Alternate Way of Running Air Conditioning System in Vehicle Using Hybrid Suspension System

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Abstract- *Due to varying conditions of heating, ventilating, cooling and dehumidification in the Atmosphere at various places, Vehicle air-conditioning system has played an important role in providing human comfort and to some extent provides safety during driving in various atmospheric conditions. The conventional system used in vehicles in turn provides load on engine and their by reducing the efficiency of the vehicle. As a team, we designed the suspension operated AC system. By implementing this system the load on the engine will be reduced and the efficiency of the vehicle will increase drastically with increased cooling effect.*

Keywords- Air Conditioning (AC), Compressed Air, Heat Exchanging, Non - Conventional, Suspension System

I. INTRODUCTION

Suspension of the vehicle is to damp out vibrations and reduce the stresses in the frame, chassis, etc. and therefore provide comfort to the passenger. This potential energy generated by the vehicle suspension is wasted only in providing comfort to the passengers. Also during AC running condition in the conventional system load on the engine is increased and it affects pickup, engine response and efficiency of engine. So in this paper we are going to make use of the vehicle suspension energy to provide the cooling effect in the passenger compartment. This system will therefore provide comfort to the passengers. On the other hand will reduce the load on engine and give better pickup to the vehicle when needed.

II. LITERATURE REVIEW

In order to carry out this work we have undergone through extensive literature survey and contribution by various authors is as follows,

1. AkshayGadekar, Prof. M. R. Jagdale, Prasad Khilari et al. In this research paper author has mentioned about the production of compressed air using vehicle suspension and storing this air for running an AC in car by reducing fuel used by engine to drive AC compressor.

2. Saiyyed Kamran, ManiyarMoij et al. In this research paper author has mentioned about the compressed air production through vehicle suspension system and passing this compressed air through heat exchanges for cooling which can be used for further applications.

3. Soundararajan. S, Aravind. R, Karthik.V et al. In this research paper author has mentioned about the production of compressed air as well as power generation through vehicle suspension.

4. V. VP. Dubey, R. R. Verma, P. S. Verma et al. this paper consists of extensive thermal analysis of the effects of severe loading conditions on the performance of the heat exchanger as well as they have out steady state thermal analysis on ANSYS 14.0 to justify the design of heat exchanger.

5. AsawariBarde. This paper represents the study of shell and tube type of heat exchanger along with the literature reviews of several scholars who have given the contribution in this regards. Classification, basic construction design and its application are also described in details inside the paper.

6. Prof. S. U. Ratnparkhi, TejasTharkude, SwaradaRadkar et al. In this project study has been made to recover the waste energy of suspension system by using pneumatic cylinders and display it using temperature sensors and pressure gauge for the safety purposes and storing it using storage tank.

III. PROBLEM DEFINATION

In the existing automobile, AC System is driven by the engine of the car. During non AC running condition, the engine's response, pickup & efficiency is good but as soon as the AC system is turned on, the engine bears excessive load and it affects the performance& efficiency of engine. As well as the refrigerant used in the AC System leads to ozone depletion and global warming. So our main motto is to run the AC system of car by such a system which will not affect the engine performance as well as to replace the detrimental Refrigerant.

IV. OBJECTIVES OF THE PROJECT

The problems associated by AC system to be driven by engine are discussed before already. The objective of our project is to drive the AC system by the suspension of the vehicle so that there will be no effect on engine performance as there will be no load acting on the engine by the AC system. As well as to replace the current refrigerant with naturally occurring element which will help to eliminate the currently used harmful refrigerant which leads to ozone layer depletion and increased greenhouse gases.

V. CONSTRUCTIONAL DIAGRAM

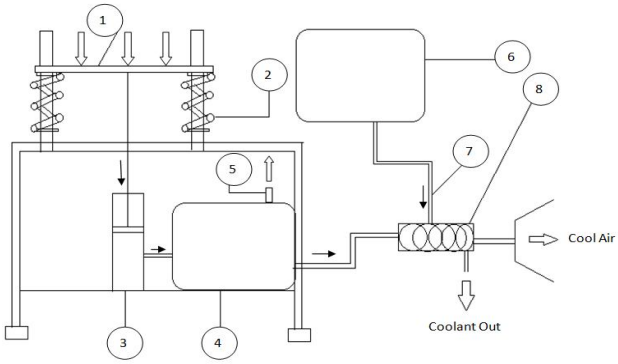

Fig.1: Expected diagram of running air conditioning system using hybrid vehicle suspension system

Table.1: list of various components in system

Sr. No.	Component / Part Name	Sr. No.	Component / Part Name
1.	Base	5.	Pressure Relief Valve
2.	Spring	6.	Coolant Storage
3.	Pneumatic Single Acting Cylinder	7.	Nylon Pipe
4.	Compressed Air Reservoir	8.	Heat Exchanger

VI. WORKING

When the vehicle runs on an uneven surface a lot of energy is generated by the vehicle suspension by the vertical linear motion of the suspension. This energy generated by the suspension will be used to compress the atmospheric air by using a pneumatic single acting cylinder (SAC). This pressurized compressed air from the SAC will be then collected into reservoir which will be provided with a non-return valve to prevent back flow of the air and also a pressure relief valve so as to remove the excessive pressurized air from the reservoir when it reaches a suitable limit. When the AC system is turned on, the pressurized compressed air from the reservoir will be supplied to counter flow heat exchanger through pipe by using knob/ flow control valve. Storage tank consisting of refrigerant will be mounted at the top of the heat exchanger. This refrigerant will be then supplied to the heat exchanger. Low temperature coolant and high pressurized air will be passed through the heat exchanger. Here heat exchange will occur and air temperature will become 24◦C to 18◦C which will be further send to the required place which is to be cooled.

VII. MERITS

1. Air is available free of cost.
2. No external supply is required.
3. No pollution & less noisy system.
4. No supervision is required.
5. It can be use with any Rotating systems.
6. Easily & immediately get results.
7. It can work for long time continuously.
8. Required less power to work the system.

VIII. DEMERITS

1. Leakage problems.
2. Clogging may occurs.
3. System may affect by thermal stresses.
4. Due to working burring of material occurs.
5. Initial cost of this arrangement is high.

IX. EXPECTED RESULTS

1. There should be effective cooling of passenger compartment as range from 24° to 18°.
2. The suspension system should work effectively.
3. More compressed air should be available within less bumps of vehicle.
4. Effective heat exchanging should take place in heat exchanger.
5. To check the actual implementation of this system over conventional system.
6. Reliable working of system on various or different load conditions.
7. To prevent the clogging of the system and avoid burring.

X. FUTURE SCOPE

We can implement this system in heavy transport vehicles & as well as in the SUVs where the shock absorbers have long stroke length where we can get our compression work done easily. This system can also be further implemented beneath the seat of the driver so that the vibrating effect will be used to work the Hybrid System.

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