Re-assessment of headform impactor test parameters

Decision of the 5th GRSP INF/GR/PS meeting

Based on IHRA simulation results performed by JARI

  - see IHRA/PS/215a&b
  - collision speed 40kph
  - child and adult pedestrian model
  - 3 walking postures
  - 3 vehicle categories
  - different geometries of each category
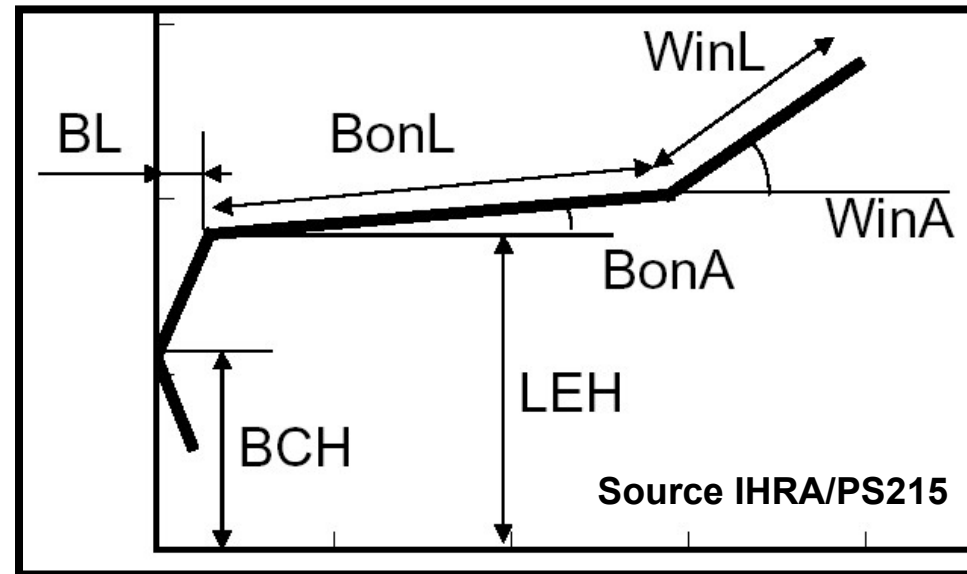 - 2 stiffness of the vehicle front

Clarification of the influence of vehicle geometry to

  - headform to vehicle impact velocity factor
  - headform to vehicle impact angle

Re-assessment of headform impactor test parameters

Vehicle geometry is defined by the following parameters:

- **BL** Bonnet leading edge

- **BCH** Bumper centre height

- **LEH** Leading edge height

- **BonL** Bonnet length

- **BonA** Bonnet angle

- **WinA** Windscreen angle

(- **WinL** Windscreen length - not assessed)

Source IHRA/PS215

Geometry data define a lower, middle and upper shape of the three vehicle categories: Sedan, SUV, 1Box

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Re-assessment of headform impactor test parameters

Use of diagrams of

velocity ratio and impact angle versus geometry
velrat   =   f(BL, BCH, …)
impang   =   f(BL, BCH, …)

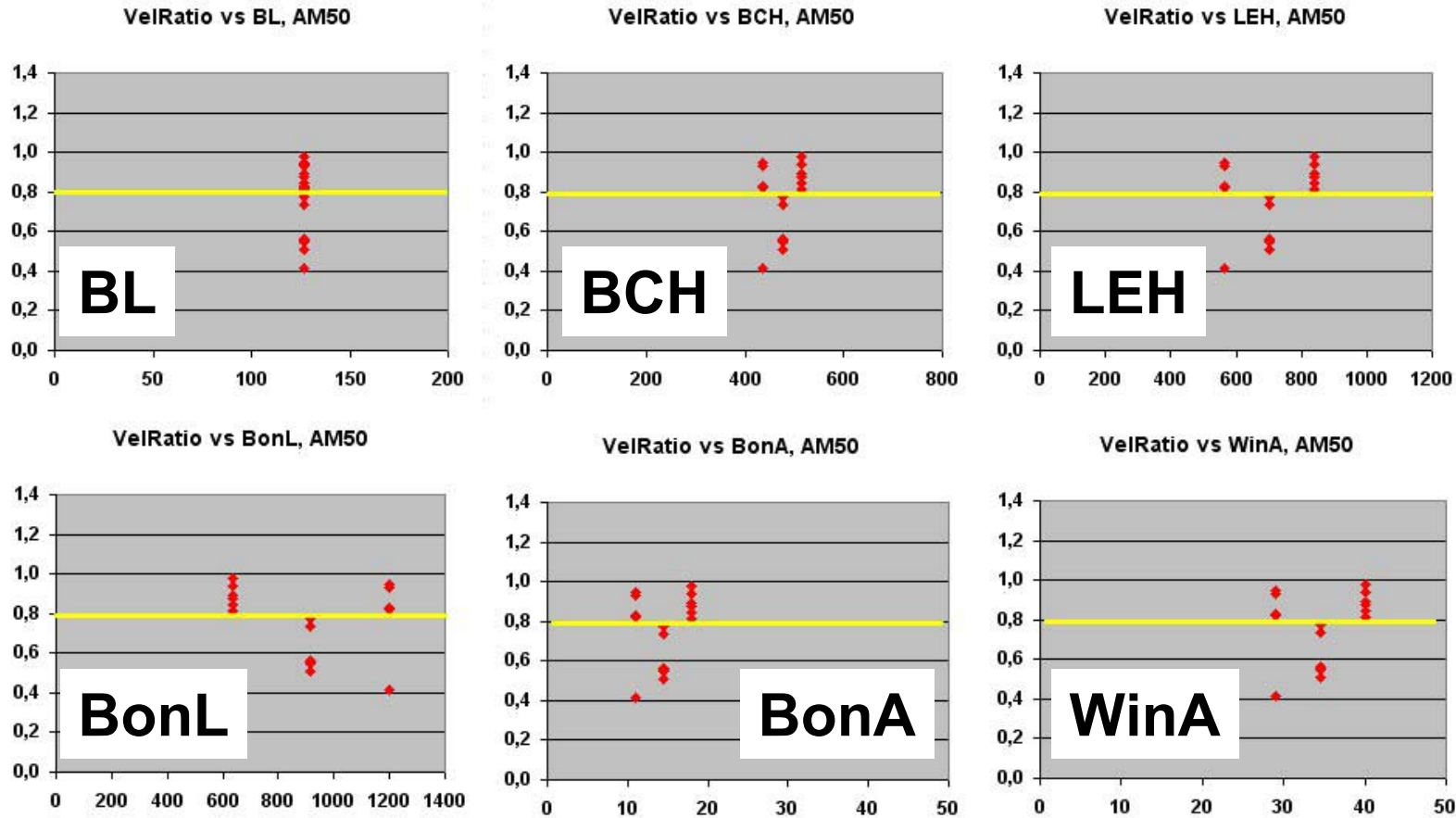**to see a correlation or an influence between the geometry and the two test parameters**

velocity ratio = impactor velocity / collision speed
Impact angle = angle of impactor velocity vector against the horizontal

Re-assessment of headform impactor test parameters

Results: e.g. velocity ration versus geometry   **MORE**
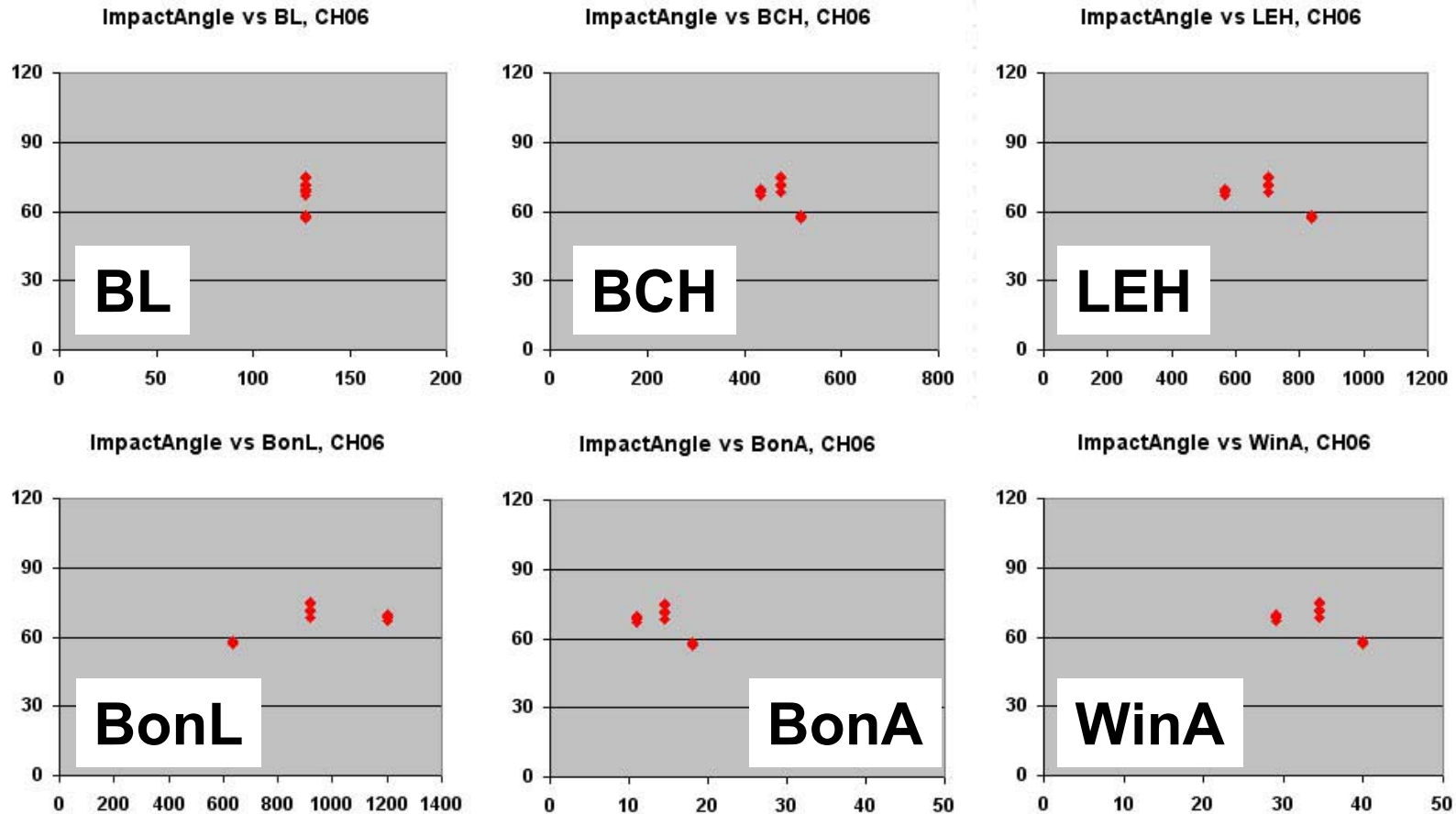   adult model, Sedan category, impact on bonnet

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Re-assessment of headform impactor test parameters

Results: e.g. impact angle versus geometry   **MORE**
                      child model, Sedan category, impact on bonnet

ImpactAngle vs BL, CH06 — **BL**

ImpactAngle vs BCH, CH06 — **BCH**

ImpactAngle vs LEH, CH06 — **LEH**

ImpactAngle vs BonL, CH06 — **BonL**

ImpactAngle vs BonA, CH06 — **BonA**

ImpactAngle vs WinA, CH06 — **WinA**

Re-assessment of headform impactor test parameters

Summary:

No significant correlation can be found between the velocity ratio and impact angle versus the geometric parameters

The velocity ratio appears to be 0.8 in all simulations

The data show different impact angles due to the combination of pedestrian/vehicle/impact area

Re-assessment of headform impactor test parameters

Re-assessment of headform test parameters based on IHRA findings		all		Head to BLE/grill contact					
		all		Sedan		SUV		1Box	
		Child	Adult	Child	Adult	Child	Adult	Child	Adult
Simulation results (JARI only)	mean vel. ratio + std. deviation	0.78 + 0.10	0.81 + 0.18	na*)	na	0.86 + 0.01	na	0.88 + 0.03	na
collision speed is 40km/h	mean angle + std. deviation	45.5 + 21.6	62.9 + 20.6	na	na	23.4 + 4.7	na	16.3 + 7.3	na

All simulation results

Re-assessment of headform test parameters based on IHRA findings		Head to bonnet contact						Head to windscreen contact					
		Sedan		SUV		1Box		Sedan		SUV		1Box	
		Child	Adult	Child	Adult	Child	Adult	Child	Adult	Child	Adult	Child	Adult
Simulation results (JARI only)	mean vel. ratio + std. deviation	0.75 + 0.10	0.76 + 0.18	0.68 + 0.04	0.83 + 0.24	0.69 + 0.02	na	na	0.90 + 0.19	na	na	na	0.76 + 0.05
collision speed is 40km/h	mean angle + std. deviation	66.0 + 6.3	66.0 + 14.0	59.2 + 2.6	90.5 + 10.8	49.8 + 1.8	na	na	42.9 + 9.1	na	na	na	52.5 + 3.6
	velocity ratio	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	angle	65	65	60	90	25	50	40	40	40	40	25	50

Proposed test parameters