

LIFEBELT - 2014 SAE WORLD CONGRESS

The challenge with a seat belt is to prevent submarining of the occupant under the lap belt. Traditionally this is addressed in front seats with a rigid steel pan (in combination with a pretensioner) to limit pelvis displacement.

Lifebelt is a webbing strap placed in the seat base, just below the seating surface, which is continuous with the standard seat belt and is therefore loaded when the seat belt loads. Its effect is to form a loop around the upper leg area which encloses the pelvis and prevents submarining. It can be located close to the seat surface and therefore engages very early compared to the seat pan providing superior control of adult occupants of the full range and no need for a pretensioner *.

Recent testing has shown a substantial reduction in lumbar spine loads whilst providing improved restraint when compared to the typical seat pan.

A new development has been tested to extend the effective range of LifeBelt for rear seat occupants. During the development testing it was recognised that whilst LifeBelt is effective (and more robust) in operating with the standard range of adult occupants 5%ile female through to 95%ile male, it was still not able to prevent submarining of a 10yo dummy. The new development known as SOSE (Small Occupant Safety Enhancement) under test showed complete restraint for the 10yo dummy without any submarining thus broadening the appeal of LifeBelt.

In front seats LifeBelt can provide a superior anti-submarining function compared to the traditional seat pan and provides an increased ability to alter the dummy kinematics by early restraint. It also dramatically reduces the risk of lumbar spine injury.

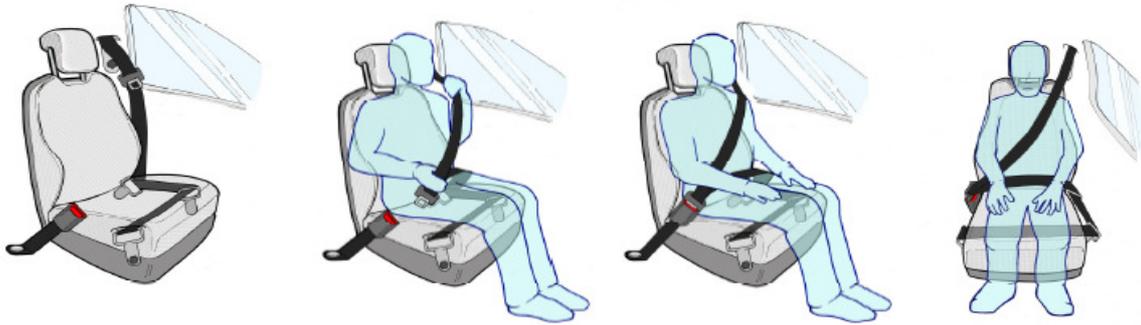
In rear seats LifeBelt can provide anti-submarining in applications where this is not provided today, or provide superior performance where the traditional solution has been used in the past. With the trend in several markets to add rear seat testing into the NCAP tests, submarining in rear seats will need to be eliminated in the future.

The function of LifeBelt is invisible to the end user. The comfort of the seat is not affected and the seat belt is attached and worn in the normal way. If the SOSE option is applied, there is an additional action required by the user to engage it. The safety improvements offered by LifeBelt is marketable as is the additional function offered by SOSE.

LifeBelt was initially conceived in 1999 by two doctors in Adelaide, Australia, who were involved in ER work on road trauma victims. They were particularly surprised by the injuries received by rear seat occupants who were wearing a seat belt and soon recognised the importance of finding a solution for submarining. Their enthusiasm has brought together a working team who helped develop the concept to the point where it achieved the SAE-A Engineering Excellence Gold Award of 2010. This team consists of Lino Fusco (CEO & Director), Robert Judd (Director) & Tom Gibson (Director). The support of Autoliv, Futuris Automotive and APV Safety has been invaluable to developing the concept to this stage.

“Come and sit on our demonstration seats and see it for yourself”.

* note that the pretensioner may provide more function than only improving anti-submarining.



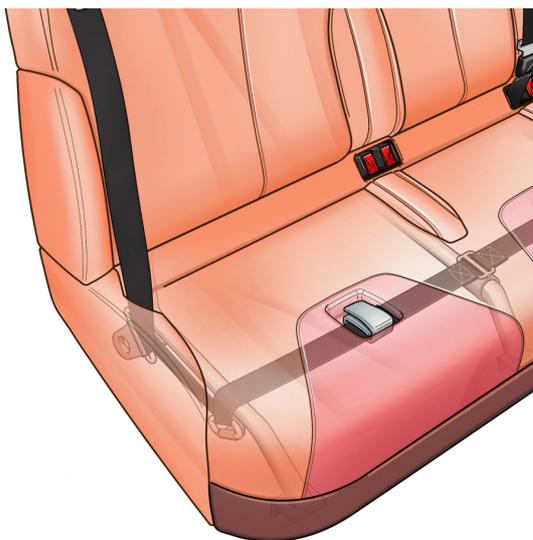
It can be used just like a standard Seat Belt



Lifebelt in an exposed concept front seat base frame



Lifebelt in front seat concept complete



Lifebelt with SOSE option included shown as ghosted image in seat base of rear seat



Lifebelt with SOSE option included in rear seat concept as complete.