

Abstract for:

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Title:

Automotive Child Restraint types and their installation in Transport Category Aeroplanes

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Abstract:

CASA's vision is "Safe Skies for all". However it's safer for adults than it is for infants or children. CASA's mandate and shortcomings in this regard are shared by other National Aviation Authorities and ICAO. Since airline transportation began, no 'nice' solutions have been developed for seating persons under 18kg, that being, one that affords babies, infants and toddlers an equivalent level of protection to that of adults in an accident and during turbulence, without undue burden to the travelling public or operators.

CASA was interested in dynamically testing automotive child restraint installations currently used by some Australian airline operators and the ISOfix Child Restraint System, programmed to be added to the Australian Standard for Automotive Child Restraints, AS/NZS1754, in 2008.

Due to Australian operators' reluctance to promote child restraint use, in part due to the impracticalities of the top tether installation in airline seating (AS/NZS1754 has required mandatory top tether use since the 1980's), CASA wanted to focus on two particular areas of infant/child restraint. Specifically, to look at the contribution of the top tether attachment in restraining AS/NZS1754 Child Restraints and to look at a non-standard installation method using an extension belt looped around the seat back in lieu of the top tether. Secondly, with the planned introduction of the ISOfix Child Restraint System to AS/NZS1754, CASA was interested in how a typical transport category aeroplane seat could be modified for ISOfix restraints and document the anticipated performance benefits for the child. Additionally, an assessment of injury effects on persons seated behind an ISOfix Child Restraint System was also conducted.

CASA dynamically tested two popular Australian automotive child restraints for the top tether and extension belt evaluations. They revealed that the top tether installation and the alternate extension belt restraint system idea added little or no benefit to the overall restraint of the Child ATD due to the limited resistance provided by the seat back. A forward facing and an aft facing ECE-R44/04 (European) ISOfix Child Restraint adapted for anticipated Australian design standards were tested using a modified economy class seat. The ISOfix restraints showed a vast improvement in dynamic performance with injury and excursion measurements well below allowable limits of various automotive and aviation child restraint standards. Testing of ISOfix Child Restraints with Adult ATDs seated behind showed no ill effects on Child injury levels but while the Adult injury levels did pass FAR25.562 requirements, trauma mechanisms associated with head rotation were of concern. The modification of the airline seat to mount two ISOfix Child Restraints weighed 340 grams in total.

The results of this research will lead to changes in CASA's guidance material for the carriage of infants and children in aircraft in Australia. ISOfix Child Restraints and correspondingly modified airline seats have the potential to be the 'nice' solution.