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Ford introduces inflatable seat belts

By: Irma Venter
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US vehicle manufacturer Ford is bringing to market the world's first inflatable seat belts, combining attributes of traditional seat belts and air bags to provide what the company describes as "an added level of crash safety protection for rear-seat occupants".

The restraint system is designed to help reduce head, neck and chest injuries for rear-seat passengers.

Ford will introduce inflatable rear seat belts on the next-generation Ford Explorer, which goes into production next year for the North American market.

Over time, the automaker plans to offer the technology in all of its vehicles globally.

"Ford's rear inflatable seat belt technology will enhance safety for rear-seat passengers of all ages, especially for young children who are more vulnerable in crashes," says Ford sustainability, environmental and safety engineering group vice-president **Sue Cischke**.

She says advances in air bag inflation and seat-belt construction methods have enabled Ford and its suppliers to develop the seat belts, designed to deploy over a vehicle occupant's torso and shoulder in 40 milliseconds in the event of a crash.

In everyday use, the inflatable belts operate like conventional seat belts, and are safe and compatible with infant and children safety car and booster seats.

According to Ford's research, more than 90% of those who tested the inflatable seat belts found them to be similar to, or more comfortable than a conventional belt, because they feel padded and softer.

This comfort factor could help improve the 61% rear belt use rate in the US, which compares to 82% use by front-seat passengers, according to National Highway Traffic Safety Administration data.

HOW IT WORKS

In the event of a frontal or side crash, Ford says the inflatable belt's increased diameter more effectively holds the occupant in the appropriate seating position, helping to reduce the risk of injury.

Vehicle safety sensors determine the severity of the collision, and deploy the inflatable belts' air bags.

Each belt's tubular air bag inflates with cold compressed gas, which flows through a specially designed buckle from a cylinder housed below the seat.

The inflatable belt's accordion-folded bag breaks through the belt fabric as it fills with air, expanding sideways across the occupant's body in about the same amount of time it takes a car travelling at highway speed to cover a metre in distance.

The use of cold compressed gas instead of a heat-generating chemical reaction – which is typical of traditional

air-bag systems – means the inflated belts feel no warmer on the wearer's body than the ambient temperature.

The inflatable belts also fill at a lower pressure and a slower rate than traditional air bags, because the device does not need to close a gap between the belt and the occupant.

"It's a very simple and logical system, but it required extensive trial and error and testing over several years to prove out the technology and ensure precise reliable performance in a crash situation," says Ford research and advance engineering safety technical leader **Srini Sundararajan**.

The inflated belt helps distribute crash force energy across five times more of the occupant's torso than a traditional belt, which expands its range of protection and reduces risk of injury by diffusing crash pressure over a larger area, while providing additional support to the head and neck.

After deployment, the belt remains inflated for several seconds before dispersing its air through the pores of the air bag.

Tel: +27(0)11 622 3744 | Fax +27(0)11 622 9350 |
newsdesk@engineeringnews.co.za
http://www.engineeringnews.co.za