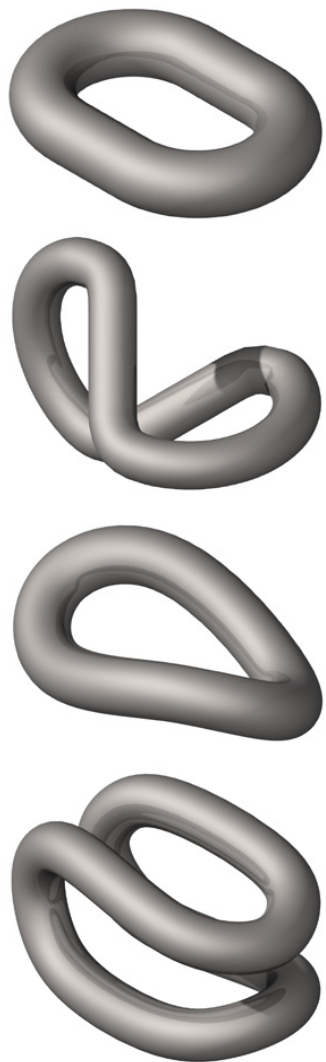
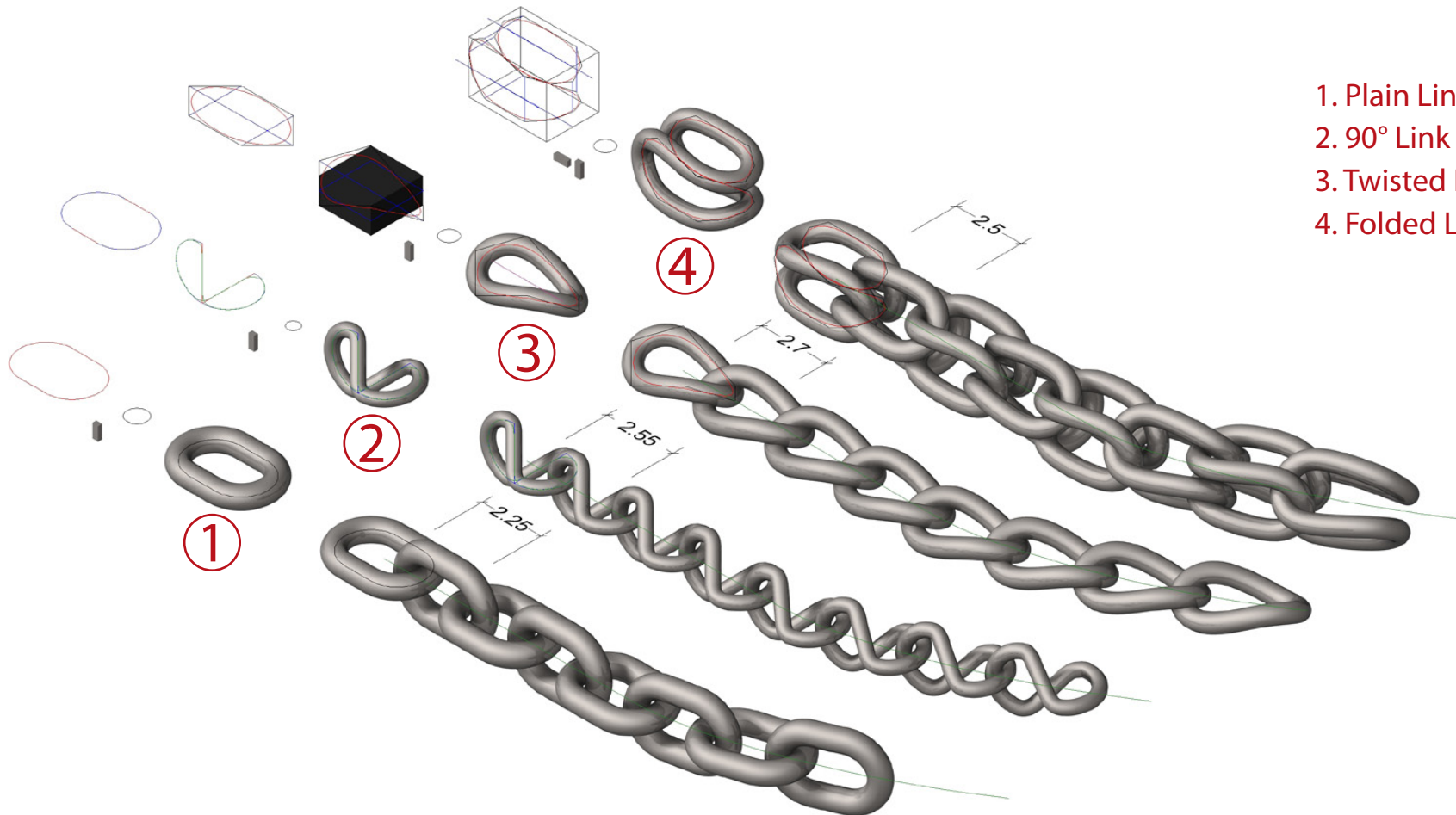


Creating chain links in TurboCAD is not as difficult as one might expect. Additionally, the new V18 Pro tool *Graphic On Path* makes creating a string of links as simple as one, two, three?



Four styles of links are looked at in the following pages, although the TurboCAD user is in no way limited to these four alone. As long as the resulting sweep does not intersect, a user should not have any problem coming up with any number of styles.



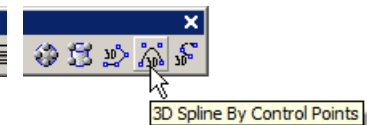
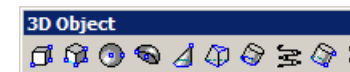
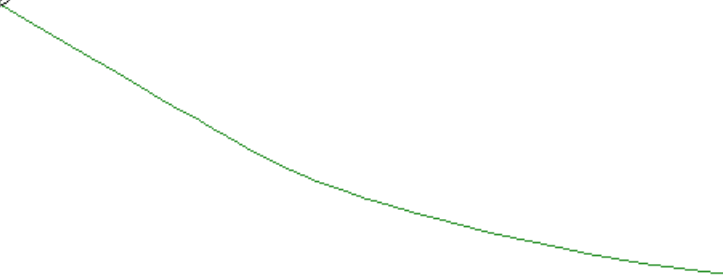
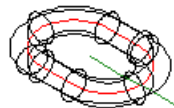
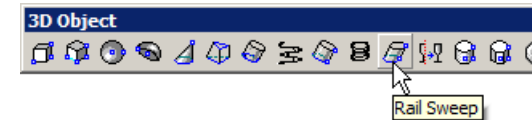
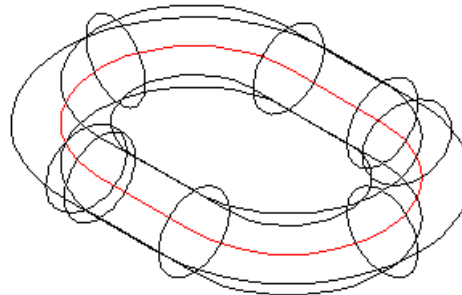
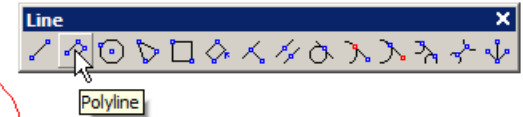
- 1. Plain Link
- 2. 90° Link
- 3. Twisted Link
- 4. Folded Link

The plain link is the easiest to create. It starts out with a polyline path or filleted rectangle and a circular profile.

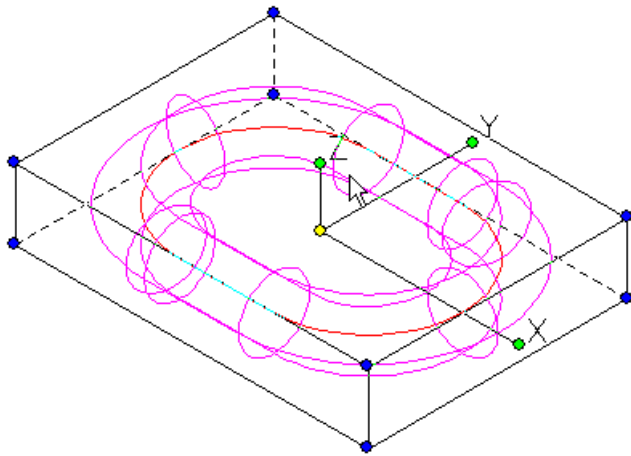
The circular profile is then swept along the polyline path using the Rail Sweep tool.

A 2D or 3D Spline (curve) is then laid out for the string of links to follow.

Care should be taken when creating the path so that it conformed to the natural flow of the links.

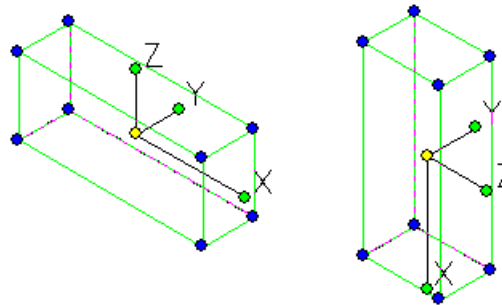


When the links are copied along the path they travel along the Z axis, so it is important to see if the coordinate system for the new link is oriented correctly. This can be checked by selecting the link and noting the indicator. In this case Z is pointing up - it does not point in the desired direction of the path.



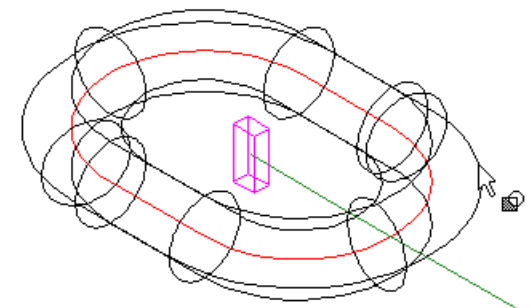
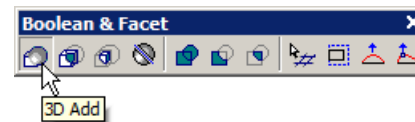
To change the coordinate system for the link the method that has come to be known as 'seeding' can be employed.

This means that a small box is created and rotated so that the Z axis does travel in the desired direction.

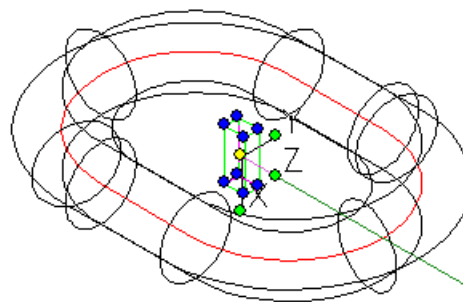
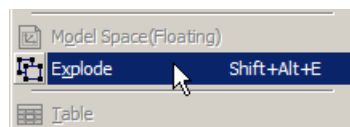


The newly rotated box is then E snapped to the link and then 3D added (selecting the seed first) to the link.

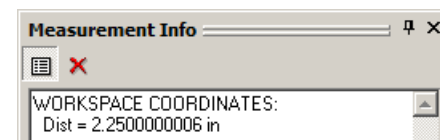
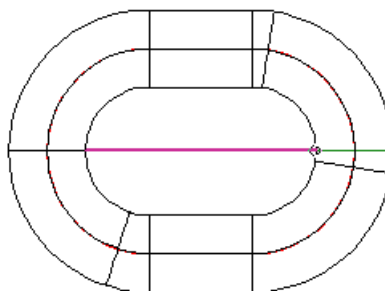
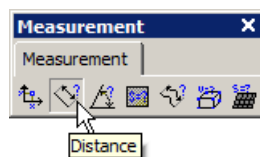
The coordinate system, as well as layer name, materials and so forth, are transferred to the link.



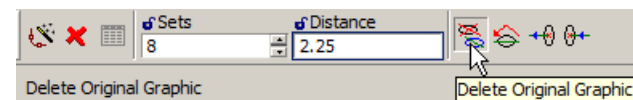
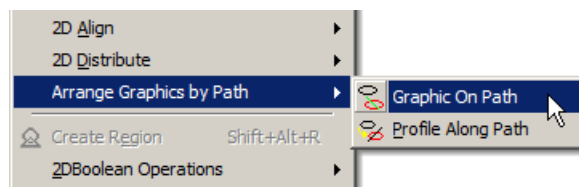
Because the link and the seed do not intersect, the added unit can be exploded once and the seed deleted. The transfer of coordinates remains as intended.



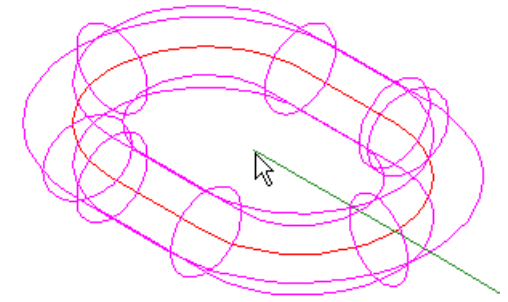
The user must determine the distance between links. In some cases this is easier than others. For the plain link it is a matter of using the Distance tool and finding the distance from the left inside edge to the right inside edge. In this case it is 2.5 inches (large links used).



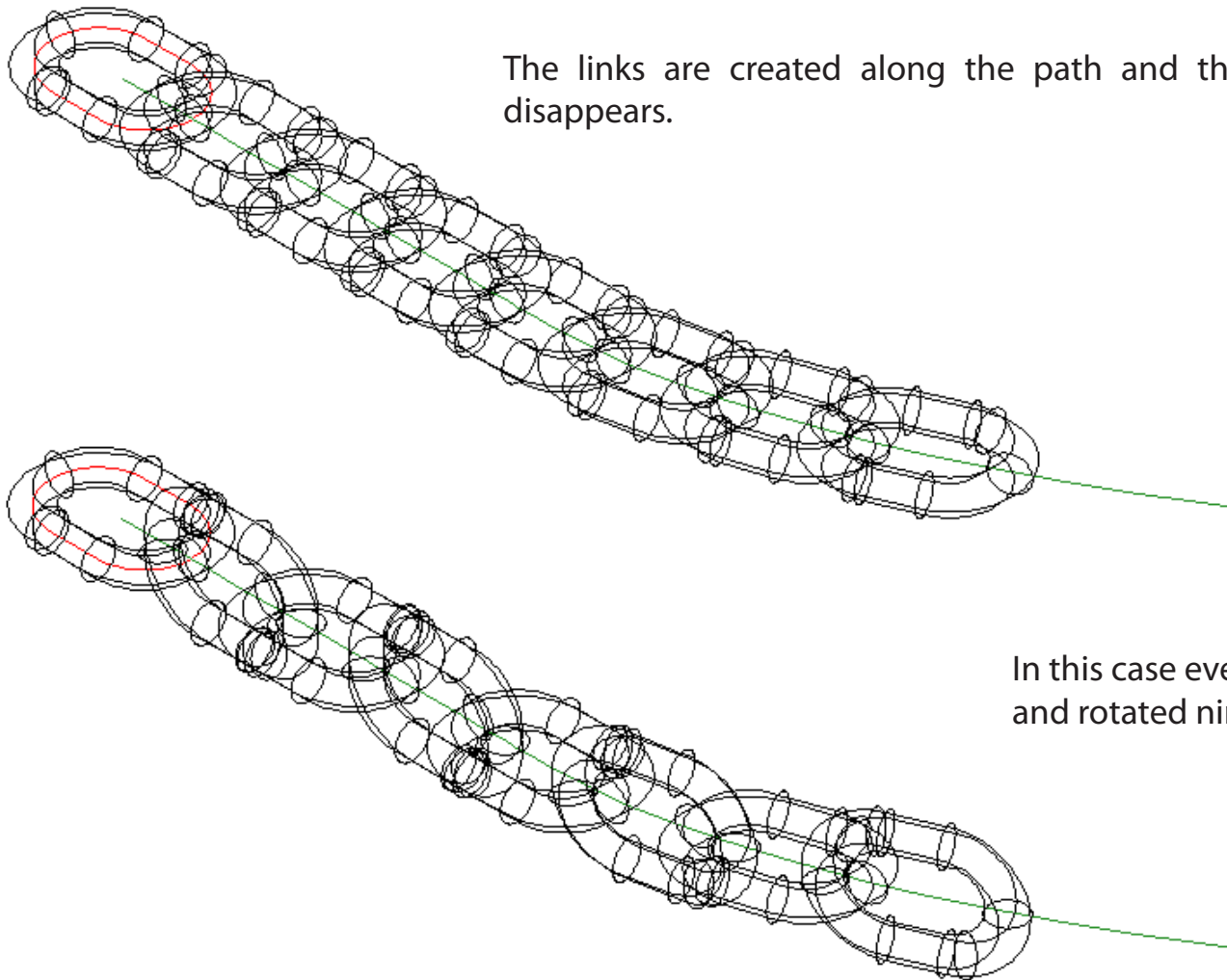
The Graphic On Path tool is then selected and the number of Sets and Distance is input. Delete Original can be selected and those to come.



The link is selected as the graphic and then the starting point is defined by a V snap at the beginning vertex of the spline.



The links are created along the path and the original disappears.



In this case every second link must be individually selected and rotated ninety degrees.

The process is similar for all styles of links, although in some cases, like the 90° link and the twisted link, no further final link rotations are required.

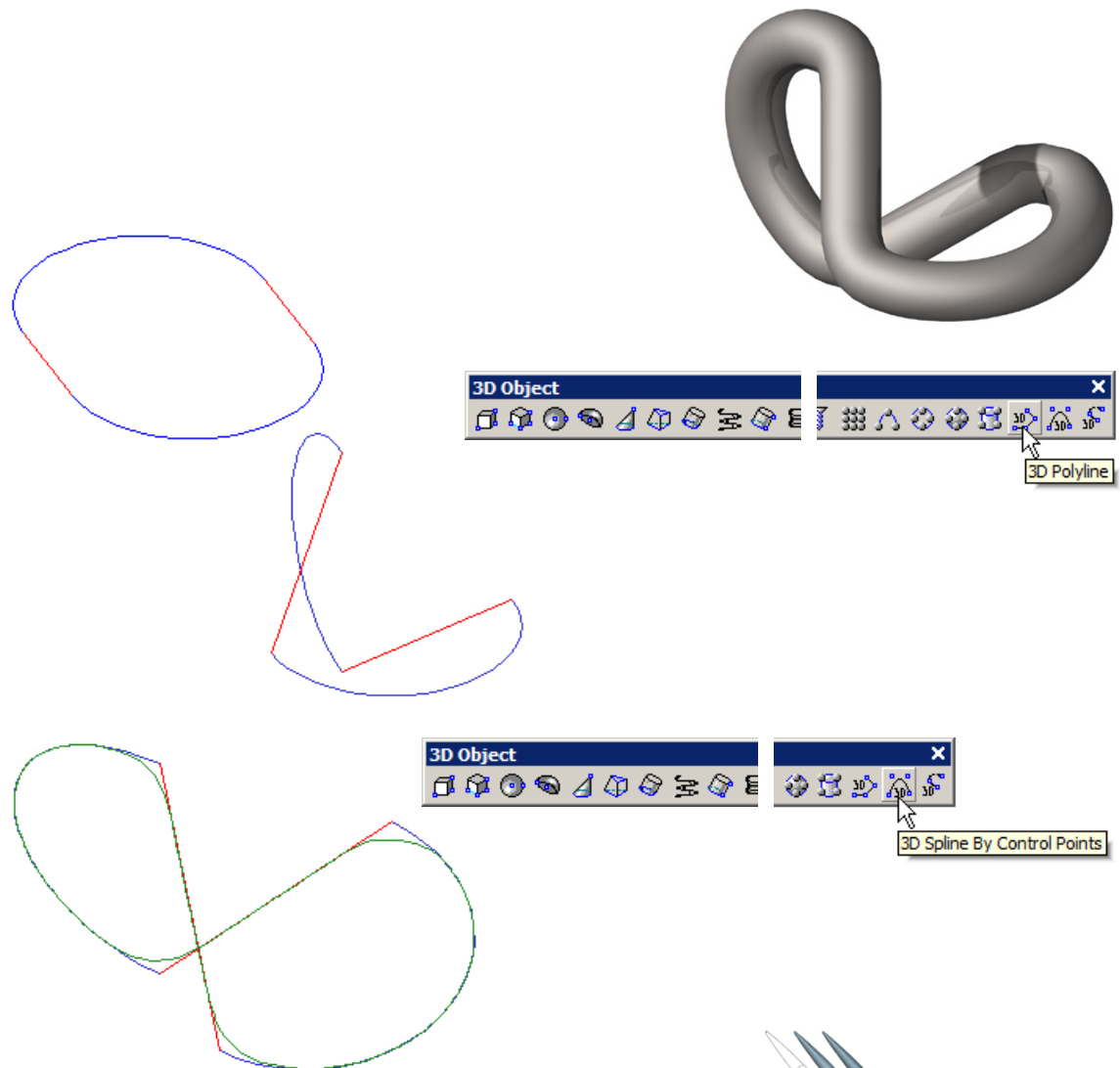
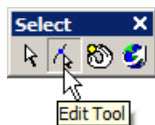
The 90° link begins with the same setup as the plain link. It is then exploded down to its constituent parts (arcs and lines).

One of the arcs is then rotated 90°.

The 2D lines are deleted and then the 3D Polyline tool is used to connect the arcs.

The profiles are then traced using the 3D Spline By Control Points tool. Points are N snapped in small increments leaving sufficient space at the corners to create a smooth turn. Close is selected when the last point is near the first point.

The Edit Tool can be employed to reposition the nodes if need be, again using N snaps to place the nodes.



The circular profile is then swept along the 3D spline path using the Rail Sweep tool.

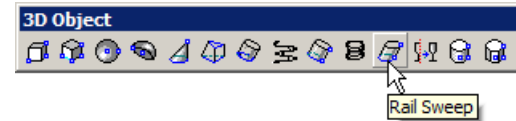
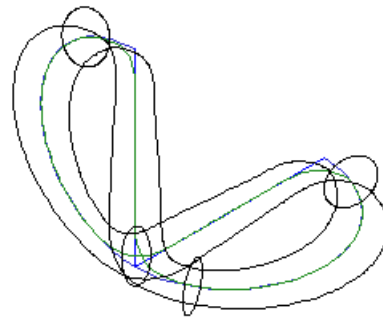
As before, a 2D or 3D Spline is laid out for the string of links to follow.

If need be, the coordinates of the link are changed by the seeding method so that the Z axis points in the desire direction.

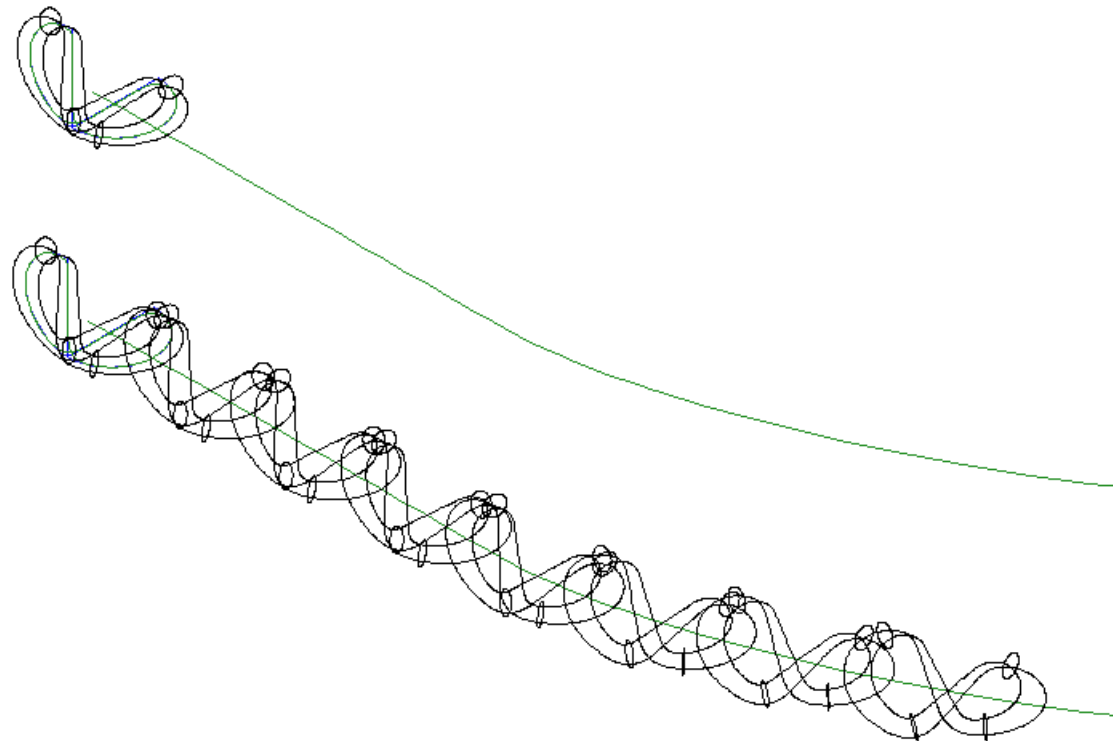
The distance between links is then determined.

The Graphic On Path tool is then selected and the number of Sets and Distance is input. Delete Original can be selected and is chosen in this case.

The link is selected and then the starting vertex of the spline is V snapped.



In some cases, like this link, the Z axis needs to point in the opposite direction of travel. In this case it was reseeded with a new box that had the opposite Z coordinates as illustrated on the previous pages with the plain link.

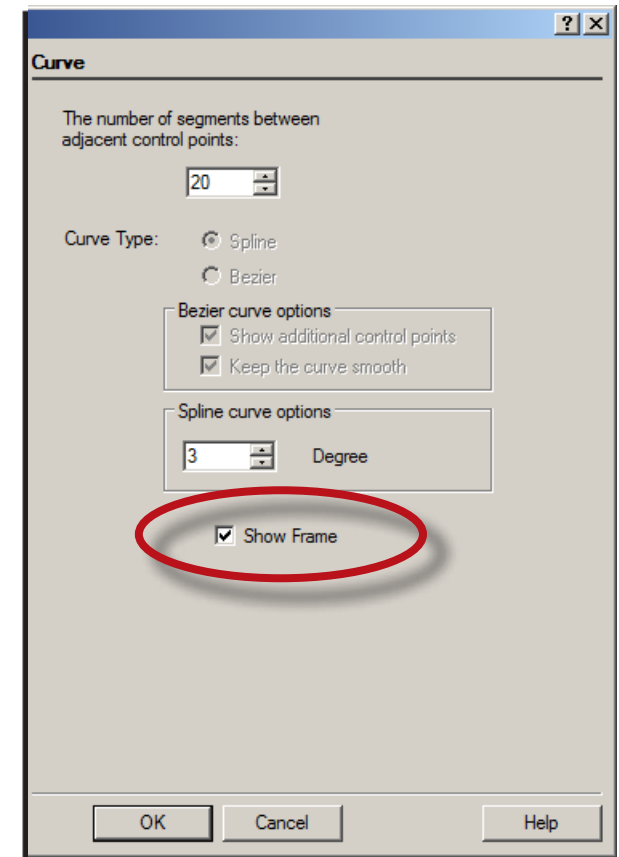
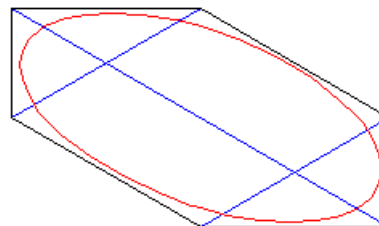
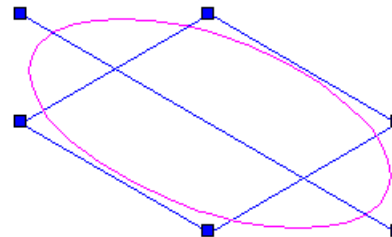
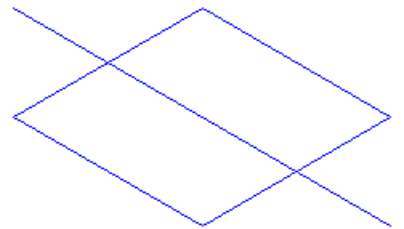
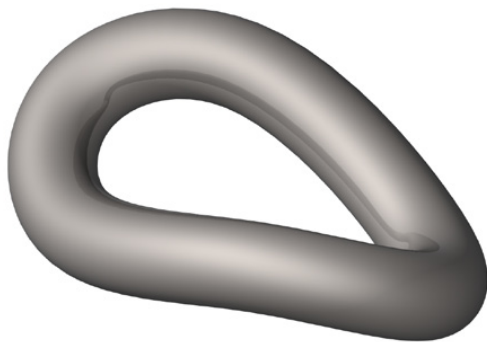


While discussing twisted links on the Beta forum, Henry Hubich offered his twisted link method which proved to be excellent. It is so simple, yet tremendously elegant, and it produces great results.

The twisted link begins with a line and a square.

A 3D Spline By Control Points is then V snapped to five of the vertexes. Close is selected after the fifth point is snapped in place. The Edit Tool has been engaged and the spline selected to indicate where the snaps were made.

The properties for the spline are opened and Show Frames is selected.



The rectangle is then extruded to create a box.

The Edit Tool is engaged and the four outside corner nodes are V snapped to alternating corners of the box.

The circular profile is then swept along the 3D spline path using the Rail Sweep tool.

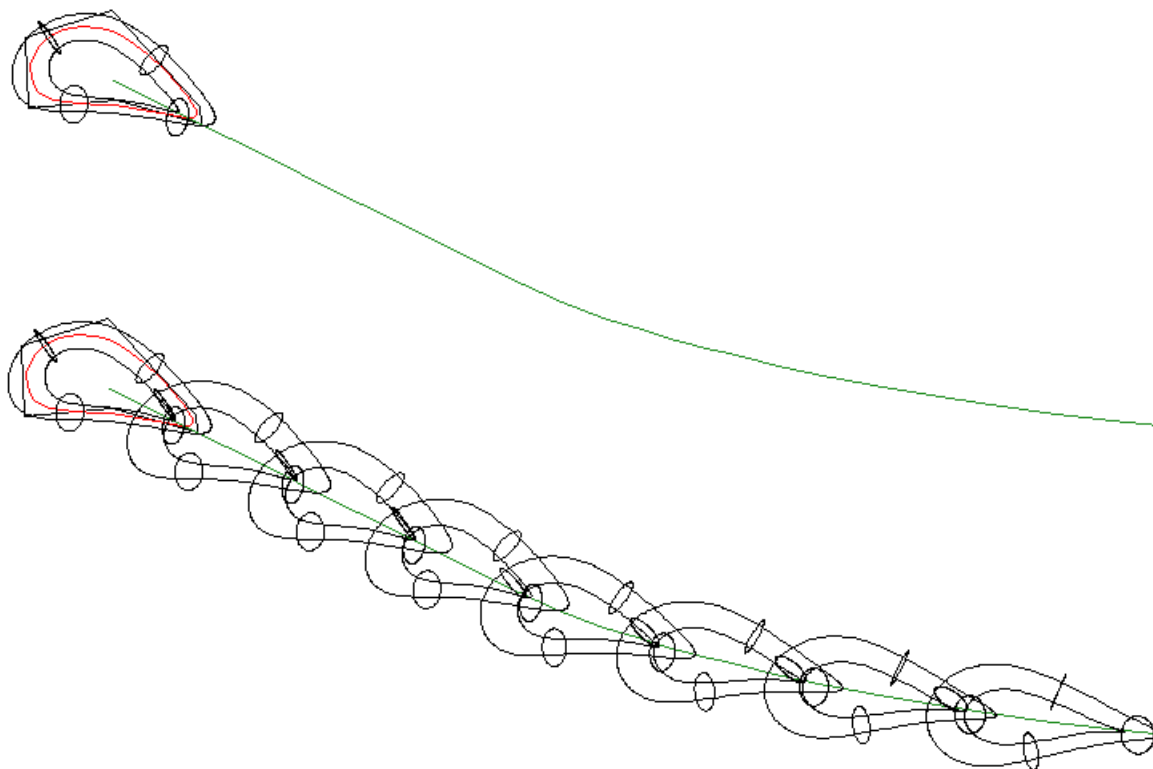
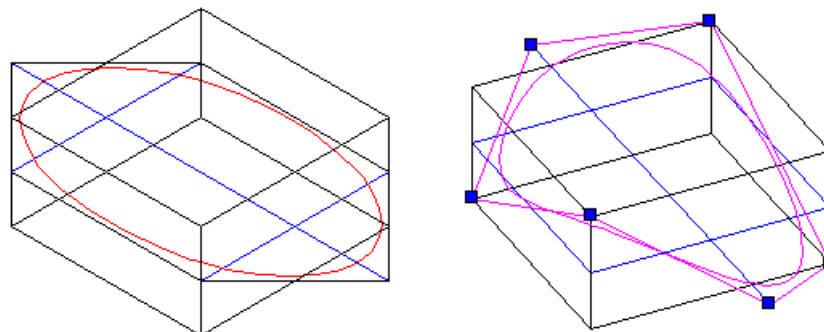
As before, a 2D or 3D Spline is laid out for the string of links to follow.

If need be, the coordinates of the link are changed by the seeding method so that the Z axis points in the desire direction.

The distance between links is then determined.

The Graphic On Path tool is then selected and the number of Sets and Distance is input. Delete Original can be selected and is chosen in this case.

The link is selected and then the starting vertex of the spline is V snapped.



While discussing twisted links on the Beta forum, Winston Mitchell offered a rendered image of a folded link he had constructed. Knowing the capabilities of the 3D Spline By Control Points tool, it was fairly easy to figure out how to lay out the initial profiles.

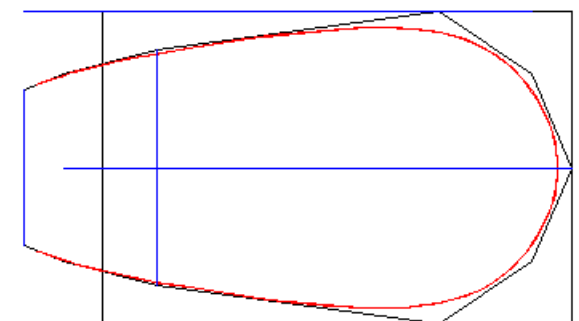
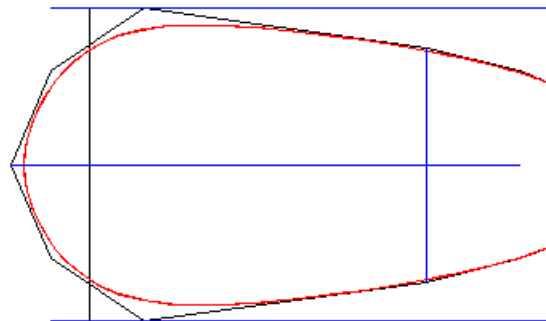
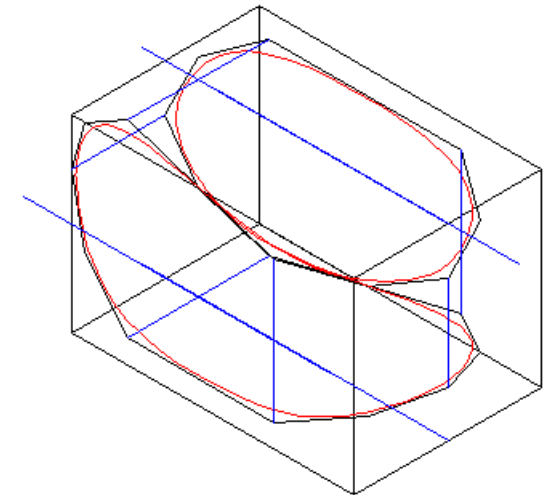
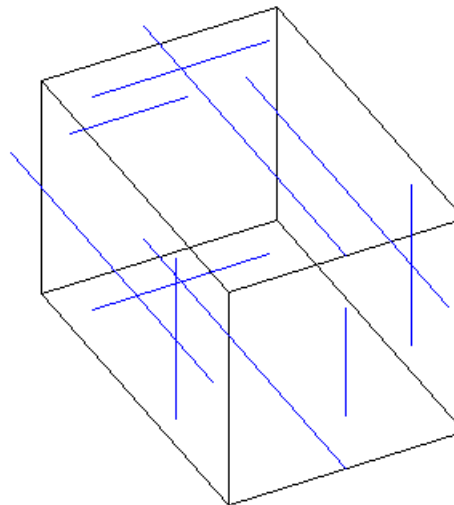
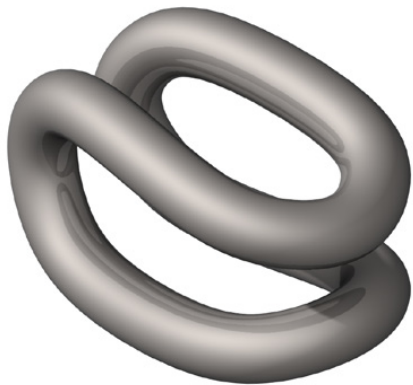
The folded link begins with a box and some lines.

A 3D Spline By Control Points is then V snapped to the vertexes. Close is selected after the last vertex point is snapped in place.

The properties for the spline are opened and Show Frames is selected.

Lines are adjusted as needed and the Edit Tool is employed to reposition the nodes using V snaps to place the nodes.

A curvature is required at each of the four loops so that the links can join without intersecting.



The circular profile is then swept along the 3D spline path using the Rail Sweep tool.

As before, a 2D or 3D Spline is laid out for the string of links to follow.

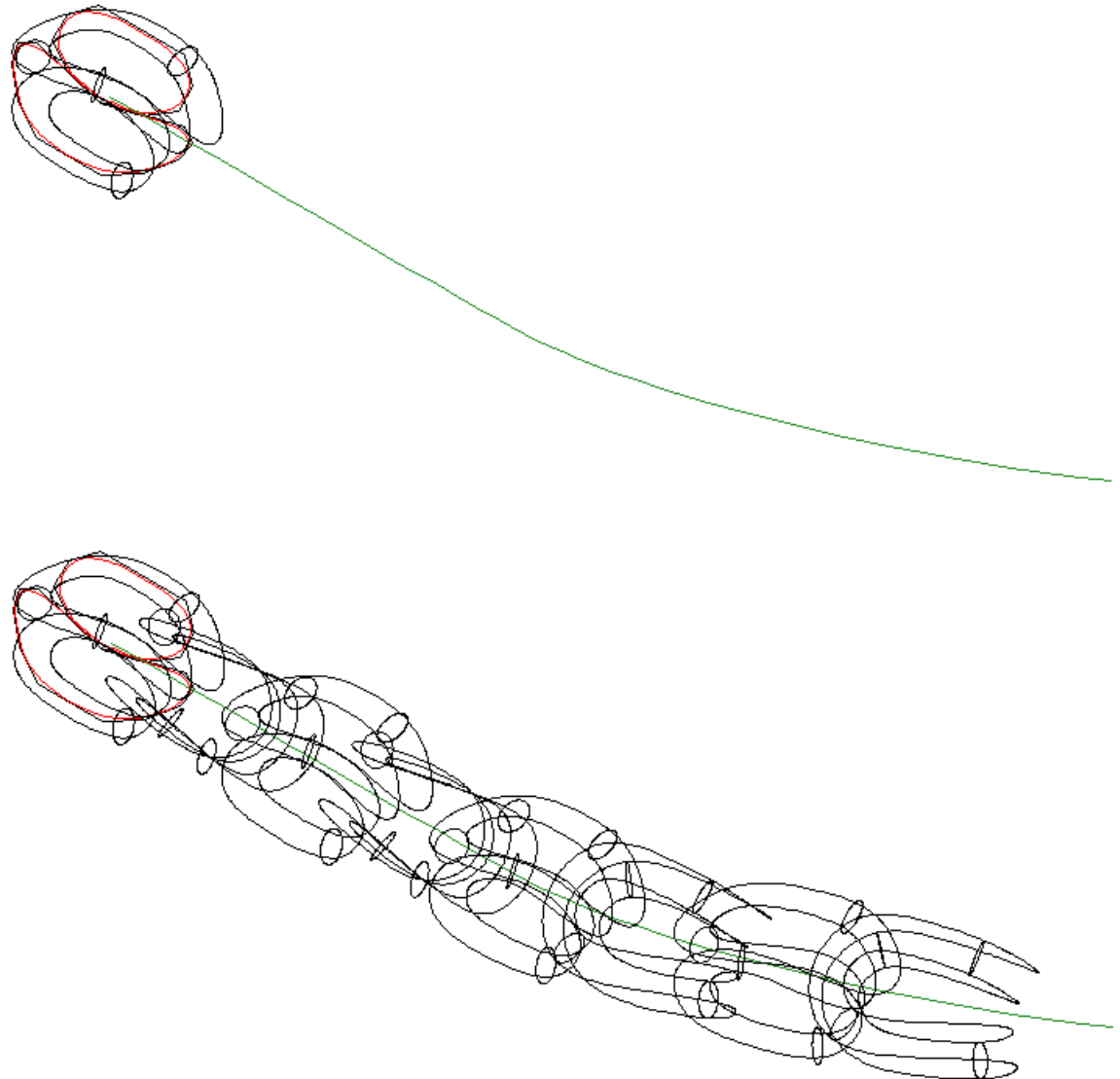
If need be, the coordinates of the link are changed by the seeding method so that the Z axis points in the desired direction.

The distance between links is then determined.

The Graphic On Path tool is then selected and the number of Sets and Distance is input. Delete Original can be selected and is chosen in this case.

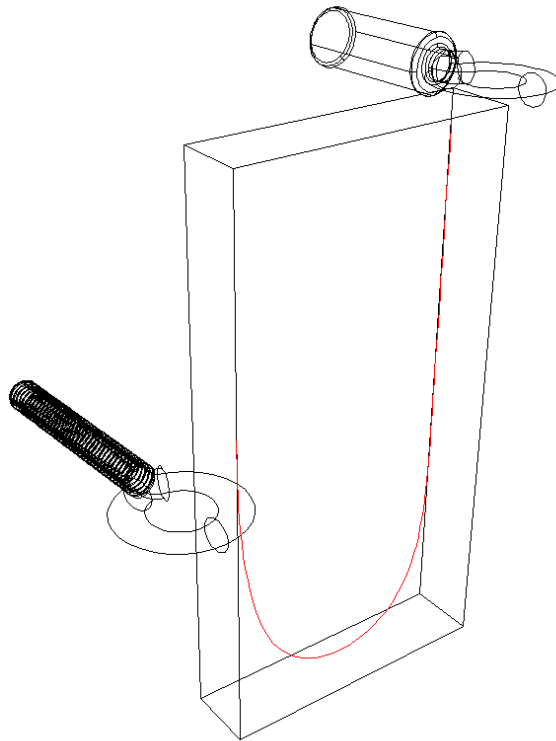
The link is selected and then the starting vertex of the spline is V snapped.

Every second link is then individually rotated 45° to complete the chain.



Please note that the sweep path for the string of links need not be limited to 2D.

A 3D Spline By Control Points can be placed by any suitable method. With this example a 3D box was snapped to the start and finish locations and a 3D Spline snapped to the box. A few tweaks were made to refine the results.



If you found this TurboCAD tip helpful, please consider purchasing a full Textual Creations TurboCAD project tutorial that will lead you through an entire project, keystroke by keystroke. You won't be disappointed! Visit the [Textual Creations Shopping Page](#)