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GTR 07 phase II **Backset measurement variations**

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HRMD-backset measurement: *Precision HPM + HRMD*

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Backset repeatability and reproducibility measurements :

Test series 1 :

Backset of the same seat (same adjustments) are measurement by 4 different trained technicians by using 3 different HPM and the same HRMD :

Seat A

Technician	HPM	HRMD	Backset [mm]
A	A	A	41
B	A	A	42
A	B	A	43
A	C	A	35
B	B	A	42
B	C	A	34
C	B	A	40
C	C	A	41
D	B	A	43
D	C	A	40

- Backset differences of up to 9mm are measured (= HPM + technician influence)

HRMD-backset measurement: *Precision HPM + HRMD*

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Backset repeatability and reproducibility measurements :

Test series 2 :

Backset of the same seat (same adjustments) are measured by 4 different trained technicians by using 3 different HPM and 3 different HRMD :

Technician	HPM	HRMD	Backset [mm]
A	B	A	66
A	C	A	63
B	B	A	66
B	C	A	63
C	B	A	74
C	C	A	68
D	B	A	70
D	C	A	67
C	C	B	56
C	C	C	58
C	D	C	61
C	D	B	63

- Backset differences of up to 11mm were measured with 3 different HPM and 1 HRMD
- Backset differences of up to 18mm were measured with 3 different HPM and 3 HRMD

HRMD-backset measurement: *Precision of tools*

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The problem :

Significant differences in the results of **backset** measurements between different laboratories on the same seats !

Influence factors of measurement tool :

- Variability of SAE J826 tool
- Variability of HRMD tool
- Variability of Calibration procedures
- Variability of seat and H-point tool set-up

Labo A : Backset = 56 mm

Labo B : Backset = 74 mm

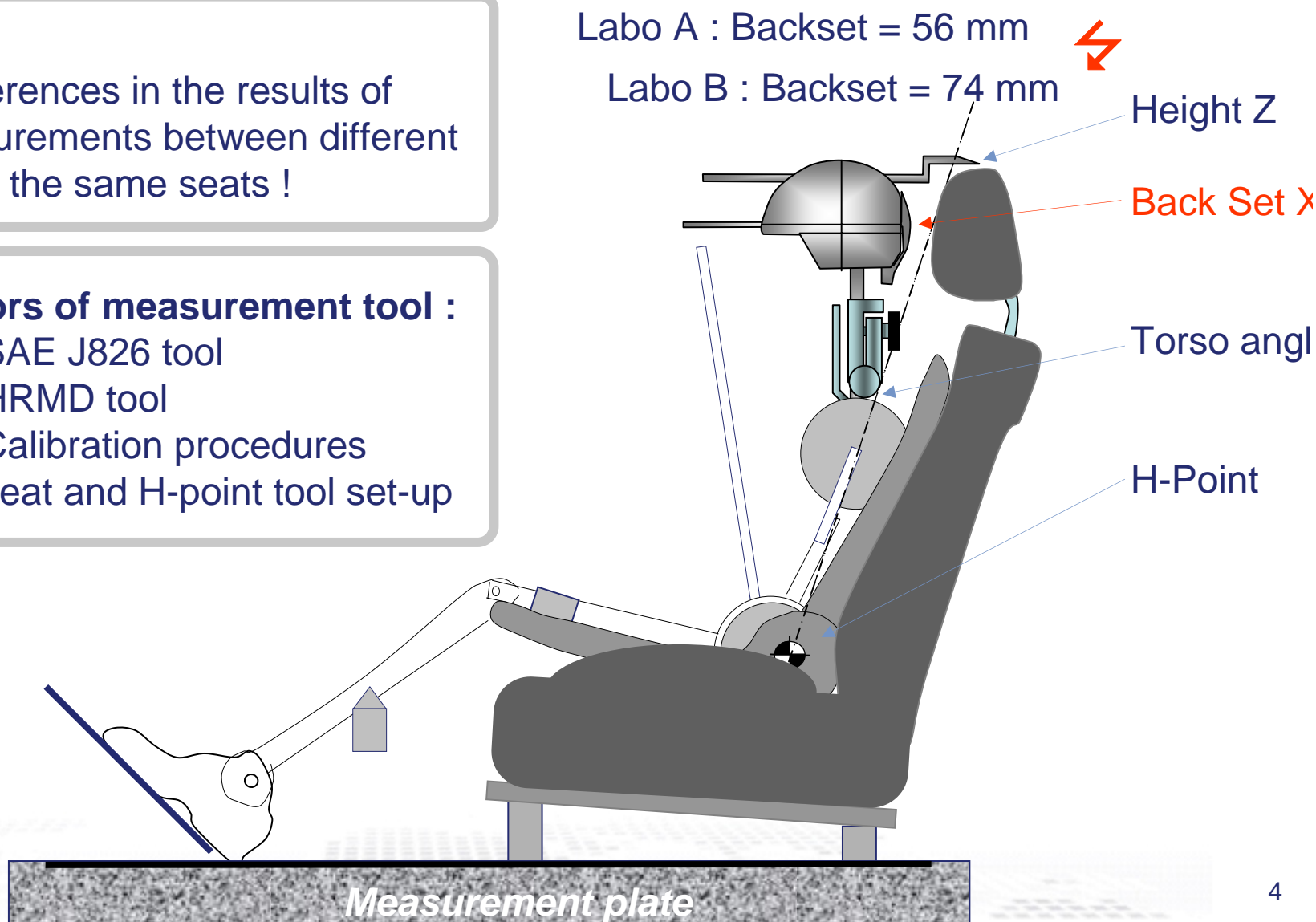


Height Z

Back Set X

Torso angl

H-Point



HRMD-backset measurement:

Influence factors : Seat and tool set-up

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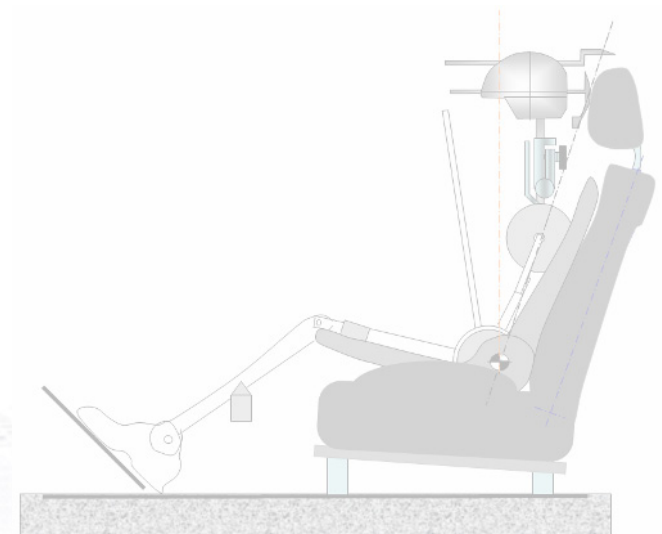
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Seat adjustments differ depending on procedure :

- seat back adjustment
- height adjustment/tilt adjustment
- head restraint adjustment

HPM and HRMD set-up procedure may vary in :

- Length of adjustment of legs
- Use of weights
-



HRMD-backset measurement: Influence factors : SAE J826 (HPM)

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Some
Examples

SAE J826 H-point measurement tool :

- In use since decades
- Several suppliers over time
- Few official geometry until 2010
- Past deviations in fabrication tolerances

SAE J826 tool geometry:

- Official 2D geometry only since nov.2008 with large tolerances
- Preliminary 3D data set since june 2011 without tolerances
- GTR 7 based on 1995 version of SAE J826 (without geometry)

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Accessory



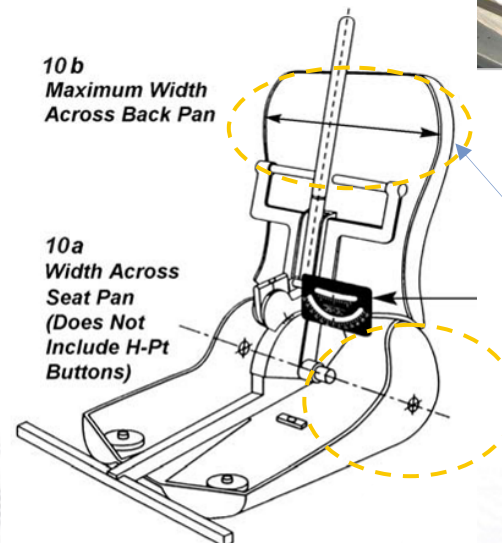
“Blue” Dummy
© BSMI



SAE-Dummy
© SAE



“Emma”
© GO-DESIGN



10 b
Maximum Width
Across Back Pan

10 a
Width Across
Seat Pan
(Does Not
Include H-Pt
Buttons)

Back pan width : allowed
388 +/- 2 and 395 (builts
prior 1989)

Back pan height : not
defined
Pan position versus H-point
+/- 2mm

Tools for HRMD-measurement: Are these precise enough?

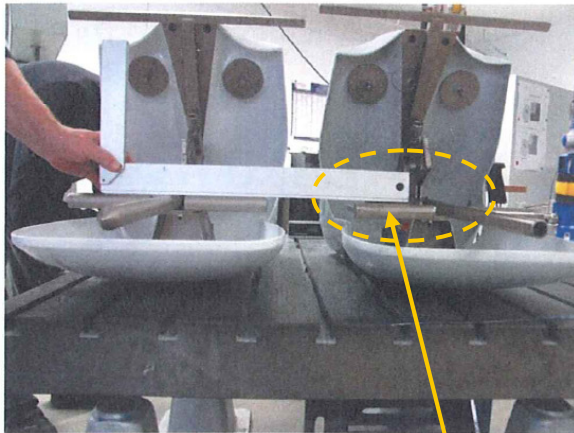
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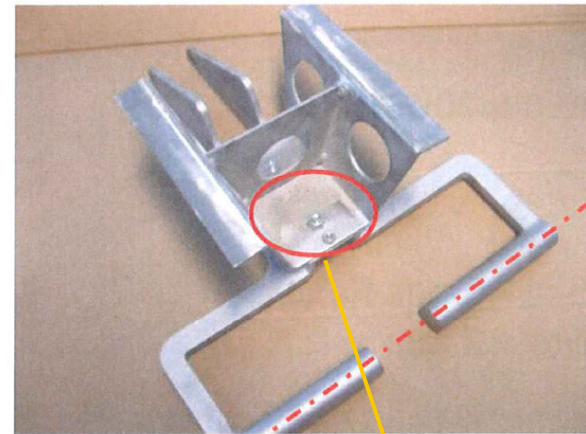
CAHRS-Whiplash-Praxis-Konferenz 20./21. Oct. 2010 :
Comparison of several HPM's (Lear/Audi/Faurecia/etc.)

Unterschiede bei „Weight Hanger“

- a) 6 mm Unterschied der „Weight Hanger“ in X-Richtung
- b) Quelle: GO-DESIGN



Quelle: Lear Corp



Quelle: GO-DESIGN

- a) Anlagefläche für den HRMD mit Abweichung bis zu 9 mm
- b) Lage im Raum und Winkligkeit mit großen Abweichungen $> 0,5^\circ$

Weight Hanger: Difference of 6 mm in X

Interface of HPM/HRMD :9 mm in X
and more than 0.5° in angle

Tools for HRMD-measurement: Are these precise enough?

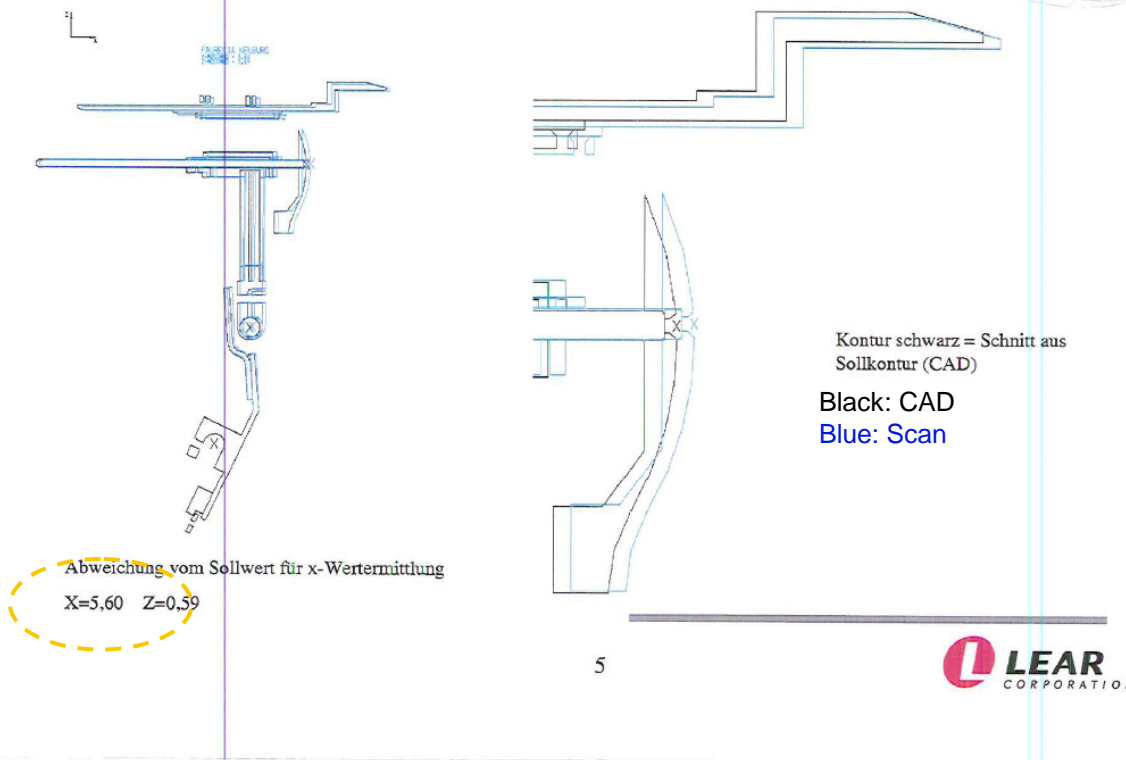
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Head Restraint Measurement Device (HRMD)

Vergleich Messung HRMD-Kopf

HRMD-Kopf Faurecia Neuburg



Overlay of different HRMD
scans :
(AUDI/LEAR/FAURECIA/AUTOLIV)
and compared with CAD:
X = 0,2 – 7,12 mm
Z = 0,59 – 6,44 mm

HRMD-backset measurement: Influence factors : HRMD

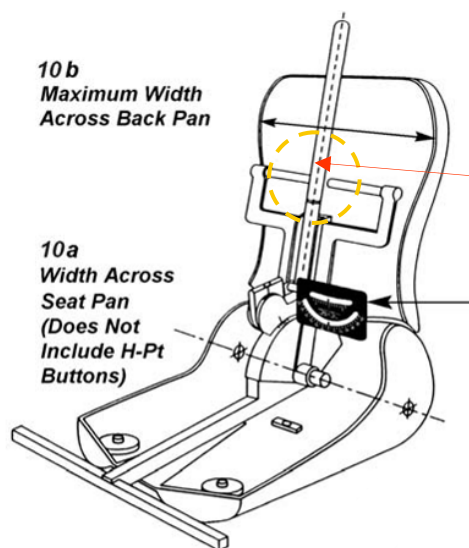
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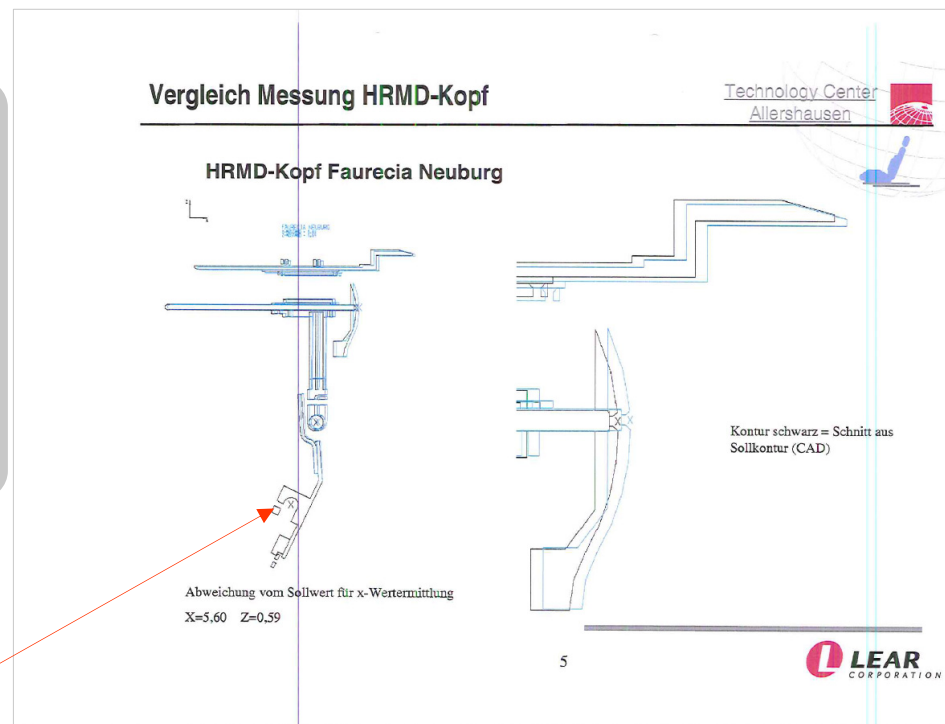
Head Restraint Measurement Device (HRMD)

Head Restraint measurement device :

- 3D geometry : secret of ICBC (owner)
- Few 2D geometry officialized
- Scans showed large tolerances
- Imprecise interface of HRMD on SAE J826 dummy



HRMD – Interface on SAE
Dummy vary by up to 9 mm
and up > 0.5° in angle



Overlay of different HRMD's
scans :
(AUDI/LEAR/FAURECIA/AUTOLIV)
and compared with CAD:
X = 0,2 – 7,12 mm
Z = 0,59 – 6,44 mm

HRMD-backset measurement: Calibration procedure HPM + HRMD

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- **SAE J826 calibration :**

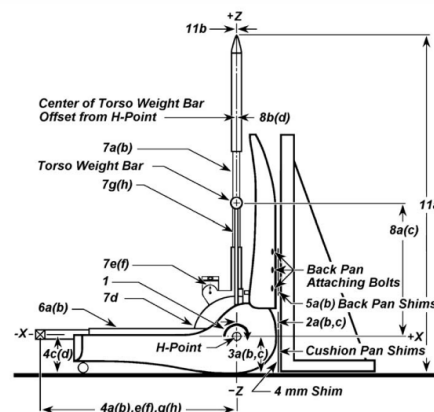
- HPM only calibration, but large tolerance:

- **Gloria calibration : (EuroNcap)**

- Calibration of HRMD in relationship to HPM pans only
- Improved, but still significant tolerances as influences from HPM pans are not excluded

- **Full HRMD + HPM calibration :**

- Calibration of HRMD
- Calibration of HPM shells with reduced tolerances
- Best procedure



HRMD-backset measurement: *Precision HPM + HRMD*

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Conclusions :

- Test series showed differences of up to 18mm for backset measurements with 3 different HPM and 3 HRMD on the same seat
- SAE J826 as defined today in SAE J826:1995 is not able to guarantee a sufficient precise geometry of the HPM able to be used together with the HRMD.
- HRMD geometry and tolerances must be controlled for the backset measurement
- Only certain HPM with reduced tolerances in comparison to SAE J826 shall be used for backset measurements.
- HPM + HRMD must be calibrated together.

HRMD-backset measurement: *Precision HPM + HRMD*

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Proposal to improve the reproducibility of the backset :

SAE J826:nov 2008

Filter with reduced tolerances

↓
HPM able for backset measurement
(reduced tolerances)

+

HRMD with defined tolerances

+

HRMD/HPD calibration as a whole

Proposal for a HPM compliant for backset measurement :

SAE J826 with reduced tolerances able for backset measurements :

- HPM back pan width [± 1 mm]
- HPM cushion pan width [± 1 mm]
- Cushion and back shell pan position versus H-point : [± 1 mm]
- HPM back pan height [± 1 mm]
- HRMD interface on SAE dummy
- Torso line measurement plate [$0^\circ/\pm 0.3^\circ$]



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