



Online Tyre Inflation System

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Abstract:

According to various automobile research organisations tyre is the main component for vehicles handling and safety. Underinflated and over inflated tyres affects various factors such as Handling, Fuel economy, Life of tyre and Safety. Online tyre inflation system plays an important role to maintain proper tyre pressure during various weather and road conditions. This system operates when vehicle is running. Online tyre inflation system is light weight and does not require much place for implementation as it is compact in design.

Keywords: Pumping Element, Non Return Valve, TPMS.

I. INTRODUCTION

According to American Automobile Association about 80% of the cars on the road are driving with one or more tyres underinflated. Tyres normally inflate or deflate according to road and weather condition, which is not more than 2 to 3 psi per month. Underinflated and overinflated tyres have great impact on vehicles fuel economy and stability at various road conditions. It is difficult to predict that tyres are underinflated or overinflated just by looking at them. Central Tyre Inflation is the existing system to overcome these tyre conditions (Underinflated and overinflated). This system consist various elements which increases weight of vehicle. As CTI system consists of more components it will require more space and consequently more maintenance. When tyre is underinflated "Online Tyre Inflation System" re-inflates tyre. This system is capable of filling tyre at very less time and vehicle travel and with no additional effort. As compare to CTI system the OTI system consist of less components, hence it requires less space and has less weight. The main purpose to develop this system to overcome disadvantages of CTI system.

II. COMPONENTS OF SYSTEM

1. Pumping Element:

Pumping element is the main component of the system, it is mounted on the wheel rim such that if the wheel starts to rotate it will start to rotate with wheel, pumping element is fixed to the rim, the tube is connected to the output of the pumping element which provides the air inside the tire through a non-return valve.

The only function of pumping element is to provide sufficient amount of air inside the tire such that the pressure is maintained to required level.

2. Cam:

Cam is the fixed element of the system. Cam is mounted on the wheel hub, which is stationary when the wheel is rotating. The piston of the pumping element has been kept in contact with the spring force on the surface of the cam. The cam used here has oval profile.

3. Air Filling Pipe:

It delivers air from pumping element to tube of tyre. One end of the pipe consists of the locking mechanism so that it locks the pipe to the valve of the tyre. This pipe rotates along with the pumping element.

III. WORKING PRINCIPLE

The rotary movement of cam allows the reciprocating motion of follower so that the piston pressurizes the air inside the cylinder. This system uses NRV so that the air from compression chamber is supplied to the outlet.

Pumping Element: Reciprocating pump operates on the principle of pushing air by a piston that executes a reciprocating motion in a close fitting cylinder.

IV. SYSTEM ASSEMBLY

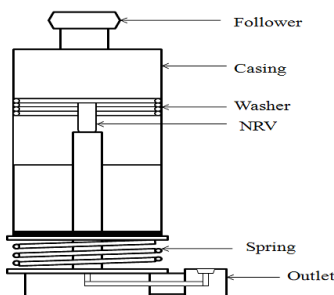


Figure.1.Front View



Figure.2.Side View

In this setup the wheel is powered by an electric motor. The pumping element is fixed to the wheel rim. Cam is mounted offset to the axis of wheel hub.

V. FUTURE SCOPE

In this setup the cam is manually engaged and disengaged for operation of pumping element also while the setup is running it is difficult to predict the pressure inside the tyre. This is major drawback of the system, so to avoid any physical interaction with the system TPMS sensor can be used. By integrating TPMS sensor with Online Tyre Inflation we can sense real time pressure and further the cam can be controlled automatically by motor which will operate according to output of the TPMS sensor.

VI. CONCLUSION

Online Tyre inflation system is an supplementary solution for other tyre inflation system. The OTI system is simple in design and requires less space as compared to other systems. OTI system has great advantage over its size, weight and cost. This system is capable of filling the tyre in minimum time and does not require vehicle to be park at one place. This system is also capable of filling tyre in at low speeds, as speed increases time require to inflate tyre is less.

VIII. REFERENCES

- [1]. "Tyre pressure management system by automatic air filling machine on 4-wheeler", "International Journal of Advanced Innovative Technology in Engineering", (IJAITE), Vol. 1, Issue 1, 2016.
- [2]. "Automatic Tyre Inflation System", "IJSRD - International Journal for Scientific Research & Development", Vol. 3, Issue 01, 2015 | ISSN (online): 2321-0613
- [3]. Inderjeet Singh, Bhupendra Pratap Singh, Hari Shankar Sahu, Raunak Chauhan, Novel Kumar Sahu, "To Study on Implementation of Tyre Inflation System for Automotive Vehicles," "International Journal of Innovative Research in Science, Engineering and Technology", (An ISO 3297: 2007 Certified Organization) (An ISO 3297: 2007 Certified