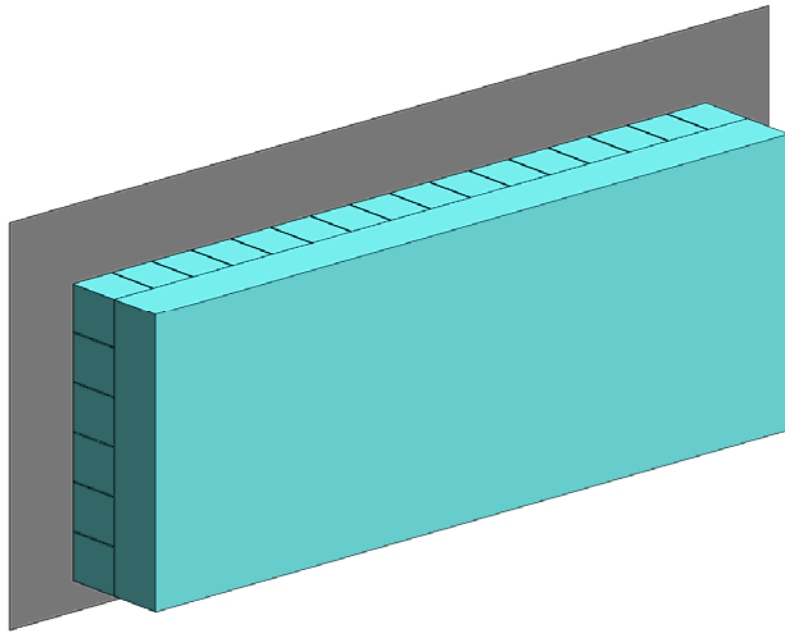


Full Width Deformable Barrier (FWDB) Version 1.0



User Manual

March 2008

This barrier is currently being developed by TRL Limited (Transport Research Laboratory) and as such no formal specification has been released yet.

Barrier Characteristics

- The barrier is made up of two layers of honeycomb material fixed to a aluminium back plate, and then mounted onto a loadcell wall.
- The barrier is mounted 80mm off the ground
- The front honeycomb layer is 1000mm x 750mm with a depth of 150mm
- The rear honeycomb layer is made up of 96 individual blocks (16 columns x 6 rows). Each block is 120mm x 120mm with a depth of 150mm

Material Characteristics

- The front honeycomb layer should have a crush strength of 0.34 N/mm².
- The rear honeycomb layer should have a crush strength of 1.71 N/mm²

Calibration Procedure

There is no calibration test specified for this barrier at the moment.

Model Description

- The units of the model are Newtons, Tonnes, seconds and millimeters. Versions of the model in other unit systems are available on request.
- The Barrier is oriented in standard vehicle coordinates, with the z-axis pointing upwards and the x-axis pointing forward, towards the front of the vehicle.
- The barrier will need to be translated so that it is correctly positioned relative to the vehicle.
- The model mesh is shown in fig 1.1.

Control Parameters

There are two Control Cards defined in the barrier model.

- Control Timestep - This control card has been added to the model to specify the mass scaling option and is set to the value that was used in the barrier correlation.

Contact Surfaces

There are a number of contact definitions in the barrier model:

- Four contacts that make up the barrier internal contacts (id 1, 2, 3, 4)
- An automatic surface-surface contact for setting up the contact with the vehicle (id 6). A part set with an id of 6 will need to be created containing the parts for the vehicle side of the contact.

Instrumentation

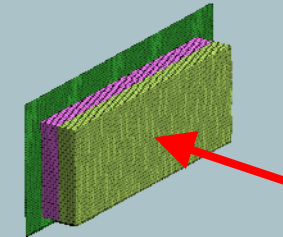
There are *Database_Nodal_Force_Groups defined at the back of the barrier to output the equivalent of the loadcell forces (see following slide for more details).

NB: The data from these can also be contour plotted in Oasys D3PLOT by using the supplied JavaScript (refer to the FWDB Loadcell Post Processing manual for more details)

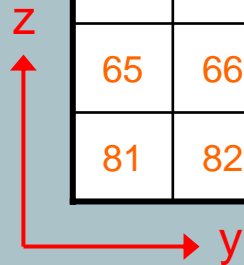
Loadcell Force Data

A number of *Database_Nodal_Force_Groups have been setup on the backplate of the barrier model to allow the equivalent of the loadcell force data to be output.

Looking towards the front face of the barrier the Nodal Force Groups are numbered as follows



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96



List of parts

The following parts were used in this model:

Part Number	Part Description
100	Front Core
101	Front Core Null Coating Front Face
102	Front Core Null Coating
103	Front Core Null Internal
104	Adhesive - Front Core to Rear Core
200	Rear Core
201	Rear Core Null Coating
202	Rear Core Null Internal
203	Rear Core Null Coating Back Face
204	Adhesive - Back Plate - Core
300	Back Plate
301	Rear Wall
400	Loadcell Wall Display Elements

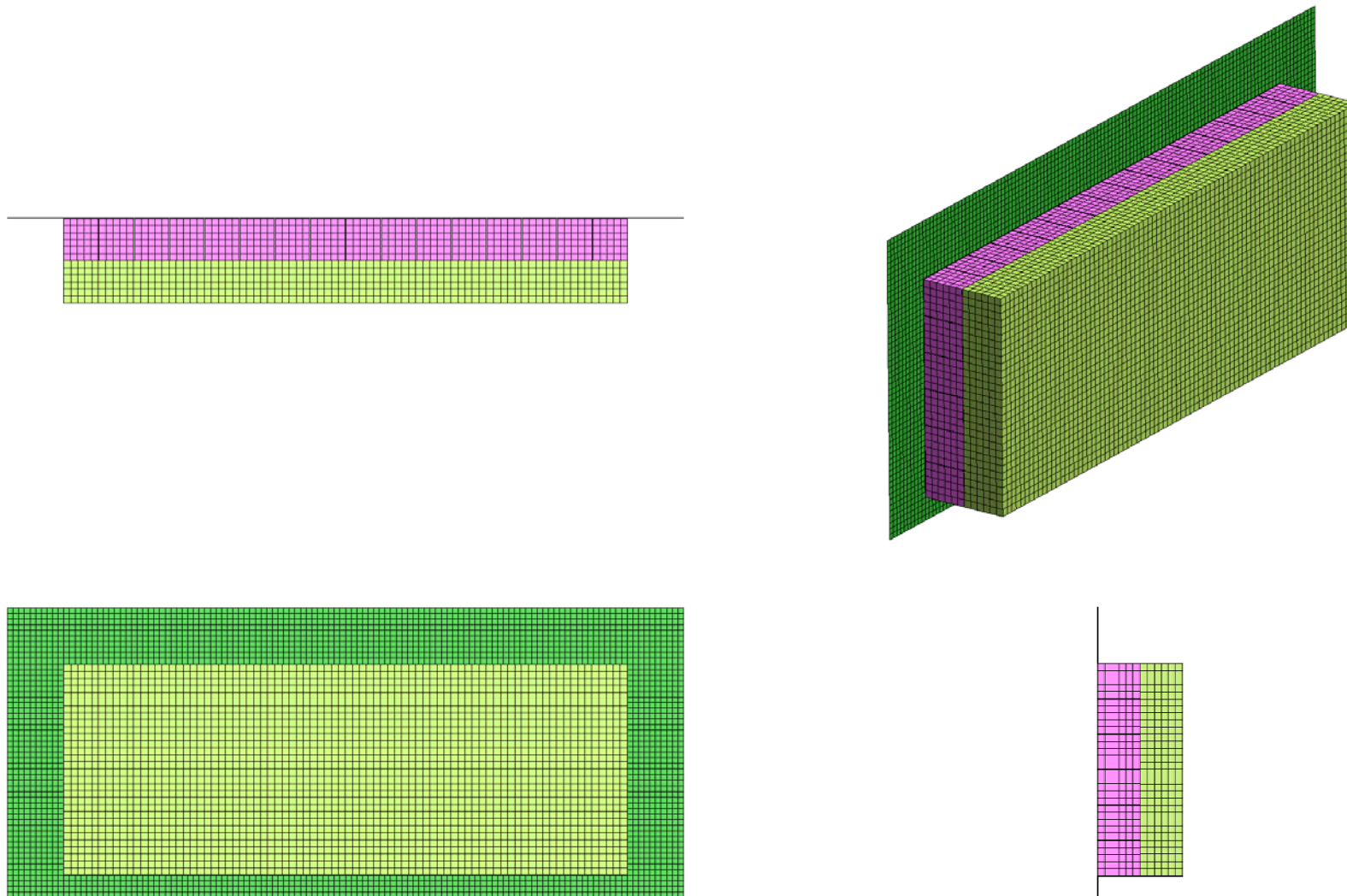
Model Size

The number of elements in the model is as follows:

Element Type	Number
Deformable solids	33600
Deformable shells	3325
Total deformable elements	36925
Null shells	46414
Rigid shells	6240

Figure 1.1 – FWDB barrier model

FWDB Barrier Model



Adhesive Material Card

In LS-DYNA version 970 5434a and earlier the option to add a title to *MAT_ARUP_ADHESIVE was unavailable. As such the barrier model may need to be modified to remove the titles from this material card. The following example show how the barrier model needs to be changed.

LS-DYNA version 970 6763 and later

```
*MAT_ARUP_ADHESIVE_TITLE
Main Core - Plate Adhesive
      4      1.0E-9      900.0      0.0      0.8      0.1      0.0      0.0
      2.0      2.0      0.0      0.0      0.0      0.0      0      0.0
```

LS-DYNA version 970 5434a and earlier

```
*MAT_ARUP_ADHESIVE
      4      1.0E-9      900.0      0.0      0.8      0.1      0.0      0.0
      2.0      2.0      0.0      0.0      0.0      0.0      0      0.0
```

The FWDB model is developed by Cellbond Composites in association with Arup.



www.cellbond.com



www.arup.com

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