



Submitted by the expert from Japan

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agenda item12)

Test Data of Q1.5 Dummy's Neck Injury Measures in R129 Frontal Test

JASIC
MLIT / NTSEL



Background

- GRSP is considering introducing neck injury criteria for the Q dummy to R129.
- In the 68th GRSP, Spain reported that the contact of the chin and chest influences neck injury of the dummy.
- We conducted R129 frontal impact tests four times using the Q1.5 dummy and four types of R129 approved CRSs, and examined the effect of contact between the chin and chest on the dummy's neck injury.



Test Conditions

Test No.	Dummy	CRS	Attachment method	Direction
Test 1	Q1.5	CRS A	ISO FIX	Front facing
Test 2	Q1.5	CRS B	ISO FIX	Front facing
Test 3	Q1.5	CRS C	ISO FIX	Front facing
Test 4	Q1.5	CRS D	ISO FIX	Front facing



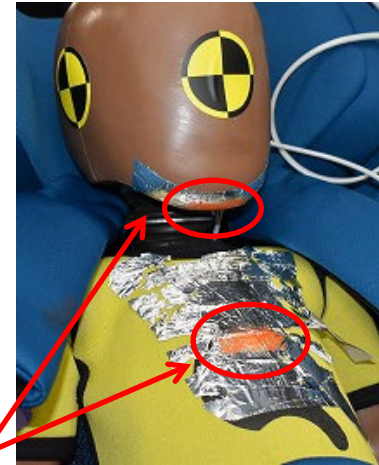
Test Results



CRS A



CRS B



**Contact
between chin
and chest**

CRS C



CRS D



Contact between the chin and chest was confirmed in all tests.



Injury Data

	Test 1 CRS A	Test 2 CRS B	Test 3 CRS C	Test 4 CRS D
Neck upper tension force (N)	1718	1242	1428	1539
Neck upper moment (Nm)	20.7	15.5	15.4	16.2
Chest 3ms maximum acceleration (G)	34.5	31.8	33.3	36.3
Chest deflection (mm)	24	14	17	14

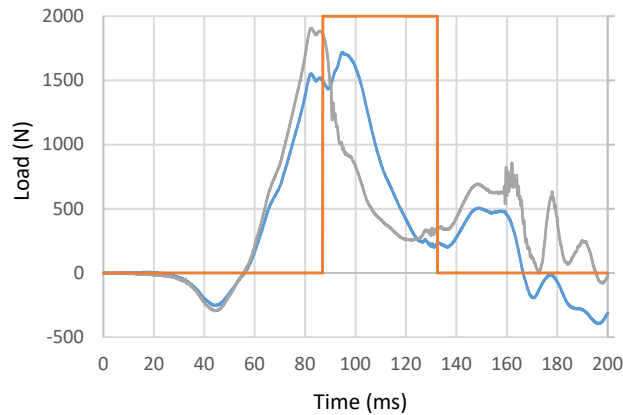
- Neck upper tension forces were between 1242 and 1718 in the four tests.
- Neck upper moments were between 15.5 and 20.7 Nm in the four tests.



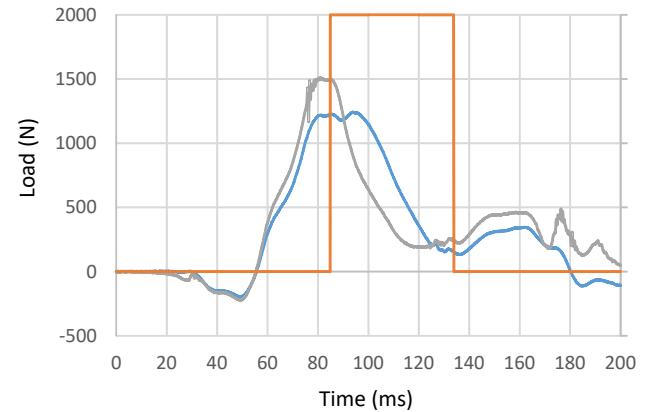
Comparison of Neck Fz and Head Load Calculated from Acceleration (az)

— Neck upper force — Head mass X Head acceleration z — Contact timing

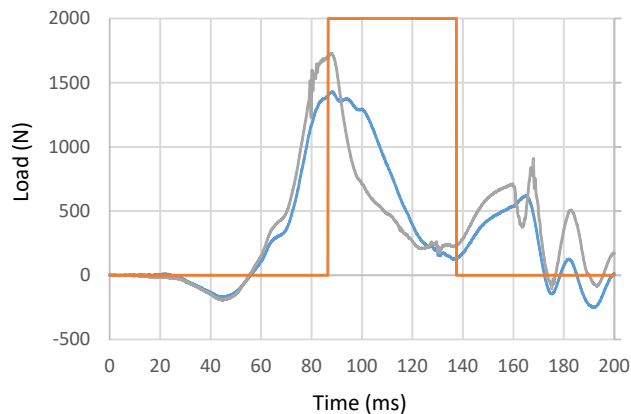
CRS A



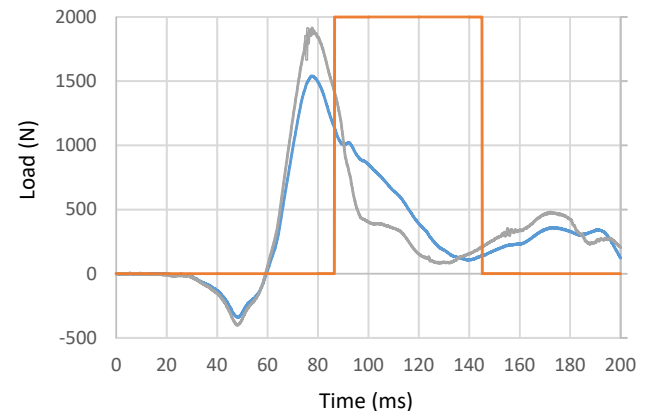
CRS B



CRS C



CRS D

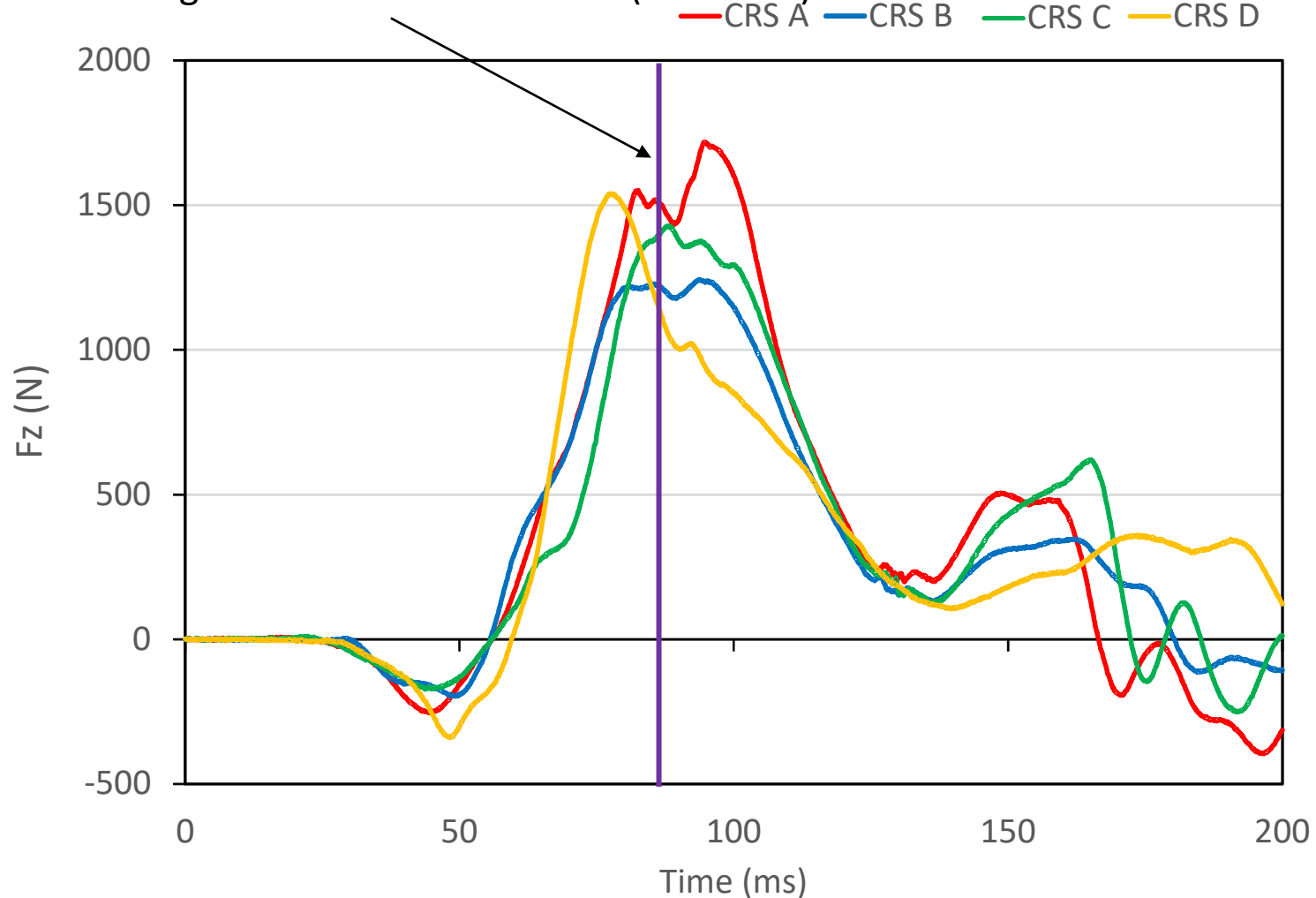


These graphs compare the neck upper Fz and the multiple (head mass \times head acceleration z). After contact between the chin and chest, Fz became larger than the multiple because of the input force from the chest to the head, however, the maximum neck tension force increased in only one case.



Neck Upper Tension Force

Contact timing between chin and chest (85–87ms)



In one CRS, the maximum neck upper tension force became much larger after contact than before contact.



Conclusions

- We conducted the R129 frontal impact tests four times using the Q1.5 dummy and four types of CRSs approved by R129.
- Contact between the chin and chest was confirmed in all tests.
- Neck upper tension forces were between 1242 and 1718 N in the four tests.
- In one CRS, the maximum neck upper tension force became much larger after contact than before contact. So, in some cases the contact between chin and chest is not influenced by the maximum neck tension force.