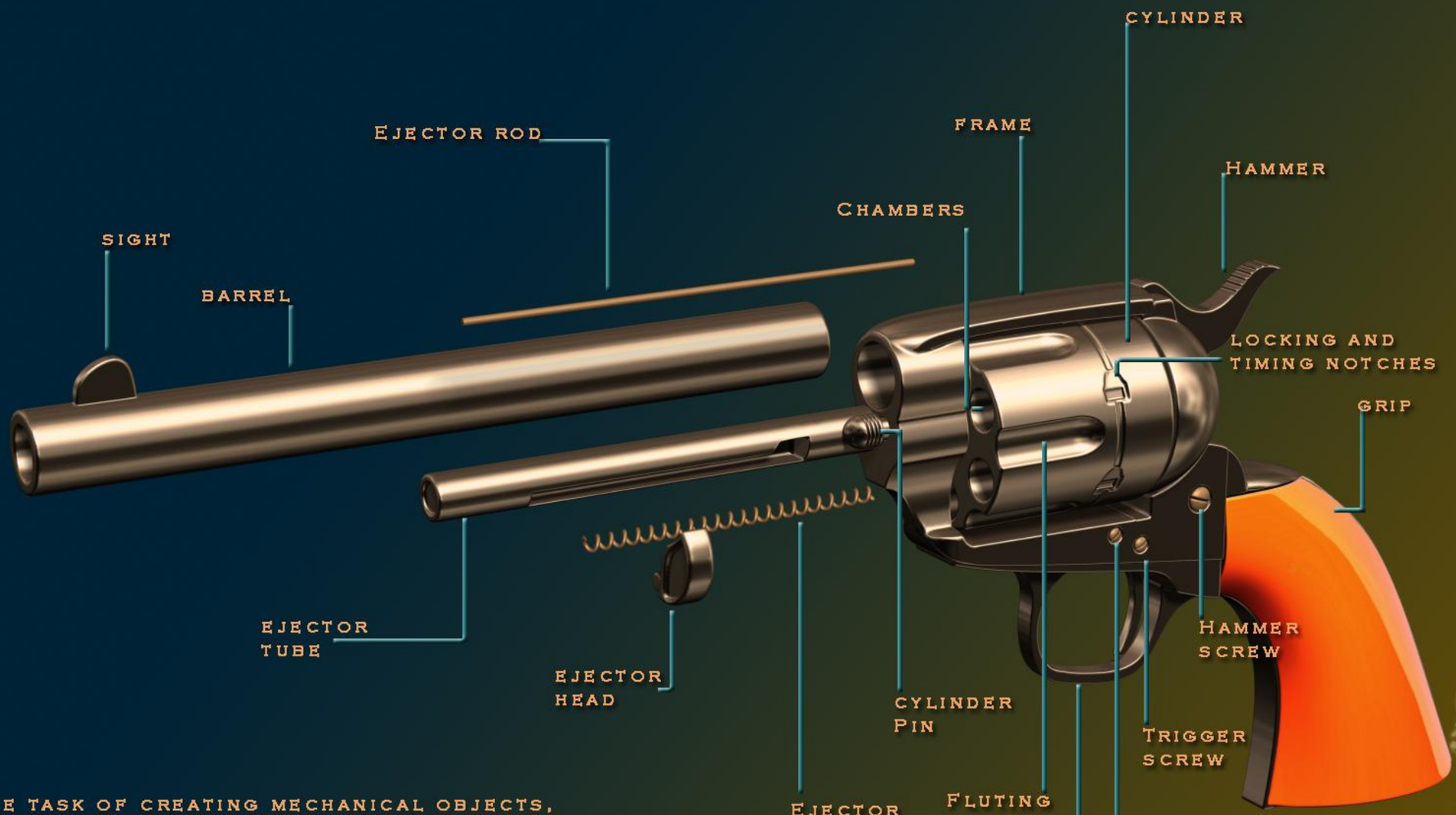
The Voxel Modeler's Workbook

by Izmeth Siddeek

Modeling from Reference

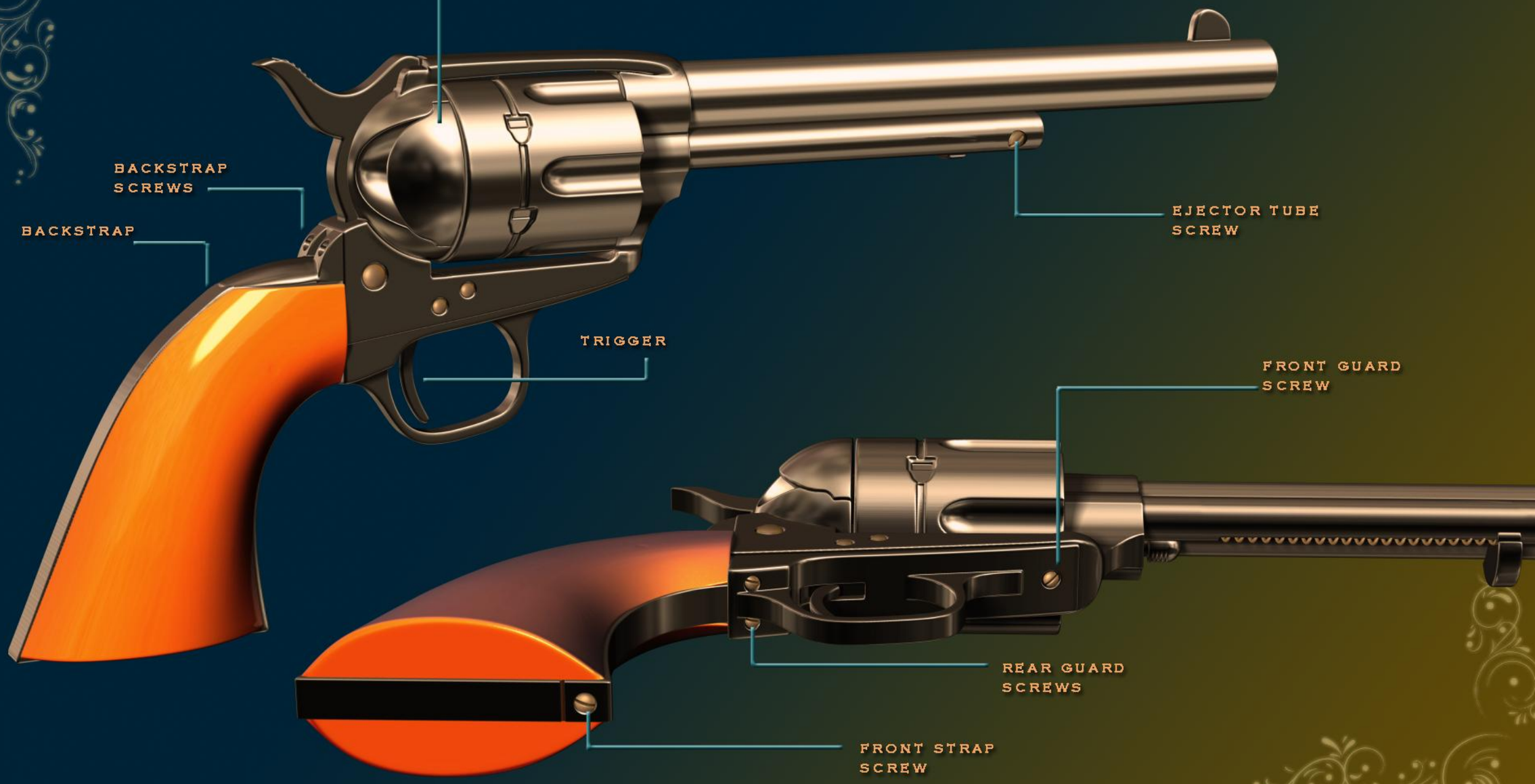
Building A Colt Peacemaker -Introduction



Before approaching the task of creating mechanical objects, especially ones with many interrelated parts, it is well worth taking some time to become familiar with these components and their proper nomenclature. During the course of modeling the Peacemaker we will refer to the relevant components depicted below.

Modeling from Reference

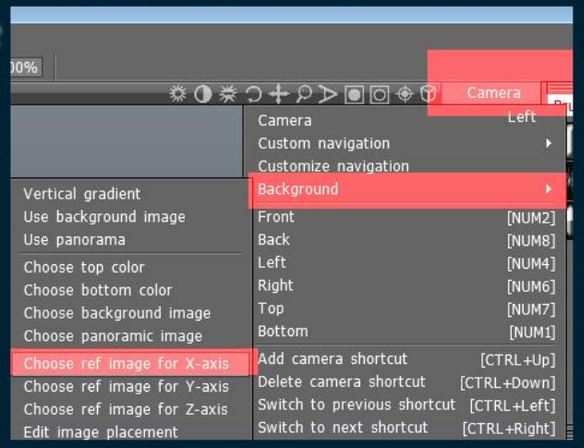
Building A Colt Peacemaker -Introduction



Modeling from Reference

Building A Colt Peacemaker -Part 1: The Barrel

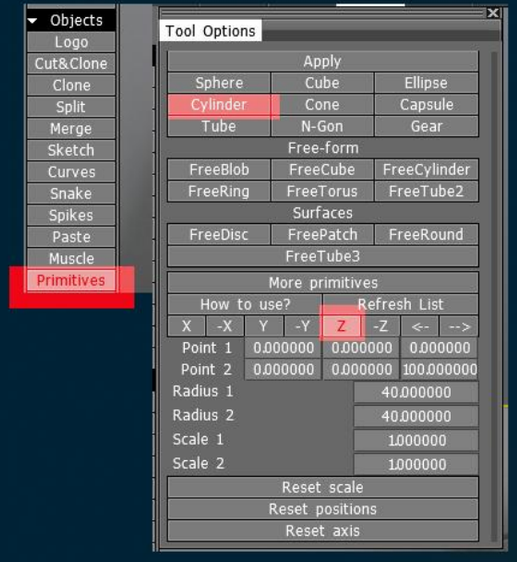
First click on Camera then Background and Choose ref Image for X-Axis



Now the image plane will be locked to the camera as it would be inMaya and now we are ready to start modeling.

Lets start with the simplest shape, the barrel; go to the Voxtree and create a new entry under the root and name it Barrel, then click OK

First Click on "5" on the keypad, this toggles the orthographic view now,Click on Primitives and choose Cylinder and enable the Z axis.



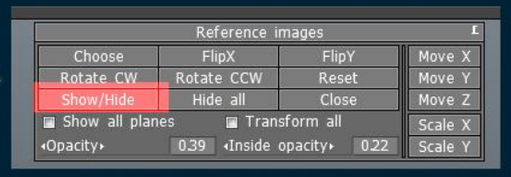
You should see a black placeholder cylinder appear in the viewport, use the manipulator gizmo to position and scale the cylinder so that it is proportioned to correspond to the Gun Barrel. Once the cylinder is in place, click on "Apply" in the Tool Options Menu

Once the Barrel has been positioned, create another layer in the Voxtree and call it Ejector, this will become the layer for the ejector housing , spring and rod.
Create another just as before, but this time, to correspond to the ejector.
Once this is done, click on Apply.

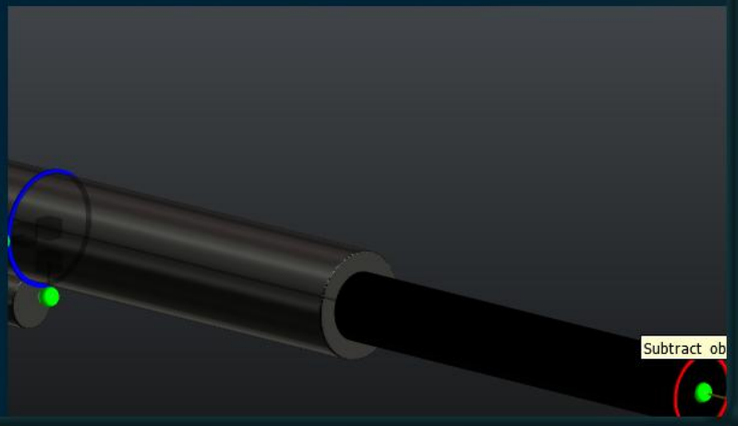
Modeling from Reference

Building A Colt Peacemaker -Part 1 cont. The Barrel

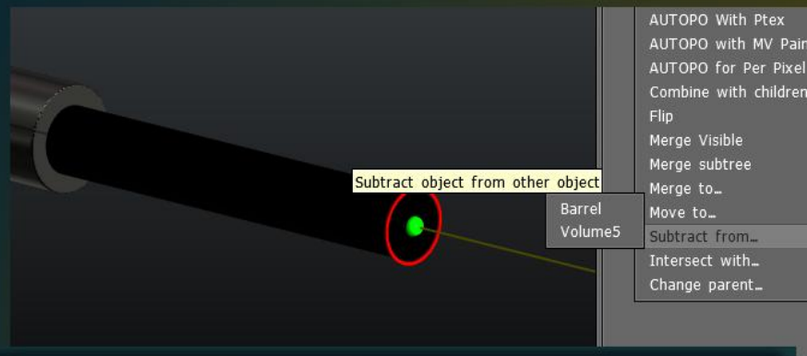
We need to create the opening to the barrel, but since our image plane only provides a profile view we will not need to view it for the moment - turn it off, by clicking on **Camera -Background -Edit Image Placement**, this calls up the dialog box that provides control over the image plane. Ciick on Show/Hide



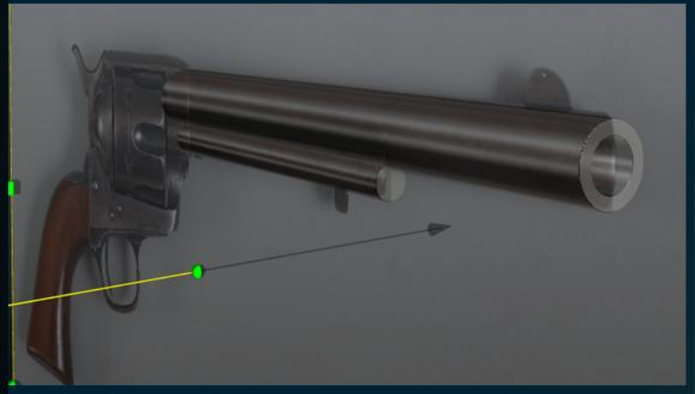
Now we are going to create the interior of the barrel to do this, create a new layer in the Voxtree, it doesnt matter what it is named since this element will be temporary. In this layer, create a new cylinde corresponding to the size of the opening of the barre



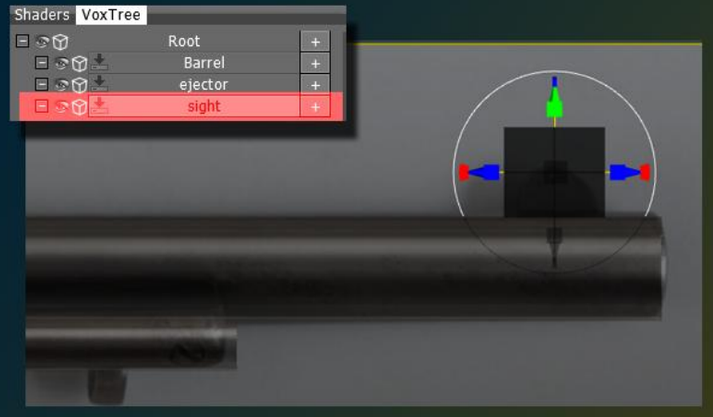
Now go to the layer of the new temporary cylinder element in the Voxtree and right click on it, then click on Subtract from and choose Barrel. The interior cylinder will carve out the barrel to create our opening.



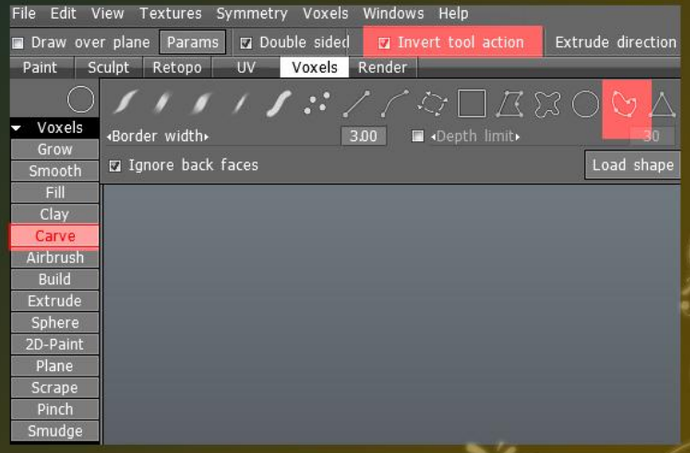
Toggle visibility of the image plane, then view our barrel and ejector to make sure that things are going well.You should see something like this.



Create a new layer in the Voxtree and name it **Sight**, this too will be a temporary layerbut naming it meaningfully will help us when it is time to collapse our layers.It is important to get used to this process since it is a big part of working in 3D Coat.
Create a Cube using the Primitives menu and position it relative to the sight on the image plane.



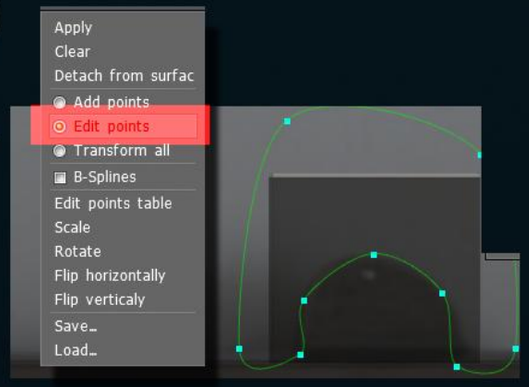
Now under the Voxels on the left panel, pick **Carve**, check the box **Invert Tool Action** then go to the Brush Palette and pick the **spline curves tool**



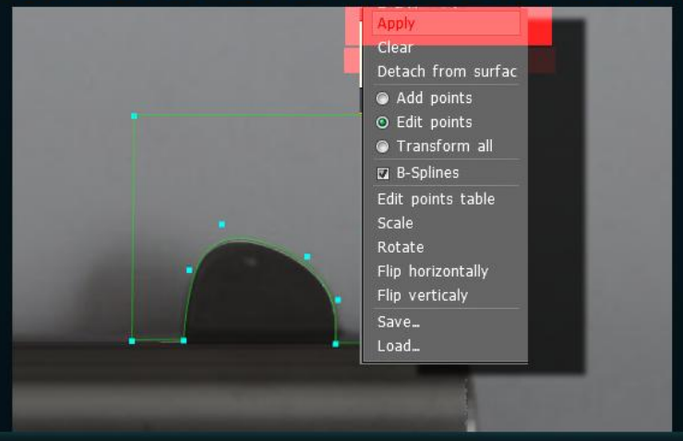
Modeling from Reference

Building A Colt Peacemaker -Part2 The Sight

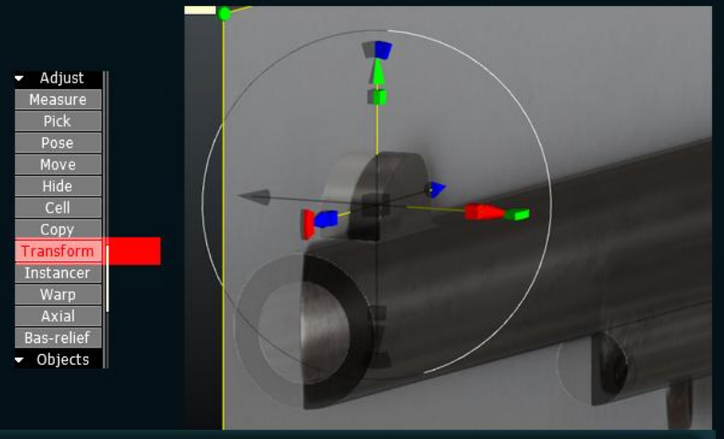
Draw a spline outline of the sight, tracing over the shape in the imageplane; once you have a rough shape,click on Edit Points this will allow you to fine tune the shape. Now you should have something like this.



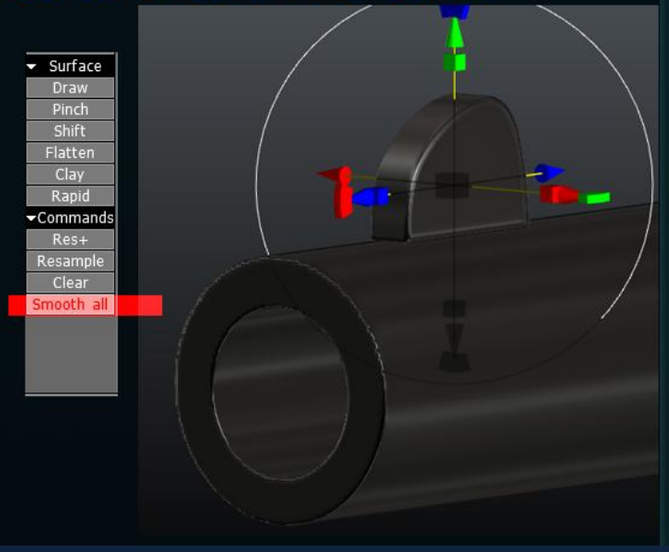
Convert, the spline type to B-Splines for a smoother curvature and refine the shape to more precisely match the image plane; right click on the spline handles to create hard linear transitions.Once the shape looks correct hold down the **Shift Key** and click on **Apply**



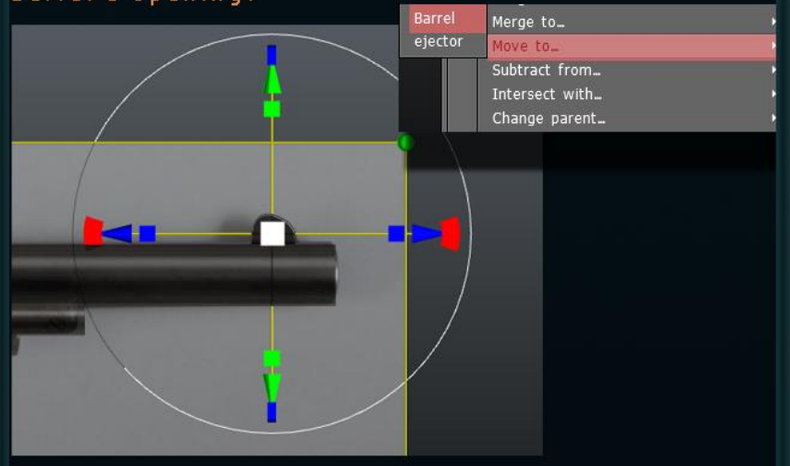
Holding down the **Shift Key** will cut the area outside the spline border thus creating the shape of the sight. View the shape from a few angles to make sure it is looking good.Use the transform tool to adjust the sight into position.



Once the shape and placement are satisfactory, we will need to soften the sharp edges on the sight to make it appear more natural,to do this, click on **Smooth All** once. The sight's edges should look somewhat more rounded.



At this stage we can unify the sight with the barrel; Right click on the sight layer in the Voxtree and click on **Move To** then choose Barrel from the drop down. Now, the barrel and the sight are one object. **Smooth All** once more, this will soften the seams and also slightly soften the sharp edges on the barrel's opening.

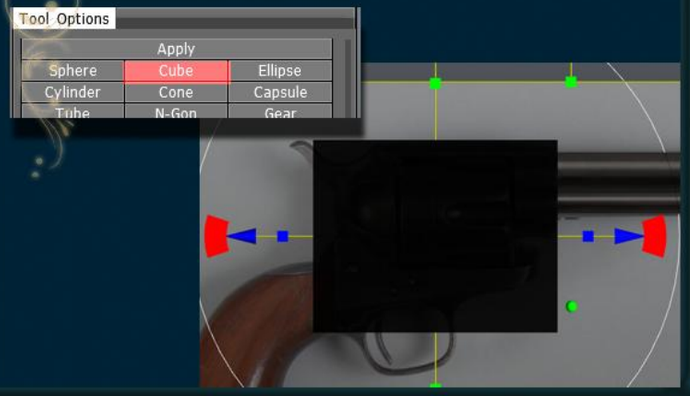


I often find it that it helps to have material differentiationas modeling progresses especially when creating complex objects with multiple parts. Select the Shaders tab and thenpick the metal shader. This will assign the shader to the current object.

Modeling from Reference

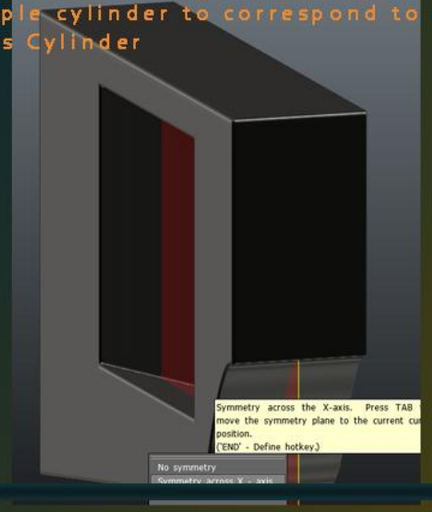
Building A Colt Peacemaker - Part 3 The Frame

Once again create a layer in the Voxtree and name it Frame, then using the primitives menu, create a cube making sure to scale and position to correspond to the frame of the colt in the image plane

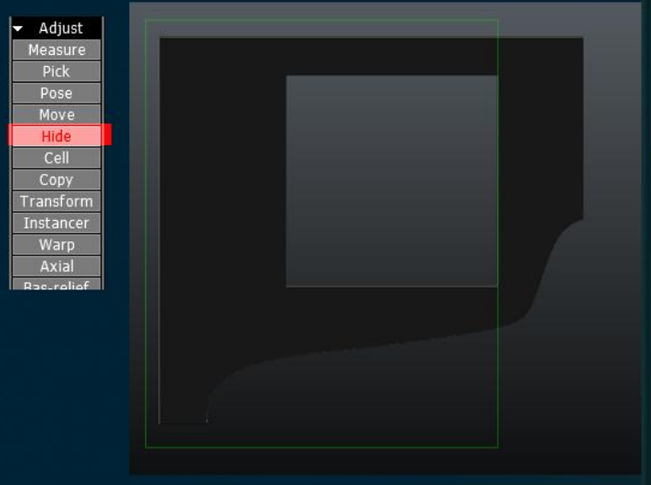


Selecting the rectangular marquee tool from the brush palette, switch to **Carve** in the voxels option, then drag the marquee in the area of the cylinder housing, then release.You must also switch to the spline curve and cut the front portion of the frame.

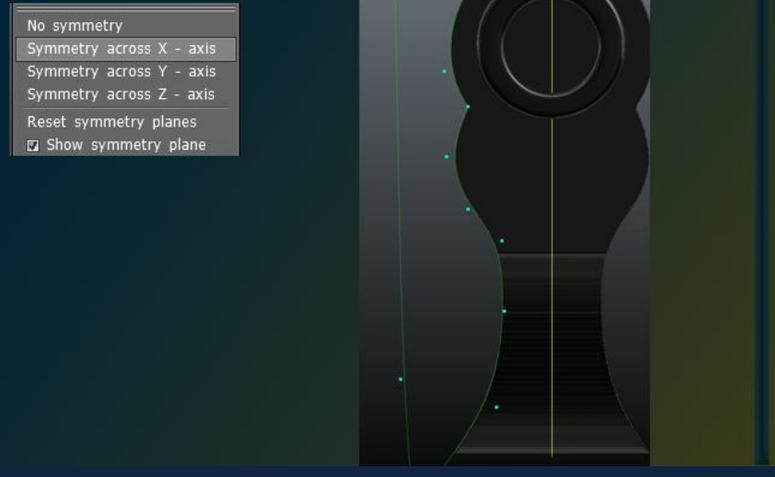
After these two cuts, rotate the camera around and review the shape, it should look like this Create a new layer in the Voxtree, name it Cylinder, then create a simple cylinder to correspond to the Peacemaker's Cylinder



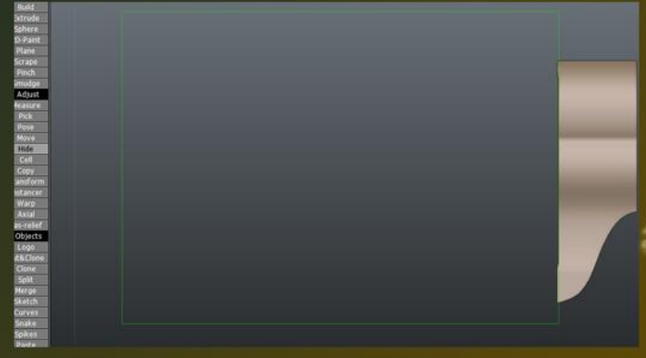
Select the rectangular marquee in the brush palette and selec the hide function. Draw the marquee as described. This portion of the fram will be hidden and we will be able to affect only the visible area



Use the spline tool from the brush palette and creat a path like the one in the image.Press the "S" key to enable symmetry on the X axis then Apply, this will create the contour at the front of the frame



Select the Hide function once again and while holding down the CTRL key, marquee drag around the full area of the frame and the hidden part will become visible



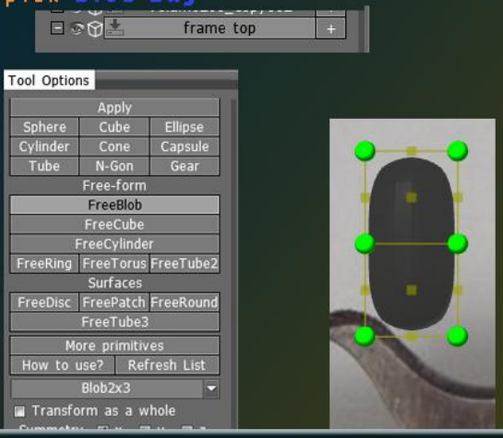
Modeling from Reference

Building A Colt Peacemaker - Part 3 cont. The Frame

Review the frame, toggle visibility of the barrel by clicking on the eye icon in its layer in the voxtree. View the frame from all angles and make sure that it is on target with the Image plane

Draw out the contour of the back using the spline curve from the Brush Palette, then use the carve function as before and apply. This will cut out the we can locate the Loading Gate. We will revisit this once more after we add the Gate, but for the moment it just helps to block out our shapes.

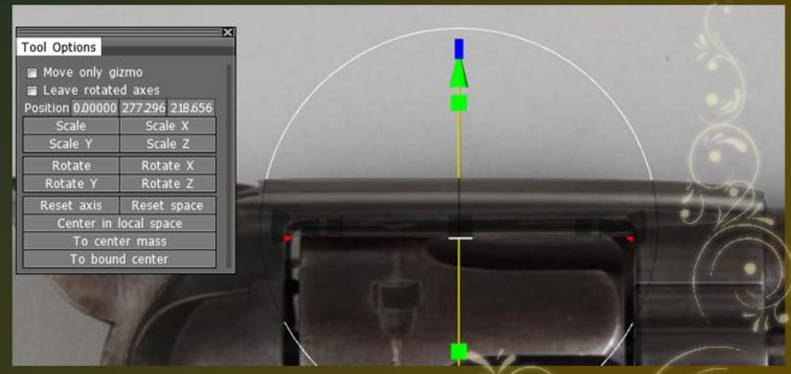
Now we can add some of the more subtle features of the frame. The top of the frame is not perfectly linear Create a new layer in the Voxtree and call it, **Frame Top**, then, from the **Primitives Menu**, create a Free Form Blob and from the drop down, pick **Blob 2x3**



Click on **Transform as a Whole**, move and scale the shape so that it roughly corresponds to the top of the frame. Then click on **Apply**.
Now the shape is ready for editing

Switching between, the **marquee** tool, and the **spline curve** tool, trim and shape the profile of the frame top using the **Carve** function.

Use the **Transform Tool** to scale the shape so that it matches the thickness of the reference more closely. You can check **Move Gizmo Only**, if you wish to position the tool to the base of the shape.
Make sure to uncheck it, to continue scaling and transforming



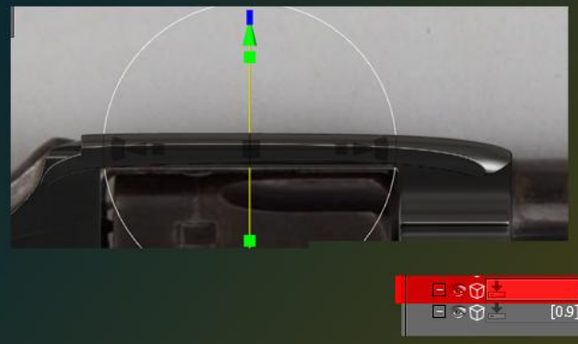
Modeling from Reference

Building A Colt Peacemaker - Part 3 cont. The Frame

Switch to a front view the press the S key to bring up the symmetry dialog box, enable symmetry on the X axis and trim the sides using the marquee tool with the carve function. Try to get as close to the underlying frame, but we will cut away any area that might show through.

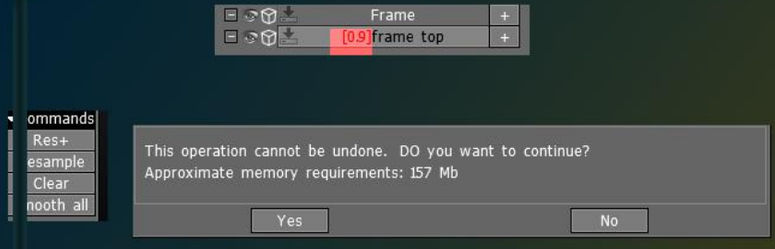
Go back to the profile view and mark out the under side of the new piece, apply the cut. After the cut, we will need to scale the new piece and trim the old frame

Scale the new piece along the Y axis using the Transform tool, then switch to the Frame layer in the Voxtree we will now cut away the the underlying voxels.



Rectangular marquee drag and Carve the underlying voxel as shown and then toggle off the visibility of the frame top layer. You should see that the underlying voxels have been cut away.

Before we can merge the new piece with the old frame we have to ensure that they both have the same voxel resolution. If this were not the case, the source would resolve itself to the target's resolution,either causing it to become degraded or result in an unnecessarily dense mesh. In this case, the frame top has a lower resolution of 0.9 than the frame. Click on the Res+ button and click on yes when you see the warning dialog box

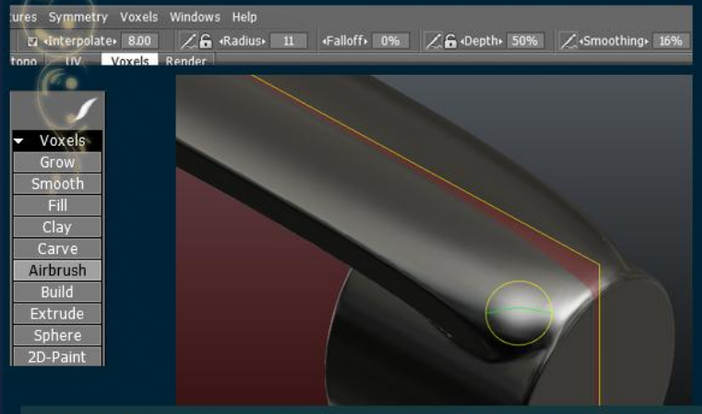


I find that merging the higher volumetric density to the lower volumetric density works the best when dealing with voxels. So, right click on the Frame and move it to the Frame Top. This will give us a good result. Now the top and the frame are one piece, rename the layer back to Frame. We will need to soften the intersection before moving onto the next step

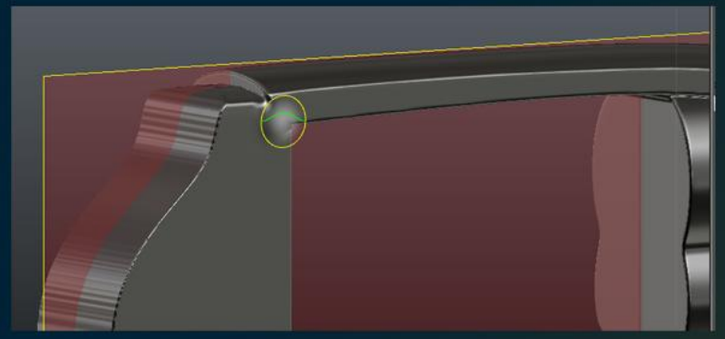
Modeling from Reference

Building A Colt Peacemaker - Part 3 cont. The Frame

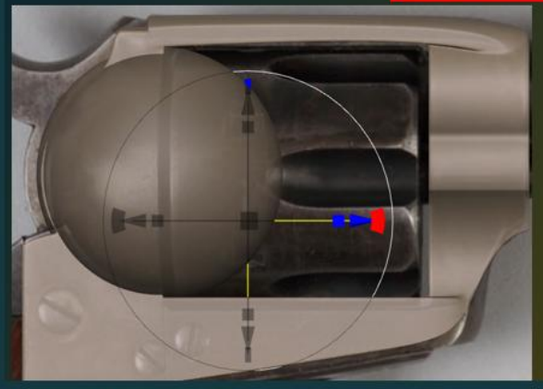
Turn on Interpolation and keep the default value at 8 and set the smoothing value to 16. Then hold down the Shift key and gradually smooth out the intersection between the new top piece and the frame



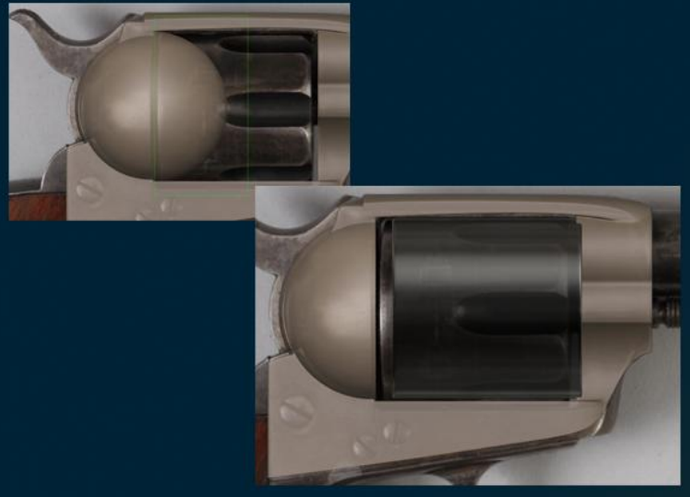
Repeat the process to the join at the back and unify the pieces.



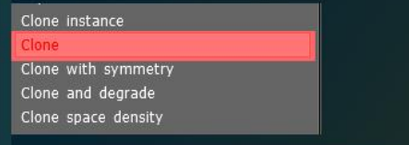
Now we are ready to work on the Gate. Create a new layer in the Voxtree and name it gate. Using the primitives menu, create a sphere and line it up as closely as possible with the gate in the reference.



Switch to the rectangular marquee and carve away half the sphere leaving us with the hemisphere shape for the gate assembly



Right click on the Gate layer and clone it, the cloned object will be placed in a new layer, rename this laye to gate temp; we won't worry about this just yet. Now create and empty layer and call it gate cut

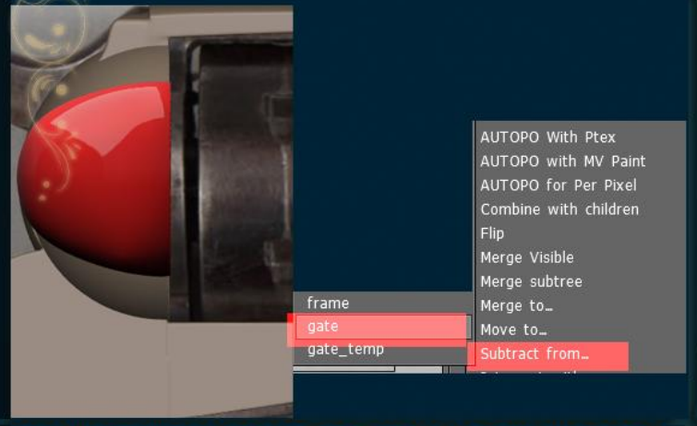


Using the primitives menu, create a 2x3 FreeBlob and pull it into the rough shape of the loading gate. Use the Lattice points to get the general shape and wrap it around the spherical shape. we will trim it with the spline tool to refine it.

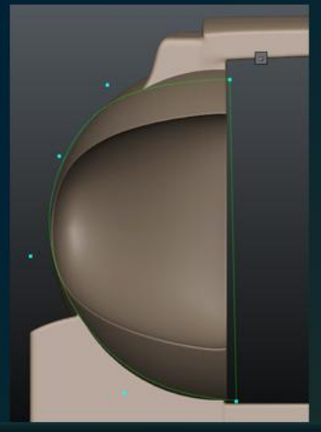
Modeling from Reference

Building A Colt Peacemaker - Part 4 The Gate

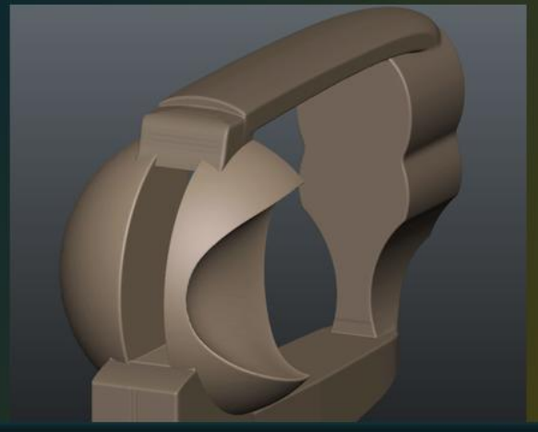
After applying the blob, you can edit or refine it using the spline cutting tools. Once you are satisfied with the shape, subtract the gate cut layer from the gate.



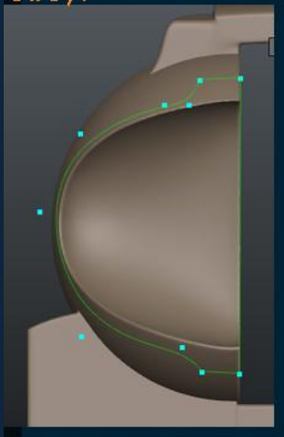
The cut reveals underlying parts of the frame showing through, so these will have to be trimmed away. Switch to the frame layer and use the spline tool in conjunction with the carve function to cut away the unnecessary portions.

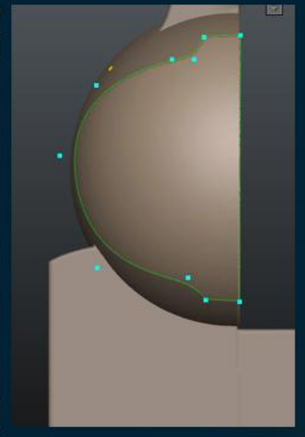


Now switch back to the gate layer and use the marquee tool to carve out the gate assembly so that we can seat the hammer



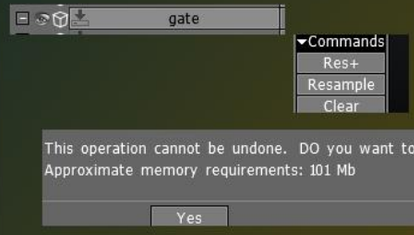
Use the spline tool to go over the cut we made, then click on edit points to create the shape shown in the image. Once this shape has been achieved, switch to the gate temp layer, make it visible, then making sure to be in a profile view, hold down the shift key and apply the cut The area outside the spline path will be cleared away.





Switch to a back view, cut away all unnecessary parts, then use the spline tool to cut out the loading gate as described in the image

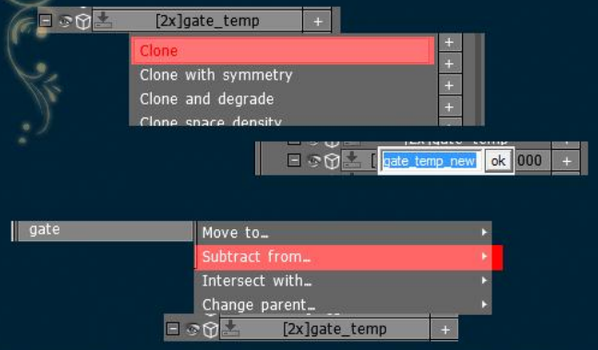
We will need to increase the resolution of the main gate assembly so click on Res+ and accept the memory cost.



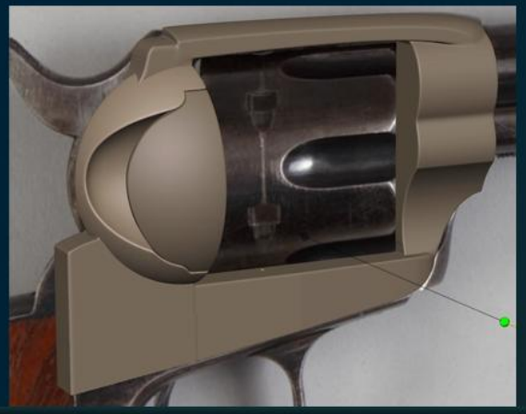
Modeling from Reference

Building A Colt Peacemaker - Part 4 cont. The Gate

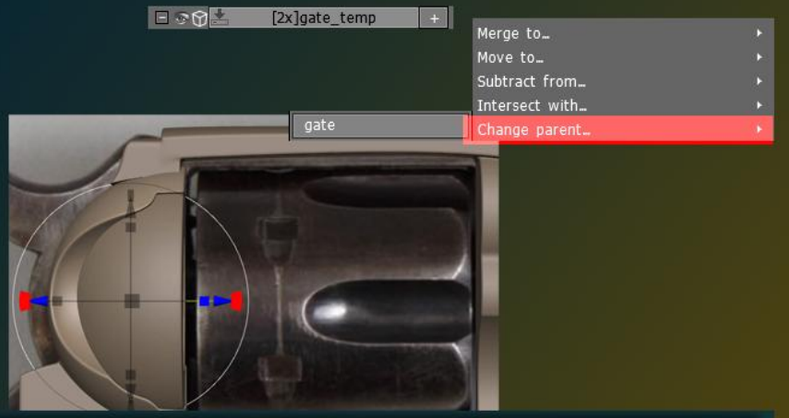
Now we will need to do a bit setup in the voxtree ; first clone gate_temp , the clone will be placed into its own new layer, name this layer to gate_temp_new. Now toggle off visibility of the layer. Now go back to the gate_temp layer, right click and subtract it from the gate. Now, click on smooth all a couple of time. this will make a nice inset for our gate.



After making the cut, our original gate temp will disappear, so turn on the visibility of its clone which we named gate_temp_new, rename this to gate temp and apply **smooth all** a couple of time. This is what the result should look like

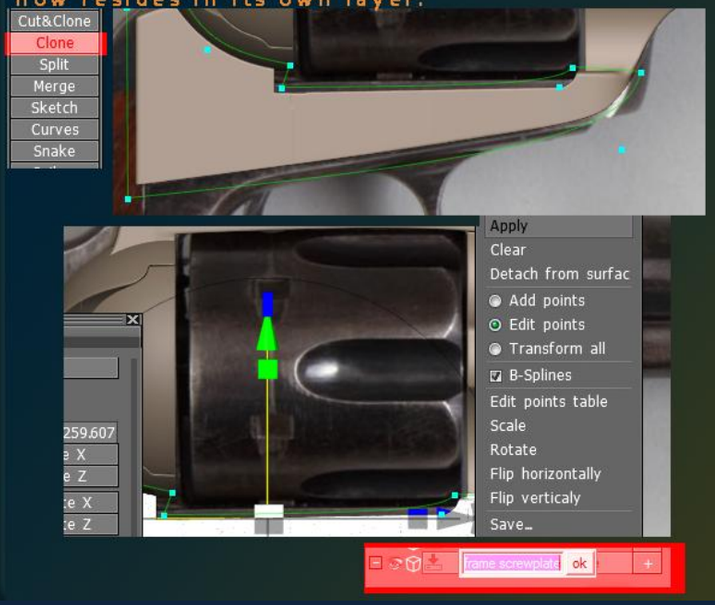


At this stage i want to adjust the placement of the gate assembly, I am not yet ready to merge the pieces together but I still want to scale and translate the assembly together. Right click on gate temp then select, **Change Parent** and choose gate as the new parent.

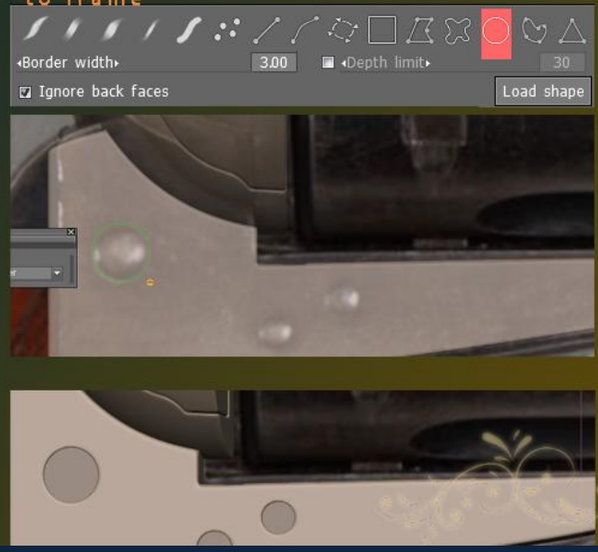


Use the spline tool to go over the cut we made, then click on edit points to create the shape shown in the image. Once this shape has been achieved, switch to the gate temp layer, make it visible, then making sure to be in a profile view, hold down the shift key and apply the cut The area outside the spline path will be cleared away.

Select the region with the spline tool with the clone function selected. Do not apply yet, create a new layer named frame screwplate , then apply. the cloned are now resides in its own layer.



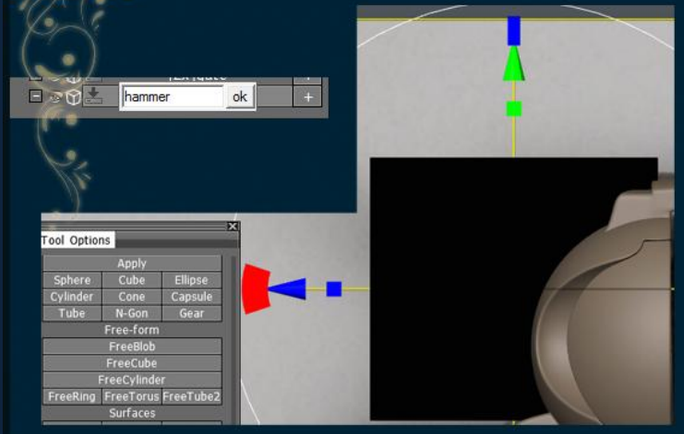
Slightly scale the new frame screwplate object, then switch to the circular marquee tool in the brush palette and carve out the positions for the screws. You should have 3 nice insets to locate your screws. Using the voxtree move the frame screwplate to frame



Modeling from Reference

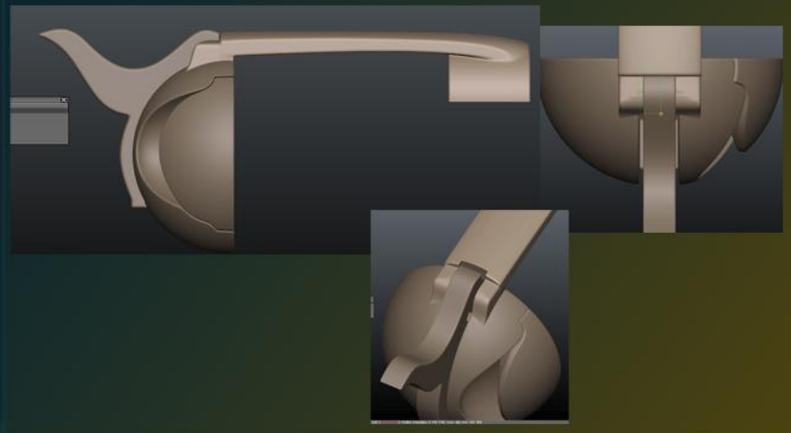
Building A Colt Peacemaker - Part 5 The Hammer

Create a new layer in the voxtree and name it hammer then using the **primitives menu**, create a cube in the location of the hammer in the reference.

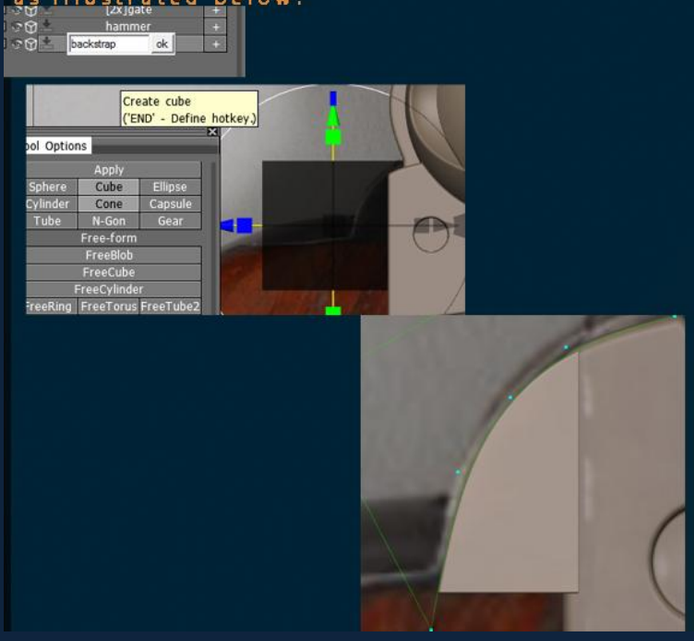


outline the hammer in the reference with the spline tool and then apply it. Use the **smooth all** command couple of times to slightly soften the resulting shape voila we have the hammer!

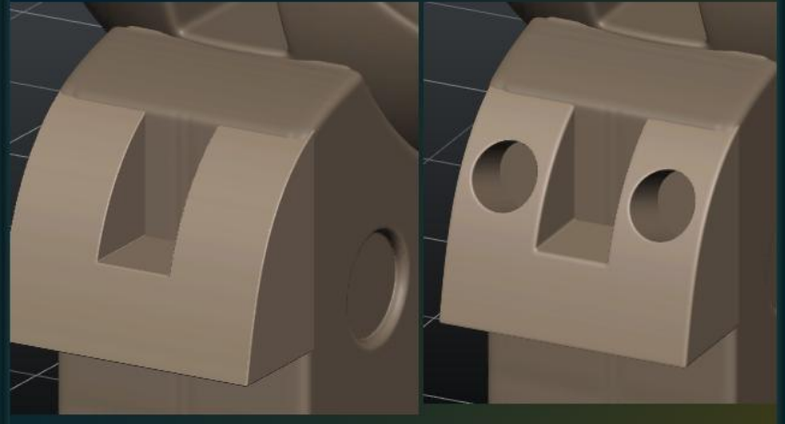
Now switch to the frame layer and using the Marquee rectangle, hide the lower half of the frame. From a top view, rectangle carve a notch as illustrated.



Create a new layer, name it backstrap and create a cube as illustrated. Spline curve, carve as illustrated below.



Marquee rectangle carve a rectangular space in the centre, the switch to the circular marquee and carve two holes, these are for the backstrap screws



Slightly scale the new frame screwplate object, then switch to the circular marquee tool in the brush palette and carve out the positions for the screws. You should have 3 nice insets to locate your screws. Using the voxtree move the frame screwplate to frame

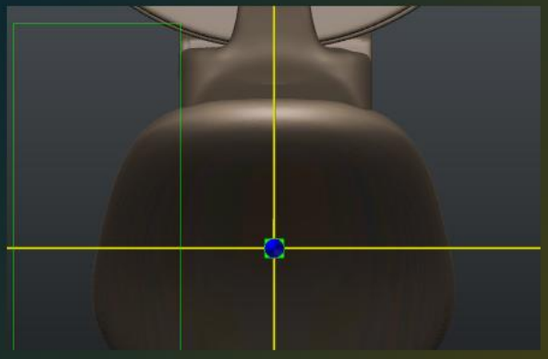
Modeling from Reference

Building A Colt Peacemaker - Part 6 The Trigger Assembly

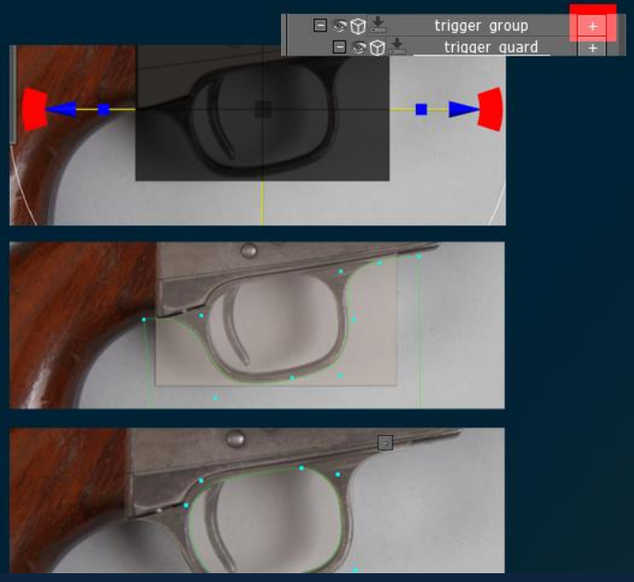
Create a new layer and name it trigger group then create a 3x3 blob and shape it as shown below

Use the spline tool and trim the shape as shown

switch to the front view and trim the shape so that it is flush or slightly inset from the frame, click on smooth all a couple of times .

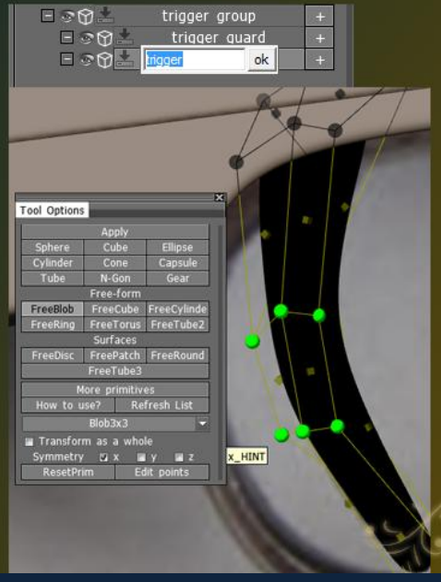


Click on the + sign to the right of the trigger group layer and create a sub layer, name this trigger guard. Create a cube and carve it as shown below. Click smooth all a few times.



The trigger guard should look something like this

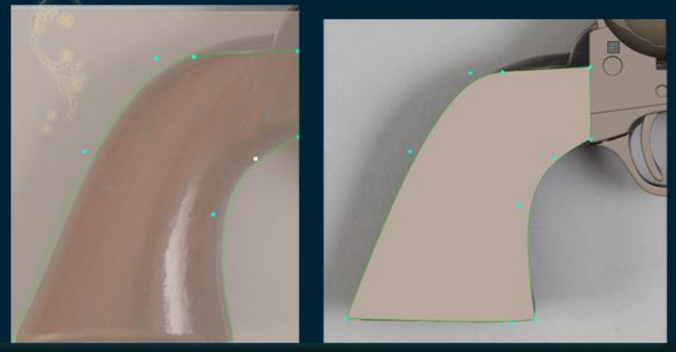
Create a new sub layer under trigger group and name it trigger. Create a free blob shape into the trigger and finish it off by trimming with our spline tool.



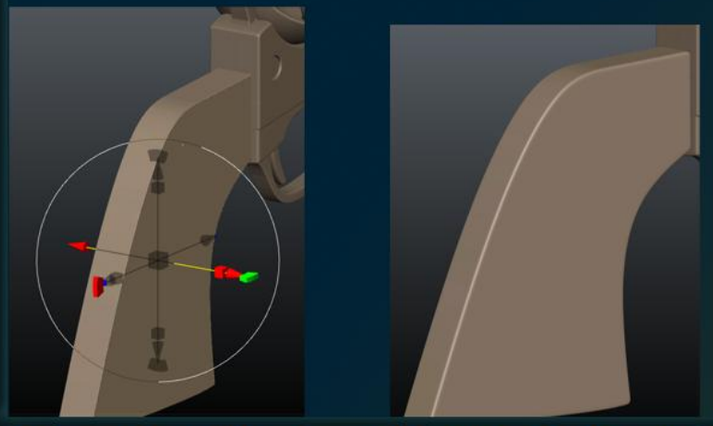
Modeling from Reference

Building A Colt Peacemaker - Part 7 The Grip

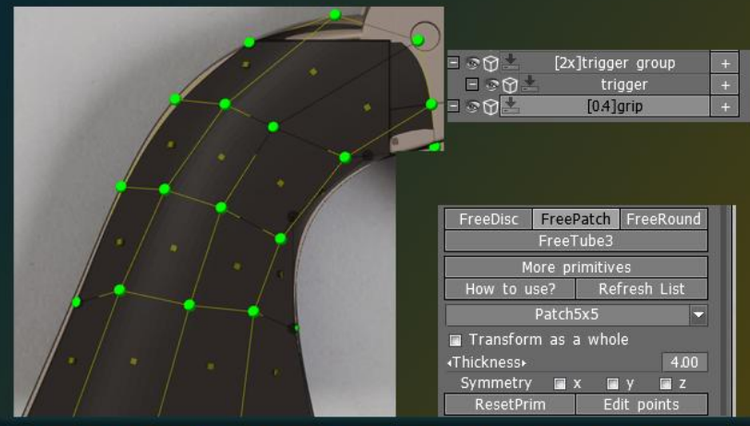
Create a cube from the primitives menu, name it backstrap 2, then using the spline tool draw the profile of the stock and holding down the shift key, click on apply to cut away the area outside the spline path



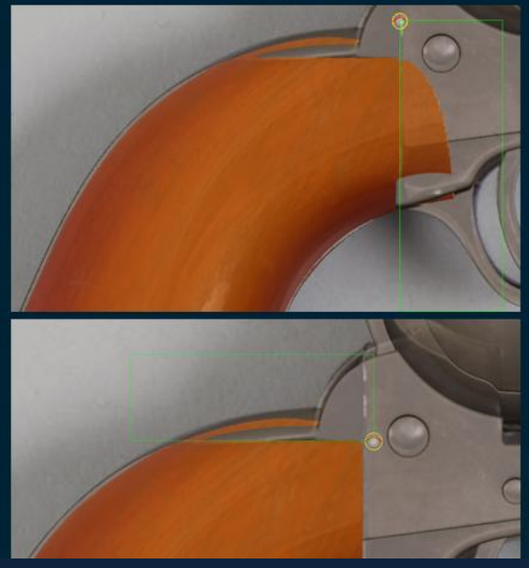
scale it down on the z axis and hit smooth all a couple of times. You should have something that looks like the result shown below.



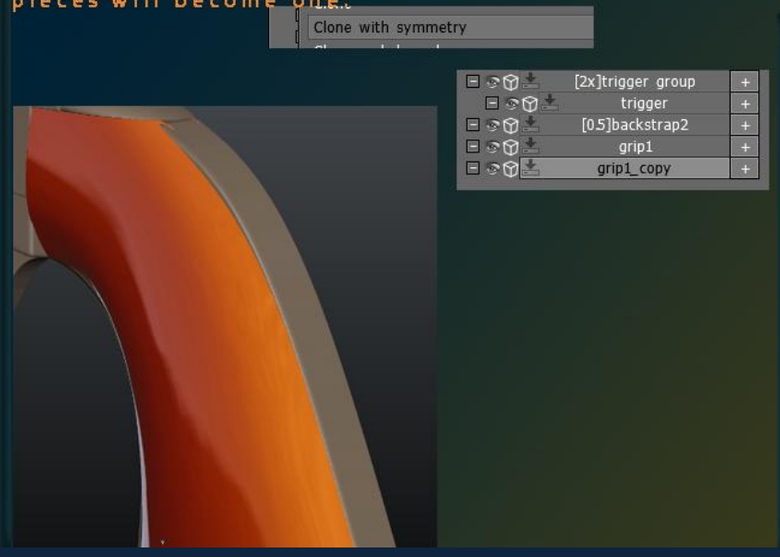
Create a new layer, name it grip. From the primitives menu, create, a 5x5 patch and shape it into the form of the grip making sure to achieve the characteristic bell like volume of a typical Colt Peacemaker Grip.



Use the rectangular marquee tool to trim away excess volume if necessary. At this stage move the layer named backstrap 2 to backstrap and unify the two volumes.



Once satisfied with the result, click on the layer named grip in the voxtree and click on clone with symmetry,a mirrored version should be created and place in its own layer.Once you are satisfied with the result move the new layer into the layer named grip. Now the two pieces will become one.

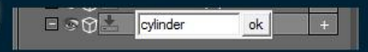


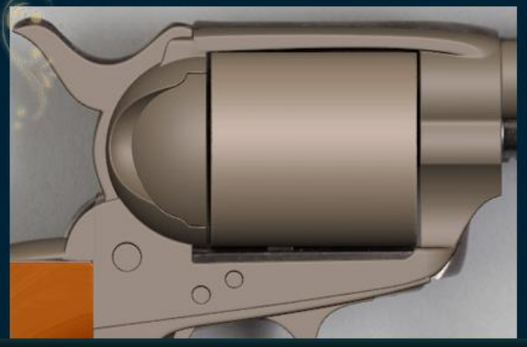
Since the grip was created from a patch surface, the ends remain open and we need to close off one end. Create a temporary layer and create a 4x4 patch and shape it as shown below. Trim away excess volumes using the spline tool and then move this layer to the grip layer, then click on smooth all, a few times.

Modeling from Reference

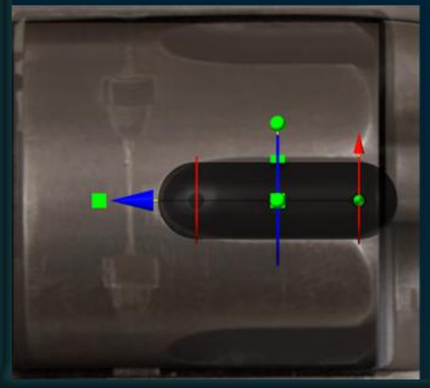
Building A Colt Peacemaker - Part 8 The Cylinder

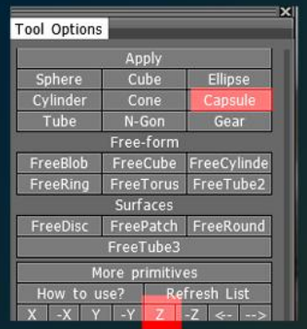
Create a new layer and name it Cylinder then use the Primitives menu to position and scale a cylinder as shown below.



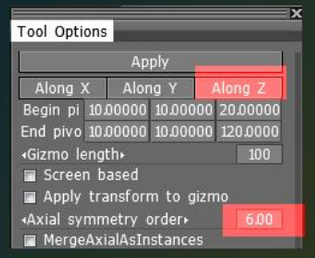


Create another layer and name it flutes; from the primitives menu create a capsule and position it in the location of the cylinder fluting as shown

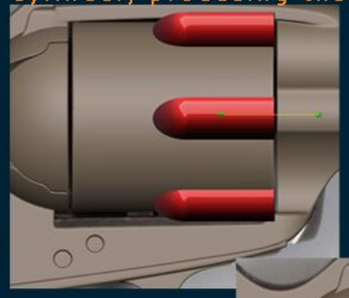


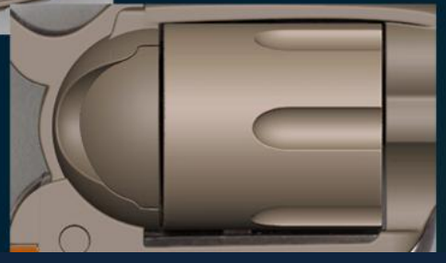


Scale and trim the shape if necessary and activate the axial symmetry function using the settings as shown. This will generate a radial arrangement of 6 flutings.

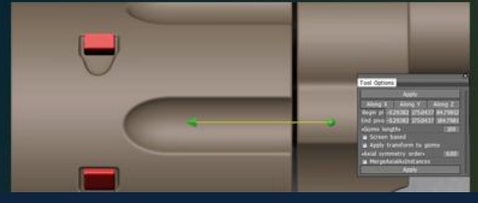


Use the manipulator to position the flutings so that they correspond to the reference, then click on apply. This will create a single object from the flutings in our flutes layer. Right click on the the flutes layer and subtract it from the cylinder. This will carve out the shape from the cylinder, producing the result shown below.

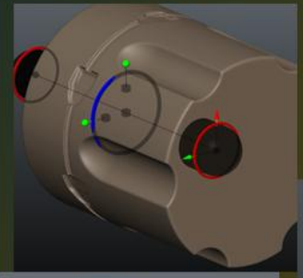


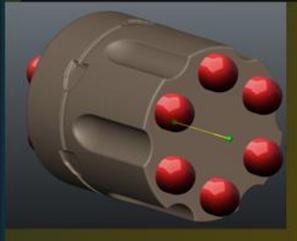


Create a new layer name it Timing Notches, then create a small cube and using a spline curve, draw out the shape of a single timing notch and shift apply to cut away the area outside of the curve.Use the Axial function as before to array 6 notches,apply these to the layer and subtract those from the cylinder. Make a new layer name it Lockup Notches, this time create a simple cube locate that cube into the area of the lockup notch which is located inside the timing notch,array 6 notches and subtract from the cylinder once again.



Create a new layer, name it chambers and create scale and position a capsule in the location of a single chamber. Array this capsule 6 times using the axial function apply it into the chambers layer then subtract this from the cylinder. Now the cylinder is complete.

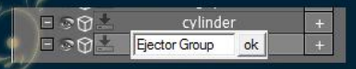


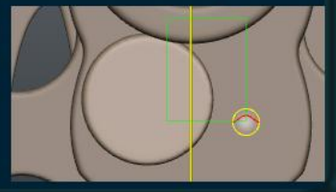


Modeling from Reference

Building A Colt Peacemaker - Part 9 The Ejector Assembly

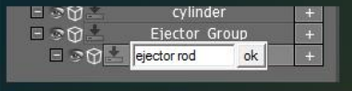
Create a new layer name it ejector group, create a cylinder and position it relative to the ejector housing in the reference. Use the hide function with the rectangularmarquee to hide the area shown in the image.

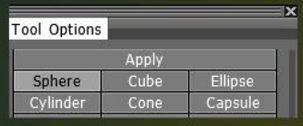


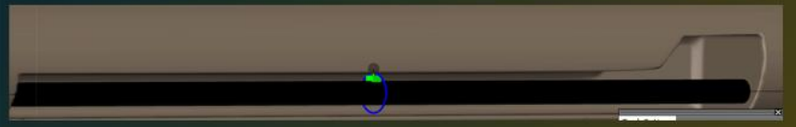


Once the selected region is hidden, use the spline tool to mark out the inset for the ejector rod and spring mechanism as shown in the image.Carve out that region then switch to the Hide function, hold down t he CTRL key and marquee select the the hidden area of the ejector housing. You should have the result shown below

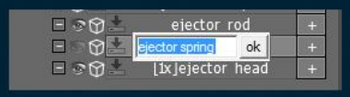
Create a new layer and name it Ejector Rod. Create a cylinder, scale and position it relative to the reference image. That' s it!

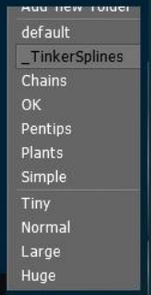


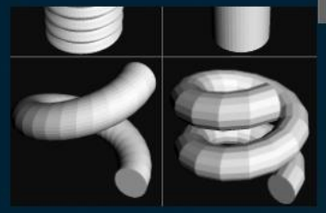




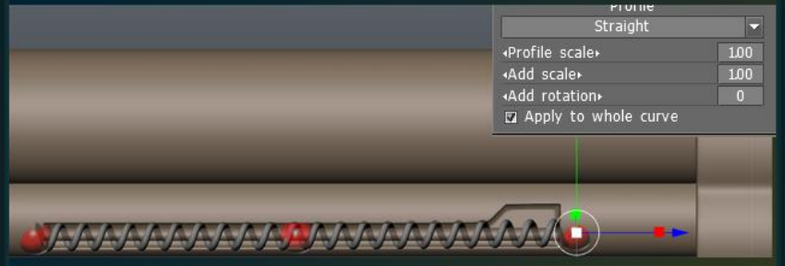
Create a new layer, name it Ejector spring. Now switch to the curves function and select the tinkersplines library. Pick the spring2.obj



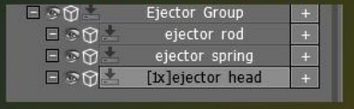


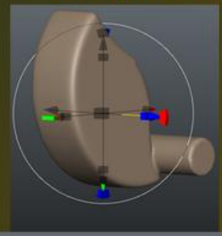


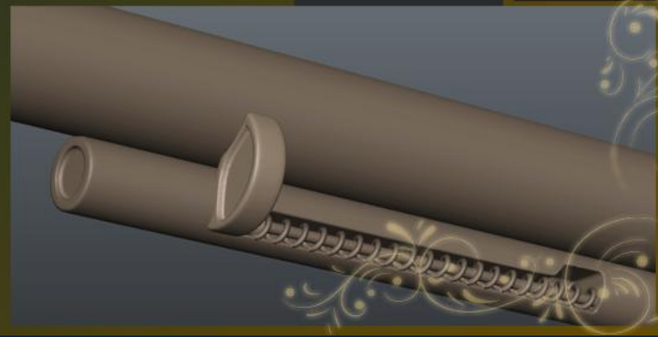
Now draw the curve as depicted in the image. Position the entire curve by checking the Apply to whole curve box in the curve attributes panel and uncheck to manipulate each of the nodes. More nodes creates more iterations, for us 3 nodes should be sufficient.



Create a new layer, name it chambers and create scale and position a capsule in the location of a single chamber. Array this capsule 6 times using the axial function apply it into the chambers layer then subtract this from the cylinder. Now the cylinder is complete.



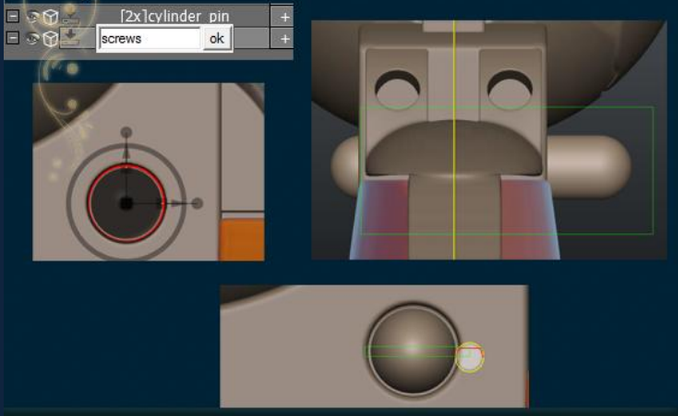




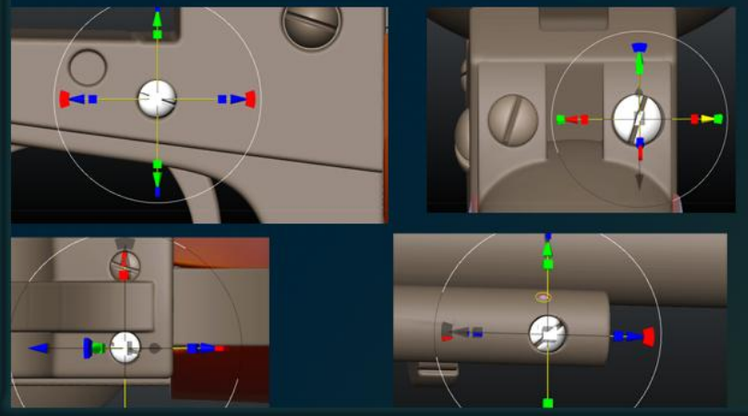
Tutorial : Modeling from Reference

Building A Colt Peacemaker - Part 10 Screws and details

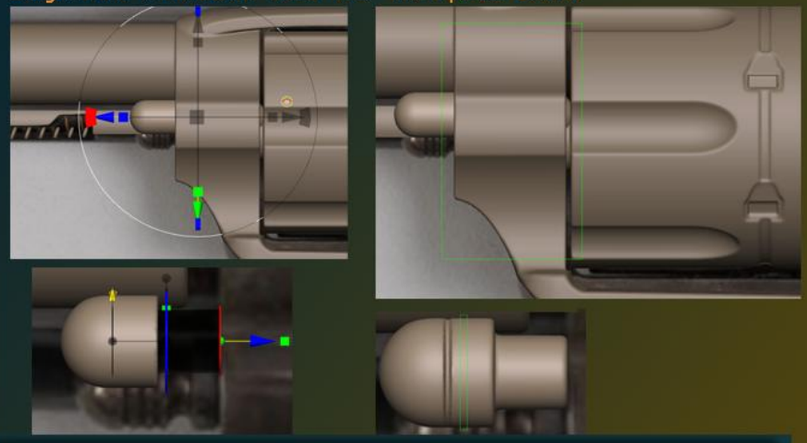
Create a layer and call it screws from the primitives menu create a capsule and position it by one the screws in the reference - I chose the hammer screw . Carve away the excess portions of the capsule and scale the shape on the z axis so that it resembles a screw. Now carve a notch and you are done.



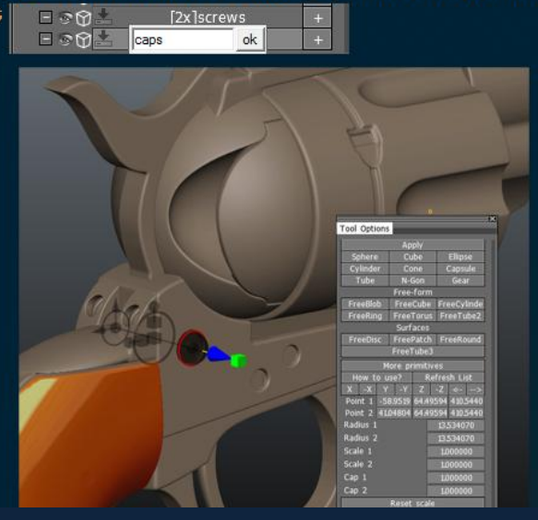
Select the clone function and switch to the rectangular marquee then select the screw you have created, a new cloned version will appear, move this into the position of the other screws in the reference.Once you have created the trigger screw and the bolt screw and ejector tube screws, move onto the backstrap screws and rear guard screws; inset these last sets quite deeply.



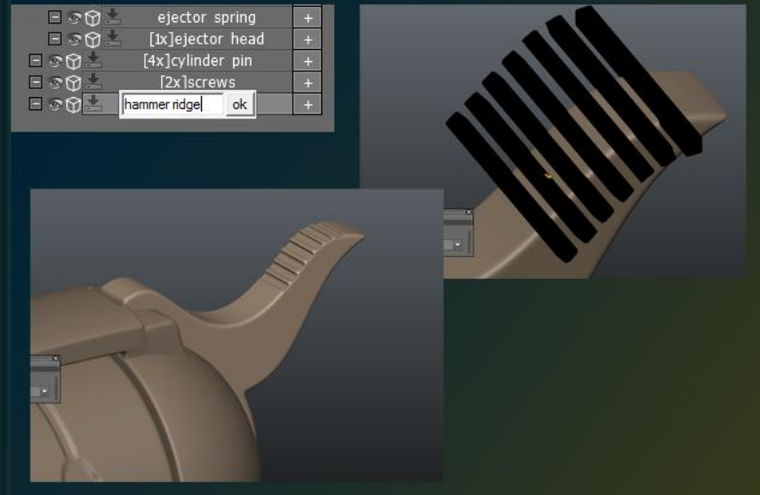
Create a new layer name it cylinder pin then create a capsule move it to the location of the cylinder pin and carve out the excess portion as shown. Move it away from the frame and add cylinder primitive, shaping it as showin in the image. Create the ridges with a negative airbrush and the marquee tool.



Create a new temporary layer named caps and create a capsule position it into the region of the hammer screw but on the opposing side - we need to simply cap off that screw. Once the capsule is properly trimmed and scaled, clone this to the location of the other two screws i.e., the trigger and bolt screws.Move this layer to screws



Create a new temporary layer and name it,hammer ridges. Array some cube primitives as shown below, then subtract this from the hammer.



Now we are almost done, At this point, unify the gate to the frame, gentle soften and smooth out the joins, review the work and take a break. In the next part we will start to customize our Peacemaker by adding some engraving.