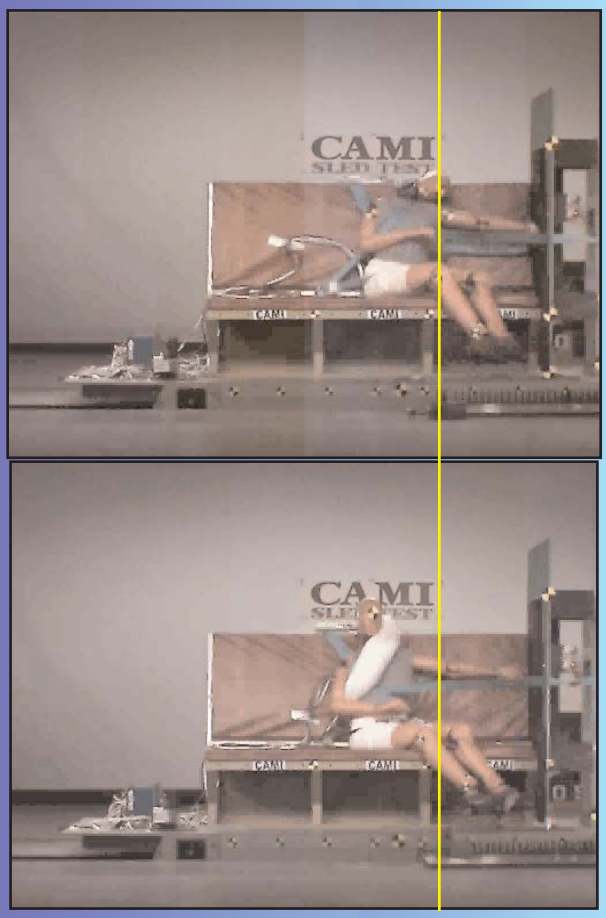
SIMULA
Safety Systems
Applied Technologies Division

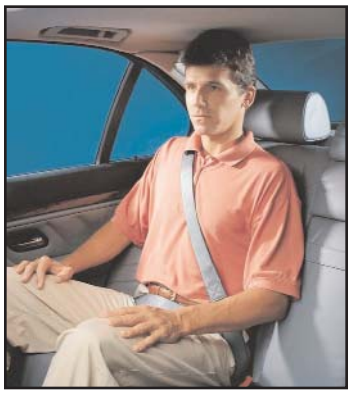
Inflatable Tubular Torso Restraint For General Aviation Aircraft

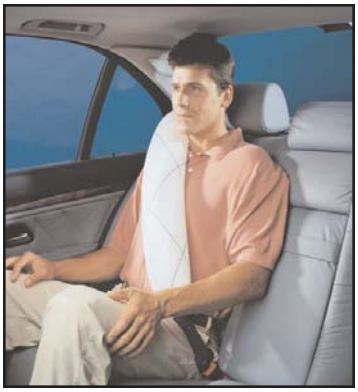


HEAD DISPLACEMENT	
	X **DISPLACEMENT**
BASELINE	13.11”
ITTR	0.89”
REDUCTION IN HEAD DISPLACEMENT	12.22”

General ITTR Information Business Jet Side-facing Seat Application

Achieving FAA certification of side-facing seats for occupancy during take-off and landing has proven to be very difficult with conventional technologies. When standard restraints are used, excessive occupant flail can lead to hazardous impacts with surrounding aircraft structure and other occupants. This may prevent these seats from meeting certification criteria, thus limiting the flexibility available to aircraft interior designers. To address this safety challenge, Simula Safety Systems, Inc. has adapted the patented automotive Inflatable Tubular Torso Restraint (ITTR™) for use on side facing aviation seats.





Automotive Industry ITTR™

The ITTR™ is an advanced seat belt restraint system that integrates Simula's innovative Inflatable Tubular (IT) technology with a conventional 3-point restraint. Upon crash impact, the torso portion of the ITTR™ inflates into a cylindrical tube approximately five inches in diameter, spanning the occupant's torso. A specially designed braid enables the ITTR™ to significantly expand in diameter, while simultaneously shortening considerably in length. This characteristic of the ITTR™ pretensions the restraint, while also distributing loads and forming a cushioning, protective support.

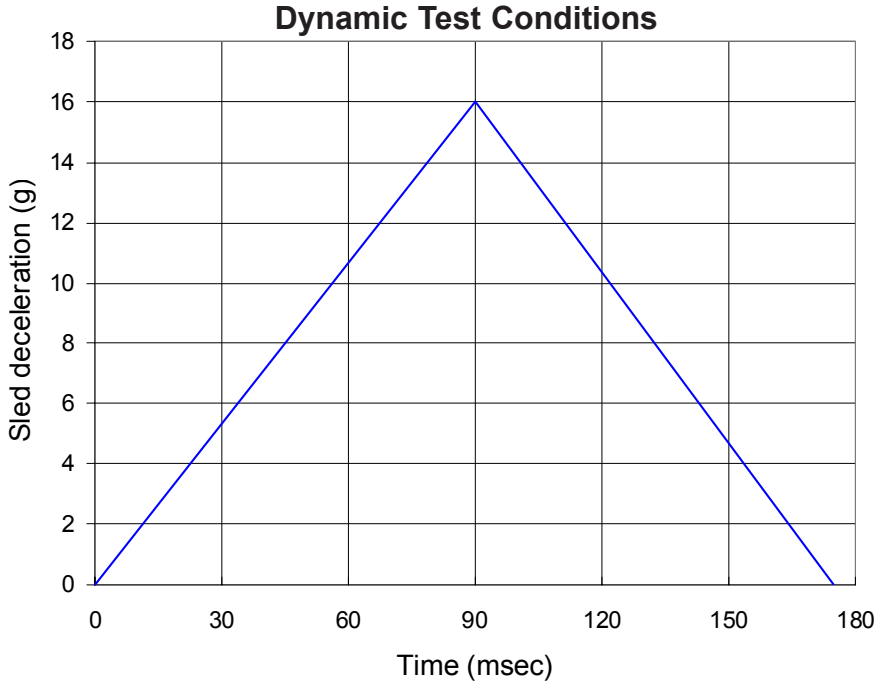
ITTR Information (continued)

The ITTR™ has proven to be very effective in minimizing head excursion and torso flail in FAA Part 25 side-facing seating applications. In a recent test at the FAA's Civil Aeromedical Institute (CAMI), the ITTR™ reduced head excursion from 13.1 inches in the baseline tests to 0.9 inches, a difference of 12.2 inches.

The ITTR™ is also effective at reducing head and upper torso flail in forward-facing seat applications, where overall head motion was reduced 38% and belt loads reduced by 36% when an ITTR™ was installed.

Simula has been a world leader in transportation safety technology since 1975.

The crash pulse used for the side-facing seat tests was based on FAR Part 25.562, which is a horizontal impact with a 16-G peak deceleration minimum and a maximum rise time of 90 msec. The total velocity change of this impact is 44 ft/sec.



16 G peak
90 msec Trise
44 ft/sec

- FAR 25.562 test pulse
- 50th-percentile male Hybrid-III ATD

For more information, contact:

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