

EXPANDABLE AUTOMOBILE

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Abstract: - We have made the air compressor based vehicle by DC motor speed control using automobile designing approach. Through this, we were able to achieve the speed control using a DC motor. We have used to control the DC motor with the help of air compressor and solenoid valve is one of the first experiments. Whenever we want to control the volume regulator and speed of the DC motor then it is not so easy. If we want to control the volume of dc motor with the help of switches it is very difficult to control the DC motor and similarly for various types of elements and battery.

Keywords:- Electric automobile jack, flat tires, crush injuries, enhancements in jack, high safety options, lead-acid battery, simple to control.

1. INTRODUCTION

Making a car that changes its length as per need. In other words a flexible car that fits in every space like over-parked lots, heavy traffic and a tiny garage. For coping up traffic chaos we have made a car that changes its length, as per need. In other words a flexible car that fits in every space like over parked parking lots, heavy traffic and a tiny garage. The car transforms itself from a four seated into two seated in few seconds with just turn of hydraulic lever. The boot space remains the same.

We have taken initiative to find a solution for ever increasing traffic kiosks, congested parking lots the magical transformation is made possible by centrally located Hydraulic unit that stretches the vehicle with the help of guide railing with roller arrangements, providing 18 " full extension length. The longitudinal member slides over guides with low friction rollers to provide drawer like fitment. The floor panel is also reinforced to provide a rigid base structure. The exhaust system also retuned and redesigned to suit the alterations. The additional feature of the car is less turning radius on compact mode ie @ 3.8 meter, that further increase the maneuverability. The project cost is 2-3 lakhs.

The entire body of the automobile consists of Pre-preg composite, a modern plastic material. The engine remains the same as Maruti 800. At fully stretched the vehicle provides more legroom space, on contract mode rear seats can folded down to resemble a sports makeover.

The car can transform itself from four seated to two seated in few seconds with just a turn of hydraulic lever.

2. OBJECTIVE

Using hydraulic system, an eight-seater vehicle can be turned into a five-seater or two-seater. The rear and the front portions of the car gets contracted to become a smaller one. In case of more passengers, the car can be expanded and vice-versa. Much like electrical vehicles, air powered vehicles would ultimately be powered through the electrical grid. This makes it easier to focus on reducing pollution from one source, as opposed to the millions of vehicles on the road.

Components of Expandable Automobile

The main elements that are essential for development of motorized cut automotive jack are:

1. Crank Shaft
2. Connecting Screw
3. Pneumatic Cylinder
4. Solenoid Valve
5. Bearing
6. Bearing Stand
7. DC Motor
8. Wheel
9. Air Cylinder
10. Compressor
11. Pneumatic Pipe
12. Connectors
13. Body Base
14. Bridge Rectifier
15. Battery.

3. WORKING & CONSTRUCTION

Our project is working in 24V dc current, we divide this current into.

- Part-1 is the Solenoid coil, one wire of the 2-coil (negative) is attach with direct and positive current is transmit by motor with its connecting shaft.
- Part-2 is Dc motor regulating supply, second 24V dc supply is going to step down transformer through fan regulator for regulate supply. This transformer converts 12V dc to 12 dc supply. Now we fix one bridge rectifier to convert ac to dc 12v supply for motor. When we operate fan regulator, motor rotate slow and fast to transmit ac current to solenoid coil.

We used Solenoid valve for transmit compressed air to the cylinder for 2 stroke rotation.

Normally in off condition Solenoid valve air inlet hole are B and E and outlet hole are D and C. due to this cylinder squeeze.

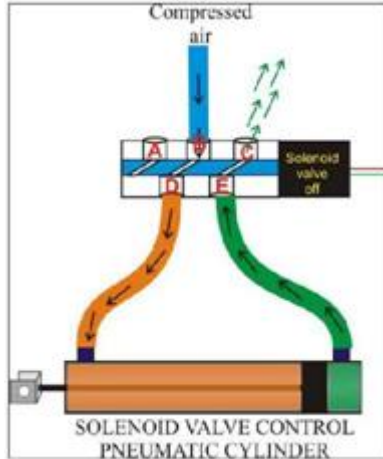


Fig 1. OFF Condition

In ON condition Solenoid valve air inlet hole are B and D and outlet hole are E and A. due to this cylinder expanded.

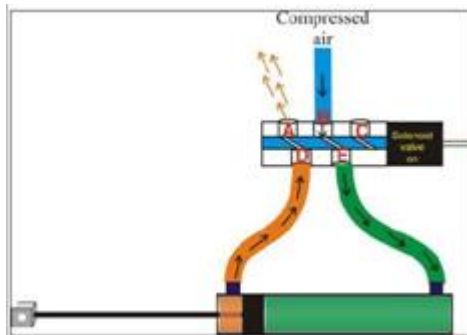


Fig 1. ON Condition

4. COMPONENT DETAIL

PNEUMATIC CYLINDER: Pneumatic cylinders (sometimes known as air cylinders) are mechanical devices which use the power of compressed gas to produce a force in a reciprocating linear motion.

Like hydraulic cylinders, pneumatic cylinders use the stored potential energy of a fluid, in this case compressed air, and convert it into kinetic energy as the air expands in an attempt to reach atmospheric pressure. This air expansion forces a piston to move in the desired direction. The piston is a disc or cylinder, and the piston rod transfers the force it develops to the object to be moved. Engineers prefer to use pneumatics sometime because they are quieter, cleaner, and do not require large amounts or space for fluid storage.

- Single- and Double-Acting Air Cylinders
- All models feature high-strength, double rolled

Type 304 stainless steel body, aluminum alloy end caps, Type 303 stainless steel piston rods, and sintered bronze bearings. Recommended for operating temperatures of -20 Degree to 200 Degree F. 250 psi max. operating pressure. Single-acting cylinders are spring loaded.

- Note: Nose-mount units include mounting nut. Pivotmount units include stationary pivot pin (except 2" and 2 1/2" bores). Double end mount units include 2 mounting nuts. Order pivot brackets, foot brackets, and rod clevis separately, below.

Air Cylinder, Double Acting, Round, Bore Dia 1 1/16 In, Stroke 5 In, Max Pressure 250 PSI, Mounting Style Pivot, Cushion Type None, Cylinder Ports 1/8 NPT

In, Operating Temp Range 20 to 200 F, Total Length 9.12 In, Max Load 222 Lb, 304 Stainless Steel Body Material, Silver Finish, Nose Mount Thread 5/8-18, Rod Dia 5/8 In, Rod Thread 5/16-24 In, Rod Thread Length 1/2 In, Tang Width 3/8 In

(Sometimes known as air cylinders) are mechanical devices which produce force, often in combination with movement, and are powered by compressed gas (typically air).

To perform their function, pneumatic cylinders impart a force by converting the potential energy of compressed gas into kinetic energy. This is achieved by the compressed gas being able to expand, without external energy input, which itself occurs due to the pressure gradient established by the compressed gas being at a greater pressure than the atmospheric pressure. This air expansion forces a piston to move in the desired direction.

5. OPERATION

Once actuated, compressed air enters into the tube at one end of the piston and, hence, imparts force on the piston. Consequently, the piston becomes displaced (moved) by the compressed air expanding in an attempt to reach atmospheric pressure.

Specialized functions

Depending upon the design of the system, pneumatic cylinders can operate in a variety of ways. Examples include having the ability to perform multiple strokes without the need for intermediate intervention, to perform a full stroke with intermediate stopping points, to be adjusted so as to control the amount of extension and/or retraction of the piston rod once actuated.

Advantages

- Using hydraulic system, an eight-seater vehicle can be turned into a five-seater. The rear and the front portions of the car gets contracted to become a smaller one. In case of more passengers, the car can

be expanded, he explained. Much like electrical vehicles, air powered vehicles would ultimately be powered through the electrical grid. Which makes it easier to focus on reducing pollution from one source, as opposed to the millions of vehicles on the road?

- 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.
- Compressed air technology reduces the cost of vehicle production by about 20%, because there is no need to build a cooling system, fuel tank, Ignition Systems or silencers.
- Air, on its own, is non-flammable.
- High torque for minimum volume.
- The mechanical design of the engine is simple and robust.
- Low manufacture and maintenance costs as well as easy maintenance.
- Compressed-air tanks can be disposed of or recycled with less pollution than batteries.
- Compressed-air vehicles are unconstrained by the degradation problems associated with current battery systems.
- The tank may be able to be refilled more often and in less time than batteries can be recharged, with refueling rates comparable to liquid fuels.
- Lighter vehicles would mean less abuse on roads. Resulting in longer lasting roads.
- The price of fueling air-powered vehicles will be significantly cheaper than current fuels.

Disadvantages

- Like the modern car and most household appliances, the principal disadvantage is the indirect use of energy. Energy is used to compress air, which - in turn - provides the energy to run the motor. Any conversion of energy between forms results in loss. For conventional combustion motor cars, the energy is lost when oil is converted to usable fuel - including drilling, refinement, labor, storage, eventually transportation to the end-user. For compressed-air cars, energy is lost when electrical energy is converted to compressed air.
- When air expands, as it would in the engine, it cools dramatically (Charles law) and must be heated to ambient temperature using a heat exchanger similar to the Intercooler used for internal combustion engines. The heating is necessary in order to obtain a significant fraction of the theoretical energy output. The heat exchanger can be problematic. While it performs a similar task to the Intercooler, the temperature difference between the incoming air and the working gas is smaller. In heating the stored air, the device gets very cold and may ice up in cool, moist climates.

- Refueling the compressed air container using a home or low-end conventional air compressor may take as long as 4 hours though the specialized equipment at service stations may fill the tanks in only 3 minutes.
- Tanks get very hot when filled rapidly. SCUBA tanks are sometimes immersed in water to cool them down when they are being filled. That would not be possible with tanks in a car and thus it would either take a long time to fill the tanks, or they would have to take less than a full charge, since heat drives up the pressure.
- Early tests have demonstrated the limited storage capacity of the tanks; the only published test of a vehicle running on compressed air alone was limited to a range of 7.22 km.

A 2005 study demonstrated that cars running on lithium-ion batteries out-perform both compressed air and fuel cell vehicles more than three-fold at same speeds. MDI has recently claimed that an air car will be able to travel 140km in urban driving, and have a range of 80 km with a top speed of 110km/h on highways, when operating on compressed air alone.

6. CONCLUSION

Mechatronics involves the bringing together of a number of technologies: Mechanical engineering, automobile engineering, electrical engineering, and control engineering. This can be considered to be the application of electronic and electric circuit, to mechanical engineering problems. Mechatronics provides an opportunity to take a new look at problems, with mechanical engineers not just seeing a problem in terms of mechanical principles but having to see it in terms of a range of technologies. The electronics, etc. should not be seen as a bolt on item to existing mechanical hardware. A mechatronics approach needs to be adopted right from the design phase. There needs to be a complete rethink of the requirements in terms of what an item is required to do.

There are many applications of mechatronics in the mass produced products used in the home. They are to be found in cars in the active solenoid valve, air compressor, piston, engine control, speed control through volume regulator etc.

Pollution is one of the major problems faced by the peoples in a routine life. Increasing use of different types of automobile plate and important role to create this big problem, several affords are made by the automobile sector to solve this big problem. Our project, electric system will be very effective to reduce this problem in a cheaper way.

Air is alternative than other fuels so during our study we appreciated the importance of electric conversion and found

that it is really helpful in controlling the pollution and also less expensive than the petrol.

We faced a few problems while converting a electric system into the petrol system but were able to find a final solution to them with proper guidance of our guide and references.

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