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Research Paper

AUTO TURNING FUEL VALVE FOR TWO WHEELERS

Engineering

KEYWORDS : Hacksaw, Relative Motion, Kinematic Pair, Frame Pair

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ABSTRACT

The Need for innovative ideas in automotive sector is a highly demanded thing to match the technology improvements in the field for managing success and competition. Our paper deals with making an auto turning fuel valve for two wheelers. aim of this work under taken in is to improvetechnology in mechanical field and also for doing a job in a scientific way. In fabricating this we gained invaluable technical knowledge regarding, material solution, planning the project, group efforts in achieving targets, cost estimation and also gained confidence in doing works.

1. INTRODUCTION

A motorcycle (also called a motorbike, bike, or cycle) is a single-track, engine-powered, two-wheeledmotor vehicle. Motorcycles vary considerably depending on the task for which they are designed, such as long distance travel, navigating congested, cruising, sport and racing, or off-road conditions.

Motorcycles are one of the most affordable forms of motorized transport in many parts of the world and, for most of the world's population; they are also the most common type of motor vehicle. There are around 200 million motorcycles (including mopeds, motor scooters and other powered two and three-wheelers) in use worldwide, or about 33 motorcycles per 1000 people. This compares to around 590 million cars, or about 91 per 1000 people. Most of the motorcycles, 58%, are in the developing countries of Asia—Southern and Eastern Asia, and the Asia Pacific countries, excluding Japan—while 33% of the cars (195 million) are concentrated in the United States and Japan. As of 2002, India with an estimated 37 million motorcycles/mopeds was home to the largest number of motorized two wheelers in the world. China came a close second with 34 million motorcycles/mopeds.

SOLENOID VALVE:

A solenoid valve is an electromechanical valve for use with liquid or gas. The valve is controlled by an electric current through a solenoid: in the case of a two-port valve the flow is switched on or off; in the case of a three-port valve, the outflow is switched between the two outlet ports. Multiple solenoid valves can be placed together on a manifold.

Solenoid valves are the most frequently used control elements in fluidics. Their tasks are to shut off, release, dose, distribute or mix fluids. They are found in many application areas. Solenoids offer fast and safe switching, high reliability, long service life, good medium compatibility of the materials used, low control power and compact design.

Besides the plunger-type actuator which is used most frequently, pivoted-armature actuators and rocker actuators are also used.

ELECTROMECHANICAL SOLENOIDS:

Electromechanical solenoids consist of an electromagnetically inductive coil, wound around a movable steel or iron slug (termed the armature). The coil is shaped such that the armature can be moved in and out of the center, altering the coil's inductance and thereby becoming an electromagnet. The armature is used to provide a mechanical force to some mechanism (such as controlling a pneumatic valve). Although typically weak over anything but very short distances, solenoids may be controlled directly by a controller circuit, and thus have very low reaction times.

The force applied to the armature is proportional to the change in inductance of the coil with respect to the change in position of the armature, and the current flowing through the coil (see Faraday's law of induction). The force applied to the armature will always move the armature in a direction that increases the coil's inductance.

Electromechanical solenoids are commonly seen in electronic paintball markers, pinball machines, dot matrix printers and fuel injectors.

ROTARY SOLENOID:

The rotary solenoid is an electromechanical device used to rotate a ratcheting mechanism when power is applied. These were used in the 1950s for rotary snap-switch automation in electromechanical controls. Repeated actuation of the rotary solenoid advances the snap-switch forward one position. Two rotary actuators on opposite ends of the rotary snap-switch shaft, can ad-

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vance or reverse the switch position.

The rotary solenoid has a similar appearance to a linear solenoid, except that the core is mounted in the center of a large flat disk, with two or three inclined grooves cut into the underside of the disk. These grooves align with slots on the solenoid body, with ball bearings in the grooves.

When the solenoid is activated, the core is drawn into the coil, and the disk rotates on the ball bearings in the grooves as it moves towards the coil body. When power is removed, a spring on the disk rotates it back to its starting position, also pulling the core out of the coil.

The rotary solenoid was invented in 1944 by George H. Leland, of Dayton, Ohio, to provide a more reliable and shock/vibration tolerant release mechanism for air-dropped bombs. Previously used linear (axial) solenoids were prone to inadvertent releases. U.S. Patent number 2,496,880 describes the electromagnet and inclined raceways that are the basis of the invention. Leland's engineer, Earl W. Kerman, was instrumental in developing a compatible bomb release shackle that incorporated the rotary solenoid.

HYDRAULIC SOLENOID VALVES:
Hydraulic solenoid valves are in general similar to pneumatic solenoid valves except that they control the flow of hydraulic fluid (oil), often at around 3000 psi (210 bar, 21 MPa, 21 MN/m^2). Hydraulic machinery uses solenoids to control the flow of oil to rams or actuators to (for instance) bend sheets of titanium in aerospace manufacturing. Solenoid-controlled valves are often used in irrigation systems, where a relatively weak solenoid opens and closes a small pilot valve, which in turn activates the main valve by applying fluid pressure to a piston or diaphragm that is mechanically coupled to the main valve. Solenoids are also in everyday household items such as washing machines to control the flow and amount of water into the drum.

PNEUMATIC SOLENOID VALVE:
A pneumatic solenoid valve is a switch for routing air to any pneumatic device, usually an actuator, allowing a relatively small signal to control a large device. It is also the interface between electronic controllers and pneumatic systems.

ROTARY VOICE COIL:
This is a rotational version of a solenoid. Typically the fixed magnet is on the outside, and the coil part moves in an arc controlled by the current flow through the coils. Rotary voice coils are widely employed in devices such as disk drives.

TYPES OF SOLENOID VALVE:
Many variations are possible on the basic, one way, one solenoid valve described above:

- **one or two solenoid valves;**
- **direct current or alternating current powered;**
- **different number of ways and positions**

COMMON USES:
Solenoid valves are used in fluid power pneumatic and hydraulic systems, to control cylinders, fluid power motors or larger industrial valves. Automatic irrigation sprinkler systems also use solenoid valves with an automatic controller. Domestic washing machines and dishwashers use solenoid valves to control water entry to the machine. In the paintball industry, solenoid valves are usually referred to simply as "solenoids." They are commonly used to control a larger valve used to control the propellant (usually compressed air or CO_2). In the industry, "solenoid" may also refer to an electromechanical solenoid commonly used to actuate a sear.Besides controlling the flow of air and fluids solenoids are used in pharmacology experiments, especially for patch-clamp, which can control the application of agonist or antagonist.

BATTERY:
It is a lead- battery. The bayberry is consider as the most important component of the MINIATURE MODEL OF SOLAR CAR . The battery has a 12V capacity. The battery is rested on the frame.

In isolated systems away from the grid, batteries are used for storage of excess solar energy converted into electrical energy. The only exceptions are isolated sunshine load such as irrigation pumps or drinking water supplies for storage. In fact for small units with output less than one kilowatt. Batteries seem to be the only technically and economically available storage means. Since both the photo-voltaic system and batteries are high in capital costs.

It is necessary that the overall system be optimized with respect to available energy and local demand pattern. To be economically attractive the storage of solar electricity requires a battery with a particular combination of properties:

(1) Low cost
(2) Long life
(3) High reliability
(4) High overall efficiency
(5) Low discharge
(6) Minimum maintenance
(A) Ampere hour efficiency
(B) Watt hour efficiency

We use lead acid battery for storing the electrical energy from the solar panel for lighting the street and so about the lead acid cells are explained below.

LEAD-ACID WET CELL:
Where high values of load current are necessary, the lead-acid cell is the type most commonly used.

The electrolyte is a dilute solution of sulfuric acid (H_2SO_4). In the application of battery power to start the engine in an auto mobile, for example, the load current to the starter motor is typically 200 to 400A. One cell has a nominal output of 2.1V, but lead-acid cells are often used in a series combination of three for a 6-V battery and six for a 12-V battery.

The lead acid cell type is a secondary cell or storage cell, which can be recharged. The charge and discharge cycle can be repeated many times to restore the output voltage, as long as the cell is in good physical condition. However, heat with excessive charge and discharge currents short ends the useful life to about 3 to 5 years for an automobile battery. Of the different types of secondary cells, the lead-acid type has the highest output voltage, which allows fewer cells for a specified battery voltage.

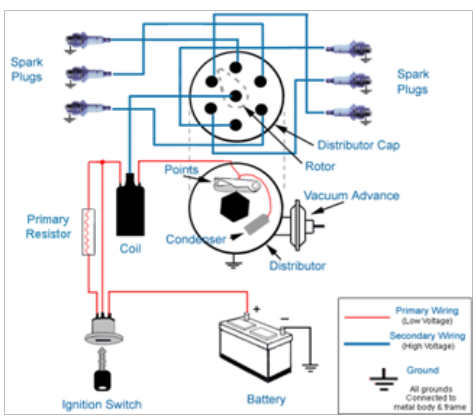
CONSTRUCTION:
Inside a lead-acid battery, the positive and negative electrodes consist of a group of plates welded to a connecting strap. The plates are immersed in the electrolyte, consisting of 8 parts of water to 3 parts of concentrated sulfuric acid. Each plate is a grid or framework, made of a lead-antimony alloy. This construction enables the active material, which is lead oxide, to be pasted into the grid. In manufacture of the cell, a forming charge produces the positive and negative electrodes. In the forming process, the active material in the positive plate is changed to lead peroxide (pbo_2). The negative electrode is spongy lead (pb).

Automobile batteries are usually shipped dry from the manufacturer. The electrolyte is put in at the time of installation, and then the battery is charged to from the plates. With maintenance-free batteries, little or no water need be added in normal service. Some types are sealed, except for a pressure vent, without provision for adding water.

The construction parts of battery are shown in figure.

IGNITION SWITCH:

An Ignition (or starter) switch is an switch in the control system of an internal combustion engine vehicle that activates the main electrical systems for the vehicle. Besides providing power to the ignition system components (the starter solenoid and ignition related components such as the engine control unit, spark coil and distributor) it also usually switches on power to many "accessories" (radio, power windows, etc).



The ignition system is used to ignite the fuel-air mixture in the engine. The starter system is the ignition system, plus the battery, and starter switch, relay, solenoid & electric starter motor. The ignition switch usually requires a key be inserted that works a lock built into the switch mechanism. It is frequently combined with the starter switch which activates the starter motor.

FUEL TANK

PRINCIPLE OF OPERATION:

A solenoid valve has two main parts: the solenoid and the valve. The solenoid converts electrical energy into mechanical energy which, in turn, opens or closes the valve mechanically. A direct acting valve has only a small flow circuit, shown within section E of this diagram (this section is mentioned below as a pilot valve). This diaphragm piloted valve multiplies this small flow by using it to control the flow through a much larger orifice.

Solenoid valves may use metal seals or rubber seals, and may also have electrical interfaces to allow for easy control. A spring may be used to hold the valve opened or closed while the valve is not activated.

The diagram to the right shows the design of a basic valve. At the top figure is the valve in its closed state. The water under pressure enters at A. B is an elastic diaphragm and above it is a weak spring pushing it down. The function of this spring is irrelevant for now as the valve would stay closed even without it. The diaphragm has a pinhole through its center which allows a very small amount of water to flow through it. This water fills the cavity C on the other side of the diaphragm so that pressure is equal on both sides of the diaphragm. While the pressure is the same on both sides of the diaphragm, the force is greater on the upper side which forces the valve shut against the incoming pressure. In the figure, the surface being acted upon is greater on the upper side which results in greater force. On the upper side the pressure is acting on the entire surface of the diaphragm while on the lower side it is only acting on the incoming pipe. These results in the valve being securely shut to any flow and, the greater the input pressure, the greater the shutting force will be.

In the previous configuration the small conduit D was blocked by a pin which is the armature of the solenoid E and which is pushed down by a spring. If the solenoid is activated by drawing the pin upwards via magnetic force from the solenoid current, the water in chamber C will flow through this conduit D to the output side of the valve. The pressure in chamber C will drop and the incoming pressure will lift the diaphragm thus opening the main valve. Water now flows directly from A to F.

When the solenoid is again deactivated and the conduit D is closed again, the spring needs very little force to push the diaphragm down again and the main valve closes. In practice there is often no separate spring, the elastomeric diaphragm is molded so that it functions as its own spring, preferring to be in the closed shape.

From this explanation it can be seen that this type of valve relies on a differential of pressure between input and output as the pressure at the input must always be greater than the pressure at the output for it to work. Should the pressure at the output, for any reason, rise above that of the input then the valve would open regardless of the state of the solenoid and pilot valve.

In some solenoid valves the solenoid acts directly on the main valve. Others use a small, complete solenoid valve, known as a pilot, to actuate a larger valve. While the second type is actually a solenoid valve combined with a pneumatically actuated valve, they are sold and packaged as a single unit referred to as a solenoid valve. Piloted valves require much less power to control, but they are noticeably slower. Piloted solenoids usually need full power at all times to open and stay open, where a direct acting solenoid may only need full power for a short period of time to open it, and only low power to hold it. Thus the fuel flow is also controlled by the same method

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ADVANTAGES:

- Compact in size
- Less maintenance cost
- Gives good reliability
- Less economic cost

APPLICATION:

- Applied in all automobile vehicles.

PROJECT SCHEDULE

S1.No	Description	Periods
1	Deciding of title	3Weeks
2	Library Study	2Weeks
3	Material collection	3Weeks
4	Fabrication	3Weeks
5	Assembly	1Weeks

COST ESTIMATION

The cost estimation of out project is

S L . NO.	NAME OF THE PARTS	MATERIAL	QUANTITY	COST
1	Fuel tank	-	1	2500
2	Direction Control Valve	-	1	2000
3	Battery(12v)	-	1	1500
4	Connecting Tube	Polyurethane	1 meter	25
Total cost		6,025/-Rs		

CONCLUSION

The aim of this project work under taken in our engineering college is apart from improving the student's practical knowledge in mechanical field and also to manufacturing suitable units for doing a job in a scientific way.

In fabricating this project we gained invaluable technical knowledge regarding, material solution, planning the project, group efforts in achieving targets, cost estimation and also gained confidence in doing works.

However in completing the project we felt the aims of the implementation of project work in our college.