By authors -RatneshParmar, SimitPrajapati Mechanical Engineering Department, Babaria Institute of Technology, Vadodara Automobile Engineering Department, A.D.I.T., Vallabh Vidhyanagar, Anand, They have mentioned that, This paper covers information [30]on the performance improvement of four International Journal of Pure and Applied Mathematics I.C engine by using vapor fuel technology. Due to the thermal losses and incomplete combustion, the efficiency of an I.C engine is in the range of 25% to 30%. The efficiency may increase with the reduction in these losses. There are many losses in the engine like heat loss, friction loss, inertia loss, combustion loss etc.[29] In our project we had concentrated in minimizing the heat and combustion losses. For that it is necessary that maximum amount of fuel energy must be absorbed in combustion chamber of engine. The experiment was carried out on the 4-stroke petrol engine[22] in which the convention fuel intake system had been replaced by another system called "vapor fuel system". In this fuel supply system, the fuel is supplied to engine in form of vapor. So this modification in fuel supply system improved the combustion in combustion chamber minimizing the heat and combustion losses and more power was absorbed by engine so there was the improved performance of the engine.[19] The engine was tested for the both conventional and fuel vapor system and the engine performance was checked for the each case.[11-16] Relationship Between Thermal Efficiency And Compression Ratio Improving internal combustion (IC) engine efficiency is a prime concern today. A lot of engineering research has gone into the improvement of the thermal efficiency of the (IC) engines, so as to get more work from the same amount of fuel burnt. Ofthe energy present in the combustion chamber only a portion gets converted to useful output power. Most of the energy produced by these engines is wasted as heat. In addition to friction losses and [3]losses to the exhaust, there are other operating performance parameters that affect the thermal efficiency. These include the fuel lower calorific value, QLV, compression ratio, and ratio of specific heats, Compression ratio is the ratio of the total volume of the combustion chamber when the piston is at the bottom dead center to the total volume of the center. Theoretically, increasing the compression ratio of an engine can improve the thermal efficiency[2] of the engine by producing more power output. The ideal theoretical cycle, the Otto cycle, upon which sparkignition (SI) engines are based, has a thermal efficiency, which increases with compression ratio, and is given by;

Compression Ratio :

Rc = Vs+Vc

VCVs- Swept Volume

Vc- Clerance volume

A. Detonation

Detonation or engine knock occurs simply when fuel preignitesBefore the piston reaches scheduled spark ignition. This means that a powerful explosion is tryingefore the piston reaches scheduled spark to expand a cylinder chamber that is shrinking in size, attempting to reverse the direction of the piston and the engine. Causing sudden pressure changes in the cylinder and extreme temperature spikes that can bevery damaging on engine pistons, rings, rods, gaskets, bearings, and even the cylinder heads[30].to expand a cylinder chamber that is shrinking in size, attempting to reverse the direction of the piston and the engine. Causing sudden pressure changes in the cylinder and extreme temperature spikes that can bevery damaging on engine pistons, rings, rods, gaskets, bearings, and even the cylinder heads[30].

III. BASIC PRINCIPLES

There are many demands on a cooling system. One key requirement is that an engine fails if just one part overheats. Therefore, it is vital that the cooling system keep all parts at suitably low temperatures. Liquid-cooled engines are able to vary the size of their passageways through the engine block so that coolant flow may be tailored to the needs of each area. Locations with either high peak temperatures (narrow islands around the combustion chamber) or high heat flow (around exhaust ports) may require generous cooling. This reduces the occurrence of hot spots, which are more difficult to avoid with air cooling.

HCCI operation is unconventional, but is not new. As early as 1957 Alperstein et al. (1958) experimented with premixed charges of hexane and air, and n-heptane and air in a Diesel engine. They found that under certain operating conditions their single cylinder engine would run quite well in a premixed mode with no fuel injection whatsoever.

Air cooled engines may also vary their cooling capacity by using more closely-spaced cooling fins in that area, but this can make their manufacture difficult and expensive. Conductive heat transfer is proportional to the temperature difference between materials. If engine metal is at 250 °C and the air is at 20°C, then there is a 230°C temperature difference for cooling. An air-cooled engine uses all of this difference.

IV. CONCLUSION

A brief summary of the work completed and significant conclusions derived from this investigation are : Models for three different shapes of Fins were developed and effects of wind velocity and heat transfer coefficient values were investigated. Heat transfer rate increases after changing fin geometry. Because of non-uniformness in the geometry of Fins turbulence of flowing air increases which results in more heat transfer rate. The shape and thickness along with material plays an important role in defining the amount of heat transfer from the fins. The elliptical shape fins are giving the best results than the rectangular and triangular fins. Also, thickness of the fins plays an important role in heat transfer. As we keep reducing the thickness, heat transfer rate is shooting up for a defined shape and material. But while reducing the thickness, we should consider the strength of the fins to understand that till which thickness fins can withstand the working temperatures.

V. CONCLUSION

The free piston linear alternator illustrated in Figure 2 has been designed in hopes of approaching ideal Otto cycle performance through HCCI operation. In this configuration, high compression ratios can be used and rapid combustion can be achieved.

The linear generator is designed such that electricity is generated directly from the pistonís oscillating motion, as rare earth permanent magnets fixed to the piston are driven back and forth through the alternatorís coils. Combustion occurs alternately at each end of the piston and a modern two-stroke cycle scavenging process is used. The alternator component controls the pistonís motion, and thus the extent of cylinder gas compression, by efficiently managing the pistonís kinetic energy through each stroke. Compression of the fuel/air mixture is achieved inertially and as a result, a mechanically simple, variable compression ratio design is possible with sophisticated electronic control. The use of free pistons in internal combustion engines has been investigated for quite some time. In the 1950ís, experiments were conducted with free piston engines in automotive applications. In these early designs, the engine was used as a gasifier for a single stage turbine (Underwood 1957, Klotsch 1959). More recent developments have integrated hydraulic pumps into the engineís design (Baruah 1988, Achten 1994). Several advantages have been noted for free piston IC engines. First, the compression ratio of the engine is variable; this is dependent mainly on the engineís operating conditions (e.g., fuel type, equivalence ratio, temperature, etc.). As a result, the desired compression ratio can be achieved through modification of the operating parameters, as opposed to changes in the engineís hardware.

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