*DEFINE_FORMING_BLANKMESH

Purpose: This keyword, together with keyword *ELEMENT_BLANKING, enable mesh generation for a sheet metal blank. This keyword is renamed from the previous keyword *CONTROL_FORMING_BLANKMESH. The keyword *DEFINE_CURVE_TRIM_NEW can be coupled with this keyword to define a blank with a complex periphery and a number of inner hole cutouts.

Card 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>IDMSH</th>
<th>ELENG</th>
<th>XLENG</th>
<th>YLENG</th>
<th>ANGLEX</th>
<th>NPLANE</th>
<th>CID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>I</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>Default</td>
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<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Card 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>PIDBK</th>
<th>NID</th>
<th>EID</th>
<th>XCENT</th>
<th>YCENT</th>
<th>ZCENT</th>
<th>XSHIFT</th>
<th>YSHIFT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>F</td>
<td>F</td>
<td>F</td>
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<td>F</td>
</tr>
<tr>
<td>Default</td>
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<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

VARIABLE DESCRIPTION

IDMSH ID of the blankmesh (not the blank PID); must be unique.

ELENG Element edge length.

XLENG Length of the rectangular blank along X-axis in the coordinate system (CID) defined.

YLENG Length of the rectangular blank along Y-axis in the coordinate system (CID) defined.

ANLELG An angle defined about Z-axis of the CID specified, starting from the X-axis as the zero degree, to rotate the blank and the orientation of the mesh to be generated. The sign of the rotation angle follows the right hand rule. See Remark 3.
**VARIABLE** | **DESCRIPTION**
--- | ---
NPLANE | Plane in which a flat blank to be generated, in reference to the coordinate system defined (CID):
  EQ.0 or 1: XY-plane (default)
  EQ.2: XZ-plane
  EQ.3: YZ-plane
CID | ID of the local coordinate system, defined by *DEFINE_COORDINATE_SYSTEM. Default is 0 representing global coordinate system.
PIDBK | Part ID of the blank, as defined by *PART.
NID | Starting node ID of the blank to be generated.
EID | Starting element ID of the blank to be generated.
XCENT | X-coordinate of the center of the blank.
YCENT | Y-coordinate of the center of the blank.
ZCENT | Z-coordinate of the center of the blank.
XSHIFT | Blank shifting distance in X-axis in coordinate system defined (CID).
YSHIFT | Blank shifting distance in Y-axis in coordinate system defined (CID).

**Remarks:**
1. A rectangular blank is defined, which can be trimmed with IGES curves to a desired periphery and inner cutouts. This keyword is used in conjunction with keyword *ELEMENT_BLANKING. The blank outlines and inner holes can be defined using keyword *DEFINE_CURVE_TRIM_NEW.

2. A partial keyword example of generating a flat blank with PID 1 is provided below. In this example, the blank mesh is to be generated in XY plane in a global coordinate system, with an average element edge length of 12 mm and a blank dimension of 1100.0 x 1050.0 mm, with node and element ID starting at 8000, and with the center of the blank in the global origin. The blank is to be trimmed out with an inner cut-out hole, given by the IGES file `innerholes.iges`. Blank outer line is defined with an IGES file `outerlines.iges`. Both IGES files are used to trim the rectangular blank using keyword *DEFINE_CURVE_TRIM_NEW, where the variable TFLG is used to indicate whether it is an inside or outside trim. The blank generated for example is shown in the figure below.
*DEFINE_FORMING_BLANKMESH

*KEYWORD
$---1---2---3---4---5---6---7---8

*CONTROL_TERMINATION
$#  endtim
  0.000

*CONTROL_FORMING_BLANKMESH
$  IDMSH  ELENG  XLENG  YLENG  ANGLEX  NPLANE  CID
  3  12.00  1100.00  895.0  0.0  0  0
$  PIDBK  NID  EID  XCEN  YCEN  ZCEN  XSHIFT  YSHIFT
    1  8000  8000

*ELEMENT_BLANKING
$#  psid
    1

*DEFINE_CURVE_TRIM_NEW
$#  tcid  tctype  TFLG  TDIR  TCTOL  TOLN  NSEED1  NSEED2
  innerholes.iges
    11111  2  1  0  0.250000  1.000000

outerlines.iges
*DEFINE_CURVE_TRIM_NEW
$#  tcid  tctype  TFLG  TDIR  TCTOL  TOLN  NSEED1  NSEED2
  11112  2  -1  0  0.250000  1.000000

*CONTROL_SHELL
......

*CONTROL_SOLUTION
......

*DATABASE_BINARY_D3PLOT
......

*DATABASE_EXTENT_BINARY
......

*SET_PART_list
1
1

*PART
Blank
$#  pid  secid  mid
    1  1  1

*SECTION_SHELL
$#  secid  elform  shrf  nip  propt  qr/irid  icomp  setyp
    1  16  0.833000  7  1  0  0  0
$#  t1  t2  t3  t4  nloc  marea  idof  edgset
    1.500000  1.500000  1.500000  1.500000  0.000  0.000  0.000  0

*MAT_037
$#  mid  ro  e  pr  sigy  etan    r  hlcid
    1  7.9000E-9  2.0700E+5  0.300000  253.25900  0.000  1.408000  90903

*DEFINE_CURVE
  90903
  0.0  253.2590027
  0.9898300  616.7999878

*INTERFACE_SPRINGBACK_LSDYNA
$#  psid  nshv
    1  1000

*END
3. The blank and mesh orientation can be rotated about Z-axis defined. Following the right hand rule, the blank in this case is rotated about Z-axis for a positive 30°, as shown in the picture below, with the angle of 0° aligned with X-axis.

*DEFINE

*DEFINE_FORMING_BLANKMESH

Rectangular blank of 1100.0x1050.0mm

Using an IGES outline and an inner cutout curve to create a blank with any arbitrary shape
Set ANGLEX=30.0 to rotate both the blank and mesh orientation by 30°

4. Inner hole and outer periphery can also be trimmed using the NSEEDs variables in keyword *DEFINE_CURVE_TRIM_NEW.

5. This feature is available in LS-DYNA R5 Revision 59165 or later releases. The keyword name change from *CONTROL… to *DEFINE… starts in R6 Revision 69074 and later releases. For NPLANE in global coordinate system, use R6 Revision 69128 and later releases.
*DEFINE

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