Squircle Plugin

[Vers 1.0.1]

Purpose

This plugin for CamBam is intended to create squircle-shaped polylines. The squircle (or rounded square, super ellipse, or perhaps more correctly the Lamé curve) is a shape that is somewhere between a circle (or ellipse) and a square (or rectangle). It is a shape that has certain aesthetic qualities and is often used in the design and manufacture of tactile objects.

These polylines can then be used to construct CamBam models.

Installation

The SquirclePlugin.dll file should be placed into the CamBam installation directory, and inside the Plugins folder. On re-start the plugin will be found in the CamBam Plugins menu.

Data Requirements

The shape of the squircle is primarily determined by the power (p) in the function:

$$\left|\frac{x-a}{r_a}\right|^p + \left|\frac{y-b}{r_b}\right|^p = 1$$

Where:

- x and y are the Cartesian coordinates.
- a and b are the (x,y) coordinates of the centre of the shape.
- r_a and r_b are the semi-major (X) and semi-minor (Y) axes lengths.

The power value (p) is often taken to be 4.0, and this produces a rather interesting "squared-circle" shape, but other values are possible. Some interesting values are:

- p = 2: produces a true circle or ellipse.
- P > 2: produces a rounded square or rectangle, the shape approaches a square (or rectangle) as the value of p increases.
- P > 1 & P < 2: produces a "rounded diamond shape"
- P > 0 & < 1: produces a concave "diamond shape".

User Interface

This is the user interface:
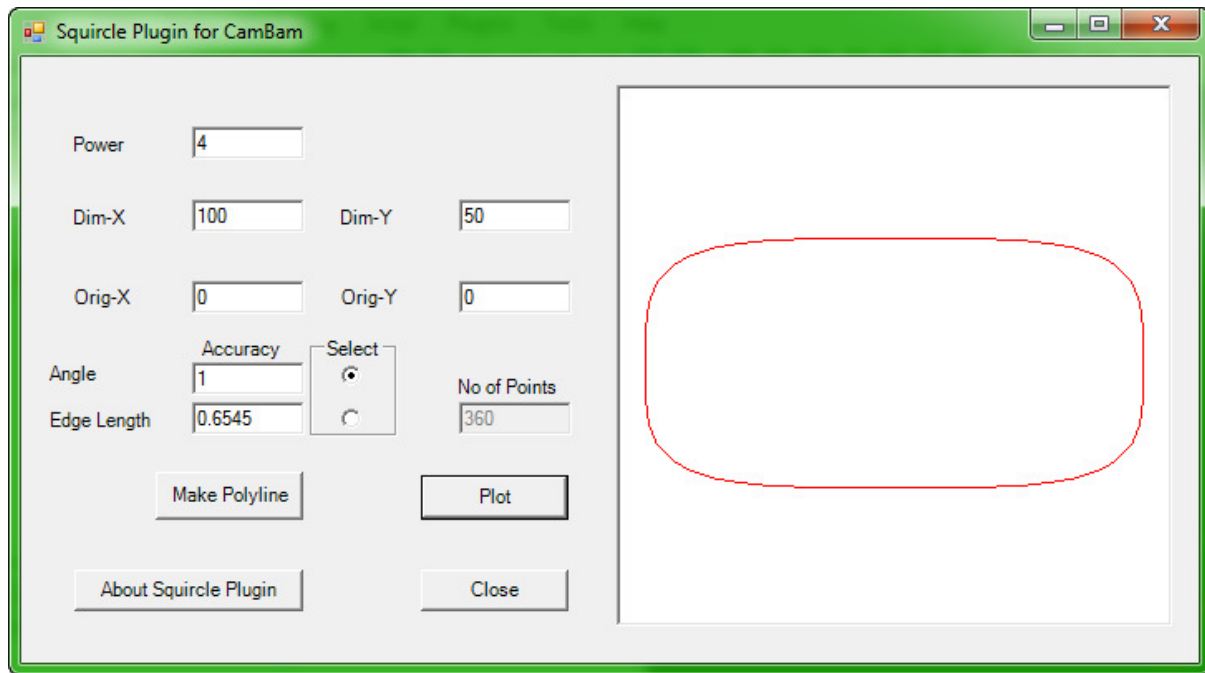
The fields are:

- **Power**: the nominated power value (> 0.0)
- **Dim-X**: the diameter in the X-direction
- **Dim-Y**: the diameter in the Y-direction
- **Orig-X**: the X position of the centre.
- **Orig-Y**: the Y-position of the centre.
- The polyline shape is made up from a number of straight line segments. The accuracy can be defined by either setting the average angle each of these makes at the centre, or the average length of the segments by selecting the **Angle** or **Edge Length** radio buttons, and entering the **Angle** value (in degrees) or the **Edge Length** (in model units). Typically am angle less than 1 deg, or an edge length less than 1 mm, will produce a relatively smooth curve. Large angles, or edge lengths, will produce "polygon" like shapes.
- The **Plot** button will display a drawing of the shape in the graphics panel (auto-scaled to fit), as a preview the shape to be generated.
- The **No of Points** field shows the number of line segments generated. If this number is more than 4000 a warning is given, and if more than 20000 an error is generated.
- The **Make Polyline** button inserts the generated polyline into the currently active layer of the CamBam model at its nominated location and with a Z-value of zero. From here it can be further edited as required.

The set parameters are saved for the current CamBam session.

Versions

Version	Date	Notes
1.0.1	15-01-2015	First version for testing