CNC :DSTV & Pipe profiling

Aaron Leacock

CNC

- Overview of DSTV file
- Example of a File
- Common setup options
- Scribing options
- Tips and tricks
- DSTV Viewers
- DXF plate (Punch overrun)
- Pipe profiling download

CNC

- All CNC information is downloaded from the 3D model's solids.
  - The model has to be as accurate as you want the CNC files to be generated.
- Setup allows you to get files for your specific needs.
  - Some machines can scribe, some can't or it is not wanted in the CNC download, etc.

DSTV

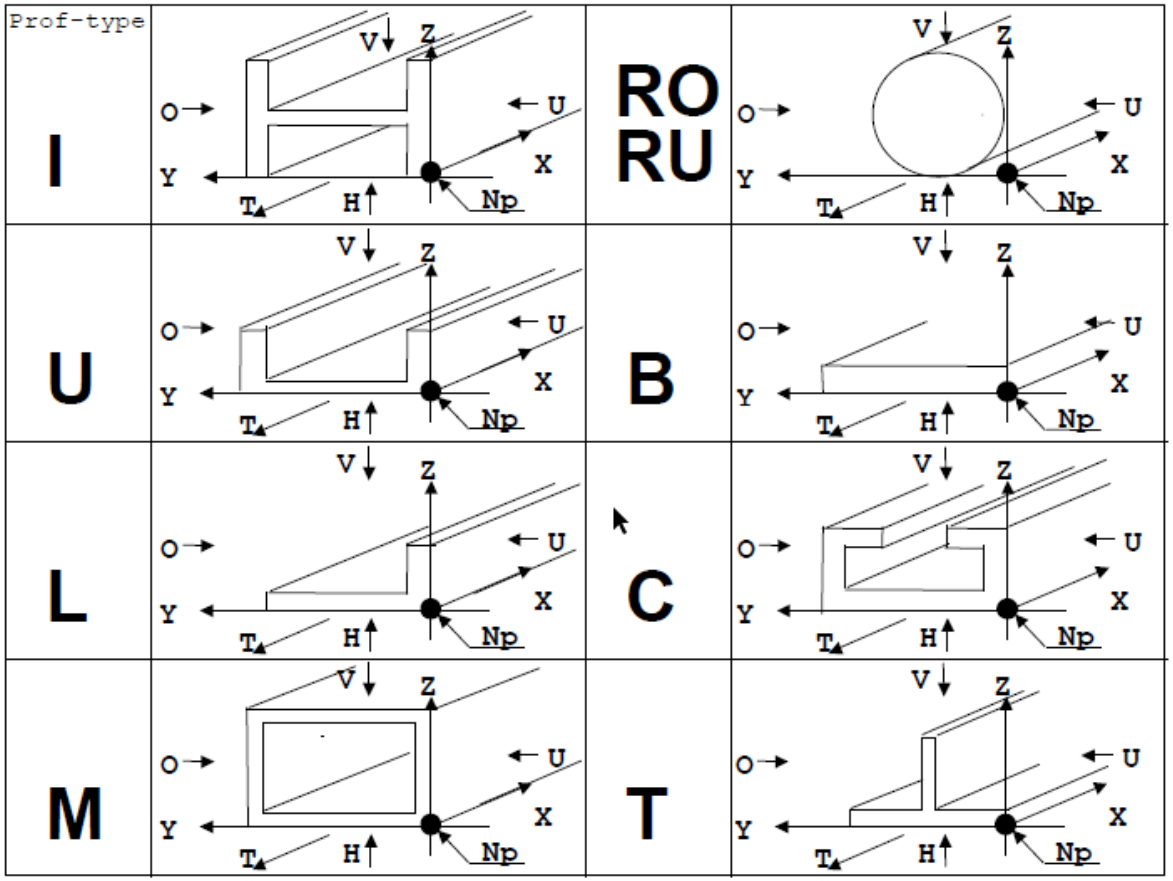
- DSTV files are an editable text file recognized by the file extension of .nc or .nc1
- DSTV ***CANNOT*** specify machine tooling
  - Just defines the features of the piece
- All holes, copes, etc. are located from the bottom, left end of the file and assume all materials are perfect, with no roll tolerance.

DSTV File Basics

- Each face is defined by AK Blocks. AK block defines External Contours.
  - The letters listed in each AK block define on what face the block is defining.
  - v-Front, u-Bottom, o-Top, h-Back
- Any internal contours of the piece, i.e. cuts inside the piece, are output in IK blocks.
- Each face is provided with a thickness that is defined in the header data. Along with other piece information like quantity, grade, sequence, etc.

DSTV File Basics

Contact Support@sds2.com if you would like a translated copy of the DSTV standard for your self.



V = Web=front face U = Bottom O = Top H = Behind
Np = Zero Point T = Displacement Direction

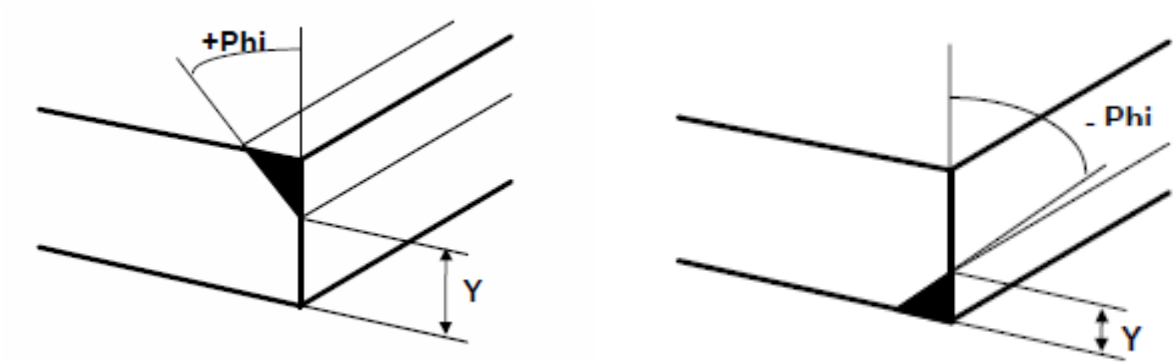
All the coordinates are referenced to this coordinates system with theorical dimensions of perfect profiles perfectly lamined. The smallest X-coordinate of a piece is 0.0, the plates are described by the smallest rectangle in which they can be inserted.

Example of faces and profiles in the DSTV Standard

DSTV file Basics

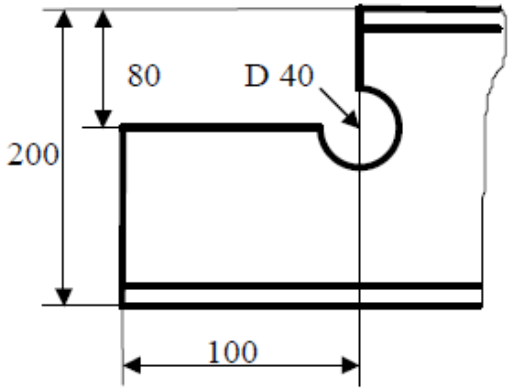
- Once the Piece is defined with the faces, other information is defined in other Block types.
  - BO block Is for hole/slot location and information.
  - SI standard stenciling of letters, like piecemarks
  - KO standard scribing, like layout mark options.
- These are all defined with just X and Y locations in the file from the defined coordinate system for the designated face.

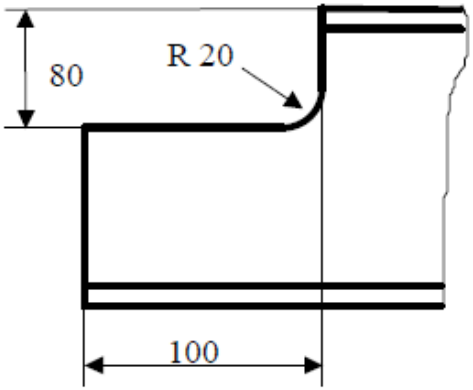
DSTV File Basics

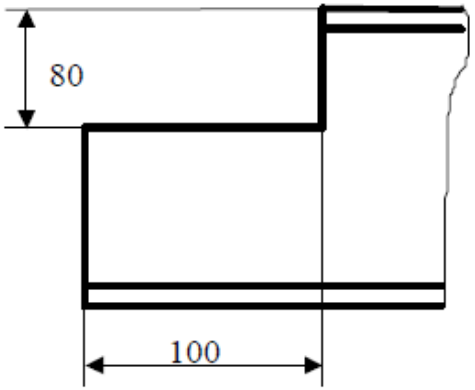


- Bevels are defined along a edge of the piece as Negative or positive, and the depth provided for the bevel is as shown for each.

DSTV File Basics








```
AK
   v  100.00u   200.00     0.00
      100.00    140.00   -20.00
      100.00    120.00w  -20.00
   →  100.00    100.00   -20.00
       80.00    120.00     0.00
        0.00    120.00     0.00
        0.00      0.00     0.00
```

```
AK
   v  100.00u   200.00     0.00
      100.00    140.00   -20.00
      100.00    120.00t  -20.00
   →   80.00    120.00     0.00
        0.00    120.00     0.00
        0.00      0.00     0.00
```

```
AK
   v  100.00u   200.00     0.00
      100.00    120.00     0.00
      100.00    120.00w    0.00
   →    0.00    120.00     0.00
        0.00      0.00     0.00
```

- Radii Are defined a couple ways with in the CNC file.
  - We write "t" if we want a tangential notch or a "w" if we want a hole

Example of DSTV File

```
ST                Indicates start of file
  DSTV
  0               Drawing(Sheet)
  1               Sequence
  B_1             Piecemark
  A992            Grade
  1               Quantity
  W21X44          Section Size
  I               Profile
  6236.88         Length, Saw length
  525.78          Depth
  165.10          Flange width
  11.43           Flange thickness
  8.89            Web thickness
  17.15           Radius
  65.479          Weight (kg/m)
  0.000           Surface area
  0.000           Web start miter
  15.000          Web end miter
  0.000           Flange start miter
  0.000           Flange end miter


SI                Beginning of text stenciling block
  v      152.40o      201.93      0.00       76             B_1
  Face   X dist       Y dist      Angle      Text height    Text string

KO                Beginning of marks block
  v      2886.01o     455.93      0.00
  v      2886.01o     481.33      0.00
  v      2895.53o     481.33      0.00
  Face   X dist       Y dist      Angle
KO
  v      2895.53o     481.33      0.00
  v      2895.53o     455.93      0.00
KO
  v      2895.53o     214.63      0.00
  v      2895.53o     189.23      0.00
  v      2886.01o     189.23      0.00
KO
  v      2886.01o     189.23      0.00
  v      2886.01o     214.63      0.00
SI
  v      2920.93o     207.65      0.00       76  pl
KO
  v      2890.77o     449.58      0.00
  v      2922.52o     449.58      0.00

BO                Beginning of hole block
  o       674.41s      38.10     20.64     0.00
  o      1829.55s     127.00     20.64     0.00
  o      2200.15s     127.00     20.64     0.00
  Face   X dist       Y dist     Diameter
```

```
BO                Beginning of hole block
  o      3857.86s     127.00     26.99     0.001    36.51     0.00     0.00
  Face   X dist       Y dist     Diameter  Slot     Width     Height   Angle
BO
  u       674.41s      38.10     20.64     0.00
  u      1829.55s     127.00     20.64     0.00
  u      2200.15s     127.00     20.64     0.00
BO
  u      3857.86s     127.00     26.99     0.001    36.51     0.00     0.00
BO
  v      3448.98o     263.83     23.81     0.00
  v      3753.78o     263.83     23.81     0.00
BO
  v      1086.29o     449.58     20.64     0.00
  v      1086.29o     373.38     20.64     0.00
  v      1086.29o     297.18     20.64     0.00
  v      1225.99o     449.58     20.64     0.00
  v      1225.99o     373.38     20.64     0.00
  v      1225.99o     297.18     20.64     0.00
BO
  v      1953.90o     449.58     20.64     0.00
  v      1953.90o     373.38     20.64     0.00
  v      1953.90o     297.18     20.64     0.00
  v      2093.60o     449.58     20.64     0.00
  v      2093.60o     373.38     20.64     0.00
  v      2093.60o     297.18     20.64     0.00

AK                Beginning of external(outside) contours
  o       101.60s       0.00      0.00
  o       101.60s     165.10      0.00
  o      5943.60s     165.10      0.00
  o      5943.60s       0.00      0.00
  o       101.60s       0.00      0.00
  Face   X dist       Y dist      Radius

IK                Beginning of internal(inside) contours
  v      4740.10o      98.42      0.00
  v      4694.08o     270.16    -25.40
  v      4687.51o     294.70t   -25.40
  v      4712.04o     301.27      0.00
  v      5168.50o     423.58    -25.40
  v      5193.04o     430.15t   -25.40
  v      5199.61o     405.62      0.00
  v      5245.63o     233.88    -25.40
  v      5252.20o     209.34t   -25.40
  v      5227.67o     202.77      0.00
  v      4771.21o      80.46    -25.40
  v      4746.68o      73.89t   -25.40
  v      4740.10o      98.42      0.00
  Face   X dist       Y dist     Radius
AK
  v         0.00o       0.00      0.00
  v      6236.88o       0.00      0.00
```

DSTV Viewers

- Use the viewer that is available from your machine's manufacturer.
  - Best bet to know how it will run on your machine
- Use the latest version of your viewer
- Different viewers can show files differently, even with the same options on out of SDS/2.
  - This is due to different assumptions or interpretations of the DSTV Standard.

DSTV Viewers

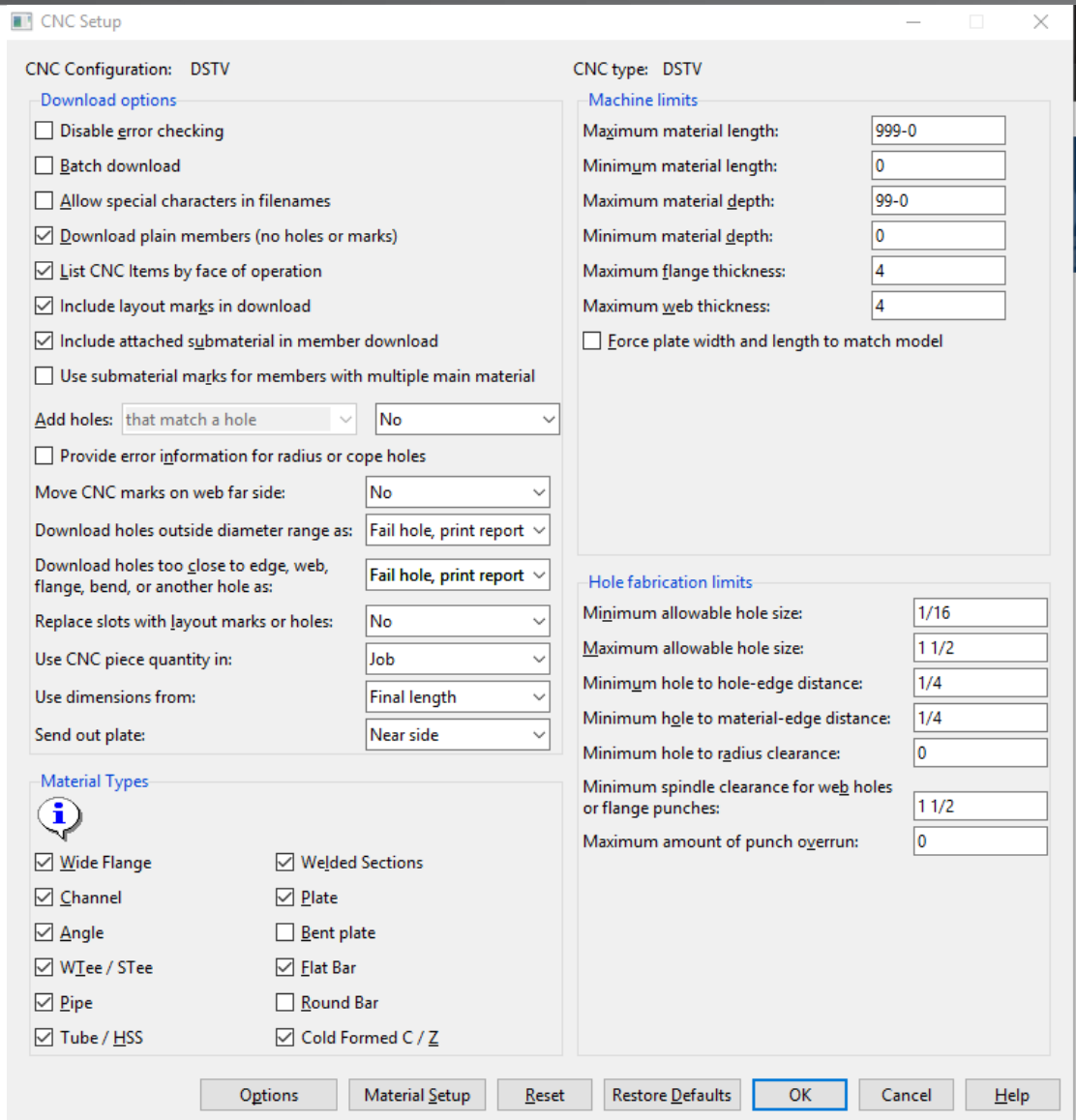
- Free viewers
  - HGG ProCAM Lite
  - StrucSoft CMS viewer
  - Steel Projects CAD Viewer
- Other DSTV viewers and editors/creators
  - Atek Automation Steel Solution
- Manufacturer specific software should be your default but it is nice to have other viewers to check against.

CNC Setup options

- Download options
- Machine and hole fabrication limits
- Material types

Setup window

- Same setup options for all CNC configs regardless of type
- General options of how the file will export, or more generic options that apply to more than just DSTV



Download Options

- Download plain members (no holes or cuts)
  - Will allow members with no holes or cuts on it to still be downloaded

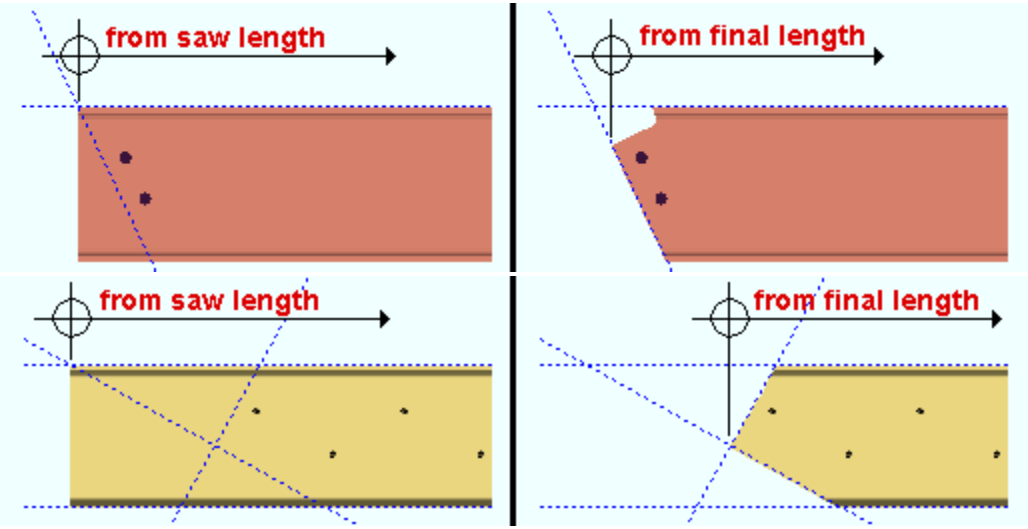
- Include attached submaterial in member download
  - Will download all material that are associated with the member piecemark selected at the same time.

Download options

- Use submaterial marks for members with multiple main material
  - Stair, double material bracing, Welded plate wide flange, etc.
  - Uses the model piecemarks for all material on member.
    - This would be used if you did not have your model piecemarks to already match your member's main materials

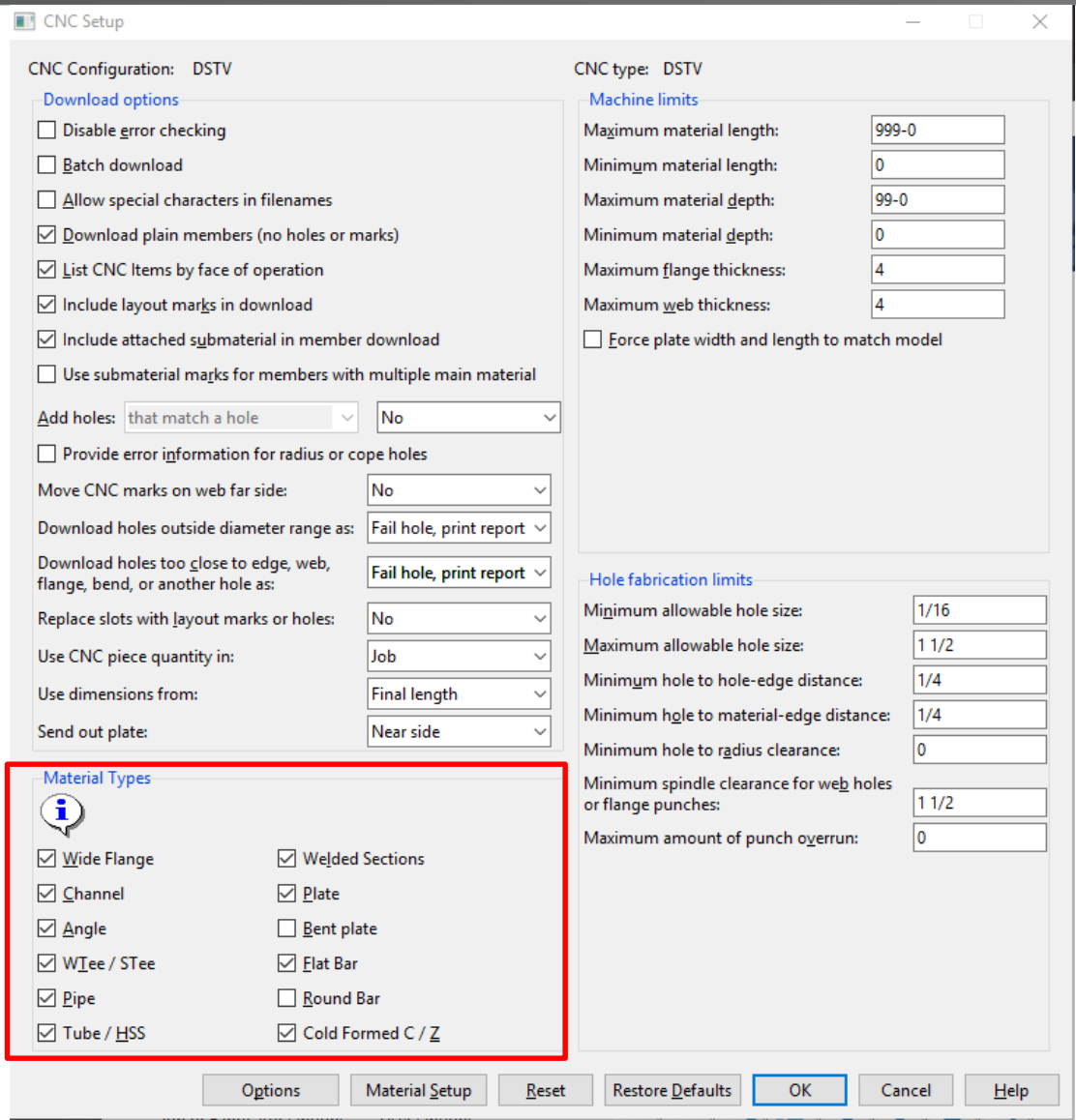
Download Options

- Saw length vs. Final length
  - Saw length is the dimension from the end of material before it is cut.
  - Final length is the dimension from the end of material after it has been cut.

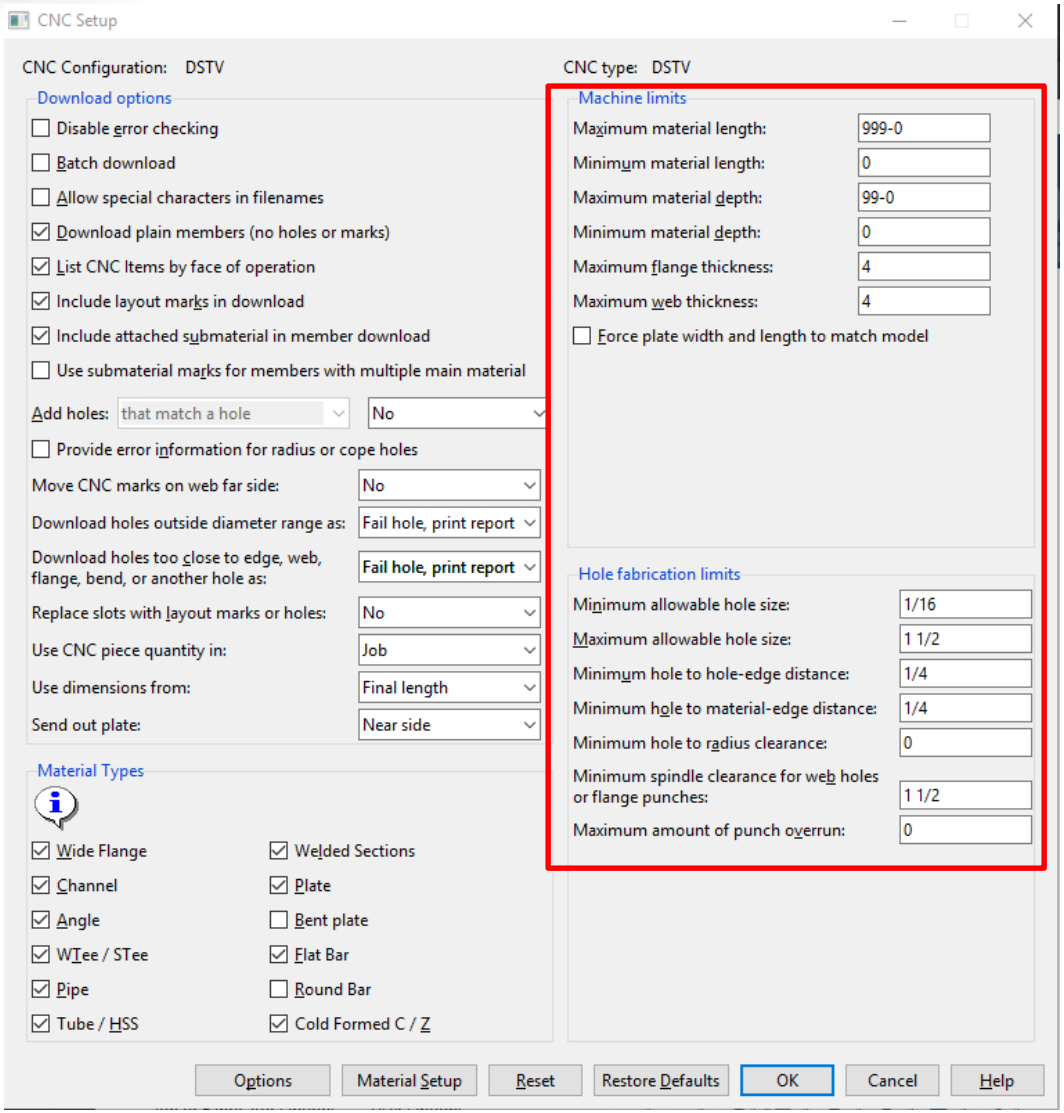


Material Types

- Decides what material types are valid for this configuration to run on.

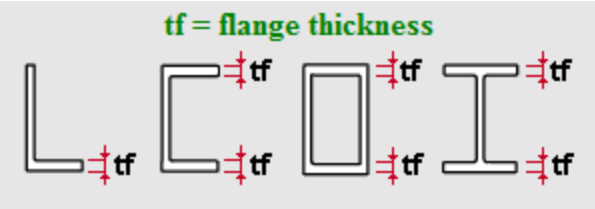


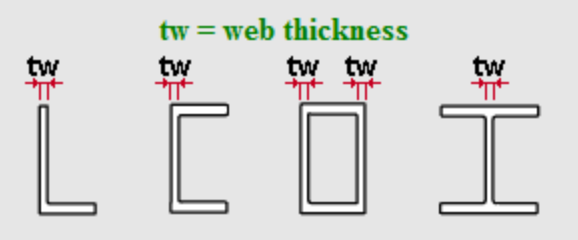
Machine/Hole Limits



CNC Setup- Machine Limits

- Maximum flange and maximum web thickness apply to angles, channels, tubes, and wide flange material

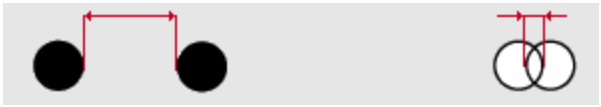


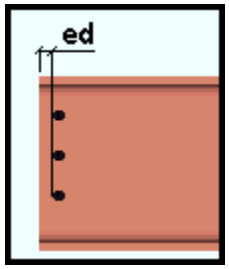


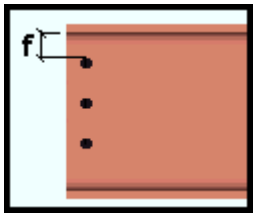
- Same with Max length and depth
- This is to help SDS/2 do some basic checks of machine limits when downloading pieces

CNC Setup- Hole Limits

- Minimum hole clearance options are taken from the edge of the hole, not the hole center.
- These values can be Negative to allow overlap of holes







When holes fail

- Download holes outside diameter range as:
  - Fail hole, Print report
- Download holes too close to the edge, web, flange, bend, or another hole as:
  - Fail hole, Print report
- This will allow you to know when a hole is failing and allow you to be able to adjust the fabrication limits and re-download
- To ignore these limits and machines limts, turn on Disable Error checking in the upper left.

DSTV Options

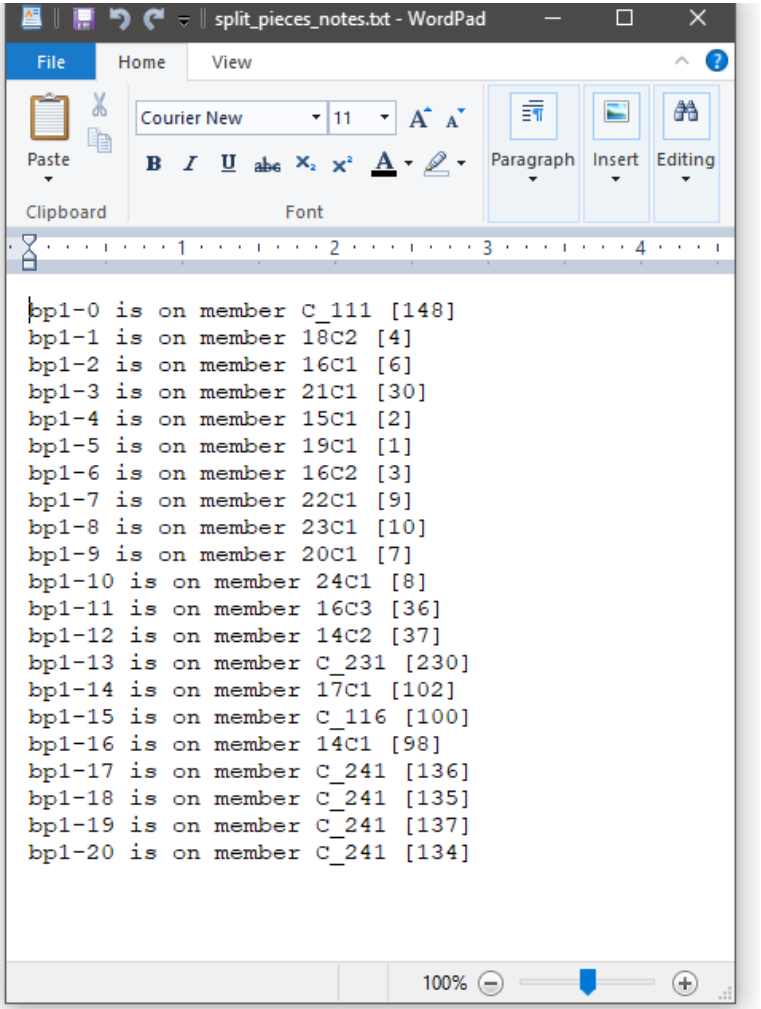
- Button in lower left of the setup window
- Specific to DSTV export
  - or any other configuration beside DSTV you have selected.
- Deviations from the standard for other software requirements.
- Scribing options
  - Layout and informational scribing

DSTV Options

- Split files
  - Allows you to split the output based on any differences in the scribing, sequence, or both.
- Example
  - bp1 is on multiple columns with different piecemarks and possibly different section sizes.

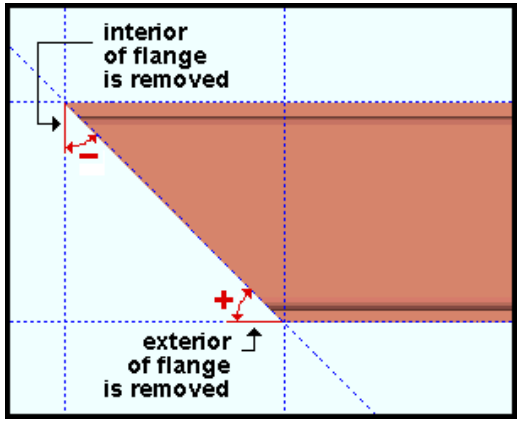
DSTV Options

Name	Date modified	Type	Size
bp1-0.nc1	9/14/2018 12:48 PM	NC1 File	1 KB
bp1-1.nc1	9/14/2018 12:48 PM	NC1 File	2 KB
bp1-2.nc1	9/14/2018 12:48 PM	NC1 File	2 KB
bp1-3.nc1	9/14/2018 12:48 PM	NC1 File	2 KB
bp1-4.nc1	9/14/2018 12:48 PM	NC1 File	2 KB
bp1-5.nc1	9/14/2018 12:48 PM	NC1 File	2 KB
bp1-6.nc1	9/14/2018 12:48 PM	NC1 File	2 KB
bp1-7.nc1	9/14/2018 12:48 PM	NC1 File	2 KB
bp1-8.nc1	9/14/2018 12:48 PM	NC1 File	2 KB
bp1-9.nc1	9/14/2018 12:48 PM	NC1 File	2 KB
bp1-10.nc1	9/14/2018 12:48 PM	NC1 File	2 KB
bp1-11.nc1	9/14/2018 12:48 PM	NC1 File	2 KB
bp1-12.nc1	9/14/2018 12:48 PM	NC1 File	2 KB
bp1-13.nc1	9/14/2018 12:48 PM	NC1 File	2 KB
bp1-14.nc1	9/14/2018 12:48 PM	NC1 File	2 KB
bp1-15.nc1	9/14/2018 12:48 PM	NC1 File	2 KB
bp1-16.nc1	9/14/2018 12:48 PM	NC1 File	2 KB
bp1-17.nc1	9/14/2018 12:48 PM	NC1 File	2 KB
bp1-18.nc1	9/14/2018 12:48 PM	NC1 File	2 KB
bp1-19.nc1	9/14/2018 12:48 PM	NC1 File	2 KB
bp1-20.nc1	9/14/2018 12:48 PM	NC1 File	2 KB
split_pieces_notes.txt	9/14/2018 12:48 PM	Text Document	1 KB



Include Torch Angling

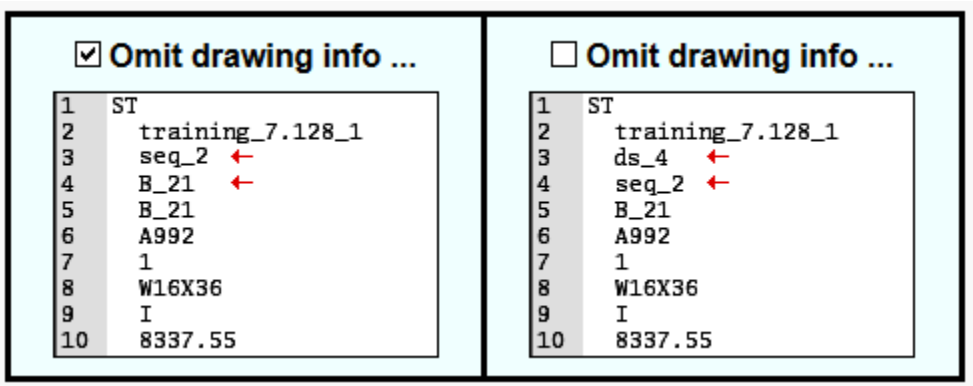
- Minimum torch angle (abs. val.)
  - Will not download a bevel for any angle below this value. I.E. 1° would not download anything until it was above ±1°



- Max angles -
- Round Torch Angle to integer.
  - Prevents angles like 44.98 and 45.01 in file

DSTV Deviations

- Omit Drawing info from header
  - This option was added for compatibility with Steel Projects software, but may also apply to other situations.
  - If this option is on, the sheet that the drawing is placed on is omitted from the header.



☑ Omit drawing info ...

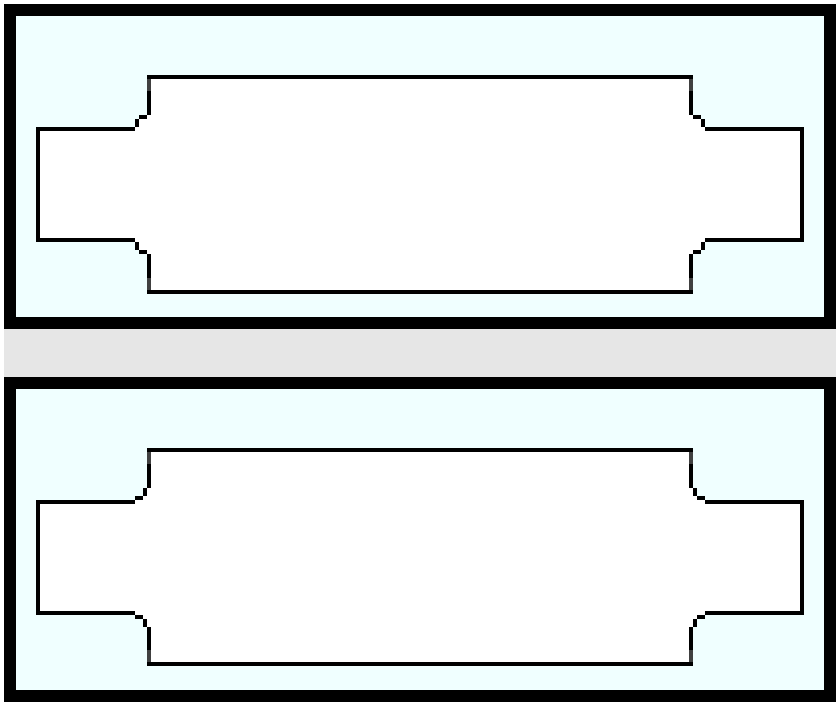
```
1   ST
2     training_7.128_1
3     seq_2 ←
4     B_21  ←
5     B_21
6     A992
7     1
8     W16X36
9     I
10    8337.55
```

☐ Omit drawing info ...

```
1   ST
2     training_7.128_1
3     ds_4  ←
4     seq_2 ←
5     B_21
6     A992
7     1
8     W16X36
9     I
10    8337.55
```

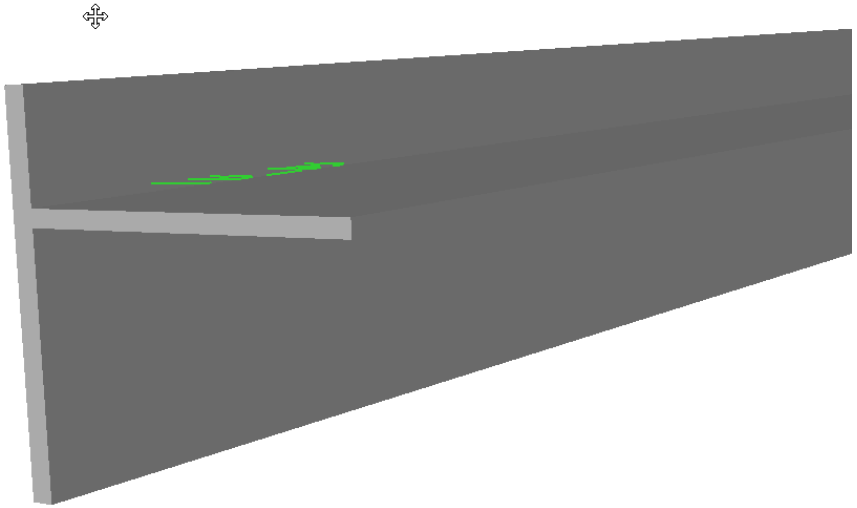
DSTV Options

- Output legacy Curve Directions.
  - This will affect Top Flange and Far Side radii on some machines. If you get the “bubbles” flip this option on/off from what you currently have set



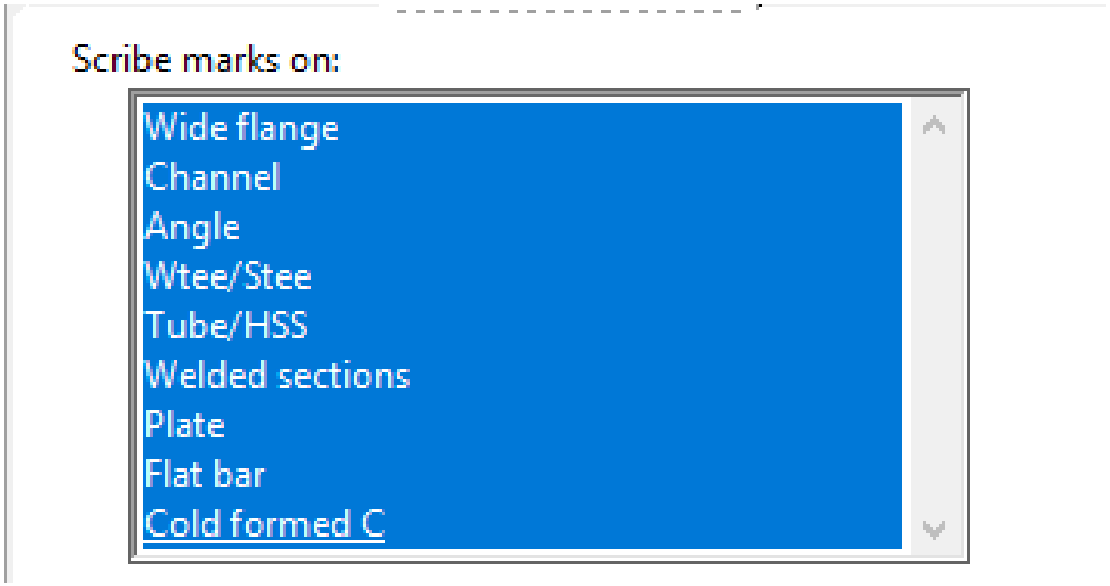
DSTV Options

- Swap Section Height and width for WTees
  - This will affect the Height and width in the Header data if your software shows incorrect Wtee shapes when viewing in your machine software.



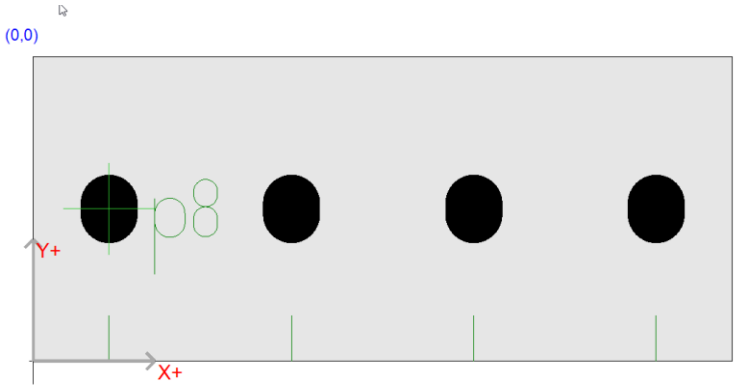
Scribing Options

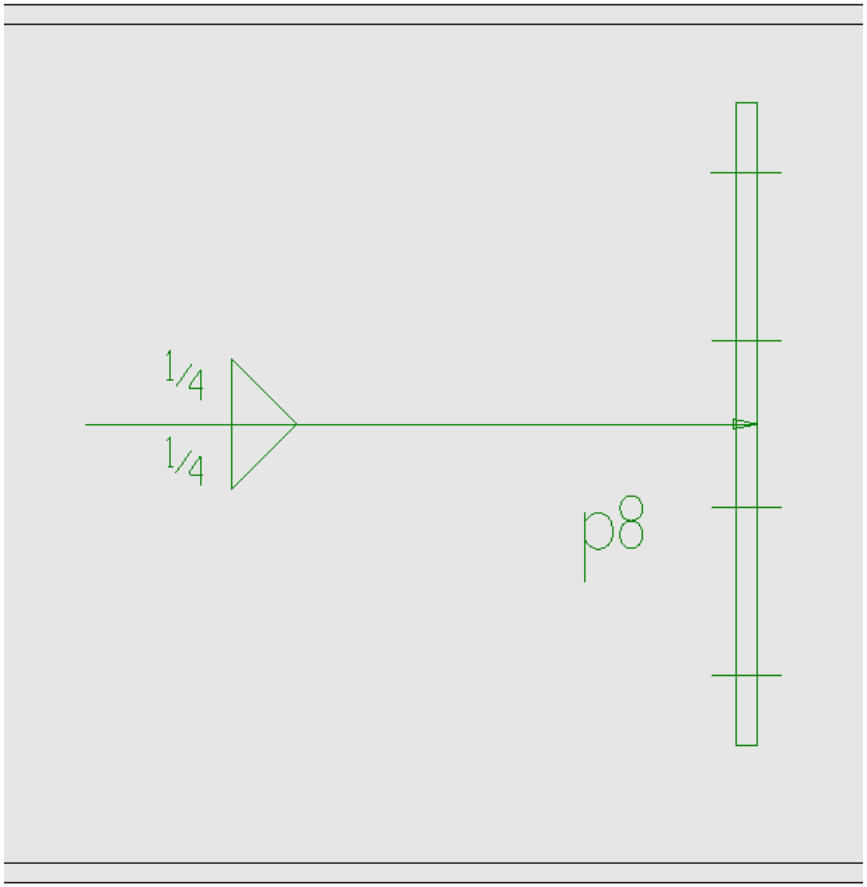
- Scribe marks on
  - Refers to what material types are valid to add scribing information to. Also affects stencil piecemarks currently.



Scribing Options

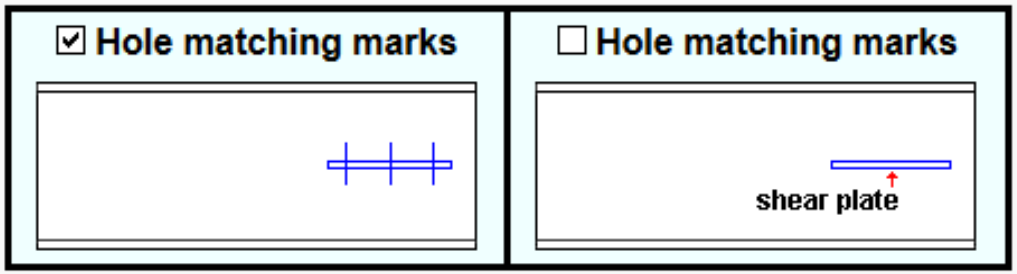
- Hole matching marks /Aligning tick on part
- Submaterial layout marks
- Placement piecemarks
- Weld symbols



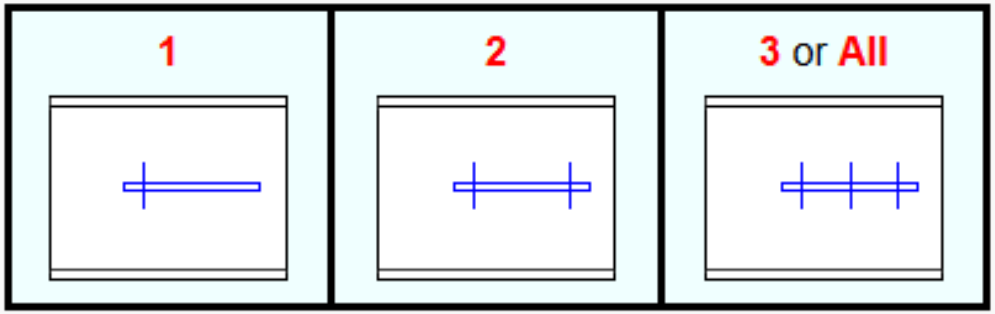


Scribing Options

- Hole matching marks-
  - Adds lines where bolts are located in connections



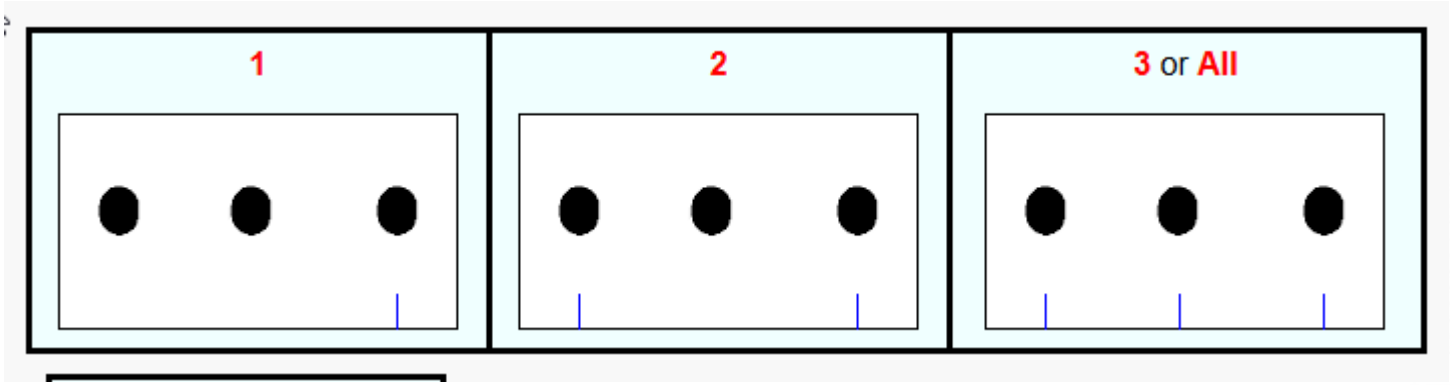
- Lines per material



  - 1 will be the hole closed to the left end of the file

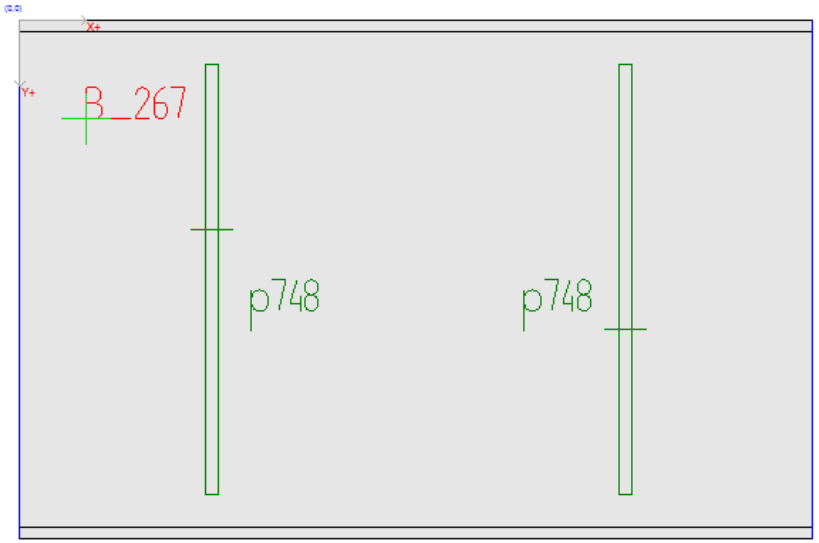
Scribing Options

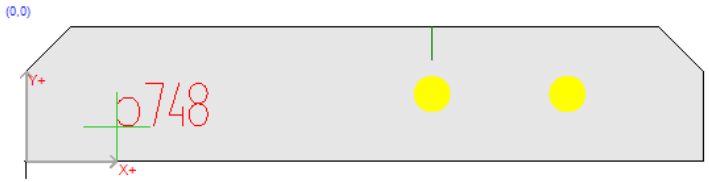
- Add hole center tick for aligning with hole match mark
  - Adds a mark to the submaterial for lining up holes instead of the edges of material.
- Ticks per material



Scribing Options

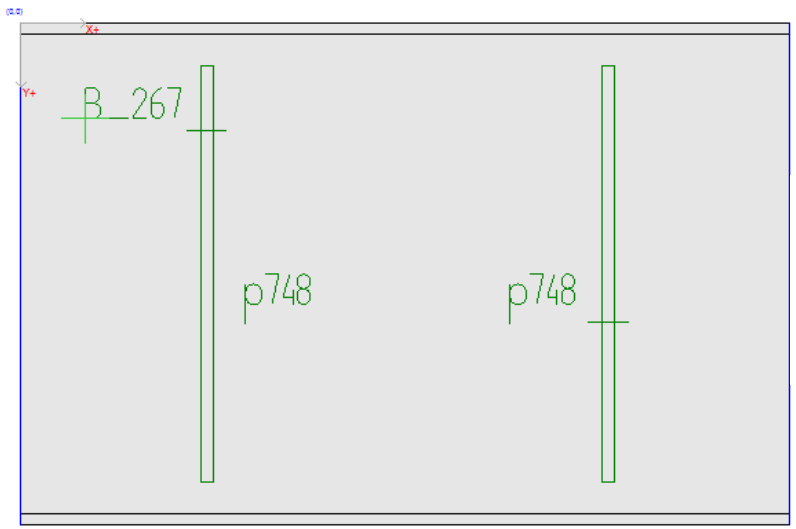
- Orient Hole match marks/ticks to submaterial or main material.
  - Submaterial allows the tick marks to be located based on submaterial to help prevent getting split scribing outputs on the submaterial outputs.

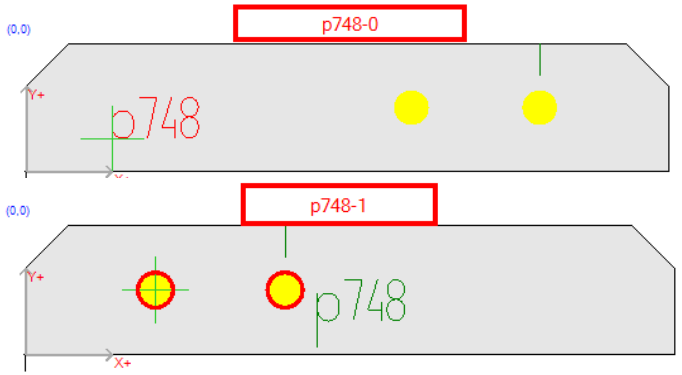




Scribing Options

- Orient Hole match marks/ticks to submaterial or main material.
  - With main material, each difference in framing is adjusted on the submaterial and can cause multiple outputs for the submaterial files.

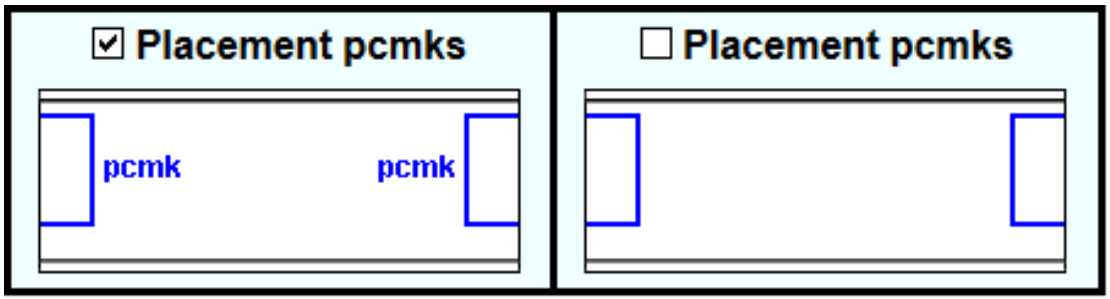





```
p748-0 is on member B_267 [1216]
p748-1 is on member B_267 [1216]
```

Scribing Options

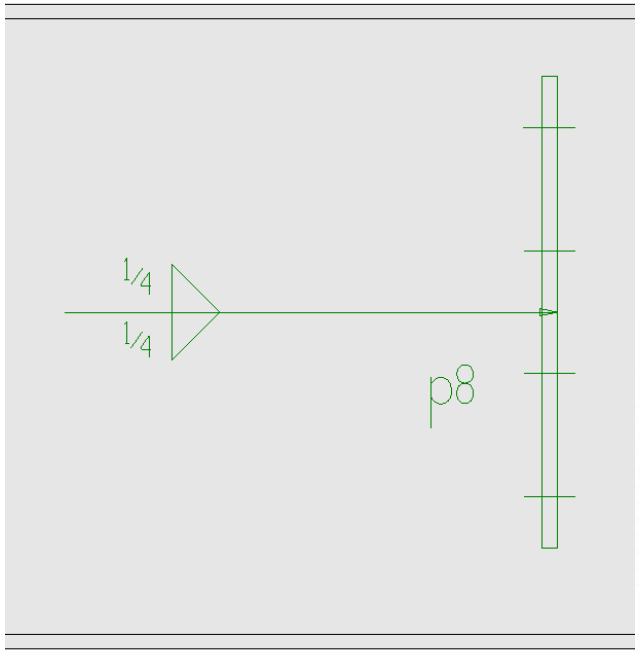
- Placement piecemark
  - Locates the piecemark of the material where it is located on the piece



  - Minimum distance to Edge
    - Keeps the piecemark scribing away from edges of the material

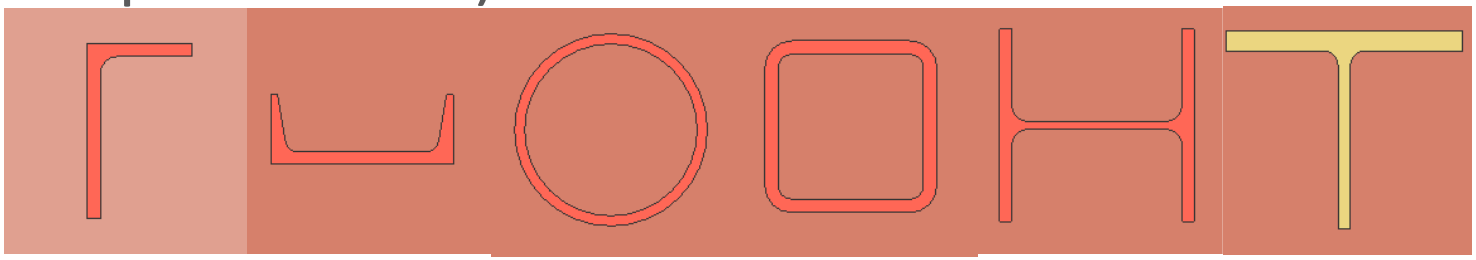
Scribing options

- Weld symbols
  - Adds the weld information from the model to the Piece in a scribing block

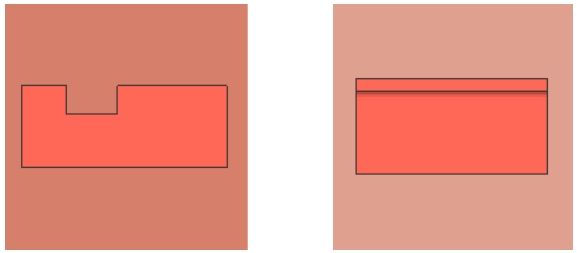


Scribing Options

- Submaterial layout scribing
  - Abutting materials (think profiles/sections of the shape are flush)

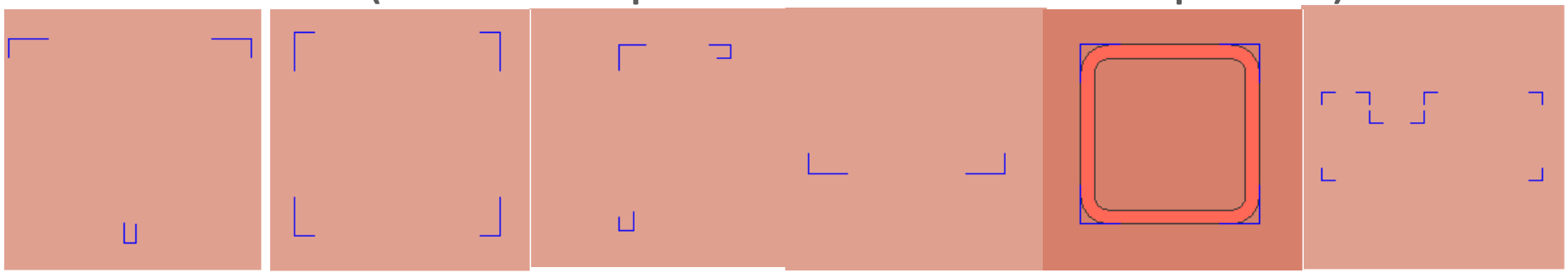


  - Flush materials (Think anything that runs along another face)
    - Plate is always considered flush

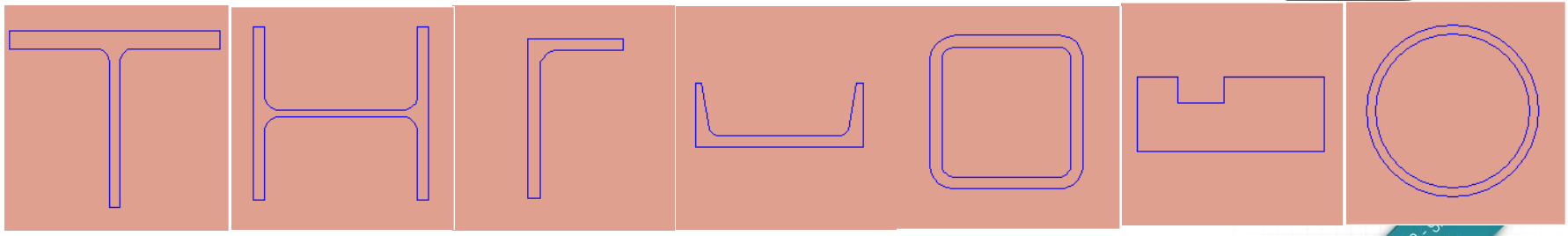


Scribing Options

- Placement lines
  - Corners (Some shapes have additional options)

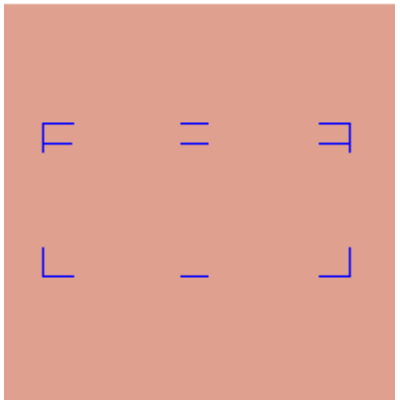


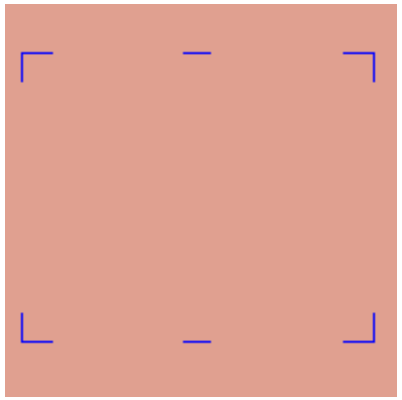
  - Outline

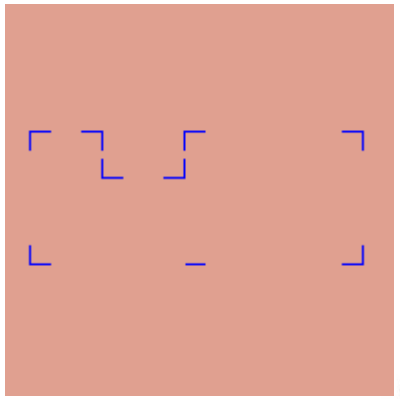


Scribing Options

- Flush Materials Can also have Dashed as an option.

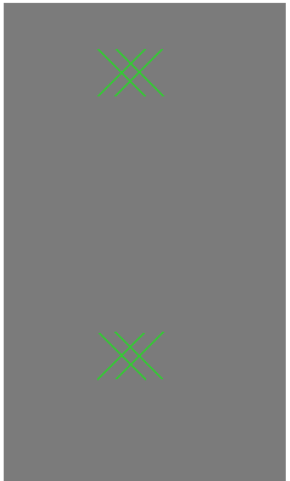






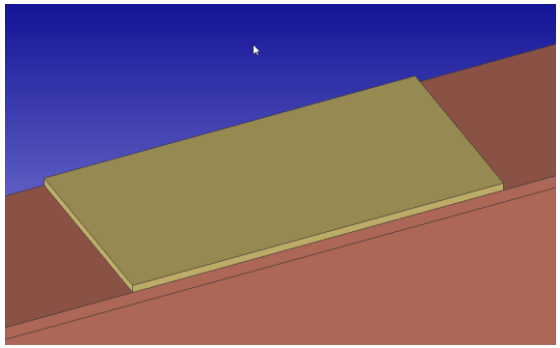
Scribing Options

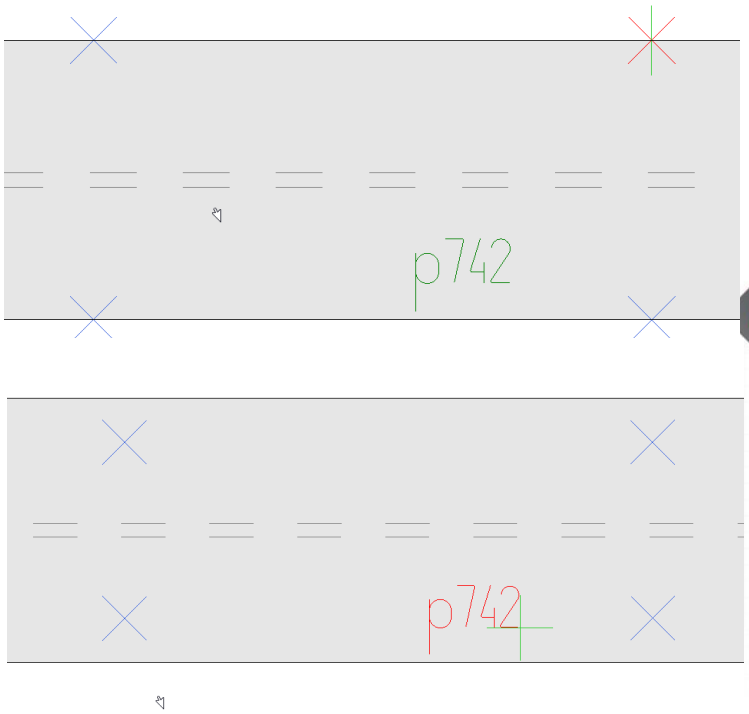
- Scribe type:
  - Standard: KO blocks
  - Powdering: PU blocks
  - Hole marks: BO blocks
    - Will place since “pop” marks at each vertex point of the material



Scribing Options

- Keep placement marks away from edges
  - Minimum distance to edge.
    - Keeps the layout marks from being lined up with the edge of the material.





Scribing options

- Scribe piecemark, Job name and/or Custom stencil
  - Adds it as one line for the stencil
  - Add on Web, Flange, or both.
- Add bend marks in bent plate downloads

DSTV Tips and Tricks

- Export multiple configurations at one time
  - Can set configs for specific material types and export all at once, with different settings
  - Include attached subm in member download
  - Example: Main DSTV for rolled sections, separate for plate and another only for bent plate.

Name	Date modified	Type	Size
BENT_PLATE_DXF	9/10/2018 4:45 PM	File folder	
DSTV	9/10/2018 4:45 PM	File folder	
PLATE_DXF	9/10/2018 4:45 PM	File folder	

DSTV Tips and Tricks

- Selection quantity in the model.
  - CNC setup option for “Use CNC piece quantity in:”
    - Set to selection rather than job
  - Bases quantity in the CNC file off of the selected pieces in the model.
  - Open your model and use the Model pulldown:

    - Member>CNC> CNC- Download by location.
      - Need to have include subm turn on in the config to download all material
    - Material>CNC – Download by location
  - Uses CNC config at the time Modeling is opened

DSTV Tips and Tricks

- Selecting pieces from the model also will pick the exact piece selected.
  - When picking from a submaterial list, It will run the index for submaterial.

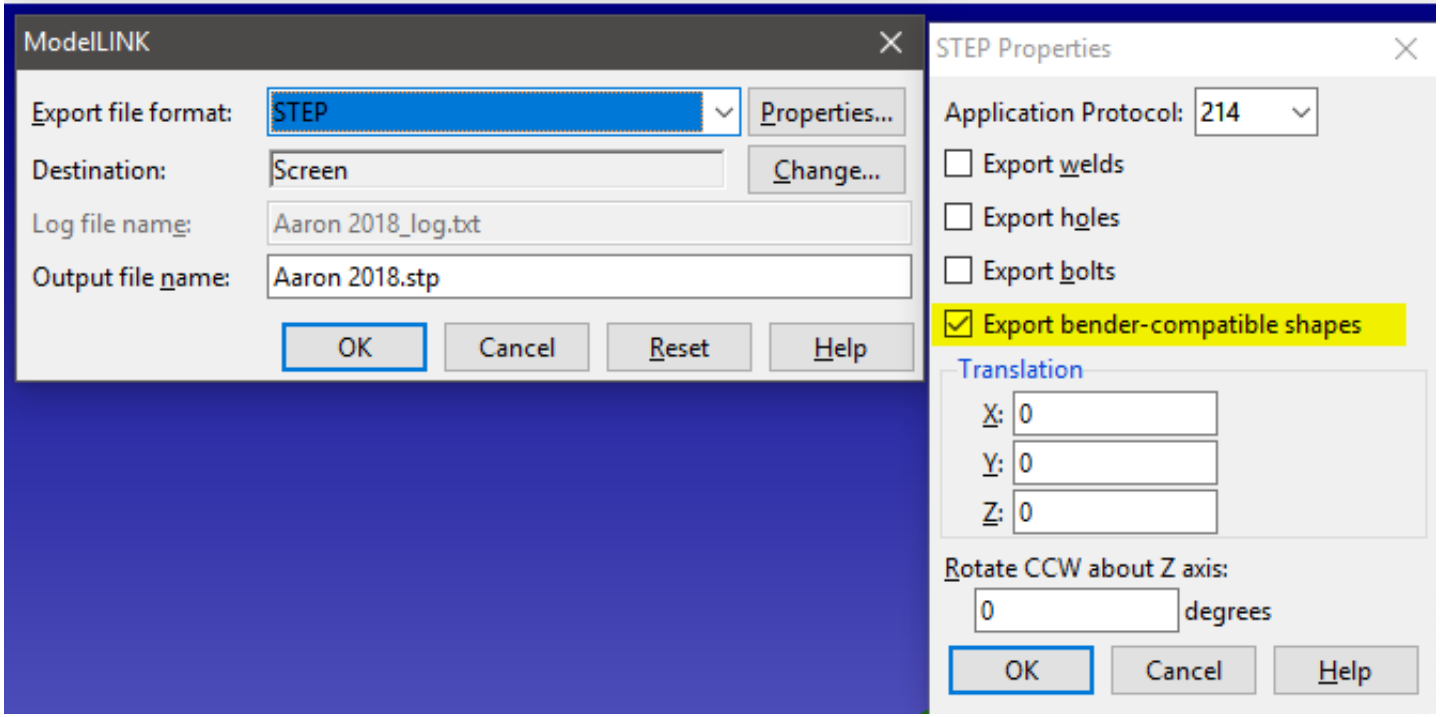
Punch Overrun (DXF PLATE)

- Most common reason a hole fails in DXF output is Punch Overrun.
  - This is a check that is made for holes that compare the hole's diameter to the thickness of material of which it is in.
  - The min diameter for the hole is the material thickness.
  - Maximum amount of punch overrun will allow holes smaller than the thickness of material by the amount specified, up to 1”
- For example:
  - You have a 1” plate, and a punch overrun value of ½” . The smallest hole allowed would be ½”.
  - ½”(overrun) + ½”(hole dia.) = 1”(plate thickness)

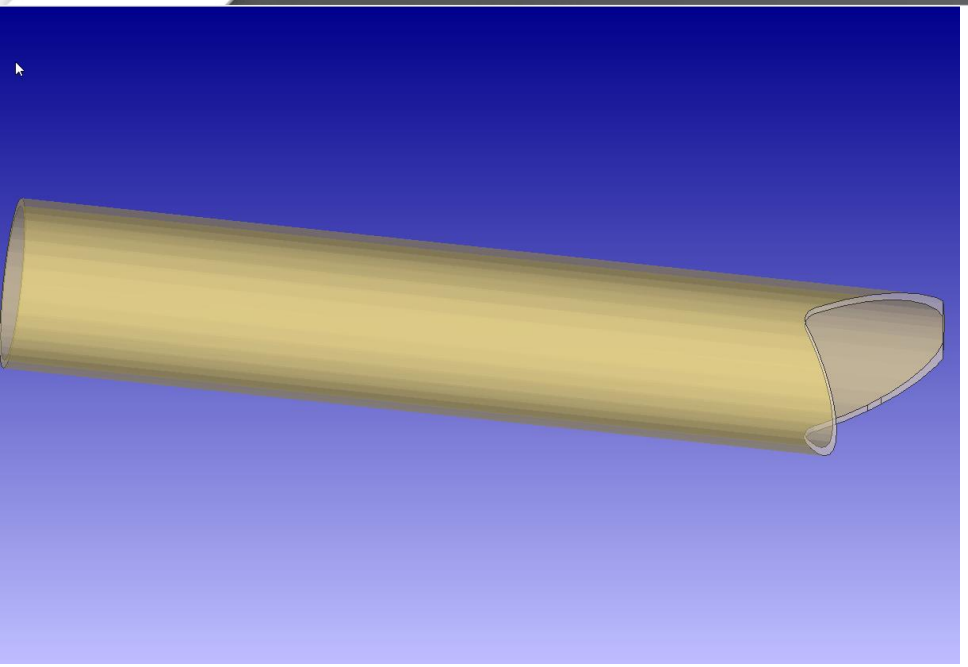
Pipe profiling exports

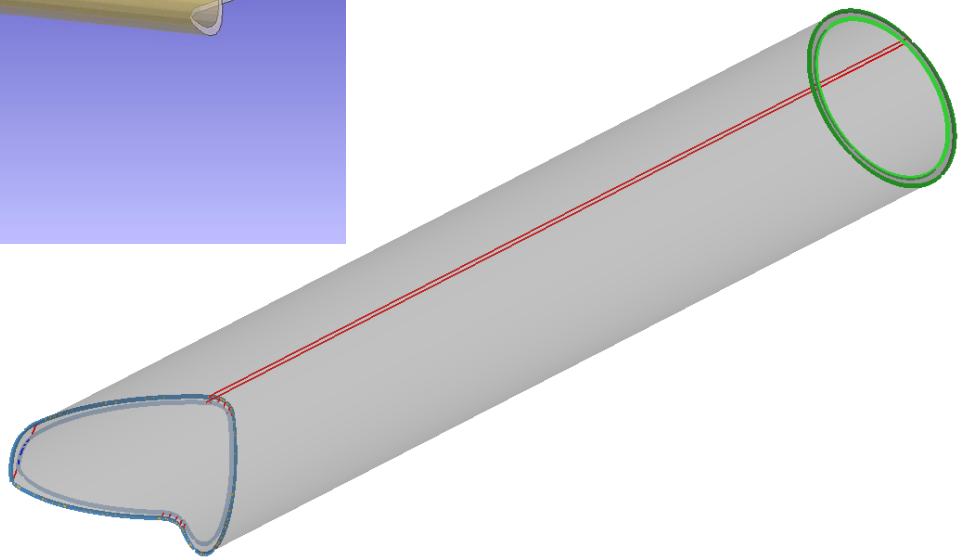
- STEP export for Pipe profiling and marking machines is downloaded from ModelLINK.
- In the STEP properties check on “Export bender-compatible shapes”
  - Does not currently include bend information.
  - Does include end cut information.
- Export from the model to export a specific selection

Pipe profiling exports



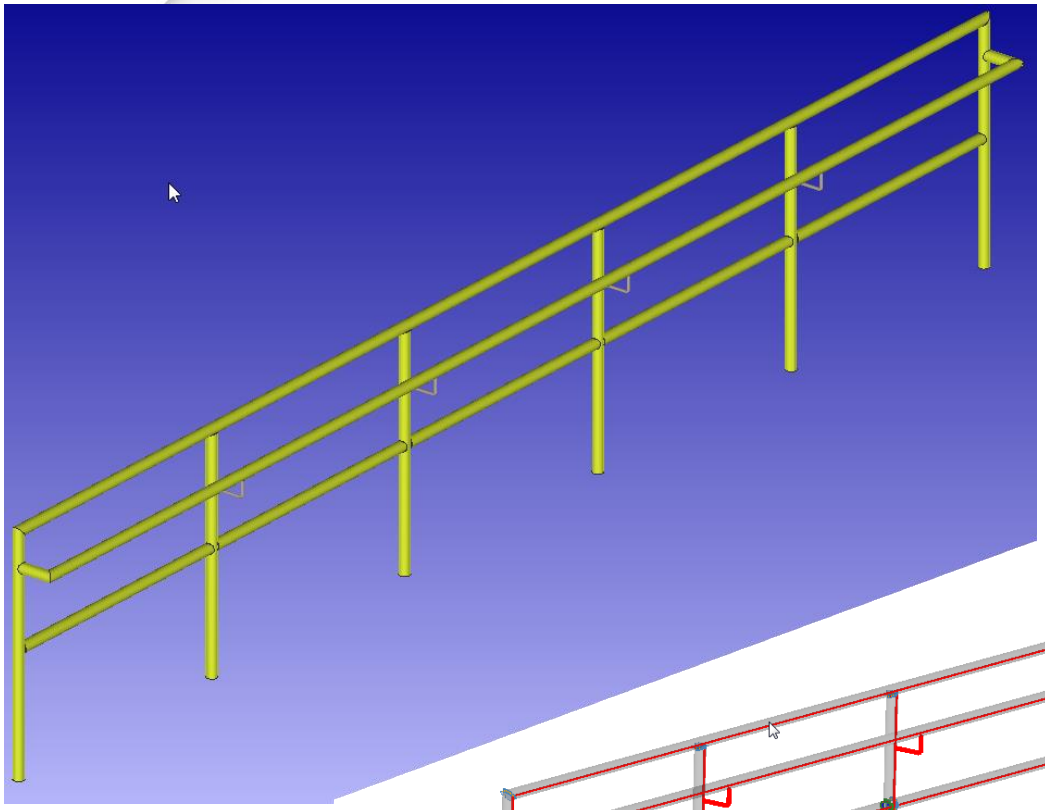
Pipe Profiling

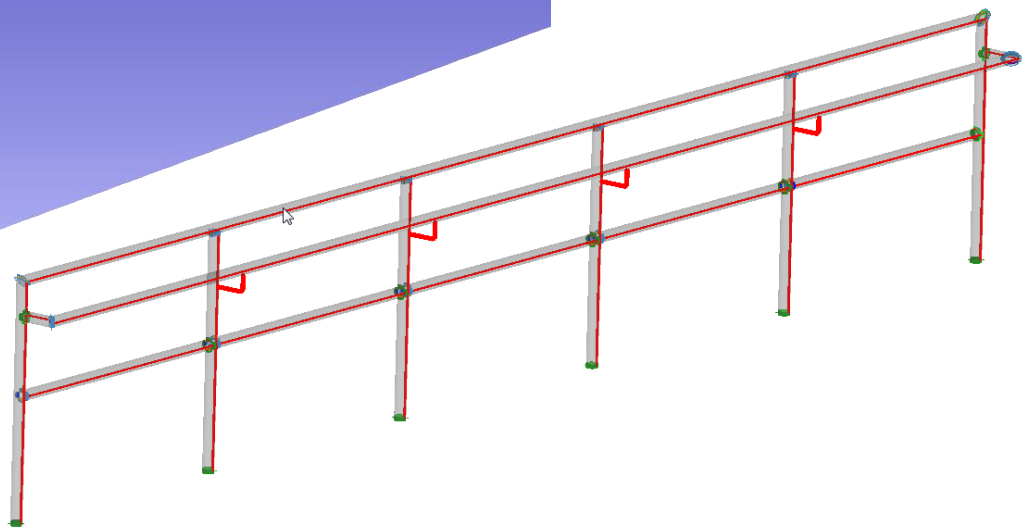




USERS GROUP
LINCOLN, NE
SDS/2
9.19 - 9.21
2018
CONFERENCE

Pipe Profiling





USERS GROUP
LINCOLN, NE
SDS/2
9.19 - 9.21
2018
CONFERENCE

Pipe profiling and marking

- These files are usable in pipe profiling and marking machines.
  - Bend-Tech
  - SigmaNEST
- Exports extruded profiles for straight and profiled pieces with end fitments
- Future Improvements
  - Bend data is still in the works
  - More complex profiles will continue to be improved