

Pedestrian Safety GTR

Head and Leg Impact Testing

141th Session of WP.29
March 2007

Overview of US Testing

- ★ Need to understand impact of draft GTR in terms of benefits in the US and costs for current US fleet
- ★ Need to gather data to determine feasibility of extending draft GTR to cover all US light vehicle fleet (4500 kg), or whether draft GTR should only apply to vehicles of 3500 kg or 2500 kg
- ★ Need to gather data for both the head and leg requirements in draft GTR

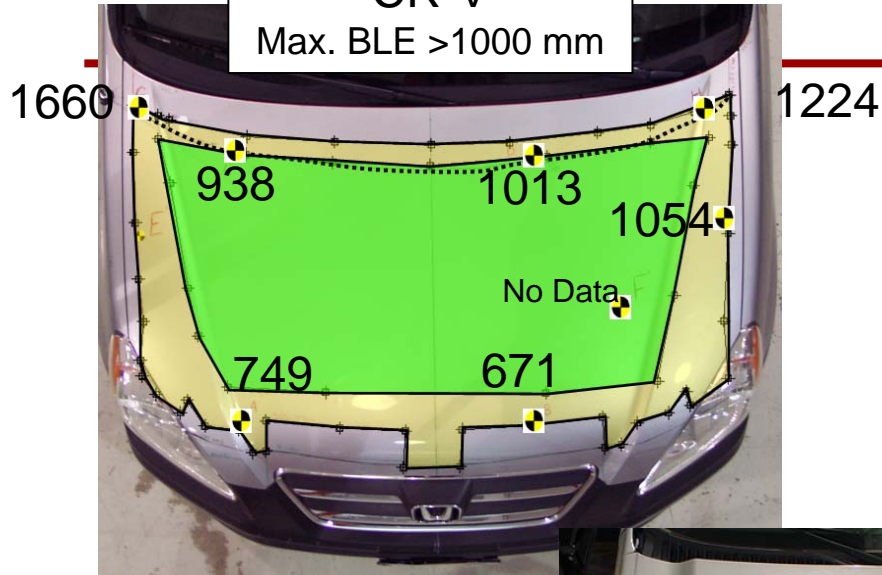
Test Overview - Head

- ★ Tested 11 vehicles for compliance with draft GTR head requirements
- ★ Purpose:
 - Provide data on current level of head protection for GTR benefits estimate
 - Focus on larger vehicles in US fleet
- ★ Methods:
 - Head impacts per GTR procedures (35 km/h)
 - 8 Hard/Soft/Typical points
 - Estimated 1/3 relaxation zone to identify probable “passing” points/vehicles.
 - ≤ 1700 HIC in relaxation zone (1/3 test zone)
 - ≤ 1000 HIC everywhere else

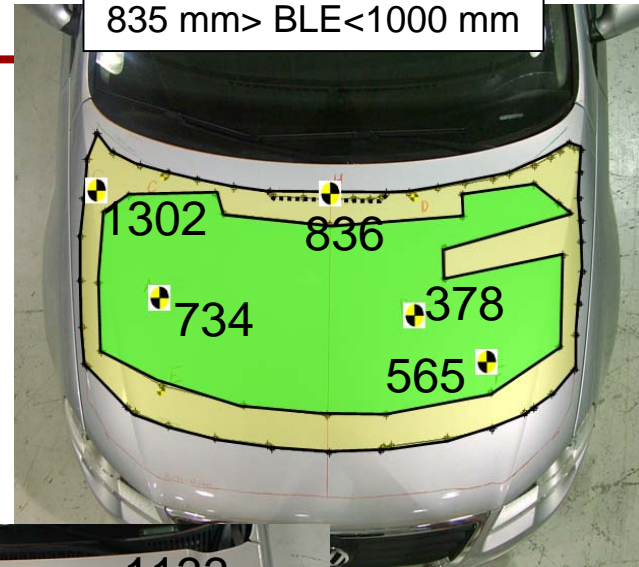
Test vehicles	GVM (kg)	Bonnet	
		Leading Edge WAD (mm)* (Min)	(Max)
2002 Jeep Wrangler	2019	916	1111
2005 Honda CR-V	2020	880	1014
2006 Volkswagen Passat	2020	840	880
2006 Toyota Tacoma	2063	992	1026
2003 Toyota 4Runner	2063	1030	1091
1999 Dodge Dakota	2200	895	995
2003 Ford Crown Victoria	2632	804	848
2006 Dodge Durango	2903	1088	1240
2003 Hummer H2	3901	1172	1196
2003 Ford E350	4127	1162	1188
2005 Chevrolet Silverado	4173	1210	1265

Vehicles with No Failures

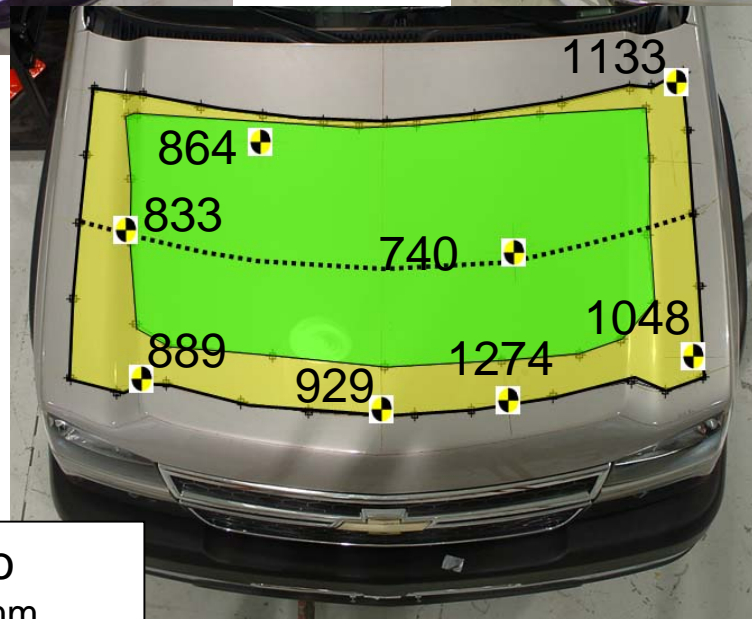
CR-V
Max. BLE >1000 mm



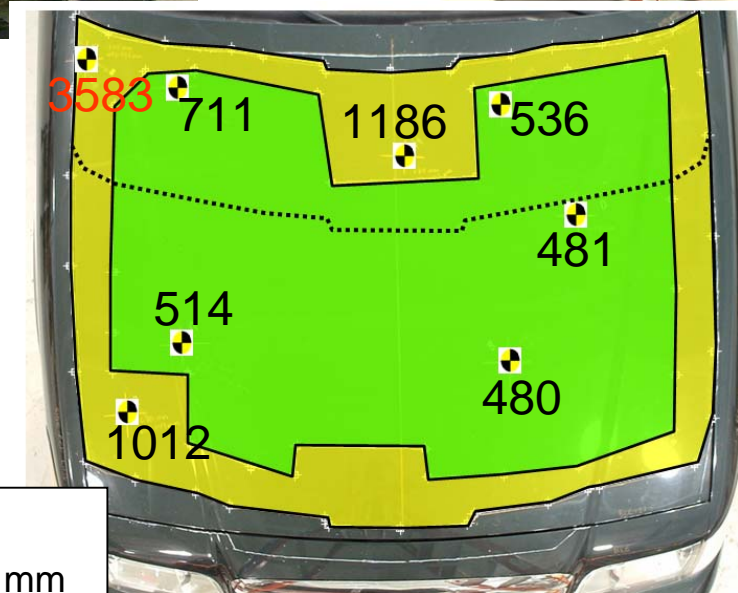
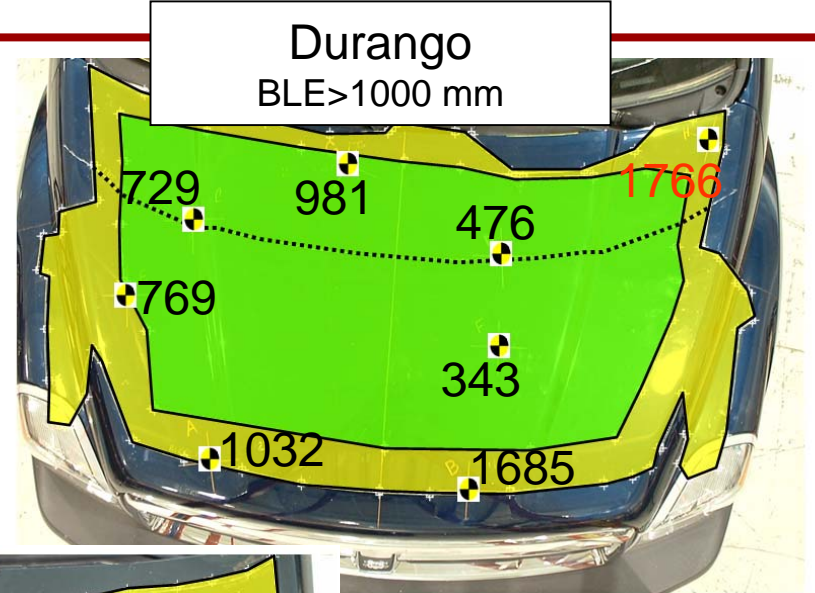
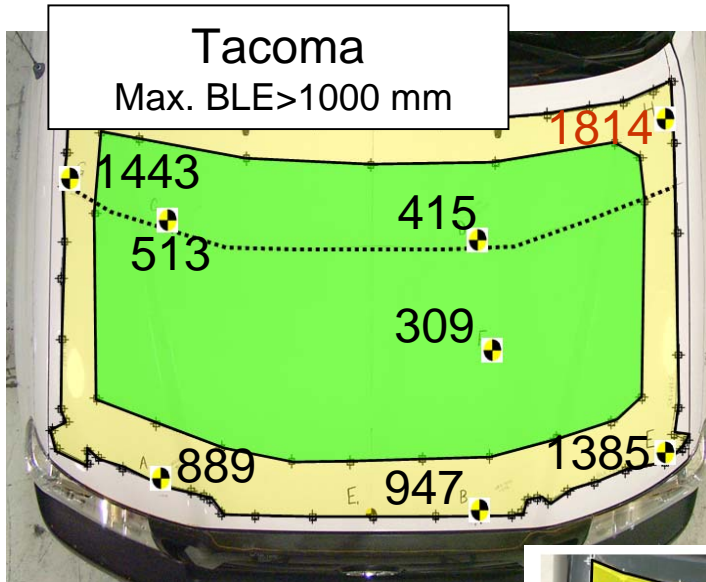
Passat
835 mm > BLE < 1000 mm



Silverado
BLE > 1000 mm

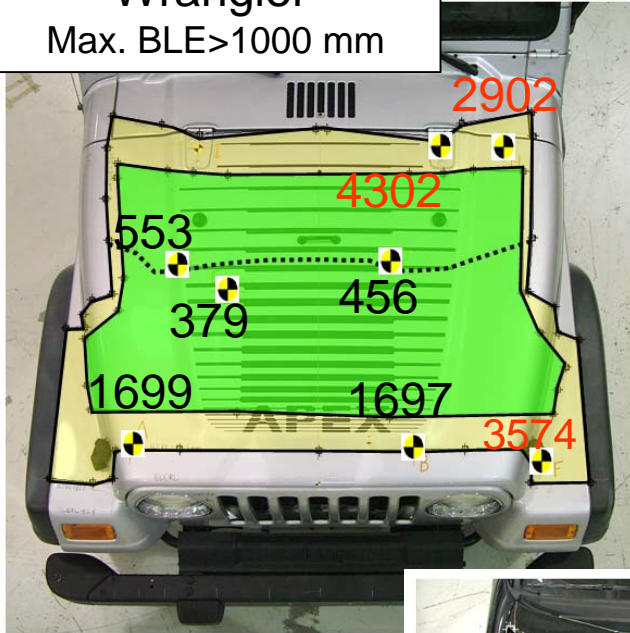


Vehicles with a Failing Impact in Estimated Relaxation Zone

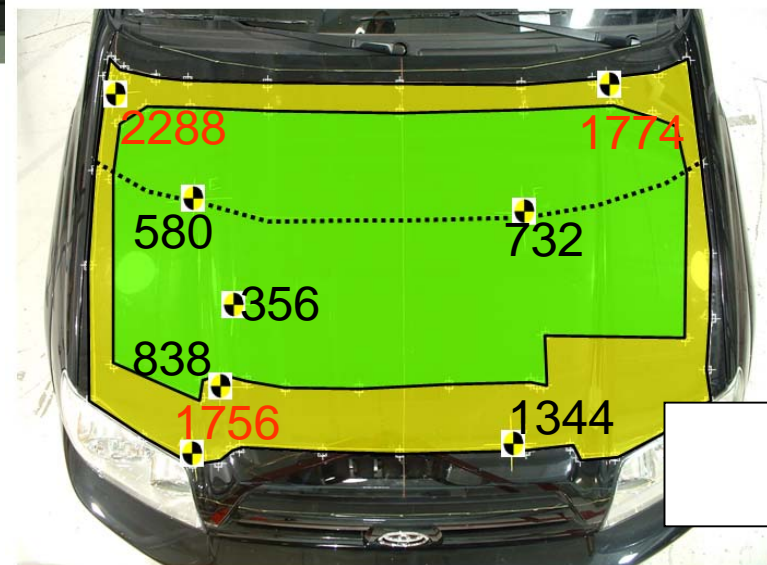
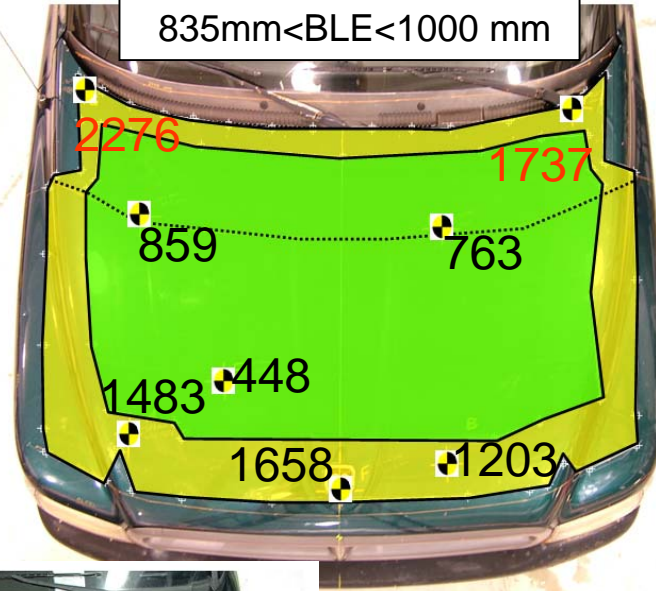


Multiple Failing Impacts in Estimated Relaxation Zone

Wrangler
Max. BLE > 1000 mm

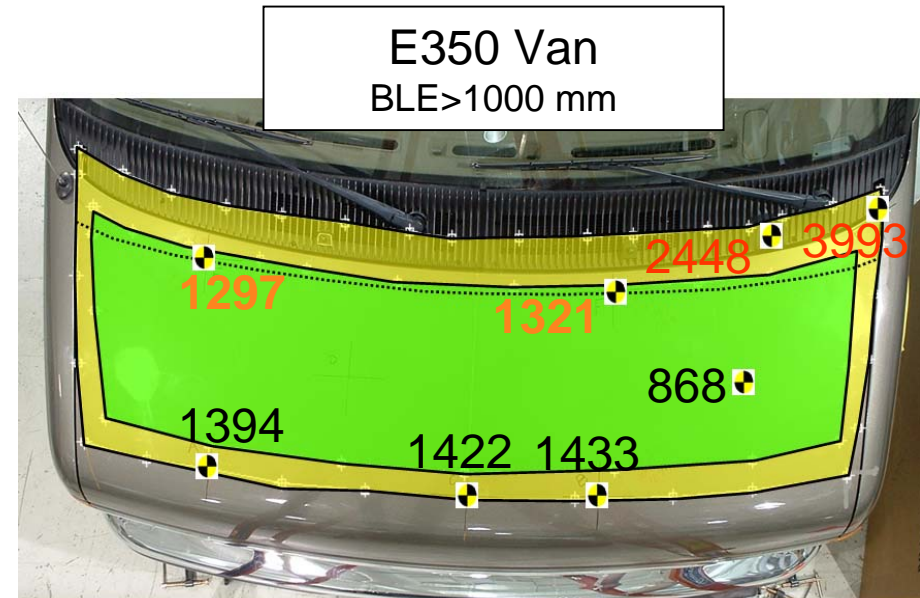
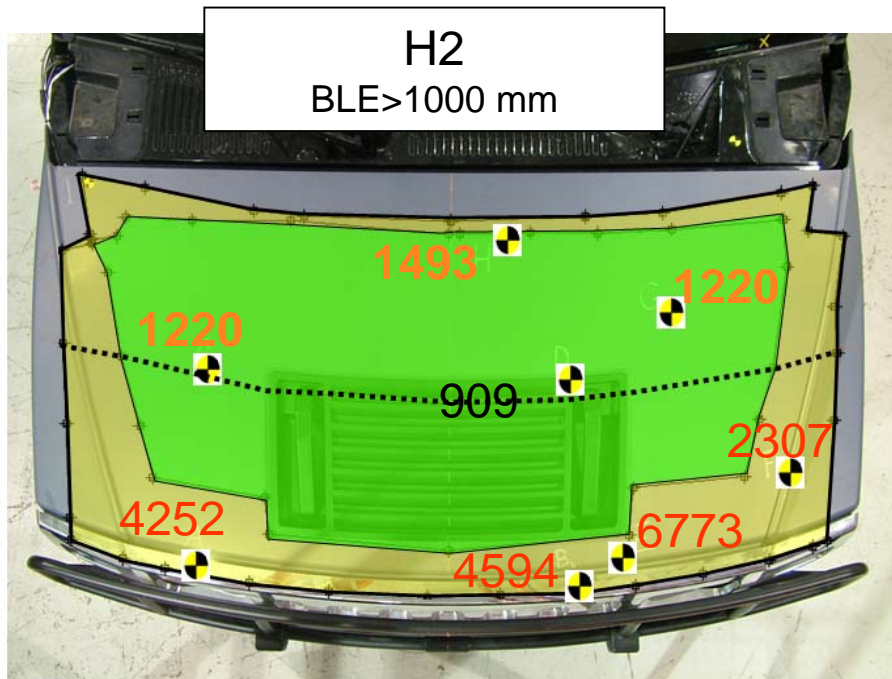


Dakota
835mm < BLE < 1000 mm



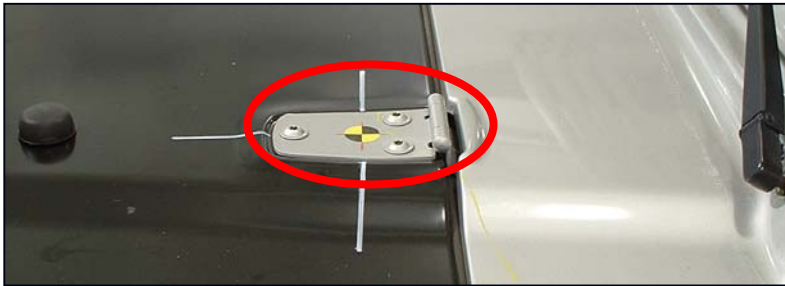
4Runner
BLE > 1000 mm

Vehicles with Multiple Failing Impacts in Relaxation Zone *and* outside of Relaxation Zone



Solutions in Challenging Areas: Hinge

Jeep Wrangler – HIC 4302



Ford E350 – HIC 3993



VW Passat – HIC 1302



Low-profile
deformable hinge

Solutions in Problem Areas: Cowl

Ford E350 – HIC 2448



Dodge Durango – HIC 981



Observations – Head Testing

- ★ No apparent reason to limit scope of GTR below 4500 kg.
 - The heaviest vehicle in our test program currently meets all head impact requirements in the draft GTR, while the lightest vehicle in our test program requires some redesign.
 - Technical consensus is that the vehicle shape, NOT the mass, that is most important
- ★ The test procedure is feasible and the requirements are cost beneficial for all vehicles up to 4500 kg.
- ★ Few vehicles will require major re-design, but most vehicles will require some redesign. Adequate leadtime must be provided to make these changes.
- ★ Effective countermeasures exist for challenges identified:
 - For all problem areas at least one vehicle performed well.

Leg Testing

- ★ Testing is just starting
- ★ Focus is on larger vehicles in the U.S. fleet
- ★ Ford Motor Company is working with NHTSA to conduct this testing
- ★ Goal is to have this testing completed in May, so we can share it at GRSP