DESIGN AND DEVELOPMENT OF SOLENOID ENGINE

[1]Dr. Udai Chandra Jha, [2]Prashant Kumar Tiwary, [3]Soumalya Maity,

[4]Atik Zafar Khan, [5]Piyush Kumar Rai, [6]Nafees Alam

[1]Assistant Professor, [2,3,4,5,6]Final Year B.Tech. Students

School of Mechanical Engineering

Lovely Professional University, Punjab

Abstract: As we tend to move towards the developed country, the necessity of fuel is increasing day by day with an increasing population. we'd like various to switch fuel. In an IC engine, the chemical energy gets reborn into energy, i.e., the low-grade energy gets reborn into high-grade energy. The IC engine we tend to use causes additional pollution. therefore to beat this drawback, the magnetic attraction force is used to run the engine. The magnetic attraction engine that uses electrical energy to run, will replace the utilization of the IC engine. As we tend to pass current through the copper wire winding, the flux generated close to the copper wire. The polarity of the flux will vary per this. The magnet hooked up at the piston gets attracted up because of the polarity of the static magnet and this force is transferred to the rod and shaft assembly, which transfers the reciprocatory motion of the piston into the rotating motion of the crankshaft and at last the regulator. The magnetic attraction engine ought to be additional compatible. The magnetic attraction engine doesn't need extra elements like cam follower, valves, fuel pump, injectors, fuel tank, etc. The strength of the magnetic force will be increase by the varied input voltage and current.

Key Words: Magnet, Magnetic attraction coil, Relay, Battery, I R sensor, Piston.

INTRODUCTION:

On gift day, we tend to can't imagine each day while not IC engines, that is one in every of the best invention of man. The IC engine is employed in cars to run it. we want an automobile for transporting product and to travel. As an increasing population, the requirement for an automobile is increasing. The IC engine uses gasoline and diesel as fuel. the requirement of fuel is increasing that offer hike within the value of a fuel. This produces a scenario that brings up a desire to change to various supplies of fuel to provide the ability almost like an IC engine. The challenge isn't to create AN engine that operates on AN alternate fuel however even has higher efficiencies. The succeeding supply of energy that strikes our minds is unquestionably electricity. we will use electricity or hybrid that runs on each fossil fuel and electrical energy. to extend the potency of the engine a mix of various energy is used. The government has taken many steps to cut back the conveyance emission by setting emission standards. However, the evolution of scientific ways for emission inventory is crucial. Therefore, analysis is finished on the emissions from numerous vehicles by exploitation IVE model. The quality of air in developing countries like Asian countries has reached a horrifyingly low level. Modal analysis to estimate a conveyance emission to showcase the temporal emission of vehicles [1]. Pistons and also the cylinders of a traditional IC Engine are replaced by the permanent magnet pistons and non-ferromagnetic materials severally that LED to the invention of magnetic force reciprocating engine by Sherman S. Blalock [2]. Multi-cylinder electro-mechanical engine for the automotive that consists of the cylinders containing metallic element Co style of magnets in pistons settled at the right angle to the pistons [3]. Growth during this field has LED to the invention of Maps Engines that are incorporated with numerous equipment and machinery whose application are in fields like engine, ship engine, locomotive engine, and garden tool.

Electromagnetism:

Leland W.Gifford mentioned electromagnetically driven ICE in his invention. Reciprocating pistons square measure slippery mounded during a cylinder and coupled to a mobile rotating shaft. mounted magnets, preferably of the atomic number 62 metal alloy kind square measure mounted within the piston to intermittently attract and repel sequentially energized electromagnets that square measure mounted within the cylinder walls. capacitance discharge circuit used as an influence supply of magnet that is employed for guiding electricity to the electromagnets. Computerized management means regulates the temporal arrangement of discharge of the capacitance and so the temporal arrangement of energizing the electromagnets[5]. Houtman P. Siregar et. al mentioned the materials for the core of magnetism fuel saver square measure created of plain steel and copper. Diameters of the wire winding, that is employed within the analysis, are 0.25 mm and 0.35 mm. Speed of engine, and a variety of coils that is voluted during a winding core of the fuel

saver square measure chosen as the testing variables. From this work is obtained that the performance of the magnetism fuel saver that uses copper core is healthier than the magnetism fuel saver[6]. Kannan et al mentioned regarding the Yamaha R15 bike 149.8 cc cylinder are created from DiASil (Die forged Aluminium Silicon) that AN all aluminium cylinder is created attainable by AN exclusive Yamaha metal forging technology. because it uses a two-hundredth silicon-aluminium alloy, it's glorious temperature reduction qualities and reduces the engine weight at the identical time. so the user shouldn't get to select expensive maintenance like sleeve replacements when riding says some twenty,000 kilometres. Another advantage of the Diasil cylinder is that the rider gets improved fuel economy. As cylinder, piston and close elements square measure all manufactured from metal, cooling is fast and efficient[7]. The metallic element magnets will offer numerous size and weight reduction and performance of enhancement over the work and, notably, secured solid solution permanent magnets, moreover, provides these benefits at an affordable value. Primarily for these reasons, these magnets square measure currently employed in the wide and growing range of peripheral, workplace automation, and shopper electronic applications and currently represent the fastest-growing section of a magnet market.

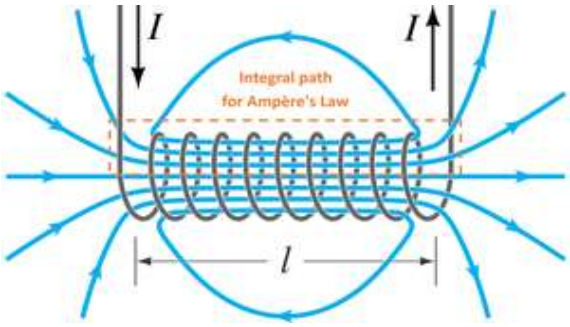

Figure 1: Solenoid

Design Of Engine Components:

(1) Cylinder: The temperature among the magnetism engine cylinder is incredibly low then no fins square measure needed for warmth transfer. These build the cylinder simply manufacturable. The cylinder is created of unblemished steel, a non-magnetic material that limits the field of force among the boundaries of the cylinder outer boundary.

Figure 2: Cylinder

(2) Piston: The piston is that the reciprocal a part of the Associate in the Nursing engine. The static magnet hooked up within the piston and the magnet hooked up within the cylinder creates an attraction that drives the

rotating shaft with the assistance of the rod.

Figure 3: Piston

(3) Connecting rod: in a very internal-combustion engine, the rod is employed to attach the piston to a shaft. It converts the linear motion or reciprocal motion of the piston to the motion of the shaft.

(4) Flywheel: The regulator is employed to store the motility energy. It regulated the engine rotation to create its operation at a gradual sped. regulator features an important moment of inertia and so resist changes in motility speed. The number of energy keep within the regulator is proportional to the face of its motility speed. Energy is transferred to the regulator by applying torsion to that. it's wont to store motility K.E...

Figure 4: Fly Wheel

(5) magnetic force coil: magnetic force coil is created once AN insulated copper wire is curled round the core or type to form the magnet. There square measure legion flip curl around the cylinder that all at once formed a coil. Coils square measure typically coated with a varnish or wrapped with adhesive tape to produce additional insulation and secure them in situ.

Figure 5: Electromagnetic Coil

(6) magnet (NdFeB): Most powerful 'rare-earth magnet composition is understood to mankind is the Neodymium-iron-boron magnet. This formation may be a comparatively fashionable, initial become commercially on the market in 1984. NdFeB magnet has the highest B & Br of any Magnet formula and additionally has very high Hc. but they're brittle and onerous to the machine and sensitive to corrosion.

Figure 6: Magnet

(7) Battery: Lead-acid cell is that the most ordinarily used sort of battery once the high price of load current is necessary. during this engine 24V, a lead-acid battery is employed. The lead-acid cell is the kind most ordinarily used. The solution may be a dilute resolution of vitriol (H_2SO_4). within the application of battery power to begin the engine in AN motorcar mobile, for instance, the load current to the starter is often two hundred to 400A One cell features a nominal output of two.1V, however lead-acid cells area unit oftentimes utilized in a series combination of 3 for a 6V battery and 6 for a 12V battery

Figure 7: Battery (24V)

(8) Relay: A relay is an Associate in the Nursing electrically operated switch. Current flowing through the coil of the relay creates a magnetic field that attracts a lever and changes the switch contacts.

Figure 8: Relay

(9)IR sensors: IR sensors square measure accustomed to discover the position of crank. in line with the position of the crank, the IR device sends the signals to the relay.

Figure 9: IR Sensors

Working principle:

Solenoid engine essentially acting on the magnetism attraction. it's an associate magnetism device that moves the plunger as per the coil magnetism. Whenever an electrical phenomenon is equipped to conductor a close flux is about up at its surface and it works like a magnet. The magnetism force relies upon this flowing through the coil and a variety of turns that wound on the coil. because

the current passes through a coil, it works as a magnet and also the basic plan is close to run the engine on magnetic attraction and repel principle.

The mechanical subsystem consists of a piston, that reciprocated inside a cylinder manufactured from a nonmagnetic material and hospitable to the atmosphere. any the piston was connected to a rod which successively was connected to a shaft, giving rotary output. the quality engine used was of double cylinder configuration that consists of connecting rods, coupled to a typical crankshaft. The system consists of a permanent metal iron-boron magnet that was adhered to the highest surface of the piston. During mutual motion magnets cosmopolitan alongside the piston. The magnets were mounted in such the simplest way that the pole orientation was within the same direction. E.g. if the south poles of each of the magnets were mounted to the piston surface then the north poles were exposed to the atmosphere. A magnet is an associate magnet that creates a dipole at the 2 finish faces once this is passed through it leading to the formation of the North and South Pole. a regular Li particle battery of 24V was accustomed to offer energy. once current was tried and a true one of the magnet, the piston gets attracted. The magnet was placed over the cylinders, that were nonmagnetic. it had been command durable with the assistance of a rigid frame consisting of differential positioning arrangements.

Conclusion:

At the time once Piston one is at BDC, the magnet is charged in such the simplest way that it ends up in the opposite pole to that of the magnet one so generating a lovely force on the piston. With the assistance of relay and IR sensors, the continual method through a piston in achieved (up and down) by conjointly rotating the regulator. The switching of the direction of current within the magnet was controlled by the dominant circuit. The controlling circuit consists of a try of Infrared electrode detector sets (IRED), that detected the position of both the cranks one by one. Whenever the link of the electrode and detector is interrupted, high worth signals are generated. in the slightest degree alternative positions of the piston, the signal is low. The positioning of sensors was such the simplest way that they provide a high output once the piston reaches about BDC.

With perennial handling, the windings of the magnet got unsnarled up which will increase the gaps between the windings. This causes a come by the mechanical energy from the facility supply band prevents the effective generation of magnetic flux. it's additionally detected that the energy of the magnet is more than that of the magnet. the look of the engine is to be through with materials having rarity. This sector needs correct producing and utmost care. The MRP has varied

benefits over an inside combustion engine. the foremost vital advantage is that it's environmentally friendly. It doesn't use any fossil fuels, does not expend natural resources, and doesn't contaminate, no heat generation inside the system. Though the electromagnet heats up with continuous operation, however, the temperatures square measure low as compared to IC engines. It rules out the necessity of a cooling system, a fuel contraption, valves, etc. The operative noise levels square measure low.

Proper development of this engine with materials like aluminium will scale back the burden considerably, and increase the potency. The vital significance is that its development will decrease the dependence on depleting resources, which may be an important demand nowadays. With additional analysis and development, it will be established to be a boon within the Automobile sector.

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