



WELDED STEEL
CHAIN PART
USER DEFINED FEATURE
INSTRUCTIONS



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Overview

The welded steel chain part UDF (User Defined Feature) is intended to provide a simple and robust solution for the creation of standard welded steel chains for both millimeter and inch part models. The UDF also provides feedback to the user in many ways.

Some of the feedback includes:

- Actual link length
- Actual designed link length
- Number of chain segments
- Verifies if grade and nominal size is standard (status)
- Recommended purchase length (minimum)

The following image illustrates the results of a completed (mm) part using the welded steel part UDF.

GRADE	UNITS	NOMINAL WELDED STEEL CHAIN SIZES - BASED ON NATIONAL ASSOCIATION OF CHAIN MFG.											
30	in	1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1	
30	mm	4.0	5.5	7.0	8.0	10.0	11.9	13.0	16.0	20.0	22.0	26.0	

43	in	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	
43	mm	7.0	8.7	10.0	11.9	13.0	16.0	20.0	22.0	

70	in	1/4	5/16	3/8	7/16	1/2	5/8	3/4	
70	mm	7.0	8.7	10.0	11.9	13.0	16.0	20.0	

80	in	7/32	9/32	5/16	3/8	1/2	5/8	3/4	7/8	1	1-1/4
80	mm	5.5	7.0	8.0	10.0	13.0	16.0	20.0	22.0	26.0	32.0

100	in	7/32	9/32	5/16	3/8	1/2	5/8	3/4	7/8
100	mm	5.5	7.0	8.0	10.0	13.0	16.0	20.0	22.0

NOTE: SET YOUR GRADE & NOMINAL INPUT VALUES FROM THE CHART ABOVE
PART MODEL UNITS MUST BE MILLIMETER OR INCH AND YOUR INPUT VALUES MUST CORRESPOND TO THE CORRECT MODEL UNITS

INPUTS	TIP: SET SELECTION FILTER TO ANNOTATION TO SELECT VALUE
CHAIN GRADE: 30	
NOMINAL SIZE: 4.000	

DESIGN RECOMMENDATIONS AND RESULTS

STATUS: ** OK **
STANDARD GRADE & NOMINAL SIZE USED FOR CALCULATIONS
RECOMMENDED PURCHASE LENGTH: 478.00 MIN
DESIGNED LENGTH: 469.53
CHAIN SEGMENTS: 20
SELECTED/CALCULATED (INSIDE) LINK LENGTH: 23.9000
DESIGNED (INSIDE) LINK LENGTH: 23.4765
GRADE 80 & 100 ARE BUILT TO MAX INSIDE WIDTH

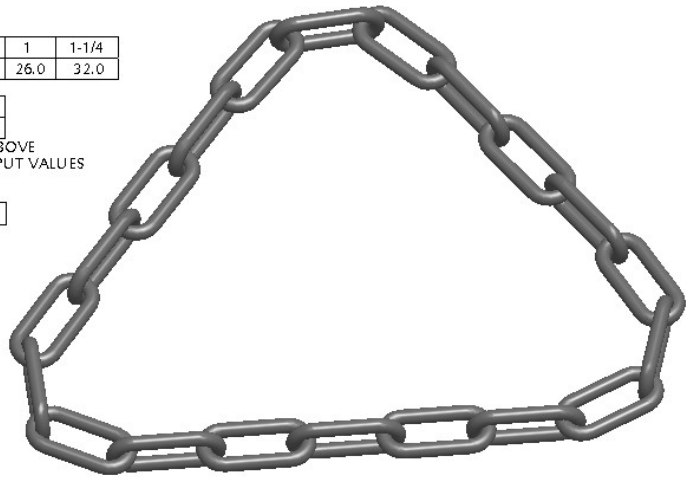


Figure 1

Requirements

To use the welded steel chain part UDF the user must have:

- PTC's Creo Elements Pro or newer version (i.e. Creo X.X). Commercial or Educational UDF's are provided
- A part model in either millimeter or inch units
- Within the part mode a composite curve (planner) representing the path or stage for the welded steel chain. This path may be an open loop (not shown below). However, the number of links will always be an even number.

Some examples of composite curves:

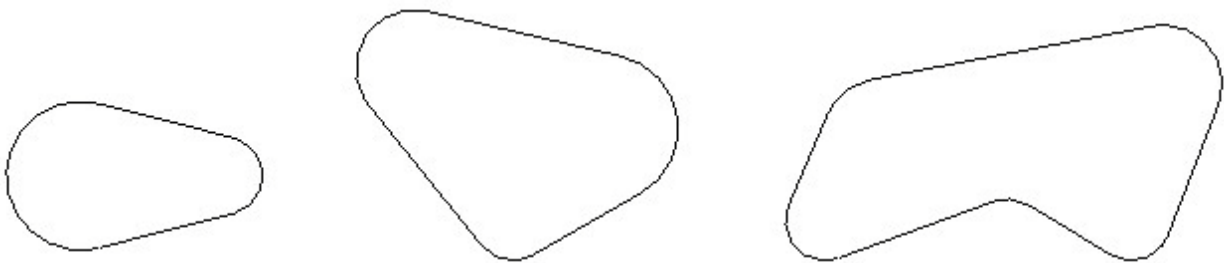


Figure 2

Tip: It is also recommended that the user have a basic understanding of the expected chain links. If this is unknown at time of placement of the UDF the user may want to initialize the UDF using the smallest standard nominal link size available for the model units (mm=4 and in=.125)

Millimeter Example

Create or open a part that contains a composite curve.

1. **Insert>User-Defined Feature**, "welded_steel_chain_part", **Open, OK**
2. Depending on your model you may be prompted to select how to handle your UDF dependency. Accept the default "**Advanced reference configuration**".

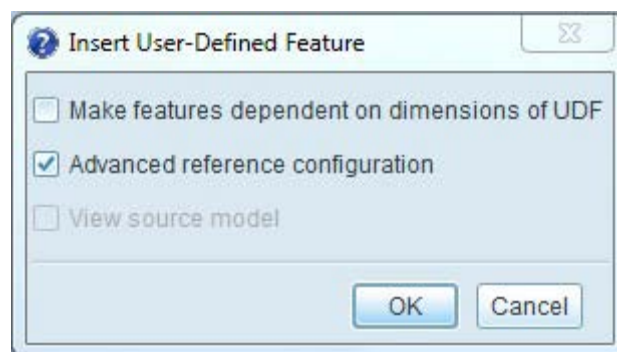


Figure 3

- Next, the UDF feature placement dialog box will appear. Utilize the **Variables** tab to set your chain nominal diameter (CROLLDIA) and grade (CGRADE) value if known. Standard values for millimeter parts are shown in figure 1.

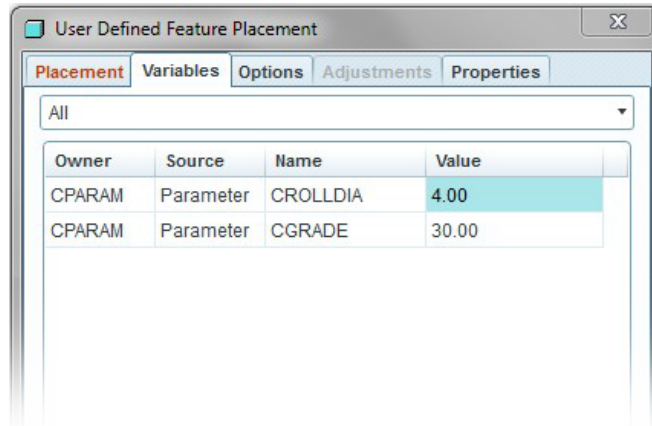


Figure 4

- Lastly, select the **Placement** tab to select your curve and click **OK** (green check mark).

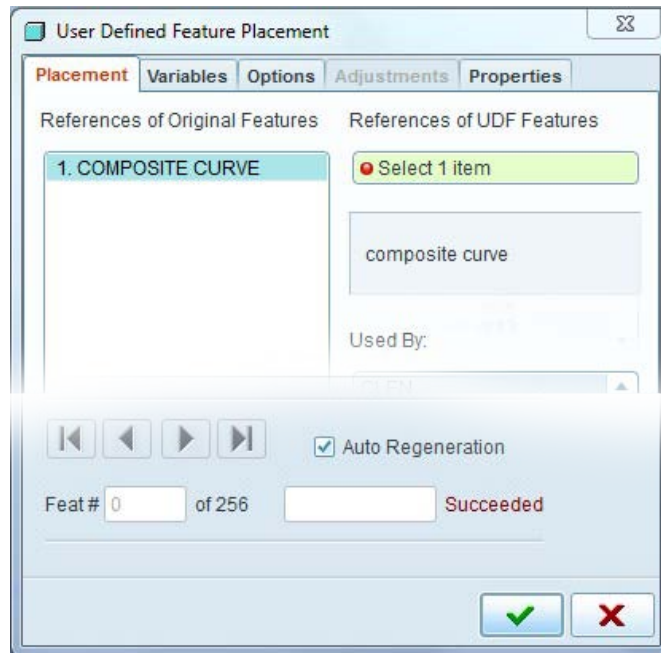


Figure 5

Inch Example

Create or open a part that contains a composite curve.

1. **Insert>User-Defined Feature**, “welded_steel_chain_part”, **Open, OK**
2. Depending on your model you may be prompted to select how to handle your UDF dependency. Accept the default "**Advanced reference configuration**".

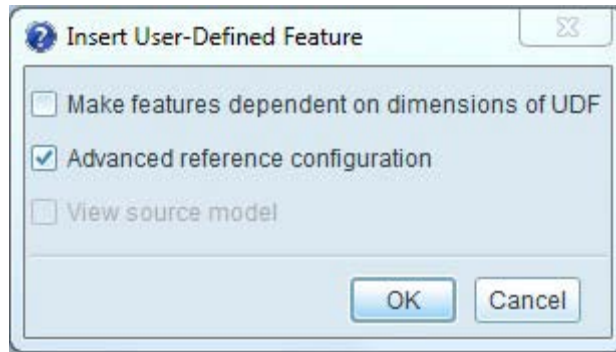


Figure 6

3. Because the part you are placing the UDF into is of unit inch you will receive an information prompt. Select **OK** and continue

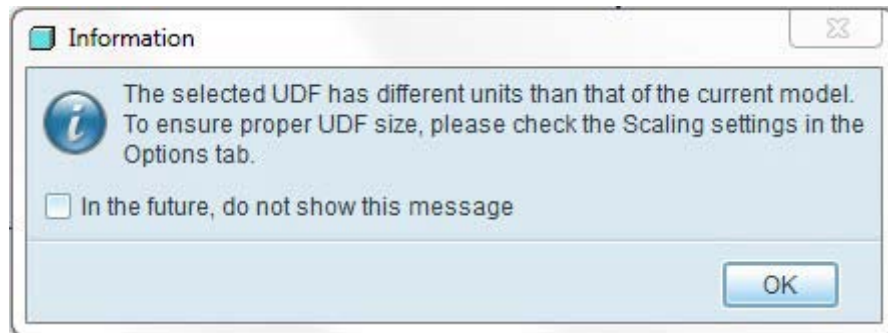


Figure 7

- Next, the UDF feature placement dialog box will appear. It is **critical** that when placing the UDF into an inch part that you enter the **Options** tab and select the **Keep dimension values** option.

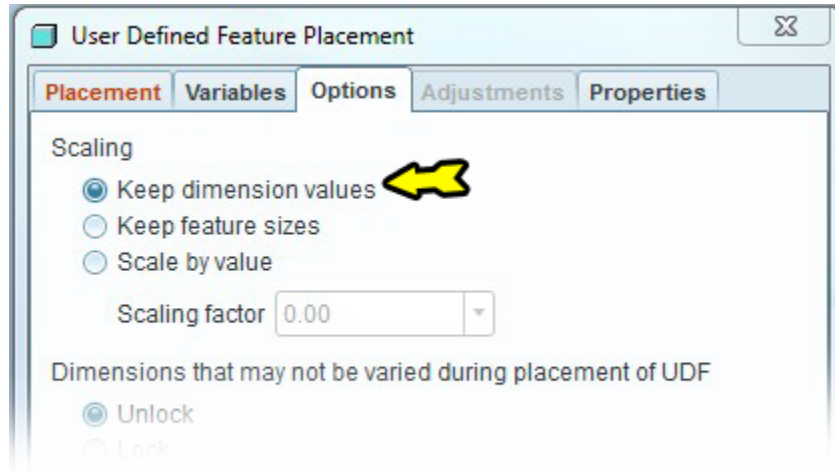


Figure 8

- Next, utilize the **Variables** tab to set your chain nominal diameter (CROLLDIA) and grade (CGRADE) value if known. Standard values for inch parts are shown in figure 1.

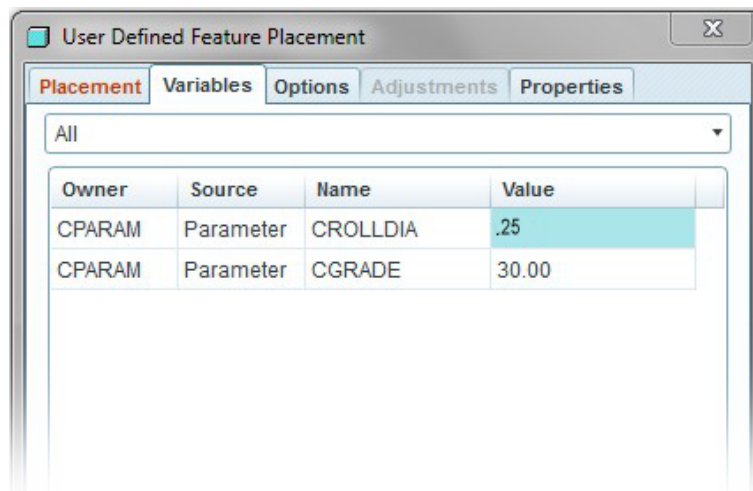


Figure 9

6. Lastly, select the **Placement** tab to select your curve and click **OK** (green check mark).

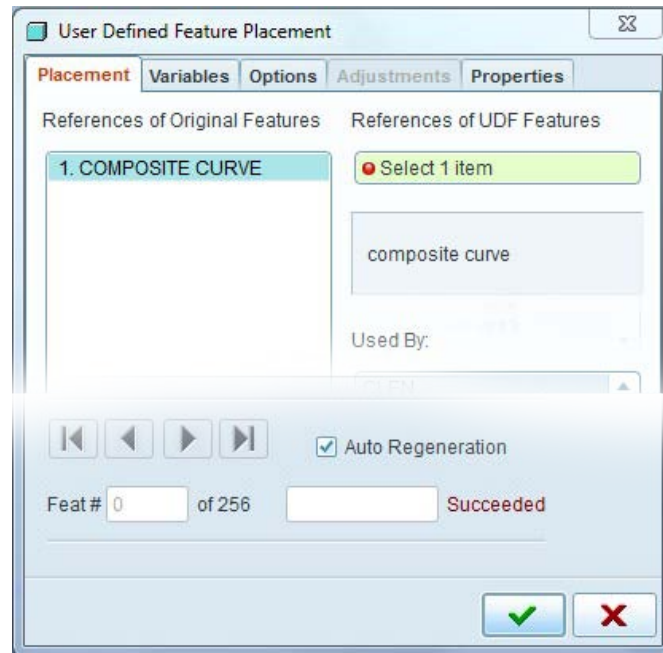


Figure 10

Understanding The Displayed Annotation

There are some very important aspects of the welded steel chain UDF that advanced users may want to consider.

1. Understand that the results produce a visually appealing chain. However, the results vary the actual link lengths of the chain to fit your designed curve/path.
2. The results allow the user to make modifications to the inputs of chain's grade and nominal size. These modifications can be made by simply editing the annotation for both items directly in the displayed annotation.
3. The status section in the results will indicate if you used values that are non-standard and it will produce a warning.
4. The results will indicate the recommended purchase length of the chain based on your current design curve/path and your selected input values.
5. The results will always indicate an even number of chain segments.

Because the UDF produces a visually appealing chain users will want to consider making adjustments to their designed curve/path. The ideal situation is to have the designed length = recommended purchase length. To achieve the ideal situation users may want to consider utilizing PTC's BMX to drive the UDF's analysis feature "CLEN" (Chain Length) to equal the Feature Parameter CTL (Chain Target Length) found in the feature "CPARAM".

Known Issues

Depending on the shape and curvature of your underlying composite curve/path you may encounter a failure with some links. Typically this occurs when the link of the chain goes around a small radius or sharp turn. This can often be fixed by increasing the radius or sharp turn in your curve/path. Another solution is to tighten your model tolerance.

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