

A.5 PATRAN 2.5 Results Files

All results obtained from an external analysis code (other than the P/FEA module) were written to one of five different types of PATRAN 2.5-compatible results files in order to be processed by PATRAN 2.5: a DISPLACEMENT, FORCE, NODAL, ELEMENT, or BEAM Results File.

In this section, we will outline the formats of the various results file types. The information contained in this section can be used to write translators for your own in-house analysis codes or for test data.

Displacement or Force Results Files

Displacement results files are a special case of the NODAL RESULTS FILES described in [Nodal Results Files, 941](#). Displacement results files contain the displacements calculated by the analysis code at the node points. There are usually 6 columns in a displacement result file. The first 3 are the X, Y and Z components of translation and the second 3 are the X, Y and Z components of the rotation at the nodes. A single column of a displacement results file can be used for contouring. For example, to contour the Y-component of displacement. Patran will also postprocess the first 3 columns to contour the resultant displacement and/or to provide deformed mesh plots. Displacement or rotations vector plots can also be generated.

Force results files have the same format as displacement results files. The only difference between the two is that a force file contains the forces and moments at nodes instead of displacements and rotations. Force results files can be used to generate force or moment vector plots. For example, reaction forces are commonly displayed this way. Weld element results are also calculated from the results in a force results file containing node force balances.

Most Analysis Model translators create a different DISPLACEMENT or FORCE RESULTS FILE for each load case. If you desire to write your own results translator from your own in-house analysis program, you should load the results in the scheme mentioned above: X, Y, Z translations or forces followed by X, Y, and Z rotations or moments.

Patran will interpret the X, Y, and Z values of displacement, force, rotation, or moment in the coordinate system defined in the associated [Patran 2.5 Results Files, 46](#).

Both a binary and a text version of displacement and force results files are supported in Patran. The format of the file will be automatically determined before reading in the data.

Sample Displacement/Force Results Data File

Binary Version

<i>Record 1:</i>	TITLE, NNODES, MAXNOD, DEFMAX, NDMAX, NWIDTH	
<i>Record 2:</i>	SUBTITLE1	
<i>Record 3:</i>	SUBTITLE2	
<i>Record 4:</i>	NODID(1),	DX(1),
	DY(1),DZ(1),	RX(1),
	RY(1),RZ(1)	
<i>Record 5:</i>	NODID(2),	DX(2),
	DY(2), DZ(2),	RX(2),
	RY(2),RZ(2)	
<i>Record N+3:</i>	NODID(N),	DX(N),
	DY(N),DZ(N),	RX(N),
	RY(N),	RZ(N)

Parameter	Description
h3	80A1 title stored in an 80 word real or integer array (1 character per word).
SUBTITLE1	Same format as TITLE
SUBTITLE2	Same format as TITLE
NNODES	Number of nodes (integer)
MAXNOD	Highest node ID number (integer)
DEFMAX	Maximum absolute displacement (real)
NDMAX	ID of node where maximum displacement occurs (integer)
NWIDTH	Number of columns after NODID for displacement information (integer) (usually = 3 for DX, DY, DZ or 6 for DX, DY, DZ, RX, RY, RZ)
NODID	Node ID number (integer)
DX	X displacement or force component (real)
DY	Y displacement or force component (real)
DZ	Z displacement or force components (real)
RX	X rotation or moment component (real)
RY	Y rotation or moment component (real)
RZ	Z rotation or moment component (real)

Text Version

<i>Record 1:</i>	h3	(80A1)
<i>Record 2:</i>	NNODES, MAXNOD, DEFMAX,	(2I9,
	E15.6, 2I9)	
	NDMAX, NWIDTH	
<i>Record 3:</i>	SUBTITLE1	(80A1)
<i>Record 4:</i>	SUBTITLE2	(80A1)
<i>Record 5 to n+4:</i>	NODID, (DATA(J), J=1, NWIDTH)	(I8,
	(5E13.7))	

Nodal Results Files

Nodal results files contain the results quantities that have been calculated at the node points. Up to 200 columns of results quantities can be stored for each node. Patran will process a single column of a nodal results file at a time and use that data to produce contour plots. Patran allows nodal results files to be used for element color-coding by averaging the data at the elements. Nodal results files can also be used for vector plotting and x-y plotting.

Most analysis model translators create a different nodal results file for each load case. Each of the MSC supported translator documents contains a table listing the type of results stored in each column. If you desire to write your own results translator from your own in-house analysis program, you must document the results contained in each column of the results file. A user can then process a particular column knowing that the required results quantity was put in that column by the translator.

Both a binary and a text version of nodal results files are supported in Patran. The format of the file will be automatically determined before reading in the data.

Binary Version

Record 1:	TITLE, NNODES, MAXNOD, DEFMAX, NDMAX, NWIDTH
Record 2:	SUBTITLE1
Record 3:	SUBTITLE2
Record 4:	NODID(1), (DATA(J), J = 1, NWIDTH)
Record 5:	NODID(2), (DATA(J), J = 1, NWIDTH)
Record N+3:	NODID(N), (DATA(J), J=1, NWIDTH)

Parameter	Description
h3	80A1 title stored in an 80 word real or integer array (1 character per word).
SUBTITLE1	Same format as TITLE
SUBTITLE2	Same format as TITLE
NNODES	Number of nodes (integer)
MAXNOD	Highest node ID number (integer)
DEFMAX	Maximum absolute displacement (real)
NDMAX	ID of node where maximum displacement occurs (integer)
NWIDTH	Number of columns after NODID for nodal information (integer)
NODID	Node ID number (integer)
DATA	Result quantities organized by column index (real)

Text Version

Record 1:	h3	(80A1)
Record 2:	NNODES, MAXNOD, DEFMAX, NDMAX, NWIDTH	(2I9 E15.6, 2I9)
Record 3:	SUBTITLE1	(80A1)
Record 4:	SUBTITLE2	(80A1)
Record 5 to n+4:	NODID, (DATA(J), J=1, NWIDTH)	(I8, (5E13.7))

Note:

MAXNOD, DEFMAX, NDMAX can be set to zero unless it is a displacement results.

Sample Nodal Results Data File

```
2          2          0          0          10
h3
SUBTITLE 2
1 +2.42755E+00 +2.93590E+00 +1.55693E+00 +1.01315E+00
+4.32207E-01
+1.08574E+00 +3.02910E+00 +3.80189E+00 +3.39958E-01
+1.63880E+00
2 +1.14613E+00 +2.32387E+00 +2.76658E+00 +7.53095E-01
+5.10357E-01
```

```
+2.12205E+00 +4.33402E+00 +4.41597E+00 -5.84647E-01
+1.74512E+00
```

Element Results Files

Element results files contain the elemental results quantities for each Analysis Model element analyzed. Up to 200 columns of results quantities can be stored for each element. Patran will process a single column of an element results file at a time and use that data to color code elements. Element results files can be used for contouring; however, the data read from the element results file will be averaged at the nodes in order to be able to produce contour plots. Element results can also be used for x-y plot data generation.

Most Analysis Model translators create a different ELEMENT RESULTS FILE for each load case. Each of the MSC supported translator documents contains a table listing the type of results stored in each column. If you desire to write your own results translator from your own in-house analysis program, you must document the results contained in each column of the results file. A user can then process a particular column knowing that the required results quantity was put in that column by the translator.

Both a binary and a text version of element results files are supported in Patran. The format of the file will be automatically determined before reading in the data.

Binary Version

Record 1:	TITLE, NWIDTH
Record 2:	SUBTITLE1
Record 3:	SUBTITLE2
Record 4:	ID, NSHAPE, (DATA(J), J=1, NWIDTH)
Record 5:	ID, NSHAPE, (DATA(J), J=1, NWIDTH)
.	.
Record n+3:	ID, NSHAPE, (DATA(J), J=1, NWIDTH)
Record n+4:	ID = 0 or end-of-file

Parameter	Description
h3	80A1 title stored in an 80 word real or integer array (1 character per word)
SUBTITLE1	(same format as TITLE)
SUBTITLE2	(same format as TITLE)
NWIDTH	Number of columns of data stored in the file (integer)
ID	Element identification number (integer)
NSHAPE	Essential shape code (BAR = 2, TRI = 3, QUAD = 4, TET = 5, PYR = 6, WEDG = 7, HEX = 8; integer)
DATA	Result quantities organized by column index (real)

Text Version

<i>Record 1:</i>	h3	(80A1)
<i>Record 2:</i>	NWIDTH	(I5)
<i>Record 3:</i>	SUBTITLE1	(80A1)
<i>Record 4:</i>	SUBTITLE2	(80A1)
<i>Record 5 to n+4:</i>	ID, NSHAPE, (DATA(J), J=1,NWIDTH)	(2I8, /,
	(6E13.7))	

Sample Element Results File

```

19
      STRESS/STRAIN AT TIME:      .005000058

      1      4
      .1483126E+05 .1492715E+05-.3057466E+03 .2852407E+01-.5369175E+01 .0000000E+00
      .9919469E+04 .1488886E+05-.8247605E+04-.8088444E+04 .3114060E+03 .2852407E+01
      -.5369175E+01 .0000000E+00-.5445350E+04 .8186974E+04 .0000000E+00 .2237059E+04
      .3357410E+04
      2      4
      .6935732E+04 .1174489E+05 .2986205E+03-.3140930E+03 .2887558E+03 .0000000E+00
      .6226875E+04 .1023987E+05-.2068523E+04-.6511836E+04-.1064728E+03-.3140930E+03
      .2887558E+03 .0000000E+00-.2860119E+04 .5766014E+04 .0000000E+00 .1683378E+04
      .2535498E+04
      3      4
      -.8141948E+04 .3225449E+04-.2815713E+04-.3211482E+03-.1085647E+04 .0000000E+00
      -.1638833E+04 .1125793E+05 .1245072E+05 .7406104E+03 .3047678E+04-.3211482E+03
      -.1085647E+04 .0000000E+00 .4397110E+04 .1319897E+05 .0000000E+00 .1379138E+04
      .2083729E+04

```

Beam Results Files

BEAM RESULTS FILES are a special type of element results file used to process data at various stations along beam elements. The file contains the elemental results quantities for up to 20 stations along each Analysis Model beam element. Up to 200 columns of results quantities can be stored for each element station. Patran will process individual columns of an element results file to create an x-y plot of the distribution of the results along a beam or a set of beams.

Most Analysis Model translators create a different BEAM RESULTS FILE for each load case. Each of the MSC supported translator documents contains a table listing the type of results stored in each column. If you write your own results translator from your in-house analysis program, you must document the results contained in each column of the results file. A user can then process a particular column knowing that the required results quantity was put in that column by the translator.

Only the binary version of beam element results files is supported in Patran.

Sample Beam Results File

Binary Version

<i>Record 1:</i>	TITLE, NWIDTH
<i>Record 2:</i>	SUBTITLE1
<i>Record 3:</i>	SUBTITLE2
<i>Record 4:</i>	ID(1), STAT(1), (DATA(J), J=1, NWIDTH)
<i>Record 5:</i>	ID(1), STAT(2), (DATA(J), J=1, NWIDTH)
.	
<i>Record n+3:</i>	ID(1), STAT(n), (DATA(J), J=1, NWIDTH)
<i>Record n+4:</i>	ID(2), STAT(1), (DATA(J), J=1, NWIDTH)
<i>Record n+5:</i>	ID(2), STAT(2), (DATA(J), J=1, NWIDTH)
.	
<i>Record n+m+3:</i>	ID(2), STAT(m), (DATA(J), J=1, NWIDTH)
<i>Record n+m+4:</i>	ID(N), STAT(1), (DATA(J), J=1, NWIDTH)
<i>Record n+m+5:</i>	ID(N), STAT(2), (DATA(J), J=1, NWIDTH)
.	
<i>Record n+m+k+3</i>	ID(N), STAT(k), (DATA(J), J=1, NWIDTH)

<i>Parameter</i>	<i>Description</i>
h3	80A1 title stored in an 80 word real or integer array (1 character per word)
SUBTITLE1	(same format as TITLE)
SUBTITLE2	(same format as TITLE)
NWIDTH	Number of columns of data stored in the file (integer)
ID	Beam element identification number (integer)
STAT	Fractional station along the beam (real between 0. and 1.). STAT(1) Should always be 0. STAT(m), STAT(n), and STAT(k) Should always be 1.
DATA	Result quantities organized by column index (real)

Note: A maximum of 20 stations is allowed for each beam.

PATRAN 2.5 Results Template Files

As mentioned above, a set of results template files (xxxxx.res_tmpl) is provided in the Patran delivery which map information from the PATRAN 2.5 results file for Patran. The specified results template file is used during the import of the PATRAN 2.5 results file.

A results template file is required for each PATRAN 2.5 results file type to be imported. You can create or customize your own results template file.

The structure of the results template file is as follows:

Keyword	Data Type	Allowable Value	Description
KEYLOC	integer	1 to the maximum number of columns in the results file, or zero.	Column number where translation key is found, or 0 if no translation key is required.
TYPE	character string	scalar, vector, tensor, or END.	If scalar, vector or tensor, TYPE is the dimension of the results quantity. If END, TYPE indicates the end of the template file.
KEY	integer	Any value found in the column indicated by KEYLOC.	Value of translation key (required if KEYLOC does not equal zero). This is often an element type number.
COLUMN	integer	1, 3 or 6	Column numbers to be translated.
PRI	character string	Character string up to 80 characters in length.	Primary label definition. This will appear in the "Select Results" box of the Results Display form.
SEC	character string	Character string up to 80 characters in length.	Secondary label definition. This will appear in the "Select Results" box of the Results Display form.
CTYPE	character string	global, nodal, elem, user, matl, ply, edge or curve.	Type of element coordinate frame (required if TYPE is vector or tensor).

The template file is organized in the following manner:

```

Line 1: KEYLOC = <value>
Line 2: TYPE= <value>
Line 3: KEY = <value> (required if KEYLOC does not equal zero.)
Line 4: COLUMN = <value(s)>
Line 5: PRI = <value>

```



```
Line 6: SEC = <value>
Line 7: CTYPE=<value> (required if TYPE is vector or tensor.)
Lines 8 through n - 1: Repeat lines 2 through 7 as many times as
required.
Line n: CTYPE = END
```

Two examples of a results template file are presented below. Example 1 shows a template file for a results file that does not require the use of an element type key. Example 2 uses the element type key to import results for two different types of Nastran elements from an element results file (**.e1s**) generated by the PATRAN 2.5 Nastran translator (naspat).

Example 1

```
KEYLOC = 0
TYPE = SCALAR
COLUMN = 11
PRI = Stress
SEC = von Mises
TYPE = TENSOR
COLUMN = 25, 26, 27, 28, 29, 30
PRI = Stress
SEC = Components
CTYPE = ELEM
TYPE = END
```

Example 2

```
KEYLOC = 19
TYPE = SCALAR
KEY = 67
COLUMN = 11
PRI = Stress
SEC = von Mises
TYPE = SCALAR
KEY = 33
COLUMN = 11
PRI = Stress
SEC = von Mises
TYPE = TENSOR
KEY = 67
COLUMN = 25, 26, 27, 28, 29, 30
PRI = Stress
SEC = Components
CTYPE = ELEM
TYPE = TENSOR
KEY = 33
COLUMN = 15, 16, 0, 18, 0, 0
PRI = Stress
SEC = Components
CTYPE = ELEM
TYPE = END
```

```
column 15 and 25 represents the XX component of stress
column 16 and 26 represents the YY component of stress
column 27 represents the ZZ component of stress
column 18 and 28 represents the XY component of stress
column 29 represents the YZ component of stress
column 30 represents the ZX component of stress
```

The keys used in Example 2 are for a CHEXA element (element type 67) and a CQUAD4 element (element type 33), as defined in the [Overview](#) (p. 1) in the *Patran Interface to MSC Nastran Preference Guide*.