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Tire pressure monitors mandated to reduce CO2 emissions

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MUNICH, Germany — The European Parliament Tuesday (March 10) passed a proposal that will make tire pressure sensors for new cars mandatory. The industry is prepared to offer the technology required — but new developments enhance the scope of options.

The proposal aims at reducing CO2 reduction for cars by keeping the tire pressure within the optimum range. Since tier ones have gathered experience with the technology in the USA where such a regulation is already in place and since tire pressure monitors are available as option already for quite a while, the technology is not basically new. However, new approaches could lead to further improvements.

The cheapest and simplest way to monitor tire pressure is to measure and compare the rotation speed of the wheels. The ESP (Electronic Stability Program) in place in many cars collect the required data anyway. A software developed by tire manufacturer Dunlop is widely used in the industry; tier ones such as Bosch group in the past simply integrated the software into the ESP system and run it on the same ECU. If the system detects rotating speed differences between the wheels the software concludes that the respective tire has lost pressure and issues a warning signal.

The system is cheap but not very exact, explained a Bosch spokesperson. It has weak points !! if, for instance, all four tires are used with low pressure the software has no means to detect this.

For this reason, the industry has developed sensor-based systems which are inserted into the tire's valve. These battery powered systems provided by several chip manufacturers consist of the actual sensor including signal processing, a digital controller, and an RF circuit that transmits the data to a receiver located inside the car's body near the wheel, using a proprietary RF technology. A display in the instrument cluster informs the driver on the status of the tires.

While this approach provides quite exact data, the industry is currently working on an advanced system embedded in the tire itself. This system will combine data regarding the tire type as well as temperature, kilometrage, and load conditions and transmit them to the receiver(s) in the body. These data are not only used to be displayed at the dashboard and generate a warning signal to the driver. They are also fed into the ESP (which in turn is part of the anti-blocking system (ABS); the ESP can use the tire data to adjust the car's dynamic driving characteristics accordingly, explained a spokesperson of automotive tier one Continental AG.

The valve-based sensors as well as the upcoming tire-embedded sensors are powered by a battery which is designed to last for the lifetime of the tire, about seven to nine years. Currently, new designs are under way which make use of piezo-based energy harvesting schemes.

In any case, in order to achieve the goal of reducing CO2 emission, the sensors have to deliver data more exact than the 20 percent currently established in price-sensitive markets, the Continental spokesperson said. "In order to optimize the emission, the devices have to deliver rather exact data which would rule out the indirect, software-based method," he said.

The European Parliament's proposal includes not only the tire pressure monitoring system which will be compulsory for cars produced after November 1, 2011. It also has set rules for tires which reduce the rolling resistance, and it made ESP mandatory beginning the same date. The measures will not only reduce the greenhouse gas emissions but also improve occupants' safety.

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