Air Filling in Moving Tyre

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Abstract— In automobile sector we always try to make everything perfect around us and there are major problem is that puncture in tyre while running. We have developed tubeless but that’s not a perfect solution, so there is a major need of improvement in this sector. In this paper self-inflating tyre system that ensures that tyres are properly filled at all times. Our design successfully implements the use of a portable compressor that will supply air to all tyres via hoses and a rotary joint fixed between the wheel spindle and wheel hub at each wheel. The rotary joints effectively pass air to be channeled to the tyres without the tangling of hoses. If pressure is below the desired, the compressor will refill in the tyre. If it is above desired, excess pressure will release through a valve. With the recent oil price growing concern of environmental issues, this system addresses a potential improvement in tyre wear reduction and an increase in handling & tyre performance in diverse conditions.

Key words: Air Filling, Moving Tyre

I. INTRODUCTION

When we travelling in car, buses, etc. if there is puncture a tyre then there are waste of time and we can’t reach the destination in time, we need to wait but when use this system we can drive the punctured vehicle without any trouble. The cost of these system is not more, we fill the air in moving vehicle easily just attached the component to the engine.

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

II. LITERATURE SURVEY

Tyre pressure monitoring and automatic air filling system is a key in reduction of accidents due under inflated tyres. Tyre is filled by turning on compressor only if the pressure inside the tyre becomes less than the desired value. If the tyre is filled with air above a particular value the compressor turned off and excess pressure release through a valve.

A. Portable Compressor:

12V Car Electric Air Compressor Tyre Pump - Tyre Inflator also for Bikes, Cycles, Boats, Inflatable Toys 100% Brand New 12V Air Compressor/Tyre Inflator Simply use this for fast and easy filling of car tyres. No strength required for filling air as it is all electronic & is powered directly from our car battery perfect for anyone who wants a ease while filling a tyre time saving as compared to mechanical pump, fast operation & it’s very Compact and easy to store in car

Fig. 1: Construction Diagram of Air Filling In Moving Tyre

The main parts are:

- Portable Compressor
- Rotary Joint
- Drain Valve
- Pedestal Bearing
- Shaft
- DC Motor Driver

B. Kshitij P. Gawande, Vaishakh A. Jawanjal:

His invention relates to pressure control in a tyre of moving vehicle system if applied in a car then surely without losing energy we will get luxurious amenity. If further developed & automated then we can use it in bikes & heavy vehicle too also.

III. CONSTRUCTION DIAGRAM & DESCRIPTION

The construction diagram of project “Air Filling In Moving Tyre” contains of rotary joint based design. The detailed description of each part and its application can be given in details as below.
dickey Suitable For: Auto tyres, Car/ bike tyres, rubber rafts balls fills car tyres, bicycle tyres, rafts and sports equipment (Basketball, Soccer, etc), boats, pools, air bed, balloon, etc.

B. Rotary Joint:
We are designing this device for common passenger vehicles, and the main challenge is the presence of the axle shaft that runs straight into the center of the wheel forcing us to find an alternative method of routing the air. Our proposed solution to this challenge is to place rotary joint that has one half spinning with the drive axle hub and the other half stationary with the spindle. Within this rotary joint will be an air chamber that will allow air to pass from the stationary half of the joint into the half that is rotating.

Fig. 2: Rotary Joint

The main criteria for our rotary joint design were the following
- Must have approx. 40mm hole in the center to allow for the axle to either pass through or support the joint.
- Air inlets and outlets must be located at the outer radius to allow the hoses on the outside of the joint to clear the vehicle spindle and hub.
- Overall thickness of the joint must be no greater than 25mm to so as not to interfere with the Vehicle driveline or suspension components.
- Ball bearing system must be used to reduce contact friction between the two rotating halves both axial and planar.

IV. WORKING
In this project will arrange tyre on mild steel structure with the help of two pedestal bearings. We will couple the tyre with high torque DC motor with the help of chain drive, to show the tyre in running condition. Now for filling the air in tyre we will use small compressor (300 psi) which will take power from DC supply. Now after compressor we will install pressure gauge to check the pressure in tyre. Now we will install the main part of our project is “Rotary Joint” on the frame. Important function of rotary joint is to preponderantly pass the air to be channeled to the tyres without the tangling of hoses. It will provide rotation on one side and also allow air to flow inside out without leakage. On one side of rotary joint we will connect compressor and on another side we will connect nipple with hose pipe by tyre. So by this arrangement we can show the air filling in running car.

V. ADVANTAGES
There are many important positive points of this system as explained below:
1) The main advantage of this system is you don’t have to check tyre pressure and so never want to go for the air filling.
2) The next major advantage is withstanding the static and dynamic loading exerted on the rotary joints note just like this system produce only positive dynamic side effects on surrounding systems.
3) The most important is pressure adjustment based on increasing vehicle speed and load. Hence reduced in tyre wear.
4) The cost of system is optimum, but increases fuel economy and overall vehicle safety.

VI. FUTURE SCOPE
The main benefit of this technology that will allow for tyre pressure to be maintained for driving conditions will be the vehicle owners. Expecting the initial investment in the technology, they will experience a reduction in tyre wear and an increase in fuel economy; both of this will result in saving money in the life.

It is truly to say that society as a whole will benefit from the resulting design. The decrease in tyre disposal in landfills and reduction the rate of consumption of natural fount will truly benefit society. Hence, the improvement in overall vehicle safety will benefit all people who travelling a vehicle on the road.

VII. CONCLUSION
The dynamically air filling in moving tyre system would be suitable of succeeding as a new product in the automotive industry. It specifically addresses the needs of the consumers by maintaining proper tyre pressure conditions for reduced tyre wear, increased fuel economy & increased overall vehicle safety.

This product does not currently exist for passenger vehicles, the market conditions would be favorable for the introduction of a air filling in moving tyre system.

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