



BioRID

Comparison upright vs. normal spine adjustment

28. April 2010

Comparison upright vs. normal spine adjustment

- Comparison of one BioRID spine
 - a) adjusted with standard adjustment tool → normal spine

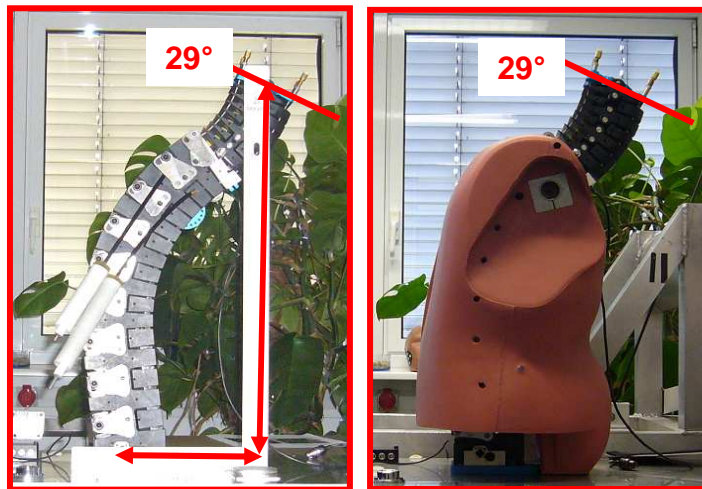
vs.

 - b) adjusted with new adjustment tool → upright (steeper) spine
- Pelvis plate of the spine (pelvis to spine attachment) was mounted horizontally on a table for geometric measurement
- In this study, the original jacket was used without any modification with both spine settings (normal/upright)

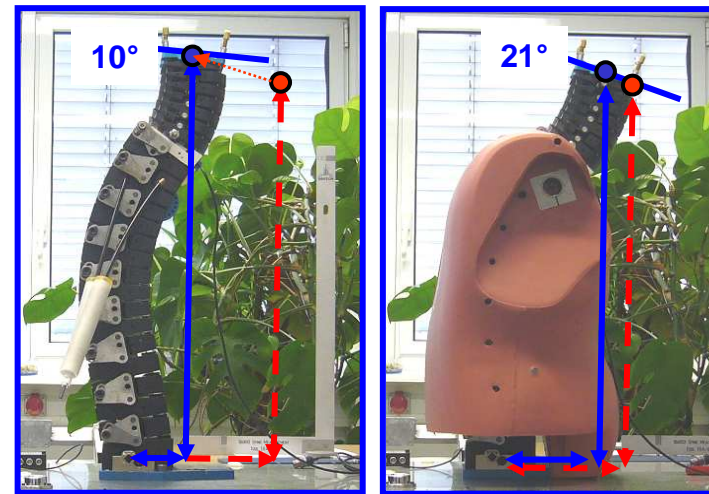
Results

	horizontal distance h-point square hole / O.C. pin	vertical distance h-point square hole / O.C. pin	O.C. plate angle	T2 vertebra angle
	[mm]	[mm]	[°]	[°]
Normal adjustment				
without jacket	153	610	29,0	37,5
Steeper adjustment				
without jacket / with jacket	40 / 119	655 / 629	10,0 / 21,0	56,0 / 45,0
Normal adjustment				
without jacket / with jacket	153 / 153	610 / 610	29,0 / 28,5	37,5 / 37,5

Normal spine adjustment:



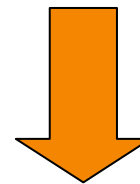
Steeper adjustment with new adjustment tool:



Results



Torso with steeper adjusted spine on certification sled



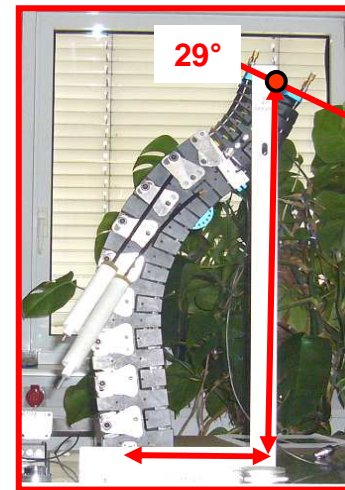
- Head angle 5° rearwards
- Pelvis angle with 26° set by certification sled

Findings

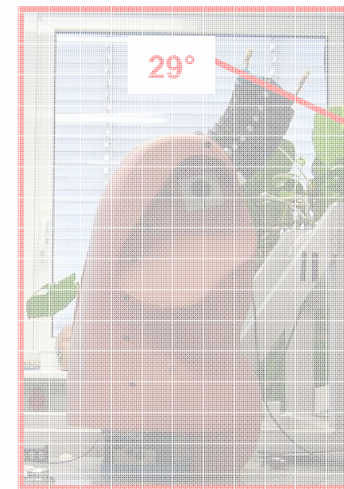
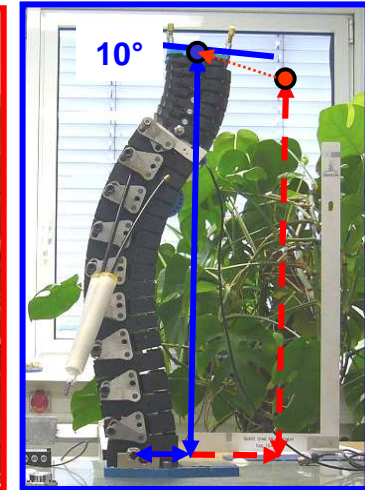
By using new adjustment tool:

- the O.C. pin moves 45 mm upwards und 113 mm rearwards
- the angle of O.C. plate decreases from 29° to 10°
- the jacket affects the O.C. angle → O.C. angle increases from 10° → 21° with jacket → stressed spine!
(The jacket has no influence on normal adjusted spine!!! → no stressed spine)
- head angle is 8° more upright (rearwards)
- the O.C. pin moves relatively to the h-point square hole 34 mm rearwards and 19 mm upwards
- the 0° head angle can not be reached on certification sled

Normal spine:



Steeper spine:



Findings

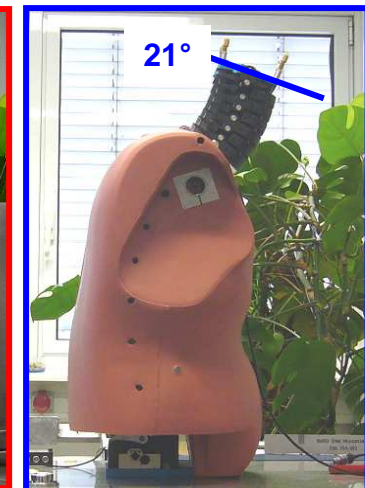
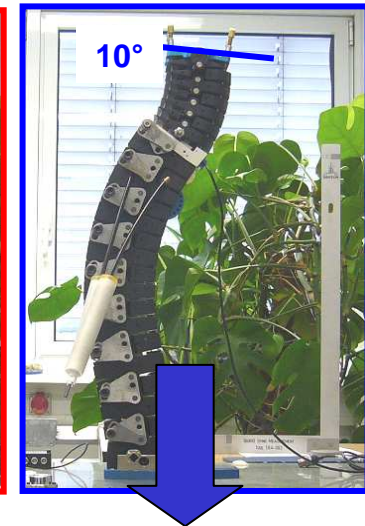
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- the O.C. pin moves 45 mm upwards und 113 mm rearwards
- the angle of O.C. plate decreases from 29° to 10°
- the jacket affects the O.C. angle → O.C. angle increases from 10° → 21° with jacket → **stressed spine!**
(The jacket has no influence on normal adjusted spine!!! → no stressed spine)
- head angle is 8° more upright (rearwards)
- the O.C. pin moves relatively to the h-point square hole 34 mm rearwards and 19 mm upwards
- the 0° head angle can not be reached on certification sled

Normal spine:



Steeper spine:

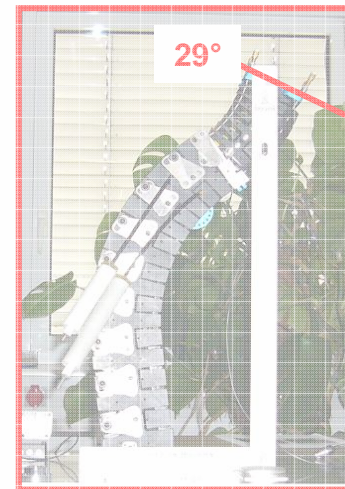


Findings

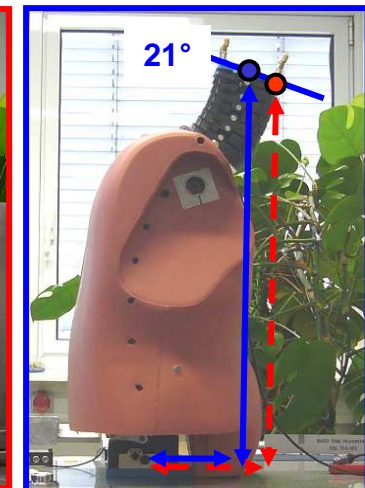
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Normal spine:



Steeper spine:



BioRID positioning with normal & steep spine adjustment

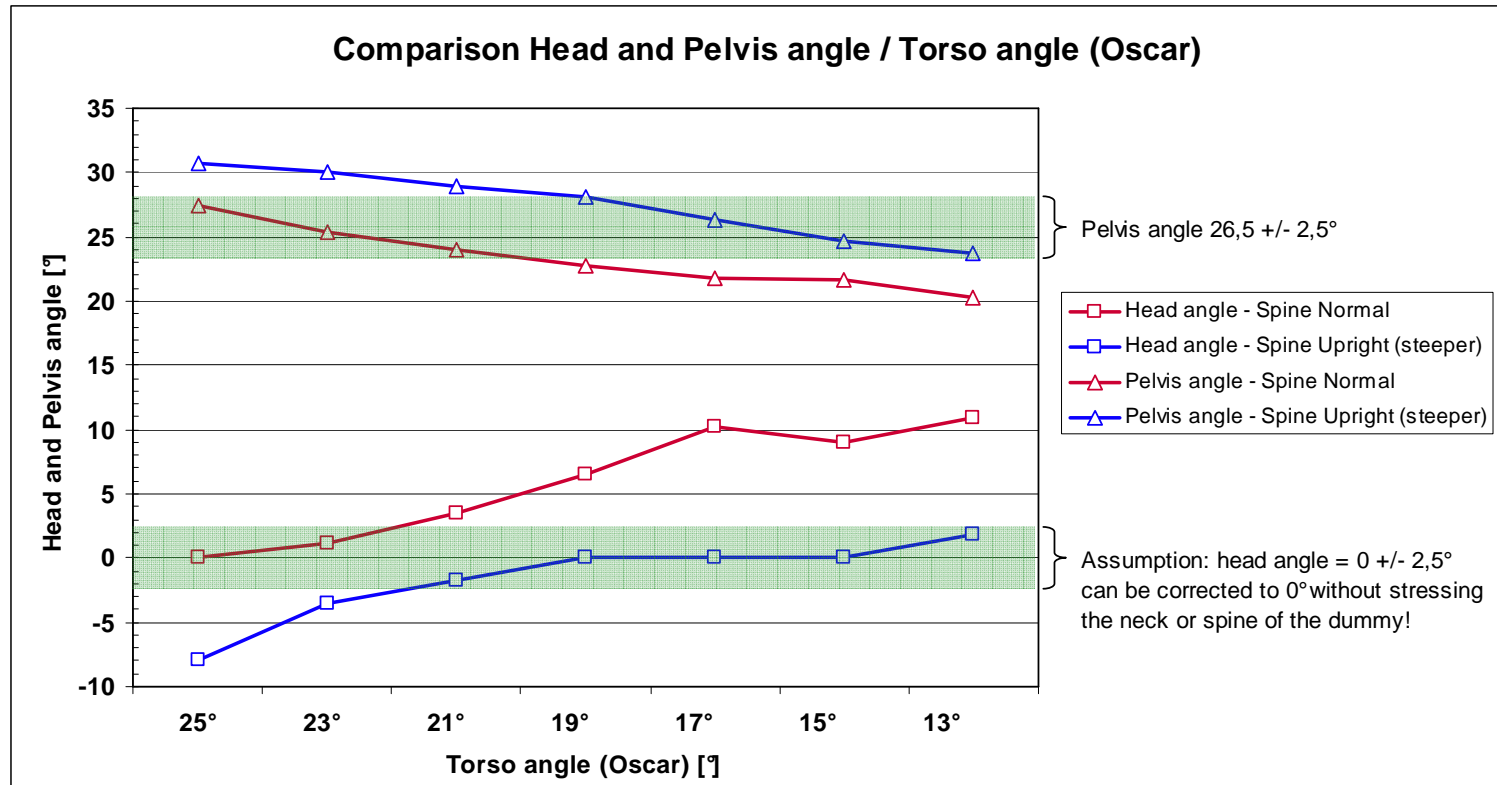
- Test Setup:
 - Vehicle Volkswagen Polo with textile-covered seat (manual)
 - Seat back adjusted to torso angle, measured with oscar (25° - 13°)
 - One BioRID-II was used with normal and upright (steeper) spine adjustment
- Guidelines: Head angle = 0° +/- 0,5°
 Pelvis angle = 26,5 +/- 2,5°
 H-point = max. +/- 5mm of starting location with normal spine

- Results:

Measurement No.	1	2	3	4	5	6	7
Seat backrest (torso angle)	25°	23°	21°	19°	17°	15°	13°
Normal Spine	1	2	3	4	5	6	7
Pelvis angle [°]	27,5	25,3	24	22,8	21,8	21,6	20,3
Head angle [°]	0,1	1,2	3,5	6,5	10,2	9,0	10,9
Backset [mm]	117	106	95	85	75	65	73
Steep Spine	9	10	11	12	13	14	15 8
Pelvis angle [°]	30,8	30,0	29,0	28,1	26,3	24,7	23,7 24,1
Head angle [°]	-8,0	-3,5	-1,7	0,0	0,0	0,0	1,9 0,0
Backset [mm]	102	81	73	65	57	46	42 40

x = Measuring sequence

BioRID positioning with normal & steep spine adjustment



BioRID positioning with normal & steep spine adjustment



Findings

- **Normal adjusted spine** → the BioRID can be used within a range of 5° seat back angle (oscar angle) – above approx. 20°.
- **Steeper adjusted spine** → the BioRID can be used within a range of 5° seat back angle (oscar angle) – below approx. 20°.
- Torso angle deviation > 5° (seat back to flat or steep) → the requirements of head and pelvis angles can not be achieved with the dummy.
- **The Backset of BioRID** with steeper adjusted spine is always **20 – 30 mm** smaller in comparison with normal spine adjustment.
- Static positioning with steep adjusted spine is feasible, but the influence on the dummy performance in dynamic tests due to modification of the spine will probably be significant.