An inflatable seatbelt

Airbags for aircraft?

Bruce Byers

AROUND 1988, design standards for the four main aircraft categories – large and small aeroplanes and large and small helicopters – were changed to improve occupant protection.

The changes introduced requirements for dynamic tests on the seat and restraint system, commonly referred to as the "16g seat rule".

An important change was the introduction of potential injury criteria. No longer is it sufficient to design a strong seat; the design must provide a measure of occupant protection.

The most difficult test criteria to meet is for passenger protection from head impact with cabin bulkheads. Various ideas have been proposed: shoulder harnesses; an articulated seat pan which activates at impact; and multiple airbags mounted to the bulkhead. Two companies have come up with a much simpler and more acceptable solution – an inflatable seat belt.

Inflatable bag: The US seat belt manufacturer, AM-SAFE, has developed a new passenger lap belt with an airbag, known as the AAIR – the AM-SAFE aviation inflatable restraint.

The AAIR system comprises a standard lap belt modified with an inflatable bag that is connected to a cold gas generator and an electronic sensor activation box. The entire unit is self-contained for each seat. The sensor determines when to activate the airbag in order to provide the required protection. Installation is planned in Jetstream 41, SAAB 2000 and Boeing 777 aircraft with expected introduction by late this year.

In the bag: **Advances in seatbelt technology will improve safety for passengers.**

The company claims that they are nearing completion of certification requirements by the UK Civil Aviation Authority and the US Federal Aviation Administration. If this occurs, aircraft fitted with this equipment would automatically be approved in Australia.

A similar concept is being developed by BF Goodrich Aerospace with the trade name "inflatabelt restraint system".

Both systems have been demonstrated under the dynamic impact conditions for transport category aircraft (FAR 25), although additional criteria will need to be considered to address the unusual issues related to an airbag in an aircraft cabin. Some of these issues are:

- deployment at the critical moment to provide the required protection.
- accommodation for all occupant sizes and ages.
- prevention against inadvertent activation.
- rapid deflation so as not to impede evacuation.
- reliability and maintenance.

There are also design issues such as a weight penalty which need to be refined.

It is early days yet, but these technologies could improve passenger protection in aircraft where the only restraint is a lap belt.

Once the system is developed it could be used for passengers in all aircraft categories.

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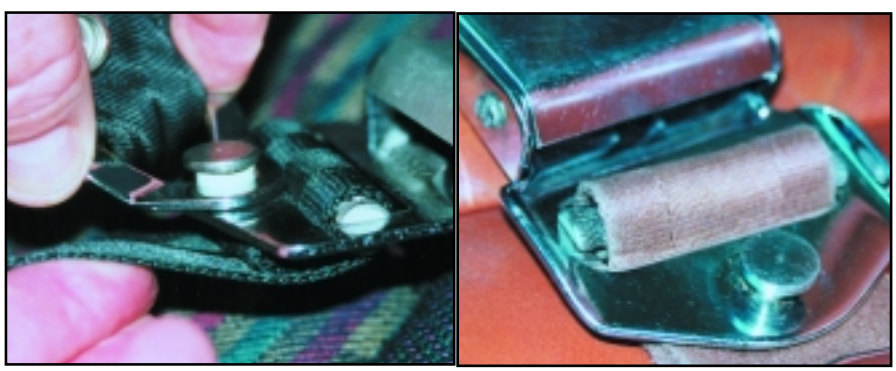
The tiniest things can make a big difference

Most GA pilots would be familiar with the lap/sash buckle used on common aircraft types. But how many have also noted the tiny white plastic "spacer" under the stud? On many seatbelts this has long been broken and has since fallen off.



This small plastic ring serves a vital task – holding the buckle from the shoulder strap tight in position. When the spacer is missing, the shoulder strap buckle is loose on the stud – as many GA pilots would have noticed. In Australia last year a passenger in the front right-hand seat suffered severe head injuries when the shoulder strap released during a heavy landing because the seatbelt's spacer was missing.

The AM-SAFE seat belt manufacturer has confirmed that without the spacer, the restraint assembly is unserviceable and should be replaced. Unfortunately, the spacer is unavailable as a spare due to previous instances of incorrect replacement, which means the problem can only be remedied with the purchase of a new buckle. It is understandable that many belts are in service without the plastic spacer, however, this is unsafe.

Replacing the correct plastic spacer with an unapproved rubber O ring is not an acceptable alternative, and will attract CASA surveillance action. Remember, the shoulder strap is there for your protection. Without that small piece of plastic, there is a real risk that the shoulder strap will put you, and your occupants, in unnecessary danger.