



Q-dummies Modification History

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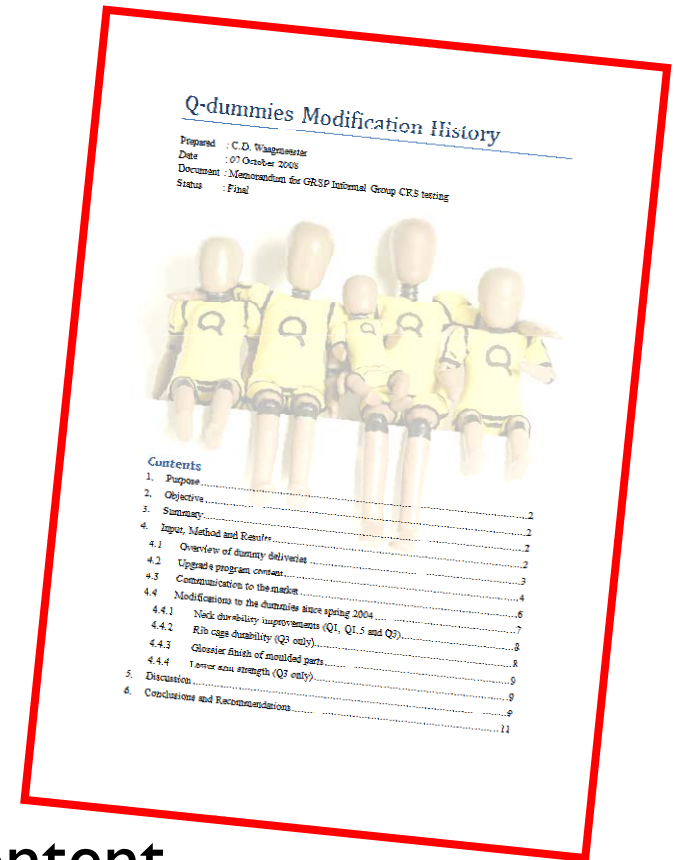
GRSP Informal Group CRS Testing – Brussels October 07, 2008

Contents

Memorandum prepared for GRSP:
Q- dummies Modification History

This presentation follows that document

- Purpose and Objective
- Overview of dummy deliveries
- Upgrade program quantity and content
- Communication to the market
- Modification to the Q-dummies since 2004
- Conclusions and Recommendations



Purpose and Objective

- **Purpose**

- To describe the configuration status of the Q-dummies with the eye on regulatory application of the dummies.
- The preparation requested by GRSP Informal Group CRS testing in its meeting in Vienna on September 02, 2008,

- **Objective**

- Describes Q-dummies final configuration that was frozen in winter 2004
- Addresses all Q-dummy modifications since 2004.
- Obtain transparency on Q-dummies configuration
- Support confidence in Q-dummies as consistent measurement tool for crash testing

Overview of Dummy Deliveries

Design frozen

Dummy	Calendar year											Remark
	98	99	00	01	02	03	04	05	06	07	08	
Q0								1	...	...	...	Prototype 2003
Q1								1	...	...	...	Prototype 2000
Q1.5							1	...	...	...	...	Prototype 2002
Q3	6	4	4	5	2	2	1	...	...	...	...	Prototype 1996
Q6					2	1	0	...	...	...	...	Prototype 2000
Q3 upgrade kits							8	5	4	0	1	

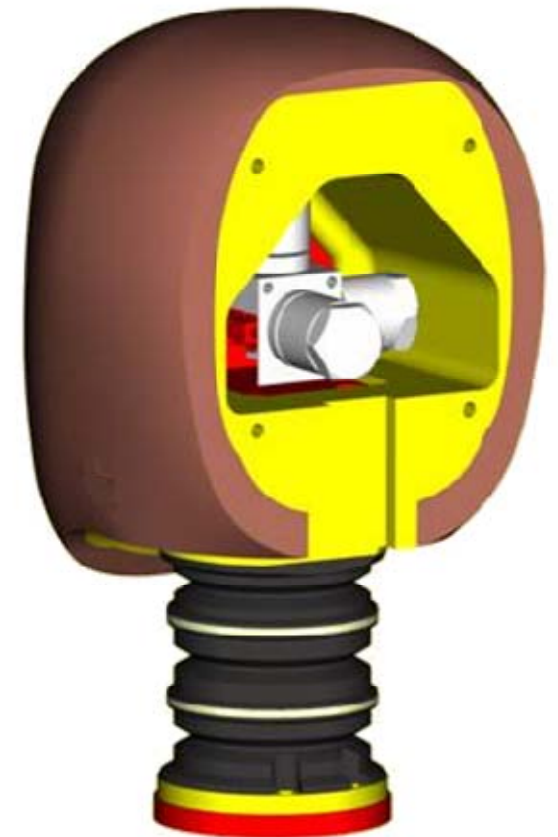
- Q3 dummy deliveries started in November 1998
- Development Q3, Q1, Q6 Q1.5 and Q0 ended 2003
- Before 2004 - **23** Q3 and **3** Q6 dummies delivered
- All early Q6 dummies delivered in final configuration

Upgrade Program Quantity and Content

- Early Q3 dummies (23 off) requires an upgrade
- 18 Q3-Upgrade kits delivered
 - 6 kits “Q3-UPGRADE”
for chest string potentiometer version
 - 12 kits “Q3-UPGRADE-2”
for chest IR-TRACC version
 - 5 Q3-dummies still in “OLD” configuration (all in JAPAN)
- Upgrade kits bring Q3-dummy 020-0000 to 020-0001 level
 - For content of upgrade kits see next slides

Upgrade Program Quantity and Content

- Q3-UPGRADE and Q3-UPGRADE-2 Bill of material (cont'd)
 - Head Frontal Assembly PN: 020-1020
 - New skin material
 - Higher mass
 - Revised interface with neck
 - Four holes in top to make neck interface bolts better accessible
 - Rear Skull Cap Assembly PN: 020 -1020
 - New skin material
 - Head Acc Mounting Bracket Assembly PN: 020-1013
 - Suitable for application of linear accelerometers
(Optional: Bracket allowing angular rate sensors application)



Upgrade Program Quantity and Content

Q3-UPGRADE and Q3-UPGRADE-2

- Bill of material (cont'd)
 - Neck Assembly PN: 020-2100
 - Atlas and OC joint deleted
 - Neck rubber segmented
 - Fiber cord neck cable
 - Lower mass
 - Neck Torso Interface Plate PN: 020-2015
 - Interface adapted to the new neck
 - Clavicle Q3, modified PN: 020-3201
 - To suite with new shoulder-spine interface parts
 - Rubber Shoulder-Spine Interface PN: 020-3310 and 020-3320
 - Rubber shoulder to spine interface part
 - Higher mass



Upgrade Program Quantity and Content

Q3-UPGRADE and Q3-UPGRADE-2

- Bill of material (cont'd)
 - Thoracic Spine (Spring Pot) PN: 020-4006 for string potentiometer
Optional Q3 UPGRADE-2:
Thoracic spine for IR-TRACC application - Part number 020-4401
 - Lower mass
 - Pelvis Flesh, Molded PN: 020-7010
 - Changed skin material
 - Optional Q3-UPGRADE-2:
IR-TRACC provisions kit PN's: 020-4402, -4403, -4404, -4405, -4406, -4407 and -4411
(together with dedicated thoracic spine 020-4401)
 - Accurate measurement under high velocity loading conditions



Communication to the Market

Since January 2004 the market was informed through:

- Mailings to customers
 - Q3-UPGRADE (for string pot) was offered to all customers
 - Q3-UPGRADE-2 (for IR-TRACC) was offered on request
- Conference presentations
 - Wiebe Onvlee: Dec '04 Munich
 - Kate de Jager: June '05 ESV and Dec '05 Munich
 - Kees Waagmeester: May '06 CHILD dissemination workshop
- FTSS NewsLine articles
 - Nov 2004 and April 2005
- Technical Sheets also used in FTSS exhibition booths
- Publication of the EEVC Q-dummies report in April 2008

Communication to the Market

- Updated manuals, Jan 2007 (Q1 and Q1.5) and July 2007 (Q3 and Q6)
- Available through <https://select.ftss.com>



4.4 Torso

Construction

The torso consists of a metal thoracic spine, left and right shoulder assemblies, a clavicle and a rib section. The rib cage is made of a deformable synthetic composite. The shoulders are connected with the clavicle element, which attaches to the left and right shoulders, and to the rib cage (sternum). The parts of the Thorax assembly are listed below:

Description	Part No	Qty in assembly
Thorax (part of torso assembly)	020-4400	1
Thoracic Spine	020-4401	1
Loadcell Structural replacement	020-2007	1
Mac 2.7 Torso interface plate	020-2015	1
Screw FHCS M5 x 0.8 x 12	5000202	4
Gimbal Ring	020-4405	1
Pivot Pin - Gimbal	020-4402	2
Gimbal shaft	020-4403	1
Shaft Locking Boss	020-4404	1
RB Cage Assembly	020-4100	1
Bracket (R-TRACC) Attachment	020-4406	1
Screw FHCS M4 x 0.7 x 10	5000203	2
Screw FHCS M5 x 0.8 x 16	5000416	6
Shoulder interface assembly RH	020-3310	1
Shoulder interface assembly LH	020-3320	1
Screw FHCS M4 x 0.7 x 12	5000205	8
Clavicle	020-3201	1
Screw FHCS M6 x 1.0 x 12	5000139	2
Scapula Molding RH	020-3100	1
Scapula Molding LH	020-3101	1
Screw FHCS M5 x 0.8 x 20	5000386	4
Shoulder Swivel assembly	020-3000	2
Shoulder Swivel Body	020-3002	2
Shoulder Retaining Cap *	020-3005	2
MS Spring Flange **	5000328	4
Detent Peg **	020-7103	2
Spring ECM 090F 1 MW *	5000450	2
12mm Internal Carriage **	5000051	2
M4x12 BRCS **	5000093	8
Screw FHCS M5 x 0.8 x 10	5000204	4
Clavicle Retainer	020-4200	1
Screw FHCS M5 x 0.8 x 12	5000374	1
Screw FHCS M5-40 x 5/8	9002975	1
Spacer (R-TRACC) Attachment	020-4407	2
Screw SSCP M4 x 0.7 x 5	5000406	1
Cable Guide	020-4411	1
Screw FHCS M4 x 0.7 x 16	5000447	2

*) Items marked are not shown in Figure 7, but in Figure 8 (Shoulder Assembly).

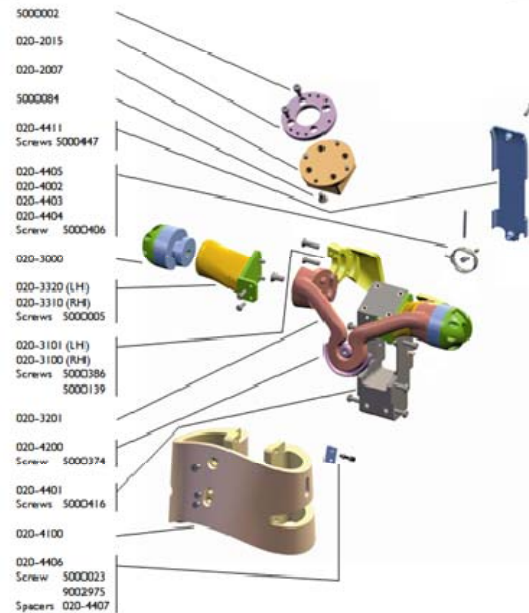


Figure 7: Q3 Thorax Assembly (Part of torso assembly 020-4400)

Manual presentation (Example Q3 manual)

- Parts list specifying per part:
 - Description
 - Part number
 - Quantity
- Exploded views
 - Parts pictures
 - Part numbers

Q-dummy Modification Since 2004

Product improvements implemented

- Overcome manufacturing problems,
- Address user feedback
- Solve customer complaints.
- Modification described in terms of: What, Why, When and Implications.

All changes are presented in the following sheets:

- Neck (Q1, Q1.5 and Q3)
- Rib Cage (Q3 only)
- Glossier appearance (all dummies)
- Lower arm (Q3 only)



Q-dummy Modification Since 2004

Neck durability improvement (Q1, Q1.5 and Q3)

Part : Q3 Neck Assembly (also for Q1 and Q1.5) PN: 020-2100

What : *New material vendor that guarantees consistency rubber.
Mould shape slight changed to reduce stress concentration.*

Why : *Necks showed small surface cracks in rubber and some users reported neck failures.
Process control at vendor not appropriate.
Other material vendor selected.*

When : *Start in June 2006 and was solved in November 2006.
Customers got replacement parts free of charge.*

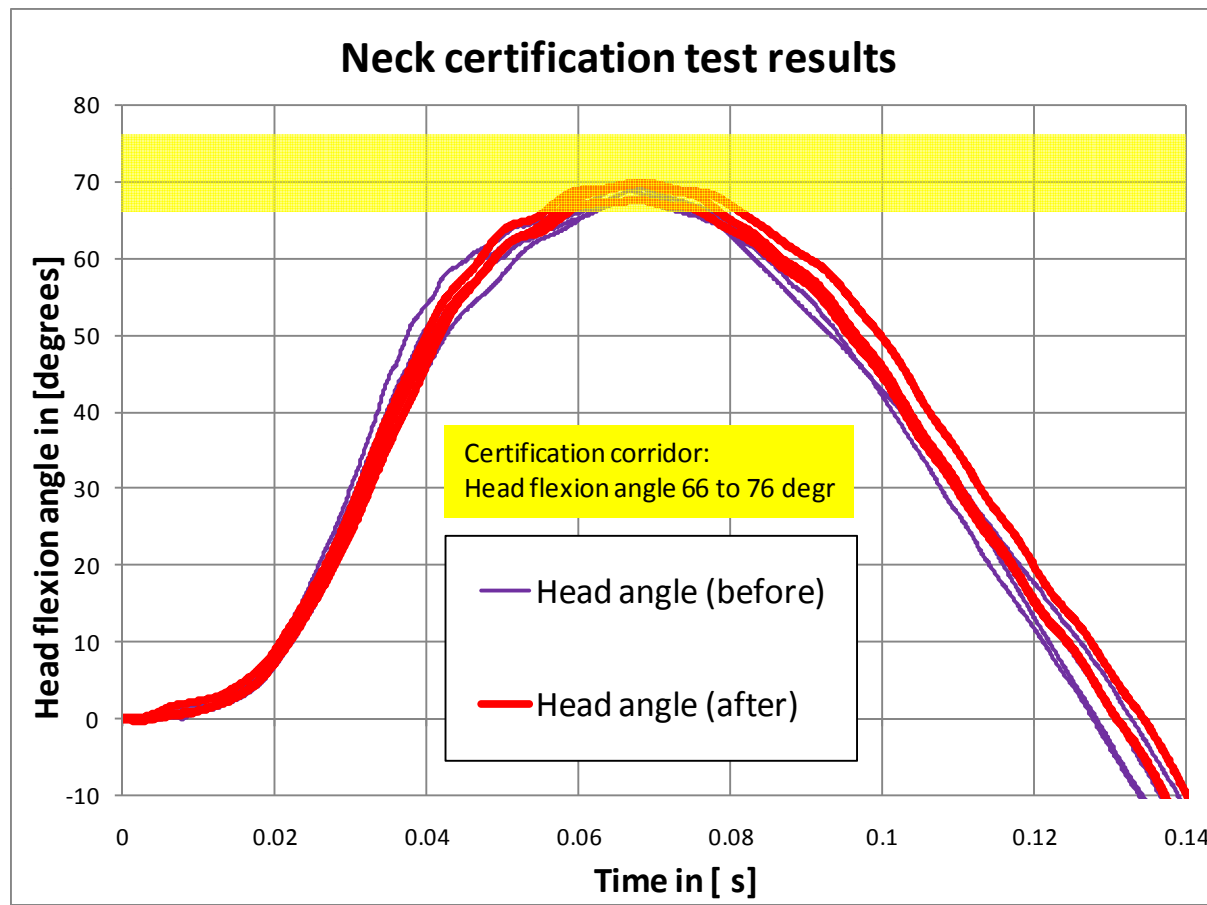
Implications:

*No affect on bending performance characteristic.
Old parts can be used as they are.*

Q-dummy Modification Since 2004

Neck durability improvement (Q1, Q1.5 and Q3)

Implications: *No affect on bending performance characteristic*



Tested according to old certification procedures

Before: Test number: 116059, 125020, 125069 and 126903

After: Test number: 65948, 66617 and 67306

Q-dummy Modification Since 2004

Rib cage durability (Q3 only)

Part : Rib Cage Assembly PN: 020-4100

What : Radius cut out at mid sagittal plane in upstanding flange of rib cage at clavicle mount location.

Why : Customers suffered early crack initiation. High stresses in top of flange due to bending promotes fatigue crack initiation.

When : May 2007 Parts identification controlled by serial number

Implications:

No affect on stiffness of ribcage section.

Improved fatigue life for frontal impacts.

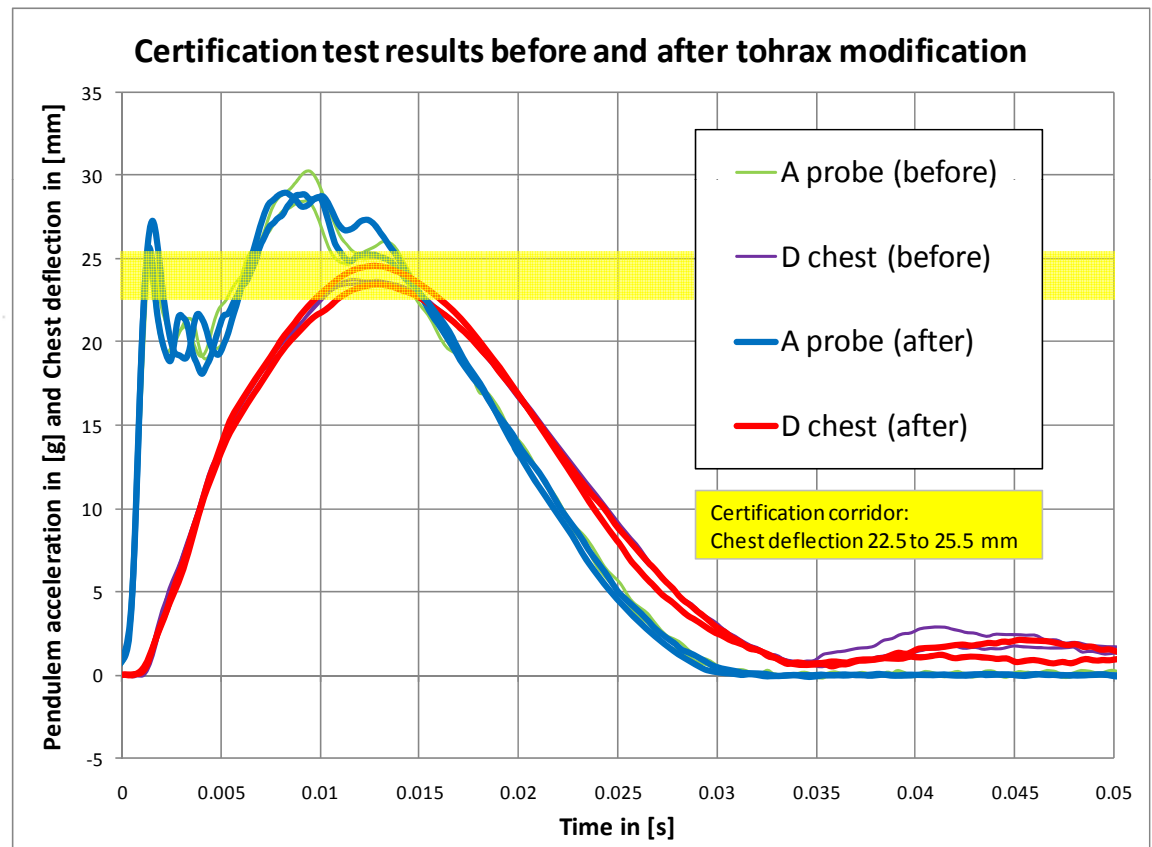
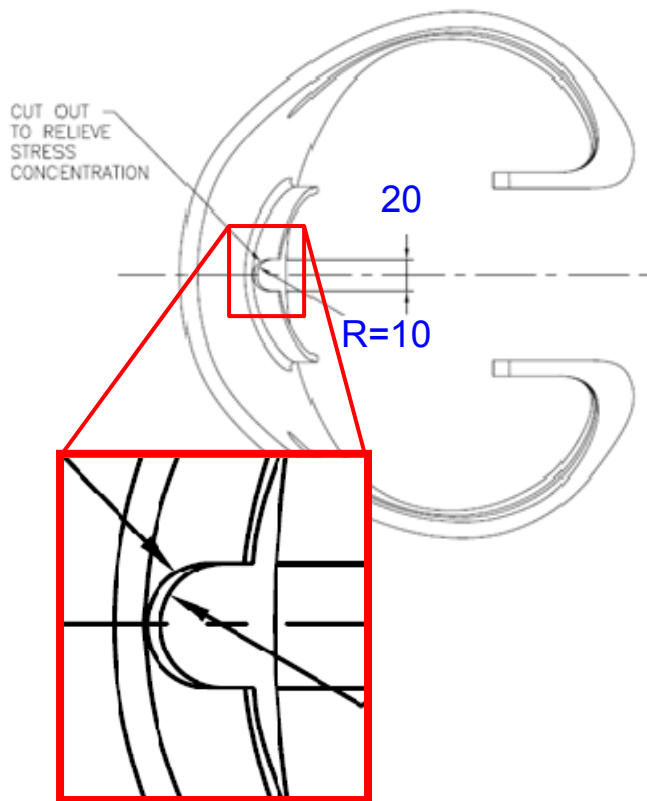
No affect on impact performance of the rib cage.

Old parts can be used as they are.

Q-dummy Modification Since 2004

Rib cage durability (Q3 only)

Implications : No affect on impact performance of the rib cage



Q-dummy Modification Since 2004

Glossier finish of molded parts

Part : Moulded parts (several part numbers)

What : Previously the surface finish of the moulded parts was satin, this changed to a glossier finish.

Why : The production of the Q-dummies is shifted from the United Kingdom to America.

The molding process is harmonized with processes applied in production of parts like for Hybrid III and ES-2

When : Nov 2007, Parts identification controlled by serial number

Implications:

This appearance change of dummies, do not have any implication for performance of the dummies.

Old parts can be used as they are.

Q-dummy Modification Since 2004

Durability of extremities (Q3 only)

Part : Q3 Lower Arm Assembly, PN 020-9302 (LH), 020-9402 (RH)

What : S. Steel reinforcement molded into bone at elbow end

Why : Q6 arm failed in 2004 in a frontal tests
(Q6 was reinforced in 2004, Q3 was reinforced later as proactive measure to try to avoid this failure.)

When : October 2005. Parts identification controlled by serial number

Implications:

Lower arm mass still within specification.

Old parts can be used as they are.

Conclusions and Recommendations

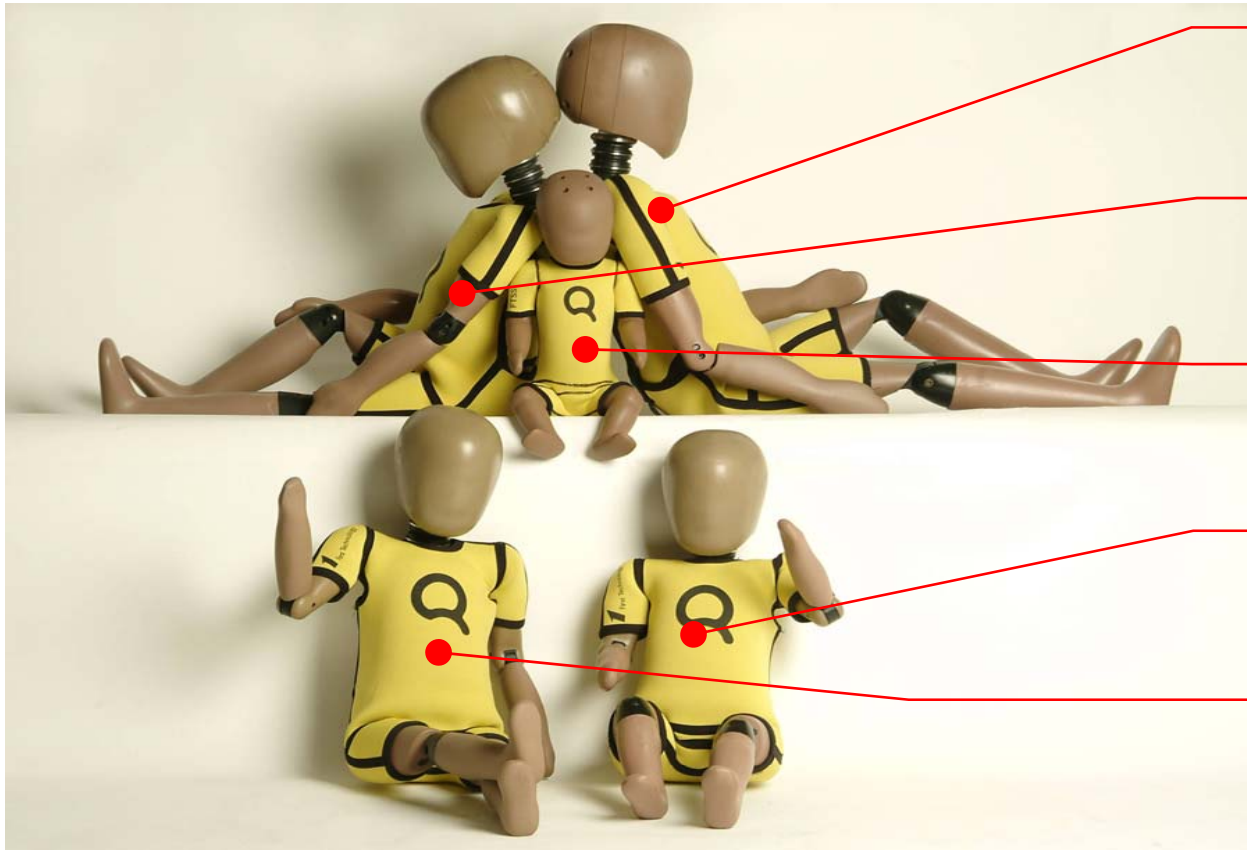
Conclusions

- Q dummies configuration is consistent since 2004
No changes that affects performance are applied
- Five Q3 dummies (in Japan) are still in the old configuration
- Six Q3 dummies (in Europe) are still equipped with string potentiometer for the chest deflection

Recommendations

- Replace all chest string potentiometers with IR-TRACC's
- In case of doubts on parts, check with manual information and contact FTSS for help if necessary.

Q-dummy family well equipped ...



Q6 23.0 kg

Q3 14.5 kg

Q0 3.4 kg

Q1 9.6 kg

Q1.5 11.0 kg

... to contribute to child safety