

CASA Research into Automotive Child Restraints and Their Installation in Transport Category Airplanes – Phase II

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safe skies for all

Overview

- Australian Situation
- Current Regulations and Policy
- CASA Infant Restraint Project – Phase I (2006-2007)
- CASA Infant Restraint Project – Phase II (2008-2009)
- Conclusions so far.
- CASA/RMIT Infant Restraint Project – Phase III

Australian situation

- Australian Standard for Child Restraints in Motor Vehicles has required top tether use since 1975.
- CASA requires installation of CRS in accordance with manufacturer's instructions – installation in aircraft requires top tether use for Australian CRS.
- AS/NZS 1754 does not currently allow for ISOfix or LATCH type attachment.

Australian Aviation Situation

- CAR 251(1) “..... seat belts shall be worn by all crew members and passengers.....”
- CAR 251(3) “CASA may direct that a type of safety harness be worn in place of a seat belt.....”
- CAO 20.16.3 Para.13.2(1) “An infant may be carried in the arms or on the lap of an adult passenger, in a bassinet or in an infant seat.....”
- CAAP 235-2(1) Para 2.1 “An infant carried in the arms of an adult passenger (lap held) must be restrained.....”

CASA Infant Restraint Project – Phase I

- 2006 – 2007



E
RÖMER BABY-SAFE
 ECE R44/04
 Semi-Universal ISOFIX
 Universal
 0 - 13 kg Y
 Semi-Universal
 0 - 13 kg Y
(E1)
 04301146
 BRITAX RÖMER
 Blaubeurer Str. 71
 D - 89077 Ulm

1028809



Date of Manufacture: **29-08-2006** SERIES No. 7000/n/2004
 Britax Childcare Pty. Ltd. (Incorporated in Victoria)
 (A Britax International Company)
 A.C.N. 006 773 600 A.B.N. 55 006 773 600
 99 Derby Road, Sunshine, Victoria 3020
Safe-n-Sound
 Arrive...Safe-n-Sound
 The Safe-n-Sound trade mark is the property of Britax Childcare Pty. Limited, Australia.
 The Britax trade mark is the property of Britax Excelsior Limited-UK.

British

Approved Product
 Australian Standard AS/NZS 1754
 Issued by CASA
 DO NOT REMOVE
 69622038



B₁
RÖMER DUO
 ECE R44/04
 Universal
 9 - 18 kg Y
 Fahrzeugspezifisch
 (specific vehicle)
 9 - 18 kg Y
(E1)
 04301133
 BRITAX RÖMER
 Blaubeurer Str. 71
 D - 89077 Ulm

86252



MANUFACTURED AND DISTRIBUTED
 IGC (AUSTRALIA) PTY. LTD.
 655 - 685 SOMERVILLE ROAD
 SUNSHINE WEST
 VICTORIA 3020

22 SEP 2006 **735**

DATE OF MANUFACTURE & BATCH NUMBER TO BE STAMPED HERE

Approved Product
 Australian Standard AS/NZS 1754
 Issued by CASA
 DO NOT REMOVE
 C0869807

CASA Infant Restraint Project – Phase I

- Assessed the contribution of the top tether strap to the restraint performance of a sample of Australian Automotive child restraints in an airline seat.



CASA Infant Restraint Project – Phase I

- Assessed the performance of a sample of European ISOfix child restraint systems in aircraft seats.
- Universal Child Lower Anchorage – two 6 mm round steel bar loops – 40mm x 25 mm, 280mm lateral centres



CASA Infant Restraint Project – Phase I



CASA Infant Restraint Project – Phase I

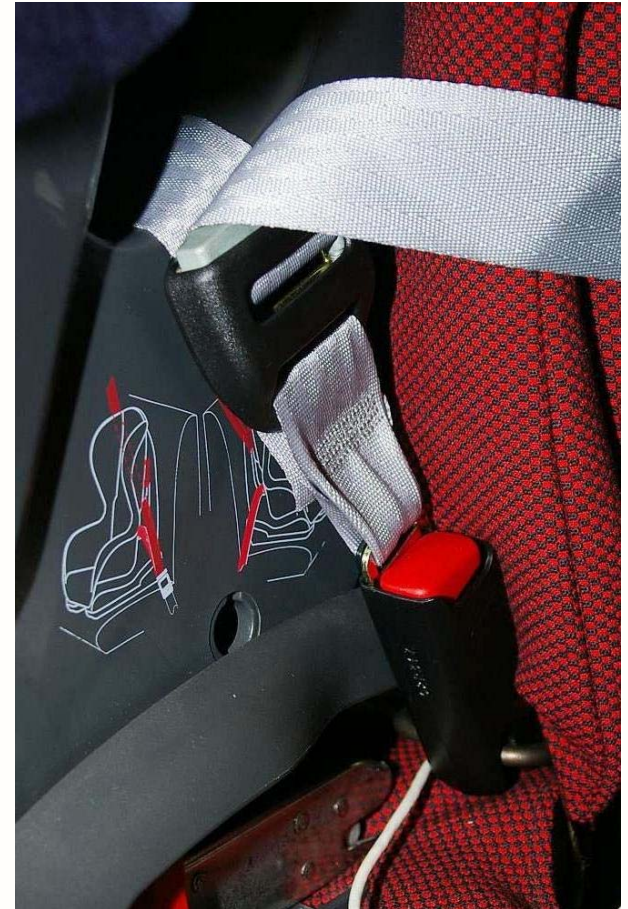
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160,00 ms



CASA Infant Restraint Project – Phase II

- 2008-2009
- This project
 - ISOfix, LATCH, conventional attachment
 - Lower Anchorage loads gathering
 - CRS/Child/Aft adult occupant interaction
- 11 dynamic tests conducted
- Two part program

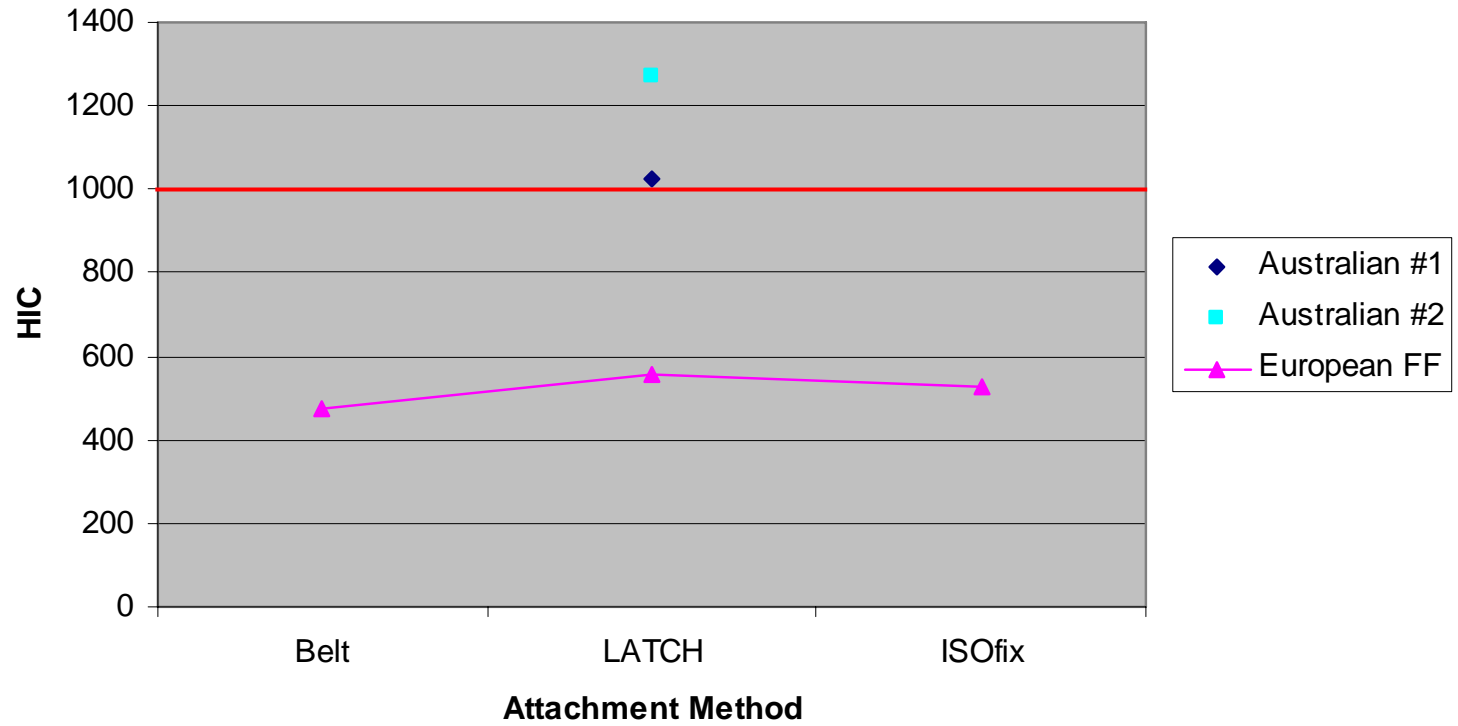


Child Restraints

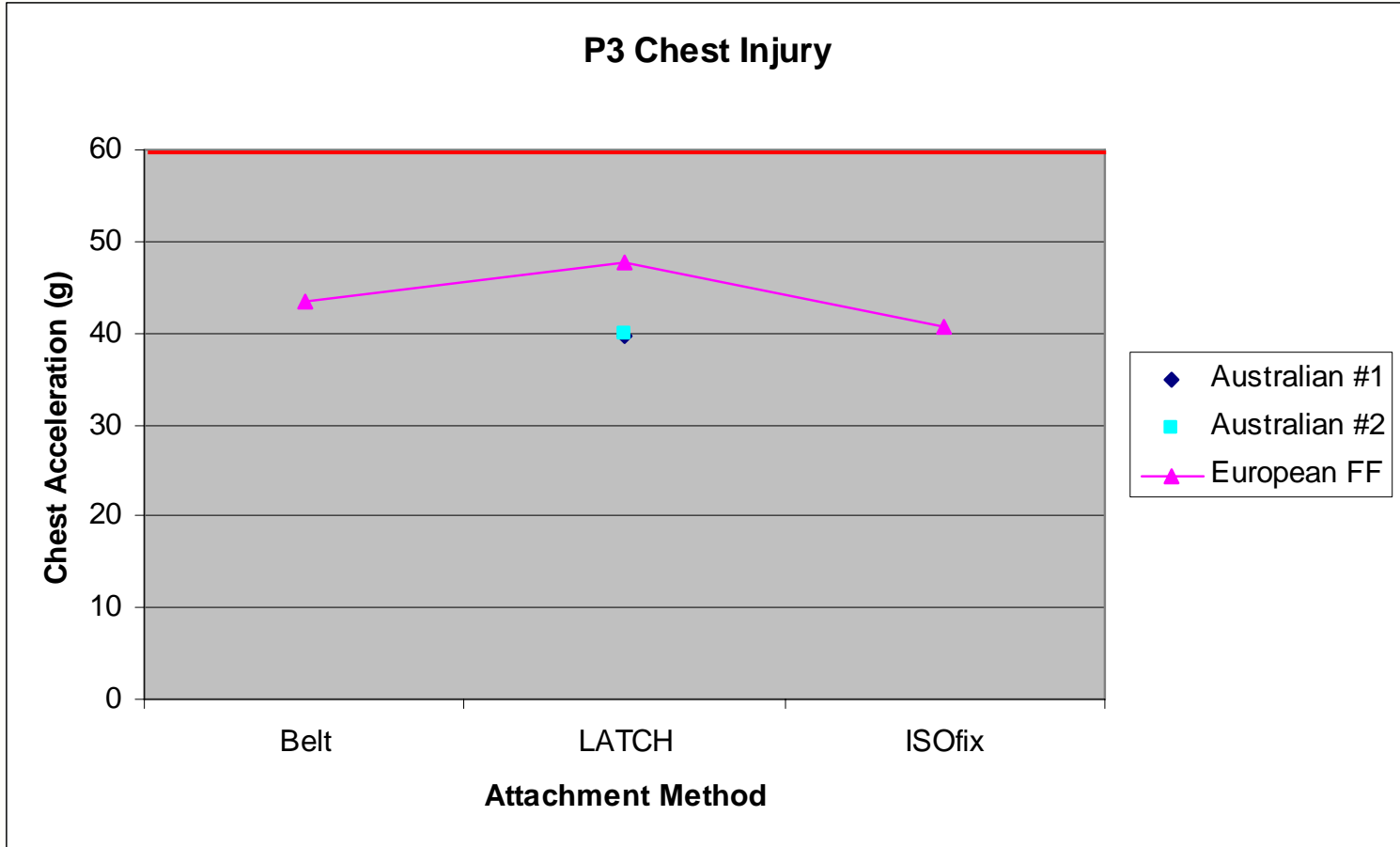
- Part 1:
 - CRS seated behind empty seat
 - Child Restraint performance, Child injury levels, Lower Anchorage loads
 - ECE-R44 and AS/NZS 1754 CRS
 - ISOfix, LATCH and lap belt attachment methods
 - Rigid, instrumented, Lower Anchorage design
 - No Top Tethers



P3 Head Injury (FF)



P3 Chest Injury

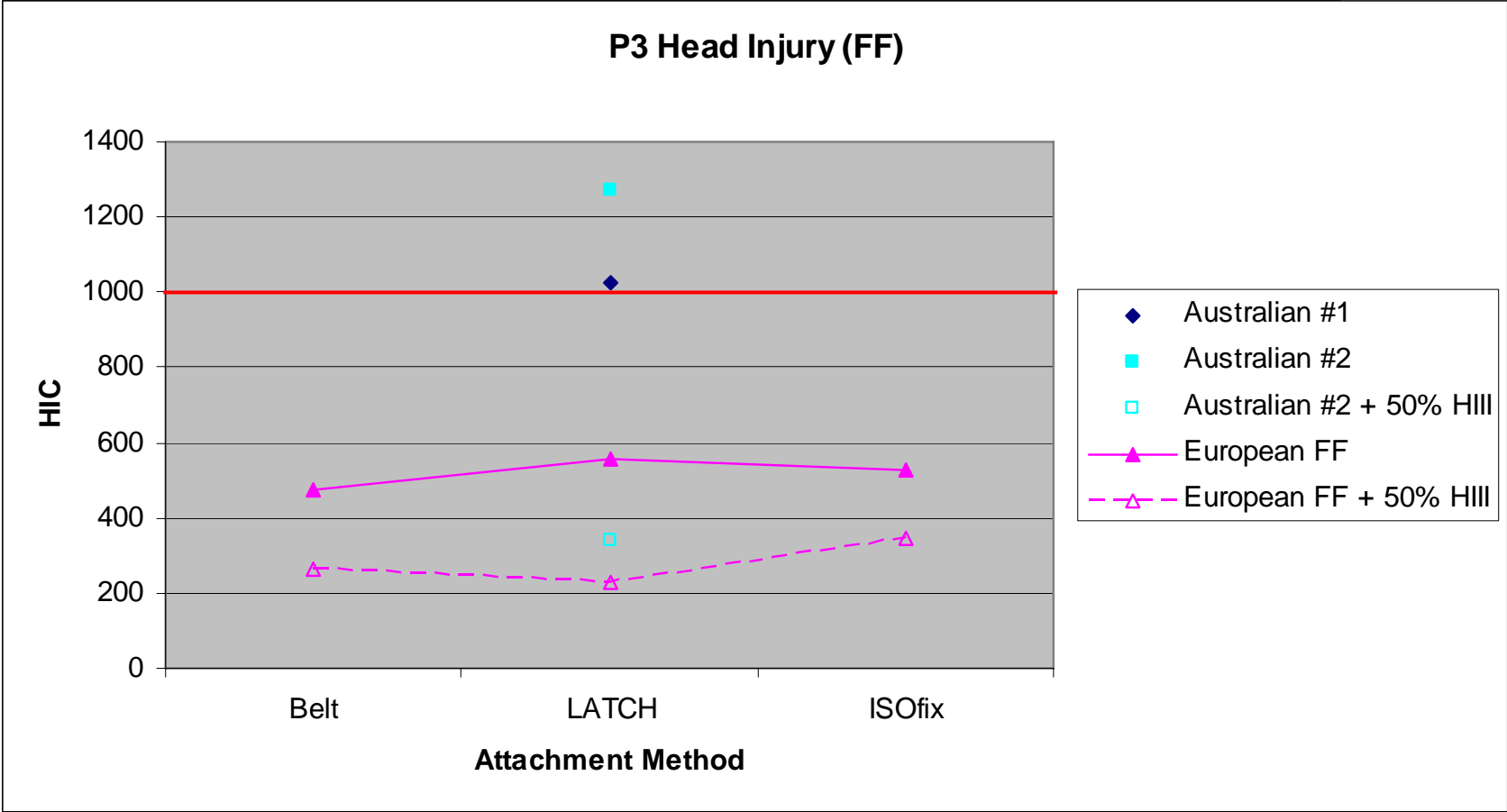


Child Restraints

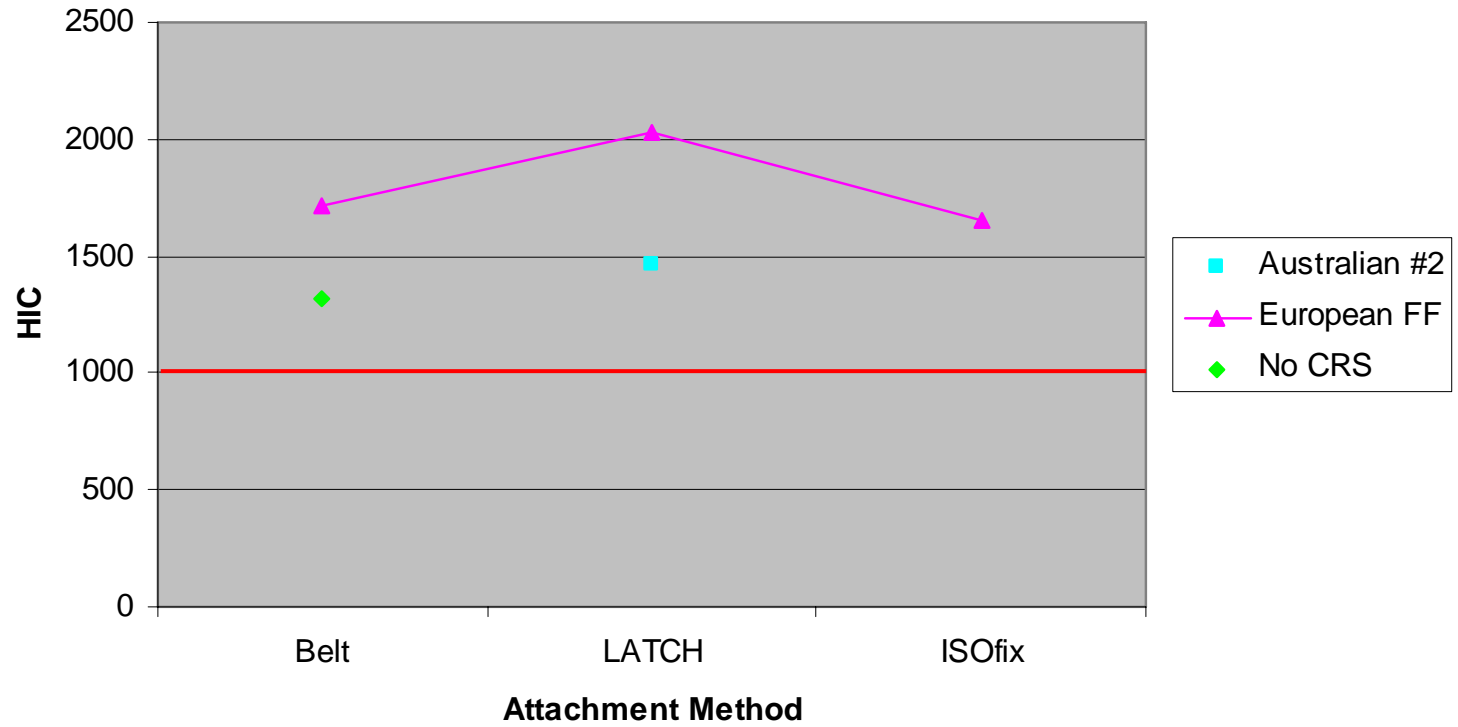
- Part 2:
 - An adult occupant seated behind a CRS
 - Child Restraint performance, Child injury levels, Adult injury levels, Adult/Child interactions
 - ECE-R44 and AS/NZS 1754 CRS
 - ISOfix, LATCH and lap belt attachment methods
 - In-seat Lower Anchorage design
 - No Top Tethers







Adult Head Injury

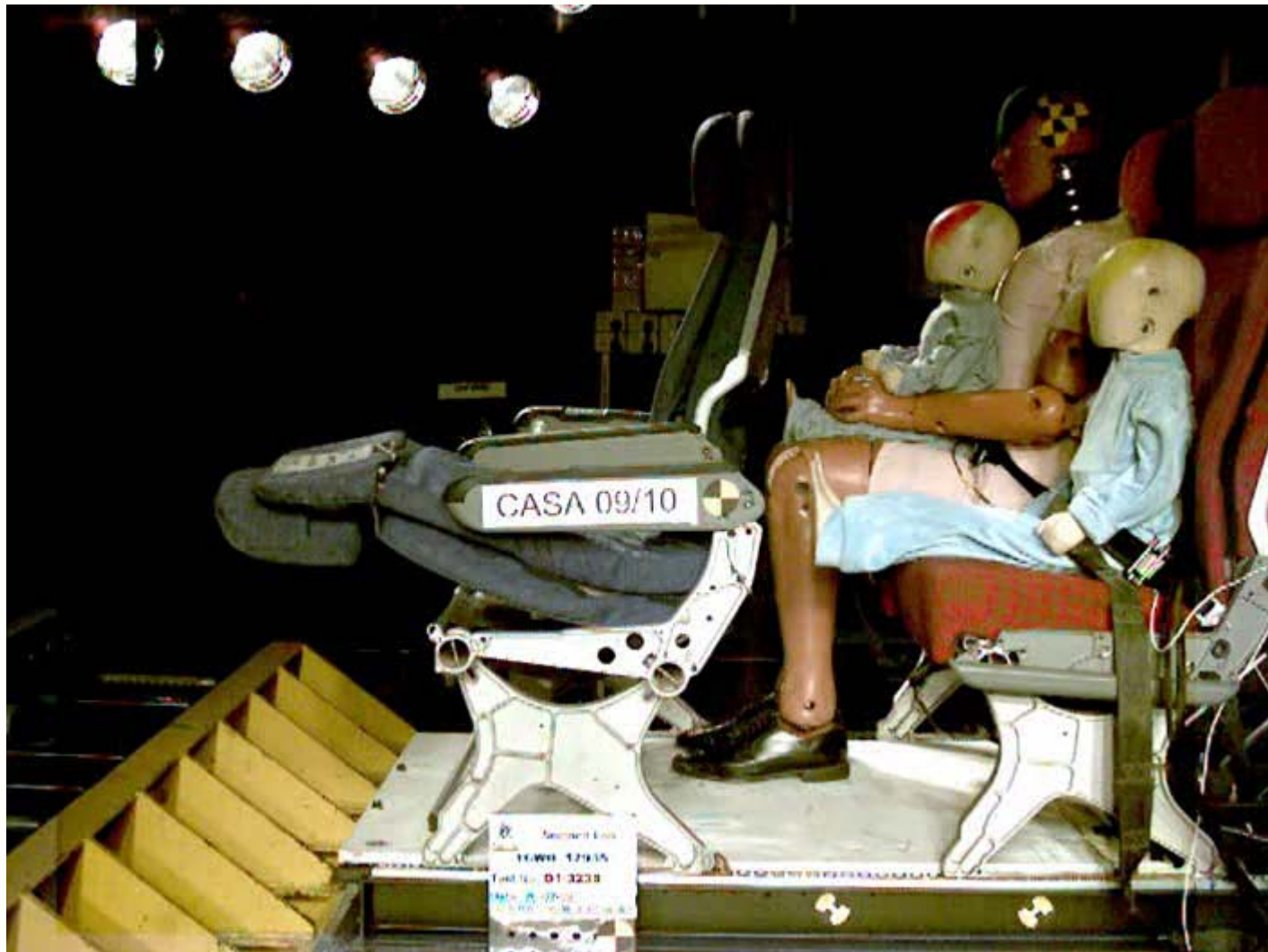


Child Restraints

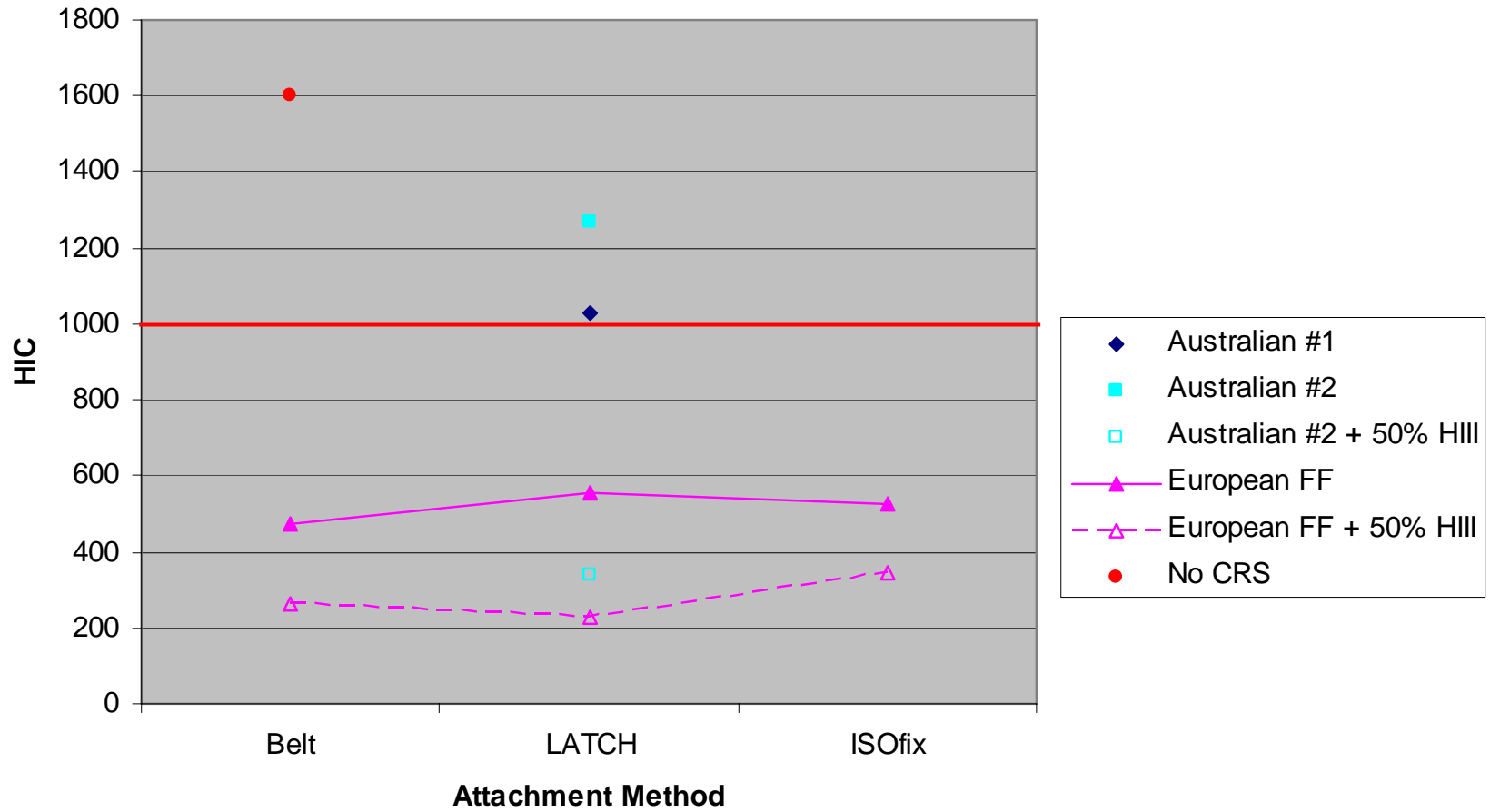
- What did we find?
 - All CRS performed adequately without anti-rotation devices
 - Lower Anchorage peak load of 5.1kN (peak lap belt load 6.5 kN)
 - Lap belt -> LATCH -> ISOfix – reducing excursion
 - Child injury levels reduced with rear occupant
 - Adult injury levels increase with CRS installed ?
 - New adult injury measures for certification ?
 - Tibia bending
 - Neck Injury

Child Restraints

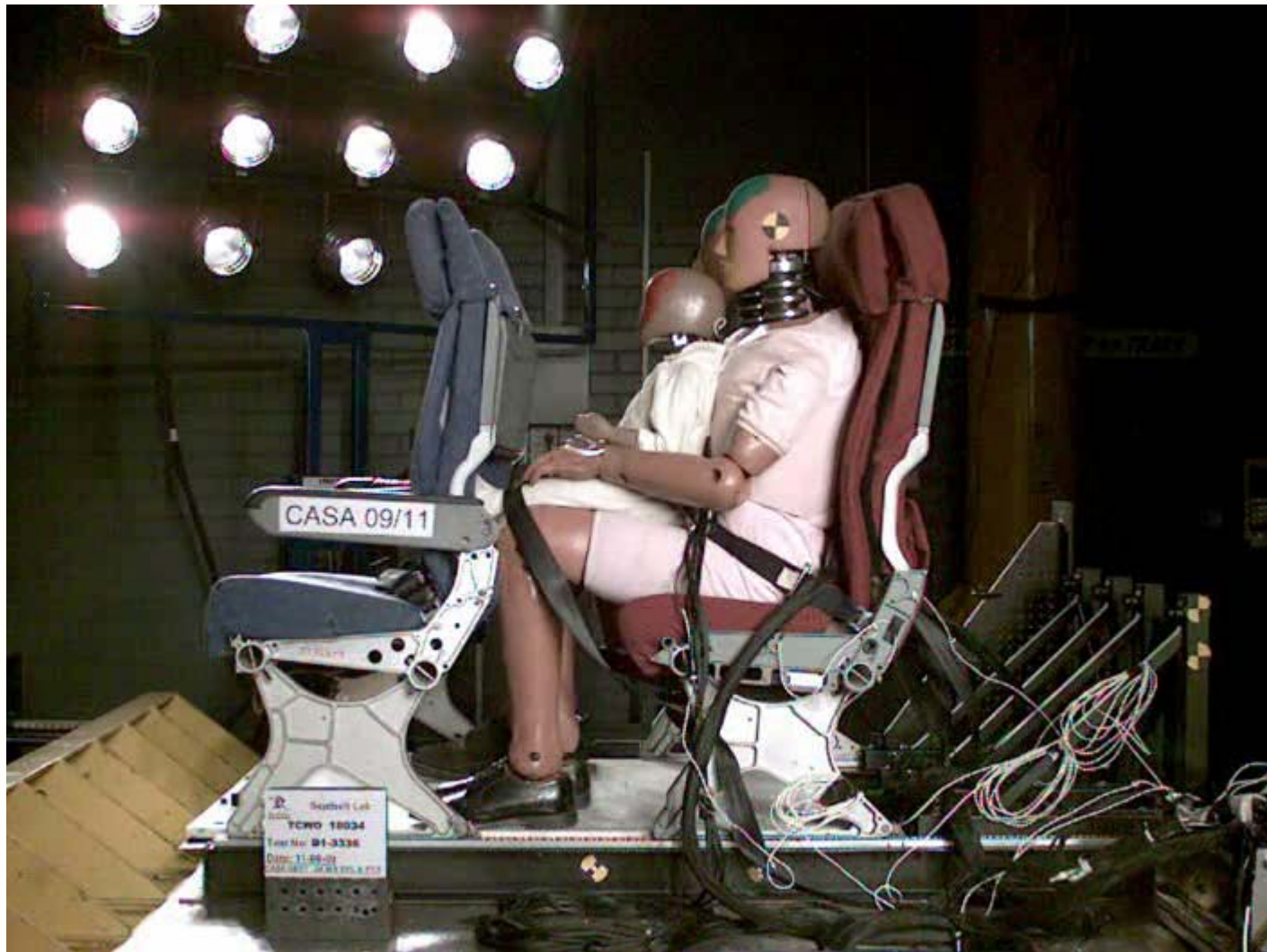
- How does this compare to a child in his/her own seat or, a lap held child?

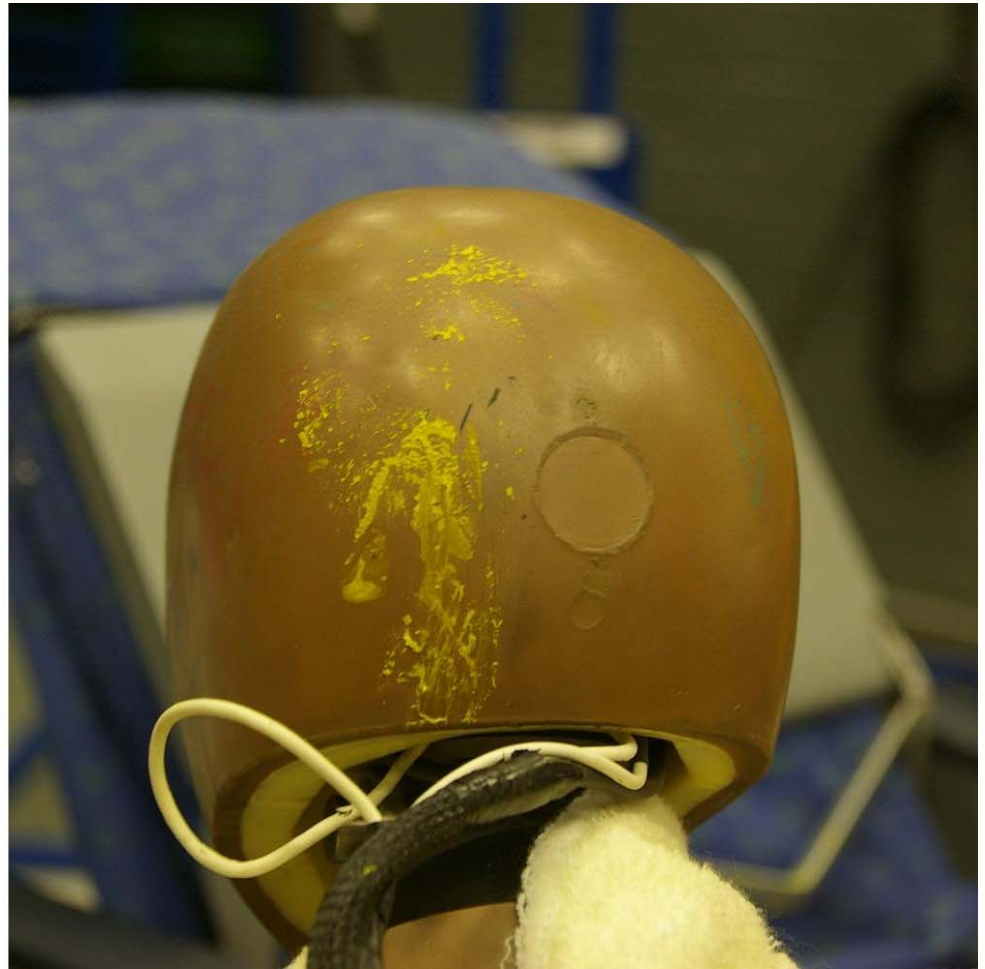
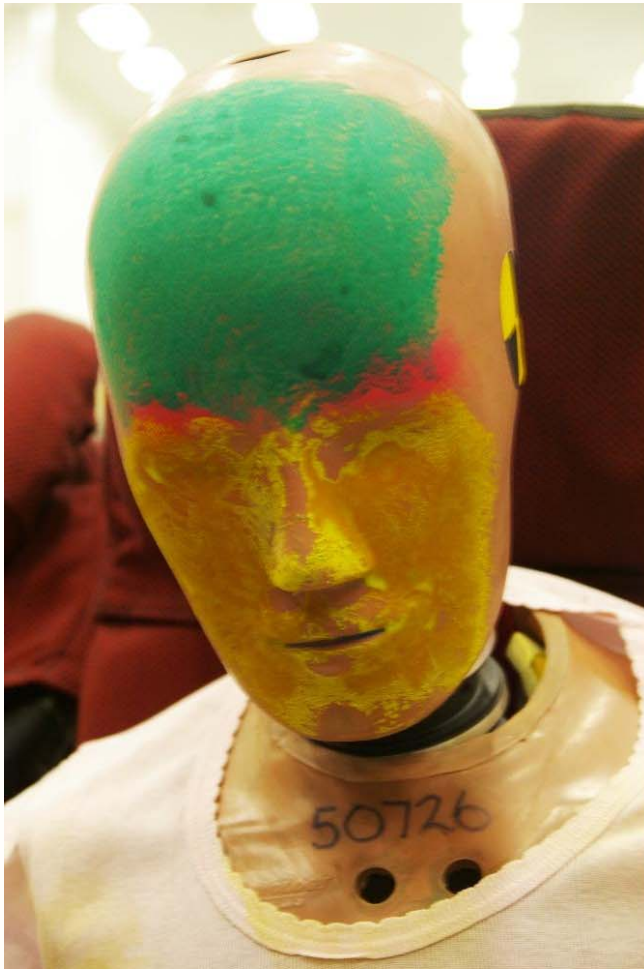


P3 Head Injury (FF)

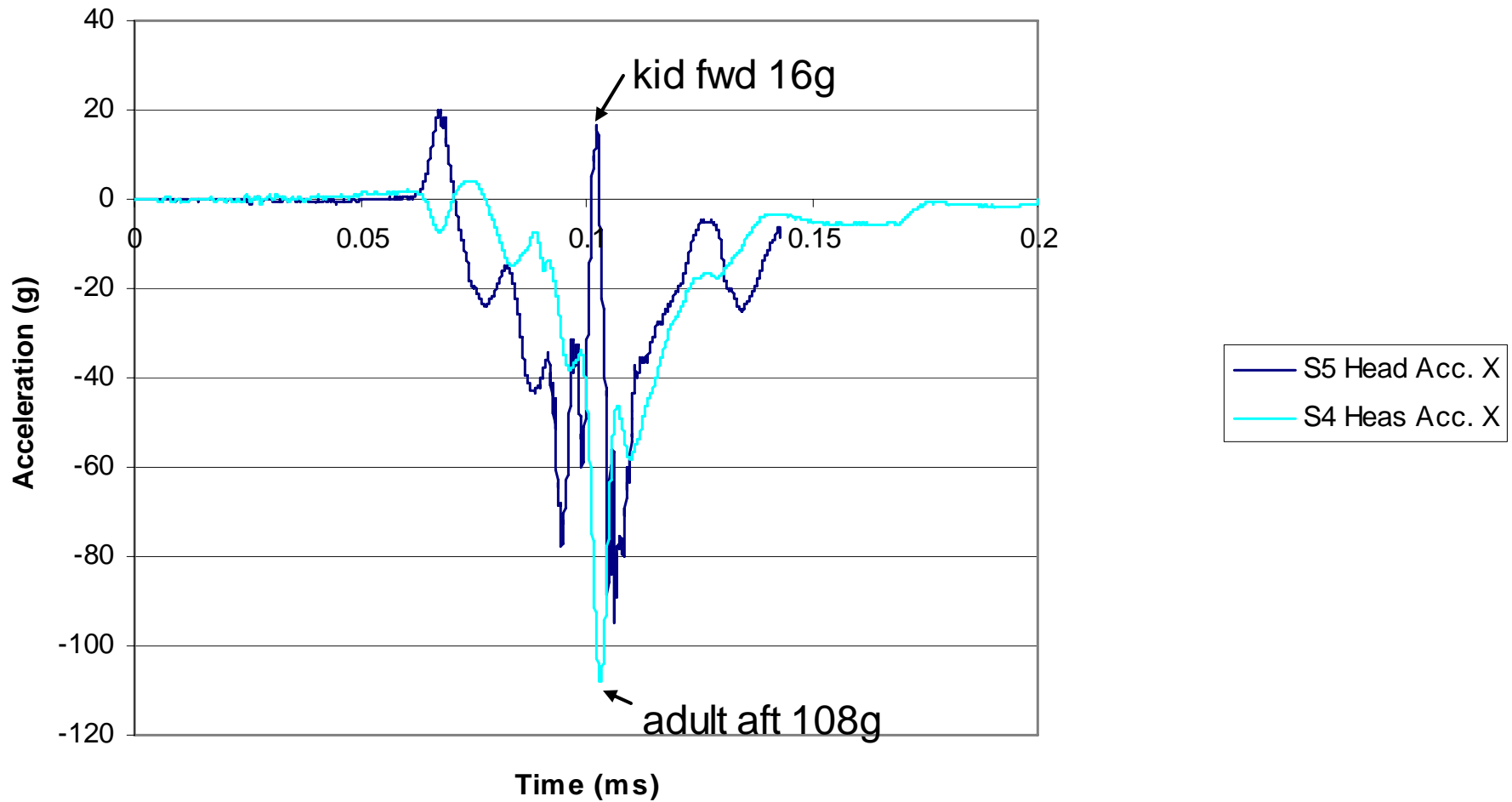




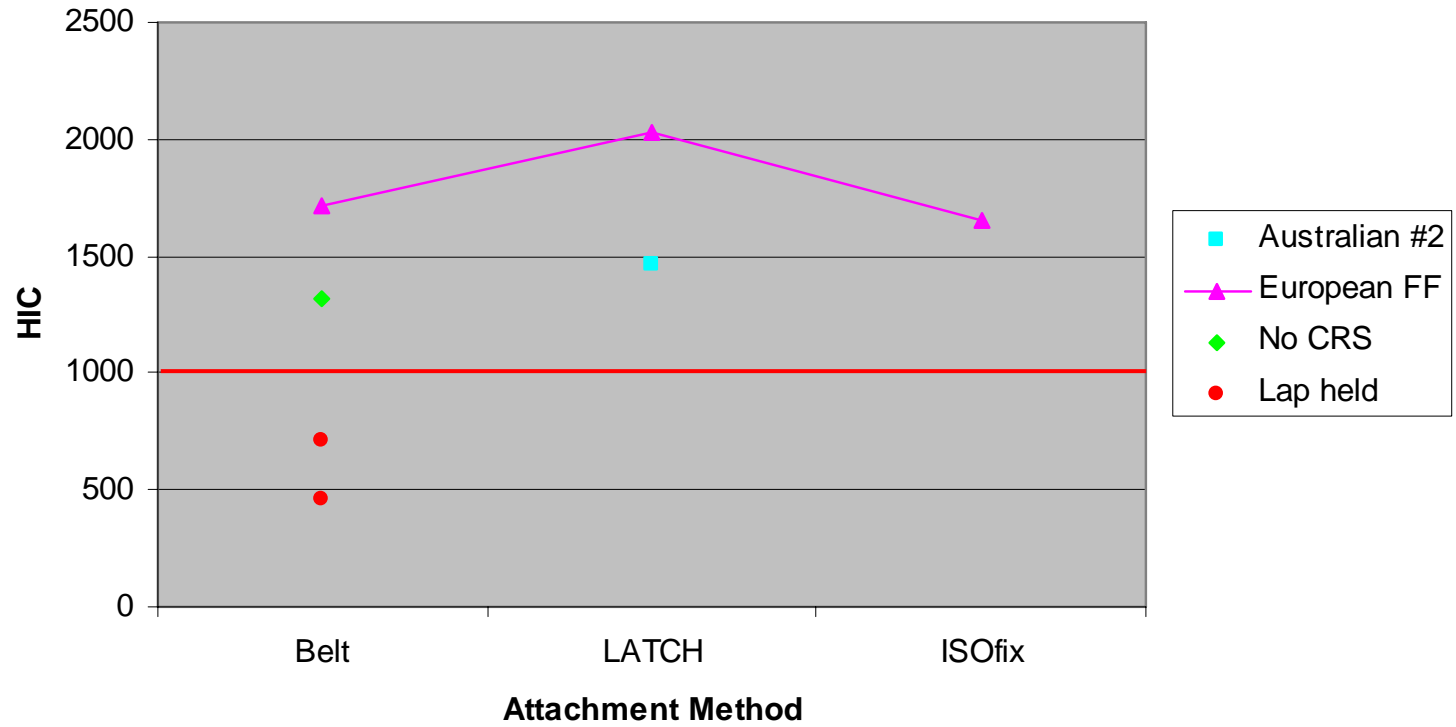




Head Acceleration (Fore/aft)



Adult Head Injury



Child in own seat or lap restrained

- Conclusions
 - 3 year old head injury higher than standard adult injury.
 - Practicalities of 3 year old seated position questionable.
 - Measured injury mechanisms for lap held child high.
 - True injury mechanisms of lap held children and nursing adults not measurable and subjective.
 - Crushing injuries applied by nursing occupant weighing 7 times more than infant.
 - Momentary compression force of ½ tonne on 18 month old head.
 - Measured adult injury mechanisms low !?!

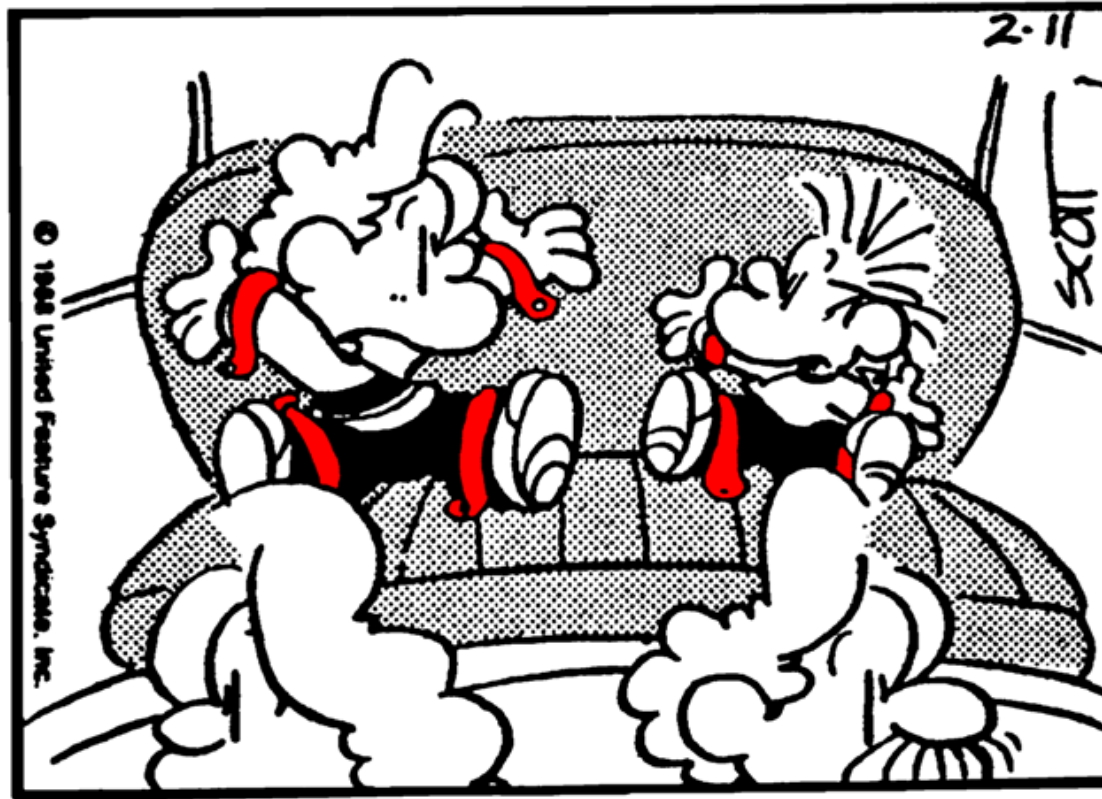
Child Restraints

- Where to from here ?
 - Infant Restraint Project – Phase III
 - CAAP 235-2(1) revision
 - Airworthiness Bulletin
 - TSO-C127a/SAE8049a revision
 - AS/NZS 1754 revision
 - Flight Safety Australia Article
 - Public Education

Public Education



Questions ?



"I DON'T KNOW ABOUT YOU, BUT I'M NOT TOO WILD ABOUT THESE NEW CHILD RESTRAINTS."