

Phil Campbell's World of Trainz

3D Studio Max Spoked Wheel Tutorial

In this tutorial you will learn how to create a spoked wheel and axle for a locomotive.

3DStudio Max will be referred to as 3ds.

1. Object creation.

Flangeless The first thing you need to do is create two cylinders, one box and one tube. At this point it does not matter what size they are. This will give the lowest poly count.

With Flange To create a flanged wheel is a little more complicated than a flangeless wheel and involves the use of keyboard entry. Firstly select the top view and zoom in on the center of the view port. Next select the "Line" tool and expand the "Keyboard Entry" section ensure that all co-ordinates are set to 0 and then click the "Add Point" button. Then type in the following co-ordinates one line at a time and press the "Add Point" button before proceeding to the next line

	X co-ordinates	Y co-ordinates	Z co-ordinates
Step 1	0	0.24	0.0
Step 2	0.04	0.2	0.0
Step 3	0.14	0.2	0.0
Step 4	0.14	0.0	0.0

After you complete step 4 click the "Close" button and then the "Finish" button. Once you have completed the spline reset the pivot point to the center of the spline and then move the spline not the pivot point to X = 1, Y = 1.2, X = 0 and then move the pivot point to X = 1, Y = 0, X = 0. Now we can use the "Lathe" modifier to turn it into the outside rim

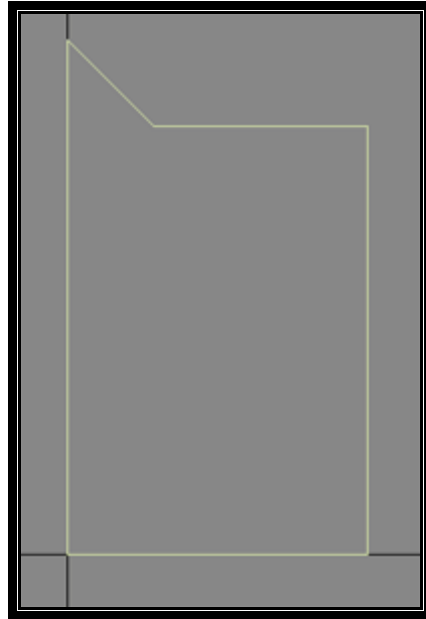


Figure 1 Spline

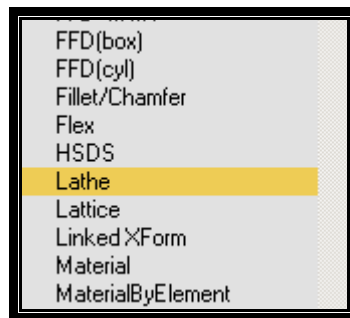


Figure 2 Lathe modifier



Figure 3 Lathe parameters

In the parameters section type 360 into the "Degrees". Change the segments to 14. In the "Direction" select the "X" button and ensure the output is "Mesh" and the "Smooth" is checked. You should now have the outside of the wheel complete with a flange.

NOTE This method will give the highest poly count

2. Resize shapes

Once you have created the objects we need to resize them. You will need to select an object and then switch to the "Modify" panel. For each of the two cylinders, the box and the tube you will need to enter the following dimensions.

Parameter	Cylinder 1 (Axle)	Cylinder 2 (Wheel Hub)
Radius	.06	.1
Height	2.2	.1
Height Segments	1	1
Cap Segments	1	1
Sides	12	12

Parameter	Box 1 (Spoke)
Length	0.04
Width	0.04
Height	1
Length segs	1
Width Segs	1
Height Segs	1

Parameter	Tube 1 (Outer Rim)
Radius 1	1.1
Radius 2	1.3
Height	0.14
Height Segments	1
Cap Segments	1
Sides	14

NOTE if you are using the lathed spline then you will not need to resize or locate it.

3. Rotating and moving

Select the axle cylinder and then select the rotate tool from the main tool button menu and type 90 into the Y co-ordinate. Do the same for the Wheel Hub and the Outer Rim. Once you have done this use the "Reset X-Form" on both the cylinders and then rotate the Axle and the Hub 45 degrees on the X axis. Once again "Reset X-Form" when finished.

4. Converting to mesh

The next step is to convert the spoke to an editable mesh object and then delete the unneeded polygons from the spokes. Select and delete the polygons from both ends of the spokes. Once you have done this select the hierarchy tab and set the pivot point to the center of all the objects.

5. Relocating

Now we can position the cylinders and the tube. Select the move tool from the main tool button menu. Type in the following co-ordinates for each object:

Co-ordinates	Cylinder 1 (Axle)	Cylinder 2 (Wheel Hub)	Box 1 (Spoke 1)	Tube 1 (Outer Rim)
X	0	1	1.005	1
Y	0	0	0	0
Z	0	0	0.097	0

Now that we have everything in location we should have a result similar to figure 1

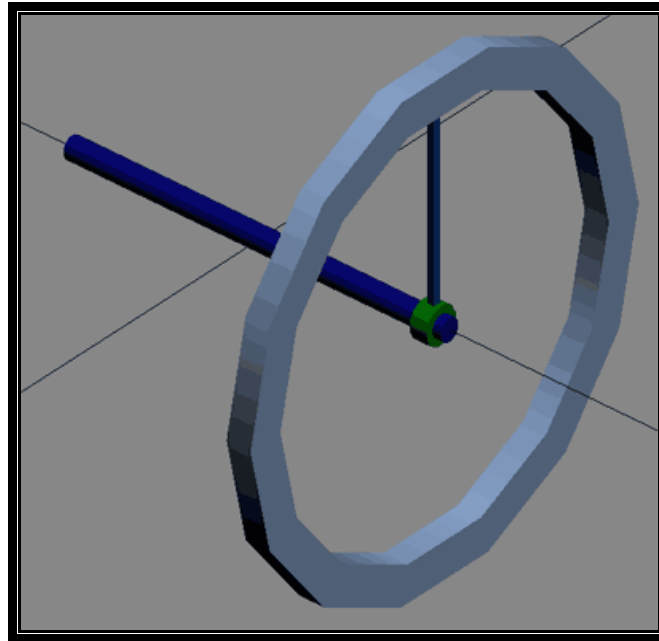


Figure 4 Results after rotating and moving

Before we can array the spokes we need to move the pivot point of the spoke to the center of the axle. Type 0 into the Z co-ordinate and leave the x setting as it is.

5. Arraying

Now we can array the spoke around the center point. Select the spoke and then select array from the "Tools" menu and then click the arrow button pointing to the right arrow next to the word "Rotate" and then type 360 into the "X" dimension box. Ensure that the "Re-Orient" checkbox is checked as this allows the spokes to be rotated as they are arrayed. In the "Type of Object" section select the "Copy" button to copy the spokes around the array and finally in the "Array Dimensions" select the "1D" and type 6 into the count. This is where you specify how many spokes you want, for this tutorial I have specified 6. Once done click OK and the spoke will be arrayed and should look like figure 5.

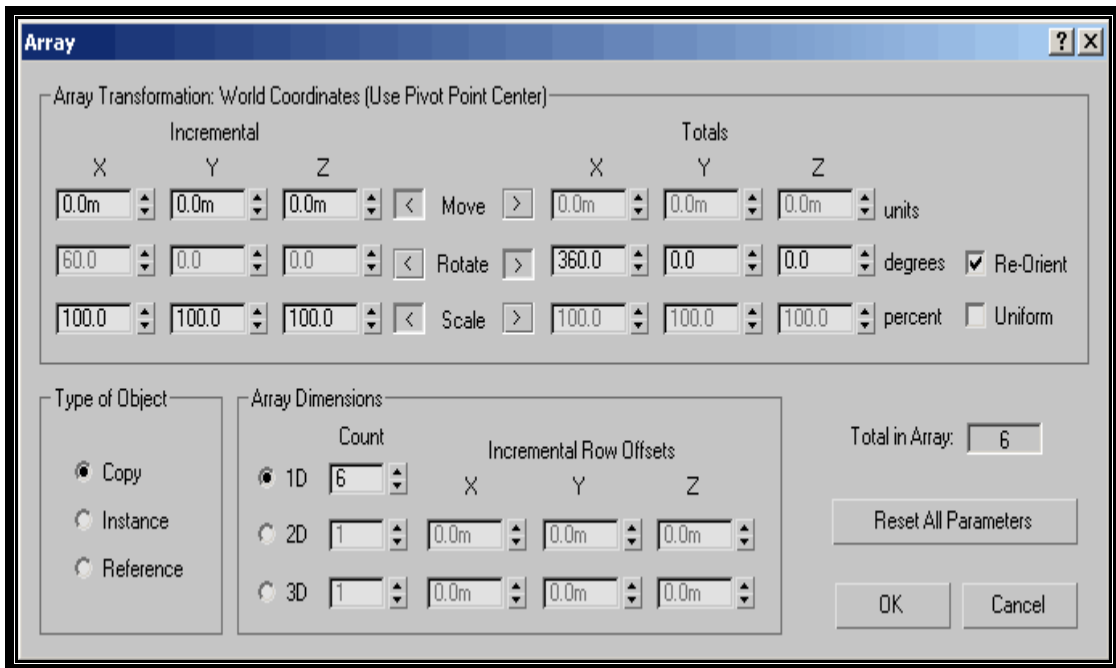


Figure 5 Array specifications window

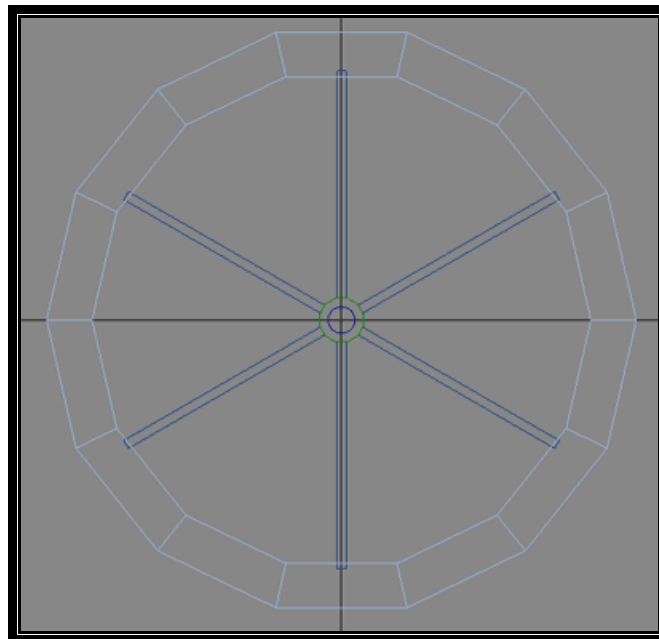


Figure 6 Array result

Now that you have one wheel created you can add textures* to the wheel and then mirror* it across to the other end of the axle.

Method 1's poly count is 466.

Method 2's poly count is 560.

The final poly count will depend on the number of spokes required and also the larger the wheel the more segments are required to produce a smooth shaped wheel. To improve the appearance of the spokes you can add a smooth modifier to each spoke or you can use a five or more sided cylinder in place of the box. Remember the more detail the more polygons required and the more processing power to run it in Trainz.

Adjust the dimensions of all the objects used to suit your particular situation.

*See 3d Studio Shiny Wheel Tutorial