Shape Corp
GTR09 NA vs EU Vehicle
Modified Round Robin

GTR9-6-19-Rev#1e:
-Added impact velocity:: pg4,6
-Corrected Y-offset value on Vehicle#2 graph:: pg5
-Removed "master" identification from VRTC legform:: pg2

Cort Corwin
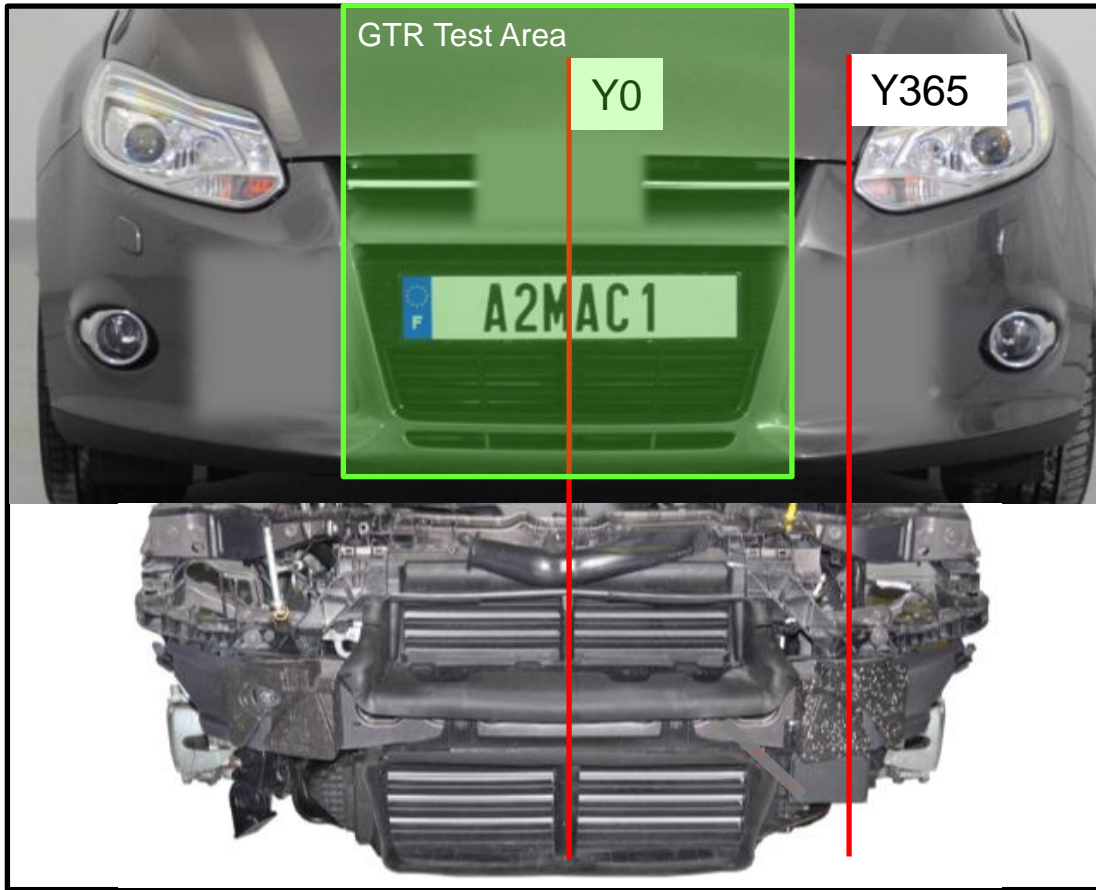*03-20-2013 Ver.2*

Shape Corp Flex PLI Testing

1. Vehicle #1 Test Setup
2. Vehicle #1 EU & NA
3. Vehicle #2 Test Setup
4. Vehicle #2 EU & NA + IWG RR Tests
5. General Testing Observations
6. Ground Line Adjustment Required in CAE

Legform Detail

SN	Version	Status*	Mass	Owner
SN01	Flex GTR	Master	13.32kg	Humanetics
VRTC	Flex GTR	TBD	13.18kg	NHTSA

Vehicle #1

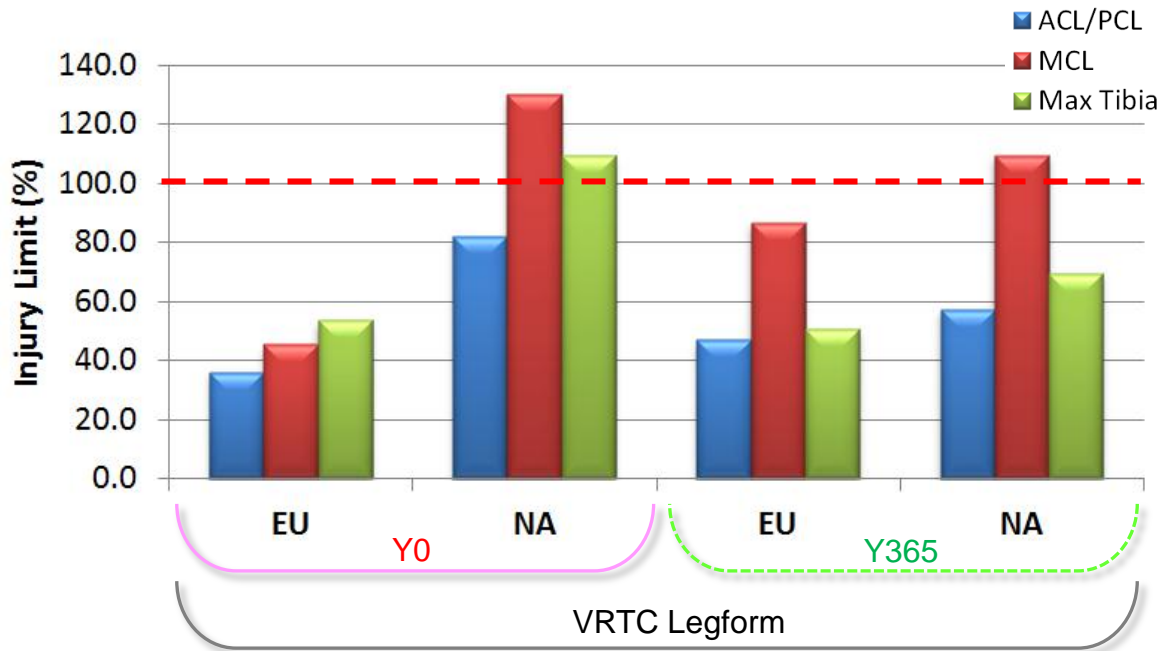## Test Locations

GTR Test Area

Y0

Y365

NA vehicle w/ EU system applied

Time: 106.0

NA Vehicle
Impact at Y0

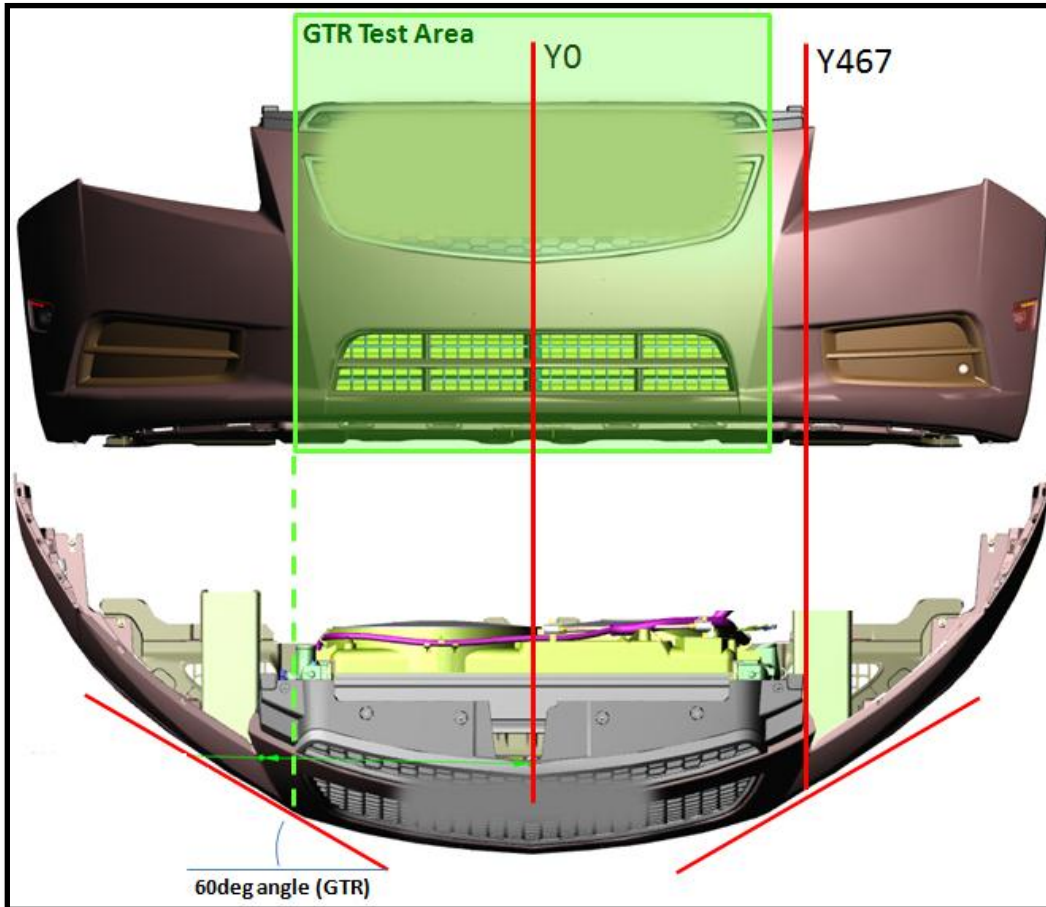*Offset location established from EuroNCAP protocol

Vehicle #1: EU & NA

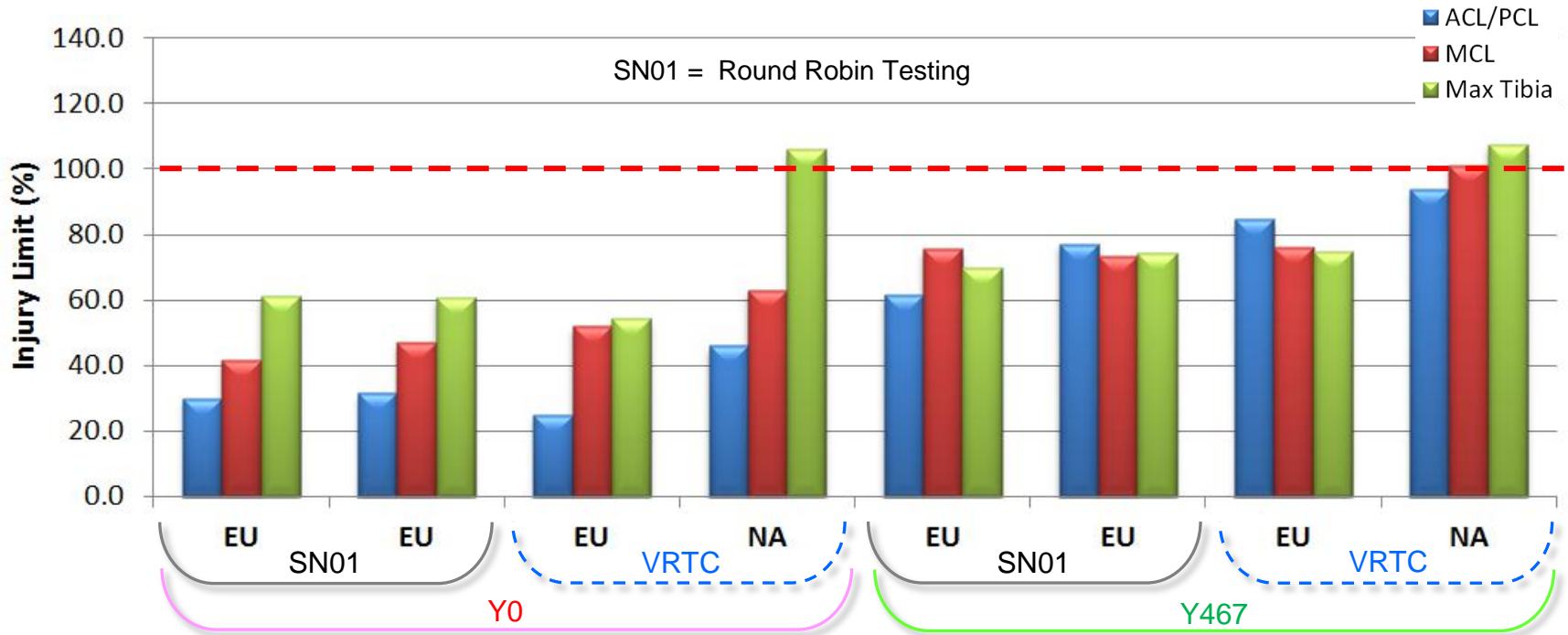|		Location	Velocity @ Impact (kph)	Leg	ACL/PCL	MCL	Max Tibia
					13	22	340 GTR9
VEHICLE #1	EU	Y0	40.39	VRTC	4.7	10.0	182.2
	NA	Y0	40.52	VRTC	10.7	28.6	372.0
	EU	Y365	40.56	VRTC	6.1	19.1	172.4
	NA	Y365	40.09	VRTC	7.5	24.1	236.4

![shape CORP logo]

Vehicle #2

Test Locations

*Offset location established from EuroNCAP protocol

Vehicle #2: EU & NA + IWG RR Tests

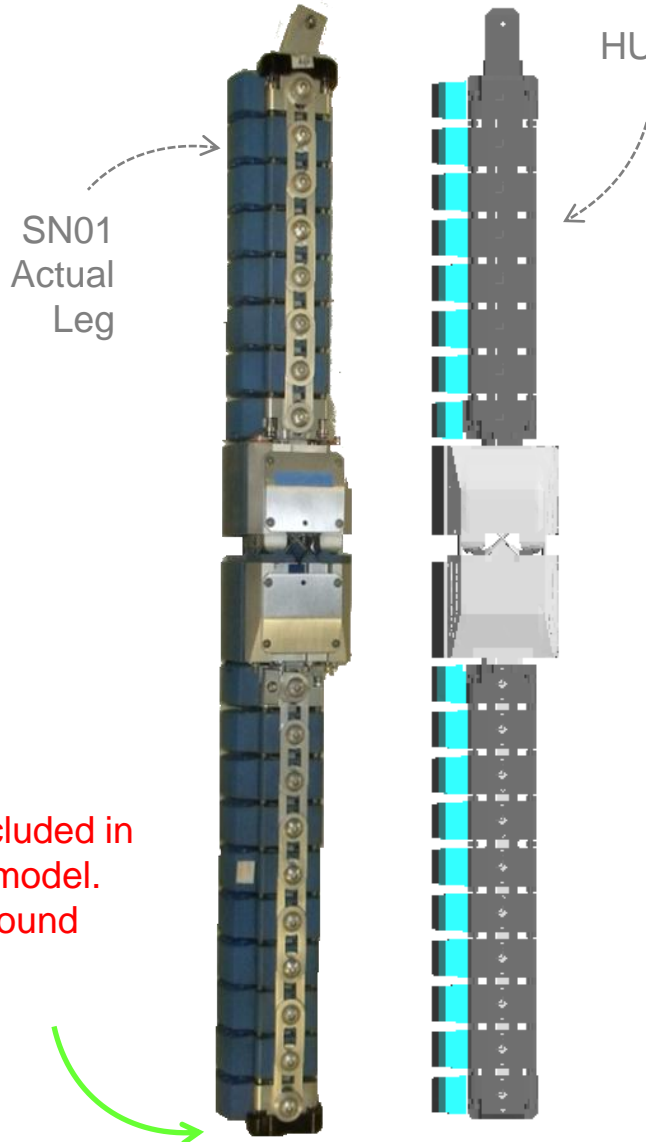|		Location	Velocity @ Impact (kph)	Leg	ACL/PCL	MCL	Max Tibia
					13	22	340 GTR9
VEHICLE #2	EU	Y0	40.39	SN01	3.9	9.2	208.5
	EU	Y0	40.30	SN01	4.1	10.4	206.4
	EU	Y0	40.52	VRTC	3.3	11.4	184.9
	NA	Y0	40.28	VRTC	6.0	13.9	360.6
	EU	Y467	40.45	SN01	8.0	16.6	238.0
	EU	Y467	40.27	SN01	10.0	16.1	252.3
	EU	Y467	40.30	VRTC	11.0	16.8	253.6
	NA	Y467	39.71	VRTC	12.2	22.3	366.1

Shape Corp: General Observations

- Both VRTC & SN01 legforms at latest level containing updated bone cores, tibia long rubber and within newly defined certification corridors (VRTC pendulum cert only).
- Slight **launch plate modifications required** to keep tibia bending below 10Nm during free flight.
    - (a) bottom plate extension
    - (b) material removed at center for knee joint clearance
- Friction differences in roller bracket required **launch pressure differences** between legs
- Wire exit base/clamp (top of tibia) were **not being used** on either legform (wires loose)
- DAS cable connection **socket damaged** when impacting floor.
- Zipper durability is an issue, several openings occurred during Y-offset tests

- During CAE correlation it was discovered the LS-DYNA Flex PLI Ver2 legform does not include the plastic endcap at tibia bottom. Measurement to ground line should be compensated by 8.6mm (see next page).

Ground Line Adjustment Required in CAE

SN01
Actual
Leg

HUMANETICS_FLEX_PLI_GTR_V2.0_S3_DYNA.key

Section of Endcap (PN: 133-5516)

Print: 8mm
Actual: 8.6mm*
*(measured with calipers at Humanetics)

11.8
8.0
(6.0)
24.5
4X R1.0
49.0
R5.0 TYP.
(3.0)

SECTION   A-A

End cap not included in
V1 or V2 CAE model.
Adjust leg to ground
line by 8.6mm