

**\*DEFINE\_COORDINATE\_SYSTEM\_{OPTION}**

Available options include:

**<BLANK>**

**IGES**

Purpose: Define a local coordinate system.

When no option is used, the local coordinate system is defined by three points. The same procedure as described in Figure 11.1, see \*DEFINE\_COORDINATE\_NODES, is used. The coordinates of the nodes are given instead. N<sub>1</sub> is defined by (X<sub>0</sub>,Y<sub>0</sub>,Z<sub>0</sub>), N<sub>2</sub> is defined by (X<sub>L</sub>,Y<sub>L</sub>,Z<sub>L</sub>), and N<sub>3</sub> by (X<sub>P</sub>,Y<sub>P</sub>,Z<sub>P</sub>).

When option **IGES** is invoked, LS-DYNA will read the IGES file containing three straight curves each representing X, Y, Z axes, and create a local coordinate system according to what are described in Remarks.

**Card 1 of 2 – Required (for no option).**

Card 1            1            2            3            4            5            6            7            8

|          |     |     |     |     |     |     |     |  |
|----------|-----|-----|-----|-----|-----|-----|-----|--|
| Variable | CID | XO  | YO  | ZO  | XL  | YL  | ZL  |  |
| Type     | I   | F   | F   | F   | F   | F   | F   |  |
| Default  | 0   | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |  |
| Remarks  |     |     |     |     |     |     |     |  |

**Card 2 of 2 – Required (for no option).**

Card 2            1            2            3            4            5            6            7            8

|          |     |     |     |  |  |  |  |  |
|----------|-----|-----|-----|--|--|--|--|--|
| Variable | XP  | YP  | ZP  |  |  |  |  |  |
| Type     | F   | F   | F   |  |  |  |  |  |
| Default  | 0.0 | 0.0 | 0.0 |  |  |  |  |  |
| Remarks  |     |     |     |  |  |  |  |  |

**Card 1 of 1 – Required for option \_IGES.**

**Card Format (A80)**

Card 1      1            2            3            4            5            6            7            8

|          |          |  |  |  |  |  |  |  |
|----------|----------|--|--|--|--|--|--|--|
| Variable | FILENAME |  |  |  |  |  |  |  |
| Type     | C        |  |  |  |  |  |  |  |
| Default  | none     |  |  |  |  |  |  |  |

| <u>VARIABLE</u> | <u>DESCRIPTION</u>  |
|-----------------|---|
| CID             | Coordinate system ID. A unique number has to be defined.                  |
| XO              | X-coordinate of origin.   |
| YO              | Y-coordinate of origin.   |
| ZO              | Z-coordinate of origin.   |
| XL              | X-coordinate of point on local x-axis.                                    |
| YL              | Y-coordinate of point on local x-axis.                                    |
| ZL              | Z-coordinate of point on local x-axis.                                    |
| XP              | X-coordinate of point in local x-y plane.                                 |
| YP              | Y-coordinate of point in local x-y plane.                                 |
| ZP              | Z-coordinate of point in local x-y plane.                                 |
| FILENAME        | Name of the IGES file containing three curves (see <b>Remarks</b> below). |

**Remarks:**

1. The coordinates of the points must be separated by a reasonable distance and not colinear to avoid numerical inaccuracies.
2. When option \_IGES is used, three curves in the IGES format will be used to define a local coordinate system. IGES curve entity types 126, 110 and 106 are currently

supported. Among the three curves, the longest length will be made as local Z-axis, the mid-length will be Y-axis and the shortest length X-axis. Suggested X, Y and Z-axis length is 100mm, 200mm and 300mm, respectively. All the three curves must have one identical point, and will be used for the origin of the new local coordinate system. Coordinate system ID of the local coordinate system will be based on the IGES file name input. The IGES file name must start with a number, followed by an “underscore” or a “dot”. The number preceding the file name will be used as the new local coordinate system ID, which can then be referenced in \*MAT\_20 cards, for example.

After the LS-DYNA run, three beam elements of a new PID will be created in place of the three curves representing the local X, Y and Z-axis in the D3PLOT file for viewing in LS-PrePost.

The following is a partial input example of using the keyword to create a local coordinate system ID 25 from an IGES file named called “25\_iges”. The IGES file contains three curves in one of the three IGES entity types. The newly created coordinate system ID 25 will be used to define rigid body MID 2 of PID 2 to move in the local coordinate system, of which the local X degree of freedom is set free. In keyword \*BOUNDARY\_PRESCRIBED\_MOTION\_RIGID, option \_LOCAL is used and the variable DOF is set to “1” to move the PID 2 according to local curves 3 and 5.

```

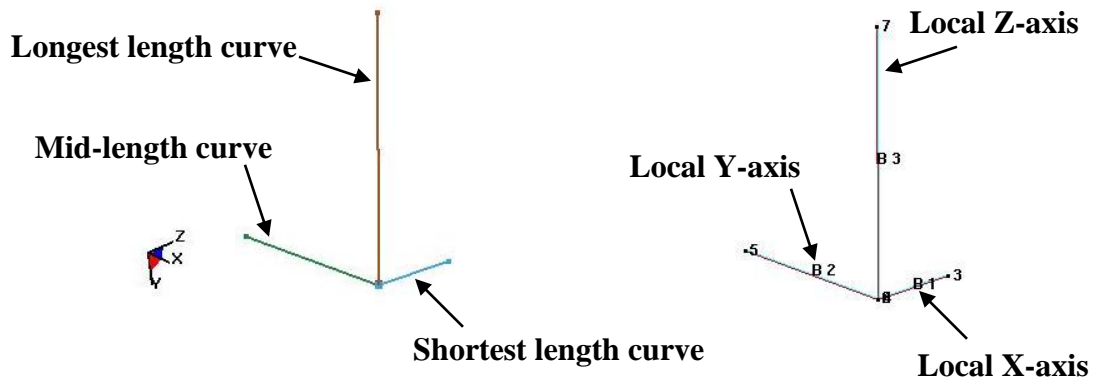
*KEYWORD
*DEFINE_COORDINATE_SYSTEM_IGES_TITLE
Flanging OP25
25_iges
$---+-----1-----+-----2-----+-----3-----+-----4-----+-----5-----+-----6-----+-----7-----+-----8
*PART
punch
      2          2          2
*MAT_RIGID
$   MID      RO      E      PR      N      COUPLE      M      ALIAS
   2 7.830E-09 2.070E+05 0.28
$   CMO      CON1     CON2
   -1      25      011111
$LCO or A1      A2      A3      V1      V2      V3
25
$---+-----1-----+-----2-----+-----3-----+-----4-----+-----5-----+-----6-----+-----7-----+-----8
*BOUNDARY_PRESCRIBED_MOTION_RIGID_LOCAL
$   typeID     DOF      VAD      LCID      SF      VID      DEATH      BIRTH
      2          1          0          3      -1.0      0      0.00241      0.0
      2          1          0          5      -1.0      0 0.0115243  0.00241

```

The keyword can be repeated for each new coordinate system if multiple coordinate systems are needed.

The following figure illustrates the corresponding axes.

This option is available in LS-DYNA R5 Revision 62798 and later releases.



Input curves

Generated local coordinate system –  
beams when viewed in LS-PrePost (right)

(Courtesy of Daimler AG)