

Draft Report
of the
18th BioRID TEG WebEx on 27th August 2019

Bernd Lorenz (BASt)

19th BioRID TEG WebEx 12th September 2019

Meetings

- 22nd January 2010: last official Global BioRID User (WebEX) Meeting (GBUM) chaired by Mike Beebe (Denton)
- 3rd February 2010: joint with IWG GTR No. 7 - Tokyo
- 15th of March 2010: 1st WebEX meeting (hosted by Denton)
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- 10th / 11th December 2012: joint with IWG GTR No. 7 – Geneva
- 12th/13th February 2013: joint with IWG GTR No. 7 – Brussels
- 26th of March 2013: GTR No. 7 Workshop – Bast, Bergisch Gladbach
- 18th of April 2013: 14th WebEx - (hosted by Humanetics)
- 23rd/24th April 2013: joint with IWG GTR No. 7 – Paris
- 16th January 2014: 16th WebEx
- 6th May 2019: 17th WebEx
- 27th August 2019: 18th WebEx

Agenda 18th BioRID TEG WebEx 27th August 2019

TEG ID 18-1

18th WebEX Meeting of the BioRID TEG

Date & Timing: Tuesday 27th August 2019, 12:00-15:00 (CET), 6:00 a.m. (EDT)

Hosted by: Humanetics

Draft AGENDA

1. Welcome (Chair)
2. Approval of Agenda (All) – TEG ID 18-1
3. Information/Discussion
 - Status of current activities (All)
 - Investigation of certification tests (JAMA/JARI) – TEG ID 18-2
 - Update/Summary on certification data analysis / Pot A issue (Humanetics) – TEG ID 18-3
 - Review corridors (if necessary)
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 - Status/Input to M.R.1
4. AOB
5. Summary of meeting/actions (Chair)
6. Next Meeting(s)
12th September 2019, 12:00 – 15:00 CET

Participants 18th BioRID TEG WebEx 27th August 2019

Participants

Name	Organization
Bernd Lorenz	BASt
Harutomi Nishide	JASIC
Kazuhiko Katou	Toyota / JAMA
Emily Bastian	Humanetics
Paul Depinet	Humanetics
Thomas Kinsky	Humanetics
Hans Ammerlaan	RDW / NL
Hans Lammers	RDW / NL
Andreas Perl	VDA
Marcy Edwards	IIHS
Anette Irwin	GM
Dan Washenko	GM
Jessica Mack	Ford
Agnes Kim	Ford
Kevin Moorhouse	VRTC / NHTSA
Bernhard Been	Humanetics
Philipp Wernicke	PDB / BMW
Irina Dausse	Renault / OICA
Jan Basilautskis	Faurecia
Philippe Petit	LAB

Summary of the Presentation of JAMA/JARI [TEGID 18-2] *“Investigation of the BioRID-II Dummy for GTR7-Phase2 / MR1”*

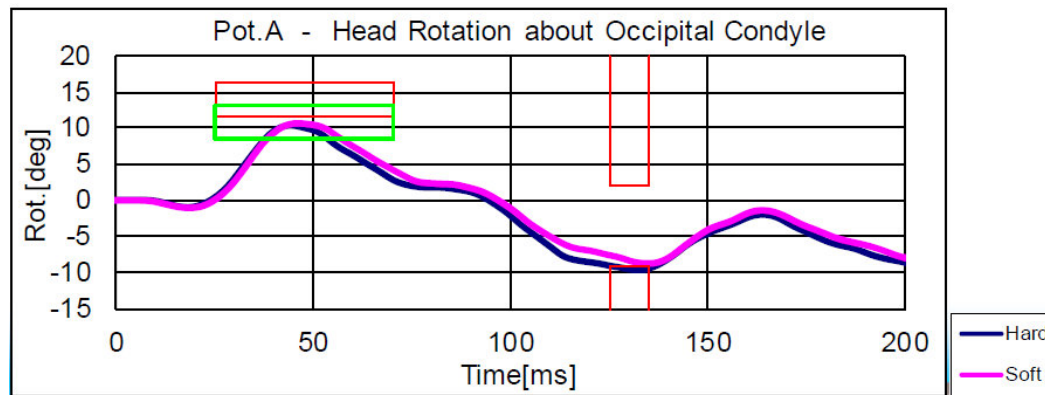
Purpose of this investigation is to:

- confirm the effect of differences in hardness of ARA-220 bumpers on the results of the certification test without headrest.
- reconsider the corridor of Pot A.

Measurement	Requirement	Unit	Time[ms]	Harder Bumper	Softer Bumper
Temperature	19-25	°C	-	20.0	20.0
Humidity	10-70	%	-	50.0	50.0
Pendulum Velocity	4.70-4.80	m/s	-	4.77	4.77
Peak Impactor Force	8000-9700	N	-	8581	8472
Peak Sled Acceleration	137-170	m/s ²	-	149	145
Peak Sled Velocity 1	2.25-2.50	m/s	20-30	2.43	2.40
Peak Sled Velocity 2	2.10-2.50	m/s	135.00	2.42	2.44
	2.00-2.40	m/s	140.00	2.34	2.36
Peak T1 Acceleration	183-267	m/s ²	18.5-30.5	225	222
Peak Head Rotation about OC (Pot.A)	11.5-16.5	deg	25-70	10.3	10.8
Peak Neck Link Rotation 1 (Pot.B)	4.00-6.50	deg	18.5-28.5	5.0	5.2
Peak Neck Link Rotation 2 (Pot.B)	-36 - -30	deg	98-108	OK	OK
Peak Neck Link Rotation 3 (Pot.B)	-36 - -29	deg	165-175	OK	OK
T1 Rotation (Pot.C)	-19 - -16.5	deg	73-78	OK	OK
Total Head Rotation (Pot.A+B)	-41 - -25	deg	100-110	OK	OK
Total Head Rotation (Pot.A+B)	-41 - -25	deg	170-190	OK	OK
Total Thoracic Rotation (Pot.C)	-21 - -10	deg	125-135	OK	OK
UpperNeck-MY Flexion	7.7-17.8	Nm	20-35	13.1	12.7
UpperNeck-MY Extension	-23.5 - -15	Nm	66-83	-17.3	-17.1

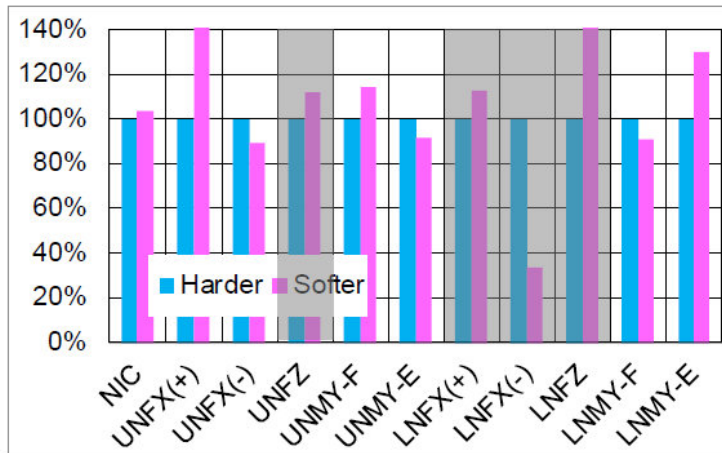
Summary of the Presentation of JAMA/JARI [TEGID 18-2]

- The bumper of ARA-220 used in this test series passed the compression test, but only Pot.A was deviated from the corridor in certification test. Therefore, it is necessary to reconsider the corridor of Pot.A.
- Considered the test results, it proposes that new Pot.A corridor (Figure : green line) is changed $14.0^{\circ} \pm 2.5^{\circ}$ to $10.5^{\circ} \pm 2.5^{\circ}$ (corridor width is not changed (median $\pm 2.5^{\circ}$)).
- It is also necessary to change the second corridor of Pot.A, but it is possible to pass the current corridor by adjusting the damper. Therefore, it is necessary to consider whether to change the second corridor of Pot.A.



Summary of the Presentation of JAMA/JARI [TEGID 18-2]

Injury measures (Ratio of Softer relative to Harder)



※ UNFZ, LNFZ(+), LNFZ(-) and LNFZ are non evaluation items in GTR7

- UNFX and LNMY-Ext have a large in ratio of Softer relative to Harder, but injury absolute value is small.
- Difference in UNMY-Fix was 14% (difference in injury value was 2Nm).

- UNFX and LNMY-Ext have a large in ratio of softer relative to harder bumper, but injury value is too small.
- Difference in UNMY-Fix was 14%(difference in injury value was 2Nm).
- In this research, because of the test results using one type of seat, it is necessary to consider the test results with other types of seat also.

Summary of Presentation of Humanetics [TEGID 18-03]

- Request to review all BioRID II certification corridors
 - At the May 6 GTR7 TEG meeting
 - it was proposed by Humanetics that there are problems with the Pot A corridor and generally agreed a change is needed
 - It was proposed by JAMA/JARI that Jacket, Pelvis, and Dummy corridors may be too narrow and should be reevaluated using more data
 - It was agreed that current data should be collected (2015 and later) to evaluate what the current population of BioRID II dummies looks like for all test corridors
 - It was suggested to
 - Evaluate corridors like other dummies moving towards regulation
 - » Average data by dummy
 - » Look at +/- 2 * standard deviation of population
 - » Look at +/- 10 % as a general limit on corridor width
 - » Make sure corridors are practical for currently used population of dummies

Summary of Presentation of Humanetics [TEGID 18-03]

- Data collected from 6 labs
 - Ford
 - BAST
 - Toyota-Boshoku
 - Humanetics Heidelberg
 - Humanetics Huron
 - Humanetics Farmington Hills / Plymouth
- Tests
 - Dummy Certification without Headrest
 - Jacket Analysis
 - Pelvis Analysis
 - Sled and Track Verification Analysis

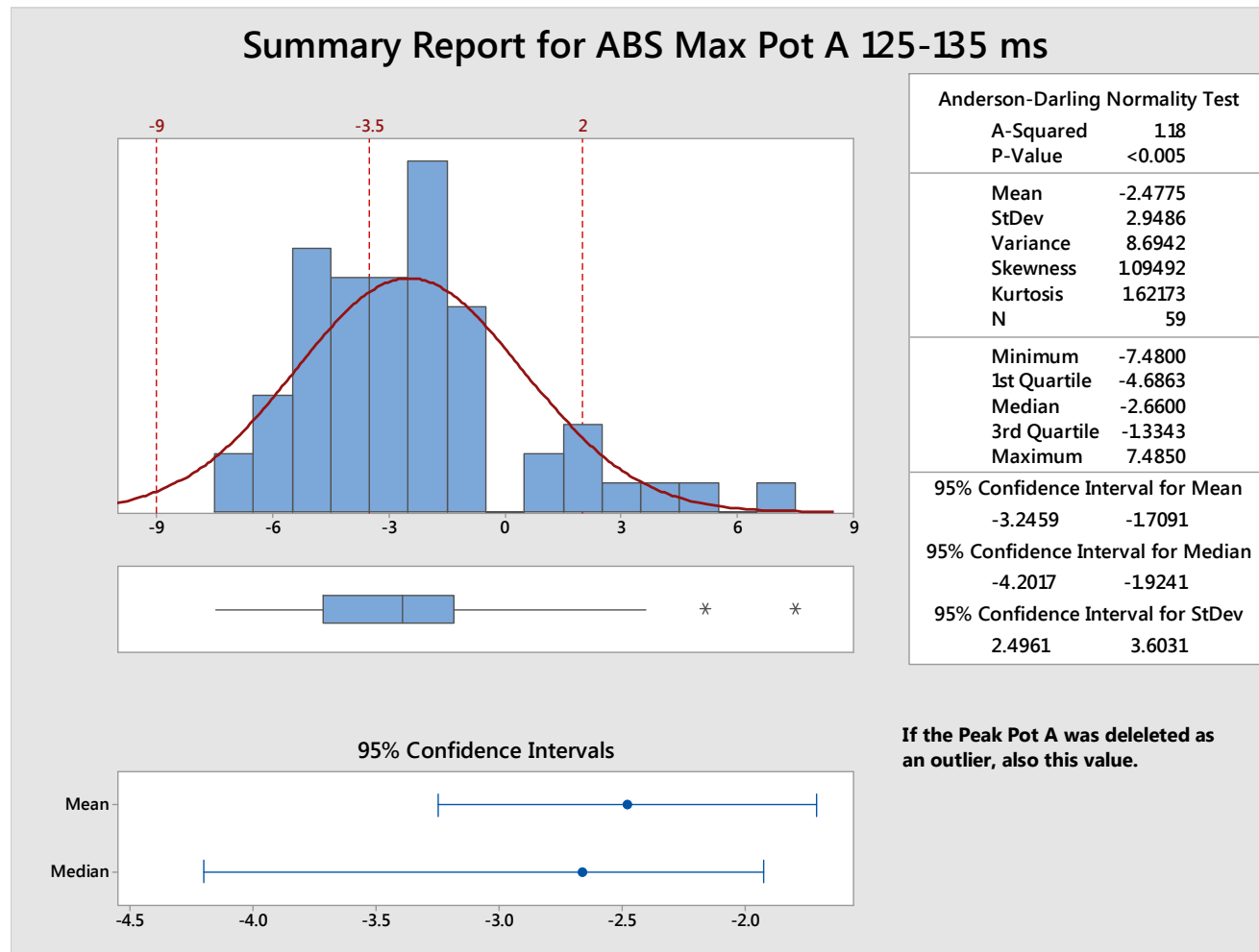
Summary of Presentation of Humanetics [TEGID 18-03]

Analysis Approach for Dummy Certification without Headrest

- **Collected 1164 tests from 6 labs**
 - **89 separate ATD's**
 - 278 Test sequences
 - A test sequence occurs each time a dummy comes into a lab for a new certification. This is particularly important since this usually entails doing maintenance such as resetting cables and damper, changing neck bumpers, other repairs. All of this can lead to changes in performance of the dummy.
 - Not all tests have all parameters
 - Some software packages simply provide a pass/fail for “tunnel” corridors rather than max/min values within the corridors.
 - There was variety in what was provided for “tunnel” parameter results.
 - Even within Humanetics, the older software package used did not provide continuous max/min values for “tunnel” corridors, only pass/fail.
 - There were obvious bad values which were deleted
 - This led to far less samples for “tunnel” corridors on which statistical analysis could be run

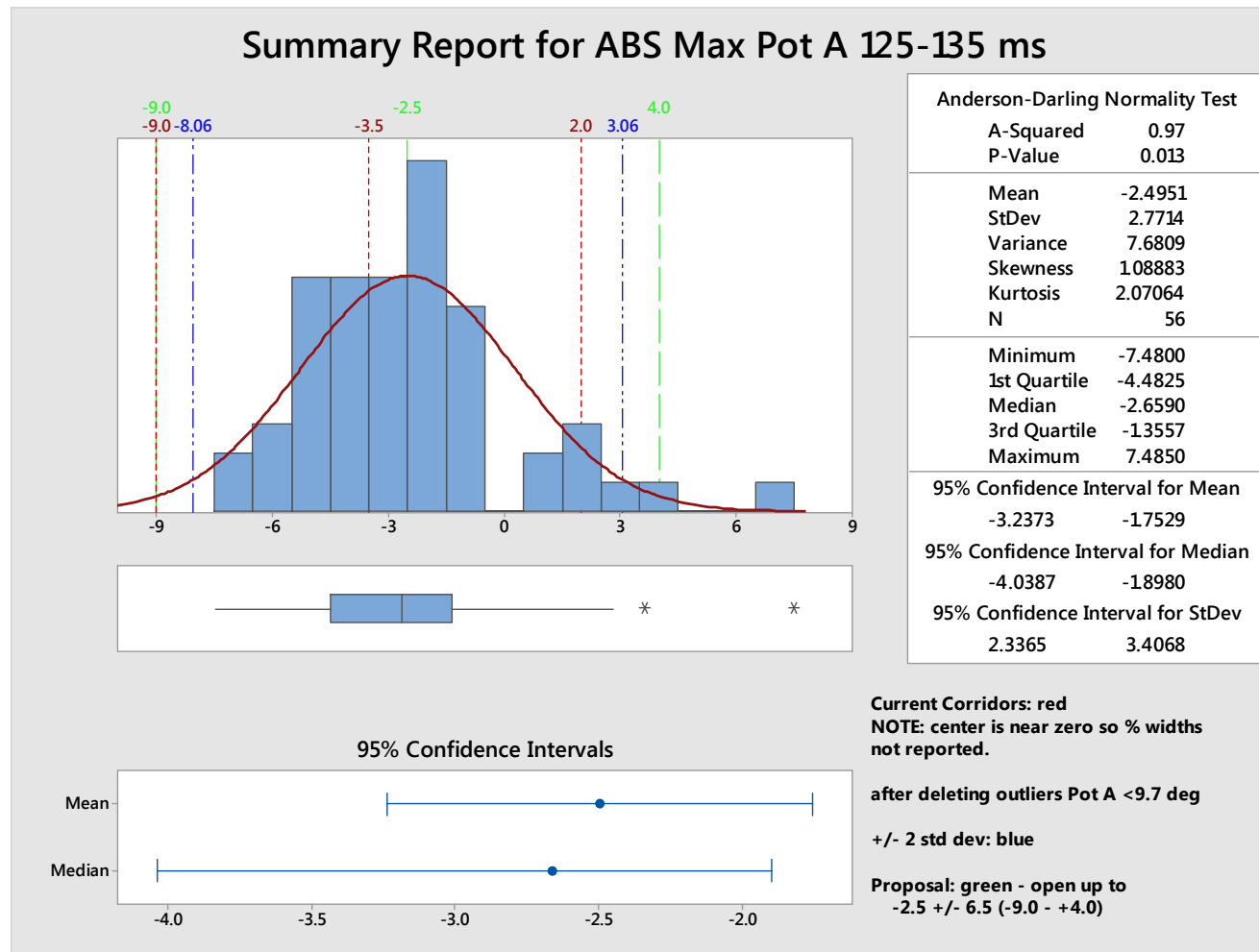
Summary of Presentation of Humanetics [TEGID 18-03]

Analysis Dummy Certification - Pot A tunnel 125-135 ms MAX



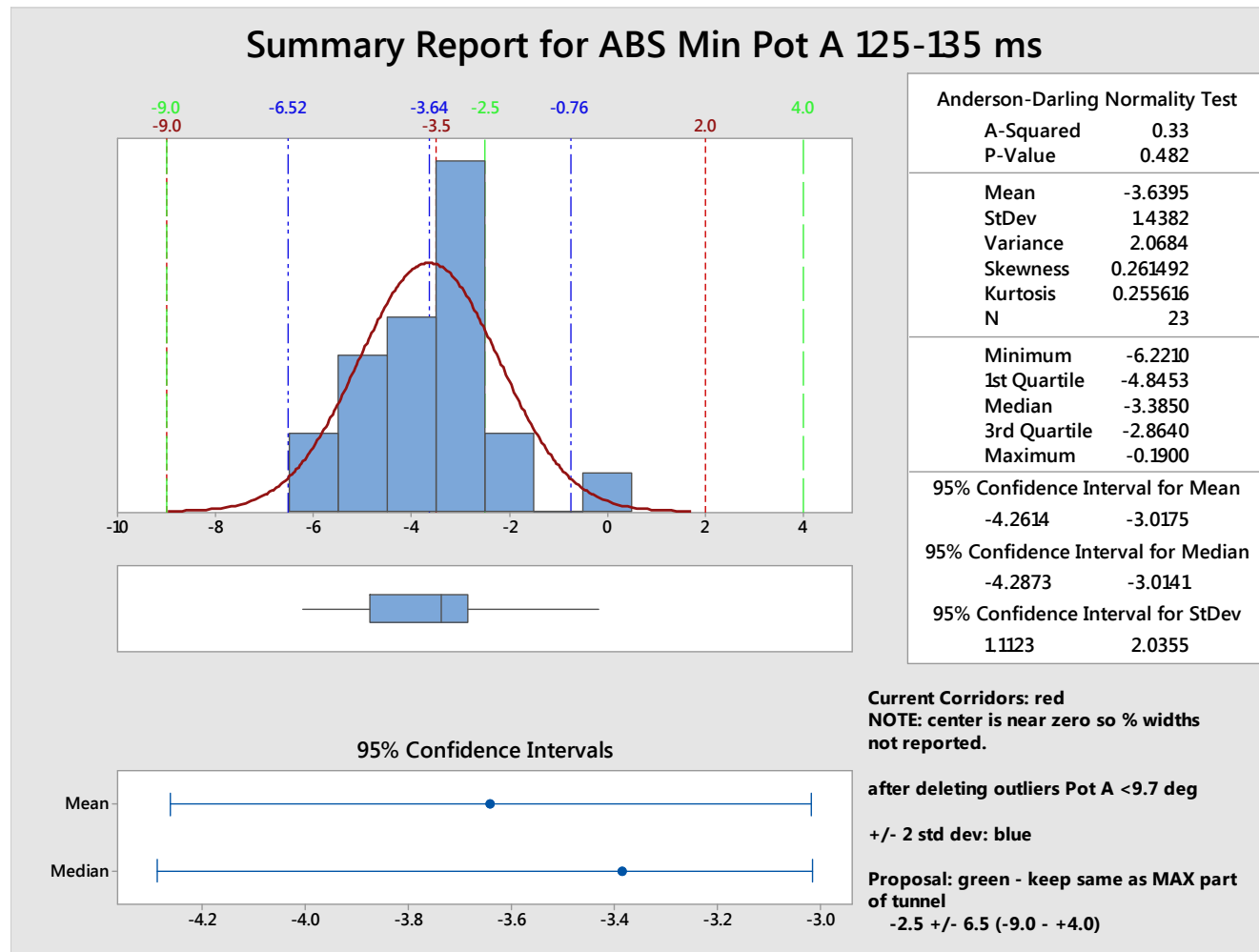
Summary of Presentation of Humanetics [TEGID 18-03]

Analysis Dummy Certification - Pot A tunnel 125-135 ms MAX [outliers deleted]



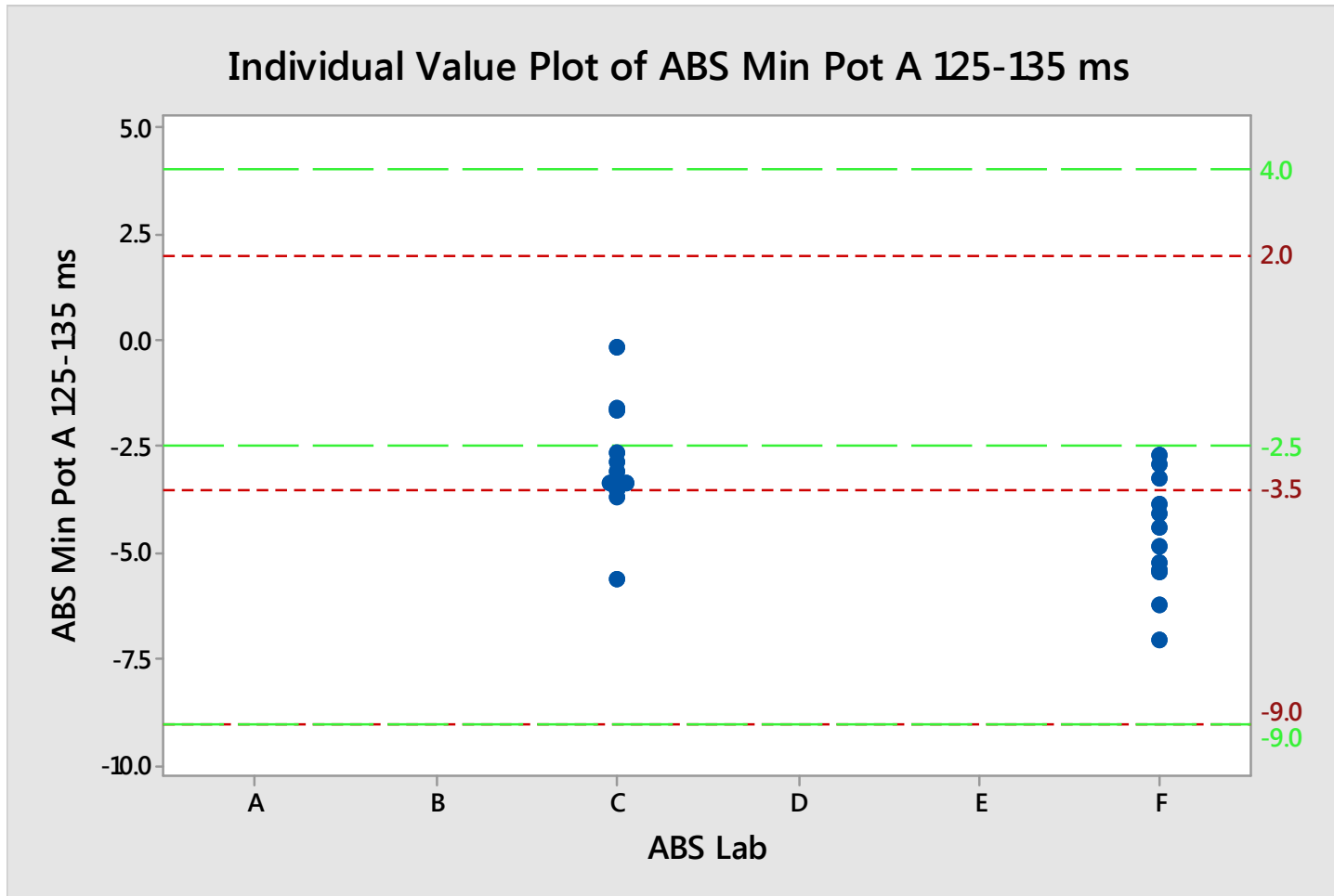
Summary of Presentation of Humanetics [TEGID 18-03]

Analysis Dummy Certification - Pot A tunnel 125-135 ms MIN [outliers deleted]



Summary of Presentation of Humanetics [TEGID 18-03]

Analysis Dummy Certification - Pot A tunnel 125-135 ms MIN



Summary of Presentation of Humanetics [TEGID 18-03]

Corridor Summary

Parameter	Current	Current	Current	+/- %	Proposed	Proposed			+/- %
	Lower	Mid Point	Upper	Width		Lower	Mid Point	Proposed Upper	
Temperature (deg C)	19	22	25	13.6%		no change			
Humidity (% RH)	10	40	70	75.0%		no change			
Impact Velocity (m/s)	4.70	4.75	4.80	1.1%		no change			
Peak Pendulum Force (N)	8000	8850	9700	9.6%		no change			
Peak Sled Acceleration (m/s^2)	137.0	153.5	170.0	10.7%	137	152	167	9.9%	
Sled Velocity Peak 1 (m/s)	2.25	2.38	2.50	5.3%	2.29	2.42	2.55	5.4%	
Sled Velocity Peak 1 Time (ms)	20	25	30	20.0%	20.9	24.6	28.3	15.0%	
Sled Velocity Tunnel	FAIL	n/a	PASS						
Sled Velocity @ 135 ms (m/s)	2.10	2.30	2.50	8.7%	2.12	2.36	2.60	10.2%	
Sled Velocity @ 140 ms (m/s)	2.00	2.20	2.40	9.1%	2.06	2.29	2.52	10.0%	
Peak T1 Acceleration (m/s^2)	183	225	267	18.7%		no change			
Peak T1 Acceleration Time (ms)	18.5	24.5	30.5	24.5%	20	25.0	30	20.0%	
First Peak Pot A (deg)	11.5	14.0	16.5	17.9%	10.2	12.7	15.2	19.7%	
First Peak Pot A Time (ms)	25	48	70	47.4%	37.8	47.3	56.8	20.1%	
Pot A tunnel	FAIL	n/a	PASS						
Max Pot A in tunnel 125-135 ms (deg)	-9.0	-3.5	2.0	157.1%			4.00	-260.0%	
Min Pot A in tunnel 125-135 ms (deg)	-9.0	-3.5	2.0	157.1%	-9.0			-260.0%	
First Peak Pot B (deg)	4.00	5.25	6.50	23.8%	3.87	5.12	6.37	24.4%	
First Peak Pot B Time (ms)	18.5	23.5	28.5	21.3%	20.7	25.9	31.1	20.1%	
Min Pot B (deg)	-36		1000		-36.9				
Pot B tunnel 1	FAIL	n/a	PASS						
Max Pot B in tunnel 1 98-108 ms (deg)	-1000		-30	9.1%			-27.3	15.0%	
Pot B tunnel 2	FAIL	n/a	PASS						
Max Pot B in tunnel 1 165-175 ms (deg)	-1000		-29	10.8%		no change		12.0%	
Min Pot C (deg)	-19.00		1000.00		-19.5				
Pot C tunnel	FAIL	n/a	PASS						
Max Pot C in tunnel 73-78 ms (deg)	-1000		-16.5	7.0%			-16	9.9%	
Total Head Rotation Tunnel	FAIL	n/a	PASS						
Min Total Head Rotation in Tunnel 100-190 ms (deg)	-41		1000			no change			
Max Total Head Rotation in Tunnel 100-110 ms (deg)	-1000		-25	24.2%		no change			
Max Total Head Rotation in Tunnel 170-180 ms (deg)	-1000		-25	24.2%		no change			
Max Thoracic Rotation Tunnel	FAIL	n/a	PASS						
Max Thoracic Rotation in Tunnel 125-135 ms (deg)	-1000		-10	35.5%			-10.5	34.4%	
Min Thoracic Rotation in Tunnel (deg)	-21		1000		-21.5				
Max Upper Neck My	7.70	12.75	17.80	39.6%	11	13.70	16.4	19.7%	
Time at Max Upper Neck My	20.0	27.5	35.0	27.3%	21.4	26.8	32.2	20.1%	
Min Upper Neck My	-23.50	-19.25	-15.00	22.1%		no change			
Time at Min Upper Neck My	66.0	74.5	83.0	11.4%	60	75.0	90	20.0%	

Summary I

- Humanetics stated to allow UNECE to use the drawings and the PADI (procedures for assembly, disassembly and inspection) of the BioRID for rulemaking purposes within the framework of the Mutual Resolution No. 1.
- Request to Humanetics for next WebEx:
 - remove outliers in an updated analysis
 - provide corridors $\pm 1 \sigma$, $\pm 10\%$, $\pm 2 \sigma$

Summary II

- Recommendation of BioRID TEG as of 12th September 2019:
- keep all corridors as they are with the exception of
- Pot A and
- Adjust Pot A at mean and keep the same corridor width
- keep jacket and pelvis compression for monitoring purposes only

- bumper compression to be added to drawings
- Review all certification criteria after 3 years
- Shoe weight confirmed to: 0.57 ± 0.1 kg (check PADI)

Thank you for your attention!

Bernd Lorenz

Bundesanstalt für Straßenwesen (BASt)

Brüderstraße 53

D-51427 Bergisch Gladbach

lorenz@bast.de