International Journal of Advance Research in Science and Engineering
Volume No.07, Special Issue No.03, April 2018
www.ijarse.com
IJARSE
ISSN: 2319-8354

AUTOMATIC TYRE INFLATION SYSTEM

Asst. Prof. Vijay Raundal ,Umesh Dahibhate[2], Govind Bhavare[3] , Akshay Deshmukh[4] , Shreedhar Desai[5]

[1,2,3,4,5]*Mechanical Engineering, SPPU, Pune, India*

ABSTRACT

In ancient time, after the discovery of wheel by man, it has been used extensively for various purposes and it is vital part of human life for ages. These wheels runs human life faster and faster with new technology and one such technology is on board air inflation system used in automobiles. Tyres are the second-highest cost for the trucking industry. The on board air inflation system is used to maintain the pressure of tyres in running condition.

The environmental conditions varies according to region, seasons because of this, it require maintaining the tyres pressure for better performance according to conditions. The most important application of this system is in military vehicle. For the military vehicle, the environmental condition, land conditions are continuously varying and they have to face very worst condition like heavy rainfall, snowfall, deserts.

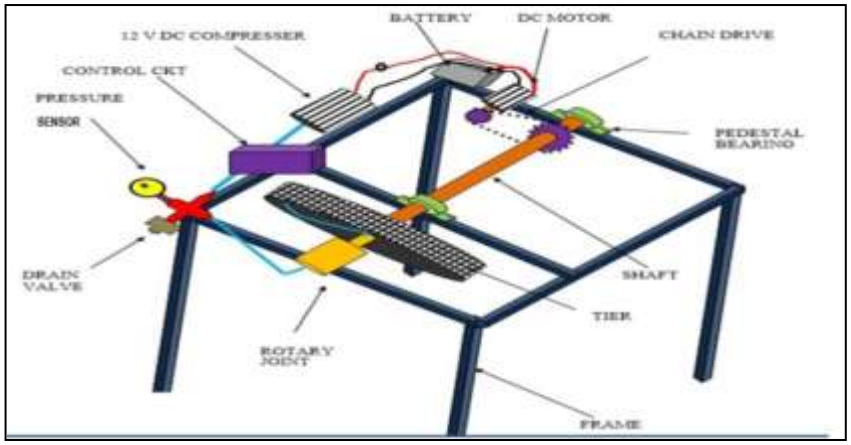
At that remote place no such devices are available for maintenances of the tyres. At some crucial times like war conditions or any flood conditions there is no time to filling the air. Thus there arises a need for automatic tyre inflation system. This can be done by employing appropriate technique. This project deals with the design and fabrication of automatic tyre inflation system.

1. INTRODUCTION:

It consists of compressor, which supplies air and air tank is used to stored air at constant pressure. This pressurize air can be filled into tyres through flexible ducting with the help of rotary bearing. The pressure conditions are achieved by pressure gauges.

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 its also bad for your gas mileage, affects the way your car handles and is generally unsafe.

International Journal of Advance Research in Science and Engineering
Volume No.07, Special Issue No.03, April 2018
www.ijarse.com
IJARSE
ISSN: 2319-8354



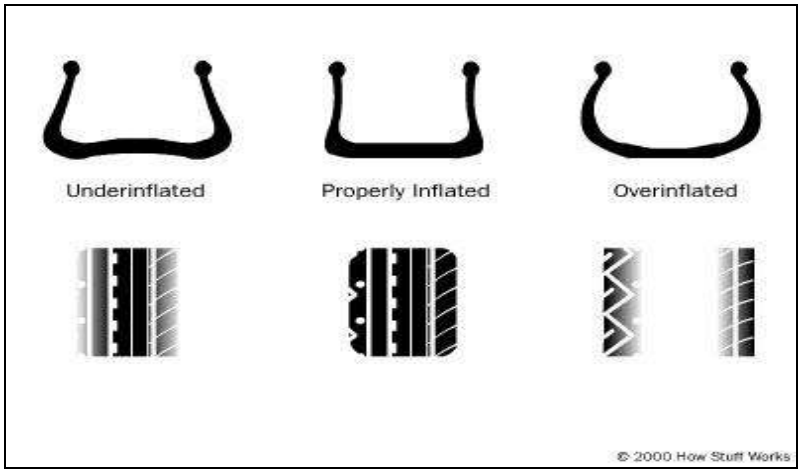


Fig.: Tyre inflating conditions

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 tyres damage.

2. OBJECTIVES OF STUDY:

- Ability to provide proper tire pressure.
- Ability to provide automatic system.
- To provide all of the said benefits to the user through an automatic system, thus minimizing user intervention

3. METHODOLOGY :

We have started the work of our project with literature review. After referring several papers we got many ideas. From these ideas we started doing rough design of our project. After doing rough design we will start calculation of different parts. Once the calculation is completed we will draw a 3d model in Auto CAD.

By referring this 3D model we will buy the standard component required for the projects. After this we will start manufacturing work in workshop. By taking proper dimensions we will manufacture components one by one.

Along with this electronics part will also be done. In electronics we will have to build controller circuit to get signal from pressure and make to make solenoid valve work.

After this, assembly of different components will be done. Later testing will be started for getting various results. Simultaneously rough draft will be prepared. After completing testing work fair report will be done and submitted.

4.LITERATURE REVIEW :

[1] B.T. Adams et. al Most research and solutions to improving the ride of agricultural vehicles to date have focused on suspending either the cab of the vehicle or the operator seat. If the operator has ever reduced the inflation pressure in radial tires, they know that the ride can be greatly improved by reducing the inflation pressure. Since the tires are the only primary suspension on most agricultural vehicles, a central tire inflation system (CTIS) would seem to be a reasonable choice of technologies to improve the ride of the vehicle without a substantial redesign or increase in cost. Since the benefits of CTIS were demonstrated in World War II, CTIS has become standard equipment on most wheeled military vehicles. CTIS allows the tires to dynamically change to lower inflation pressures to accommodate speed in rough terrain.

[2] Do Minh Cuong et. al Relationships among intensity of vibrations, tractor speed, soil moisture content and tyre inflation pressure are important for the design of tractor suspension systems. This study was designed to evaluate the effect of tyre inflation pressure and forward speed on tractor vibration in the paddy fields of Southern China by using a two-wheel-drive unsuspended tractor with different combinations of forward speed, tyre inflation pressure and soil moisture content. During experiments, the vertical vibration accelerations in front and rear axles and triaxial vibration accelerations of the tractor body were measured using three accelerometers.

[3] T. S merda & J. C upera This work deals with the influence of tire inflation on tractive characteristics and performance-energetic parameters of a ploughing set. The test was conducted using two tire sets with different tire pressures under field conditions. Measurements of tractive properties were performed by setting travel speeds to 5, 8, and 10 kph, respectively. The ploughing set was operated at 8 kph, according to the manufacturer's recommendation. The measurement results were processed graphically and mathematically into the Vehicle Traction Ratio, drawbar power, and slip characteristics.

[4] Mark Reiter and John Wagner The under-inflation of pneumatic tires, a typical problem in sedans and light duty vehicles, affects the vehicle's handling characteristics. An automated tire monitoring and inflation system can ensure adequate tire pressure to better accommodate handling requirements. In this paper, the variance of longitudinal and lateral forces, plus aligning torque, have been numerically investigated for different tire inflation pressures using the STI tire model. The tire/road interface results were integrated into a comprehensive simulation to evaluate vehicle handling behavior. A quadruple lane change test revealed that the required steering wheel angle increased by up to 47.7% for front axle tire inflation pressures at 70% of nominal values, whereas the vehicle slip angle was up to 77.8% larger when all tires were inflated to 70% of the recommended pressure.

REFERENCES

[1] B.T. Adams, J.F. Reid, J.W. Hummel, Q. Zhang, R.G. Hoeft Effects of central tire inflation systems University of Missouri-Columbia, 234 Agricultural Engineering Building, Columbia, MO 65211, USA 2004.

[2] Do Minh Cuong, Sihong Zhu, Yue Zhu Effects of tyre inflation pressure and forward speed on Vibration College of Engineering, Nanjing Agricultural University, Nanjing 210031, PR China 2013.

[3] T. S merda & J. C upera Tire inflation and its influence on drawbar characteristics and performance Department of Engineering and Automobile Transport, Mendel University in Brno, Brno, Czech Republic 2010.

[4] Mark Reiter and John Wagner Automated Automotive Tire Inflation System Mechanical Engineering Department, Clemson University, Clemson, SC 29634 USA 2010.