

Air Filling In A Moving Tyres

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ABSTRACT

Studies have shown that due to drop in tyre pressure by just a few PSI can result in reduction of tire life, gas mileage, and performance of vehicle. Also it can be the for road accidents. Though tubeless tires has been invented but it could not withstand as a perfect solution in all the conditions. So we have developed automatic and self-inflated tyre system for stabilization of air in tyres that ensures that tyres are properly inflated all the times. This concept is based on the use of compressor power to regulate and maintain the tyre pressure in both steady and running condition. The most important factors that should be taken in account for maintenance of tyre like proper inflation pressure, proper vehicle loading, regular inspection, good driving habits, vehicle condition, etc. This paper arises with innovative idea for improvement in our Automobile industry.

ARTICLE INFO

Article History

Received : 29th February 2016

Received in revised form :

1st March 2016

Accepted : 4th March 2016

Published online :

6th March 2016

I. INTRODUCTION

Study shows that, about 75 percent of the vehicles are driving with one or more tires under proper inflated. Tyres lose air through normal driving (especially after hitting stampedes or pot holes), permeation and seasonal changes in temperature. They also possibly lose one or two psi every month during the winter and even more in the summer. When tires are not properly inflated, the tread wears more quickly. According to Goodyear, statistics shows that 15 percent less miles you can drive on them if they are under inflated. Also Under inflated tires get overheated more quickly than properly inflated tyres, resulting in more tire damage.

So for overcoming these issues we are implementing this system. Beneficiaries of this advancement in technology helps in maintaining the required pressure in tires. With the recent oil price hikes and growing concern of environmental issues, this system firmly addresses a potential improvement in gas mileage. So it is plausible to say that society as a whole will benefit from the resulting design.

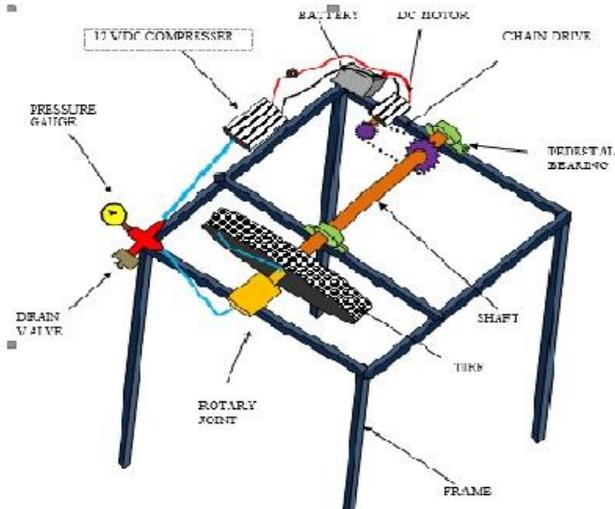
II. CONSTRUCTION

The model of setup of a system is shown in fig. (b) Main components of the system are listed below,

1. Compressor
2. Hoses
3. Rotary Joint
4. Pressure gauge
5. Relief valve



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COMPRESSOR

For adequate inflation, normal size of the compressor with the capacity around 300psi is used. Due to the normal size of compressor it can be easily mounted. The main advantage of this compressor is that, it can be operated on 12V DC battery.

The cost of compressor is around ₹ 3000-4000.

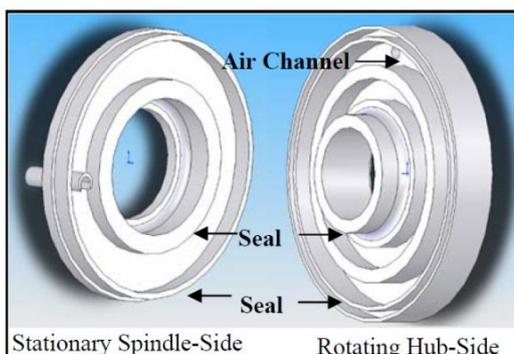
HOSES

The air from compressor is passed through the hoses. The main function of hoses is to transfer the compressed air from compressor to the Rotary joint and further from Rotary joint to the tire.

The optimum diameter of hoses is 1.5-2.0cm is required which can fluently pass the compressed air to further parts of system.

ROTARY JOINT

It is the key component of this system. Rotary joint has one half spinning with the drive axle hub and the other half stationary with the spindle. Within this rotary joint, there will be an air chamber that will allow air to pass from the stationary half part of the joint into the rest half that is rotating.



Air inlets and outlets are located at the outer radius to allow the hoses on the outside of the joint to clear the vehicle spindle and hub. Also Ball bearing system is being used to reduce contact friction between the two rotating halves both axial and planar.

PRESSURE GAUGE

Pressure gauge is used for monitoring the air pressure in tires so that if it gets under-inflated or over-inflated then we can stabilize it.

PRESSURE RELIEF VALVE

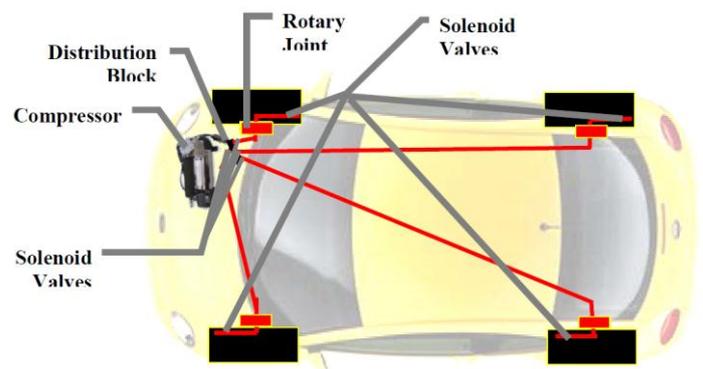
In any case during air filling, if air in the tire exceeds its prescribed limit then pressure relief valve is used to blow out the excessive air. It plays vital role during over-inflation.

WORKING

When gradual decrease in the tire pressure occurs which affects the driver's drive which may further lead to an accident. Also when we are out of the city and any prickles occurs in the tire of the vehicles, we get sudden fall in the pressure of the tire. At that time we get the problem of air filling in the tire due lack of any external aid, in such situations this system is very useful at this time.

When pressure in the tire decreases, pressure gauge warns us the level of the pressure. So by actuating compressor the compressed air is passed to the rotary joint and further to the moving tires so as to stabilize the air pressure in tyres.

If the same process takes places 2 to 3 times then there must be puncture in the tire and tire needs to repair. And if the urgent repairing of tires cannot be possible then the vehicle can be driven by continuous air filling until driver gets any help.



The above figure shows the implementation and working of the system. In figure, independent rotary joints are provided to all four wheel and are connected to the compressor.

III. ADVANTAGES

There are lots of important positive points of this system as listed below:

1. The most important advantage is you don't have to stop in any area where you can't find help if tire get punctured, as you get solution for such problem by yourself.
2. Another important advantage of this system is that you don't need to check tire pressure at any air filling station. Thus never have to go anywhere for the air filling.
3. As the required pressure in tires is always maintained, the life of tires increases.
4. Also the efficiency and mileage of the vehicle increases which eventually saves the money of owner.
5. You don't have to change your tire with another tire which saves a lot of time and you can utilize that time in reaching to your destination.
6. The overall weight of this system is also very less so that this system can be effectively implanted in cars, buses, trucks etc.
7. Pressure adjustment based on increasing vehicle speed is possible due to this system.
8. Pressure adjustment based on increasing vehicle load is also possible due to this system.

IV. CONCLUSION

The Self-inflating tyre system would be capable of succeeding as a new product in the automotive supplier industry. It specifically addresses the needs of the consumers by maintaining appropriate tire pressure conditions. Because such a product does not currently exist for the majority of passenger vehicles, the market conditions would be favourable for the introduction of a self-inflating tire system. Through extensive engineering analysis, it has also been determined that the self-inflating tire system would actually function as desired.

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