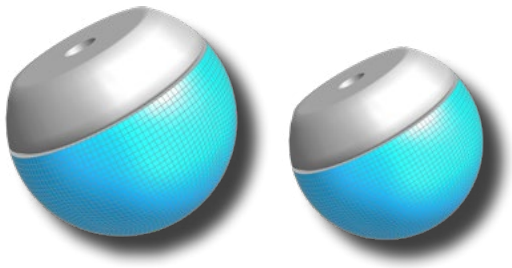
Arup Pedestrian Impactor Models

Pedestrian safety is one of the most rapidly evolving parts of automotive legislation and engineers need the right pedestrian simulation tools for the job.



Headforms

3.5kg Child/Small Adult Headform Model
4.5kg Adult Headform Model

This model is used for pedestrian impact load cases to predict the potential risk of head injury to children, adults and cyclists.

- Model calibration has been performed using test data provided by Cellbond according to EU regulation drop tests.
- Used in regulations:
  - EuroNCAP (2020 & 2023)
  - J-NCAP
  - C-NCAP
  - GTR No. 9 and ECE R127
- Oasys LS-DYNA Environment provides a comprehensive solution to headform impactor analysis setup and post-processing.

Headforms

3.5kg Child/Small Adult Headform Model 4.5kg Adult Headform

The specification used for the headform impactor has been taken from EC Regulation 78/2009 (14 January 2009) and annexed in EC Regulation 631/2009 (22 July 2009).

Arup-Cellbond have developed two standard 165mm diameter headforms used for both the European and Japanese regulations:

- 3.5kg Child/Small Adult Headform Model
- 4.5kg Adult Headform Model

Validation

The LS-DYNA model calibration has been done using the test results provided by Cellbond according to EU regulation calibration drop tests.

Peak resultant acceleration curves (obtained from model analysis and tests) are measured by the triaxial accelerometer in the headform and compared against the specified corridors from the regulations document.

The validation work has been carried out in both SMP and MPP versions of LS-DYNAR 9.2, R7.12 and R11.2.2 to ensure performance and accuracy.

Specifications

- The head forms consists of a rigid sphere coated with a rubber hull.
- A triaxial accelerometer is fitted in the centre of gravity.

Specifications

LS-DYNA Release Version	Total Number of Elements	Mass	Regulation Test	Regulation Speed
LS-DYNA 971 R7.1.2 SMP/MPP	12532	3.5kg/4.5kg	Euro NCAP & J-NCAP	40km/h