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System Requirements:

Adobe Illustrator CS3

Installation:

Drag the file Curvius 3.0.aip to Illustrator's plug-in folder.

Filters and Effects

Curvius adds a new entry to Illustrator's list of filters. Selecting the Curvius entry in the filter menu brings up a sub-menu of 5 filters as follows:

- Arrowhead
- Crenellate
- Roulette
- Roughen
- Straighten

All these are available as effects as well as filters and a similar menu is present in Illustrator's Effects menu.

All these filters and effects operate on the currently selected path art (they are dimmed if no artwork is selected) and are described further in this manual. Multiple selections may be made.

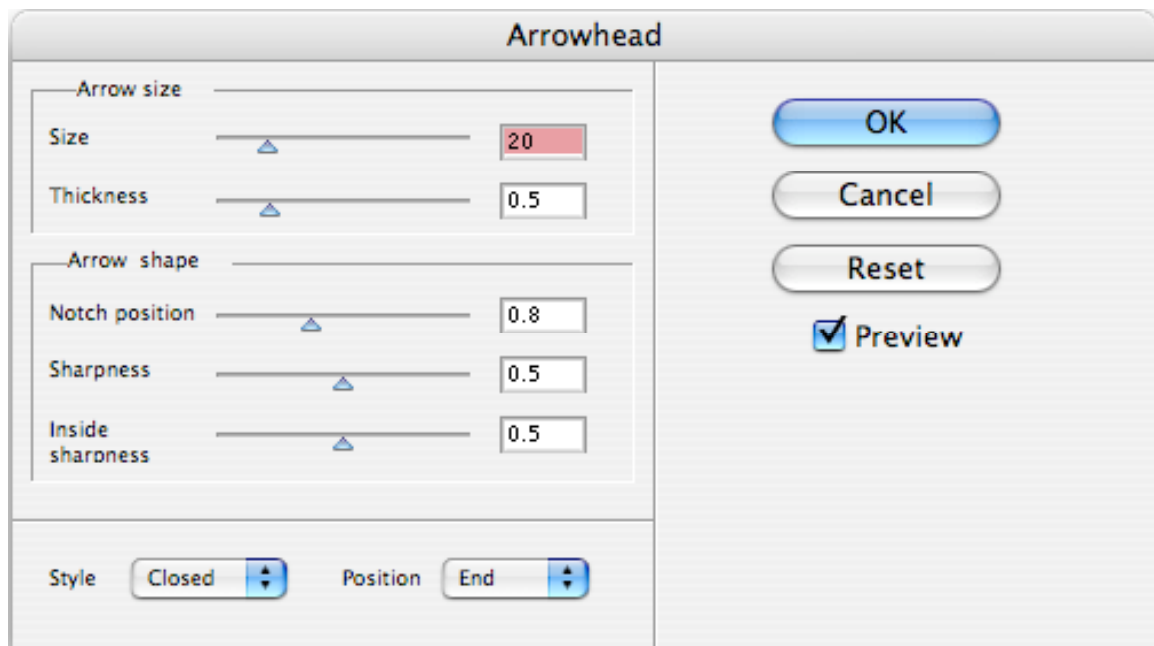
The Crenellate, Roughen, and Straighten filters work with partially selected paths. To partially select a path, use the Direct Selection tool or the Lasso and drag across those portions of the path to which the filter will be applied. Note that you can use the shift key with these tools to select multiple parts of the path. The corresponding effects work on the whole path only.

All filters are actionable.

Arrowhead Filter and Effect

Although Illustrator already has a built-in arrowhead tool, it's rather limited and in particular has the irritating characteristic that the arrowhead extends beyond the ends of the path. This filter is an attempt to rectify the more serious deficiencies of Illustrator's Add Arrowhead filter.

Selecting a path and invoking Curvius's Arrowhead filter (or effect) brings up the following dialog:



With the default settings this will produce the following affect on a stroked line:



Although not easy to see above, the tip of the arrow is exactly at the end of the original curve. Also, the shape of the arrowhead will curve along with the path if the path is curved in the vicinity of the arrowhead.

This filter will produce no results if:

- a) The path is unstroked.
- b) On compound paths.

Some points on the controls:

Size

The size is expressed in point units as the distance in points from the arrow tip to the 'barb'. Compared with the previous graphic, doubling the size would yield the following:



Thickness

This is expressed in terms of the fraction of the size. Compared with the original graphic once again, doubling the thickness would yield the following:



Notch Position

This is expressed in terms of the fraction along the path (starting at the arrow tip) of the position of the notch with respect to the barb. The default is 0.8 but reducing it to say 0.5 results in a more sharpened appearance as seen below, again starting from the original default arrow.



On the other hand increasing it to 1.0 results in a square arrow.



and increasing it still further to 2 results in a diamond.



Sharpness

Sharpness controls the curvature of the two lines that run from the tip to the 'barb'. The default value is 0.5 which results in a straight line but increasing it to, say, 0.75 results in a sharper tip.



Inside sharpness

Similar to sharpness but controls the curvature of the two lines that run from the notch to the 'barb'. The default value is 0.5 which results in a straight line but lowering it to, say, 0.25 results in a more curved appearance at the back.



Style

The default style is 'Closed', meaning that the arrow is represented by a closed path with the same colour as the original stroke. However two alternate styles are available. Here is 'Stroked', where the arrow is represented with a white fill and stroked outline; the stroke width and style

being identical to that of the original path.



The third style, 'Open', represents the arrow as an unfilled stroked path.



In the case of the default "Closed" style, the arrow tip lies exactly on the original end point of the path. For the other two styles, the arrow tip extends by an amount approximately equal to half the stroke width.

Position

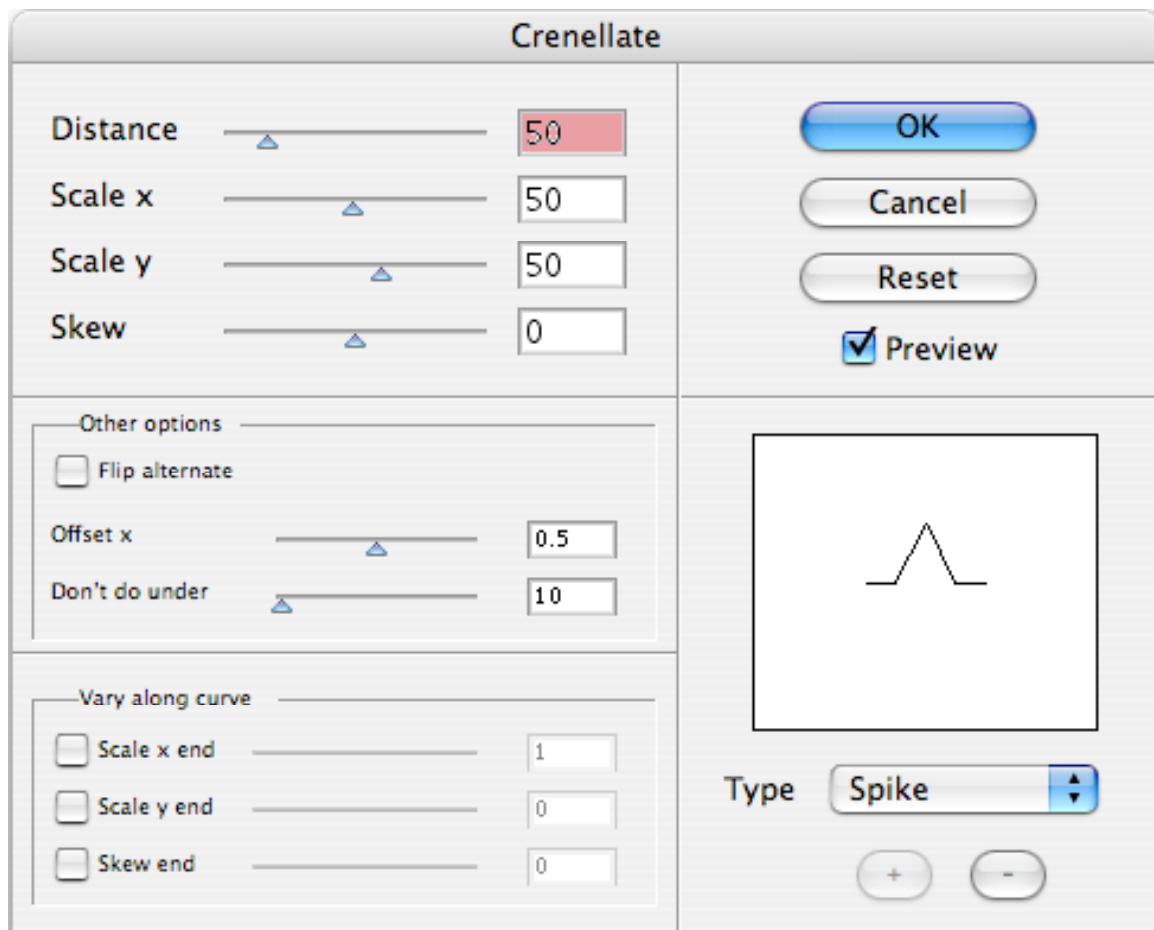
The arrow is normally added just at the end of the path but optionally it can be added at the start or be applied to both ends. For the sake of completeness here they are.



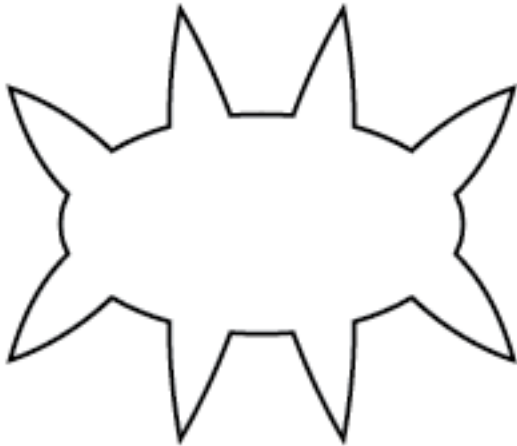
Crenellate Filter and Effect

Crenellate works by repeatedly adding a path defined by a crenellation definition to the selected artwork. Some simple crenellations are predefined: the user may create arbitrarily complex ones from Illustrator art.

Selecting a path and invoking Curvius's Crenellate filter (or effect) brings up the following dialog:

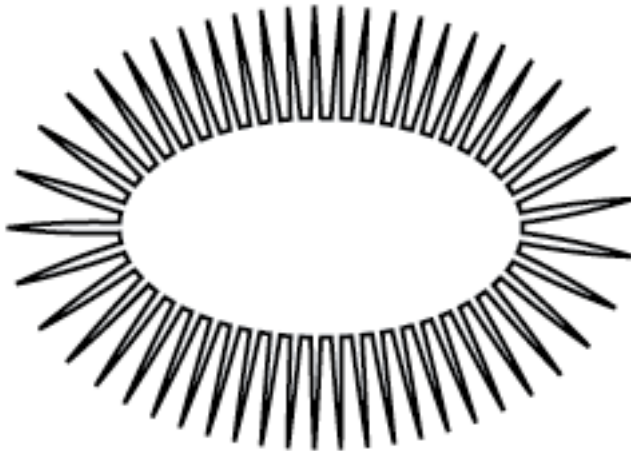


With the default settings this will produce the following affect on an ellipse:



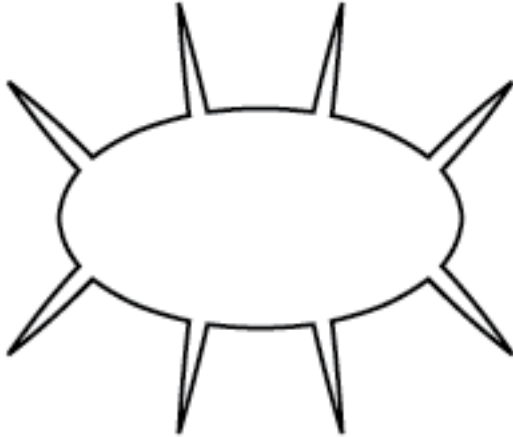
Distance

This is the distance between crenellations expressed in point units. Compared with the previous graphic, reducing the size from 50 to 10 the size would result in the following:



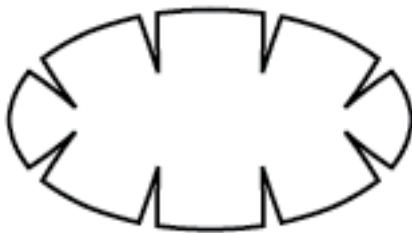
Scale x

This is the percentage of the distance between crenellation instances that is taken up by the crenellation itself with the remaining fraction being taken up the original path. Values from 1 to 100 are permissible: here is the original with this value reduced from 50 to 15.



Scale y

The height of the crenellation in points. Negative values are allowed, and here is the original path with the scale changed from 50 to -25



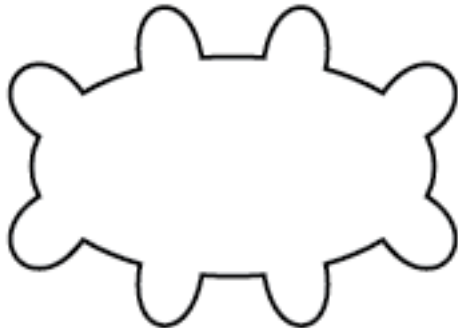
Skew

Slants the crenellation definition left or right. This is the original path with the skew value set to 1.



Type

The crenellation definition. While the default is Spike, several other 'precanned' definitions are provided: the graphic below shows the original ellipse with a hemisphere. User-defined crenellations are discussed later.



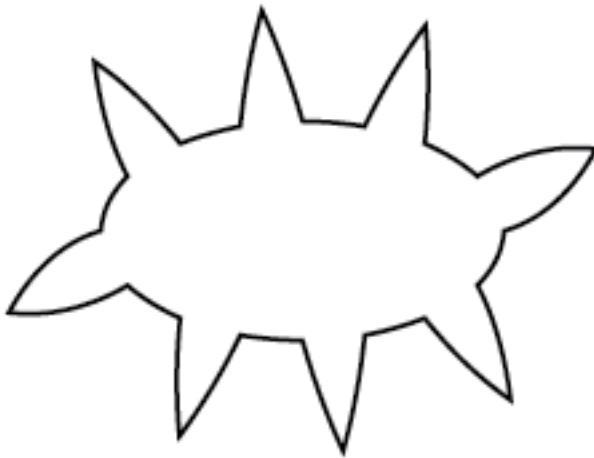
Flip alternate

When set, alternate instances of the crenellation definition are flipped across the path. When applied to the original path you end up with the rather ugly construct seen below. Much more pleasing examples can be made; in particular some nice zig-zag effects can be seen when the Scale X is set to 100 and other crenellation definitions are used.



Offset x

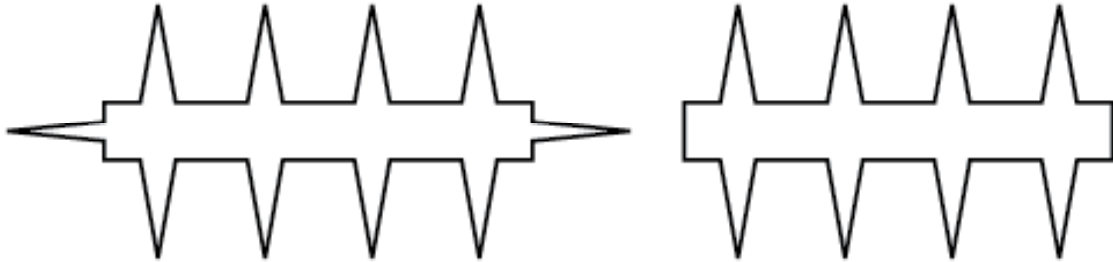
This simply controls where, starting from the beginning of the path and expressed in terms of fractions of the crenellation distance, where the first crenellation instance starts, allowing for a little fine-tuning of the appearance. Here's the original with value reduced to zero.



Don't do under

Crenellation cannot be done across corners, so art to be crenellated is split up into sections delimited by corners. These segments are then processed individually. On occasion, a section may be so short that the

appearance of a crenellation instance within that section may be distorted. This setting provides a way of setting a lower limit on the section length (in points along the path) that may be crenellated. As an ellipse has no corners this effect is illustrated on a thin rectangle.

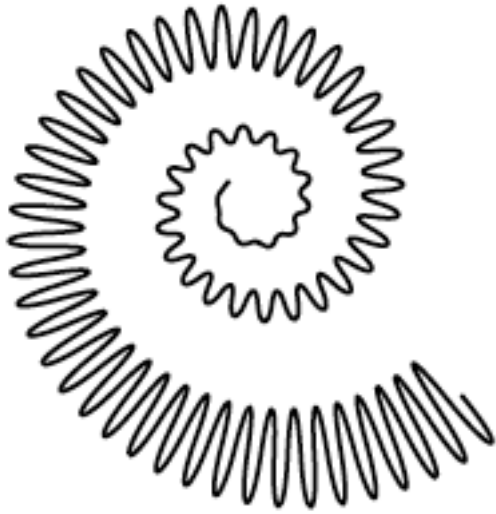


On the left is the original rectangle crenellated according to the default settings, while on the right the 'Don't do under' setting has been increased till it has exceeded the length of the short rectangle sides.

Vary along curve

Three of the above settings; Scale x, Scale y, and Skew can be varied along the path. The value of these settings at the start of the path or section is given by the value specified in the main slider/text edit box, while the value at the end of the path is given by that specified in the controls at the bottom of the dialog box. Interpolation is linear with distance along the path.

Using this on open paths tends to result in better effects than if it were used on closed paths so here is an example using a spiral with a crenellation type of semicircle; a value for Scale x of 100; Flip alternate set; and the value of Scale Y set to 0 at the end.



User-defined crenellations

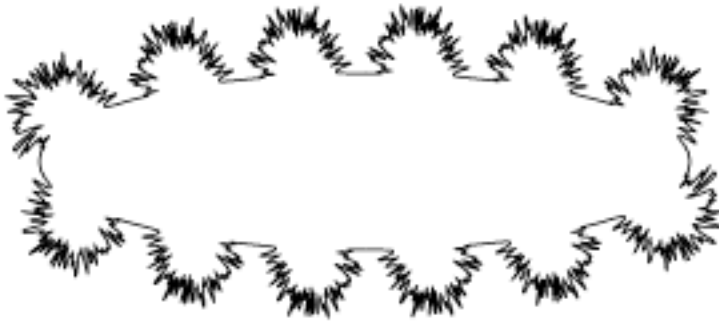
Crenellate provides some 'pre-canned' crenellation definitions, most of which are comparatively simple, but also provides a means of creating arbitrarily complex crenellation definitions from existing Illustrator art.

The steps to do this are as follows:

- 1) Create an open path in Illustrator that will serve as the crenellation definition. For best results, the start and end points should be relatively far apart.
- 2) Name the path to something other than the default <Path>. This is because the name of the path will be appended to the Type menu and its best to have something meaningful,
- 3) Select the path and invoke the Crenellate filter. (Best to turn preview off to avoid confusion as otherwise it will look as if the art that will form the crenellation definition is itself being crenellated with whatever the current definition is).
- 4) Click the button labeled + below the type menu and Cancel to exit the dialog.

5) The definition has now been added to the Type menu: it can be used like any other definition.

Here is a circle that has been roughened; cut in two, and then one half used as a crenellation definition. This definition is in turn applied to an ellipse.



The definitions are held across invocations of Illustrator: in fact they are stored in a file called CurviusCrenDefs in the Preferences file. This file may be safely deleted (it can even be edited if you like: its in text format),

Individual crenellation definitions may also be removed by selecting them in the type menu and clicking the “-“ button below it.

Crenellation will work on multiple selections, and the filter will work on the selected segments of partially selected paths (i.e. use the Direct Selection tool and drag across those segments that are to be crenellated).

Roulette Filter and Effect

Roulette is not only the name given to an uninteresting casino game, but also to a particular class of curve generated by the following mechanism:

Take a path, P (closed or unclosed; it doesn't matter), and a closed path, C . Consider a point X lying on the perimeter of C . As C rolls along P , the path traced out by X is called a roulette, and some fantastic curves can be created in this way.

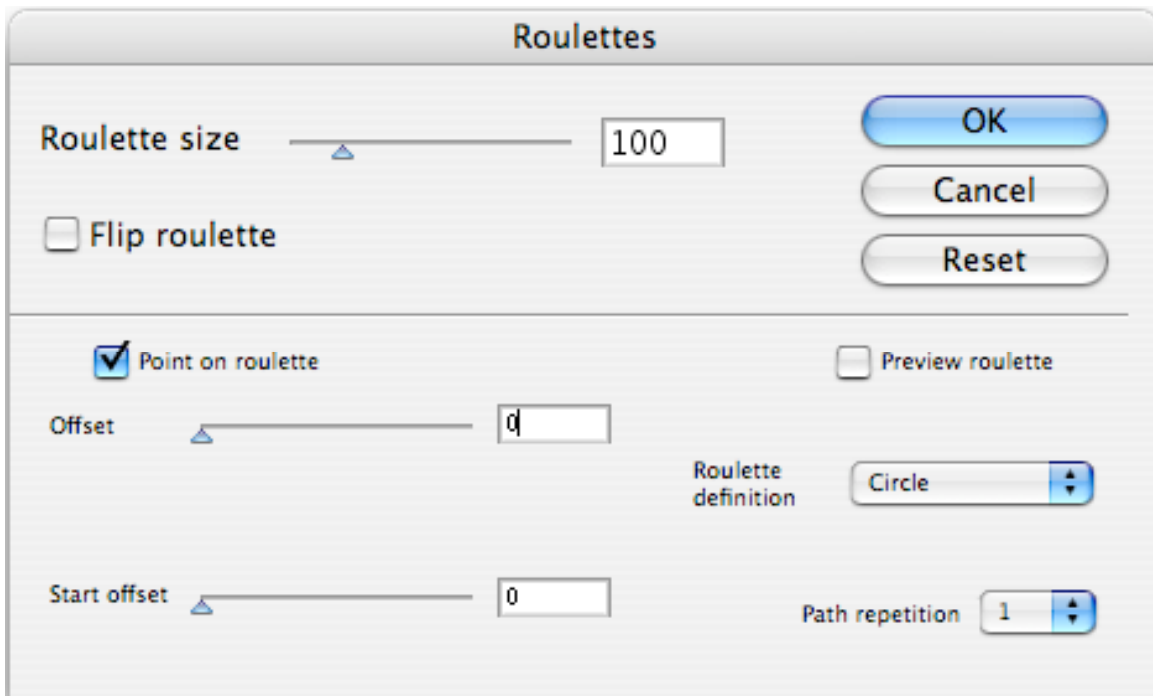
In Curvius, P is represented by the currently selected artwork and C is selected from a predefined list. The default selection for C is a circle.

Some of the simpler roulettes have their own special names. For example, if P is a straight line and C is a circle, we get a cycloid, which looks like this:



There are a fair number of options to this tool, and it is perhaps best introduced by selecting a simple path such as an ellipse, demonstrating what happens when using the default settings, and then changing the parameters one at a time to see the effect.

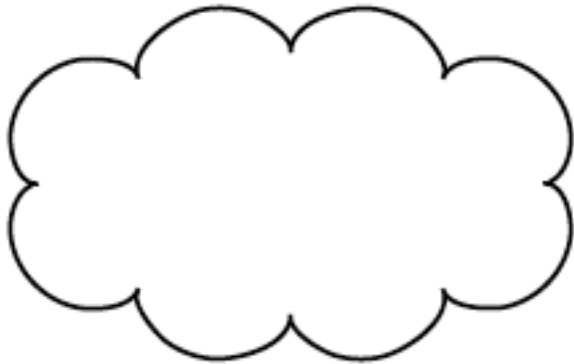
Selecting a path and invoking Curvius's Roulette filter (or effect) brings up the following dialog:



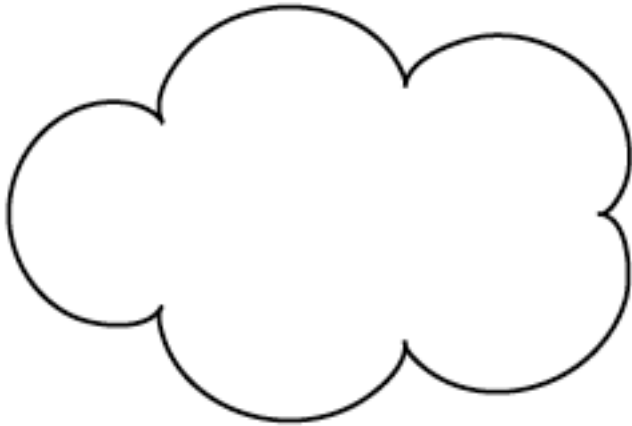
Here's what we see when we select an ellipse and invoke the Roulette tool with the default parameters:

Roulette Size

The slider and text box labeled Roulette Size control the perimeter length of the roulette definition (the circle is the default as mentioned above). Increasing this value will mean fewer 'bumps', while decreasing it will result in more.



Roulette size increased:



And decreased:



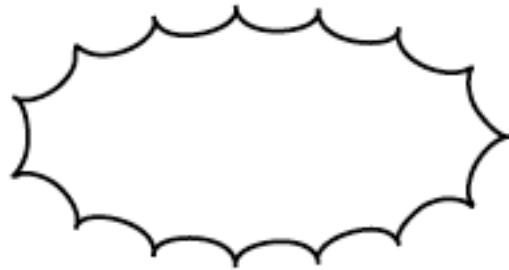
If the selected path is closed, the roulette size is constrained to certain values; hence the 'jumping' effect when the slider is dragged and the preview is on. This is because the perimeter length of the path must be an integer multiple of the perimeter length of the roulette definition: otherwise the path would not join up at the beginning and end.

This filter will work on multiple paths but not portions of paths, as do the other filters in Curvius.

Flip roulette

By way of illustration, consider a circle, A, rolling along an ellipse, B. A can roll either inside or outside B and the curves generated will be completely different. The Flip Roulette checkbox toggles this inside/outside behaviour.

All the previous graphics showed a roulette generated by a circle rolling along the outside of an ellipse. Here is the result of toggling the flip and having the circle roll around the inside of the curve instead.



Reset

This button sets everything (including all the options) back to their default settings. This is useful if things get too confusing.

Preview

This checkbox controls the preview. Leaving it on is recommended unless you have many long paths selected and/or a slow machine.

Preview Roulette

If this control is checked, then a preview of the roulette definition is drawn at the start of each selected path. The roulette definition is drawn in red and the control point (Point X in the second paragraph) in green.

Having this checkbox set while the preview itself is off can provide some insight into the way these curves are generated.

Note that if both Preview and Preview Roulette are checked, the green cross that indicates the position of the control point will always lie on the preview path due to the nature of the generating process.

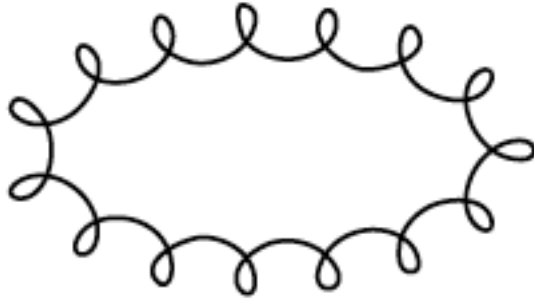
Point on Roulette

As explained earlier, the roulette is generated by a point, X , on a closed curve, C , as it rolls along another curve, P . However, the point need not actually lie on the perimeter of C (although it normally does). It is sufficient that X be fixed in relation to C .

This checkbox toggles between these 2 options. How we control the position of this point in relation to the roulette definition depends on whether this checkbox is ticked or not.

The character of the curves generated by these two modes are different. If the point is on the roulette, the resultant path will contain cusps (it's

actually a good idea to set the Stroke Join setting to round). If not, the appearance is more rounded, possibly containing loops. Here is the previous graphic with Point on Roulette unchecked and X set 1 and Y to 0.



Offset

(Visible and relevant if and only if Point on Curve checkbox is selected).

This slider/text edit box controls the distance of the control point along the perimeter of the roulette, measured as a fraction from 0 to 1. In the (default) case in which the roulette definition is a circle, this does not affect the main shape of the curve, but rather, what might be termed the 'phase' of the curve. The change of the original curve's shape appears to shift along the path.

If the roulette definition is something other than a circle, the shape of the curve will change. For example, in the case of a crescent rolling along a straight line, changing the Offset value from 0 (left) to 0.75 (right) dramatically alters the shape of the line.

X, Y

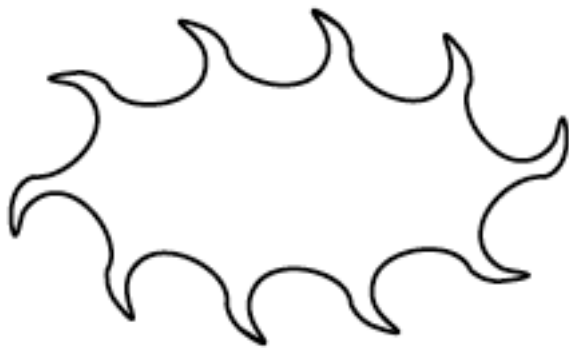
(Visible and relevant if and only if Point on Curve checkbox is not selected)

These determine the position of the control point relative to the centre of the roulette. Their effect can be most easily seen if the Preview Roulette checkbox is selected. It is best to just experiment with these, but two examples are shown below. In each case, a circle is rolling on an ellipse. In the left hand example the generating point is inside the circle, while in the right hand example it is outside.

Roulette Definition

As explained previously, the default roulette definition is a circle, but it is possible to use other closed paths as the definition. One that gives pleasing curves is the crescent (a very thin C).

This example uses the crescent as the definition. It is rolling on an ellipse.

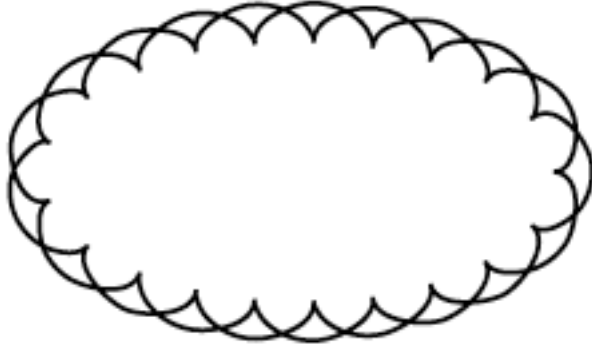


The same, but with a point not on the roulette path, creating a nice mushroom effect:

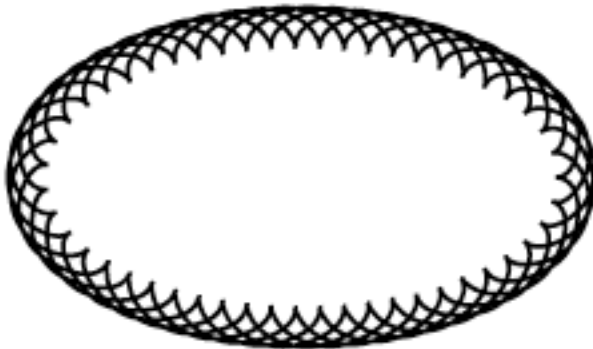


Path Repetition

This allows the generating roulette (C) to roll along P more than once, generating some nice 'spirograph' effects. In the standard circle-on-ellipse graphic as seen below, the Path repetition value has been set to 2.



Here it has been set to 5.



Note: If P is unclosed and if the path repetition value is even then P will be treated as closed with the path reversing back on itself appropriately.

A straight line with a circle rolling along it 6 times:

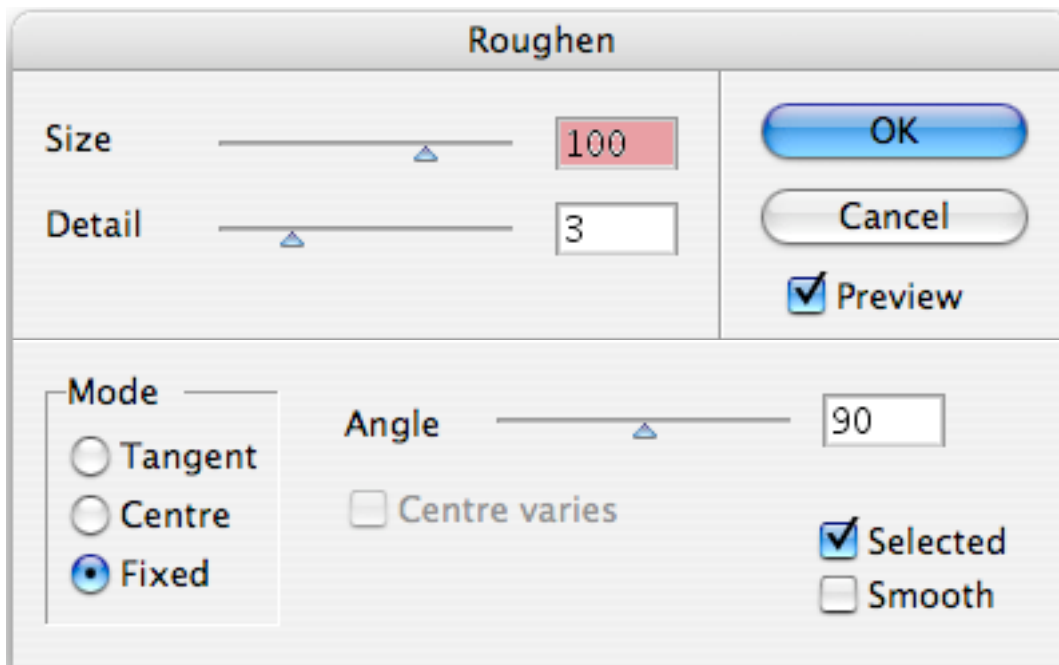


Roughen Filter and Effect

The Roughen filter is an improved version of Illustrator's own Roughen filter. It has the following advantages over the native filter:

- 1) The effect is reproducible. The same filter settings applied to an object in the same position will always produce the same result.
- 2) Touching edges are treated identically with no gaps or overlaps.
- 3) Partial selections may be roughened.
- 4) The direction of roughening may be changed in several ways.

Invoking the Roughen filter (one or more paths must be selected first) brings up the dialog box shown below:



Size

This slider/edit text box controls the maximum distance, in points, by which the points can be moved.

Details

This slider/edit text box controls the level of detail in the resulting art. A low value results in a spiky appearance while a high value will give a smoother effect. This is an approximate value only: points are not necessarily added at an equal distance along the path. A low (numerically speaking) value of detail results in the familiar spiky appearance: a high one gives a more crinkled hand-drawn appearance that is particularly pleasing with the smooth option turned on.

Preview

This checkbox indicates whether a preview is to be shown. Shown for the filter only.

Selected

If the preview is checked, this checkbox indicates whether the artwork is to be shown as selected or not. Illustrator's selection marks can obscure the art, particularly when the points are close together: un-checking this option enables the result to be shown more clearly. Shown for the filter only.

Smooth

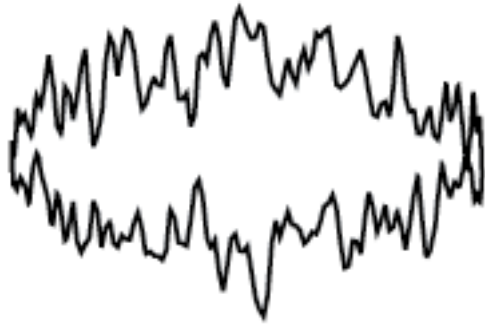
When set, all points in the resultant art will be smooth.

Mode

This radio group controls the way in which added points are offset from the original.

Tangent

In this mode, points are offset perpendicular to the original path in a manner very similar to Illustrator's own roughen filter. Corner points are not processed. Here's an ellipse roughened in this way.



Centre

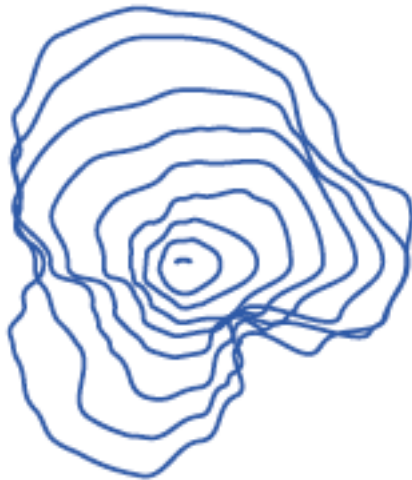
In this mode points are offset from the centre of all selected artwork, resulting in a radial appearance to the new art. Example:



Centre varies

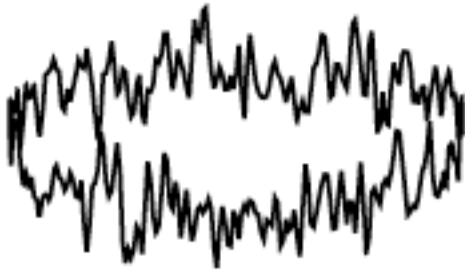
This checkbox is enabled if and only if Centre mode is selected. If set the size of the roughen effect is proportional to the distance from the centre of the selected artwork : this will be the common centre if more than one object is selected.

Here is the effect applied to a series of concentric circles: note variability is greatest towards the edges.

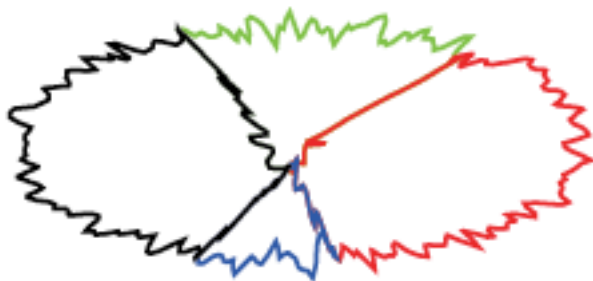


Fixed

When set, roughen takes place in a single orientation which is specified by the Angle Slider/Text Edit box. Here is an ellipse roughened in a fixed direction of 90 degrees.



One useful feature of this filter is the fact that adjacent edges are treated in exactly the same way. To demonstrate this, here is an ellipse that has been cut into several pieces by the knife tool. Selecting all of them and processing them with the roughen filter it can be seen that the new edges match exactly.

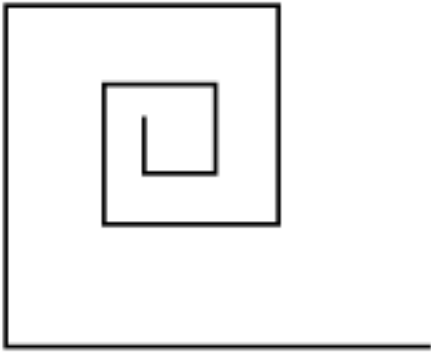


The edges have been given different stroke styles so that the results are more readily visible.

Straighten Filter and Effect

This filter, which has no parameters, simply converts all I selected curved segments into straight ones.

Here is a spiral to which the Straighten filter has been applied.



Restrictions:

1) Curvius will not work on text art, raster art, graph art, or gradient mesh art.

2) Live blends are affected by these tools, however be aware that in addition to the end paths the spine of the blend will also be affected. It may be desirable to expand blends.

3) When using Partial Selections (see above) deselecting and subsequent reselecting the Preview checkbox will result in the loss of information as to which points were originally selected (i.e. the entire path will now be treated as selected).

Some Interesting URL's:

Well, interesting to me anyway.

<http://www.ics.uci.edu/~eppstein/junkyard/all.html>

<http://www-history.mcs.st-and.ac.uk/~history/>

Curvius 3.0 Written by Stephen Vincent