

# Building Models from CSV Target File



# What is Multi-Model Build?

- Used to setup multiple impacts on an object in different locations.
- Automates the time consuming task of impactor positioning:
  - Can use a CSV file to specify each target point.
- An impactor is positioned and depenetrated at each specified target point.
- A new model is created for each target point (using **\*INCLUDE\_TRANSFORM**) and can be written automatically from PRIMER.
- The SHELL and REPORTER can then be used to batch submit the models in LS-DYNA and automatically post-process the results.



# CSV Positioning File - format

```

PEDHEAD
$
model,          vehicle.key
impactor,       child_head.key
$
$define 3 coordinates on impactor either by
$method=define or method=nodes
$orient, define, <name/id of csys>
$orient, nodes, <name/id>, <name/id>, <name/id>
orient, nodes,  base node, x node, y node
$
$rootdir, <root dir name>
rootname, childhead
$
$depenetrate, partset, <name/id>, <X/XZ/XYZ>
$depenetrate, contact, <name/id>, <X/XZ/XYZ>
depenetrate, contact, head contact, XZ
$
$load case lines consist of
$directory name, zone name (as dir if blank),
$X coord, Y coord, (optional Z coord)
C1A,, 899.98401, 1393.1749
C1B,, 841.03717, 1276.2445
C2A,, 804.94501, 1171.8967
C2B,, 788.00812, 1057.6227
C4A,, 768.07831, 730.11487
C5A,, 785.90338, 511.51501
C5B,, 808.98187, 397.24100
C6A,, 845.07404, 292.89313
C6B,, 893.83685, 185.96274

```

NB: for omitted optional data don't leave a space between commas

- Locations and file name of
  - Vehicle Model
  - Impactor Model
- Depenetration Method
  - Name or ID of coordinate system, or
  - Name or ID of 3 nodes in impactor model (names can be defined in **\*DATABASE\_HISTORY\_NODE\_ID**)
- Directory where to write out the models and root names of input files.
- How to depenetrate the impactor
  - Choose a contact (headform to vehicle)
  - Choose a part set (headform and vehicle).
  - Choose a direction
- Load case lines:
  - Unique directory name
  - Zone name (optional)
  - Target point coordinates near the vehicle surface
- Optional data can also be input for the auto submission and post processing with Oasys Software.

# General Process for Building Models from CSV File



# Building from CSV Targeting File

- **Build from CSV Targeting File** – this file already has the locations and file names of the impactor and the vehicle model. This file allows the user to edit the depenetration methods, and the coordinates of where each load case will be. Using this file will mean the user has all or most of the information required to create all the models. This file can be setup externally to PRIMER if required.
- It is also possible to create your own CSV targeting file from within this function.
- When reading the CSV file the type of build will normally be preselected but if not it can be selected from the dropdown menu, as shown on the next slide with brief descriptions of what each build type is used for.

Model functions ?

Create	Copy	Delete	List	Modified?
Read	Merge	Build	Compare	Renumber
Write	Submit	Check	Contents	Utilities

Apply

Select existing xml database

- Build model from keyword files
- Select existing xml database
- Use last xml database loaded
- Create xml database by manual edit
- Create xml database from model includes
- Create xml database from directory
- Build from csv targeting file**

Read csv label

Preset model bu

☒ User

☐ master on

☐ Simple

☐ Rigorous

☐ component

Make connection contact

☒ Do not make

☐ Make contac

Fix connection contact

☒ Do not fix

☐ Fix contacts

Option for simple build

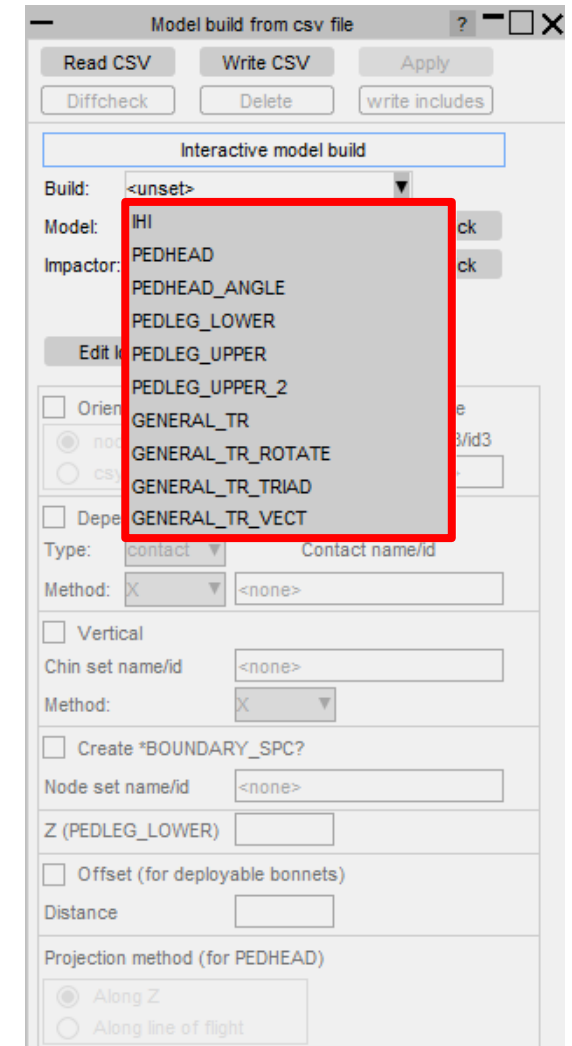
☒ Scan - always scan component files for includes

☐ No scan - component files don't contain Includes

Block Database/Template errors? ☐

# Types of Model Build

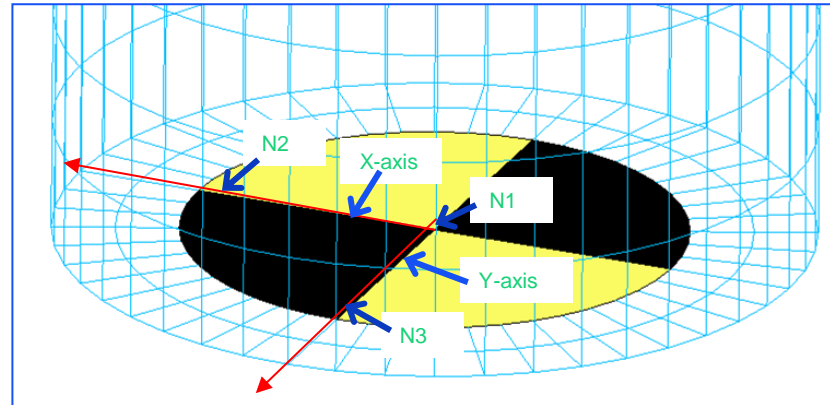
1. IHI – Interior Head Impact/FMH.
2. Pedhead – Pedestrian Head Impact.
3. Pedhead Angle – Pedestrian head impact with variable approach angle.
4. Pedleg Lower – Pedestrian lower leg impact.
5. Pedleg Upper – Pedestrian upper leg impact.
6. Pedleg Upper 2 – Pedestrian upper leg impact with explicit Z specification.
7. General TR – Used when impactor is to be translated but not rotated.
8. General TR Rotate – The centre of rotation is the impactor base coordinate.
9. General TR Triad – Impactor is rotated such that its base triad aligns with the target triad.
10. General TR Vect – Axis of rotation is normal to two the vectors.



# How to specify orientation of impactor

- **Orient**– This allows the user to specify the local coordinate system for the impactor, and therefore how it will move during positioning/depenetration. Two methods are available:

- **Node** – select 3 nodes to specify local coordinate system:
  - **Node 1** – The base node will be moved to the target point so should be on the impactor y-centreline.
  - **Node 2** - Combined with node 1 defines the x-axis and so should therefore point towards the vehicle.
  - **Node 3** – Combined with nodes 1 & 2 defines the x/y-plane of the impactor.
- **CSYS** – Select or create an LS-DYNA coordinate system in the model:



Model build from csv file

Read CSV Write CSV Apply

Diffcheck Delete write includes

Interactive model build

Build: <unset>

Model: Pick

Impactor: Pick

Make

Edit loadcases

☐ Orient N1N3 is normal to impactor XZ plane

☒ node Name1/id1 Name2/id2 Name3/id3

☐ csys

☐ Depenstrate

Type: Contact contact name/id

Method: X <none>

☐ Vertical

Chin set name/id <none>

Method: X

☐ Create \*BOUNDARY\_SPC?

Node set name/id <none>

Z (PEDLEG\_LOWER) 0.0

☐ Offset (for deployable bonnets)

Distance 0.0

Projection method (for PEDHEAD)

☒ Along Z

☐ Along line of flight

Master model style Transformations filename:

☒ Standard

☐ GM style

☐ CASE style

Define Transform title:

☐ First impact point only

Output dir

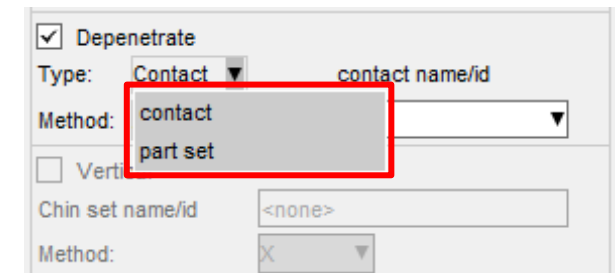
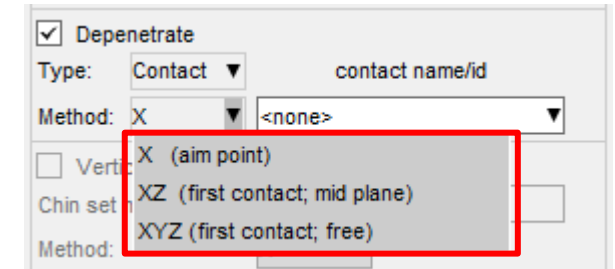
Output name

Reporter individual

Reporter summary

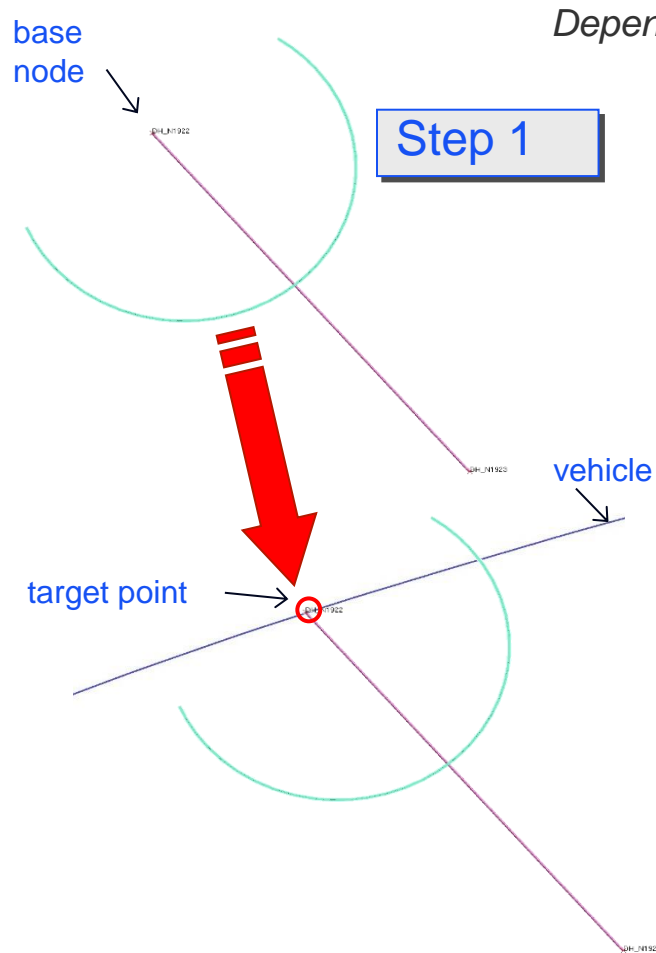
# Depenetrate Function

- **Depenetrate** allows the user to define how the impactor will be depenetrated after initial positioning. The available three methods are:
  - **x-axis** – Impactor will depenetrates along the local X-axis only.
  - **zx-plane** – Impactor will depenetrates by moving only in the plane defined by the local X and Z axis.
  - **xyz-plane** – Impactor will move freely in all directions to achieve an initial contact point as close as possible to the target point.
  - Images of these methods are available on the next slide.
- There are also two ways of specifying the contact between the impactor and the target model:
  - **Contact** – This is used when there is already a contact definition defined in the model between the impactor and the target model.
  - **Part Set** – This allows the user to specify a set of parts that the target model should consider when depenetrating the impactor from the model. (Choose this option if there is no contact definition already defined in the target model.



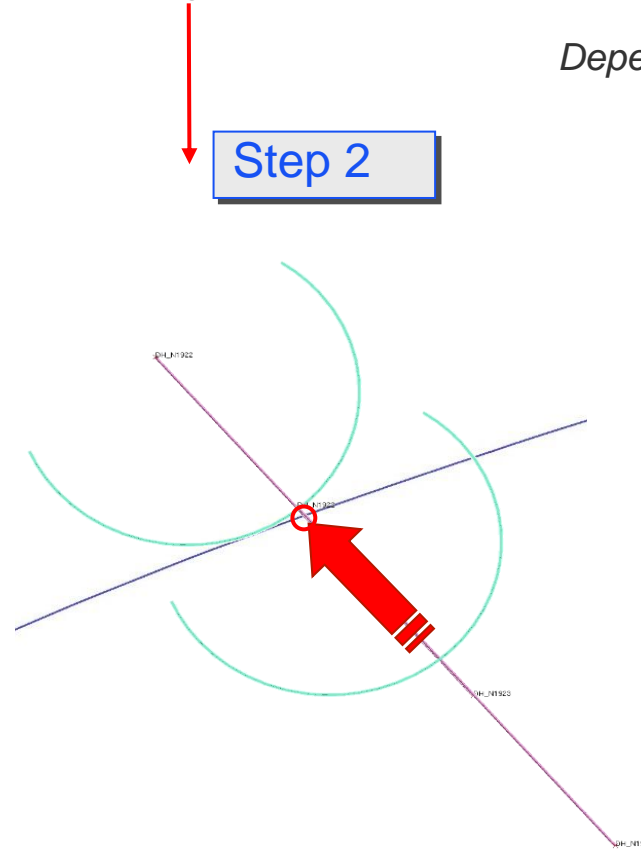


# Depenetration Methods



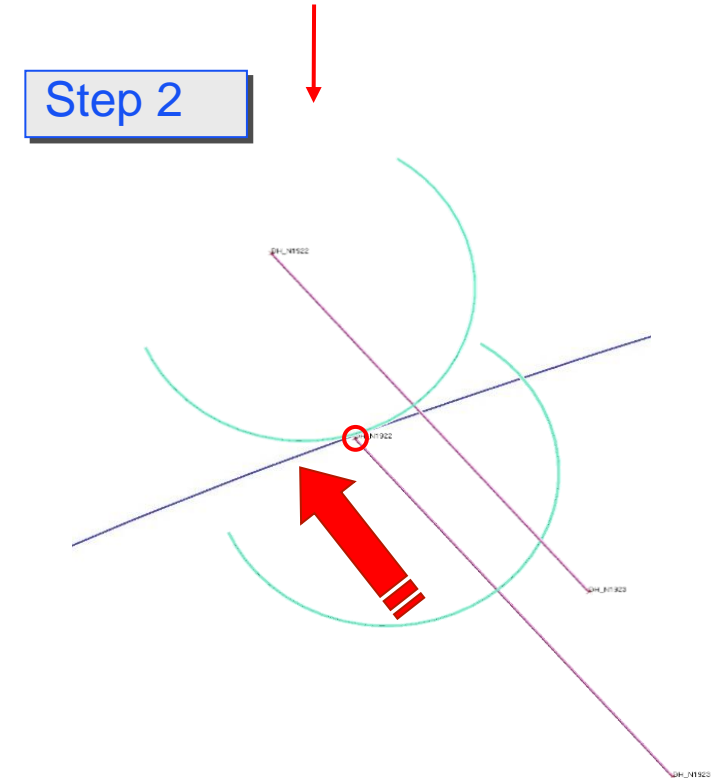
For every target point PRIMER translates headform so that the base node is on the target point. Then...

*Depenetration along x axis*



...depenetrates along local x-axis, or...

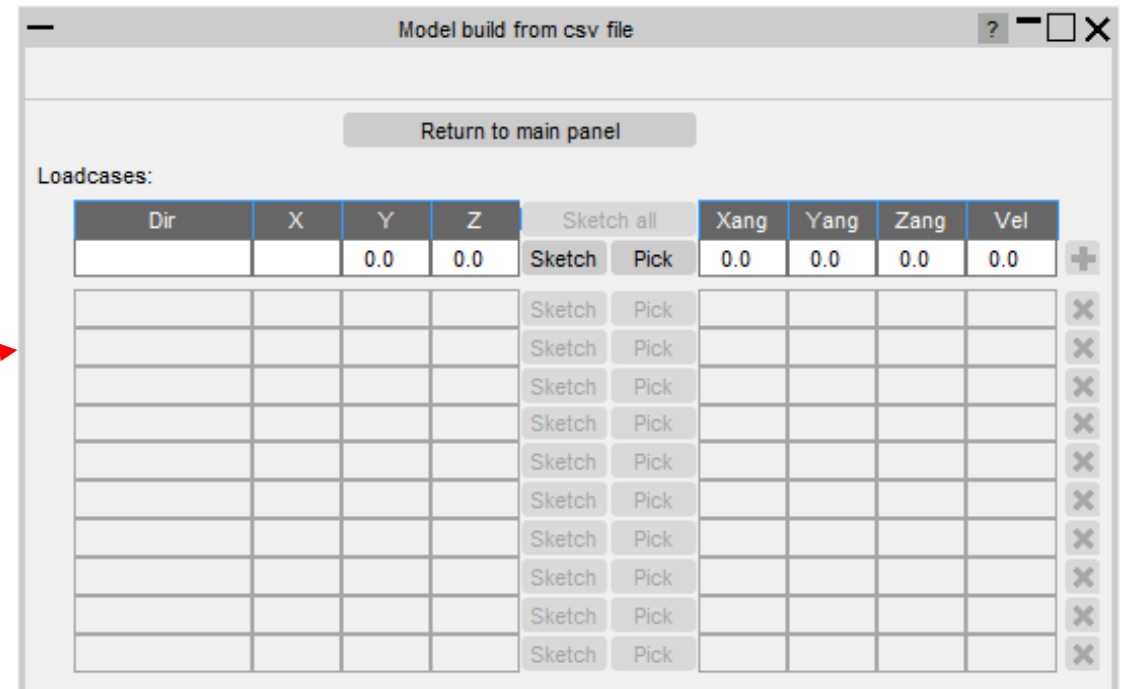
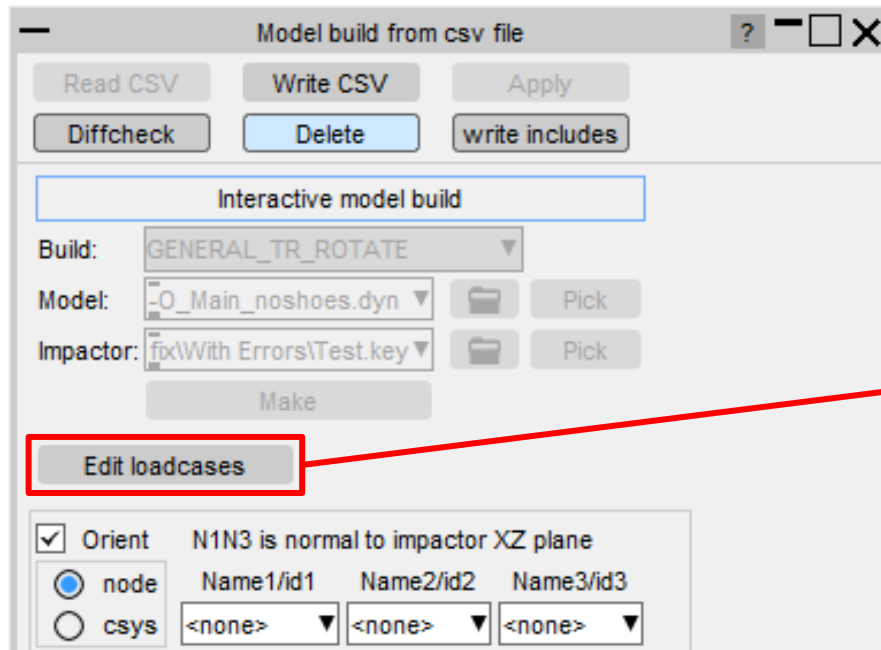
*Depenetration along xz axis*



...depenetrates along local xz-axis (*xyz-axis option is also available*)

# Load cases

- Editing the load cases will allow the user to specify exactly where in the model they would like the target points, if this has not previously been specified in a CSV file.
- These loadcases specify the x and y coordinates of where the impactor will strike the vehicle, the z coordinate is optional – if omitted PRIMER will calculate the z coordinate.
- X, Y and Z angle as well as velocity can also be specified here.



# Contact us

## Global / UK

T: +44 121 213 3399

E: [dyna.support@arup.com](mailto:dyna.support@arup.com)

## India

T: +91 40 69019723 / 98

E: [india.support@arup.com](mailto:india.support@arup.com)

## China

T: +86 21 3118 8875

E: [china.support@arup.com](mailto:china.support@arup.com)

## USA

T: +1 415 940 0959

E: [us.support@arup.com](mailto:us.support@arup.com)

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