



Electromagnetic Engine – A Future

Anisha K*

Assistant Professor, Department of EEE, Sri Chandra Sekharendra Saraswathi Viswa Maha Vidyalaya, Enathur-631561, Tamil Nadu, India

ABSTRACT

In the recent science and technology there is an increase in the use of Electrical energy. But most of the Electricity is generated with the help of fossil fuels. These fuels are the one of the common cause for Green house effect. so we are going for an alternative solution to these kind of issues such as an alternative to the fossil fuels. This Paper explains the need to replace fossil fuel and reduce the carbon footage by providing main power sources for the automobile engines. This Paper describes the design of an Electro magnetic piston engine, which operate with the help of electromagnetic principle. The normal IC engine utilises the Fossil fuel for its working. But the Electromagnetic Engine (EME) works with the principle of electromagnetic attraction and repulsion of magnetic force instead of using fossil fuels. It has two permanent magnet and two electromagnets. Electromagnets are Fixed on the cylinder head and the permanent magnets are Fixed on the piston head. The current for producing magnetic field is supplied by a battery. The permanent magnet placed on the piston moves from TDC to BDC produces rotary motion.

Keywords: Electromagnetic engine, alternative fuels, electric vehicle

1. INTRODUCTION

Presently, there is a need for alternate fuel as the demand of electricity increases rapidly. The price of fuels are also increasing rapidly and also more usage of fossil fuels creates a threat to the environment. Likewise the demand, the fossil fuel requirement for transportation and other needs are also increasing, so the deteriorating nature of the fuels make us to think for an alternative solution for fueling needs. Also there is a great need to reduce the emission of gases like CO, SO₂, NO_x, which are hazardous to nature and humans.

As the fossil fuel resources are diminishing and the increase in the cost of energy and environmental effects, engines use alternate energy sources such as bio-fuel, solar power; wind power, electric power, stored power, etc. However, such engines have many disadvantages. Production of bio-fuel takes vast resources and they still pollute the environment. Similarly, the solar power is variable and completely depends on the climatic condition of the region. The installation and subsequent maintenance costs of using alternative energy sources are very high. Hence, in the absence of a viable alternative, as of now, switching to new technology by changing from traditional Internal Combustion engines has been a great challenge. Magnetism is the basic principle of working for an electromagnetic engine.

The Advantages of Electromagnetic Engine are

- a. Environment
- b. operating cost is low
- c. Used for any kind of transportation – cars to large trucks
- d. No fuel cost

2. PROBLEM STATEMENT

Now days, increasing fuel cost and pollution are the major disadvantages of using Internal Combustion engines. This can be compensated by the Electromagnetic engine. Because of the use of batteries in series thus more input is given to the system to get increased output.

3. CONSTRUCTION DETAIL

Batteries and electromagnets are used instead of commercial fuel. The dimensions of the set-up are as follows :

- a. Cylinder:
Inner diameter = 0.038m.

Outer diameter = 0.070m.

Material: Aluminium

b. Connecting Rod:

Big end diameter = 0.012 m.

Small end diameter= 0.010m.

Length = 0.06492m.

Material: Cast Iron

c. Piston:

Diameter = 0.037m.

Height = 0.020m.

Material: Aluminium

d. Fly wheel:

Diameter of outer circle = 0.17m.

Hole at centre = 0.03m.

Material: Mild steel

e. Electro magnet:

Diameter = 0.065m.

Height = 0.080m.

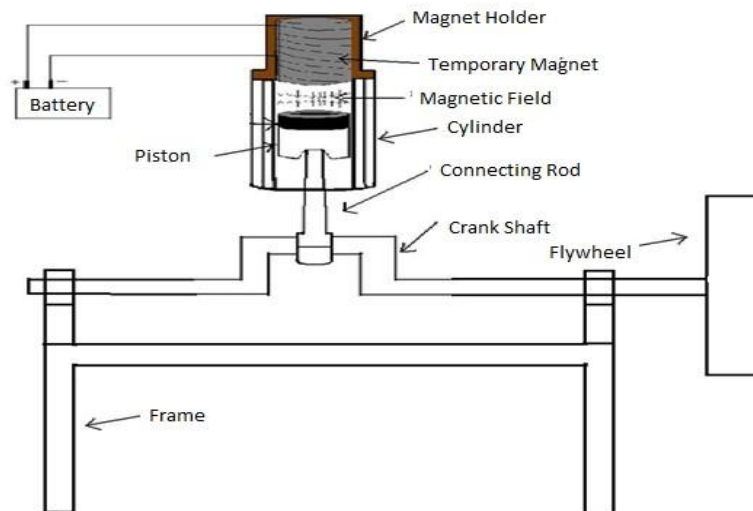


Figure 3.1 Schematic Diagram of Electromagnetic Engine

The Figure 3.1 shows the layout of Electromagnetic Engine. The whole setup is set on a frame. The piston cylinder arrangement is connected to Crank shaft with the help of Connecting rod, which is connected to flywheel. The battery is connected to supply the electromagnet.

The permanent magnet is located at the top of the piston and electromagnet is set is located at the top of the cylinder, which produces magnetic field in the system by using the battery.

3.1 SYSTEM DESCRIPTION

3.1.1 Cylinder:

The cylinder is made up of Aluminium, a nonmagnetic materials such as stainless steel, fiber, titanium or similar materials of high resistivity and low electrical conductivity. Because it should not interfere with the magnetic property.. The temperature inside the cylinder is very low and so no fins are needed for heat transfer.

3.1.2 Piston:

The hollow piston is also made up of non-magnetic stainless steel, titanium or similar materials which are of high resistivity and low electrical conductivity. A powerful permanent magnet made of neodymium iron-boron (NdFeB) is attached with the piston. The other end of the piston case is connected with the piston rod which in turn is connected to the crankshaft. The crankshaft and the piston rod convert the linear reciprocating movement of the piston to the circular movement.

3.1.3 Connecting rod:

The connecting rod is used to connect the piston with the crankshaft. It is used to convert the linear motion or reciprocating motion of the piston to the circular motion of the crankshaft. The material used for the connecting rod is cast iron.

3.1.4 Flywheel:

Flywheel is used to convert reciprocating energy into rotational energy. It is made up of mild steel. The amount of energy stored in a flywheel is proportional to the square of its rotational speed.

3.1.5 Electromagnet:

It consists of an core of Magnetic material surrounded with a coil of conductors, which is carrying current to create a magnetic field around it. The coil consists of many number of turns. The number of turns depends upon the strength of the magnetic field need to be produced.

3.1.6 Battery

The most commonly used type of battery is Lead Acid battery because of its long durability it is used for high power applications. It is used to supply the coils carrying current for an Electromagnet.

4. WORKING

The electromagnetic engine working principle is based up on magnetism. Any magnet has two poles, they are North pole and South pole. As per the principle, Like poles repel each other and the unlike poles attracts each other. This same principle is used for the working of this Electromagnetic engine. Thus main the piston head and cylinder head are modified into magnets so that force are created between them. So the working of this engine greatly resembles the working of a two-stroke IC engine. The piston is located in the lower position that is the BDC, battery is supplying the copper coil, which in turn is energized to produce the magnetic field. The piston of the Neodymium magnets gets attracted by the electromagnet hence moving the piston head from BDC to TDC and hence rotate the fly wheel connected to crankshaft link. While one piston move from BDC to TDC the electromagnet gets de-energized and other electromagnet gets energized and hence resulting the flywheel to reach one completefull stroke.

Input Power(Pi) = Input Voltage x Input Current.

The force acting on Electromagneis given by equations

$$F1 = \frac{N^2 i^2 \mu_0 \mu_r K}{2G^2} \quad - [1]$$

$$F2 = \frac{B^2 \cdot A_p}{2K} \quad - [2]$$

The Total Force F = F1 + F2

Torque (T) = Total Force (F) x Radius(r)

Efficiency:

$$\eta = \frac{P_o}{P_i} \times 100 \quad -[3]$$

4. CONCLUSION

Thus the design of an electromagnetic engine is developed. This concept is entirely different from the motor based vehicles, because the working principle is based on the electro magnetic principle also the power consumption will be very less. The only power consumed is the power consumed by the electromagnet to create the magnetic field and auxiliary circuits. The efficiency of this engine is also more compared with the motor based vehicles.

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