

PlayStation 3D Graphics Tool Manual dxf2rsd

NAME

dxf2rsd - Converts DXF files to the PlayStation 3D model data file format.

DATE

1996/May/01 Version 2.81

FORMAT

dxf2rsd [options] DXF-files ...

DESCRIPTION

A DXF filename is provided as an argument. The following four files are created.

- * RSD file (*.rsd)
- * polygon file (*.ply)
- * material file (*.mat)
- * group file (*.grp)

The argument can contain wildcard identifiers. Multiple files can be given to perform batch conversions. The ".dxf" extension in the filename can be omitted.

Changes in Ver 2.81

Memory related bug has been fixed.

New release of an SGI version. (See psxgraph/sgi)

[options]

- o output-file: Specifies the output RSD filename. Extensions will be removed. The default is the filename of the input file without the extension.
- 55 -col r g b: Specifies the colors in the entire model as RGB (values of 0-255 for each). The default is gray (200 200 200).
- cf color-file: Specifies the color table file.
- s -cl: Outputs a list of undefined colors to standard output. Polygon having the same color will be sorted and output to a MAT file. The default setting is OFF. (See Example 2.)
- size -info: Displays information regarding the input DXF file. Approximate and polygon counts can be viewed. Conversion is not performed.
- max n-poly: Specifies the maximum polygon count that can be converted. The default setting is 10000.
- ith -quad: Triangulation is not performed for 4-vertex 3DFACE. Combined with -quad1, it is possible to decrease the total polygon count in a model. The default setting is OFF.

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-quad2 (threshold): Combines two adjacent triangles into one four-sided polygo
 an argument is specified, the difference in orientations of tw
 triangles (normal vectors) can be specified as an angle, and
 triangles for which the angle is not more than this value are
 combined. When the argument is 0.0, triangles are combined onl
 they have identical normal vectors. When the argument is 10.0,
 differences of up to 10 degrees are allowed. Decimal numbers b
 0.0 and 90.0 should be specified. The default setting is 1.0.
 Example 4.)

-quad3: Four-sided polygons having identical third and fourth vertices
 generated from triangles. This allows all polygons to be four-
 polygons.

-s or -g: Performs smooth (Gouraud) shading. The default setting is OFF.

-e distance: All vertices existing within a sphere having a radius specifie
 the distance argument are considered identical. This allows th
 vertex count and the polygon count to be decreased. The calcul
 of distance is performed after scaling has been performed with

-r: The normal count is decreased by not generating identical norm
 vectors. This is effective for cases involving flat shading. T
 default setting is OFF. (See Example 3.)

-n: Normals are not created. This option is used when light source
 calculations are not performed. The default setting is OFF.

-sc factor: Reduces or enlarges the model. The scale is indicated by the
 argument. The default setting is 1.0.

-t x y z: Translates the model. The translation is specified by the argu
 The default is (0.0, 0.0, 0.0).

-auto: Translates the model near the origin and enlarges or reduces t
 model to an appropriate size (so that it fits in a cube having
 side 1000). The default setting is OFF.

-back: Reverses the direction of the normals for all the polygons. Th

default setting is OFF.

g is -both: Creates all polygons as two-sided polygons. The default setting is OFF.

ygons. -dup: Polygons are created on both the front and back of all the polygons. The polygon count is doubled. The default setting is OFF.

g is -nopl: Ignores POLYLINE and converts only 3DFACEs. The default setting is OFF.

-Y-Z
-Y+Z
+Y-Z
+Y+Z
-Z-Y
-Z+Y
+Z-Y
+Z+Y

te These settings specify the method used to convert the coordinate system. The settings specify the top coordinate axis and the axis coming forward and their orientations when the modeler's coordinate system is looked at from the front. For example, "-Y+Z" indicates that the negative of the Y axis comes forward, and the positive of the Z axis goes up. The coordinate system here is that of the DXF, and is not necessarily identical to that of the modeler screen. The default is "-Y+Z". In dxf2rsd, this is converted to the PlayStation coordinate system (-Z-Y). (In the PS coordinate system, the negative of the Z axis comes forward, and the negative of the Y axis goes up.)

-v: Detailed information regarding conversion is output to standard output. (See Example 1.)

Main improvements over the previous version (ver.2.7).

- * The -quad2 option is implemented. Two adjacent co-planar triangles are converted to a four-sided polygon. The margin of error in conversion can also be specified. This allows the total polygon count to be reduced. (See Example 4.)
- * Triangle and quadrilateral groups can be created and written as GRP files.
- * When the -cl option is specified, groups are created by color, and GRP files are written.

RESTRICTIONS: The current version has the restrictions shown below.

- * Only DXF files in ASCII format can be handled.
- * Of the DXF entities, only 3DFACE and POLYLINE can be handled.
- * In some cases, large POLYLINEs cannot be converted. If possible, DXF files should be created by converting to 3DFACE (three-sided or quadrilaterals) from the modeler.
- * If the four vertices in a quadrilateral are not co-planar, the polygon may not be correctly displayed.
- * The maximum number of polygons that can be converted is influenced by the number of vertices and normals to be generated. About 5000 polygons should be considered the maximum.

NOTES

- * 3DFACE, POLYLINE are both formats for representing polygons in DXF. In 3DFACE, a single polygon (three-sided or four-sided) is represented with four vertices. In POLYLINE, multiple polygons are represented through connected lines. 3DFACE files tend to be larger but provide better compatibility. POLYLINE files tend to be smaller, but there is greater freedom in expression so that exchanging data with different modelers can be a problem.

3DFACE can be converted directly to RSD, but triangulation must first be performed for POLYLINE. This division is generally expensive, and can sometimes be unsuccessful (a "Fail to triangulate!" error message will be displayed).

Furthermore, even if triangulation is completed successfully, the orientations of some of the polygons may be reversed with POLYLINE.

However, the POLYLINEs generated by 3D Studio are called POLYFACE MESH, and these use a representation method that is equivalent to 3DFACE. Thus, there are no problems in conversion for these cases.

- * On the console, the practical maximum limit for animating a single object is approximately 2000 polygons. Model data should be prepared accordingly.
- * If the polygon count is too high for conversion using flat shading, it may be possible to perform the conversion by specifying Gouraud shading.
- * The orientation of polygons will be reversed each time the Y-Z coordinate axes are

exchanged or when the sign of an axis is swapped.

* With certain modelers the orientation of the polygons will be reversed even when a 3DFACE output is made. If all the polygons are reversed, the coordinate system can be changed (+Y+Z, for example) or the -back option can be used. If only some of the polygons are reversed, the reversed faces need to be reversed from the modeler.

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* Below is a list of commercial 3D modelers for which conversion with dxf2rsd has been checked.

The options for converting coordinate systems are also noted.

3D modeler (version)	Hardware	Option for coordinate conversion
form Z (2.1 and later versions)	Mac	-Y+Z
Strata Studio Pro (1.0-)	Mac	+Z+Y
StrataVision 3d(2.0-)	Mac	+Z+Y
Sculptura (1.1)	PC	-Y+Z
trueSpace (1.0-)	PC	-Y-Z

(The PlayStation version of trueSpace can directly output RSD files, so dxf2rsd is not needed)

Alias Upfront (1.1)	PC	-Y+Z
3D Studio (4.0)	PC	-back

The following have been confirmed as currently not being capable of conversion:

MacroModel (1.5)	PC
ShadeIII (1.0)	Mac

The necessary conditions for "convertability" are that DXFs of all the 3DFACEs can be output and that the orientation for polygons can be reversed individually.

Conversion can be possible even if these conditions are not met. It is also possible to use another modeler to read a DXF file and save it, so that conversion is possible for a file that cannot be directly converted.

* If the data size is too large and not all the normals can be generated, the -n option will assume that the normals have been generated and will create an RSD without normals.

* The -r option is not valid when Gouraud shading is performed. Also, since the option changes the normal count and the ordering, it cannot be used when performing a normal MIMe.

* A Z sort may occur if -quad2 is used to combine two triangles into a quadrilateral.

* If two triangles to be combined in -quad2 were specified by the modeler to have different colors in the DXF, it is possible to override -quad2 just for that portion. When doing this, the -cl option should also be invoked, as in dxf2rsd -quad2 -cl.

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EXAMPLE 1: Sample output when the -v option is used.

```
> dxf2rsd -v -auto +Z+Y -quad -s foo

=====
Input DXF file: foo.dxf
[DXF] SIZE      :      40230 lines
>
> VERTEX       :      4320
file>
POLYGON        :      1468 (estimate)
3-poly         :      1376 (contents)
4-poly         :      32
(9<)-poly      :      2
s>
polylines      :      2 (max size=32)
RANGE x        :      -1.015 ... +0.785
is
y              :      -2.533 ... +0.768
S axes
z              :      -1.161 ... +0.625
SCALE          :      302.870
MOVE           :      (dx,dy,dz)=(34.788, 267.255, 81.207)
MATERIAL        :      0

[RSD] VERTEX    :      796
sion>
POLYGON         :      1468
sion
triangles       :      1436 (contents)
quadrangles     :      32
RANGE x         :      -272.477 ... +272.477
is
y              :      -500.000 ... +500.000
z              :      -270.510 ... +270.510
MATERIAL        :      0
ls>
NORMAL          :      796

Output files    :      foo.[rsd, ply, mat, grp]
```

<Description>
<input DXF filename>
<number of lines in the DXF file>
<number of vertices in the DXF file>
<estimated polygon count>
1376 triangles
32 quadrilaterals
<2 polygons with 10 or more sides>
<2 polylines (with 32 vertices)>
<minimum ... maximum for each axis>
(the Y,Z axes are converted to P when necessary)>
<scale>
<translation>
<number of colored polygons>
<number of vertices after conversion>
<number of polygons after conversion>
1436 triangles
<32 quadrilaterals>
<minimum ... maximum for each axis after resizing and translation>
<number of polygons with materials>
<number of normals>
<output filename>

EXAMPLE 2: Using color data

The color data used in the modeler can be reflected in the RSD. To do this, the -cl option should be specified. Polygons will be colored "approximately". "Approximately"

means that the colors will be different from the modeler's, but portions that had the same color will be assigned a single color. This is because DXF does not use RGB values and instead only saves "color numbers". Colors can then be specified by editing the MAT file using a text editor or by creating a color table file as described below.

```
> dxf2rsd -cl foo > foo.cl <create a color table file>

> type foo.cl    <creates a file containing color numbers>

183
40
253
0
8
```

A text editor is used to enter RGB values (0 - 255) following each of the color numbers.

```
> type foo.cl

183  100 100 200
40    58  20  43
253   10 100  10
0     212 20 100
8      0 128 126
```

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dxf2rsd is executed again using the -cf option.

```
> dxf2rsd -cf foo.cl foo
```

The newly created RSD will have colors assigned according to the color table file.

EXAMPLE 3: Converting large data files

When a data file is too detailed, the -e option can be used to combine a number of vertices into a single vertex. In the following example, two vertices that are separated by a distance of 100 or less are considered identical. This results in decreased vertex, polygon and normal counts (note that distances are calculated based on the scale after scaling has been performed).

While it depends on the data, an appropriate distance setting can generally reduce the size of the data with almost no change in shape.

```
> dxf2rsd -v -e 100 -sc 1000 big.dxf
```

```
=====
Input DXF file: big.dxf
```

```

[DXF] SIZE      : 134628 lines
      VERTEX    : 18982
      POLYGON   : 8618 (estimate)
                3-poly      : 1746
                4-poly      : 3436
      RANGE  x:  -1.644 ...  +1.545  <scale is small so scale by a
                y:  -2.352 ...  +0.000  factor of 1000>
                z:  -3.649 ...  +3.993
      SCALE    : 1000.000
      MATERIAL:    0

[RSD] VERTEX    : 1208
      POLYGON   : 2708 (68% reduced)  <polygon count reduced to approximately 30 perc
ent>
                triangles : 2708
      RANGE  x: -1643.811 ... +1545.072
                y: -2352.365 ...  +0.000
                z: -3649.154 ... +3992.687
      MATERIAL:    0
      NORMAL   : 2708

```

Output files : big.[rsd, ply, mat, grp]

Furthermore, the normal count can be reduced by specifying the -r option.

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EXAMPLE 4: Combining into quadrilaterals

By specifying the -quad2 option, two adjacent triangles can be combined into a single quadrilateral. In the following example, two triangles having an angle between them of 5 degrees or less are combined into four-side polygons. This results in the polygon count reduced by almost a half.

```
> dxf2rsd -v -quad2 5.0 earth
```

```
=====
```

Input DXF file: earth.dxf

```

[DXF] SIZE      : 88158 lines
      VERTEX    : 8811
      POLYGON   : 2937 (estimate)
                3-poly      : 2937  <- initially 2937 triangles
      RANGE  x:  -4.000 ...  +3.986
                y:  -3.997 ...  +3.997
                z:  -4.000 ...  +4.000
      MATERIAL:    0

[RSD] VERTEX    : 2231
      POLYGON   : 1686  <- 2502 triangles were combined
                triangles : 43  to form 1251 quadrilaterals.
                quadrangles: 1251 1686 polygons total.
      MATERIAL:    0
      NORMAL   : 1686 (quad2 < 4.9870)

```

Output files : earth.[rsd, ply, mat, grp]

NORMAL : 1686 (quad2 < 4.9870)

In the above, the "4.9870" indicates the largest angle out of the maximum angle (in this case 5.0) that was actually converted. Thus, executing the command again with a "-quad2 4.986" option would further reduce the number of combined quadrilaterals somewhat.

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