UGC Approved Journal

IARJSET

ISSN (Online) 2393-8021
ISSN (Print) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

ISO 3297:2007 Certified

Vol. 4, Issue 8, August 2017

Advancement in Internal Combustion Engines

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Abstract: Over the years, there have been continuous advancements in the design of internal combustion engines. In particular, the vision behind the evolution of these engines was to ensure a minimum power extraction from the fuel while reducing the emissions and pollution to the environment. The main areas of advancements were in the engine design, the timing controls, fuel injection, combustion and material selection [1]. With the recent technological advancements, the current engine designs are fuel efficient, and produce much fewer emissions.

Keywords: Scavenging: remove (combustion products), Supercharger: increase the density of air, Turbocharger: Provides extra air to the combustion chamber.

I. INTRODUCTION

Since its inception, technology has been at the center of most advancements. In different disciplines, there have been continuous improvements in the systems being developed mainly for an increase in efficiency and effectiveness. For instance, material science has been developed through a combination with essential engineering designs to come up with systems that are more effective.

Again, there have been changes in different fields that have ensured that the developed systems can be achieved and maintained at a lower cost. Specifically, in the engineering field, there have been advancements with the internal combustion engines that have not only made it easy to move from one position to another but also ensured that the journey is efficient.

II. ADVANCEMENTS

One of the main advances in the design of the internal combustion engines is in the use of a direct injection mechanism. With this mechanism, air is first filled in the cylinder then when halfway through the compression stroke, a controlled small amount of fuel is directly injected into the cylinder so that a lean mixture can be created. With this design, there is no need to have a carburetor. Again, it ensures that a better compression is achieved while lowering the NOx emissions [3]. Furthermore, the stratified learner mixture can also be used which ensures a reduction in the fuel consumption.

Another possible advance in the design of these engines is the use of superchargers. With this system, the compressor is coupled to the engine through the use of a belt to ensure that the output is directly connected to the engine. Its performance s enhanced through the increment in the amount of oxygen fed into the engine which helps in better burning. This is achieved through the sucking of air as the engine rotates which is then compressed and fed into the cylinders. Again, there is the use of turbochargers which work in the same way as superchargers but the coupling of the compressor is not in the engine but rather in the shaft [1]. With this system, the turbocharger uses the exhaust to turn the turbine which then is responsible for the rotation of the compressor. However, turbochargers can only work at very high velocity exhausts which then makes them take some time to start up more so when in cold starts. This is the time referred to as the turbo lag.

Another advancement was in the use of six stroke engines. This system was invented for specific reasons which included reducing the weight to power ratio, reducing scavenging, increasing power and fuel economy, improving cooling and reducing the moving parts. With this system, the water is first injected into the cylinder towards the end of the exhaust stroke. In this way, the fluid absorbs the heat then expands in a way that provides another power stroke [2]. This system improves the performance of the engines by reducing the emissions and increases the performance. With such a system it is easy to conserve the environment through the minimal emissions.

III. CONCLUSION

Technological advances are important in day-to-day lives. For engineers, it is paramount that they come up with new designs that suit the current trends and ensure that efficiency is increased while reducing the costs. With internal

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combustion engines, technological advances such as the use of direct injection mechanisms, the use of superchargers and six stroke engines have ensured that vehicle engines are more efficient and have less emissions. With such systems, the environment is conserved and people can have cars that are highly efficient.

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