Analysis of STEP-Export in Plant3D (Version 2015)

Explanation of the SNDF-Format (Packet 10):

Example of a SDNF-File exported by AutoCAD Plant3D:

TEST.sdnf

```
1  #*****************************************************
2  #*                                                   *
3  #*    SDNF VERSION 2.0                               *
4  #*                                                   *
5  #*    COMPANY: Autodesk Software                     *
6  #*                                                   *
7  #*****************************************************
8  #
9  Packet 00
10 "Name des Ingenieurbüros"
11 "Name des Kunden"
12 "Name der Struktur"
13 "Name des Projekts"
14 "02/15/16" "13:51"
15 1 "Problemcode"
16 "Designcode"
17 0
18 #
19 Packet 10
20 "millimeters" 1
21 1 5 0 0 "beam" "" 1
22 "HEA100" "St 37-2" 0.000000 0 0
23 0.000000 0.000000 1.000000 1000.000000 0.000000 0.000000 0.000000 0.000000 0.000000 -121.671689 -69.310894
24 0.000000 0.000000
25 50.000000 0.000000 -48.000000 50.000000 0.000000 -48.000000
26 0 0 0 0 0 0 0 0 0 0 0 0
27 #
28 #############
29 # Packet 20 #
```

Explanation of line 20:

```
20  "millimeters" 1
```

Linear units | Number of linear members

Explanation of line 21:

```
21  1 5 0 0 "beam" "" 1
```

Member number | Cardinal Point (Point of origin of the cross-section of the member buy using the numblock of a keybord) | Status | Class | Type | Piece Mark | Revision Number

Attention: The cardinal point seems to work different than in Plant3D. The line of sight is from endpoint to startpoint!

Explanation of line 22:

```
22  "HEA100" "St 37-2" 0.000000 0 0
```

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

Explanation of line 23:

```
23  0.000000 0.000000 1.000000 1000.000000 0.000000 0.000000 0.000000 0.000000 0.000000 -121.671689 -69.310894
```

Siegfried Schachinger
Schatz GmbH
http://www.tbschatz.at

Orientation Vector (X | Y | Z) | Start Coordinates (X | Y | Z) | End Coordinates (X | Y | Z) | Value of Backcut (Startpoint) | Value of Backcut (Endpoint)

Explanation of line 24:

```
24  0.000000 0.000000
```

Cross-section offset X | Cross-section offset Y

Explanation of line 25:

```
25  50.000000 0.000000 -48.000000 50.000000 0.000000 -48.000000
```

Offset Startpoint (X | Y | Z) | Offset Endpoint (X | Y | Z)

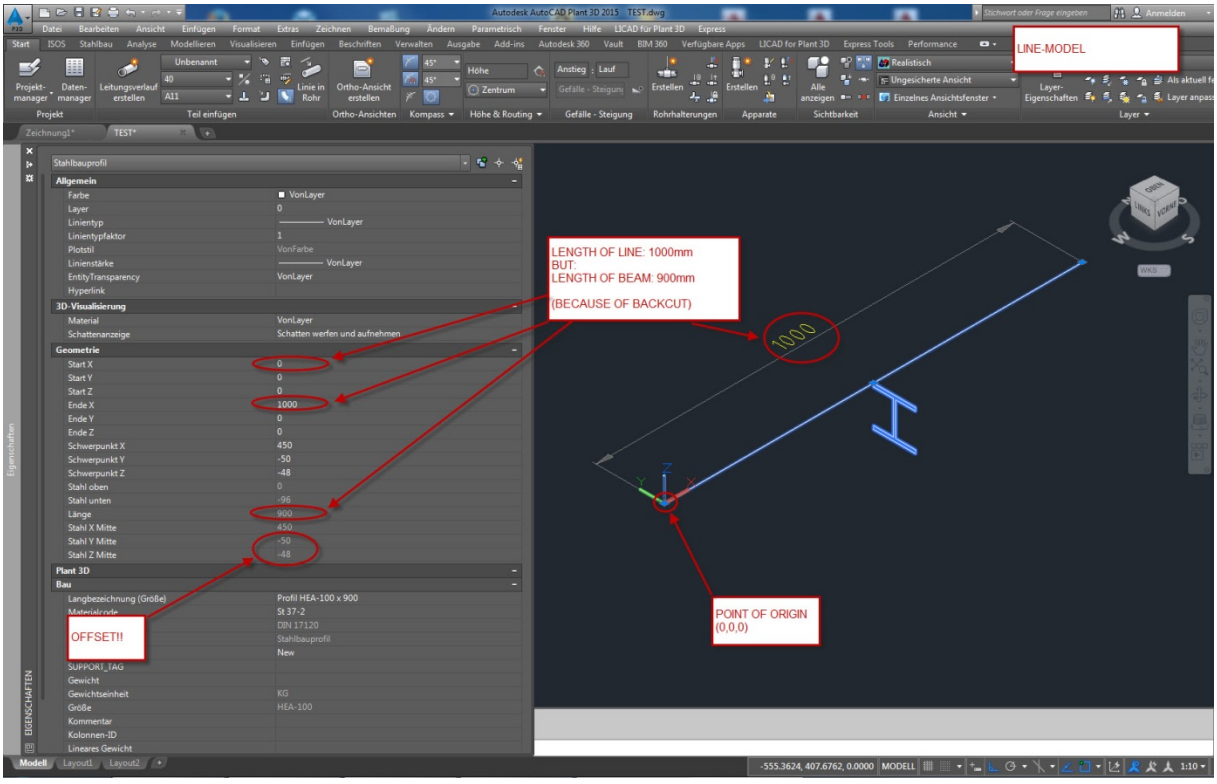
Explanation of line 26:

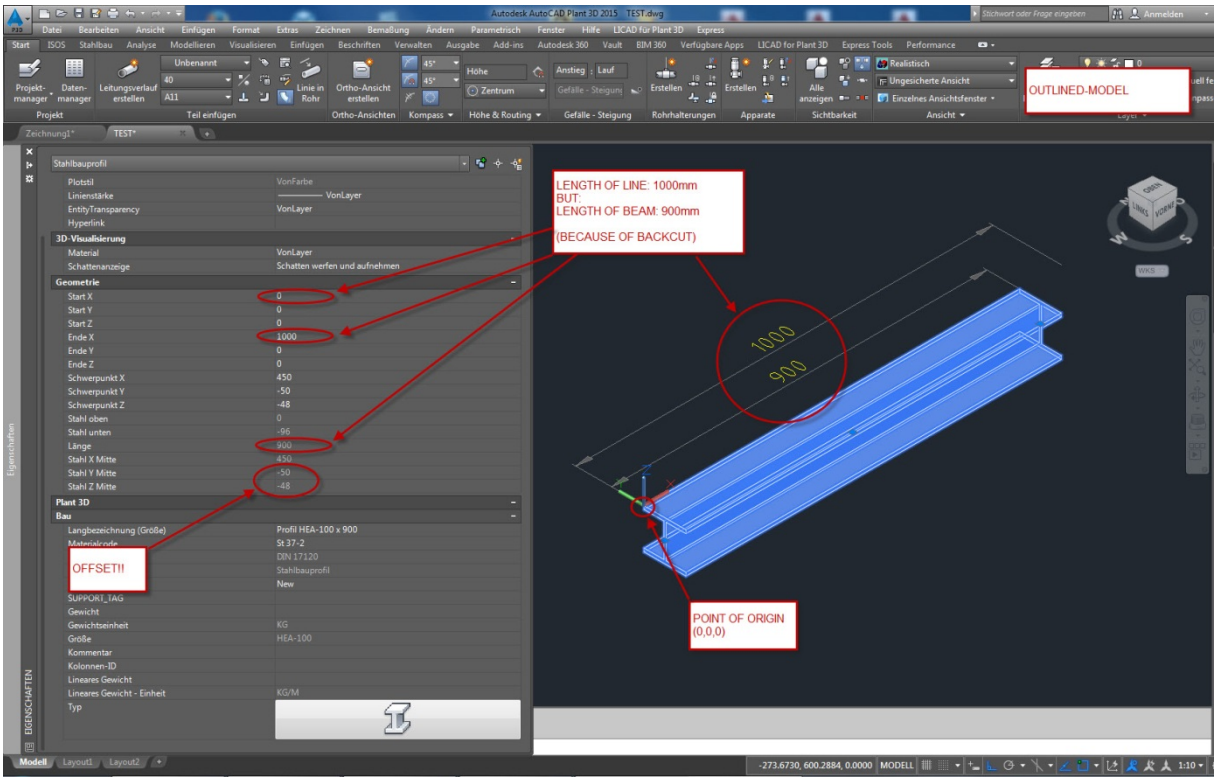
```
26  0 0 0 0 0 0 0 0 0 0 0 0
```

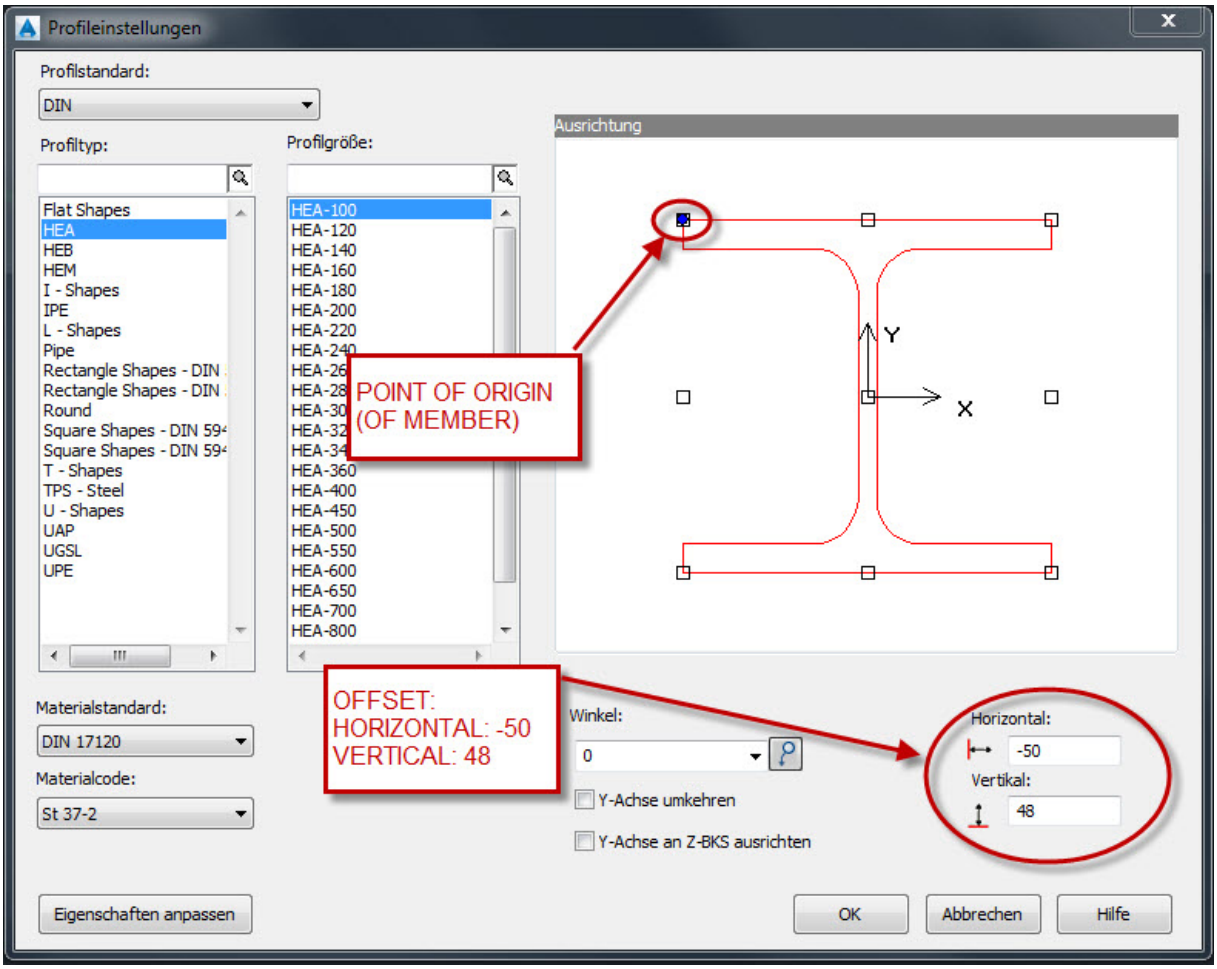
Releases of Startpoint (Tx | Ty | Tz | Rx | Ry | Rz) | Releases of Endpoint (Tx | Ty | Tz | Rx | Ry | Rz)

Which model was used for testing the generated SNDF-File?

For this test we have generated one beam in Plant3D. The length of the beam (line-model) is 1000mm. In the outlined model one side of the beam has been shortened 100mm. Also the point of origin (of the beam) has been moved to the upper left corner. Following some pictures regarding the test-file:




OUTLINED-MODEL
LENGTH OF LINE: 1000mm
BUT:
LENGTH OF BEAM: 900mm
(BECAUSE OF BACKCUT)
1000
900
OFFSET!!
POINT OF ORIGIN
(0,0,0)

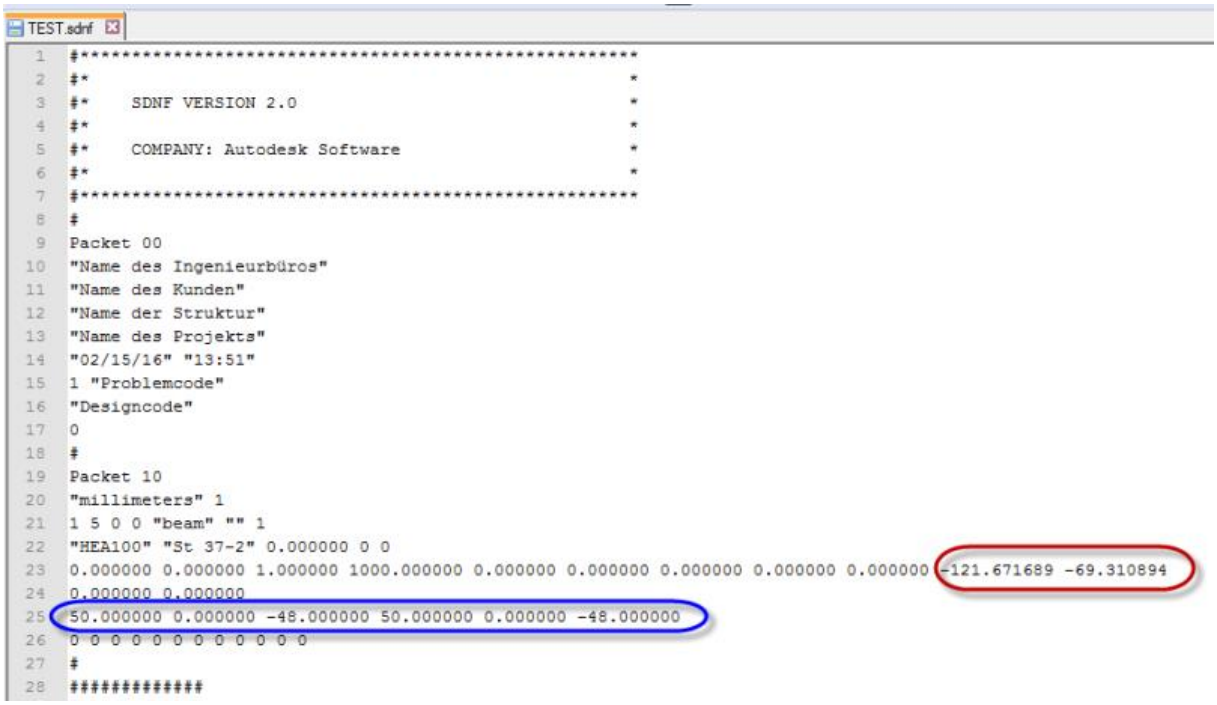

Profileinstellungen
Profilstandard:
DIN
Profiltyp:
Profilgröße:
Flat Shapes
HEA
HEB
HEM
I - Shapes
IPE
L - Shapes
Pipe
Rectangle Shapes - DIN
Rectangle Shapes - DIN
Round
Square Shapes - DIN 59
Square Shapes - DIN 59
T - Shapes
TPS - Steel
U - Shapes
UAP
UGSL
UPE
HEA-100
HEA-120
HEA-140
HEA-160
HEA-180
HEA-200
HEA-220
HEA-240
HEA-26
HEA-28
HEA-30
HEA-32
HEA-34
HEA-360
HEA-400
HEA-450
HEA-500
HEA-550
HEA-600
HEA-650
HEA-700
HEA-800
Ausrichtung
POINT OF ORIGIN
(OF MEMBER)
Y
X
Materialstandard:
DIN 17120
Materialcode:
St 37-2
OFFSET:
HORIZONTAL: -50
VERTICAL: 48
Winkel:
0
Y-Achse umkehren
Y-Achse an Z-BKS ausrichten
Horizontal:
-50
Vertikal:
48
Eigenschaften anpassen
OK
Abbrechen
Hilfe

SNDF-File “TEST.sdnf” (Output of Plant3D):

This file is the output of Plant3D without any manual corrections or adaptations.

The red marked values cannot be correct. Those values should indicate the backcut of the start- and of the endpoint and therefore they should be “-100” and “0”. Also most of the other programs that deal with SDNF-files cannot handle backcuts.

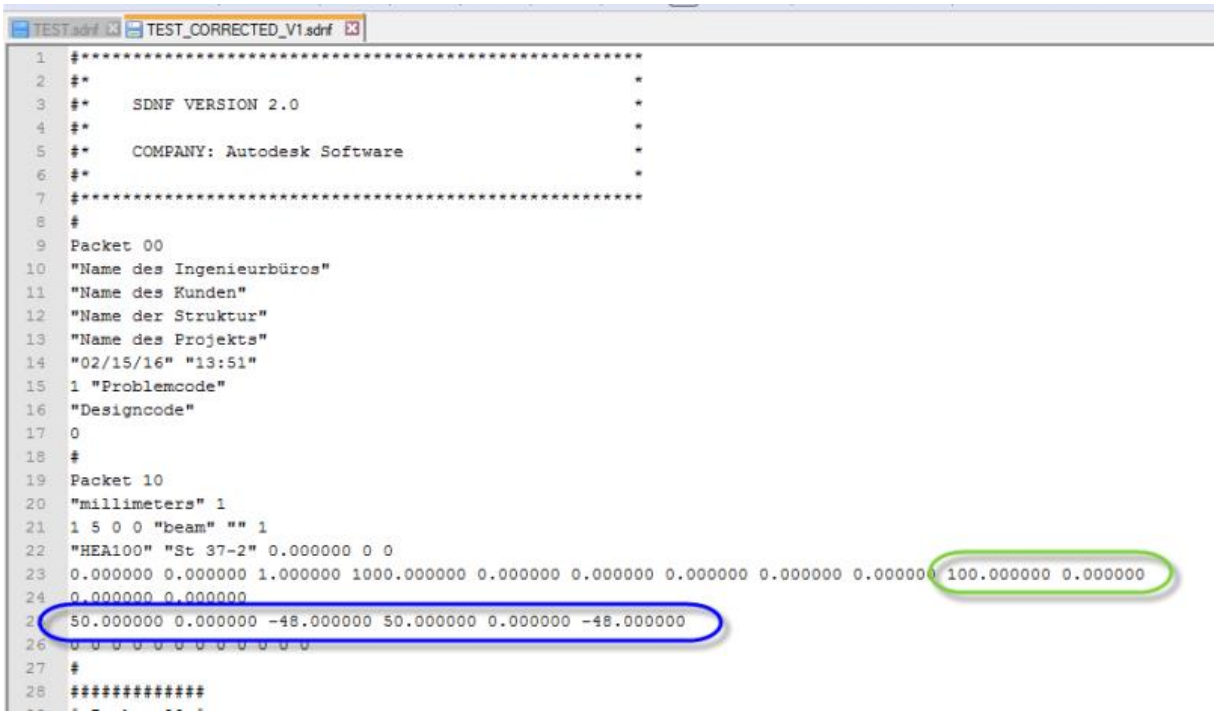
The blue marked line stands for the offset of the start-point resp. of the end-point. They seem to be ok. But also: Most of the other programs that deal with SND-files cannot handle offsets.



Thus we have tried to adapt the SNDF-file in that way that it can be used for all other programs that import/export SNDF-files.

SNDF-File “TEST_CORRECTED_V1”:

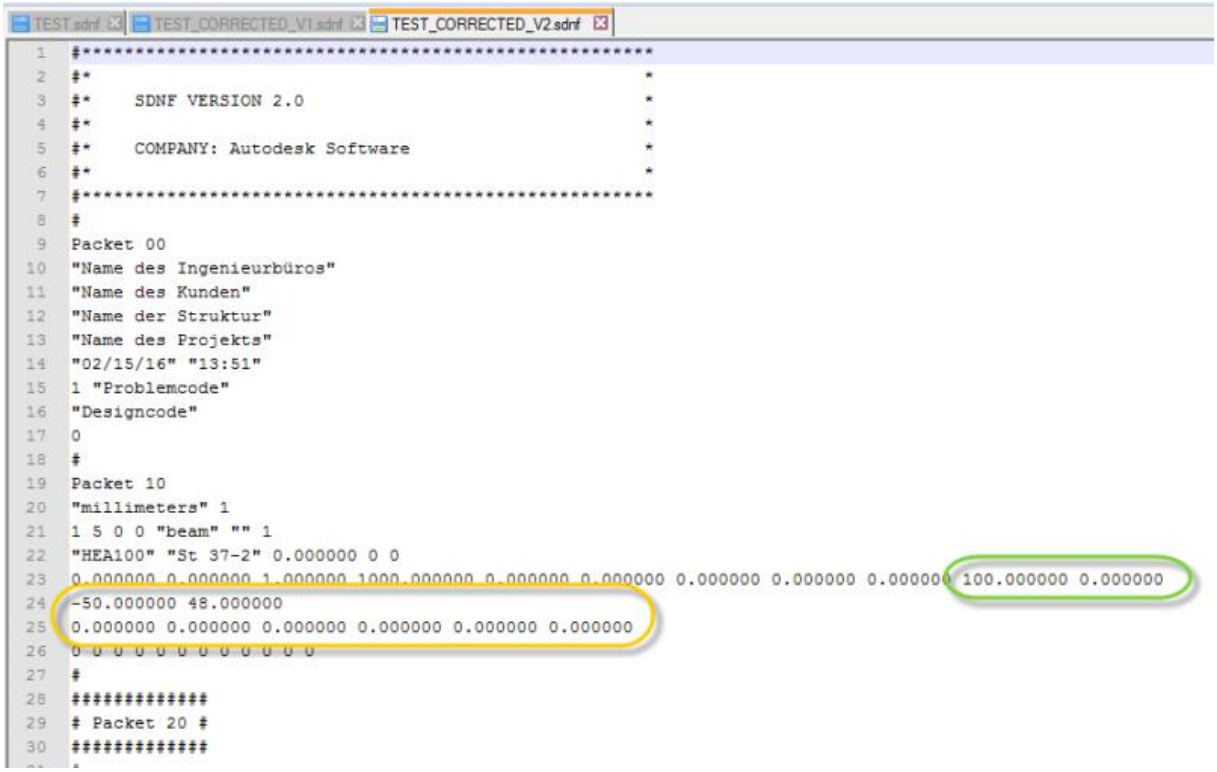
Only the green marked backcuts have been modified.



```
#*******************************************************
#*                                                     *
#*    SDNF VERSION 2.0                                 *
#*                                                     *
#*    COMPANY: Autodesk Software                       *
#*                                                     *
#*******************************************************
#
Packet 00
"Name des Ingenieurbüros"
"Name des Kunden"
"Name der Struktur"
"Name des Projekts"
"02/15/16" "13:51"
1 "Problemcode"
"Designcode"
0
#
Packet 10
"millimeters" 1
1 5 0 0 "beam" "" 1
"HEA100" "St 37-2" 0.000000 0 0
0.000000 0.000000 1.000000 1000.000000 0.000000 0.000000 0.000000 0.000000 0.000000 100.000000 0.000000
0.000000 0.000000
50.000000 0.000000 -48.000000 50.000000 0.000000 -48.000000
0 0 0 0 0 0 0 0 0 0 0
#
##############
```

SNDF-File “TEST_CORRECTED_V2”:

Additional the yellow marked offset have been modified from “offset of start- and end-point” to “cross section offset”



```
#*******************************************************
#*                                                     *
#*    SDNF VERSION 2.0                                 *
#*                                                     *
#*    COMPANY: Autodesk Software                       *
#*                                                     *
#*******************************************************
#
Packet 00
"Name des Ingenieurbüros"
"Name des Kunden"
"Name der Struktur"
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"02/15/16" "13:51"
1 "Problemcode"
"Designcode"
0
#
Packet 10
"millimeters" 1
1 5 0 0 "beam" "" 1
"HEA100" "St 37-2" 0.000000 0 0
0.000000 0.000000 1.000000 1000.000000 0.000000 0.000000 0.000000 0.000000 0.000000 100.000000 0.000000
-50.000000 48.000000
0.000000 0.000000 0.000000 0.000000 0.000000 0.000000
0 0 0 0 0 0 0 0 0 0 0
#
##############
# Packet 20 #
##############
```
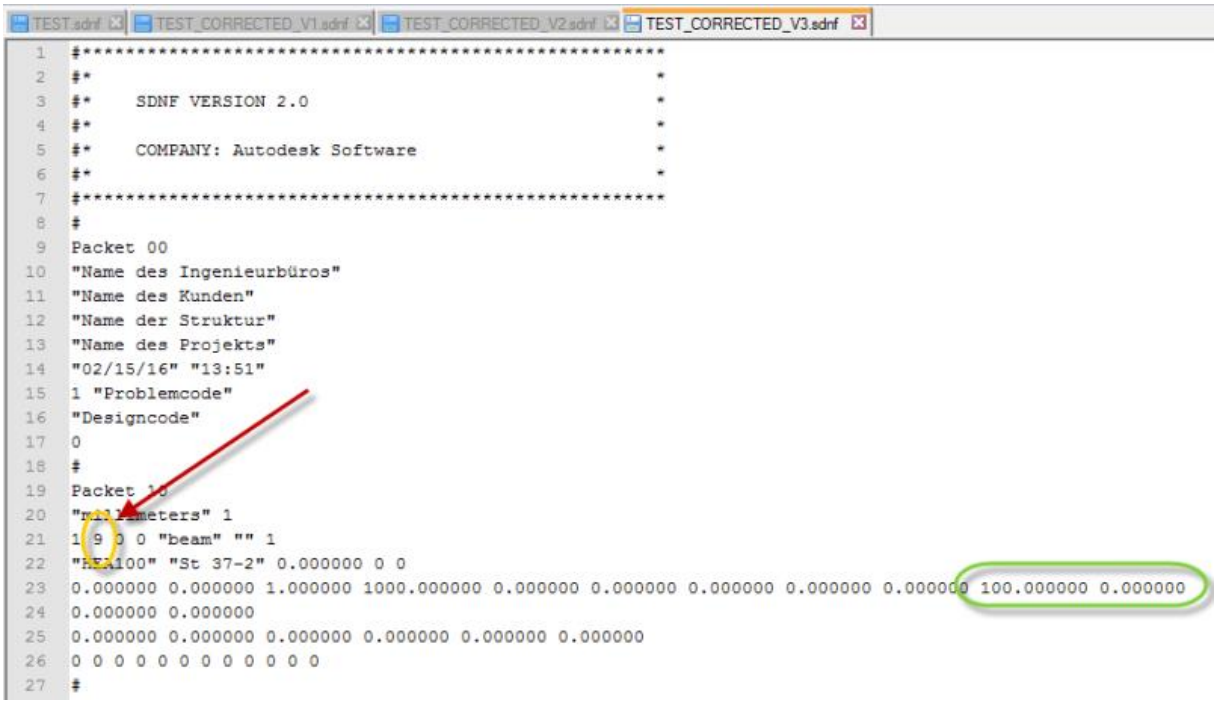
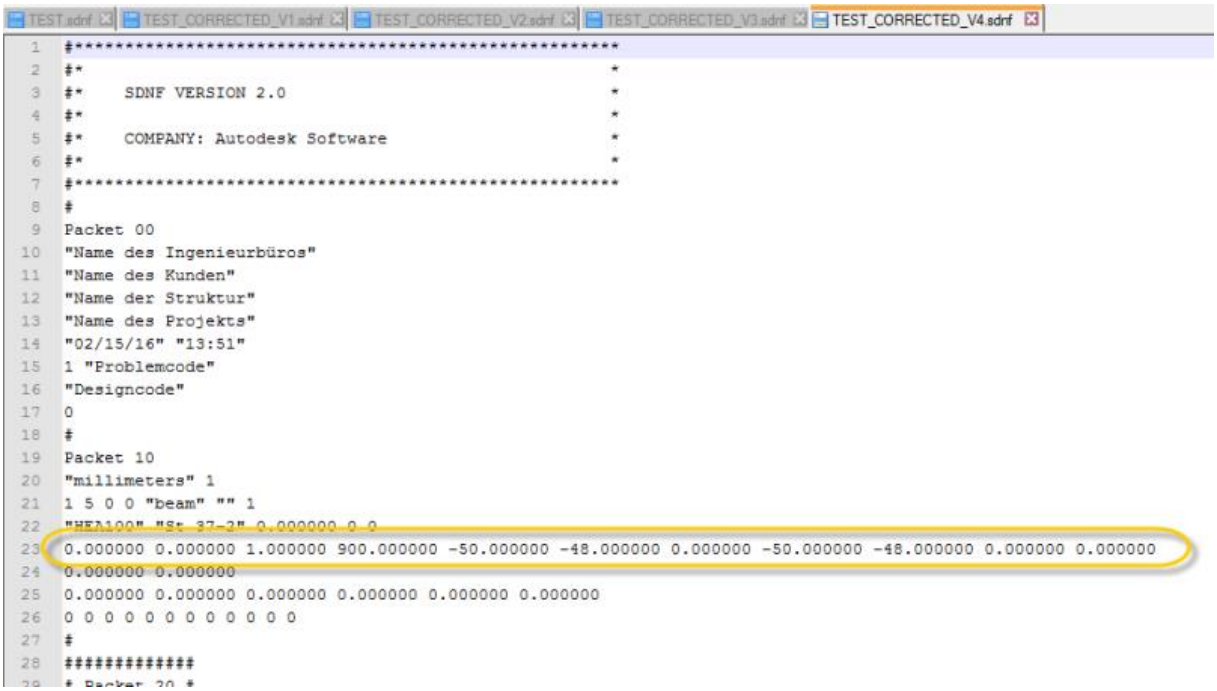

SNDF-File “TEST_CORRECTED_V3”:

The offset from version V2 has been deleted and the cardinal point has been set to 5 (from center to upper right corner)



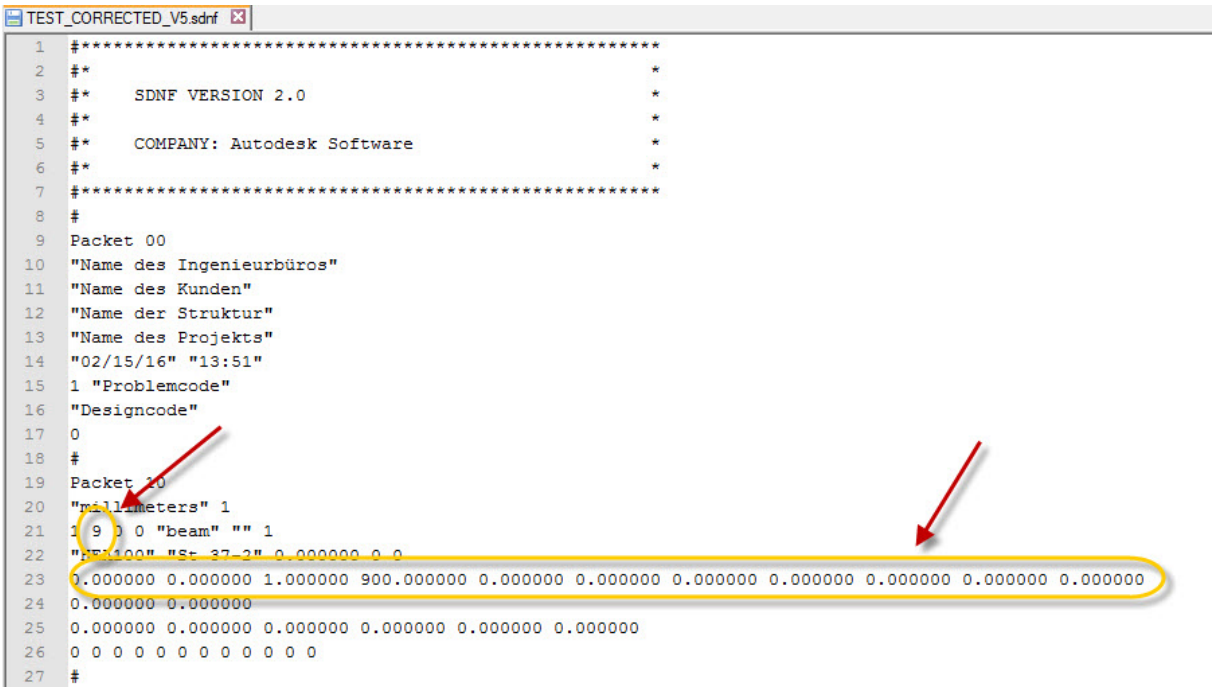
SNDF-File “TEST_CORRECTED_V4”:

Offsets and backcuts have been deleted completely. Therefore the coordinates of start and endpoint have been modified manually. Disadvantage of this version is that the alignment of the steel member cannot be transported to the target-program.



SNDF-File “TEST_CORRECTED_V5”:

The backcuts have been included to the start- and end-point of the member. The offset has been implemented by modifying the cardinal point to 9 (upper right corner).



Which program can deal with the different versions of the SNDF-file?

We have checked the different versions with the following programs:

- AVEVA PDMS (engineering software / plant design software)
- SCIA ENGINEER (structural analysis of steelworks)
- RSTAB (structural analysis of steelworks)

These are the results:

	AVEVA PDMS	SCIA ENGINEER	RSTAB
TEST.sndf	FAULT	FAULT	FAULT
TEST_CORRECTED_V1.sndf	FAULT	FAULT	FAULT
TEST_CORRECTED_V2.sndf	FAULT	FAULT	FAULT
TEST_CORRECTED_V3.sndf	OK	FAULT	FAULT
TEST_CORRECTED_V4.sndf	OK	OK	OK
TEST_CORRECTED_V5.sndf	OK	OK	OK