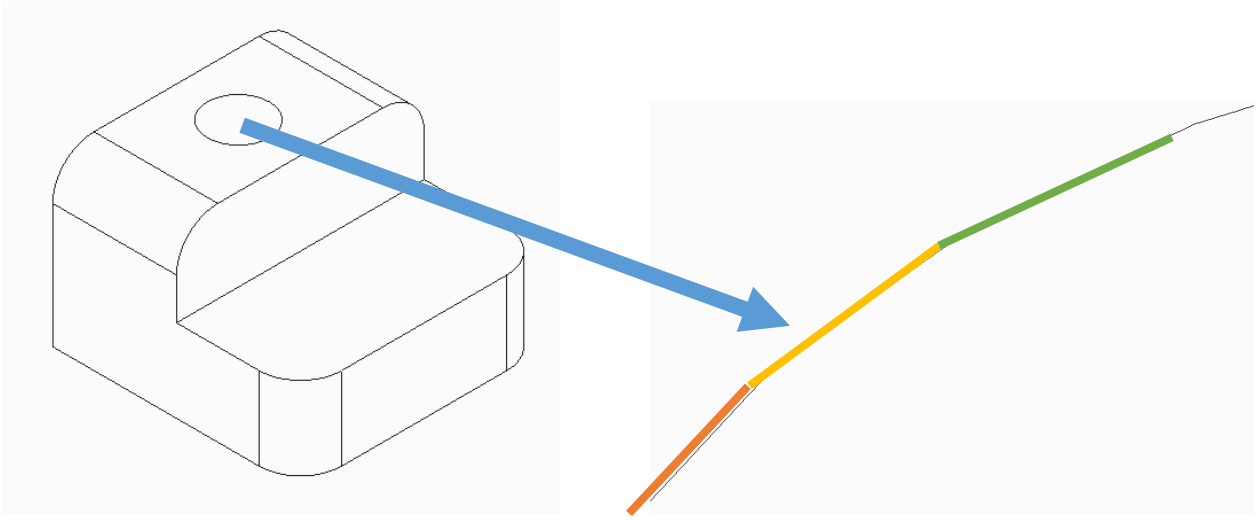
Reference: CAD Model to G Code

Step 1: CAD Solid Model to Stereolithgraphy File

Background

Each software has its own way of converting from a solid model to sterolithgraphy file (a set of coordinate data points). Each type of software uses chords (geometry definition: of a circle is a straight line segment whose endpoints both lie on the circle edge) to divide up the object. The concern when dividing up the object is with curved edges/surfaces. Since circles and arcs by definition are made up of an infinite number of points, CAD Software are unable to produce them because they lack the processing power. Solution the software creates a polygon with a lot sides to represent an arc or circle.



Solid Model Zoomed View of edge of the hole

NOTE: Colors denote polygonal edges

Chord Length

Rule of thumb is the higher the chord number the more polygon with fewer sides the object will look, lower the chord number (closest to 0 (Note: 0 is not an option because there needs to be distance between points) the more round the feature will look.

Figure 1: Orginal Object

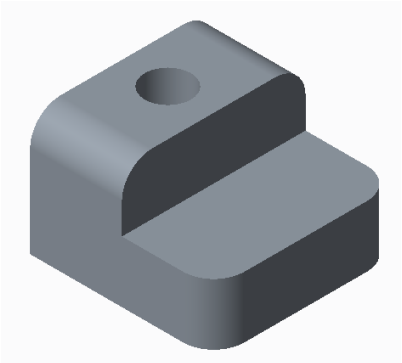


Figure 2: Chord Length = 1

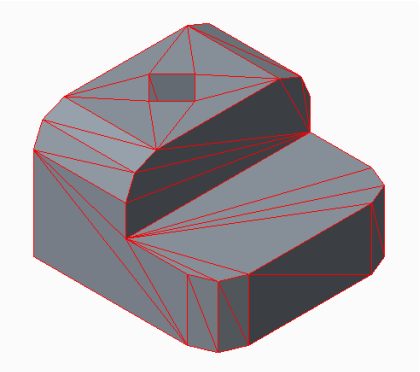
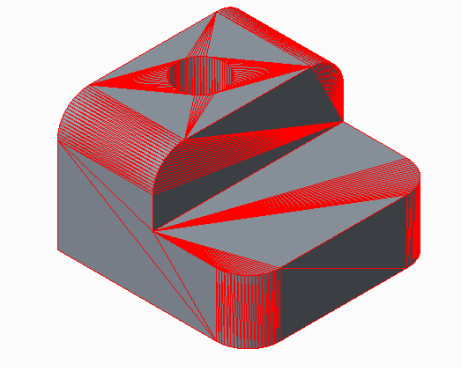


Figure 3: Chord Length = Smallest Spacing Possible Allowed by Software



Redlines on the object represent the coordinate points that when connected form the geometry.

Notice on Figure 2 with a high chord length the hole feature from the Original Object (Figure 1) has turned into a square and on Figure 3 with a low chord length the hole although not truly a circle creates points close enough to appear as a circle.

Advantages and Disadvantages to Chord Length

Disadvantages

High Chord Length

1. High Chord Length will result in poor resolution on the part. Meaning the features on the part will not be as detailed
2. Curved or circular features will be created in the 3D printer more polygonal than circular
3. Surface finish maybe coarser depending on the geometry
4. Difficult to assemble mating pieces because it is hard to match geometry between pieces. The dividing of coordinate points is calculated be the software, user does not have control on how the polygonal shape looks, number of sides, etc.

Low Chord Length

1. Increased Print Time
2. Machine stepper motors may not be able to traverse a small distance between coordinate points resulting in a failed print

Advantages

High Chord Length

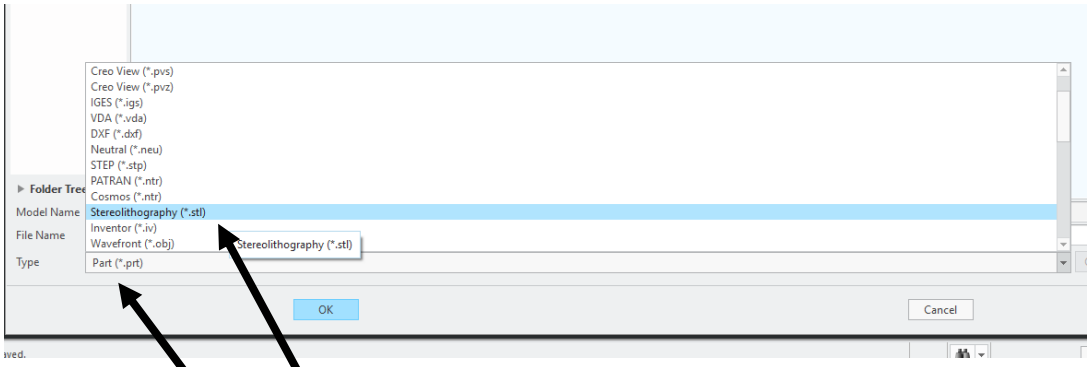
1. Decreased Print Time
2. Machine stepper motors will have little strain moving between coordinate points

Low Chord Length

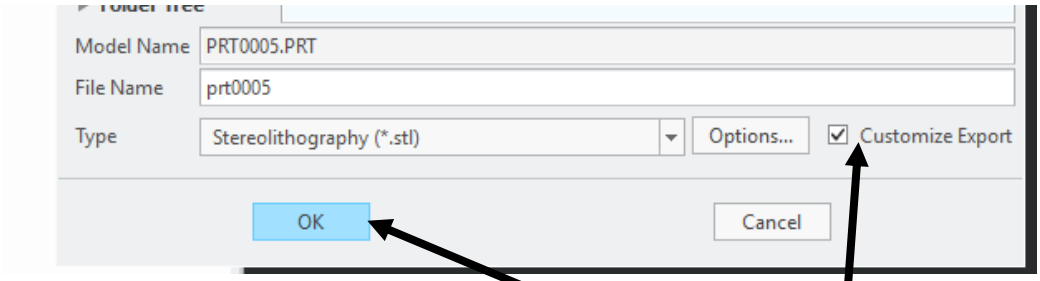
1. Better resolution
2. Better print quality
3. Curved and circular features will be created as round as possible, making mating pieces easier to assemble

Creo Stereolithography File Creation

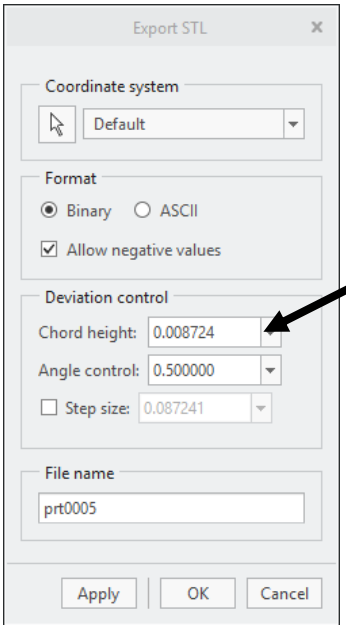
1. File Tab > Save As > File Type > Stereolithgraphy (.stl) > Select Customize Export > Change Chord Height to something small to give a more rounded feature > Click OK when done



Change type of file to Stereolithgraphy



Check Customize Export > Click Ok



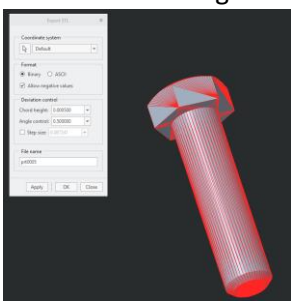
Adjust Chord Height

Smaller the number the more rounded the object will look

Larger the number more polygonal the object will look

Click Apply to Preview the Object

Low Chord Height



High Chord Height