Further development of chest deflection proposals

Prepared by Jolyon Carroll
Senior Researcher

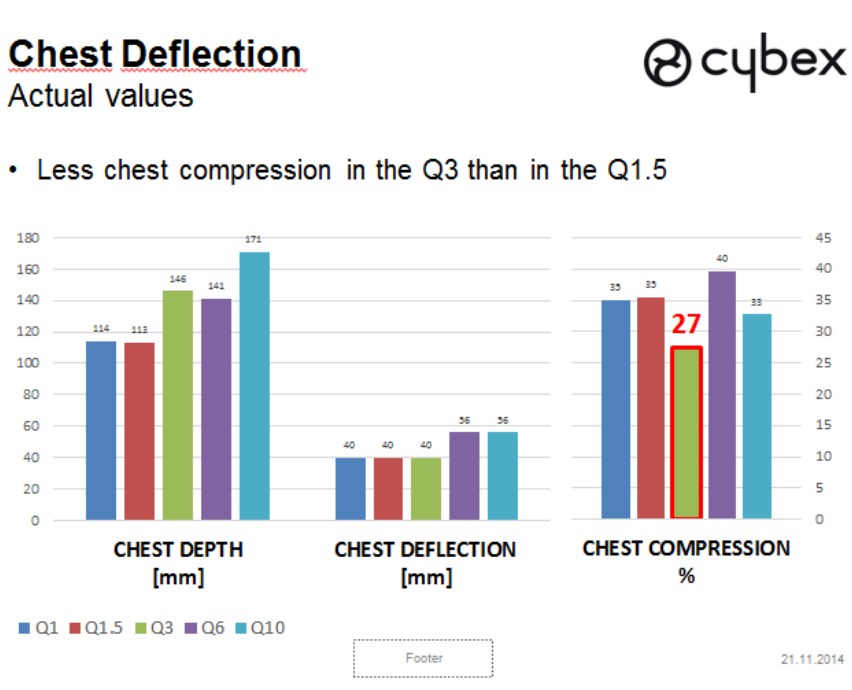
UN Informal Group on CRS 24th Nov 2014

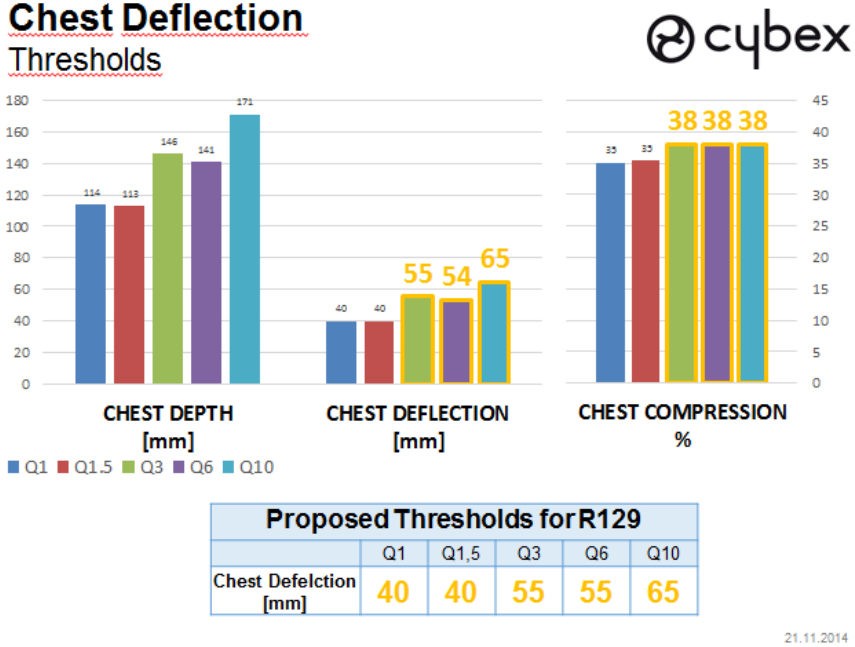
The draft 01 Series of amendments to UN R129 specifies pragmatic thresholds for chest deflection

Criterion	Unit	Q0	Q1	Q1.5	Q3	Q6	Q10
Chest deflection	mm	n/a	40	40	40	56	56

- Limited biomechanical basis
  - Chest & abdomen injury criteria task force yet to report
- Q6 threshold exceeds measurement capacity of dummy
  - No CRS could fail test with this dummy
- Large step between Q3 and Q6 not justified by human geometry

Cybex (CRS-47-08) highlighted variation in chest compression for UN R129 draft thresholds





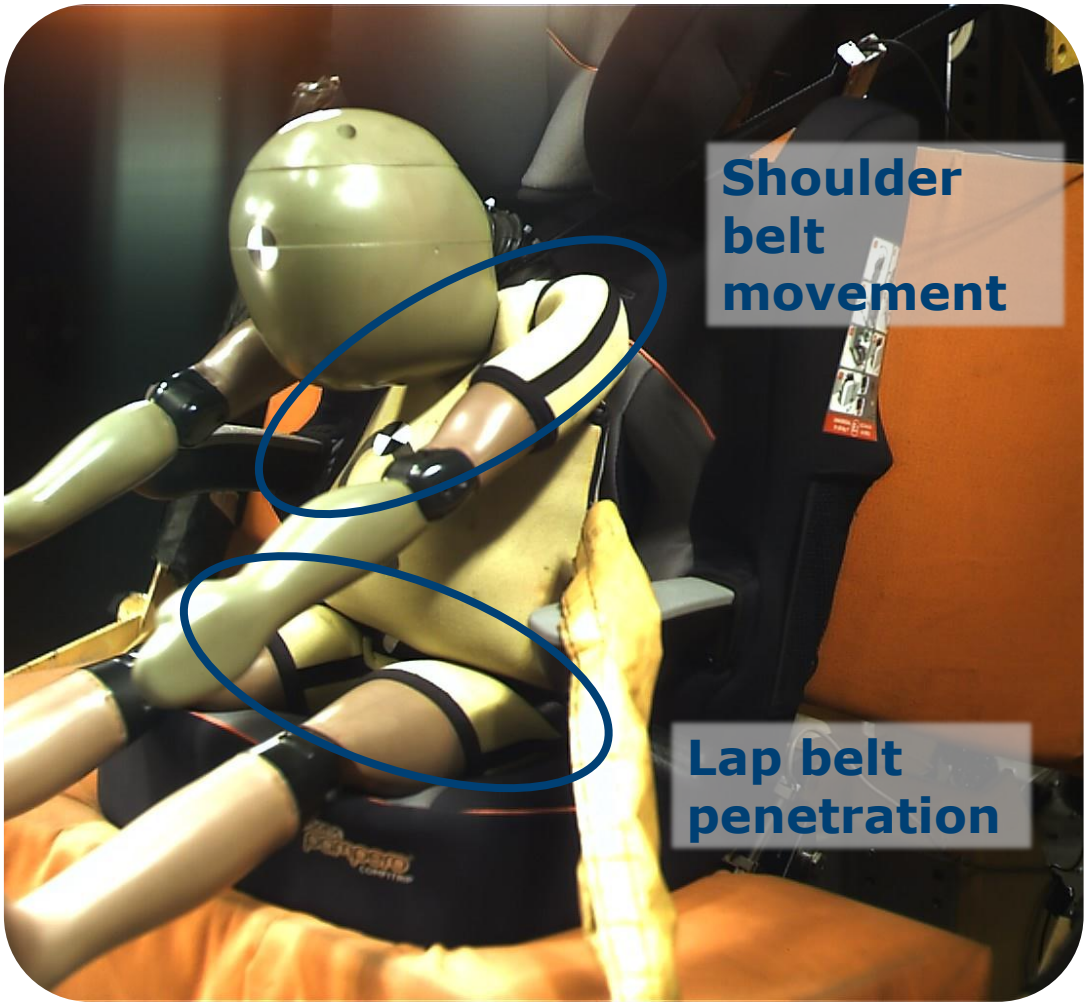
- Analysis based on dummy <u>not</u> human chest depth
- Cybex proposal exceeds measurement capacity of Q3 and Q10(?)

CANDAT human data enables thresholds to be derived that take account of child geometry

Criterion	Unit	Q1	Q1.5	Q3	Q6	Q10
Chest depth (CANDAT)	mm	109	113	122	135	155
Chest deflection (R129 01 Series)	mm	40	40	40	56	56
Chest compression (Deflection /depth)		37%	35%	33%	41%	36%
Chest deflection (35% compression)	**mm**	**38**	**40**	**43**	**47**	**54**

- Draft R129 thresholds equate to wide variation in chest compression
- Consistent '35% thresholds' a reasonable compromise
  - Need validation with CRS

Robust thresholds are important, but we can't forget dummy / belt interaction issues and their effects on sensor measurement (see CRS-42-07e)



Diagonal belt loads dummy away from deflection sensor – limit belt movement or 2nd sensor needed?

Lap belt unlikely to load abdomen in boosters (even with no CRS) – new set-up conditions?

Visvikis, C., Pitcher, M., Carroll, J., Cuerden, R., Barrow, A. (2014). New UN regulation on child restraint systems - assessment of amendments to the new regulation, front and side impact procedures and Q-Series dummy family injury criteria (Client Project Report 1801). http://ec.europa.eu/enterprise/sectors/automotive/documents/calls-for-tender-and-studies/index_en.htm