Midas NFX project application

Door Trim linear impact Analysis

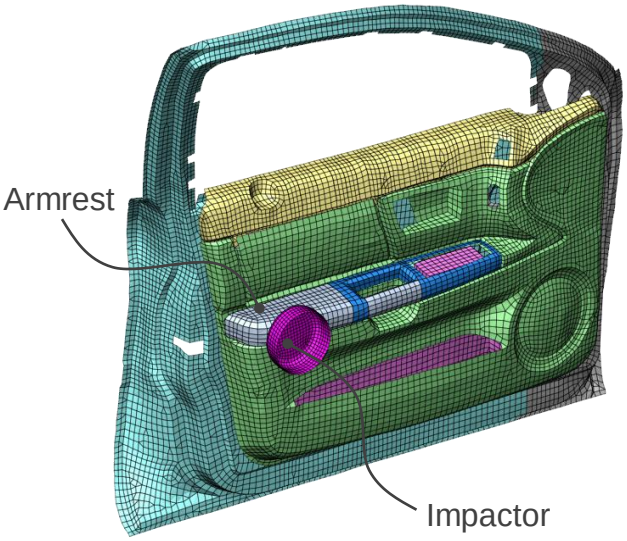


Figure 1.1 FE model of Car Door for Door Trim linear Impact Analysis

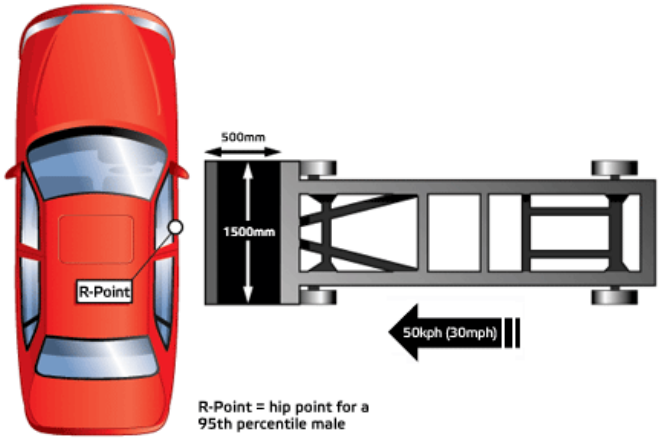
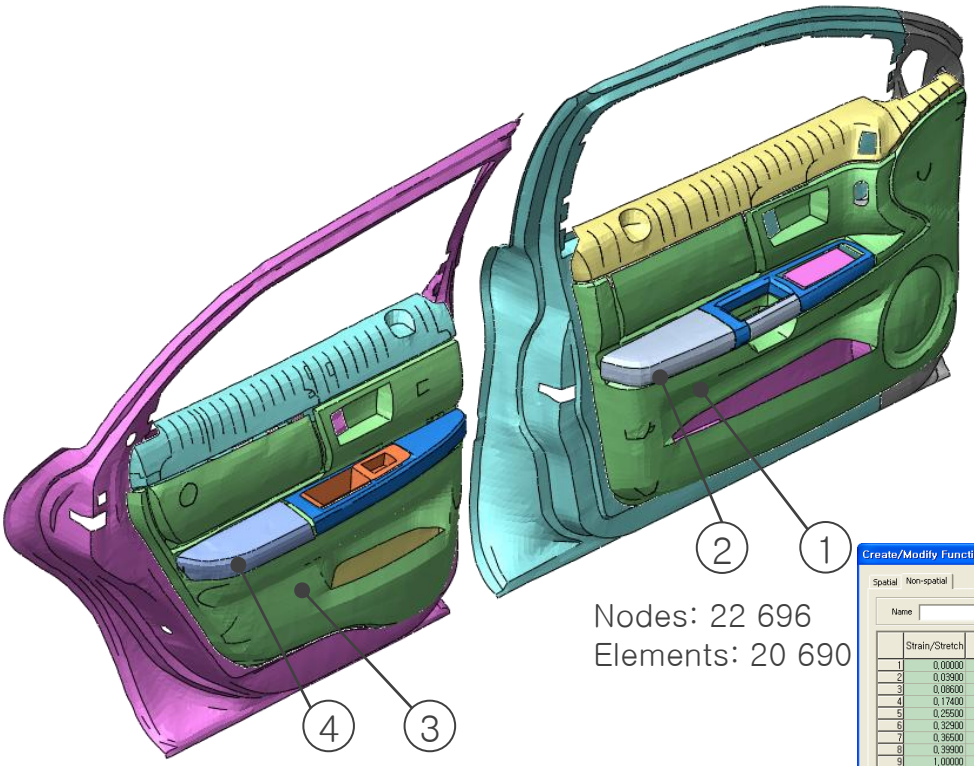


Figure 1.2 FE Car to car Side Impact (EURO NCAP)

In case of car to car side impact, the safety of the passenger need to be assured. This is why the load delivered to the passenger's chest by the armrest of the door need to be investigated to be sure it doesn't exceed the norm defined by the regulation.

At the beginning of the simulation, the door trim round impactor is set with an initial velocity. After the chock caused by the impact, the peak force delivered to the impactor is calculated and compared with regulations.

By reducing the peak force, the injury to the passenger's chest can also be reduced.



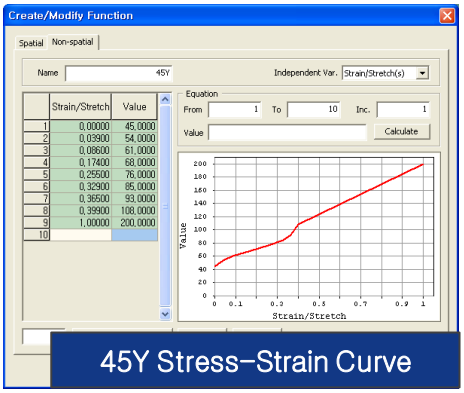
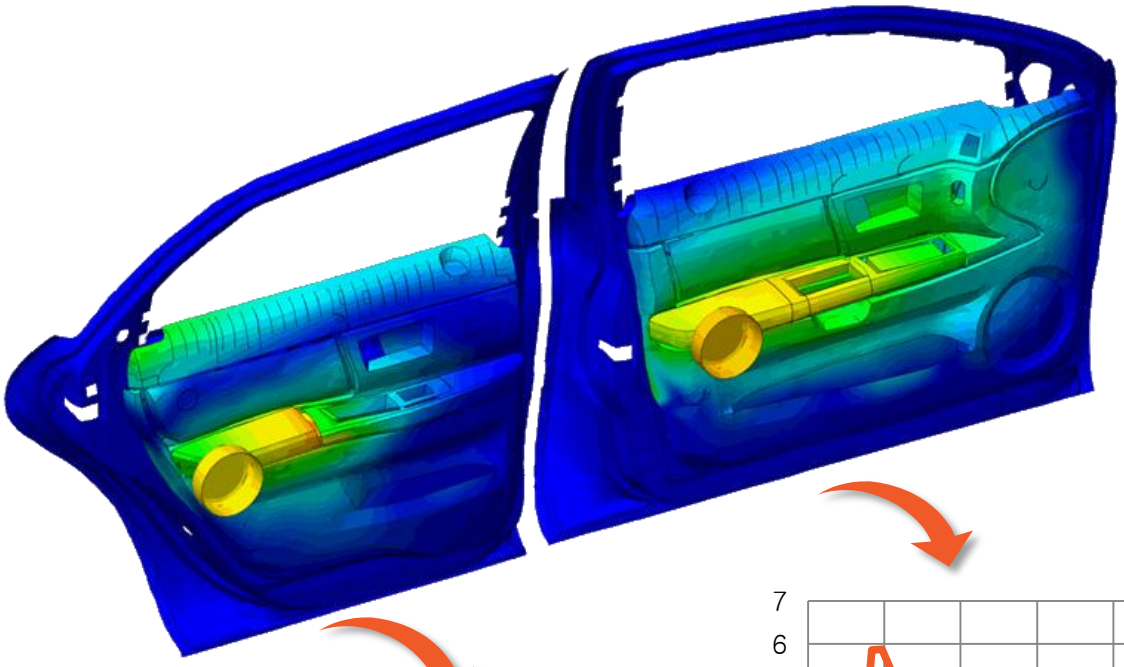
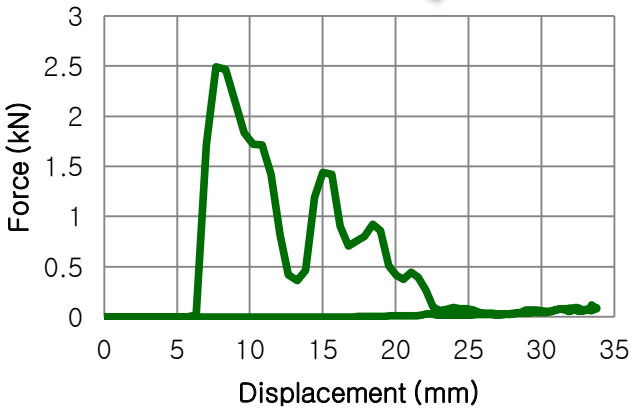


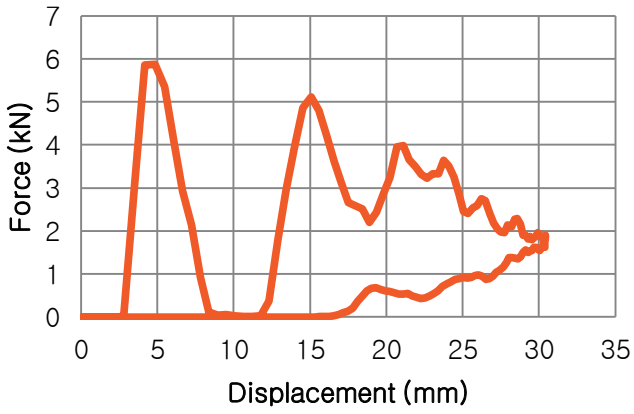
Fig 2.1 Front, Rear door trim structure

	Part	Thickness (mm)	Modulus of elasticity (N/mm^2)	Poisson's ratio	Density (kg/mm^3)	Plastic curve
1	DOOR_TRIM_FRT_LH	2.31	2800	0.3	1.2e-6	45Y
2	ARM_REST_FRT_LH	Solid	2800	0.3	1.2e-6	45Y
3	DOOR_TRIM_RR_LH	2.70	2800	0.3	1.2e-6	45Y
4	ARM_REST_RR_LH	Solid	2800	0.3	1.2e-6	45Y

Finite element models of the front and rear doors have been both considered for the study. Front door model consisted of 20,690 elements and 22,696 nodes and rear door model consisted of 17,057 elements and 18,472 nodes. The same nonlinear material stress-strain curve have been applied for all the parts.







	Peak force
Front door	5.9kN
Rear door	2.5kN

Analysis lead to interesting conclusion showing that the peak force on the front door was more than 2 times higher than the peak force of the rear door. Thanks to midas NFX, Engineers realized that the front door needed to be re-engineered to make the car safer for the front passenger.