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Self Inflating Tyres

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***Abstract*—**Self-inflating tyres are designed to constantly maintain tyre pressure at the proper level. Self-inflating systems are designed more for the slow leaks and for optimizing performance and safety than for keeping a vehicle moving on a tyre that will no longer hold air. Self-inflating tyres allow a vehicle to adjust to the current terrain for ideal performance and safety in those conditio Currently, lots of consumer vehicles are equipped with pressure-monitoring systems, but there's no way for the driver to do anything about it without an external air source. There are lots of self-inflating-tire systems on the market, but most of them are only available for commercial and military application

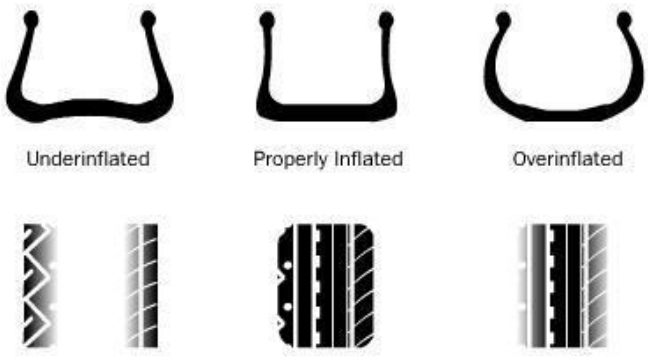
***Keywords*—** Self-inflating tyres, vehicle

I. INTRODUCTION

TIRE-INFLATION BASICS

About 80 percent of the cars on the road are driving with one or more tyres under inflated (as per AAA). Tires lose air through normal driving (especially after hitting pot holes or curbs), permeation and seasonal changes in temperature. Tyres lose one or two psi (pounds per square inch) each month in the winter and even more in the summer. It cannot be told that tyres are properly inflated or not by looking at them. Tyre pressure gauge is used for this. Not only is under inflation bad for tyres, but it's also bad for gas mileage, also affects the way car handles and is generally unsafe.

When tyres are under inflated, the tread wears more quickly. This equates to 15 percent fewer miles which can be drived on them for every 20 percent that they're under inflated. Under inflated tires also overheat more quickly than properly inflated tires, which cause more tire damage.



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As tyres are flexible, they flatten at the bottom when they roll. This contact patch rebounds to its original shape once it is no longer in contact with the ground. This rebound creates a wave of motion along with some friction. When there is less air in the tire, that wave is larger and the friction created is greater -- and friction creates heat. If enough heat is generated, the rubber that holds the tire's cords together begin to melt and the tyre fails. Extra resistance of an under inflated tire while rolling makes car's engine to work harder. .AAA statistics show that tires that are under inflated by as little as 2 psi reduce fuel efficiency by 10 percent

II. SELF-INFLATING SYSTEMS

Tire-inflation systems have three general goals:

- Detect when the air pressure in a particular tire has dropped - This means they have to constantly (or intermittently) monitor the air pressure in each tire.
- Notify the driver of the problem
- Inflate that tire back to the proper level - This means there has to be an air supply as well as a check valve that opens only when needed.

III. PARTS OF ANY SELF-INFLATING SYSTEM

While the available tire inflation systems vary in design, they share some common elements. They all use some type of valve to isolate individual tires to prevent airflow from all tires when one is being checked or inflated. They have a method for sensing the tire pressures. This is addressed in most cases with central sensors that relay information to an electronic control unit and then to the driver. They have an air source, which is usually an existing onboard source such as braking or pneumatic systems. When using an existing system, however, they have to ensure that they don't jeopardize its original function. For this reason, there are safety checks to ensure that there is enough air pressure for the source's primary use before pulling air for tire inflation. There has to be a way to get the air from the air source to the tires, which is usually through the axle. Systems either use a sealed-hub axle with a hose from the hub to the tire valve or else they run tubes through the axle with the axle acting as a conduit. There has to be a pressure relief vent to vent air from the tire without risking damage to the hub or rear-axle seals.

IV. CENTRAL TIRE INFLATION SYSTEM (CTIS)

CTIS is provided to control the air pressure in each tyre as a way to improve performance on different surfaces. For

example, lowering the air pressure in a tire creates a larger area of contact between the tire and the ground and makes driving on softer ground much easier. It also does less damage to the surface. This is important on work sites and in agricultural fields. By giving the driver direct control over the air pressure in each tire, maneuverability is greatly improved. Another function of the CTIS is to maintain pressure in the tires if there is a slow leak or puncture. In this case, the system controls inflation automatically based on the selected pressure the driver has set. The CTIS includes a speed sensor that sends vehicle speed information to the electronic control unit. If the vehicle continues moving at a higher speed for a set period of time, the system automatically inflates the tires to an appropriate pressure for that speed. Tire Maintenance System (TMS)

Tire Maintenance System is a "smart" system for tractor trailers that monitors tire pressure and inflates tires as necessary to keep pressure at the right level. It uses air from the trailer's brake supply tank to inflate the tires.

V. A Closer Look

On the road: The electronic control unit tells the pneumatic control unit to check current pressure and either inflate or deflate the tire to the pressure selected by the driver.if they are, it applies a slight pressure to the wheel valve to allow inflation. If the tyres are over inflated, the system applies a slight vacuum to the wheel valve. When the pneumatic control unit reads that the appropriate pressure is reached, the valve closes Like the CTIS, this system also has an electronic control unit that runs the entire system. It performs checks to make sure the system is operational, notifies the driver via a warning light on the trailer (visible through the rear-view mirror) if a tyre's pressure drops more than 10 percent below its normal pressure and performs system diagnostics. AIRGO SYSTEM

Like the CTIS, this system also has an electronic control unit that runs the entire system. It performs checks to make sure the system is operational, notifies the driver via a warning light on the trailer (visible through the rear-view mirror) if a tyre's pressure drops more than 10 percent below its normal pressure and performs system diagnostics. AIRGO SYSTEM

The AIRGO system is a constant monitoring system that uses a series of check valves to detect a loss in air pressure. AIRGO doesn't use air from the vehicle's braking system. AIRGO uses carbon-graphite and case-hardened steel for its seals rather than rubber.

Meritor Tire Inflation System (MTIS) existing trailer air supply is routed to a control box and then into each axle. the overall system is made up of a wheel-end assembly and a control module.

VI. Controls

The system control module has a shut-off valve to stop air from being sent to the system, as well as a filter to remove moisture and contaminants. The petcock releases system pressure so maintenance can be performed. Like some of the other systems that use onboard air supplies, this system has a pressure protection valve so that it won't pull air if the air supply is below 80 psi.

VII. Conclusion

Self inflating tyres will become very common in the near future. It increases the safety and the fuel efficiency of the vehicle.The development of self inflating tyres increases the safety, comfort and other performances of vehicle.The driver will be able to adjust the pressure depending upon the desire driving mode:comfort,sporty over obstacle.so “self inflating tyres are the future tyres”

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