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Experimental Investigation on Magnetized Piston Powered Engine

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ABSTRACT: *In the present energy scenario the fossil fuel sources are fast depleting and their combustion products are causing global environmental problems. So it is inevitable to shift towards the use of other alternative energy resources such as renewable energy, Green energy, bio fuels which leads to reduction in pollution.Magnetic Engine is an alternative technology which uses magnetic fluxdensity to run the engine and thus eliminates the use of fossil fuels. Since the exhaust temperature is slightly less than atmospheric temperature it is used to reduce global warming, since there is no emission of co2 and hydrocarbon content there is no chance of global warming. Due to elimination of pollution, this new technology is easy to adapt. Another benefit is that no external energy such as electrical & electronic energy is required to run the engine. This paper is reports on the review of magnetic reciprocal engine for the design and development of single cylinder engine which can be run by magnetic force of repulsion. The magnetic engine vehicle will contribute to reducing air pollution and tend to zero pollution level and promoting great environment*

I. INTRODUCTION

There is currently some interest in developing engine which is useful to the environment, the present system the fossil fuel sources are fast depleting and their combustion products are causing global environmental problems. Though pollution is controlled in combustion engine Nox gas level is increased which leads to damage in ozone layer and also by using other various technology like Exhaust Gas Recirculation (EGR) valve are used the Nox content is reduced but the co2 content is increased , due to increase of co_2 in atmosphere global warming occurs . Since the use of fossil fuel rate is increased day by day at the year of 2050 the existence of fossil fuel decreases and leads to fuel scarcity. Then where we shall go for fuel?

In order to reduce this condition we shift towards the use of alternate fuel which do not require any combustion material so we have choose magnetic flux to power the engine and decided to design and construct a magnetic engine .

II. NEED OF THE TECHNOLOGY

Today fossil fuels are widely used as a source of energy in various different fields like power plants, internal & external combustion engines, as heat source in manufacturing industries, etc. But its stock is very limited and due to this tremendous use, fossil fuels are depleting at faster rate. So, in this world of energy crisis, it is inevitable to develop alternative technologies to use renewable energy sources, so that fossil fuels can be conserved. One of the major fields in which fossil fuels are used is Internal Combustion Engine. An alternative of IC Engine is "*MAGNETIC POWERED ENGINE"*.It is an engine which will use magnetic flux density to run the engine.

III. SELECTION OF PERMANENT MAGNET

There are various types of magnets depending on their properties. Some of the most well known are listed below.

IV. PERMANENT MAGNETS

These are the most common type of magnets that we know and interact with in our daily lives. E.g.; The magnets on our refrigerators. These magnets are permanent in the sense that once they have been magnetized they retain a certain degree of magnetism. Permanent magnets are generally made of ferromagnetic material. Such material consists of atoms and molecules that each have a magnetic field and are positioned to reinforce each other.

V. CLASSIFICATION

Permanent Magnets can be classified into four types based on their composition:

1. Neodymium Iron Boron (NdFeB or NIB)
2. Samarium Cobalt (SmCo)
3. Alnico
4. Ceramic or Ferrite

NIB and SmCo are the strongest types of magnets and are very difficult to demagnetize. They are also known as rare earth magnets since their compounds come from the rare earth or Lathanoid series of elements in the periodic table. The 1970s and 80s saw the development of these magnets.

Alnico is a compound made of ALuminium, NIckel and CObalt. Alnico magnets are commonly used magnets and first became popular around the 1940s. Alnico magnets are not as strong as NIB and SmCo and can be easily demagnetized. This magnet is however, least affected by temperature. This is also the reason why bar magnets and horseshoes have to be taken care of to prevent them from losing their magnetic properties.

Ceramic or Ferrite magnets are the most popular today. They were first developed in the 1960's. These are fairly strong magnets but their magnetic strength varies greatly with variations in temperature.Permanent Magnets can also be classified into Injection Molded and Flexible magnets. Injection molded magnets are a composite of various types of resin and magnetic powders, allowing parts of complex shapes to be manufactured by injection molding. The physical and magnetic properties of the product depend on the raw materials, but are generally lower in magnetic strength and resemble plastics in their physical properties. Flexible magnets are similar to injection molded magnets, using a flexible resin or binder such as vinyl, and produced in flat strips or sheets. These magnets are lower in magnetic strength but can be very flexible, depending on the binder used.

VI. SHAPE & CONFIGURATION

Permanent magnets can be made into any shape imaginable. They can be made into round bars, rectangles, horseshoes, donuts, rings, disks and other custom shapes. While the shape of the magnet is important aesthetically and sometimes for experimentation, how the magnet is magnetized is equally important. For example: A ring magnet can be magnetized S on the inside and N on the outside, or N on one edge and S on the other, or N on the top side and S on the bottom. Depending on the end usage, the shape and configuration vary.

VII. DEMAGNETIZATION

Permanent magnets can be demagnetized in the following ways: - Heat - Heating a magnet until it is red hot, makes the magnetic properties to fail - Contact with another magnet - Stroking one magnet with another in a random fashion, will demagnetize the magnet being stroked. - Hammering or jarring will loosen the magnet's atoms from their magnetic attraction.

VIII. TEMPORARY MAGNETS

Temporary magnets are those that simply act like permanent magnets when they are within a strong magnetic field. Unlike permanent magnets however, they lose their magnetism when the field disappears. Paperclips, iron nails and other similar items are examples of temporary magnets. Temporary magnets are used in telephones and electric motors amongst other things.

IX. ELECTROMAGNETS

Had it not been for electromagnets we would have been deprived of many luxuries and necessities in life including computers, television and telephones. Electromagnets are extremely strong magnets. They are produced by placing a metal core (usually an iron alloy) inside a coil of wire carrying an electric current. The electricity in the current produces a magnetic field. The strength of the magnet is directly proportional to the strength of the current and the number of coils of wire. Its polarity depends on the direction of flow of current. While the current flows, the core behaves like a magnet. However, as soon as the current stops, the core is demagnetized.

Electromagnets are most useful when a magnet must be switched on and off as in large cranes used to lift cables and rods in construction. The flow of magnetic line of force is illustrated in figure 1.1

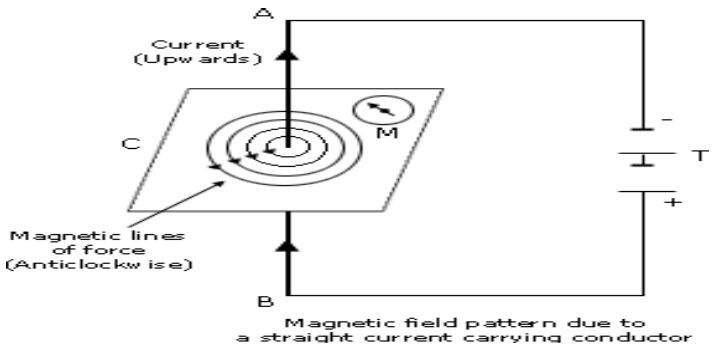

Figure 1.1 Flow of magnetic line of force

X. SUPERCONDUCTORS

These are the strongest magnets. They don't need a metal core at all, but are made of coils of wire made from special metal alloys which become superconductors when cooled to very low temperatures.

XI. TEMPERATURE OF MAGNETIC MATERIAL

The temperature of various magnetic materials are illustrated in table 1.1

Material	Maximum Working Temperature	
	°C	°F
Ceramic	400	752
Alnico	540	1004
SmCo 1,5	260	500
SmCo 2, 17	350	662
NdFeB N	80	176
NdFeB M	100	212
NdFeB H	120	248
NdFeB SH	150	302
NdFeB UH	180	356
NdFeB EH	200	392

Table1.1 Temperature of Various Magnetic

XII. PROPERTIES OF MAGNETIC MATERIAL

The various property of magnetic material are illustrated in table 1.2

	Maximum Energy Product *Bhmax(MGOe)*	Residual Flux Density *Br(G)*	Coercive Force *Hc(Koe)*
Ceramic 5	3.4	3950	2400
Sintered Alnico 5	3.9	10900	620
Cast Alnico 8	5.3	8200	1650
Samarium Cobalt 20 (1,5)	20	9000	8000
Samarium Cobalt 28 (2,17)	28	10500	9500
Neodymium N45	45	13500	10800
Neodymium 33UH	33	11500	10700

Table 1.2 Property of Magnetic Material

By considering some of the factors such as magnetic field strength, grade and working temperature rigidity and life period, property finally Neodymium magnet is chosen for constructing magnetic engine

XIII. CONSTRUCTIONOF MAGNETIC ENGINE

The constructions of Magnetic engine mainly consist of components such as:

1. Neodymium magnet.
2. Acceleration unit.
3. Single cylinder engine.
4. Crankshaft.
5. Connecting rod.
6. Magnetizedpiston.
7. Flywheel.
8. Clamp.
9. Aluminum liner.

XIV. DESIGN OF MAGNETIC ENGINE

The design of magnetic engine is illustrated in figure 1.2

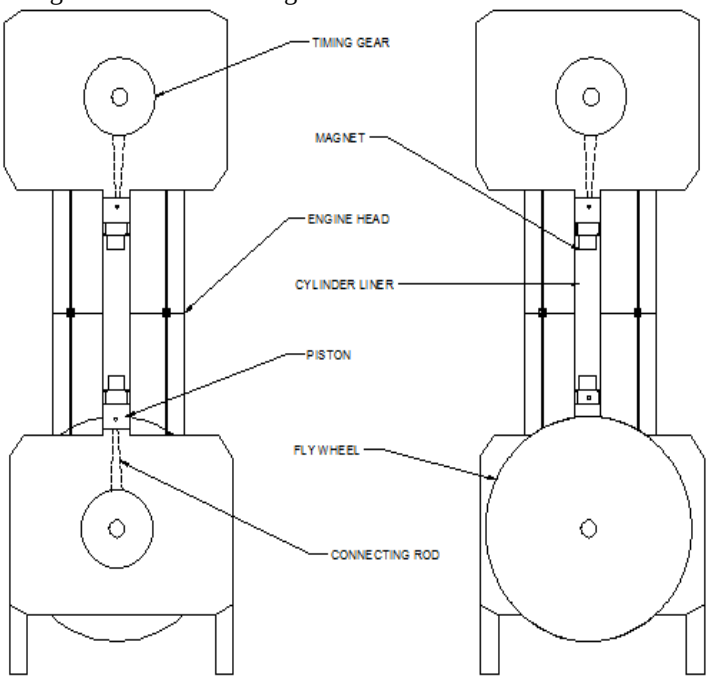

Figure 1.2 Design of Magnetic Engine

XV. WORKING OF MAGNETIC ENGINE

1. Magnetic engine works in a simple manner, Magnetic engine consist of two engines which ismounted vertically and hold using a clamp.
2. When the acceleration is given for 90° in the engine 1 the piston moved to the Top Dead Center (TDC) for first time then the piston in the engine 2 has to be ready at the Top Dead Center (TDC) for the power stoke .
3. Due to magnetic repulsion the piston in the engine 2 moves to BottomDead Center (BDC).
4. Then with the aid of flywheel at the movement of piston from Bottom Dead Center (BDC)toTop Dead Center (TDC) takes place.
5. Finally the output power is obtained from the crankshaft.
6. For continuous rotation the acceleration has to be provided adequately.
7. Due to this continuous process the engine is powered and runs.

XVI. APPLICATIONS

1. Two wheeler Application.
2. Automatic guided vehicle.
3. Pump applications.
4. Power generating applications.

XVII. ADVANTAGES

1. Reducing pollution from one source, as opposed to the millions of vehicles on the road.
2. Transportation of the fuel would not be required due to drawing power off the electrical grid. This presents significant cost benefits. Pollution created during fuel transportation would be eliminated.
3. There is no need to build a cooling system, fuel tank, Ignition Systems or silencers.
4. The mechanical design of the engine is simple
5. Low manufacture and maintenance costs as well as easy maintenance.
6. The price of fueling magnetic powered engine will be significantly cheaper than current fuel.
7. No pollution is obtained.
8. Consumption of fossil fuel is reduced.
9. Initial crank is enough to start the engine.
10. Life time of the magnet is high, so it can run for a long period
11. No combusting takes place inside the engine. which reduce the evaluation of heat and toxic gases from the engine
12. Reduces global warming.
13. Green environment is established.

XVIII. RESULT AND DISCUSSION

The magnetic field is analyzed for a single magnet by placing two repulsive magnets to each other at 0.5 mm and 1 mm distance.When the distance between two repulsive magnet is reduced the magnetic field strength increases and it is illustrated in the figure 1.3 and when the distance between two repulsive magnet is increased the magnetic field strength is reduced, this case is illustrated in figure 1.4 .The magnetic field strength produced at 0.5 mm distance is more than 7558 gauss and it is greater than magnetic field strength produced at 1 mm distance at 7598 gauss

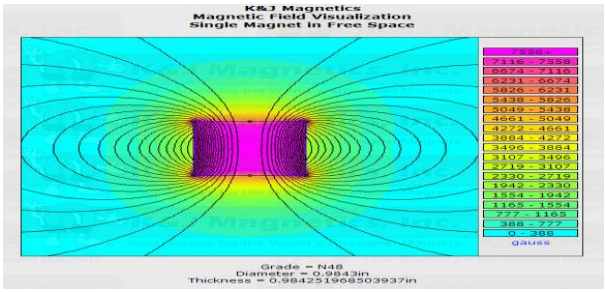

Figure 1.3 analysis of magnetic field at 0.5 mm gap

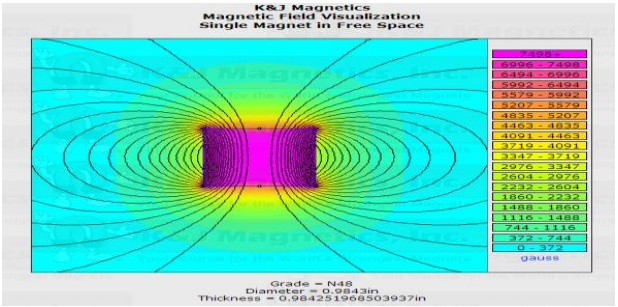

Figure 1.4 analysis of magnetic field at 1 mm gap

The force produced between two repulsive magnets at a distance of 0.5 mm and 1 mm is illustrated in figure 1.5 and 1.6.From the force vs. distance graph, it is clear that when the distance is reduce between two repulsive magnets the force produced between the two magnet is high similarly when the distance between two repulsive magnet is increased the force produced between two repulsive magnet is decreased . The force produced between two repulsive magnets at 0.5 mm distance is 56.49 lb and it is greater than that of force produced between two repulsive magnets at 1 mm distance is 50.63 lb.

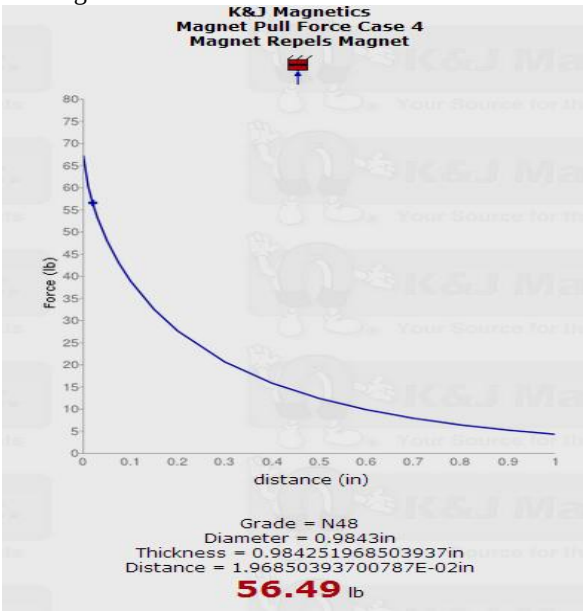

Figure 1.5 Force Produced by the Magnet at 0.5 mm Gap

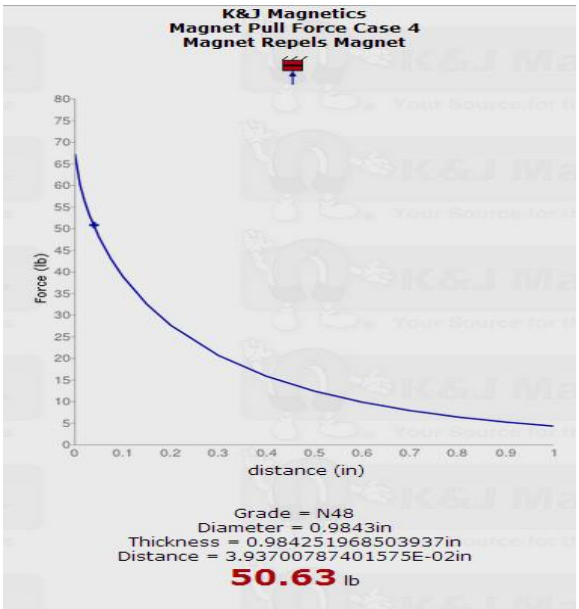

Figure1.6Force Produced by the Magnet at 1 mm Gap

XIX. CONCLUSION

Since the fossil fuel rate is reducing day-by-day we have come with a magnetic reciprocating engine which can fulfill the use of fossil fuel in a reduced manner. On the whole, the technology is just about modifying the engine of any regular IC engine vehicle into an Magnetic Powered Engine. The Magnetic

Powered Engine technology is cheaper in cost and maintenance, can be easily adapted by the masses and it doesn't cause any kind of harm to the environment. Instead, its widespread use will help mankind in controlling the serious problem of global warming and produce a green environment in the world. Only improvements of the current technology can help its progress within reasonable time and financial limits. The Magnetic Piston Engine fits perfectly into this view. Its adoption by the automobile industry would have a tremendous impact on the environment and world economy, by adopting this technology the availability of fossil fuel can be extended more than 2050's.By further research and development it can prove to be a boon to the middle class Indian citizen.

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