Tutorial

Modeling a Pawn

In this lesson, you will model a pawn for a set of chessmen. In a wooden chess set of standard design, pawns are turned on a lathe. You will use **3ds max** to do something similar: draw the pawn's outline, and then use a Lathe modifier to fill out its geometry. The Lathe modifier revolves the outline around a central point to create a shape, not unlike the way wood is turned on a machine lathe.
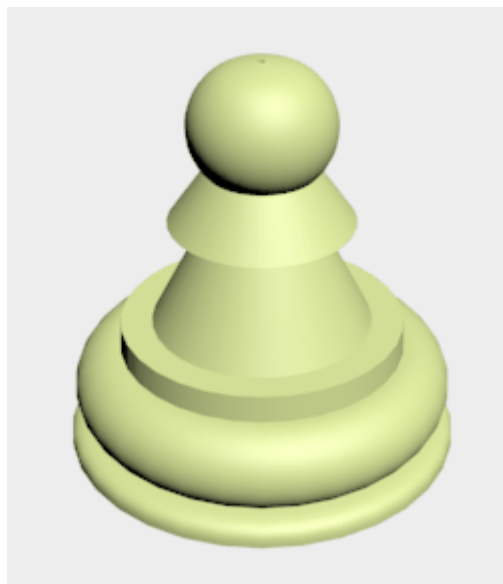
Features and techniques covered in this lesson:

- Using spline shapes to draw an outline of an object.

  This lesson also briefly introduces you to spline editing.

  Splines are a type of curve that is interpolated between two endpoints and two or more tangent vectors. The term dates from 1756, and derives from a thin wood or metal strip used for drafting curves in architecture and ship design.

- Using 2D snap to help control spline drawing.

- Using the Lathe modifier to turn a 2D outline into a 3D model.

Tutorial Files:

Tutorial files for this lesson can be found in the *\tutorials\intro_to_modeling* folder.

Skill Level: Beginner

Time to complete: 15 minutes

Set up the lesson:

- Start **3ds max** or choose File > Reset if the program is already running.

  No startup file is necessary for this tutorial.

Set up the grid and 2D snap:

You need to choose 2D snap options that will help you draw the outline. 2D snap can snap to the home grid that appears in viewports, or to other geometry in the scene. You also need to adjust the home grid so it is easy to see your work.

1. On the toolbar, click the Snap flyout and choose the 2D snap type.

   The 2D Snap Toggle is located on a flyout of 2D/3D snap options.

2. Right-click the 2D Snap Toggle. The Grid And Snap Settings dialog appears.

3. On the dialog's Snaps tab, turn on Grid Points and Grid Lines.

4. On the dialog's Options tab, set Snap Preview Radius to **10**, and set Snap Radius to **10**.

5. Close the Grid And Snap Settings dialog by clicking the X button in the upper-right corner of the dialog's window.

   Warning: The Clear All button at the bottom of the dialog clears all your snap settings. It is easy to confuse this button with a Close button!

6. In the Front viewport, and Zoom in until the viewport is a little over 10 grid squares high.

Now you are ready to begin drawing.

Start the pawn's outline:

You will draw the pawn's outline from the top down, beginning with the "knob" on top.

1. On the Create panel, click Shapes, then click Arc.

2. Make sure that 2D Snap is turned on.

3. In the Front viewport, drag from a grid point near the top center, to the point one square to the right and two squares down. Release the mouse, then drag until you have an arc to the right side that corresponds to the top of the pawn.

   The top of the arc should not rise much above the grid line (otherwise, the pawn will result with a dent on top).
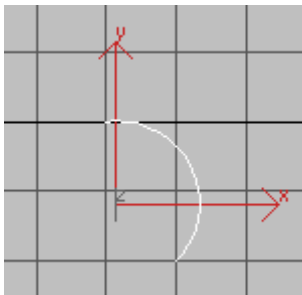

   First draw an arc like this.

   Blue snap indicators should appear while your cursor is over a grid point or a grid line.

4. For the body of the pawn, click Line. Draw a zigzag downward from the grid point where you finished the Arc. Drag from that point to the bottom edge of the same square. Click to set the new point, then drag horizontally to the grid point on the left. Click to set another point. Finally, drag to the point two squares down and one to the right. Click to set the last point of the Line, and then right-click to end Line creation.
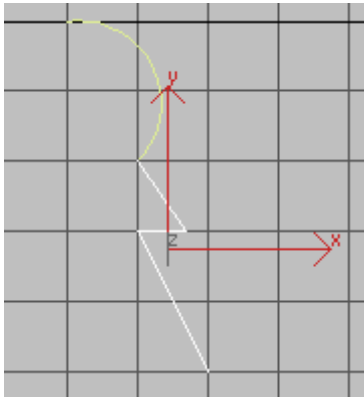
Next draw a zigzag line.

5. The top of the base of the pawn has a small ledge. Draw this as another Line with two segments: just drag to the right a bit, click, and then drag down (ignoring snaps for the last point). Right-click to complete this Line.
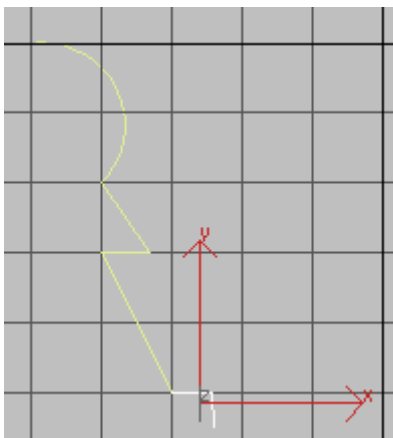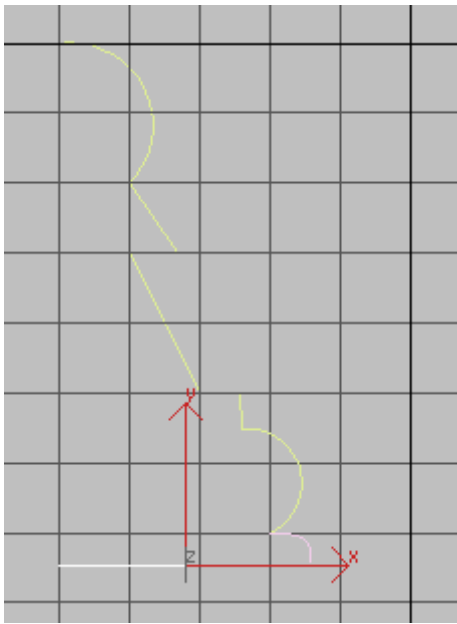

Add the ledge

You are now ready to complete the base.

Complete the pawn's outline:

1. Right-click 2D Snap again. In the Grid And Snap Settings dialog, make sure Endpoint is on. (Leave Grid Points and Grid Lines turned on as well.)

   Because you didn't use snap for the end of the last Line, you need something else to "grab onto" while completing the outline.

2. Close the Grid And Snap Settings dialog by clicking the X button in the upper-right corner of the dialog's window.

3. Make sure that 2D Snap is turned on.

4. Turn on Arc again. Drag from the endpoint of the line that forms the "ledge" at the top of the base, to the grid point of the next square down, and to the right of the ledge.

5. For the last bit of the base, click Line. Drag from the grid point where the second Arc ends, to the right a bit, then release the mouse and drag down a bit to curve the line segment.

This little Line segment can be the trickiest part of the outline to create.

6. Finally, drag from the end of that line, horizontally leftward to the grid line that is beneath the point where you began the outline.

Finish the lathe profile

7. Turn off 2D Snap.

8. Save the file as **my_pawn.max**.

   Tip: Make a *MyTutorials* folder on your hard disk to store the files you create with these tutorials.

Edit the outline:

Tip: At this point, you can continue with the file you created in the previous steps, or you can open the file *pawn_outline_completed.max*, and continue from there.

Before you use the Lathe modifier, the outline should be consolidated into a single spline, rather than a collection of individual spline objects. To do this, you convert it to an Editable Spline.

1. In the Front Viewport select the arc at the top of the pawn's outline.

2. Right-click, and on the Transform (lower-right) quadrant of the quad menu, choose Convert To > Convert To Editable Spline.

3. Go to the Modify panel. In the name field at the top of the panel, rename the object from Arc01 to **Pawn**.

4. On the Geometry rollout, click Attach, and then click each of the other splines that make up the outline.

   Now the pawn outline is a single object.

5. The modifier stack display is the window near the top of the Modify panel. In this window, click the plus icon next to Editable Spline, to show elements of the spline geometry.
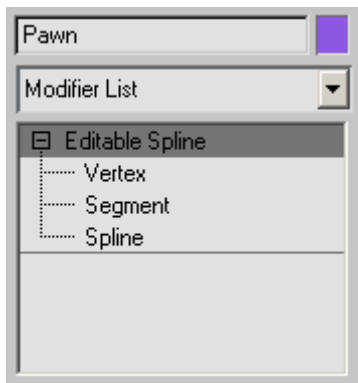
Editable splines and editable surfaces are made of various elements known as "sub-objects." Editable splines have three sub-object levels, as the stack display shows: Vertex, Segment, and Spline. The Spline sub-object level corresponds to the individual splines you created in previous steps.

You are going to "clean up" some of the vertices to make the outline simpler.

6. Click the Vertex entry to highlight it. The Vertex sub-object level is now active.
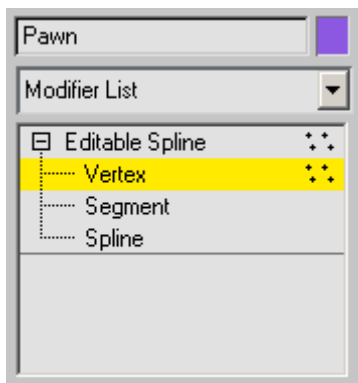
The original splines overlap at their endpoints. In most cases, **3ds max** displays these double vertices with an additional box around them.
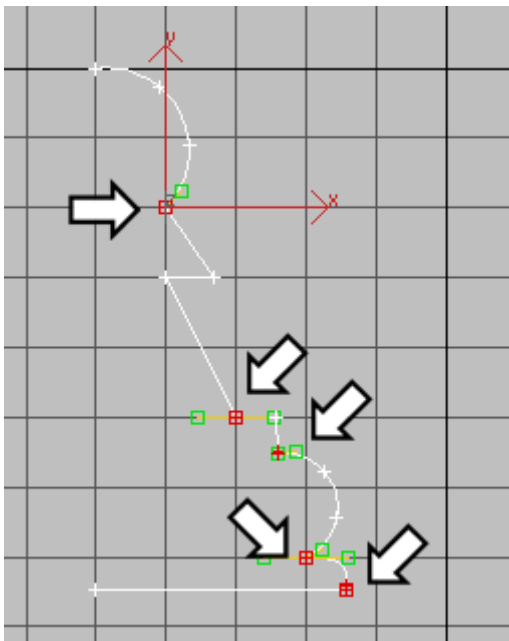

Overlapping vertices shown selected in red, and indicated by arrows.

7. On the Geometry rollout, increase the value of Weld to **1.0** (this is the spinner to the right of the Weld button).

8. ⬚ Click Select (this turns off Attach). Select the upper overlapping endpoints by dragging a box around them. (Just clicking might select only one of the two vertices.) Then hold down CTRL while you drag a select box around the other overlapping endpoints.

9. Click Weld.

   The outline is now a single spline, instead of the six original ones. It has fewer vertices, and no redundant ones.
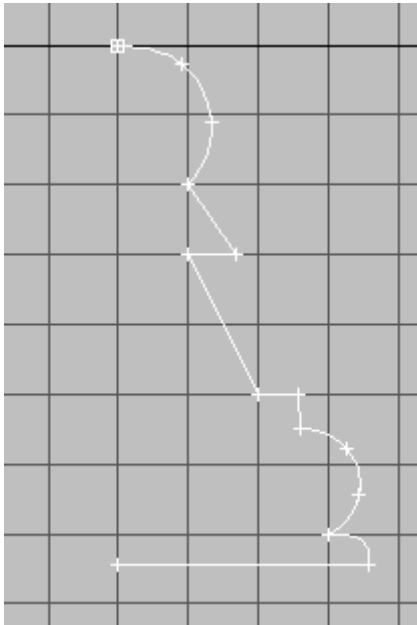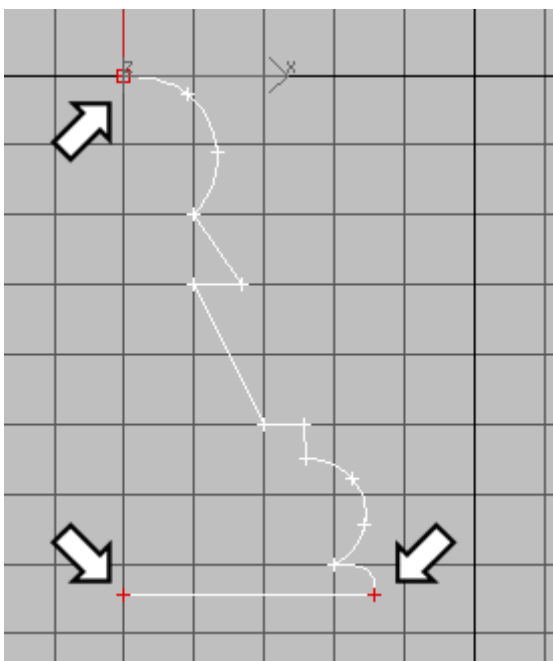

10. Choose File > Save.

Turn some vertices into corners:

Sometimes curvature can "creep in" to a spline. To avoid this, and to get a clean top to the pawn, you will make some vertices into Corner vertices.

1. Right-click the topmost vertex, and choose Corner from the Tools 1 (upper-left) quadrant of the quad menu.

2. Repeat step one for the two bottom vertices.

Arrows show the three vertices to make into Corner vertices.

The other options for vertex type, Bezier, Bezier Corner, and Smooth, all generate more curvature than Corner.

Tip: ⊕ The lathe comes out best if the bottom of the piece is completely horizontal. At this point, you might want to move the lower-left vertex so the bottom line is completely flat. Be careful not to move this vertex left or right, however. It needs to be directly below the top vertex for the lathe to be clean.

3. Click the Editable Spline entry in the modifier stack display. This turns off the Vertex sub-object level.

4. Choose File > Save.

Lathe the outline:

Tip: At this point, you can continue with the file you created in the previous steps, or you can open the file *pawn_outline_edited.max*, and continue from there.

1. Select the pawn and click Modifier List above the modifier stack display. This is a drop-down list of various modifiers.

2. From the list, choose Lathe.

   The pawn is now a 3D object.
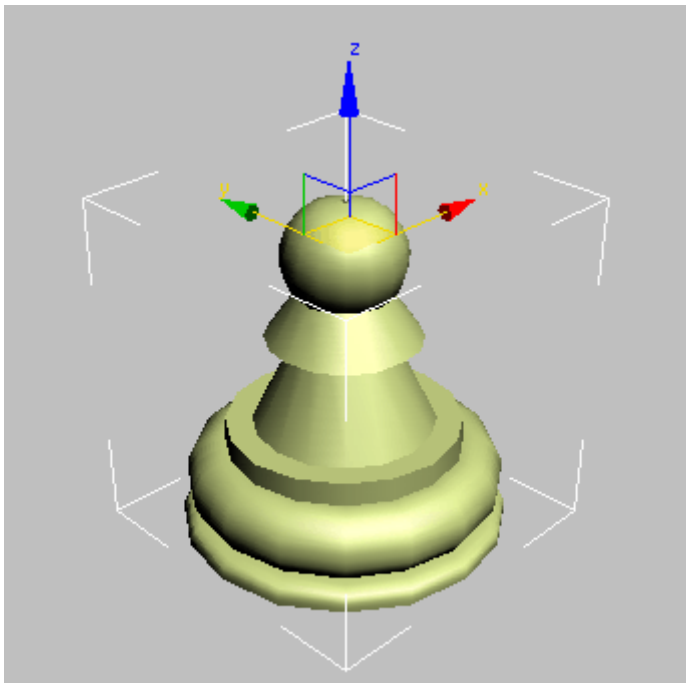
Tip: If your pawn model looks different from this, on the Parameters rollout of the Lathe modifier, find the Direction group and click Y. If it still looks funny, or "inside out," turn on Flip Normals.

3. As you can see in the Perspective viewport (you might have to zoom in), the outline of the lathed pawn is a bit "choppy." To fix this, on the Parameters rollout of the Lathe modifier, increase the number of Segments to **32**.

    The pawn is now smoother, as you can see if you render the Perspective viewport.

    Tip: If, for some reason, you find a hole in the top or bottom of the pawn, you can apply a Cap Holes modifier to the object to fix the problem.
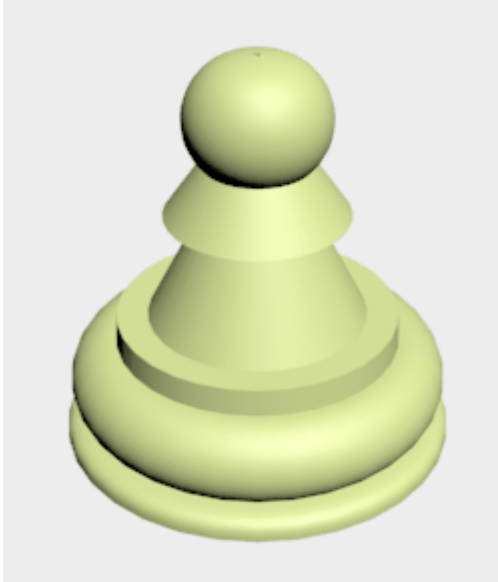
4. Choose File > Save. Name your file **mypawn01.max**

    In the Introduction to Materials and Mapping tutorials, you will provide more convincing color and texture for the chess pieces, and will create a shiny, reflective wood-grain chessboard.

Summary

In this lesson you learned spline creation and editing. You also learned to create 3D geometry using the Lathe modifier.

Next

Modeling a Rook

Comments