



Super Light Architectures for Safe and Affordable Urban Electric Vehicles

Collaborative Project
Grant Agreement Number 605634

Start date of the project: September 1st, 2013, Duration: 36 months

Project newsletter

Spring 2015

Lead contractor for this deliverable: **LKR**

Coordinator:

Dr.-Ing. André Heinrietz
Fraunhofer Institute for Structural Durability and System Reliability LBF
Department Materials and Components
Bartningstr. 47 - D-64289 Darmstadt - Germany
Phone +49 6151 705-271, Fax +49 6151 705-214
E-mail andre.heinrietz@lbf.fraunhofer.de

Project co-funded by the European Commission within the Seventh Framework Programme (2007-2013)		
Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Improvement of structural properties (Apr. 2015)

One main goal of this project is to meet the weight targets of the L7e class vehicle together with excellent structural behaviour, crashworthiness and application of light metals. The structural, dynamic and crash analysis of the original structure mainly made of steel did not meet the requirements of a safe vehicle.

The use of aluminium and magnesium has the advantage of lower density, but also the disadvantage of lower Youngs’s moduli compared to steel used in Casple-EV. To ensure the same stiffness, the tube geometries had to be expanded but the maximum diameters are limited to a certain design determined by the outer panels. Additionally, two other measures to improve structural stiffness especially of the passenger compartment were taken. The introduction of a substructure and the availability of the door reinforcement bar for global stiffness raised the static stiffnesses; both bending and torsional stiffness. Consequently, the behaviour of this space frame structure raised to a level which also fulfil the requirements of the higher M1 class.

	Original setup	Improved setup	Reference
Bending stiffness [N/mm]	7958	11628	8500
Torsional stiffness [daNm/rad]	38321	58984	65000
1 st bending mode [Hz]	29.6	54.6	> 40
1 st torsional mode [Hz]	29.6	36.5	> 35
Crashworthiness	☹	☺	☺
Weight [kg]	115 kg	74	

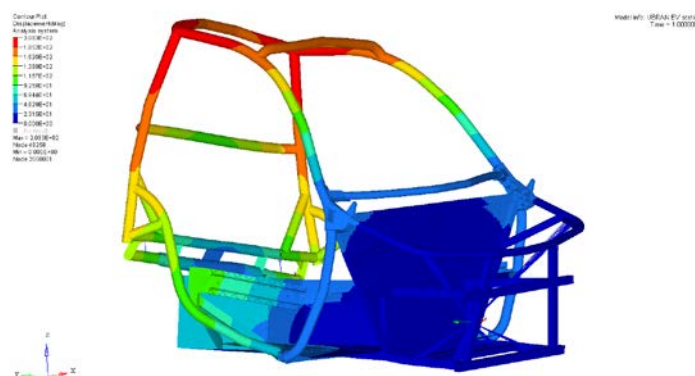


Figure: Deformation of improved structure due to torsion