

***CONTROL_FORMING_TIPPING**

Purpose: This keyword is developed to reorient or reposition a part between the stamping dies. In stamping line die simulation, panel tipping and translation between the die stations are frequently required. Typically such transformation involves only a small amount of rotations, e.g. < 15 degrees; and some large amounts of translation. For example, there could be a tipping angle of 10 degree along Y-axis and a translation of 2000 mm along the X-axis between the current trimming die and next flanging die.

Cards 1,2,3,4, ... (the next “*” card terminates the input)

Card Format (5I10)

Card 1 1 2 3 4 5 6 7 8

Variable	PID/SID	ITYPE	ISTRAIN	IFSTRSS	NMOVE			
Type	I	I	I	I	I			
Default	none	none	0	0	0			

Card Format (I10, 7E10.0)

Card 2 for rotation:

Card 2 1 2 3 4 5 6 7 8

Variable	ROT/ TRAN	V11	V12	V13	X01	Y01	Z01	DISTA1
Type	I	F	F	F	F	F	F	F
Default	none	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Card Format (I10, 3E10.0)

Card 2 for translation:

*CONTROL

*CONTROL_FORMING_TIPPING

Card 2	1	2	3	4	5	6	7	8
Variable	ROT/ TRAN	DX	DY	DZ				
Type	I	F	F	F				
Default	none	0.0	0.0	0.0				

<u>VARIABLE</u>	<u>DESCRIPTION</u>
PID/SID	Part ID or part set ID of part(s) that requires tipping and/or translation.
ITYPE	Part ID or part set ID indicator: EQ.1: PID means part ID, EQ.2: PID/SID means part set ID.
ISTRAIN	Strain tensors inclusion option: EQ.1: include in tipping/translation.
ISTRESS	Stress tensors inclusion option: EQ.1: include in tipping/translation.
NMOVE	Total number of tipping and translation intended with this keyword.
ROT/TRAN	Transformation type: EQ.1: rotation, EQ.2: translation.
V11, V12, V13	Vector components of an axis about which tipping is performed.
X01, Y01 & Z01	X, Y and Z coordinates of a point through which the tipping axis passes.
DSITA	Tipping angle in degree.
DX, DY, DZ	Translation distances along global X-axis, Y-axis and Z-axis.

Remarks:

1. Keyword *INCLUDE can be used to include the file to be tipped or translated.
2. Tipping angle DISTA1 is defined in degree. Signs of the tipping angles follow the 'right hand rule'.

- 3. An example of the keyword is included below, to tip a part +23.0 degrees, -31.0 degrees, and +8.0 degrees about X-, Y-, and Z-axis, respectively and passing through the origin; and to translate the part 12.0mm, -6.0mm and 91.0mm along X-, Y-, and Z-axis, respectively.

```
*INCLUDE
trimmedpart.dynain
*CONTROL_FORMING_TIPPING
$ PID/PSID      ITYPE    ISTRAIN    ISTRSS    NMOVE
   1             0         1          1          4
$ ROT/TRAN      V11       V12        V13        X01        y01        z01        DSITA1
$-----1-----2-----3-----4-----5-----6-----7-----8
   1         1.000  0.000000    0.000    0.000    0.000    0.000    23.0
$ ROT/TRAN      V21       V22        V23        X21        y21        z21        DSITA2
   1         0.000  1.000000    0.000    0.000    0.000    0.000   -31.0
$ ROT/TRAN      V31       V32        V33        X31        y31        z31        DSITA3
   1  0.000000    0.000    1.000    0.000    0.000    0.000    8.0
$ ROT/TRAN      DX        DY        DZ
   2         12.0    -6.0     91.0
```

- 4. This feature is available in LS-DYNA R4 Revision 53448 and later releases.