

Air Conditioning System on Vehicle Suspension

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Abstract: *Now a day we have required fuel efficient car. But the engine of the cars is not efficient when the load on car is high. For this purpose we have reduce the load on engine that is to run the AC and Compressor. Instead of engine power we are used the suspension system for producing compressed air and AC effect Vice-Versa. Current air-conditioning systems can reduce the fuel economy of high fuel economy vehicles. And also in previous days there is wastage of energy in suspension system that is linear motion of suspension system, which is also use for compress the air by using piston-cylinder arrangement. By using this compress air we can run AC system in the car and save fuel economy.*

Keywords: AC system, Piston cylinder arrangement, Save Fuel economy

I. INTRODUCTION

In automobile the suspension system is essential to absorb shocks, vibration and bumps etc. Vehicle is run on different type road conditions such as even, uneven, rough etc. The automobile frame and body are mounted on front and rear axle through springs and shock absorbers. To maintain human comfort and improve internal atmosphere in an enclosed space, proper control of freshness, temperature, humidity and cleanliness of the air is required. So, in this project we are using renewable energy of suspension system to produce air conditioning effect in automobile.

II. LITERATURE SURVEY

2.1 Basics of Air Conditioning System

In history long ago, man has recognized and accepted fluids as a source of power. This is quite evident from the fact that in olden day's simple machines like Pelton wheel were developed to transmit irrigation water or water head was used to transmit the power. In recent times, engineers started using fluids for power transmission and basic elements like pumps, control valves, cylinders, etc. were experimented and perfected. Slowly oil hydraulics and pneumatics assumed a place of importance in areas of power generation and replaced many mechanical elements like line shafts, chains, pulley boxes, electric drive motors etc., in various mechanical systems. In industries, fluid power is used for various purposes. Because of this a new branch is developed called as "Industrial fluid power". Now a day in industries, material Handling is the field where fluid power is used in a really big way. It includes cranes of very high capacity, fork lifts. Such huge crane handled by a single miniature control valve by an operator.

2.2 Pneumatic System

Pneumatic systems form the most primitive and distinct class of mechanical control engineering. They are classified under the term 'Fluid Power Control', which describes any process or device that converts, transmits, distributes or controls power through the Use of pressurized gas or liquid. In a pneumatic system, the working fluid is a gas (mostly air) which is compressed above atmospheric pressure to impart pressure energy to the molecules. This stored pressure potential is converted to a suitable mechanical work in an appropriate controlled sequence using control valves and actuators. Pneumatic systems are well suited for the automation of a simple repetitive task. The working fluid is abundant in nature and hence the running and maintenance cost of these systems are exceptionally low. All fluids have the ability to translate and transfigure and hence pneumatic systems permit variety of power conversion with minimal mechanical hardware. Conversion of various combinations of motions like rotary-rotary, linear-rotary and linear-linear is possible. The simplicity in design, durability and compact size of pneumatic systems make them well suited for mobile applications. These features make them versatile and find universal applications including robotics, aerospace technology, production and assembly of automotive components CNC machines, food products and packaging industry, bomb deployment units and fabrication process of plastic products.



2.2.1 History of Pneumatic System

For thousands of years, man has used air as an aid in doing various tasks, e.g. a bellows for lighting fires. In the year 260 BC, a Greek called Ctesibios built the first air gun. In addition to a tight sinew, he used air compressed in a cylinder to increase the range of projectiles. So it is not surprising that "pneuma", the Greek word for "air", has given its name to the technology known as pneumatics. During the industrialization process in the 19th century, machines powered by compressed air were used for mining and building roads. Pneumatic technology has become indispensable in modern industry. Pneumatically powered machines and robots are to be found in numerous industrial processes such as assembling or arranging components, or packing finished goods.

2.2.2 Necessity of Compressed Air Conditioning

We used pneumatic system, as it has some advantages over the hydraulic system. There is no need for fluid replenishment. Light tubing/piping is sufficient. There is no fire hazard. But in our pneumatic system, we have used air as a working fluid. Because air has the some advantages over the other gases. Properties of air are very suitable for pneumatic system.

Properties of Air

Air is a mixture of 78% nitrogen, 21% oxygen and 1% other inert gases with moisture by volume. Air exerts pressure at sea level of about 1.013 bar (14.7 psi) called atmospheric pressure. It is equivalent to 760 mm of Hg or 10.3 m of water pressure as measured by U-tube manometer. Other physical properties of air are:

- [1] Molecular mass, $M = 28.96 \text{ kg/kg mol}$.
- [2] Boiling point at 1 bar = -191° C to -194° C .
- [3] Freezing point at 1 bar = -212° C to -216° C .
- [4] Characteristic gas constant, $R = 287 \text{ Nm/kgK}$

III. PROBLEM STATEMENT, OBJECTIVE

3.1 Problem Statement

In vehicle the AC is essential parameter for human comfort. But for running AC required large power. Hence the power of engine was distributed and efficiency of vehicle decreased. The AC effect was produced by compressor which was driven by engine. To overcome these effects we have to use the linear motion of suspension system to compress the air by using piston-cylinder arrangement. By using this compress air we can run AC system in the car and save fuel. AC System Using Vehicle Suspension which have following objectives

- a. Recover waste energy of suspension system.
- b. Save fuel which is burn for working of AC
- c. Run AC on waste energy of suspension system.
- d. To increase the mileage of vehicle.

3.2 Objective of Study

The basic objectives of the present study are as follows:

To study, design & fabrication of AC System on vehicle suspension.

To enhance the use of non-conventional energy & suspension to compress air.

To increase overall fuel economy of the vehicle

V. PROPOSED DESIGN



Figure 1: Air Conditioning System on Vehicle Suspension

Figure 1 shows the complete diagram of the compressed air production using vehicle suspensor is given below. The pushing power is converted into compressed. Air energy by proper driving arrangement. The pneumatic single acting Cylinder is used for this project. The spring arrangement is fixed at the outside of the pneumatic cylinder. The spring is used to return the inclined L-angle window in same position by releasing the load. The output air from the pneumatic cylinder is collected through quick ex-haust valve and non-return valve and inside spring arrangement.

V. CONCLUSION

This project is made with pre planning, that it provides flexibility in operation. This innovation has made the more desirable and eco-nomical. This project “Using Vehicle Suspension AC system with electricity generated” is designed with the hope that it is very much economical and help full to all vehicles to produce the compressed air. this project helped us to know the periodic steps in completing a project work. Thus we have completed the project successfully.

It has been a great experience while competing our project we come across lot many practical knowledge as well as experience. We had an opportunity to learn how project are been done. We received a lot of practical experience while working on this project as well as got enough freedom to our ideas for the improvement in our assigned project and check whether ideas are fruitful. Therefore the design must be as perfect as possible and special attention is given during each manufacturing activity. We paid special attention during each and every manufacturing process that was carried out. In the manufacturing we come to know how theoretical aspects are implemented in actual practice, we got to learn about different manufacturing processes, welding, pulley, cutting etc.

Cost Analysis was carried out by considering the material cost, machining cost etc. Then the actual cost saving is calculated.

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