Scientific Journal of Impact Factor (SJIF): 5.71

e-ISSN (O): 2348-4470
p-ISSN (P): 2348-6406

International Journal of Advance Engineering and Research Development

Volume 5, Issue 04, April -2018

AUTOMATIC TYRE INFLATION SYSTEM

Prof. R.H.Kekan [1], AadeshBaswankar [2], DevanshuChauhan [3], AkanshJadhav [4], NiteshKamble [5]

[1]*Assistant Prof & Guide, Mechanical Engineering, A.C. Patil College of Engineering, Navi Mumbai.*
[2,3,4.5]*Students of, Mechanical Engineering, A.C. Patil College of Engineering, Navi Mumbai.*

Abstract- *Our*design*proposes and successfully implements the use of a* portable*compressor that will* supplyair to all four ty*resvia hoses and a rotary joint fixed between the wheel spindle and wheel hub at each wheel. The rotary joints effectively* channel air to the ty*res without the tangling of hoses.*

Keywords- *Rotary joint, Tyre inflation, Automatic Air supply, Pressure Switch*

I. INTRODUCTION

According to American Automobile Association (AAA), about 80 percent of the cars on the road are driving with one or more tyres under inflated. Tyres lose air through normal driving (especially after hitting pot holes or curbs), permeation and seasonal changes in temperature. They can lose one or two psi (pounds per square inch) each month in the winter and even more in the summer. And, you can't tell if they're properly inflated just by looking at them. You have to use a tyre pressure gauge. Not only is under inflation bad for your tyres but it's also bad for your gas mileage, affects the way your car handles and is generally unsafe. When tyres are under inflated, the tread wears more quickly. According to Goodyear, this equates to 15 percent fewer miles you can drive on them for every 20 percent that they're under inflated. Under inflated tyres also overheat more quickly than properly inflated tyres, which cause more tyre damage.

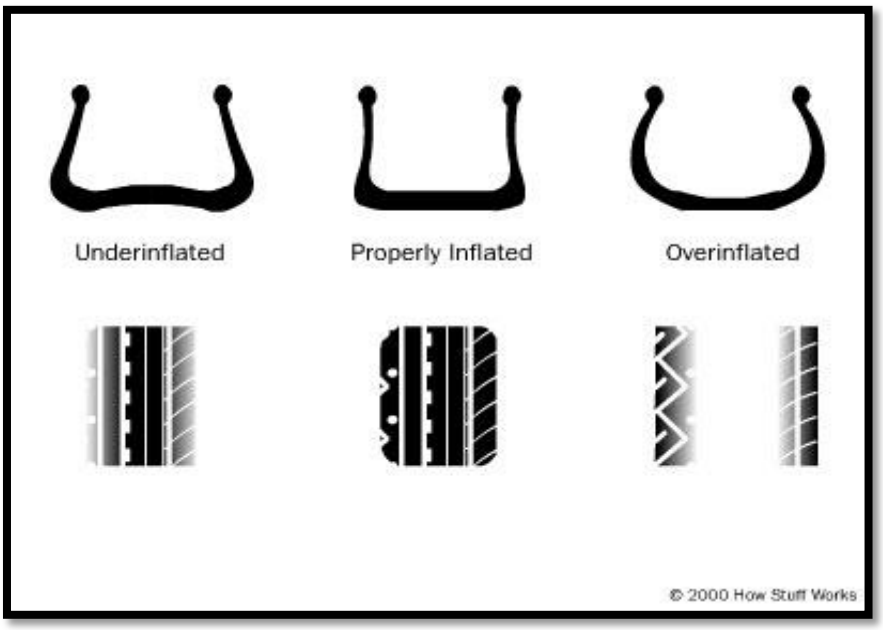

Figure No1: Shape of the tyre for different types of inflations

II. PURPOSE OF THE PROJECT

The overall goal of our design project is to develop a product that will decrease tyre wear while improving fuel economy, performance and safety of a passenger vehicle through dynamically-adjustable tyre pressures. However, there are several key objectives that the team has targeted our design to meet, and these objectives include both design characteristics and business objectives. Our main objective is to provide safety to commercial vehicle which carries very expensive jobs on it, if any one of tyre burst the whole job will fall and heavy loss of time and money will be there, so to safe guard that we are designing this kind of system.

III. PROCESS OF MANUFACTURING THE MODEL

The construction of our project begins with an assembly of MS chassis. A rectangular frame is made with the following dimensions: 2m and 1.2m in its length and width respectively, by welding the MS bars together.After the construction of the main frame, the next step was to mount the four tires on to the chassis, for which two shafts having 1.3m length and 20mm diameter is used. First two tires were welded at the end of each shaft and then both the shafts were mounted on the chassis with the help of pedestal bearing P204.

Once the mainframe was mounted with tires, the main component of the system (Automatic Tire Inflation System), a Rotary Joint is welded on the shaft at the outer periphery of each tire so that it could easily reach the air filling valve of the tire. After welding a Rotary Joint on each tire they are now bolted to the main frame, so as to ensure easy mounting of other pneumatic components near the rotary joint.Now the remaining components i.e. Pressure switch, Solenoid Valve and pressure gauge are mounted on the frame for each tyre. At the middle portion of the chassis a storage tank is mounted which uses a pressure switch to maintain its pressure. The compressor is also mounted in the middle of the frame.

Finally all the pneumatic and electrical circuits are made and the system is checked for any leaks so as to reduce losses and perform tests on the system more efficiently and accurately.

Components used:

Figure No.2 :AC-DC unit

Figure No.3:12V / 100PSI Standard Compressor

Figure No.4 :Rotary joint

Figure No.5 :Pressure Gauge

Figure No.6 :Solenoid Valve

Figure No.7 :Pressure Switch

Table No. 1: List of components used

SR NO	PART NAME	MATERIAL	QTY
1	Ac/Dc Unit	STD	1 NOS
2	Compressor	STD	1NOS
3	Rotary Joint	STD	4 NOS
4	Pressure Gauge	STD	5 NOS
5	Pressure Switch	STD	5 NOS
6	Solenoid Valve	STD	4 N0S

IV. CONCLUSION

Central tyre inflation systems have many advantageous benefits in the transportationindustry. Thesebenefits are improved vehicle mobility due to the increase in traction when tyre pressures are lowered, improved ride quality and cargo safety due to the reduction in vehicle vibrations when the correct tyre pressure is used for a particular road condition, reduced road maintenance because sediment production is limited and lowered road construction costs, increased fuel efficiency and a considerable increase in the tyre life of vehicles. All these benefits contribute to a considerable cost saving in the overall operation of a transportation vehicle.

Consequently, it appears that central tyre inflation is a worthy investment. However, the successful implementation of central tyre inflation has not been extensively examined and the suitability of central tyre inflation to roads and operating conditions needs to be examined.

V. REFERENCES

1. Sugavanam. S, Sankar. B, Varadan. V and Varadan. V, “Active Control of a Lightly Damped Cantilever Beam Using Spatial Distributed Actuators and Sensors”, Journal Wave-Material Interaction , Vol 11, No. 1, 1996, pp. 67-84
2. Pietrzakowski. M, “Experiment on a Cantilever Beam Control and Theoretical Approximation”, Journal of Thermal and Applied Mechanics, 2002, pp. 667-686.
3. Gustavo. L, José. F, “Spatial H_∞Control of A Flexible Beam Containing Piezoelectric Sensors and Actuators”, ABCM Symposium Series in Mechatronics, Vol. 1, 2004, pp. 243-253.
4. Lin. J, Nien. M, “Adaptive control of a composite cantilever beam with piezoelectric damping-modal actuators/sensors”, Composite Structures 70, 2005, pp. 170–176.
5. Vasques. C.M, Rodrigues. J, “Active Vibration Control of Smart Piezoelectric Beams: Comparison of Classical and Optimal Feedback Control Strategies”, Computers and Structures 84, 2006, pp. 1402-1414.

6. Zhi-chengQiu, Xian-min Zhang, Hong-xin Wu, Hong-hua Zhang, "Optimal Placement and Active Control for Piezoelectric Smart Flexible Cantilever Plate", Journal of Sound and Vibration 301, 2007, pp. 521-543.
7. Zeki. K, Levent. M, Murat. A, "Active Control of Residual Vibrations of a Cantilever Smart Beam", Turkish J. Eng. Env. Sci. 32, pp. 51-57.
8. Shawn Le, "Active Vibration Control of A Flexible Beam",SJSU ScholarWorks, 2009.
9. Dafanga. W ,Yuewu. W and Shuang. W, "Experimentalstudyandnumericalsimulationofactivevibrationcontrolofahighlyflexiblebeamusingpiezoelectricintelligentmaterial",Aerospace Science and Technology 37, 2014, pp. 10–19.
10. Das. S, "Vibration and surface finish in gear hobbing—some experiments and analyses", G. C. Sen Memorial Machine Tools and Research laboratory MEJU, 2010.

