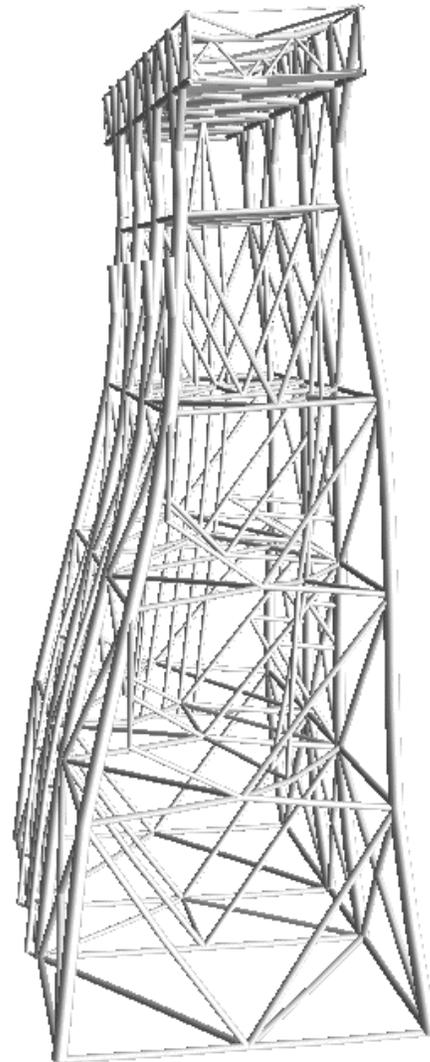


JNTRES
User's Manual



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1 Introduction

JNTRES is a simple tool, which is available for free for the users of Usfos. The tool is used to extract and print joint results from an Usfos analysis, and the results are taken from the “RAF” file.

The tool is found on the web (www.usfos.com under download modules). JNTRES is available on the following computer platforms:

- ❑ Windows
- ❑ Linux 64 bit
- ❑ Mac OSX

JNTRES is under development and at present, only beta versions (0.9-X) are available. This document is based on JNTRES version 0.9-5, August 2013.

2 Running JNTRES

The most efficient way to run JNTRES is from a command shell (DOS or Unix).

By just typing *jntres*, the tool starts and asks for the following information:

- Raf file name (including file extension)
- Output file name (to print the actual data)
- Step number and some optional parameters

```

-----
-----
-----
-----
          J O I N T   R E S U L T S
-----
Results from Usfos CHJOINT elements  -----
-----
Version 0.9-5/ Aug, 05, 2013
-----
          Usfos AS
-----
-----
-----
Give RAF File Name Prefix           : res
Give Output File Name                : jntres.txt
Give Stored Step Number /all/       :
Dump of curves ? / NO/              :
Joints exceeding specified Limit ?
-----

```

Table 2-1 Running JNTRES from a simple command shell

JNTRES could also be run from the Usfos GUI (Run Utilities), and the user gives the same input information.

2.1 Input parameters

The five input parameters are explained in Table 2-2. If the default parameters are used, only the two first parameters (raf- and output) need to be specified. For the remaining 3, the defaults are selected by just hitting the “enter” button, (i.e. blank).

Input/option	Comments
Raf file name prefix	USFOS result database. Either : <ol style="list-style-type: none"> 1. file name (if JNTRES is activated from the same file folder as the raf file is stored), or 2. full path. For example: <ol style="list-style-type: none"> 1. res 2. /tmp/scratch/res
Output file name	Complete file name for result printing. For example: jntres01.txt
Stored step	JNTRES goes trough all steps up to the specified step. NOTE. Specify <i>stored</i> step number (not analysis step). F example, if the default storing is used, USFOS will store every 10 th analysis step: 1, 10, 20, 30, 40, etc. For example will <i>stored</i> step no 2 mean analysis step 10, stored step no 3 means analysis step 20, etc. By default, all steps are used, (i.e. up to last stored step).
Dump of curves	Continuous updated <i>axial</i> strength curves are dumped after the result print (on same line). The curve contains 13 points, and this means 26 extra columns. Default OFF
Joints exceeding...	Special use. F example for screening of elastic analysis, where certain utilization level is used for sorting the data. Default off.

Table 2-2 - JNTRES input parameters and options.

2.2 Normal output (ultimate capacity assessment)

The contents of the output file depend on choice of input parameters. The normal *) output has 3 main blocks of data:

Output Blocks	Comments
<p>Block-1: Heading and key results</p>	<p>Contains:</p> <ul style="list-style-type: none"> ❑ JNTRES version ❑ USFOS analysis status ❑ Processed date ❑ Input raf file ❑ Number of connections ❑ Last used step (stored step is converted to USFOS analysis step in the print)
<p>Block-2: Joint capacity summary</p>	<p>Connections are <i>sorted</i> for the following <i>axial</i> force response:</p> <ul style="list-style-type: none"> ❑ Exceeding axial ductility limit ❑ Exceeding peak axial force ❑ Exceeding first yield ❑ Elastic connections <p>The printed utilizations are always based on <i>all</i> force components (axial + in&out-of plane bending).</p> <p>See Table 3-3 for description of the groups.</p>
<p>Block-3: Detailed connection-by-connection print.</p>	<p>The history of each connection is printed, with or without the capacity curve printed at the end of each line.</p>

Table 2-3 - JNTRES output blocks. Normal ultimate capacity.

*) “Normal” means that focus is set on the **axial** force-displacement development (ductility) of each connection. The force-displacement curves are defined by the codes (ISO, API, NORSOK).

2.3 Special output (screening of utilization)

USFOS used for special analysis, (for example dynamic analysis of a jacket transport), a different output could be useful. By specifying: “yes” on parameter no 5, (“joints exceeding”...), the user could specify a certain target utilization level to be used in the screening.

All output is based on utilization levels, (and not on ductility levels).

Output Blocks	Comments
Block-1: Heading and key results	Same as “normal output”
Block-2: Joint utilization summary	Connections are sorted as follows: <ul style="list-style-type: none"> ❑ Max utilization for connections exceeding the specified target utilization level. ❑ Max utilization for connections below the specified target utilization level.
Block-3: Sorted print	Sorted print of all connections. Both absolute utilization and relative (to the specified target utilization).

Table 2-4 - JNTRES output blocks. Special screening of utilization levels.

3 Examples

In the following examples, the joint results for the simple model are printed in different ways. The examples are extracting the joint results from the simple frame shown in Figure 3-1.

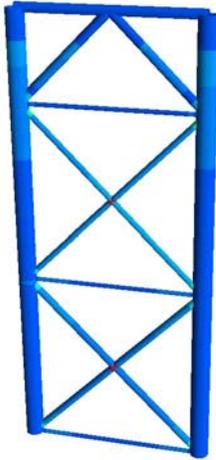


Figure 3-1 - Simple Analysis model

3.1 Normal Ultimate Capacity Assessment

In this example the normal (default) output is selected. Raf-file and output file are specified, and the 3 last parameters are left blank (just hitting “enter”).

```

-----
-----
-----
-----
          J O I N T   R E S U L T S
-----
Results from Usfos CHJOINT elements -----
-----
Version 0.9-5/ Aug, 05, 2013 -----
          Usfos AS
-----
-----
-----
Give RAF File Name Prefix      : res
Give Output File Name         : jntres.txt
Give Stored Step Number   /all/ :
Dump of curves ?           / NO/ :
Joints exceeding specified Limit ?

```

Table 3-1 - JNTRES prompt

“Block-2” results are shown in Table 3-2 and Table 3-3 explains the different result items.

```

-----
Connections Exceeding Duct Limit -----
-----
Connection Node Brace LoadCase StepNo LoadLevel Utiliz Status PeakAxial DispAxPeak Axial Disp DuctLim
19 7 31 1 40 3.891 1.000 TensFail 1.580E+06 0.006 1.256E+06 1.831E-02 0.009
18 6 24 1 50 4.257 1.000 TensFail 2.457E+06 0.007 2.037E+06 2.087E-02 0.011
17 6 21 1 140 6.164 1.000 TensFail 2.448E+06 0.007 2.177E+06 1.564E-02 0.011

-----
Connections Exceeding Peak Axial -----
-----
Connection Node Brace LoadCase StepNo LoadLevel Utiliz Status PeakAxial DispAxPeak Axial Disp DuctLim
9 11 23 1 90 5.761 1.000 CompPlast 7.862E+06 0.043 7.834E+06 4.401E-02 0.396
15 13 44 1 170 6.122 0.958 CompPlast 4.011E+06 0.019 3.804E+06 1.964E-02 0.396
7 3 43 1 180 6.407 1.000 TensPlast 5.887E+06 0.015 5.810E+06 1.652E-02 0.069

-----
Connections exceeding First Yield -----
-----
Connection Node Brace LoadCase StepNo LoadLevel Utiliz Status PeakAxial DispAxPeak Axial Disp DuctLim
20 7 34 1 20 1.999 0.750 TensYield 1.580E+06 0.006 1.186E+06 1.386E-03 0.006
3 2 22 1 60 4.556 0.550 CompYield 1.008E+07 0.032 5.541E+06 7.472E-03 0.032
5 2 52 1 60 4.556 0.646 TensYield 4.096E+06 0.014 2.632E+06 3.031E-03 0.014
6 3 32 1 60 4.556 0.599 CompYield 7.445E+06 0.026 4.432E+06 6.669E-03 0.026
12 12 33 1 60 4.556 0.575 CompYield 7.731E+06 0.023 4.445E+06 6.470E-03 0.023
13 12 52 1 60 4.556 0.681 TensYield 3.887E+06 0.015 2.632E+06 4.402E-03 0.015

-----
Max Utiliz for Elastic Connections -----
-----
Connection Node Brace LoadCase StepNo LoadLevel Utiliz Status PeakAxial DispAxPeak Axial Disp DuctLim
1 1 21 1 40 3.891 0.268 TensElast 9.148E+06 0.070 2.449E+06 3.798E-03 0.087
2 1 51 1 200 6.414 0.229 TensElast 3.881E+06 0.070 1.127E+04 4.424E-05 0.087
4 2 31 1 30 2.994 0.204 TensElast 7.711E+06 0.018 1.569E+06 1.562E-03 0.030
8 3 53 1 90 5.761 0.558 TensElast 3.401E+06 0.022 1.866E+06 3.238E-03 0.054
10 11 51 1 200 6.414 0.241 TensElast 3.891E+06 0.013 1.127E+04 4.444E-05 0.030
11 12 24 1 190 6.419 0.508 TensElast 8.777E+06 0.028 2.313E+06 2.737E-03 0.067
14 13 34 1 30 2.994 0.207 TensElast 7.568E+06 0.018 1.564E+06 1.680E-03 0.033
16 13 53 1 90 5.761 0.468 TensElast 4.019E+06 0.012 1.866E+06 1.729E-03 0.030

```

Table 3-2 - JNTRES result overview (“block-2”). Normal Ultimate Capacity.

Comments to the results:

Grouping	Explanation
Exceeding Duct Limit	Axial displacement exceeds the ductility limit. The instantaneous ductility limit is printed under “ductlim”.
Exceeding Peak Axial	Axial force exceeds the peak. The instantaneous peak axial capacity is printed under “PeakAxial”.
Exceeding First Yield	Axial force exceeds the proportion limit, which typically is set to 60% of the axial peak capacity.
Elastic Connections	Maximum utilization for connections, which has not reached the proportional limit (see above)

Table 3-3 Grouping of jntres result overview. Normal Ultimate Capacity.

3.2 Special screening of utilization

In this example special output is selected. Raf-file and output file are specified, and the 2 next parameters are left blank (just hitting “enter”). “Yes” is answered on parameter number 5, and it is asked for the “utilization limit” to be used in the screening.

The default limit is set to 0.8, because this is a good estimate on conventional joint checking.

In the actual example, the target utilization is set to 0.6.

```

-----
-----
-----
-----
      J O I N T   R E S U L T S
-----
      Results from Usfos CHJOINT elements
-----
      Version 0.9-5/ Aug, 05, 2013
-----
      Usfos AS
-----
-----
-----
Give RAF File Name Prefix      : res
Give Output File Name         : jntres.txt
Give Stored Step Number /all/  :
Dump of curves ? / NO/       :
Joints exceeding specified Limit ? YES
Give Utilization limit /0.8/  : 0.6
-----

```

Table 3-4 - JNTRES prompt. Special use.

In this example, a dynamic analysis is performed, and “time” is printed instead of “load level”.

The “sorted print” presents both the absolute utilization and a relative level. The relative level is computed as 100 % x (absolute) / (target utilization).

```

-----
---- Max Utiliz for Connections exceeding ----
---- Utilization Limit 0.600 ----
-----

Connection Node Brace StepNo Time Utiliz Status PeakAxial DispAxPeak Axial Disp
17 6 21 10 1.000 0.891 Tension 2.457E+06 0.007 2.191E+06 2.222E-03
18 6 24 11 1.100 0.893 Tension 2.457E+06 0.007 2.194E+06 2.250E-03
19 7 31 19 1.900 0.995 Tension 1.578E+06 0.006 1.570E+06 3.964E-03
20 7 34 10 1.000 0.991 Tension 1.580E+06 0.006 1.566E+06 3.668E-03

-----
---- Max Utilization for Connections with ----
---- Utilization Less than limit: 0.600 ----
-----

Connection Node Brace StepNo Time Utiliz Status PeakAxial DispAxPeak Axial Disp
1 1 21 11 1.100 0.240 Tension 9.148E+06 0.070 2.190E+06 3.373E-03
2 1 51 15 1.500 0.001 Tension 3.881E+06 0.070 1.001E+03 3.939E-06
3 2 22 11 1.100 0.231 Compress 9.845E+06 0.034 2.275E+06 3.343E-03
4 2 31 15 1.500 0.204 Tension 7.711E+06 0.018 1.571E+06 1.602E-03
5 2 52 10 1.000 0.048 Tension 4.111E+06 0.014 1.943E+05 2.488E-04
6 3 32 11 1.100 0.275 Compress 7.663E+06 0.028 2.105E+06 3.206E-03
7 3 43 15 1.500 0.168 Tension 1.239E+07 0.020 2.080E+06 1.419E-03
8 3 53 10 1.000 0.020 Tension 3.946E+06 0.013 7.821E+04 1.309E-04
9 11 23 11 1.100 0.280 Compress 8.113E+06 0.045 2.274E+06 4.811E-03
10 11 51 15 1.500 0.001 Tension 3.744E+06 0.070 1.000E+03 3.937E-06
11 12 24 11 1.100 0.225 Tension 9.754E+06 0.021 2.195E+06 1.987E-03
12 12 33 11 1.100 0.278 Compress 7.595E+06 0.028 2.108E+06 3.382E-03
13 12 52 10 1.000 0.051 Tension 3.891E+06 0.017 1.943E+05 3.249E-04
14 13 34 15 1.500 0.207 Tension 7.563E+06 0.018 1.566E+06 1.745E-03
15 13 44 11 1.100 0.128 Compress 1.243E+07 0.032 1.589E+06 1.803E-03
16 13 53 10 1.000 0.019 Tension 4.222E+06 0.015 7.809E+04 1.327E-04

```

Table 3-5 - JNTRES result overview (“block-2”). Special screening of utilization.

```

-----
---- Sorted for all connections. ----
---- Absolute and relative ----
-----

Connection Node Brace Utiliz Relative to 0.600
19 7 31 0.995 165.8 %
20 7 34 0.991 165.2 %
18 6 24 0.893 148.8 %
17 6 21 0.891 148.6 %
9 11 23 0.280 46.7 %
12 12 33 0.278 46.3 %
6 3 32 0.275 45.8 %
1 1 21 0.240 39.9 %
3 2 22 0.231 38.6 %
11 12 24 0.225 37.5 %
14 13 34 0.207 34.5 %
4 2 31 0.204 34.0 %
7 3 43 0.168 28.0 %
15 13 44 0.128 21.3 %
13 12 52 0.051 8.5 %
5 2 52 0.048 8.0 %
8 3 53 0.020 3.4 %
16 13 53 0.019 3.1 %
10 11 51 0.001 0.2 %
2 1 51 0.001 0.2 %

```

Table 3-6 - JNTRES result overview (“block-3”). Sorted print.

4 Limitations

JNTRES needs results, which are created by USFOS version 8-6 and later versions. For version 863 and higher, the ductility limit is printed in addition.

All sorting of ductility (normal output) are based on the axial component only. Therefore, the *ductility* option in JNTRES is not suited for sorting of joints dominated by bending.