



ACE Structural Engineering Applications LLC

ACE FrameWorks Utilities

ACE Steel Detailing Neutral File Import Documentation

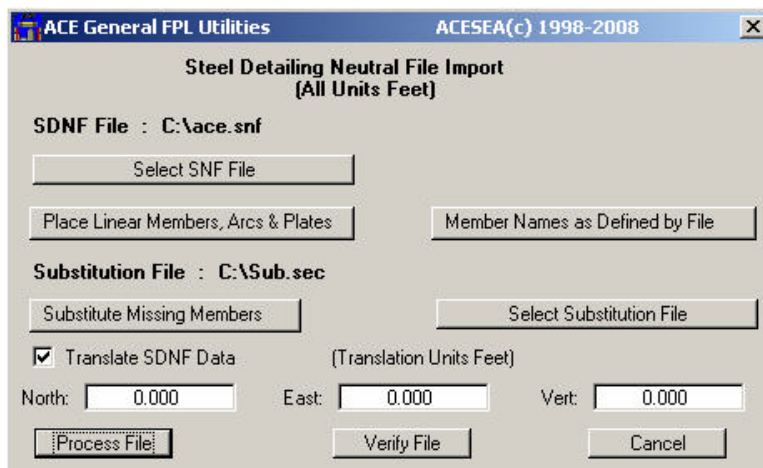
Mar 15, 2013

ACE Steel Detailing Neutral File Import (ACE_SNF.MA)

(Versions - FWP 3.1.x.x/3.2.x.x rel 2.0.4 & FWP 7.0.x.x rel 7.0.4 & FWP 7.1/7.2/7.3 rel 6.0.4 & FWP 8.0.x.x rel 8.0.4 & FWP 9.0.x.x rel 9.0.4 & FWP 10.0.x.x rel 10.0.4 & FWP 11.0.x.x rel 11.0.4 & FWP 12.0.x.x rel 12.0.4)

The steel detailing neutral file (SDNF) import application can be utilized to read SNDF files (version 2). SDNF files created by FrameWorks or any other application that writes the SDNF (version 2) format can be imported. A copy of the SDNF (version 2) specification and a sample SDNF file, ACE.SNF, is included toward the end of this document. The SDNF (version 2) format supports linear & arc members (tapered or non-tapered) and plate elements, which are placed as solids. This application does not support the version 3 SDNF format (FWP 7.1.x.x & FWP 7.2.x.x) as

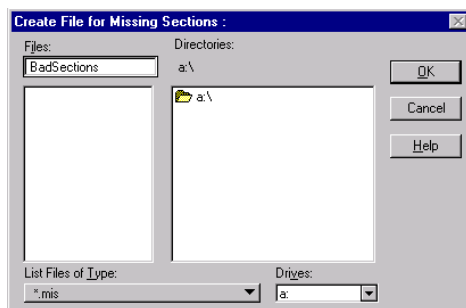
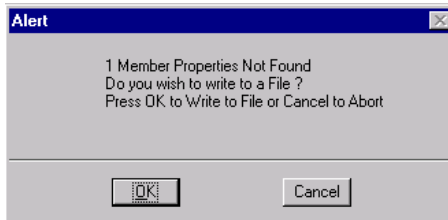
Intergraph provides software to read version 3 SDNF. If a SDNF version 3 file is encountered, a message is displayed.



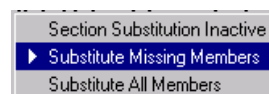
Steel Detailing Neutral File Import - Dialog Box

status and cardinal point. The following information is carried for each plate: name, class, grade, thickness, and shape vertices.

This application provides several features and options to enhance handling of SDNF files. The most significant feature is the missing section and section substitution capabilities. If any sections are not found when a SDNF file is processed, the option is given to write an ASCII file (shown left) that will contain the names of the missing sections. This missing sections file (named anything.MIS) can be easily converted into a section substitution file (named anything.SEC). The application has the ability to substitute for missing members, substitute all members or substitute no members. Thus when translating from a CAD system to FrameWorks and different section naming conventions are utilized the .MIS and .SEC files can be effectively utilized to properly place all members. To do this first run the verify command and produce a .MIS file. Next edit the .MIS file and create a .SEC file (.MIS and .SEC file details are discussed later in this document). Finally run the import and select “substitute missing members”.



.MIS File Creation Dialog Box

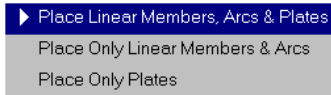


Substitution Option Button

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ACE Steel Detailing Neutral File Import Program (con'd)

A second feature allows the importation of linear & arc members and plates, only linear members & arcs or only plates. Thus, if a fabricator supplies a SDNF file with gusset plate information, this data can be read separately. Another use for this option is to put linear & arc members (FWP members) and plates (FWP solids) into separate models.



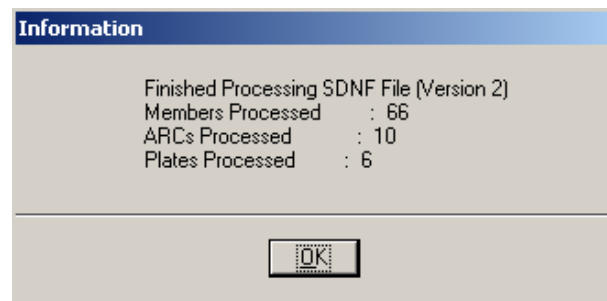
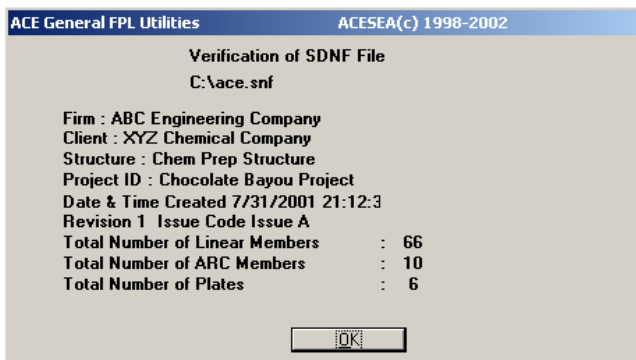
Placement Option Button

The last feature involves naming of linear members & plates. Three naming options are available. First the linear member & plate name specified in the SDNF file may be utilized (default option). However two additional naming options exist. In the second option, new names can be generated at placement time. Under this option, all components for a given member type (member or plate) are given the a name by concatenating a sequence number to a prefix (i.e. mem or pla). Finally, FrameWorks normal naming for individual components (autoname) may be specified.



Naming Option Button

When the verify mode is invoked, the verify dialog box shown below left will appear.



If the file is processed the import information dialog box shown above right will appear.

The SDNF import application can be extremely useful in converting structural models from one modeling system to another. Models from any 3D modeling system that writes SDNF format files can be translated to FrameWorks. The process is simple, first using the original CAD application write a SDNF file and then utilizing this application import the SDNF file into a FrameWorks model. The subsequent FrameWorks models can be used for interference checking, design review or drawing generation.

LOG FILES

All applications can write log files if the environment variable ACE_DUMP is set to 1. There have been reports that some sites lock the C root drive and under certain conditions a locked C drive can cause a system fault 5.

This application will produce a log file (default c:\ace_snf.log)which will contain: Packet 00 information, information on linear members placed, information on plate elements placed, error information and summary placement information. This particular application will ALWAYS WRITE to a log file. This application WILL FAIL with a locked C drive. The environment variable ACE_LOG_PATH must be utilized for this application if the C drive is locked.

All applications have been modified to warn of a locked drive/file and then gracefully exit. All applications now look for the environment variable ACE_LOG_PATH. If it is found, that is the directory where the log files will be placed. If the directory is locked or non-existent or if file is locked a warning will be given and the C drive will be tried. If it is locked or the file is locked a warning will be given and application will gracefully exit.

Usage of the variable ACE_LOG_PATH to control log file locations is similar to ACE_DEF_PATH to control DEF files. However there is one very important difference: ACE_LOG_PATH should NEVER point to a network drive (this is highly recommended for ACE_DEF_PATH). Everyone writes to the same named log file and if they are on a network drive there will be bad consequences. ALWAYS point ACE_LOG_PATH to a local drive (perhaps a temp off C root).

ACE Steel Detailing Neutral File Import Documentation

Special Notes and Limitations on SDNF File Processing

General Handling of SDNF (version 2) File Packets

The SDNF format (version 2) supports 7 packet types which are: PACKET 00 - General Project Information; PACKET 10 - Linear members & Load Case/Combination definitions; PACKET 20 - Solid Plates; PACKET 30 - Linear Member Loads; PACKET 40 - Details; PACKET 50 - Grid definitions and PACKET 60 - Arc Members. This application handles the packets as follows. PACKET 00 - Information processed is displayed and written out into the program log file. PACKET 10 - Linear member information is read and linear members are placed. Load cases & combinations are presently ignored. PACKET 20 - plate information is read and solid elements representing the plates are placed as FrameWorks solids. PACKET 30 - Member load information is currently ignored. This information could be placed into the model however ACESEA did not feel this would be significant. If the load information is significant to your organization please contact ACESEA. PACKET 40 - Connection detail information is ignored, as there is not a suitable way to utilize it. PACKET 50 - Grid information is ignored, as unfortunately FrameWorks does not presently provide FPL functions to create grids. PACKET 60 - Arc member information is read and arc members are placed.

Plate Orientation Convention

Plate orientation is handled by the variable “Connect Point” on plate record 1 of Packet 20 (see page 8). If this variable is 0 the plate is centered about the specified plate shape vertices. Centered definition is preferred as there is no chance for orientation confusion. A positive value of 1 indicates that the shape is on the positive face and a negative value of -1 indicates that the shape is on the negative face.

This application interprets this definition as follows. A normal vector is determined by the following procedure:

1. Create vector 1 from plate vertices 0 to plate vertices 1
2. Create vector 2 from plate vertices 0 to plate vertices 2
3. Compute normal vector as the cross product of vector 1 and vector 2.

If the shape is centered, then the plate vertices will be projected one half the plate thickness to both the positive and negative side of the normal vector. If the shape is on the positive face, the solid is created by projecting the shape in a negative normal vector direction equal to the plate thickness. Conversely, if the shape is on the negative face, the solid is created by projecting the shape in a positive normal vector direction equal to the plate thickness. It is possible that different applications will interpret -1 and 1 connect points differently. If this application interprets the connect point in the wrong direction, set the environment variable ACESDNFRev to 1 and the opposite interpretation will be utilized. When reverse is active an R symbol will appear on the primary dialog box next to the placement option button.

FrameWorks and ACE Extensions

For tapered members, FrameWorks writes the section size as “W8X24>W8X31”. This is not a part of the original specification. This application looks at section size definition and if a “>” is found the member is treated as a tapered section.

Type handling is not clear in the original specification. This application handles type for linear members as follows: “column” is column, “beam” is beam, “brace” or “vbrace” is vertical brace and anything else is a horizontal brace. For plates all elements irrespective of type specification are placed as solid elements.

SDNF version 3 Files

FrameWorks Plus can write either SDNF version2 files or SDNF version 3 files (FWP 7.1.x.x & later). This application WILL NOT import SDNF version 3 files (Intergraph provides software that will import SDNF version 3 files). The ACE FrameWorks Utility “Convert SDNF v3 File to SDNF v2 File” will create a SDNF version 2 file that this utility will import. In creating the SDNF version 2 file ALL version 3 extensions are removed (see documentation for the Convert SDNF v3 File to SDNF v2 File).

ACE Steel Detailing Neutral File Import Documentation

Missing Section File

As previously mentioned, an option is given to produce a “missing file” if section profiles are not found in active FrameWorks section libraries (both project and user) when verify or place is invoked. The generated file’s name is user specified with a .MIS extension. The file contains a record for each missing section. Each record contains the name of the section profile in quotes and the number of instances. A sample file is shown below:

Sample .MIS File

“WF8X31” 5 instances
“Wf10X30” 1 instances
“WF6X20” 8 instances
“MY Shape” 7 instances

Section Substitution File

A section substitution file may be specified. A lookup dialog box is utilized to located section substitution files. Section substitution files have a .SEC extension. A .MIS file can be very easily edited to become a section substitution file. The initial search directory for the substitution file (.SEC file) can be specified with the following environment variable: ACE_SEC_FILE (such as: ACE_SEC_FILE=f:/subst_files/)

The section substitution file specifies old shape and new shape to be substituted on a record. There is no limit to the number of substitutions (records) that may be contained in a file. Capitalization is not important as strings for member profile shapes are compared without regard to capitalization. Thus a single record in a section substitution file would look as follows:

“old profile name” “new profile name”

where

Each profile name must be contained in quotes

A profile name may have embedded spaces

Capitalization is not important

A minimum of at least one space must separate the old and new profiles

Each record in the file is a single substitution

No limit to the number of records in the file

Sample .SEC File

“WF8X31” “W8X31”
“WF6x20” “w6x20”
“Wf10x30” “w10X30”
“MY Shape” “My New Shape”

SDNF Files

The SDNF Import application will by default look for *.SNF files in the c:\ directory. A lookup dialog box is utilized to located section substitution files. Note that SDNF files have a .SNF extension. The initial search directory for the SDNF file (.SNF file) can be specified with the following environment variable:

ACE_SDNF_FILE (such as: ACE_SDNF_FILE=f:/sdnf_files/). The following section provides the specification for version 2 SDNF files.

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Steel Detailing Neutral File Specification – Version 2

General:

The file will be an ASCII (text) file of sequential organization. Maximum record length is 132 characters. All records (except the fixed-format Packet identification records) are free formatted, with fields delimited by white space (blanks). Coordinate values are in the global Cartesian (X, Y, Z) system.

NOTE: The Steel Detailing Neutral File was generated and is maintained by Intergraph. The SDNF file originated with the Modeldraft product with input from the SESIG Steering Committee. SDNF export is incorporated into FrameWorks and additional information can be found in the FrameWorks reference manuals and online help.

Format Specifiers:

- FP** - ASCII Floating value, e.g. "12.15" or "1" (decimal optional)
- I** - ASCII Integer value, e.g. "5" (range of value: +/- 2billion)
- Cnn** - ASCII character value of 'nn' characters maximum
e.g., C10 - up to 10 ASCII characters including blanks
character strings must be enclosed in double quotes ("example string")
- fixed** - record must have exact content shown in example

With the exception of the fixed format records, the data may start in any column of the record. An example record follows each record format description, and is shown in *italics*.

Comment Cards:

Comment cards may be inserted anywhere in the input file, provided that the record begin with the "#" character in the first field.

Format: #comment
This is a comment record

Notes on Member ID & Plate ID

When FrameWorks write a member ID or plate ID, the format: XXXZZZZZ is utilized.

where:

XXX is the model ID
ZZZZZ is the member ID

When a member is placed using FPL, there is no control over the member or model ID. Thus the member & plate ID's are reference values only and not utilized by this application.

ACE Steel Detailing Neutral File Import Documentation

Steel Detailing Neutral File Specification – Version 2 (con'd)

Title Packet (PACKET 00) :

This packet must be the first in the file.

Record 1: Packet Header

Format: fixed

Packet 00

Record 2: Engineering Firm Identification

Format: C80

"Name of Engineering Firm"

Record 3: Client Identification

Format: C80

"Name of Client"

Record 4: Structure ID

Format: C80

"Name of Structure"

Record 5: Project ID

Format: C80

"Name of Project"

Record 6: Date, Time of file creation

Format: C30; C30

"11/19/91" "13:12"

Record 7: Revision Number, Issue Code

Format: I; C64

18 "Issue Code"

Record 8: Design Code

Format: C80

"Design Code Name"

Record 9: Number of Loading Records

Format: I

2

Record 10 on: 'n' Load Combination record, where 'n' is from Record 9

Loading #, Loading type (0=load case, 1= load combination), Description

Format: I; I; C64

1 1 "Live and Wind loads"

ACE Steel Detailing Neutral File Import Documentation

Steel Detailing Neutral File Specification – Version 2 (con'd)

Linear Member Packet (PACKET 10) :

Record 1: Packet Header
Format: fixed
Packet 10

Record 2: Linear units, number of linear members
Format: C24; 1
"feet" 376

Record 3 on:
Each linear member is represented by 6 records which follow:
(total of 6*n records, where 'n' is number of members from Record 2 above)

Linear Member Record 1:
Member ID, Cardinal Point, Status, Class, Type, Piece Mark,
Revision Number
Format: I; I; I; I; C24; C24; I
00100040 8 0 1 "Beam" "B_101_FL1" 14

Linear Member Record 2:
Section Size, Grade, Rotation, Mirror X axis, Mirror Y axis
Format: C32; C24: FP, I, I
W12x50" "A36" 90.0 0 0

Linear Member Record 3:
Orientation Vector; Start, End Coordinates; Start, End Cutbacks
Format: 3 FP; 3 FP; 3 FP; 2 FP
0 0 1.0 10 0 72.75 10 12.5 72.75 0 0

Linear Member Record 4:
X, Y Cross-section offsets
Format: 2FP
0 -.25

Linear Member Record 5:
X, Y, Z Offsets Start; X, Y, Z Offsets End
Format: 6 FP
0 0 0 0 0 -1.0

Linear member Record 6:
Releases - End 1 Tx, Ty, Tz, Rx, Ry, Rz; End 2 Tx, Ty, Tz, Rx, Ry, Rz
Format: 12 I
0 0 0 0 1 1 0 0 0 0 1 1

ACE Steel Detailing Neutral File Import Documentation

Steel Detailing Neutral File Specification – Version 2 (con'd)

Plate Element Packet (PACKET 20) :

Record 1: Packet Header

Format: fixed

Packet 20

Record 2: linear units, thickness units, number of plates

Format: C24; C24; I

"feet" "inches" 121

Record 3 on:

Each plate is represented by a variable number of records which follow:

Plate Record 1: Plate ID, Connect Point, Status, Class, Type

Format: I; I; I; I; C24

02600005 1 0 1 "slab"

Note: Connect point refers to plate position relative to the plane defined by plate coordinates.

Connect point:

0 = *by center*

1 = *positive face*

-1 = *negative face*

Plate Record 2: Piece Mark, Grade, thickness, number of vertices

Format: C24; C24; FP; I

"Plate GP_78" "A36" 1.125 6

The plate geometry is represented on 'n' records, where 'n' is the number of vertices from Plate Record 2 above. Each record contains the X, Y, Z coordinates of a vertex.

Plate Geometry Record: X, Y, Z coordinates

Format: 3FP

22.763 8.475 10

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Steel Detailing Neutral File Specification – Version 2 (con'd)

Member Loads Packet (PACKET 30) :

Record 1: Packet Header

Format: fixed

Packet 30

Record 2: linear units, force units, number of loaded members

Format: C24; C24; I

"feet" "kips" 140

Record 3 on:

Each member loading is represented by a variable number of records which follow:

Member Loading Record 1:

Member ID, Number or loadings (for this member)

Format: I; I

00100040 3

The loads for each member are represented on '3*n' records which follow, where 'n' is the number of loadings from Member Loading Record 1 above.

Load Record 1: Loading number, Description

Format: I; C64

1 "Equipment loads"

Load Record 2: Member Forces - Start (end 1)

Format: 6 FP (Axial Force, Shear Y, Shear Z, Moment Y, Moment Z, Torsion)

-3.762 14.8 4.1 .03 -77.23 3.17

Load Record 3: Member Forces - End (end 2)

Format: 6FP (Axial Force, Shear Y, Shear Z, Moment Y, Moment Z, Torsion)

-3.762 11.3 -8.334 5.4 -14.7 8.64

Note: Member ends are defined by the order of coordinates in Packet 10.

ACE Steel Detailing Neutral File Import Documentation

Steel Detailing Neutral File Specification – Version 2 (con'd)

Connection Details Packet (PACKET 40) :

Record 1: Packet Header

Format: fixed

Packet 40

Record 2: number of connection details

Format: I

628

Record 3 on:

Each connection detail is represented by a record as follows:

Connection Record: Detail Number, Member number, Member End #

(1 = Start, 2 = End), Connection Detail

Format: I; I; I; C50

177 14 1 "End 1 detail information"

Grid Packet (PACKET 50) :

Record 1: Packet Header Format:

Format: Fixed

Packet 50

Record 2: Number of grid sets or floor levels

Format: I

6

Record 3 on:

Each grid set is represented by a variable number of records which follow:

Grid set record 1:

Grid set number, number of grid lines, grid set description

Format: I,I, C64

1 4 "TOS El 108'-0"

Grid set record 2 through number of grids in set:

Grid label, start coordinates, end coordinates

Format C64, 6 FP

1 -1711.0 -2480.0 108.0 -1711.0 -2495.0 108.0

2 -1702.0 -2480.0 108.0 -1702.0 -2495.0 108.0

A -1711.0 -2480.0 108.0 -1702.0 -2480.0 108.0

B -1711.0 -2495.0 108.0 -1702.0 -2495.0 108.0

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Steel Detailing Neutral File Specification – Version 2 (con'd)

Arc Member Packet (PACKET 60) :

Record 1: Packet Header

Format: fixed

Packet 10

Record 2: Linear units, number of linear members

Format: C24; 1

"feet" 376

Record 3 on:

Each arc member is represented by 7 records which follow:

(total of 7*n records, where 'n' is number of members from Record 2 above)

Arc Member Record 1:

Member ID, Cardinal Point, Status, Class, Type, Piece Mark,
Revision Number

Format: I; I; I; I; C24; C24; I

02600121 8 0 0 "beam(Arc)" "B_3" 1

Arc Member Record 2:

Section Size, Grade, Rotation, Mirror X axis, Mirror Y axis

Format: C32; C24: FP, I, I

"W8X24 > W8X31" "A36" 0.000000 0 0

Arc Member Record 3:

Arc center point; Start angle, Sweep, Arc plane normal vector

Format: 3 FP; 1 FP; 1 FP; 3 FP

20.0 50.19 51.34 0.0 75.93 -1.0 0.0 -0.0

Arc Member Record 4:

Orientation Vector; Start, End Coordinates; Start, End Cutbacks

Format: 3 FP; 3 FP; 3 FP; 2 FP

0.0 0.0 1.0 20.0 50.0 61.5 20.0 60.0 54.0 0.0 0.0

Arc Member Record 5:

X, Y Cross-section offsets

Format: 2FP

0 0

Arc Member Record 6:

X, Y, Z Offsets Start; X, Y, Z Offsets End

Format: 6 FP

0 0 0 0 0 0

Arc member Record 7:

Releases - End 1 Tx, Ty, Tz, Rx, Ry, Rz; End 2 Tx, Ty, Tz, Rx, Ry, Rz

Format: 12 I

0 0 0 0 0 0 0 0 0 0 0 0

ACE Steel Detailing Neutral File Import Documentation

Sample SDNF File (partial file)

```
Packet 00
"ABC Engineering Company"
"XYZ Chemical Company"
"Chem Prep Structure"
"Chocolate Bayou Project"
"1/24/2000" "21:12:35"
01 "Issue A"
"AISC"
0
Packet 10
"feet" 66
00100040 5 0 0 "column" "C_7" 1
"W14X90" "A36" 90.000000 0 0
1.000000 0.000000 0.000000 35.000000 20.000000 0.000000 35.000000 20.000000 18.000000 0.000000 0.000000
0.000000 0.000000
0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
0 0 0 0 0 0 0 0 0 0 0 0
00100041 5 0 1 "column" "C_8" 1
"W14X82" "A36" 90.000000 0 0
1.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.000000 18.000000 0.000000 0.000000
0.000000 0.000000
0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
0 0 0 0 0 0 0 0 0 0 0 0
00100042 5 0 2 "column" "C_9" 1
...
removed remaining 64 linear members
...
Packet 20
"Feet" "Feet" 6
02600005 0 0 6 "slab"
"BP-00005" "A36" 0.083333 5
35.500000 40.500000 -0.041667
35.500000 39.500000 -0.041667
34.500000 39.500000 -0.041667
34.500000 40.500000 -0.041667
35.500000 40.500000 -0.041667
02600006 0 0 6 "slab"
"BP-00006" "A36" 0.083333 5
35.500000 60.500000 -0.041667
35.500000 59.500000 -0.041667
34.500000 59.500000 -0.041667
34.500000 60.500000 -0.041667
35.500000 60.500000 -0.041667
...
removed remaining 4 plates
...
Packet 60
"feet" 10
02600121 8 0 0 "beam(Arc)" "B_3" 1
"W8X24 > W8X31" "A36" 0.000000 0 0
20.000000 50.194767 51.343023 0.000000 75.936903 -1.000000 0.000000 -0.000000
0.000000 0.000000 1.000000 20.000000 50.000000 61.500000 20.000000 60.000000 54.000000 0.000000 0.000000
0.000000 0.000000
0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
0 0 0 0 0 0 0 0 0 0 0 0
02600122 8 0 0 "beam(Arc)" "B_2" 1
"W8X31 > W8X24" "A36" 0.000000 0 0
20.000000 49.805234 51.343021 0.000000 75.936886 -1.000000 0.000000 0.000000
0.000000 0.000000 1.000000 20.000000 40.000000 54.000000 20.000000 50.000000 61.500000 0.000000 0.000000
0.000000 0.000000
0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
0 0 0 0 0 0 0 0 0 0 0 0
...
removed remaining 8 arc members
...
```