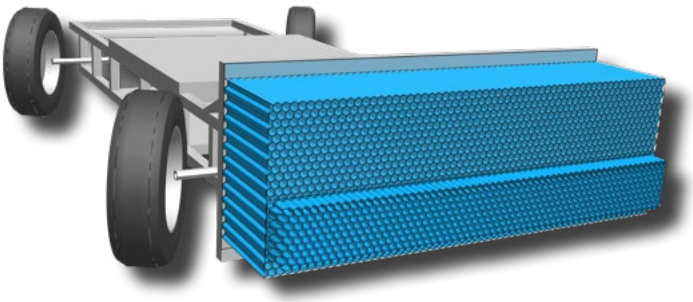
Arup Cellbond Barrier Models

Working in collaboration, Arup and Cellbond have developed a range of LS-DYNA finite element models based on the aluminium honeycomb barriers produced by Cellbond.



NHTSA Barrier

National Highway Traffic Safety Administration
LS-DYNA Shell model for side and rear impact

This model is used for side and rear testing. The model is provided with different heights, initial speeds, and tyre orientations for the two load cases.

- Used for side and rear impact testing.
- Required for NHTSA FMVSS 214 and FMVSS 301 evaluations; and for U.S. NCAP.
- Model calibration and validation processes go beyond the barrier specification tests: the model is correlated to additional dynamic tests at component and full barrier levels.
- Arup has a track record with over 20 years of experience in barrier development using proven modelling techniques that demonstrate robustness and fidelity.

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NHTSA Barrier

National Highway Traffic Safety Administration LS-DYNA Shell model for side and rear impact

The specifications used for the development of the NHTSA Side and Rear Moving Deformable Barrier have been taken from the NHTSA documents 'Federal Motor Safety Standard, MVSS 214 – Side Impact Protection', 'Federal Motor Safety Standard, FMVSS 301 – Fuel System Integrity – Rear Impact Test' and 'National Highway Traffic Safety Administration, PART 587 – Side Impact Moving Deformable Barrier'.

The NHSTA MDB barrier is used by NHTSA in their SINCAP side and rear impact tests and was also adopted by US-NCAP in 2012 for their side impact tests. When used in the FMVSS 301 rear impact the barrier is set 50mm lower.

Validation

The LS-DYNA model calibration has been done using the test results provided by Cellbond for four different impact conditions. The tests involve the barrier on a trolley impacting a rigid pole, a rigid wall, a rigid rear armature and a half rigid wall. The force-deflection curves (generated from model's analyses and tests) for the barrier have been compared.

This validation work for this Shell model has been carried out in LS-DYNA R9.3.0 SMP and MPP versions.

NHTSA Side and Rear Impact Barrier is also available in the Solid element version.

Specifications

Element Type	LS-DYNA Release Version	Total Number of Elements	Timestep	Regulation Test	Regulation Speed
Shell	LS-DYNA 971 R.9.3.0 SMP/MPP	1134707	1.2E-6	FMVSS 301 Fuel System Integrity (Rear Impact Test)	80kph
Shell	LS-DYNA 971 R.9.3.0 SMP/MPP	1134707	1.2E-6	FMVSS 214 Side Impact Protection	53kph
Shell	LS-DYNA 971 R.9.3.0 SMP/MPP	1134707	1.2E-6	US-NCAP Side Impact Test	61.9kph