

## A REVIEW STUDY ON SELF INFLATED TYRE SYSTEM

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**Abstract**— Self-inflating tyres allow a vehicle to adjust to the current terrain for ideal performance and safety. This technology also enhances the safety feature of the vehicle as sudden tyre puncture can lead to road mishap. For this technology, pressure needs to be monitored continuously, i.e. pressure sensor needs to be present along with an external air source. The main aim is to spread and incorporate this technology in all public vehicles which was only present in commercial and military vehicles as of now.

### I. INTRODUCTION

Cold About 80% vehicles on the road are driving with one or more tyres under inflated. While going over potholes, tyres usually loses some amount of tyre pressure and becomes underinflated. Underinflated tyres are not only bad for tyre life but it also reduces the performance capability of engine, vehicle and increases the risk of accident. The temperature gets increased rapidly in under inflated tyres which causes the thread wears more rapidly and the rubber that holds the tyre chord begins to melt thus decreasing its life. In order to rectify the problem, tyre pressure gauge should be used to check the psi ratings regularly though it is a temporary solution which needs to be repeated all the time.

In order to make a permanent solution, self-inflating system should be implemented in vehicles.

Self-inflating system is basically an automatic tyre inflation technology whose goals is to: «

1. Detect the tyre out of all and when the air pressure drop happens. i.e. constant pressure monitoring is needed.
2. Notifying the problem to the driver.
3. Inflating the tyre back to normal level as recommended pressure

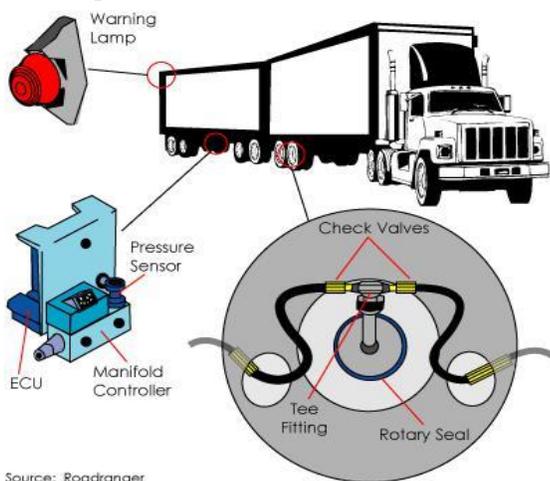


Fig.1. TMS SYSTEM

Bezuidenhout in discuss The South African Sugar cane industry has identified central tyre inflation (CTI) as a technology that could improve vehicle performance and reduce costs. This specific need is due to the fact that transport comprises up to 20 % of a cane grower's production costs because of poor vehicle utilization. Consequently, it is important that transport costs should be reduced in order for the sugarcane industry to maintain profitability. Central tyre inflation technology offers benefits such as improved mobility and savings in road maintenance costs, but more importantly can also reduce the two largest operational expenses on a transport vehicle namely fuel and tyres as per Oberholzer. As per Kaczmarek During World War II the mobility requirements in the former Soviet Union and Warsaw pact countries were extremely demanding due to poor road and highway quality. Consequently, a considerable effort was made by these countries to develop systems to improve mobility, including primary suspensions and central tyre inflation systems. Kaczmarek (1984) stated that "One of the most effective and well proven systems that have been adapted

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to wheeled tactical vehicles to improve the overall vehicle mobility is CTI." However, after World War II no serious consideration of the benefits of CTI occurred until the early 1980's, where after most of the military tactical vehicles produced in the United States were equipped with CTI discuss by Adams. Sturoset al. Say's Tyre deflection is the key to understanding the use of CTI technology. Tyre deflection is defined as the change in tyre section height from the freestanding height to the loaded the height. The percentage deflection is the ratio of that change to the freestanding section height. At the lowered inflation pressures (increased tyre deflection), the tyre's imprint or contact the area is greatly increased and the load is applied over a substantially larger area. Foltz and Elliot discuss that A CTI system permits a vehicle operator to optimize tyre and vehicle performance by varying inflation pressures in response to changing operating conditions (load, road and vehicle speed) while the vehicle is moving.

### Benefits.

The system control module is operated by a shut-off valve to stop air from being sent to the system as well as filter the air from dust. This system has a pressure protection valve so that it won't pull air if the air supply is below 80psi.

This mechanism works on the principle that the compressor supplies air to the tire when the vehicle is running. The air from the compressor is supplied to the rotary joint, from where the air is supplied to the tire which is under-inflated because of the implementation of rotary joint the air is easily supplied to the tire without tangling the hoses. An automatic compact air compressor, shutdown automatically when the required tire pressure is reached. In the process of automatic tyre inflation system as shown in fig.(c), the compressor is used to compress the air. The air is taken from the atmosphere and compressed it at required pressure. There is ducting which is used connect to the compressor outlet port and one end of

the rotary joint. The compressed air is supplied to the rotary joint through the ducting. Two Pedestal bearings are used to support the axle of the assembly. Bearings are fixed to the rigid supports via nuts and bolts. The axle is rotate on which wheel or rim is mounted on one end. One end of coupler is connected to axle and other end is connected to rotary joint.

The SIT system is based on highly reliable and proven peristaltic pump principles. It usesthe weight and motion of the vehicle to inflate the tire as needed, sourcing air from the outside atmosphere. The whole system consists of only two components – a tube chamber functioning as a peristaltic pump for the tire and a pressure management device to control the inflation There are electronic sensors are used to detect the tyre pressure with the help of pressure gauge. When the pressure in the tyre reduced below the required level then the sensors senses the pressure level and send feedback signal to compressor for maintaining pressure level of the air in the tire. Compressor works on the 12V battery of the vehicle and it is reciprocating in nature that's why it's easy to obtain the desired pressure level. Rotary joint is used to rotate well as to supply compressed air simultaneously when required

## CONCLUSION

Self-inflating tyres is the future of tyre world. Though this review paper shows the advantages of it but it overlooked the disadvantages which can cause and also the complete costing to build the complete plan into reality. The pricing of the vehicle will go up tremendously which is a big disadvantage. It will consume more amount of power from the battery. This review paper only gave the positive side of Self-inflating technology where as it overlooked the negative side of it.

## REFERENCE

1. International Journal on Applications in Mechanical and Production Engineering Volume 1: Issue 5: May 2015, pp 5-6.
2. Losey, Robert Allen, and Robert Leon Benedict. "Selfinflating tire assembly." U.S. Patent No. 8,042,586. 25Oct.
3. 2011 [2]. Benedict, Robert Leon. "Self-inflating tire." U.S. Patent No. 8,113,254. 14 Feb. 2012.
4. Schofield, Kenneth, and Niall R. Lynam. "Tire inflation assistance monitoring system." U.S. Patent No. 6,294,989. 25 Sep. 2001
5. Ronald, Leslie Sheppard. "Self-inflating pneumatic tires." U.S. Patent No. 3,304,981. 21 Feb. 1967.
6. Scholer, Richard A. "Tire inflation system." U.S. Patent No. 4,763,709. 16 Aug. 1988
7. Dosjoub, Andre, and Claude Lescoffit. "Inflation and deflation of a tire in rotation." U.S. Patent No. 4,922,984