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SOLENOID ENGINE (V4)

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ABSTRACT- In present investigation we have designed a solenoid coil engine based on Induction principle which is alternate option of electric Engine in future due to it high load carrying capacity and low cost as compared to electric engine. Through this work new advanced automobile cum electrical technology is implemented.It is possible to regenerate a new, advanced electric engine without requiring a motor, and this tec hnique is known as a high torque coil engine.It functions just like a regular fuel engine, but the power source is now a battery, which is completely pollution- and environment-friendly.

Index Terms- Firefighting robot; compact size robot; ultrasonic sensor; flame sensor; remote control

I. INTRODUCTION

we develop the idea of an engine in which the reciprocating motion of the armature of the solenoid is transmitted to the crankshaft which converts into rotary motion of it, through a metal strip which acts as a connecting rod. When the power is turn ON, the coil is energized and hence pulls the armature in the middle of the coil and as the coil gets un-energized the armature returns back to its position with a hammering stroke. A single solenoid is responsible for 90 degree rotation of the crankshaft, hence to complete the cycle of 360 degree four solenoids are being used and actuator of this solenoid at different time is done using a copper clad PCB board. The copper clad PCB board is divided in four slots and on each slot one of the wire from each solenoid is soldered. There is a metal wire which is mounted on the crankshaft and one of the ends of this wire is made rounded and is in contact with the copper clad PCB board. This wire completes the circuit and actuates the solenoid.

A solenoid is a type of electromagnet when the purpose is to generate a controlled magnetic field. If the purpose of the solenoid is instead to impede changes in the electric current, a solenoid can be more specifically classified as an inductor rather than an electromagnet. In engineering, the term may also refer to a variety of transducer devices that use energy to move linearly.The term is also frequently used to describe a solenoid switch, a specifi c kind of relay that internally employs an electromechanical solenoid to operate an electrical switch, such as an a utomobile starter solenoid or a linear solenoid, which is an integrated device that contains an electromechanical solenoid that actuates either a pneumatic or hydraulic valve.

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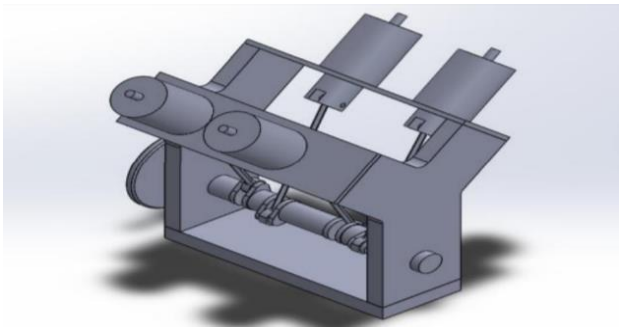
II. METHODOLOGY

This paper is about to design electricity operated engine construction. In this engine there is no use of fuels like diesel and petrol. So this engine is operating on pure electricity coming from a battery source. An electromagnet is positioned on the top of the cylinder, while construction of engine is traditional. And piston is just a permanent magnet (Neodymium magnet). There is no combustion within the cylinder so design of piston and Compared to an IC engine, the cylinder configuration is simpler.Dimensional correctness is therefore not a big i ssue in this case.Although there is no combustion of fossil fuels in this engine, it cannot produce any flue gases t hat are harmful to the environment.



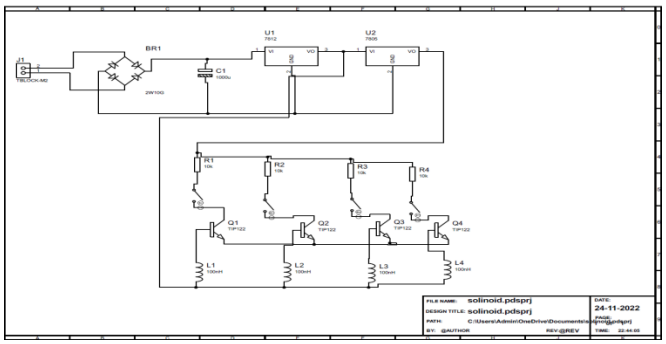


Fig. 1.Circuit for solenoid.

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III. RESULT

When the solenoid prototype is built it has to be tested. To test the solenoid, an electric circuit is developed. The circuit is designed such that the electric parameters can varied easily. The first thing which is needed is a power source. The source can vary from 0 to 300 V. The source charges a capacitor whit a capacity of 4.7 mF. A resistor is positioned in between the capacitor and the source.When the capacitor is fully charged,
the switch can be closed, releasing the entire capacitor's energy over the solenoid coil.
The coil's resistance is 2.5 and it has an inductance of 15.8 mH.Over the coil is a second diode.
When the switch is open, the coil can discharge its energy in this manner.Fig. 2 depicts the electrical circuit in d etail.

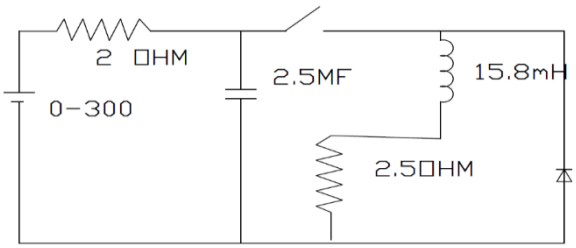

Fig 2- Electric circuit

To compare the test with the simulation the motor constant has to be determent. This is done by measuring the force with a special load cell. The motor constant is different at every position of the plunger. To get a good indication, several plates of 8 mm are placed. In this way the motor constant can be determent at intervals of 8 mm. The test setup for this experiment is shown in Fig 3.

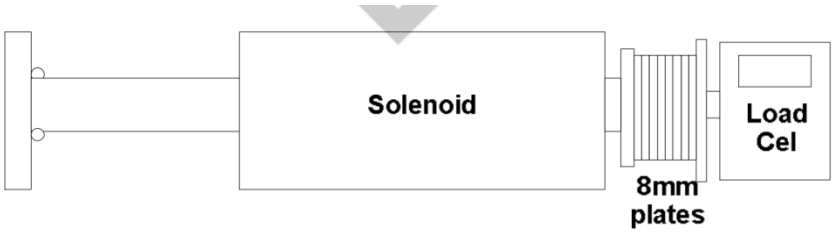

Fig.3- Solenoid

Now the design of the prototype is ready, all the final dimensions are known. To get a good simulation outcome, the final prototype is modeled in FEMM and al the calculations are made. The most important thing which does not match the theory is the coil. The wire is not exactly 1.25 mm in diameter. Another important difference is the Weight of the plunger. This is 1.0 kg instead of 0.6 kg. Also for the test the current is set at approximately 45 A. When running the simulation again for the prototype, the energy and speed are recalculated. The result is shown in Fig 6.1. The end speed of the plunger is about 8.2 m/s at 5 mm (because a rubber ring of 5 mm is added). The distance is the distance that the plunger move before it hits the shield.

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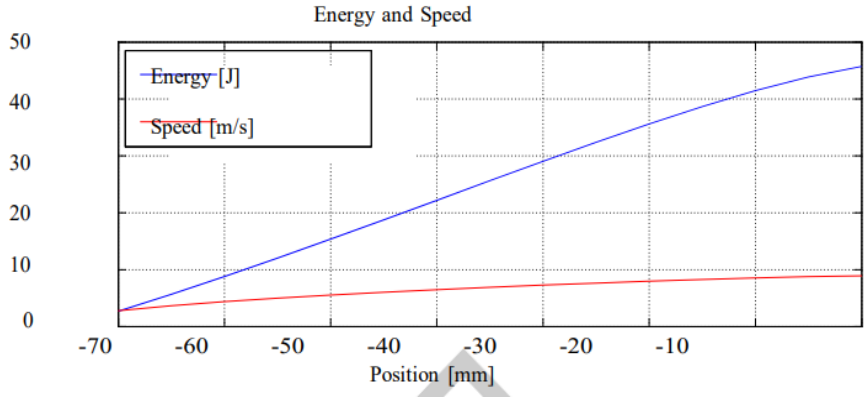

Calculated energy and speed for the prototype) The above simulation is at the full current. As described before, an inductor has a time constant. So the plunger must be held on its initial position until the current is at its maximum. The time constant equals = 0.0150 (8) When plotted , it is easy to see that the plunger must be released after 0.06 seconds. After this time, the current is at 98% of its maximum and the solenoid works at almost full power.

IV. CONCLUSIONS

The four-stroke solenoid engine has been designed as shown in above system .and fabricated as shown. We have measured the speed at the wheel and at the crankshaft using tachometer successfully. The project was mainly concerned with fabricating a revolutionary engine that runs with the help of solenoid coil. Basically, it's advancement to the electric vehicles where electric motor is used to run the engine but in our project we have used solenoid coils in order to increase the battery life and eliminate the losses of the electric motor so as to enhance the power of the vehicle. This innovative technology allows extraction of energy in a clean way and reduces the emission to zero level due to which pollution is minimized to a large extent. It has been cost effective as the design is much simpler than the conventional engines of an electric car.There is no need for cooling, and many additional components including valves, cams, and ports were removed.We can draw the conclusion that the suggested engine is a straightforward and excellent method for operating the electric vehicle very efficiently, and that if used in largescale manu facturing while taking the suggestions mentioned in the future scope, the power, speed, and efficiency can be increased even further.

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