

Repeatability of the Deformable Element

Test series with the Reference Vehicle

GRSP IWG Frontal Impact, Brussels

Thorsten Adolph
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Bundesanstalt für Straßenwesen

Objective

In previous research projects the repeatability of the full width deformable barrier was analyzed. It was not fully answered if the vehicle or the deformable element of the full width test with the load cell wall used caused differences.

Therefore a test series with a „reference“ vehicle attached with an PDB barrier against the FWDB was conducted.

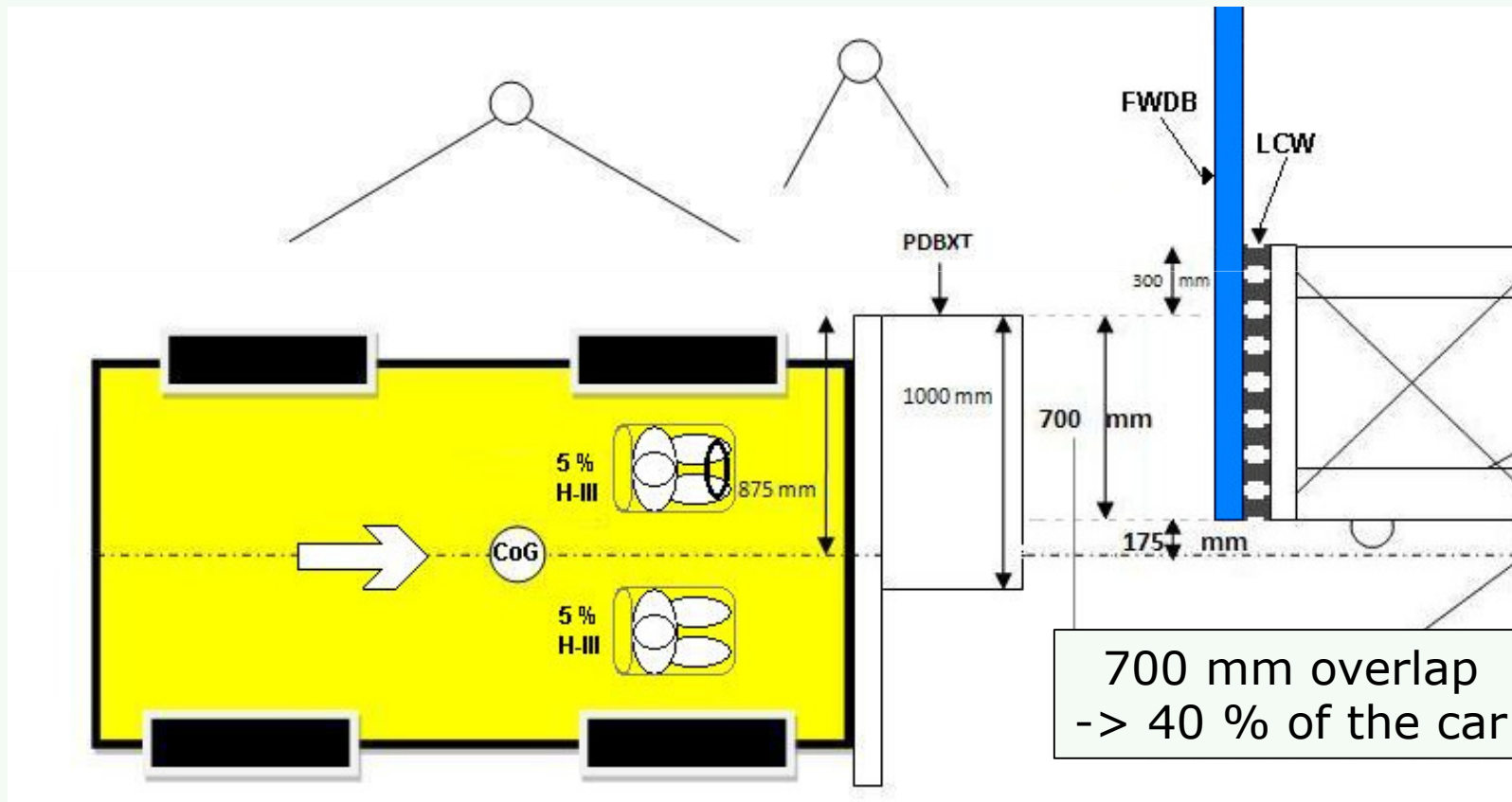
Method and Materials

- Reference vehicle with restraint system and interior parts
- The PDB barrier produces relative low and equal distributed loads on the load cell wall
- Barriers
 - PDB-XT for the front structure of the vehicle
 - FWDB as the collision opponent on the LCW



Test Configuration

Test speed 55 kph

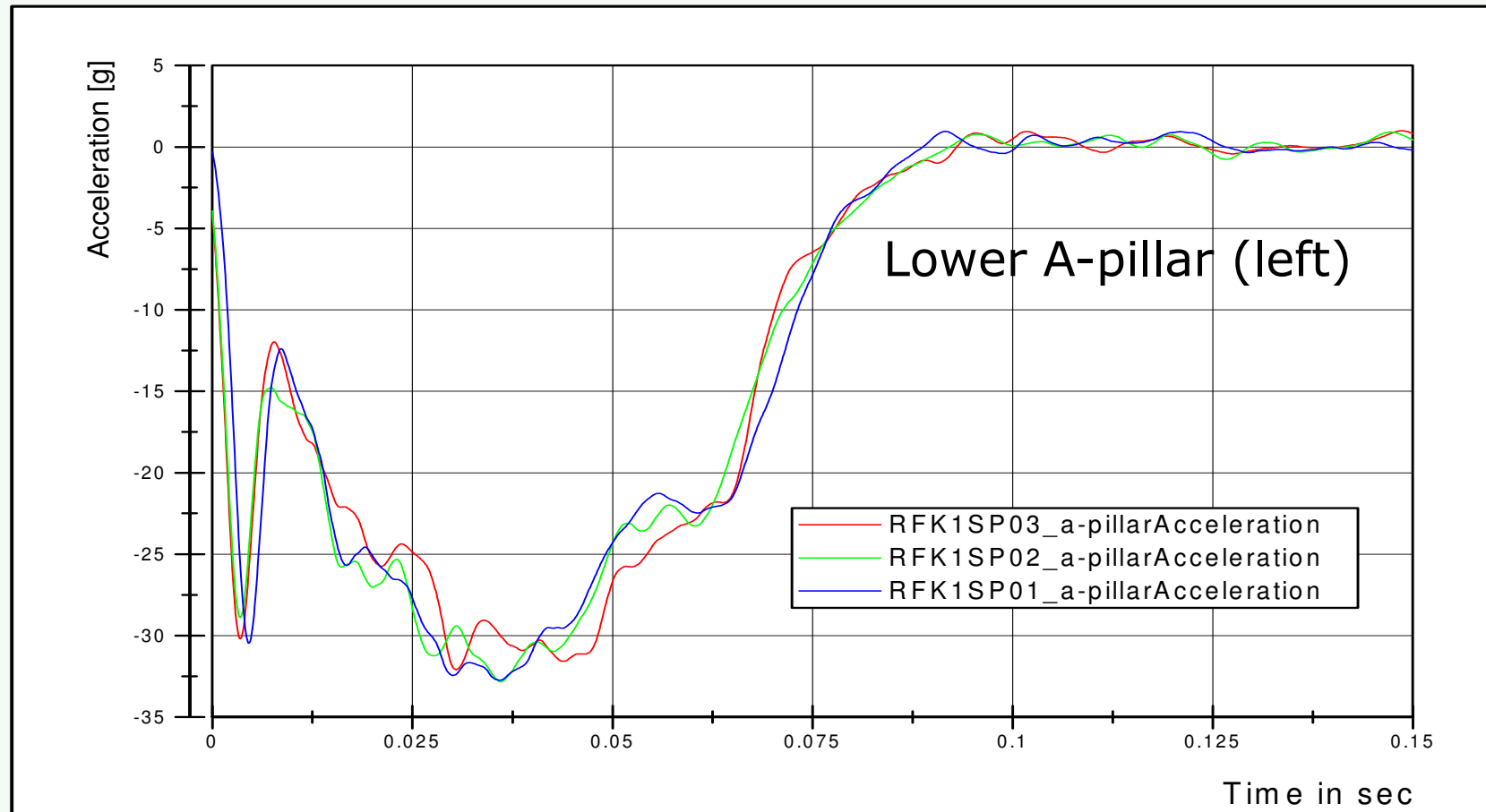


Vehicle Position after Crash

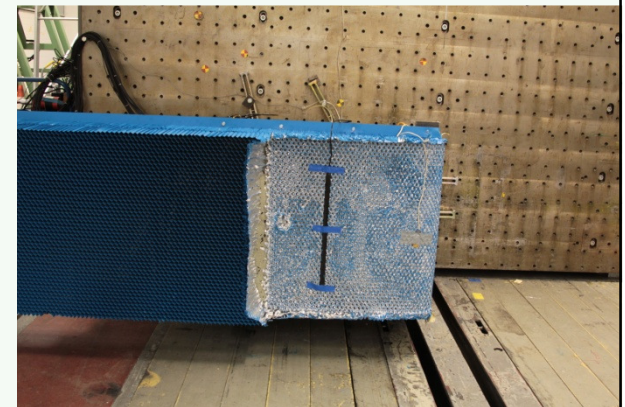
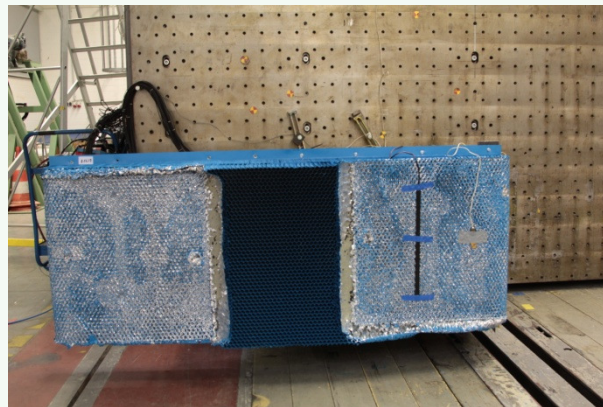
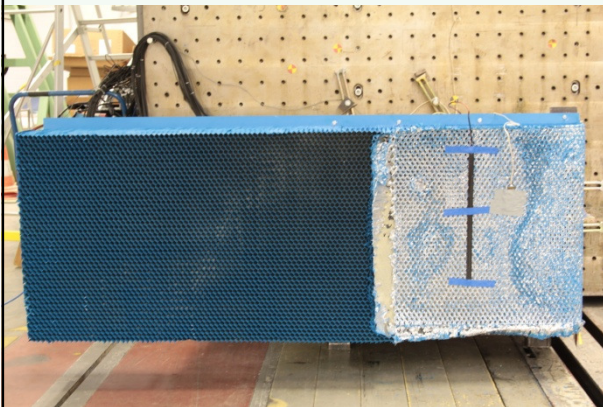
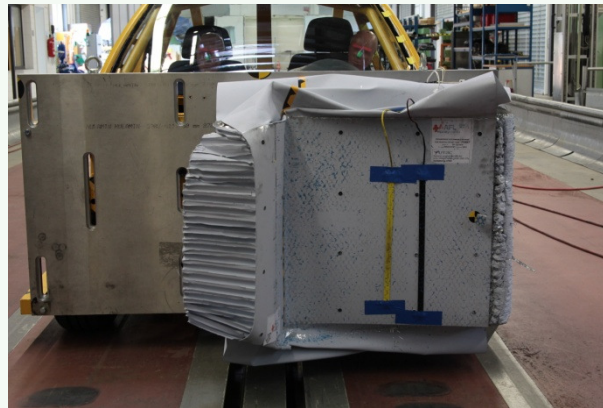
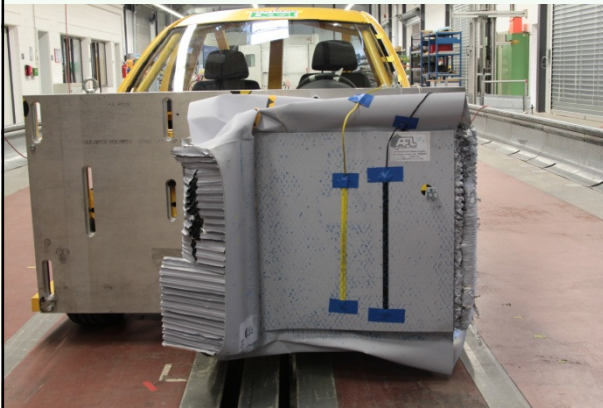


Comparison of Deceleration pulses

Deceleration pulses of the three tests are comparable

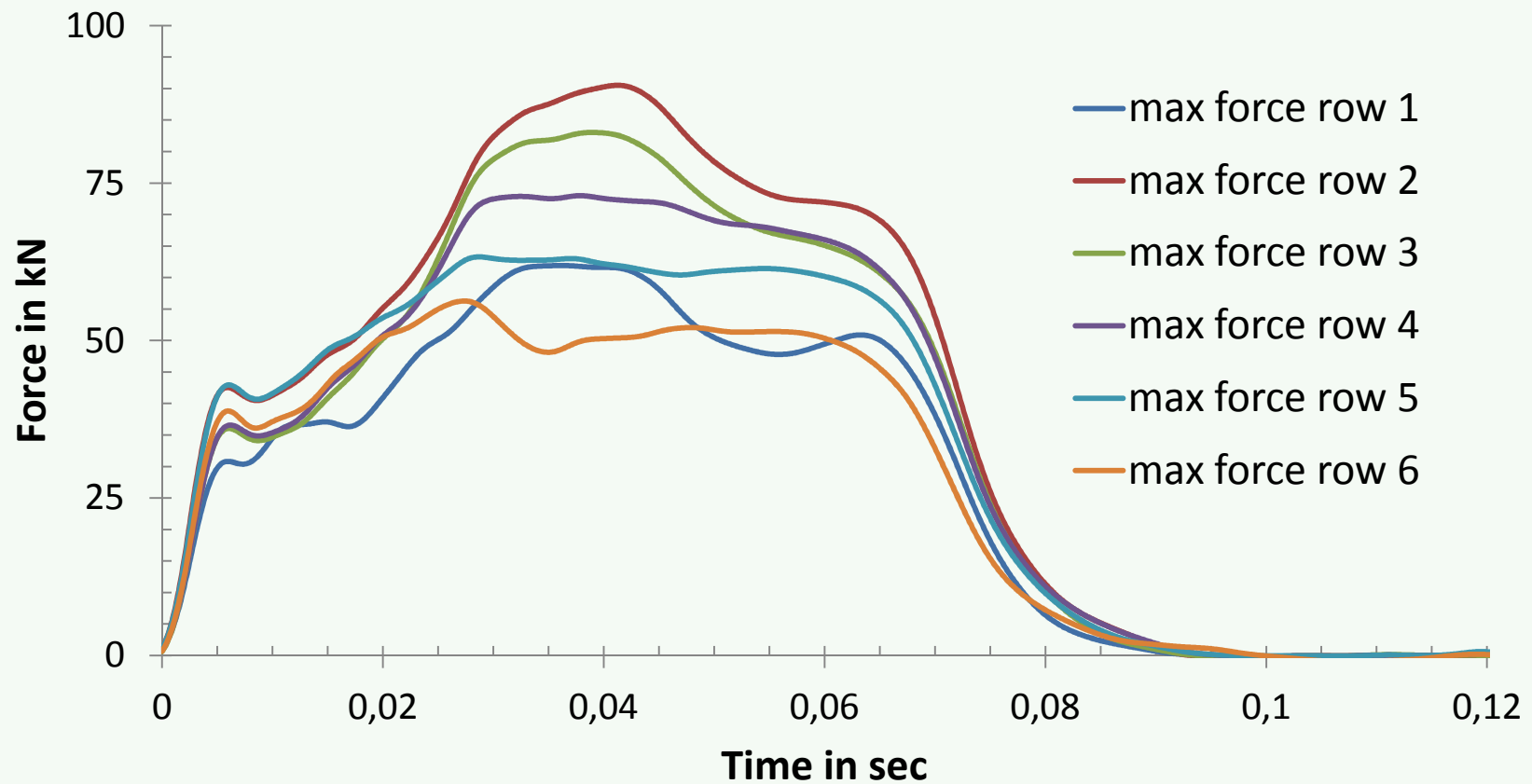


Comparison of Deformed Elements after Crash



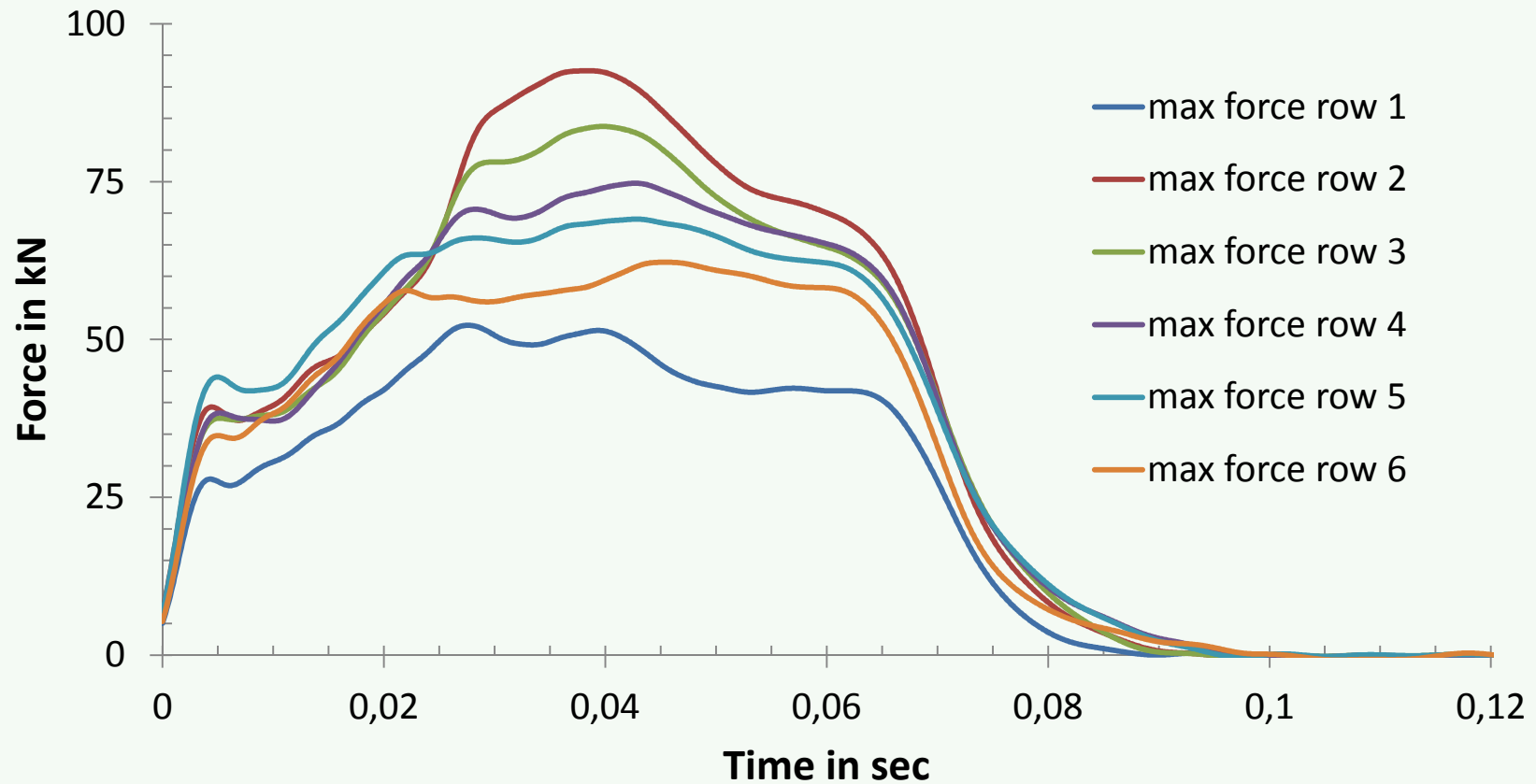
No unusual differences at the deformed barriers were detected
Impact alignment was good
Row 1 and 6 are on the edge

LCW Maximum Forces - RFK1SP01



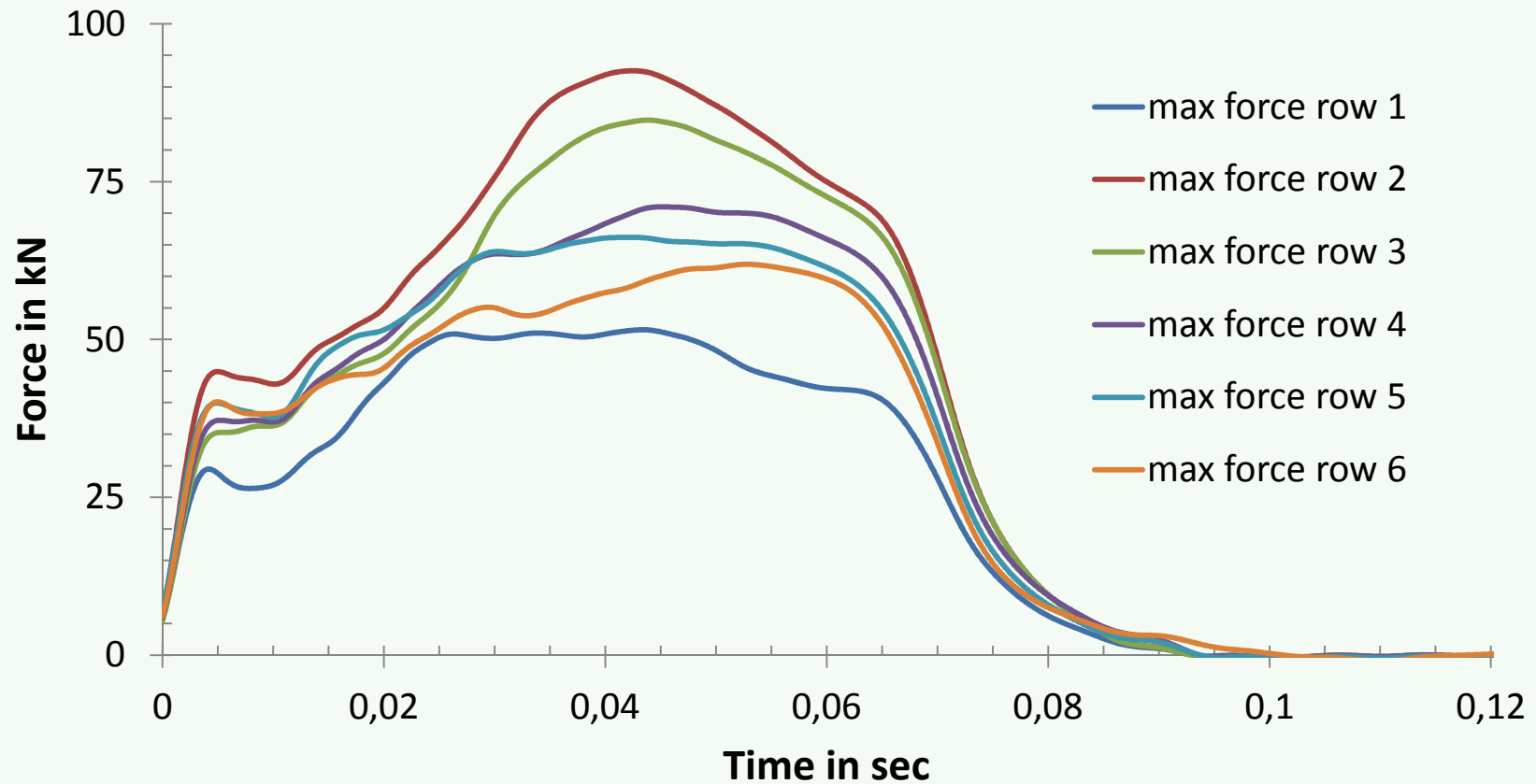
Comparison of the maximum force in row 1 to 6

LCW Maximum Forces - RFK1SP02



Comparison of the maximum force in row 1 to 6

LCW Maximum Forces - RFK1SP03



Comparison of the maximum force in row 1 to 6

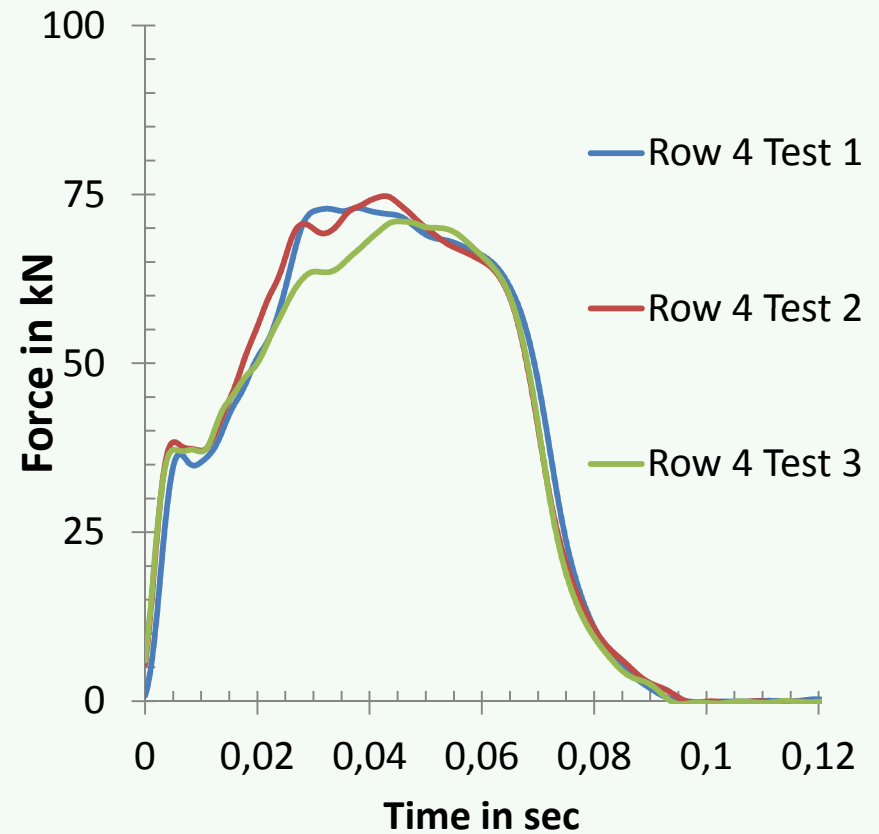
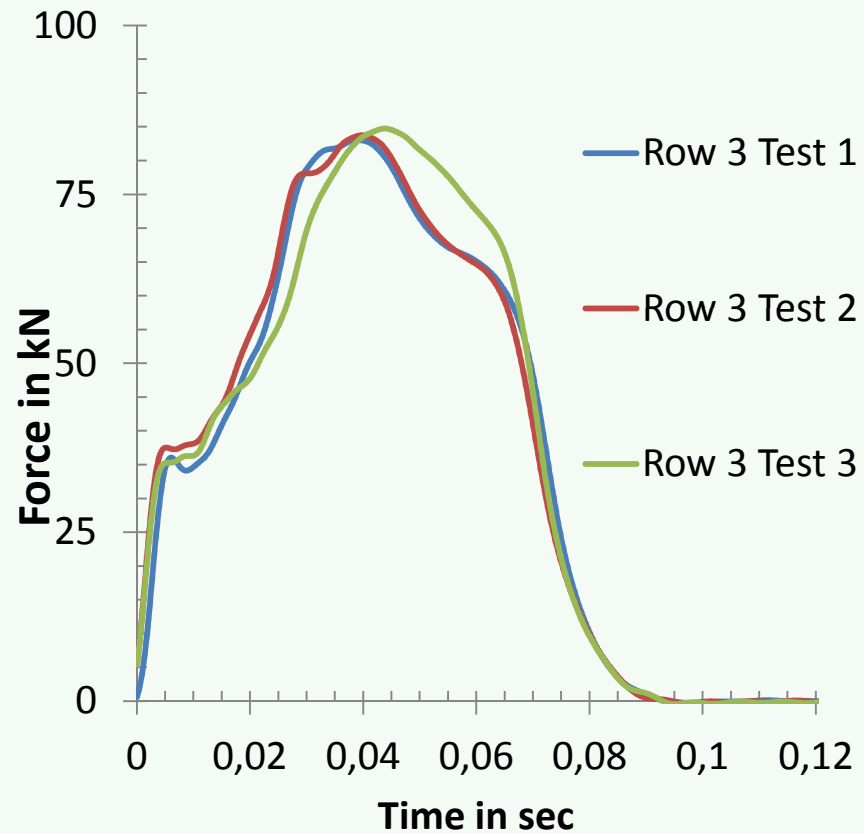
Maximum Values of the Row Force

Row	RFK1SP01 [kN]	RFK1SP02 [kN]	RFK1SP03 [kN]	Average [kN]	Deviation in %
6	56,3	62,2	61,9	60,1	-9,6
5	63,3	69,1	66,2	66,2	-8,4
4	73,0	74,7	71,0	72,9	-5,0
3	83,0	83,7	84,7	83,8	-2,0
2	90,5	92,5	92,6	91,9	-2,2
1	61,9	52,2	51,5	55,2	-16,8

Calculation row forces: sum of all cells in one row at one time, then calculate maximum value

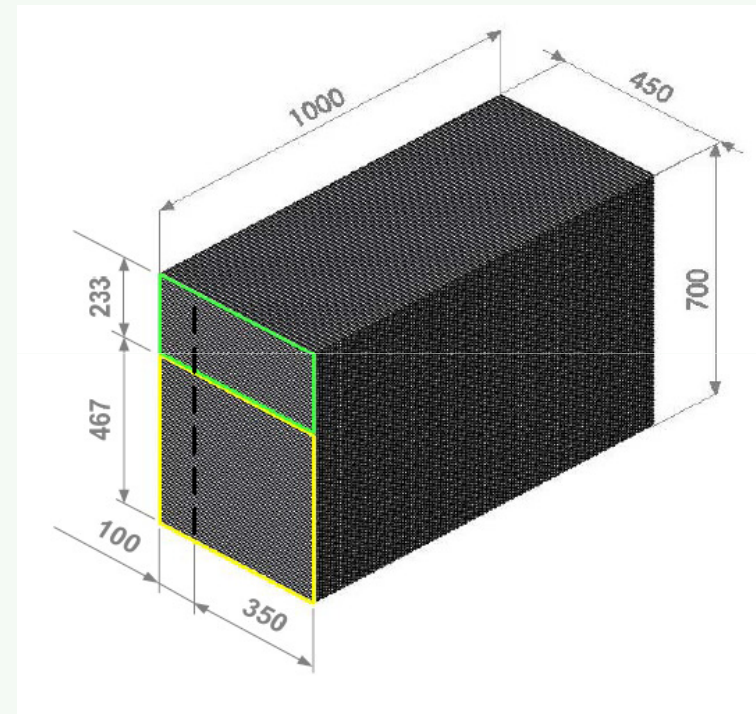
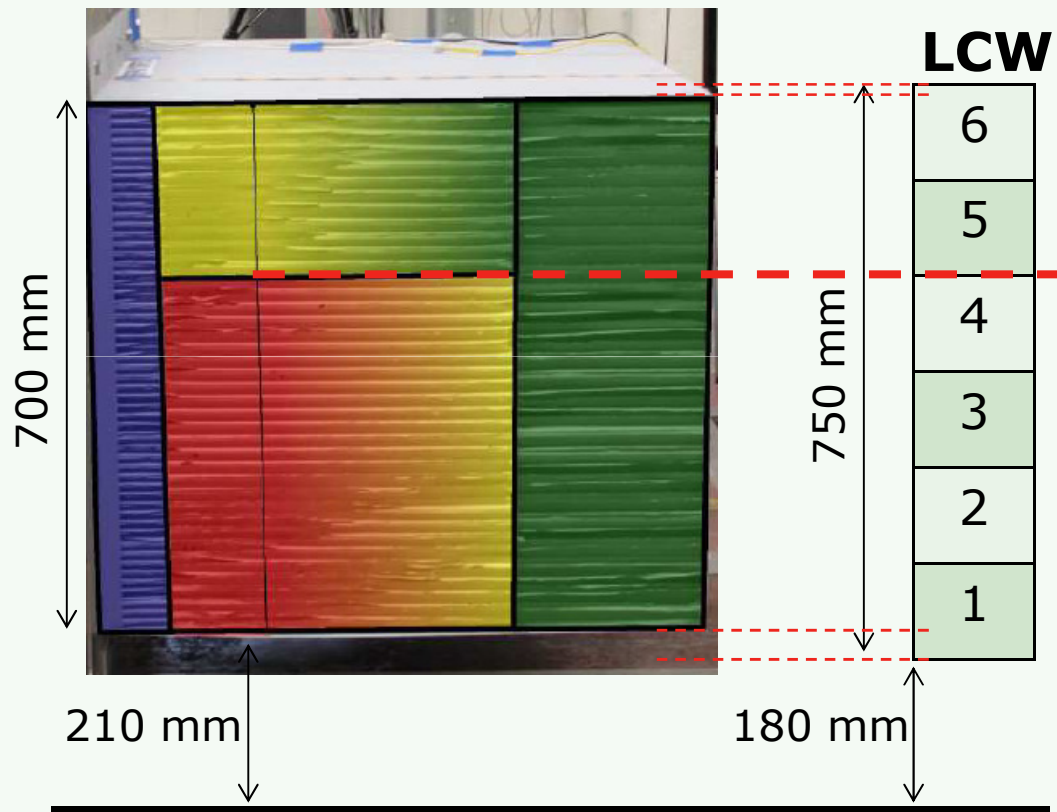
Deviation in row 2, 3 and 4 is good; row 6 and 1 was hit only partially because they are on the edge

Comparison of Row 3 and 4 in test 1 to 3



The forces in the main rows (row 3 and 4) were very close

PDB influence in Row 4 and 5



The structure of the PDB leads to small uncertainties in row 5

Conclusions

- Acceptable repeatability capability of the LCW, even when two barriers were attached
- This test configuration is kind of worst case situation because
 - Low forces per load cell
 - Influence of two crash barriers
 - BAST load cell wall with uncertainties
- The results are promising if whole time period and the maximum value of the row force are considered
- Row 1 and 6 are not as good as due to the honeycomb edge effects occur and partial overlapping of the barriers

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Thank you for your attention

Dr. Thorsten Adolph
Section "Passive Safety & Biomechanics"

adolph@bast.de

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