WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

DESIGN AND FABRICATION OF SOLENOID RADIAL ENGINE

E. Vinay[1], B. Sowmya[1], J.VamsiKrishnaReddy[1], P. Govind[1], MD. Gayasuddin[1], Mr. R.S. Kiran[2]

[1] Final Year B. Tech Students, Department of Mechanical Engineering, Sanketika Vidya Parishad Engineering College, P.M Palem, Visakhapatnam, 530041, India.

[2]Assistant Professor, Department of Mechanical Engineering, Sanketika Vidya Parishad Engineering College, P.M Palem, Visakhapatnam, 530041, India.

A B S T R A C T

Electric Vehicle are becoming increasingly attractive and alternative to the vehicles with combustion engine, considering the effect on the environment as well as economic factors such as gradual increasing price of fossil fuels, maintenance and others. Due to the fact that these vehicles are widely known for their zero emission and powered by renewable energy sources. In general, Electrical vehicles are driven and controlled by the integration of electrical, electronics and also mechanical components but the main component that actually moves these vehicles is the electric motor. Electric motor works on principles of the electromagnetic induction by converting electrical energy to kinetic energy. The main idea of this project is to take another alternative design of EV prime mover to replace existing electric motor with a solenoid engine which drives the engine with the help of solenoid actuator. Basically this solenoid engine works on the principle of electro-magnetism. With the help of electromagnetism principle we have decided to drive the engine and provide an alternative to electric motor in electric vehicle to compensate its various losses and avoid drainage of battery with a quick rate. It works like a normal fuel engine but now power source is battery which is totally pollution free and eco-friendly.

Keywords*::Electromagnetic Induction, Electromagnetism*

1. INTRODUCTION

The main disadvantage of radial engine is its fuel consumption. It consumes a lot of fuel and also it causes pollution to environment that's why we are making the engine which works on solenoid. Solenoid engine works on a electricity and it comparatively takes less electricity than regular electric motors.

A solenoid engine is defined as the engine that works by passing electricity through the coils which makes the pistons move back and forth due to electromagnetism. A solenoid engine works on the principle of "electromagnetism". When the current flow through the coil magnetic field is generated in it. It moves the piston and power is transferred to connecting rod and crank shaft.

2. COMPONENTS

a) Electro Magnetic coil
b) Crank
c) Plunger
d) Relay
e) SMPS (Switch Mode Power Supply)

3. WORKING

When the current passes through the coil it produces a magnetic field, due to which the plunger reciprocates and power is transferred from plunger to crank via connecting rod and to crank shaft. The energize and how much supply of power is all determined by Arduino in which we give instruction via coding. Due to that the power is supplied to all coils in a specific manner. We used 12V 10a power supply for giving current. The relay acts as a switch for the circuit.

4. EQUATIONS OR CALCULATIONS

- Max. Force exerted by electromagnet on piston

  F= $(N^2 I^2 \text{KA})/2G^2$

  Where,

  F = force of electro magnet

  N = No of turns = 100

  I = current supplied = 10A

  K = Permeability of free space = $4\pi \times 10^7$

  A = Area of Electro Magnet = $0.0019m^2$

  G = distance between the electromagnet ang plunger = 0.0032m

By, substituting all these we get force = 117.5 N

- Torque T = F × r = 3.52 N-m

  Where, r = radius of crank = 0.003m

- Input Power = Voltage × Current = 12 × 10 = 120 W

- Output power (P) = (2 π n T)/60 = 33.24 W

  Where n = speed = 90rpm

- Efficiency = (Output/Input) × 100% = 27.7%

5. DESIGN ON SOFTWARE

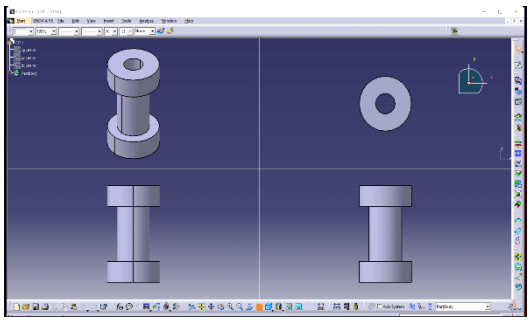


Fig (5.a) Coil

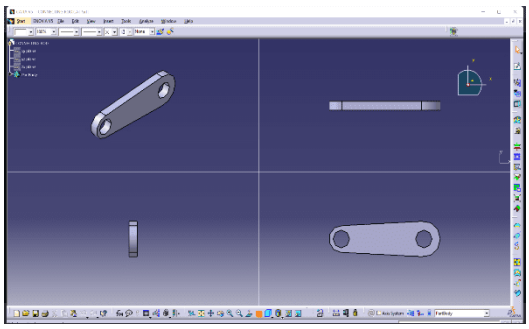
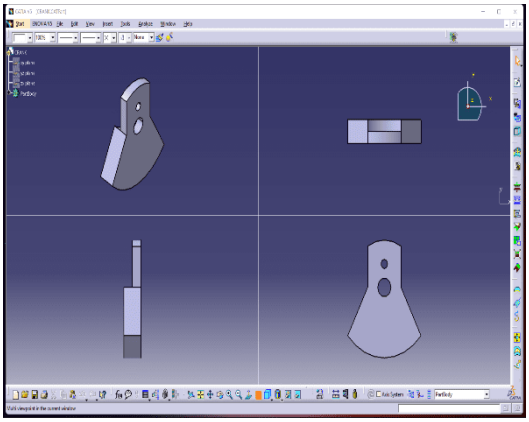


Fig (5.b) Connecting Rod



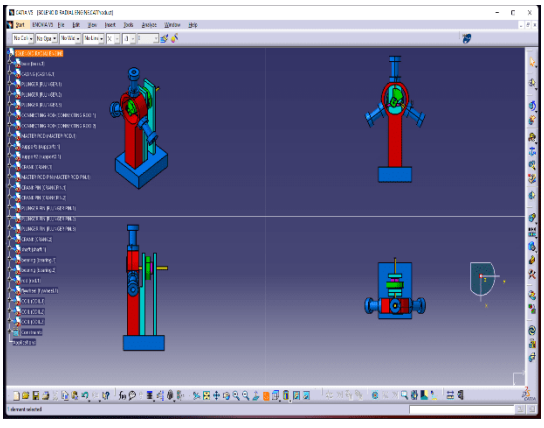


Fig (5.c) Crank **Fig (5.d) Final Assembly**

6. CONCLUSION

By using solenoid engine there will be no pollution to environment. To eradicate the use of fossil fuel. It is lighter in weight then an internal combustion engine and requires less maintenance then IC Engine. The global temperature is rising over the decades so there will be no air pollution by using solenoid engine

REFERENCE

[1] K. Sreenivas , T. Suresh , P. Sai Srinivasulu , K. Akhileswari , B. Santhi , SOLENOID ENGINE, International Journal of Engineering Trends and Applications (IJETA) – Volume 5 Issue 2, Mar-Apr 2018

[2] Dr. Udai Chandra Jha, Prashant Kumar Tiwary, Soumalya Maity, Atik Zafar Khan, Piyush Kumar Rai, Nafees Alam , DESIGN AND DEVELOPMENT OF SOLENOID ENGINE, 2021 JETIR May 2021, Volume 8, Issue 5

[3] Anamika Tiwari, Abhishek Tiwari, A REVIEW PAPER ON 4 – STROKE SOLENOID ENGINE, International Research Journal of Engineering and Technology (IRJET) - Volume: 07 Issue: 04 | Apr 2020