Cinema 4D

RETRO SPACECRAFT

How to use Maxon's Cinema 4D to create a science-fiction spacecraft in the style of Chris Foss. By **Adam Benton**

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DVD Assets

The files you need are on the DVD
FILES: FinalShipModel. cd4, Step3.cd4, Step4. cd4, Step7.cd4, Step8.cd4, Step9.cd4, Step11.cd4
FOLDERS: Full screenshots
SOFTWARE: Cinema 4D

As a child of the '70s, I was probably one of a great many kids who had posters of vast airbrushed spaceships on their bedroom walls. These ships were usually very organic, covered in various cavernous intakes, and were often brightly coloured, with bold, geometric markings, alien texts, panelling and thousands of tiny window lights. And if they weren't rumbling through the depths of space, they were lowering the statues onto Easter Island, or hovering menacingly overhead, while some other smaller vehicle tried to flee.

Chances are that if you had one of these posters (or at least if you know some kid that did!) it was probably designed by Chris Foss.

Chris was, without doubt, one of the great pioneers of science-fiction art, specialising in creating visions on a grand scale never really seen in the genre before. You can clearly see the influence his work has had on his peers (past and present), as well as in many epic science-fiction films, including Star Wars.

For this issue's tutorial, I have set about creating a ship that might not be out of place in Chris Foss's repertoire. To do this, I have used Maxon's excellent Cinema 4D application (there's a demo on the DVD f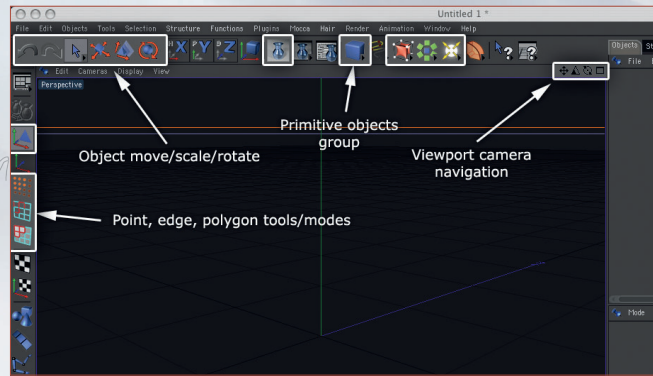or you to take a look at). Cinema 4D is a professional 3D application, which opens up far more creative possibilities than other 3D programs like Bryce. But don't let its added sophistication put you off, since as well as its enormous power, it's one of the friendliest, and arguably, easiest of its kind to get to grips with – without inducing you to pull out much (if any) of your hair!

This tutorial is a basic introduction to some of the modelling aspects of Cinema 4D, which will hopefully help demystify the program a little, and enable you to experiment at creating your own organic Foss-esque ships. Please check the cover disc for related scene files and additional screenshots.

Primitive objects group

Object move/scale/rotate

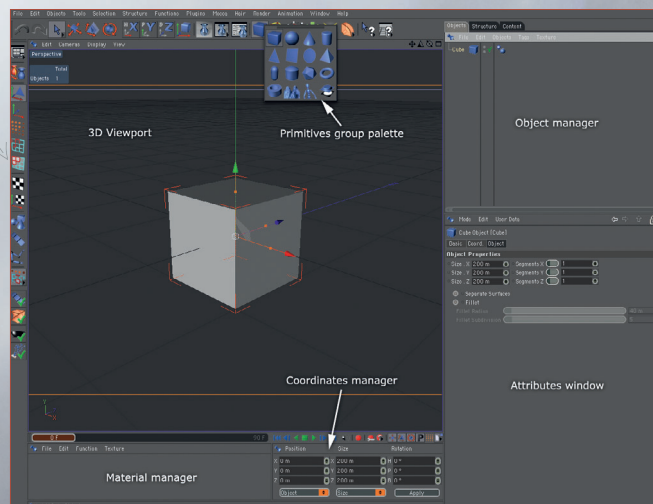Viewport camera navigation

Point, edge, polygon tools/modes

1 Orientation

To get orientated a little, I'll start with an overview of Cinema's basic layout and tools, as well as showing you how to navigate around the 3D space. Firstly, looking along the icons at the top of the screen from left to right, I have highlighted the tools we'll be using predominantly for this tutorial, which are: Undo, Redo, Selection tools, Move, Scale, Rotate, Render, Primitives, NURBS, Special modelling tools and Lights. For full descriptions, see the manual with the demo on the cover disc. On the left side, we will also use a few of the tools: Model tool, Point tool, Edge tool and Polygon tool.

The camera navigation controls are in the upper right of each of the viewports, and consist of a move/pan, zoom/move in and rotate controls. The final rectangle switches between a single viewport display, or multiple (ie, 3D view, top, right, and left, etc).
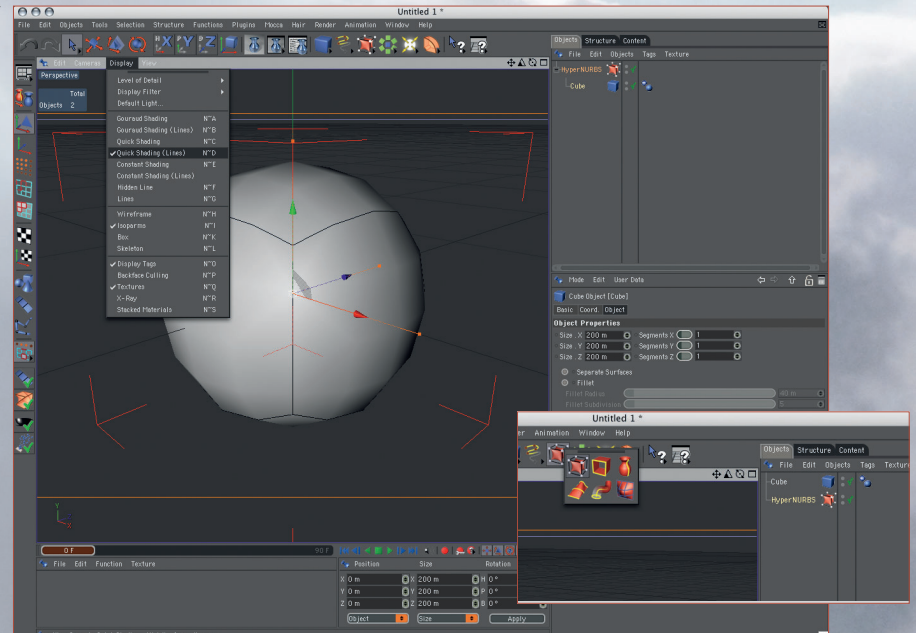
2 A Broader view

Now let's get a broader picture of the other panels. Start by clicking and holding on the Primitives group palette

3D Viewport

Primitives group palette

Object manager

Coordinates manager

Material manager

Attributes window

(the blue cube). You are presented with a selection of typical 3D primitive objects, from which you should select a cube. Now, the cube has appeared in the viewport and a reference to it appears in the Object Manager. If you click on the cube in this window, the attributes window displays information about the cube (its dimensions and how many segments it's composed of, etc). You'll also notice that its dimensions are displayed in the Coordinates manager, along with its position in the 3D space and rotation angles. With the Move tool activated, click and drag the cube around in the viewport to see how these figures are affected.

3 Modelling tool primer

With the interface now hopefully a little less mysterious, go up to the NURBS group palette, click and hold, and select the first 'HyperNURBS' object. This is a fantastic tool, and really is a great place to start if you want to see near-instant organic results. In the Object Manager, select your cube and drag and drop it onto the HyperNURBS object. You'll notice that the cube's hard corners have been smoothed away, and it has practically become a sphere. If you change the display settings to Quick Shading (Lines) and either Wireframe or Isoline, you can better see how the shape has been subdivided into smaller polygons, enabling the shape to curve. The Wireframe view shows all the 'virtual' polygons used to make the new shape, and the Isoline view shows only

the original six cube polygon edges, albeit with the HyperNURBed curve.

4 Smooth operator

Now test out the camera navigation controls. With your cube selected, clicking and dragging on the rotate or zoom controls moves your view around and into/away from the selected object.

Select the cube in the Object Manager, and change its segments from 1 to 3 on all axes. Notice how with more segments/polygons, the smoothing gets pushed further to the edges, and we now have a soft, rounded cube. The HyperNURB (HN hereafter) object interpolates a curve between each point, so the closer they are together, or the more there are globally, the less obvious the curve becomes. While the cube remains in this state, we can continue to alter the amount of divisions etc, but if we want to start pushing and pulling polygons around, we need to make it editable. Click on the icon above the Model tool – the cube's icon in the Object Manager changes to a lighter blue triangle. ➡➡

'Make Editable' tool
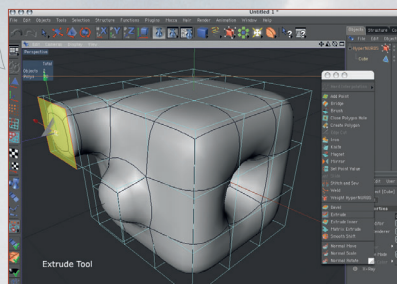
Polygon Tool

Selected Polygon
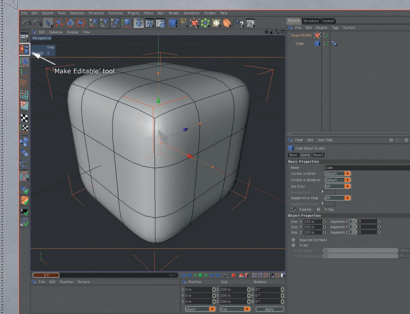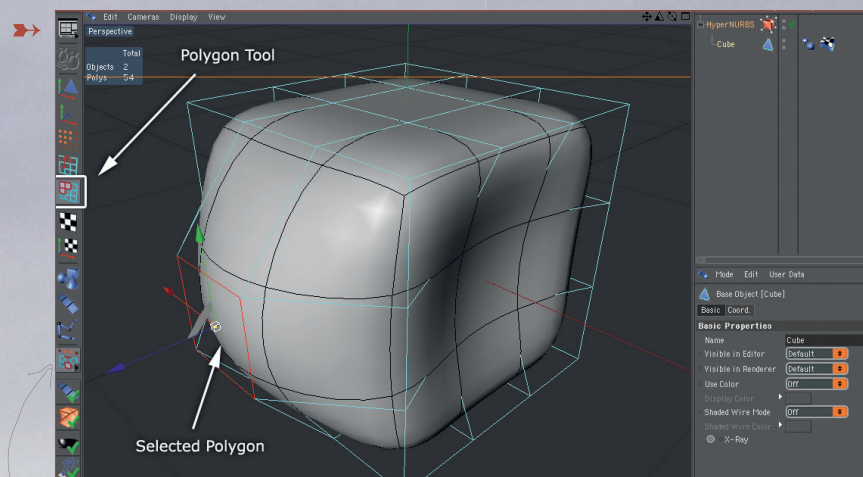
5 Poly pushing

Click on the Polygon tool on the left of the screen, and you'll see an indication of how the cube's original polygons look, and we can now click and select any of these polygon faces, to enable us to modify them. Selecting the Move tool and either clicking and dragging any of the selected polygon axis handles, we can pull it away from the main shape thus creating a protrusion. The reverse can be done to make an indentation. Already, particularly if you are sculpturally minded, you should see how much fun and how creative this approach can be. Experiment with pulling the various polygons around, using the scale and rotate tools to further distort and mould the shape. Don't forget to use the Undo/Redo tools if you want to return to a previous state, or see the difference between edits.

6 Venting

Now, with our cube back in its original, undistorted state, it's time to try some more tools that will help attain specific and more detailed features in our ship model. Go up to the Structure menu, and roll down a small way onto a horizontal line at the top of the dropdown menu – clicking on this detaches the Structure menu, and retains it as a
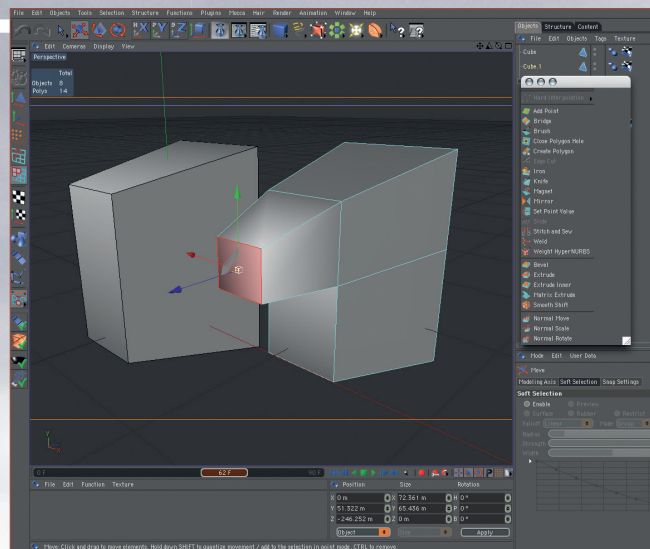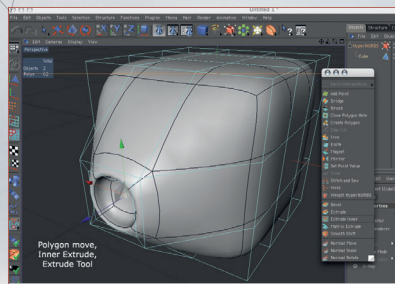
floating window above our workspace. With the Selection tool, select a polygon on the cube, and then select the Extrude tool. Now click and drag anywhere in the viewport – the polygon will be raised or indented from the main shape. If you release and then apply the same action again, notice how the shape hardens depending on how close the second extrusion is to the first. This is a great way to pull out specific features on your ship. If you also use the scale move and rotate tools along the way, you can really control how the shape tapers and twists. Return the cube to its previous state again with the undo command, and try the Inner Extrude tool. In my example, I pull the central polygon forward, apply an Inner Extrude, and then an Extrude inwards to create a defined, circular indentation – a ship jet vent, maybe?

Check the other screen grabs to show what the form looks like with and without the HyperNURBS tool activated.
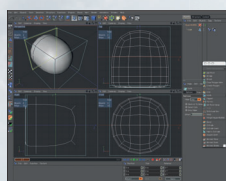
7 Definition

With my cube restored to its original (1:1:1) polygon shape (multiple Undo, edit the cube divisions, and make editable again, or simply create a new cube), I select the Knife tool from the structure menu. The knife has a number of modes, but by far the most useful is

Extrude Tool

Polygon move, Inner Extrude, Extrude Tool

Shortcuts
Zoom in
[1], [2] and [3] (Mac and PC)
For a fast keyboard approach to viewport navigation, use the [1] [2] and [3] keys to Move, Zoom and Rotate respectively.


the Loop mode, which enables you to make cuts around the entirety of the form. In this example I have used it to flatten one end of the spherical cube. As you can see, when we switch to the multiple views, this creates a kind of bullet shape in this case, but it demonstrates how knife cuts can be used throughout a model's form to add definition only where we want it.

8 Ship building

Time to get down and dirty, and start to use these techniques to build our ships! As with the examples above, I actually start with a cube, since it is one of the most versatile shapes to begin with. I find it's useful to edit the shape without an HN smoothing object initially, and then add one once I have a basic form. I stretch the cube upwards in the Y axis (with the model tool selected), and scaling down the front polygon (with the polygon tool selected). In the next step, I have applied a loop knife cut around the cube, and extruded the top front, top face and scaled it down further. Next I selected the polygons on the top of the object and used the scale tool to reduce their width, extruded the rear polygons backwards, and then used the Edge and Move tools, to move some of the edges further out or inwards as desired. You can already see how a basic form begins, and is easily attained!
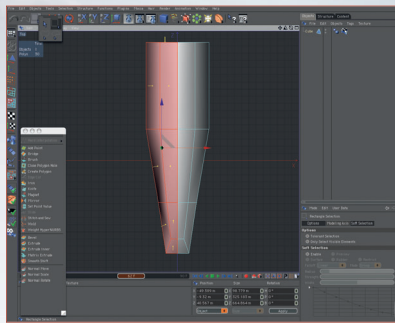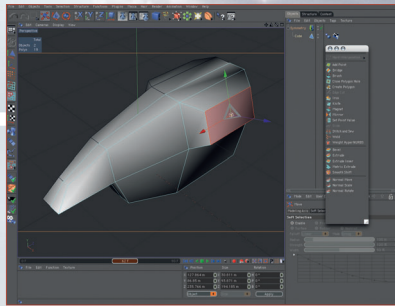
9 Symmetry

Assuming your ship design is going to be basically symmetrical, it makes sense to reduce the amount of work early on, and concentrate on only one side of the form. Working this way enables us to make any number of detailed extrusions and shape changes to one half, and have
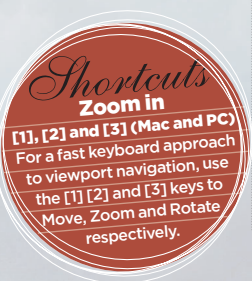
it automatically mirrored onto the other. Switch to the top view [F2]. Select the knife tool, and in the attribute manager, make sure it's in loop mode and that none of the other options are ticked. Now, when you hover over the object, you'll see the proposed knife line moving over the form… when it's roughly in the middle of the shape across the ZY axis, hit the Shift key, which freezes the proposed knife cut, enabling you to adjust the exact offset amount – make it 50 per cent for exact centre, and now click in the viewport.

The knife cut will have been applied, and if you go back to the 3D view [F1] you'll see the polys have been divided along the centre of the shape. Now click and hold on the Selection tool group and select the Rectangle Selection tool. Click and drag over one half (over the seam you just cut) of your object, and press the Delete key. Now, from the Special Tools group palette, select the Symmetry object, and drop your cube onto it. Your missing geometry has now been replaced with a virtual, mirrored version. Now when I extrude and rescale a polygon on the right-hand side, it's duplicated exactly on the left.
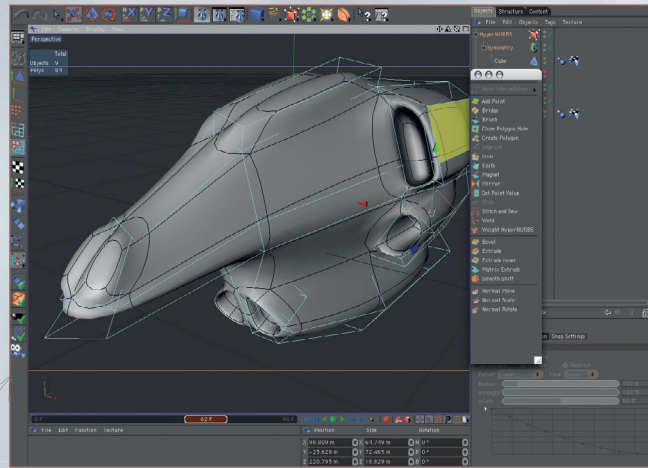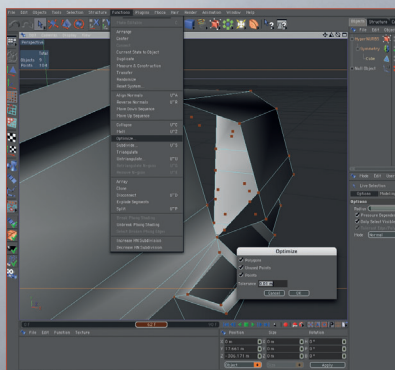
10 Extrusions
With an Inner Extrude and Extrude added to the front face of the side extrusion, I have the basis of what will become a jet intake. Switch to the Point Tool mode, and tweak individual points for finer shaping, but remember not to pull them away from the central ZY axis, or the shape will split apart at the seam of the symmetry object. Now, bring in the HN object again and drop the symmetry and its cube onto it to get some organic forms to appear. Using the Knife tool in Loop mode, and working from the centre line, we can make defining cuts to add ridges and detail.

11 Keeping it together
You may want to add extrusions to the polygons on the central axis seam, but since this is mirrored, we end up with two extrusions – one either side of the seam. To rectify this problem, switch off the symmetry and HN objects in the object manager (click the green ticks). Rotate the view around so you can see the inside of the ship, and using the Poly tool and Selection tools, select and delete the offending polygons. With the symmetry and HN back on, we now have singular extrusions, but they are torn apart at the seam. Switch to the Point tool mode and select each point in turn, changing their X position value to 0 in the coordinates manager, thus enabling the symmetry object to re-seal.

12 Reverse engineering
If you decide later that you don't like a modification that you've done, but have added other details that you like since, then using the Undo function would be inapplicable. So instead, you can delete the problem area polygons

(the upper intake vent, in my case), and patch up the hole left by them. Switch to the Point tool, and you'll notice that despite deleting the polygons, the points that defined them are still present. To remove these, go to the Functions menu, and select Optimise – now just click OK and any extra points are removed.

13 Patching it up
Now, using the Create Polygon tool from the Structure menu, click on each of the four points in a clockwise order, finally clicking back on the first point again to finalise the function. Now that polygon has been replaced as good as new, do the same for the lower four points to complete the process. When you turn the HN smoothing back on – assuming you connected all the points correctly – you can see how the form has returned to a nice sealed unit.

14 Taking it further
Now it's just a matter of extending and refining the shape using the techniques I have explained throughout. Even though the ship has now evolved quite a lot through various tweaks and refinements, you can see how the cubic form is still essentially quite simple.

15 Final model
To finish, add some other primitive objects, like the Oil Drum and Cylinders, etc. These will boost structure detail in certain areas to add to the sense of scale, and suggest that this is not just one big, organic craft but that it's made up from familiar geometric structures. In this case, I also add a second HyperNURBed cube for the rear of the ship.

Shortcuts
Extrude Tool
[D], [I] and [K] (Mac and PC)
While modelling, simply use [D] to activate the Extrude tool, [I] for the Inner Extrude tool, and [K] for the Knife tool.