



CINEMA 4D

Watch the clock

This month, we bring you a complete Cinema 4D project: to model, texture and light this elegant antique pocket watch. The walkthrough starts out gently, then speeds up to stretch your skills **BY ADAM BENTON**

FACTFILE

FOR

Cinema 4D

DIFFICULTY

Elementary / Intermediate

TIME TAKEN

2-3 hours

ON THE WEB

- Full-size screenshots
- Supporting scene files and textures

ALSO REQUIRED

MoGraph module (ideal, but not essential)

When you're starting out in 3D, there's nothing like a graded project to test your skills. So this issue, we're going to create the antique pocket watch above from scratch. We'll start by focusing on the modelling work in detail, then go on to explore texturing and lighting, covering more and more ground as we do so. See how far through you can get!

For the tutorial, we'll be making use of *Cinema 4D's* various polygon modelling tools, and some of the useful new objects and instancing tools in the *MoGraph* module. (If you don't have *MoGraph*, we'll suggest alternative workarounds.) Modelling complete, we'll explore the creation and application of shader-based textures to create an authentic gold finish for the watch, with the addition of grime bitmaps and lots of procedural noise, and a silky red material for the background cloth. Lastly, we'll touch on lighting and rendering.

Along the way, we'll be teaching you some techniques you can use in your own projects. Some of the biggest giveaways that an

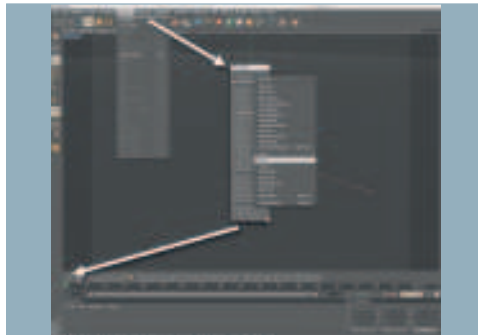
image has been created using 3D are pristine objects with unfeasibly sharp edges; perfectly smooth surfaces with no flaws or fluctuations; and squeaky-clean surface materials with no traces of dirt and grime. This might seem like a challenge to counter, but use of HyperNURBS and careful knife cuts during modelling – as well as a few simple additions to the model's materials using procedural noise, and the odd 'dirty' bitmap – can create something that looks authentic.

Full-size screenshots are provided at the Stop Press section of the *3D World* website (www.3dworldmag.com), so that you can refer to key settings in more detail. The supporting files on the site also include pre-built textures, and the final scene file. If you get stuck, try loading this in and 'reverse engineering' our solution.

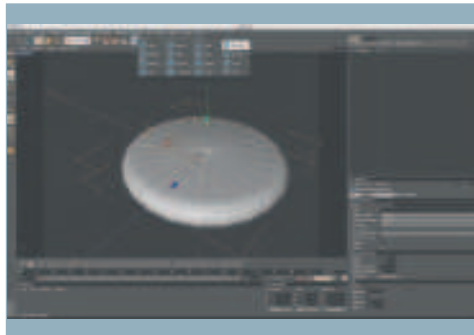
Adam Benton is a freelance illustrator from the UK. He has been using Cinema 4D professionally for six years, and creates tutorials and illustrations for various magazines www.kromekat.com



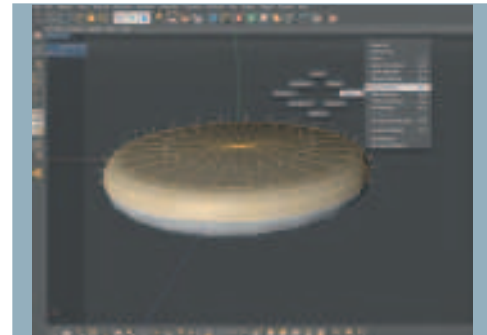
STAGE ONE | Modelling the body of the watch



01 There are a few tools you will be using regularly throughout the modelling process, so in the Structure menu, click on the top bar to tear off the menu palette. Right-click on the floating menu, untick Text, and select Transpose to make the icons horizontal. Finally, increase the Icon Size to Large Icons, then drag the Icon palette into the interface and dock it above the timeline.



02 Left-click to open the Primitive object palette (the cube icon), and select a Cylinder. In the Attributes Manager (AM) open the Object Properties tab and reduce its Height to 30m, and change the Radius to 100m. Next reduce the Rotation Segments to 24, and in the Caps tab, activate the Fillet option by checking the checkbox, then set Segments to 3 and Radius to 14m.

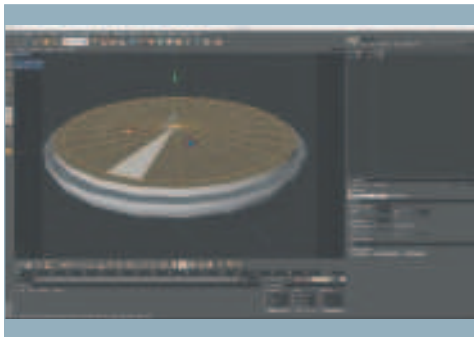


03 Make the Cylinder editable (press [C]). Then in Poly Mode (select the Use Polygon Tool icon), select all the polygons above the central axis. These will be duplicated and used for a couple of elements within the model. From the Functions menu, select Split to create a copy of just these polygons. Next hide this new object by clicking the visibility dots next to the copied object in the Objects Manager.

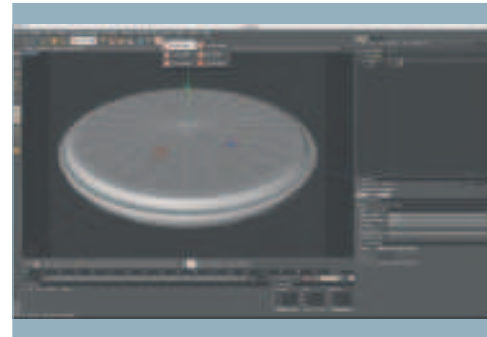
EXPERT TIP

V is for versatile

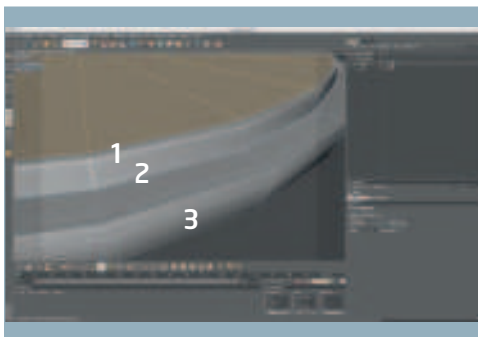
If you hold down the [V] key, a menu will appear under your cursor, which gives you quick access to a number of tools and options used within a typical modelling session in *Cinema 4D*. From the mouse-centred, diamond-shaped array of headings that appears, you can very quickly and easily access options 'on location' instead of moving to the top of the interface and using menus there. Each option contains a sub-menu of tools and commands. This is a highly intuitive way to switch through the various selection tools such as Loop, Fill, Ring and Outline Selection.



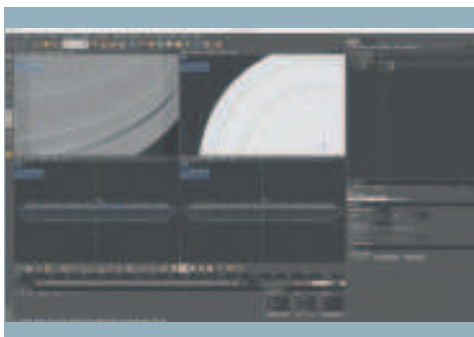
04 With the polygons still selected, choose the Scale tool (press [T]). Use the Y-axis handle and drag downwards to compress the polygons until they are all flat. Next, use the Loop Selection option to deselect the outer two rings of polygons. (On a Mac, hold down [Apple] to deselect; on a PC, hold [Ctrl]. Hold [Shift] to add to the selection.) Now press [D] to select the Extrude tool, and drag right with the mouse to extrude the polygons.



05 In the Objects Manager (OM), name the active Cylinder 'Body' and the non-visible Cylinder 'Lid'. Select both 'Body' and 'Lid', then hold down [Option]+[G] / [Alt] + [G] to group them under a Null Object. From the top icon palette, select a HyperNURBS (HN) object and drop the Null Object onto it. (This places the Null Object beneath the HyperNURBS in the hierarchy.) Now these and any further objects added to the Null will be smoothed by the HN.



06 The smoothed shape needs tightening up. Select Body, then from the tools palette you docked earlier, select the Knife tool. In the AM, set the tool's Mode to Loop, and deactivate Restrict To Selection. Make cuts running around the entire face of the watch, close to the edges marked [1] and [2] above, to create tighter folds. On the outer rim [3], use Loop Selection (in Edge Mode) to move the existing edges closer to the outer edge to tighten it.



07 After tightening the main edges, add a couple of inset ridges to the main upper face using the Knife tool, with Mode set to Loop as before. To do this, create two cuts close together, then use Loop Selection to select the newly created polygons, and use the Extrude tool to extrude downwards. Before moving, changing the tool or deselecting the extrusion, increase the Subdivision of the extruded polygons in the AM to 2. This sharpens the ridge.

EXPERT TIP

Text without MoGraph

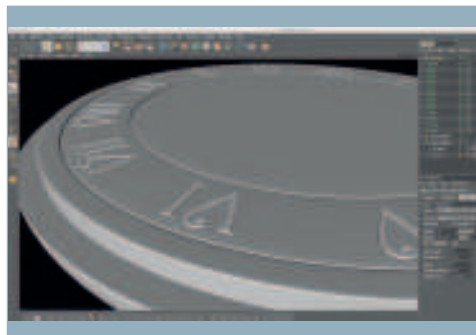
Overleaf, we'll show you how to place the numerals on the watch face using the *MoGraph* module. If you don't have *MoGraph*, you can do this by hand: the simplest, but most labour-intensive, solution. In the Spline palette, locate the Text Spline. The text itself, the font and the scale can be edited via the Attribute Manager. From the NURBS palette, select an Extrude NURBS and drop the Text Object into it in the AM. The depth of the text can be altered via the Movement fields; in the Caps tab, it is possible to add fillets. You can then move the numerals into position manually using the Move and Rotate tools.



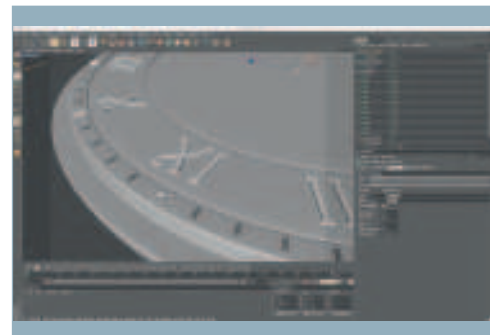
STAGE TWO | Adding numerals and markers to the face



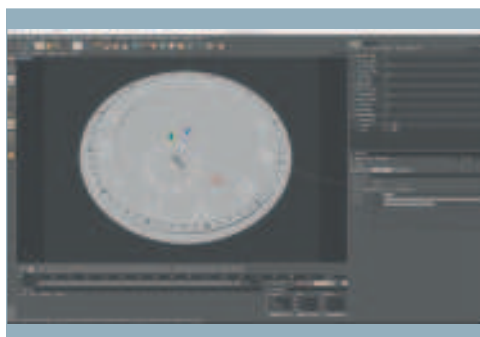
08 For the watch face numerals, we've used *MoGraph*. Go to the *MoGraph* menu, and select the *Text Object*. You need a separate *Text Object* for each numeral. Set up the first with a suitable font, type in the numeral (start with 12), then duplicate and edit each one to create the numerals from 1 to 11. Select a *Cloner Object* from the *MoGraph* menu and drop all of the *Text* objects under it in the *OM*.



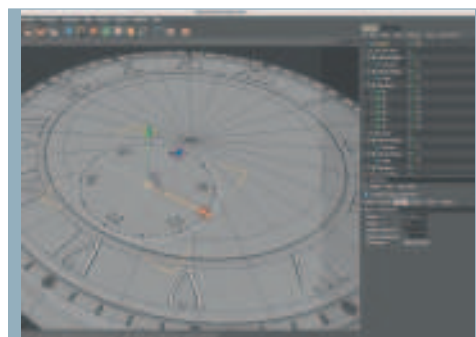
09 With the *Cloner Object* selected, in the *AM*, set the *Mode* to *Radial*, *Count* to 12, and *Plane* to *XZ*. With the watch base visible, alter the *Radius* until it fits as desired. Finally, by multi-selecting ([Shift]-selecting) all of the *Text Objects*, alter their size. Add a slight bevel to their top faces if you want. (To do this, you'll need to make the *Text Objects* editable, and use *Structure > Bevel*.)



10 Next, add the minute indicators. Start with a *Cube* primitive; scale it so that it becomes rectangular; and give it a slight bevel. Next, select another *Cloner Object* from the *MoGraph* menu, and drop the *Cube* into it. Using similar settings to the numerals, but with a *Count* of 60, make an array of 'minutes' around the outer edge of the face. Do the same with the hour indicators using a scaled *Cylinder*.



11 Next, let's make a separate seconds dial. Since the elements are in place for the main dial's digits and indicators, you can duplicate these and re-edit them for their new purpose. Group all the *Cloned Objects* of the main dial into a *Null*, and rename it 'Main Dial'. Copy and paste this dial, renaming the duplicate 'Seconds Dial'. Rescale the new dial as shown in the image above.



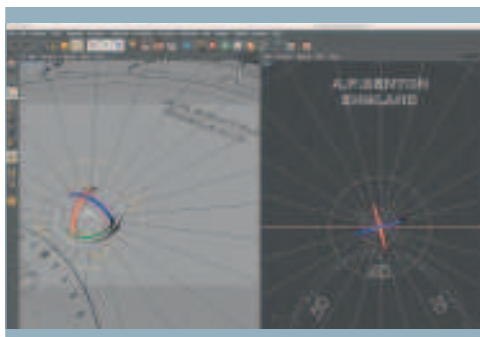
12 Remove six of the *Text Objects* under the new *Cloner Object*, by selecting them in the *OM* and hitting [Delete]. Edit the remaining six to display the numbers 10, 20, 30 and so on up to 60. To create a base for the dial, select a *Cylinder* object from the menu, flatten it to a minimal height, then move it just below the new numerals using the *Transfer* tool, as explained in the next *Expert Tip*.

EXPERT TIP

Using the Transfer tool

The *Functions* menu contains an extremely useful tool which is often overlooked by new users of *C4D*. *Transfer*, as the name suggests, allows an object or group of objects, to be moved to the location of another object or group. It can also adjust the object you wish to move to the same rotation axis and scale as the target object. This can be very useful during modelling, since it saves a lot of manual alignment work in the various viewports, especially when the target object has been placed in awkward non-planar rotations.

STAGE THREE | Creating the hands and the lid



13 Create a primitive *Cylinder*; this will be the minute hand. Press [C] to make the *Cylinder* editable. Scale it to match the image above. Change the *Rotation Segments* to 12. Rotate the *Cylinder* axis 15 degrees in the *X*-axis using the *Object Axis Tool*. Then using the *Model Tool* rotate the entire cylinder back 15 degrees. Next select the polygon facing 12 on the watch and extrude this polygon.



14 The extruded polygon will form the hand itself. Using the *Knife* tool in *Loop Mode*, add three lateral cuts across the extruded watch hand. In *Edge Mode*, using the *Loop Selection Tool*, select the central edge loop and scale up in the *X*-axis to form the diamond shape on the hand. Next select the end polygon in *Polygon Mode*, and scale down in the *X*-axis to make more of a point at the end of the hand.



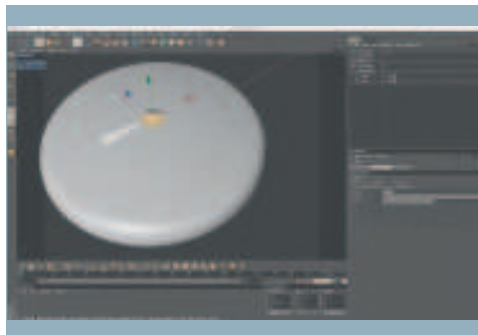
15 Place the watch hand in a new *HN* object to smooth it. Add further loop cuts around the edge of the hand, as in Step 6. This will harden up its edges while retaining smooth curves for its overall form. To create the hour hand, duplicate the minute hand, and using the *Loop Selection tool*, select the three polygon loops towards the end of the hand. Use the *Move Tool* in the *Z*-axis to resize the new hand.



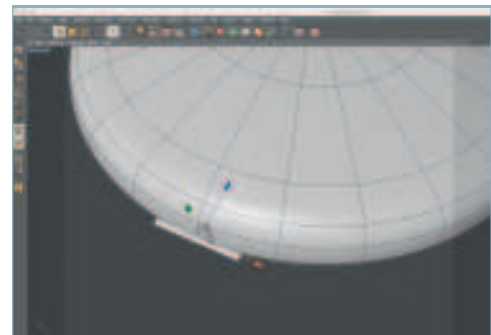
STAGE THREE (Continued) | Creating the hands and the lid



16 Add a new Cylinder object to form the central pivot for the hands, as shown above. After some more loop cuts, use the Bevel tool to raise the inner and outer polygons to add a little more detail. For the seconds hand, copy the hour hand, then rescale it and Transfer it to its appropriate location on the seconds clock face.



17 Make the Lid object visible and position it as shown above. Add a couple of loop cuts to the top polygons. With the Loop Selection tool and the Move Tool, raise both inner loops slightly in the Y-axis. With only the inner circle selected, raise this a little further, creating a domed shape. Make a copy of the lid for later and make it invisible in the OM.

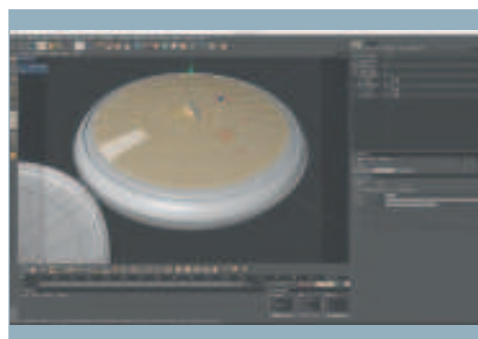


18 To create the tiny hinge, create a new Cylinder, scale it as shown above and move it to the bottom end of the watch (where the number 6 is on the main dial). In the Object Manager, drop the Lid object under it. Now use the actual hinge axis point for rotating the lid. With the Hinge object selected, rotate the lid open.

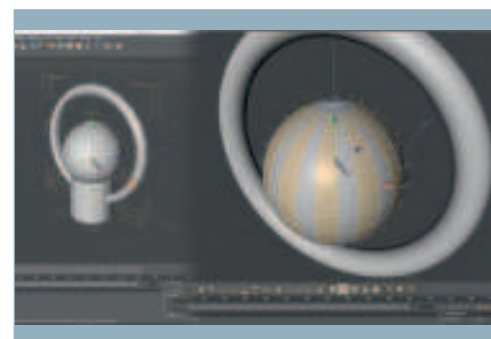
STAGE FOUR | Adding the final modelling touches



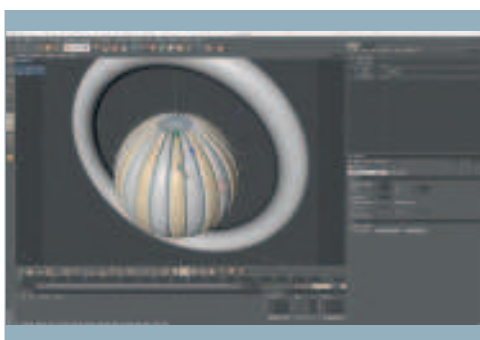
19 To make the lid more realistic, you need to add some thickness. Select all of the polygons and Extrude inwards with Create Caps checked. The colour of the new polygons (blue), means the normals are all inverted. (That is, the polygons face in the wrong direction.) To make them all face outwards again, select Reverse Normals from the Functions menu.



20 Make the second copy of the Lid visible and rename it 'Glass'. Scale it to reduce its size and position it so that it just covers the edges of the watch face. Then select and extrude the outer rings of the polygons. These will form the metal rim of the watchglass. Add a hinge for the watchglass to the left side of the watch face, using the same method as in Step 18.



21 Next, you need to make the winder and ring for the watch. Starting with a fresh document (File > New) add and make editable Cylinder, Sphere and Torus objects. Use the Live Selection tool to select alternate lines of polygons on the Sphere, as shown above. In the Selection menu, choose Set Selection to create a Selection Tag, then Selection > Invert. Deselect the top and bottom polar polygons.



22 Press [D] to activate the Extrude tool, and with an Offset of around 4m, hit Apply in the AM. Double-click on the Selection Tag to recall the previous selection, then extrude again. Finally, select the upper polar circle of polygons, and extrude them down -4m. Add some indents to the Cylinder using the Knife and Extrude tools. Move the three objects into position, group them and place in a HN object.



23 Copy and paste the winder group into the main watch document and move and scale the group into place at the top of the watch. Finally, check that everything is HN smoothed. You could also add some finishing touches such as a maker's name using a Text Object under the hour hand and some additional loop cuts to tighten up the lid edge and to create an indent for the glass lid on the watch base.

EXPERT TIP

Selective memory
Selection Tags are used for a number of things in C4D, including restricting textures to specific polygons and restricting polygons to specific bone deformers. You can use them when modelling too: for instance, when you wish to make multiple modifications to alternate poly groups which would be tedious to have to keep reselecting manually. By making a Polygon Selection, you are in effect creating a memory or snapshot to which you can return later, thus eliminating a lot of manual selection and saving time. Once you have no further need for that selection, just delete the tag.



STAGE FIVE | Texturing and lighting the watch



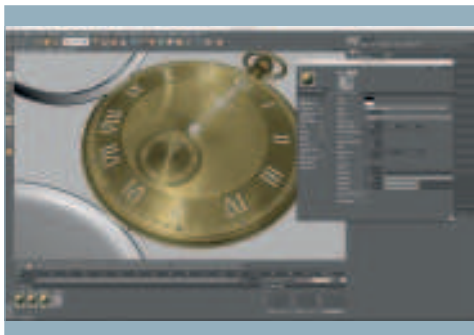
24 The next stage is to create shaders for the watch elements. We want this to be an antique gold watch, so we will start with the gold material. Double-click in the Materials window to create a new material, and then double-click again on the new Mat icon to open the Material Editor. Copy the settings above. In the Color channel, go to Texture > Effects > Lumas. Increase Brightness to 100%.



25 To apply the shader, select the polygons of the central face, then choose Selection > Set Selection to create a Selection Tag. Apply the material by dragging it from the Material Editor to the Body object in the OM. Drop the Selection Tag (in the OM) onto the material's Selection field in the AM. This restricts the material to just those polygons contained in the tag. Deselect the tag again. In the Material Editor, click Lumas, and edit the shader Color to RGB 198, 172, 84; set Specular 2 to RGB 255, 227; 160; and set Specular 3 to RGB 193, 168, 92.



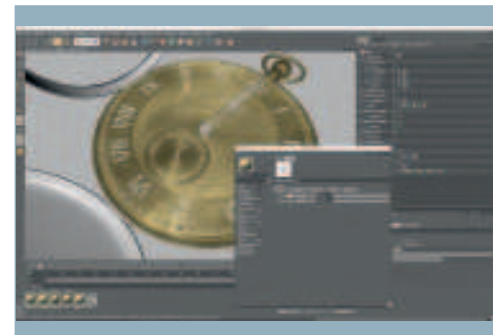
26 Now add Reflection (by ticking the Reflection channel), set Brightness to 25% and Color to RGB 212, 191, 110. The 'anisotropic' effect Lumas creates is ideal for machined/lathed metal. Click Lumas and check the Anisotropy setting to activate it. Copy the settings shown in the screenshot above. Now duplicate the material and apply it to the polygons behind the numerals by using a new Selection Tag. To create some variation in the tone of the gold on the watch face, experiment with the Anisotropy > X Roughness and Anisotropy > Y Roughness settings.



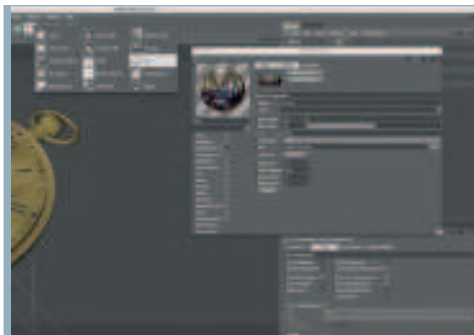
27 Duplicate the material again and uncheck Anisotropy. This new material will be applied to all of the other gold parts on the watch body. But the gold looks too even and clean. Select each gold material, check the Diffusion channel, and select Texture > Noise to apply procedural noise. Use the settings shown above for the noise values; and use a slightly different Global Scale to vary each gold shader.



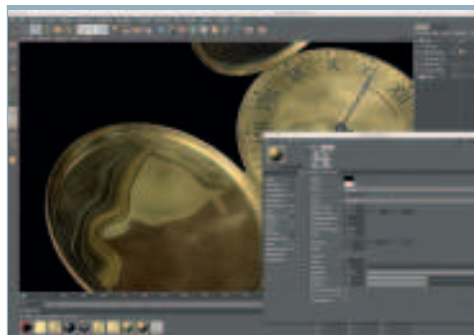
28 To distress the gold still further, apply another Noise in the Luminance channel of each gold material. Turn on Luminance, set Brightness to 0%, apply Noise with a Mix Strength of 5%, set Noise type to Wavy Turbulence and vary the Global Scale. Now let's apply some engravings to the watch. We've created two designs in Photoshop (Celtic.psd and Celtic Border.psd) for you to use. You can find the files online.



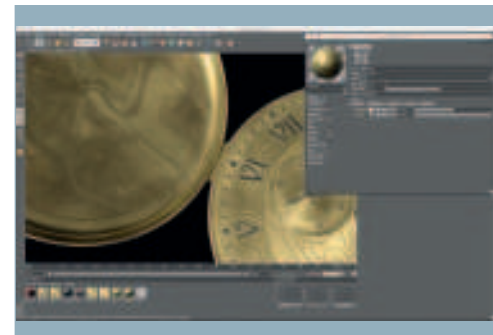
29 To apply the engravings, select the first gold material you created. In the Material Editor, turn on the Bump channel. Next load the Celtic.psd image and adjust the Strength to 30%. Now change the projection from UVW Mapping to Cubic (in the AM). You can scale the engravings using the Use Texture Tool as required. Repeat the process for the second gold material you created, using Celtic Border.psd.



30 Reflection has been used in all of the gold materials, so now you need something to reflect. We'll use an HDRI image for this. Select a Sky object from the Lights Palette, then create a new material and drop it onto the Sky tag. In the Luminance channel, load DH2175X.hdr (included on the web), and click the thumbnail of the image. Lower the HDR Gamma to 0.6. Turn off all the other channels.

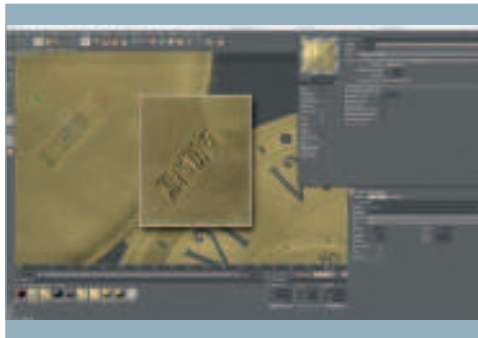


31 Next, right-click the Sky object and choose Cinema 4D Tags... > Compositing. In the Compositing Tag this creates, turn off the Seen By Camera option. To make the engraved gold shaders a little more convincing, add a layer to their Bump channels. (More details on how to do this in Step 31.) Inside the layer, add Noise, then drop 'Noise' under 'Celtic'. Set the Noise to 98% to make the reflections distort a little.

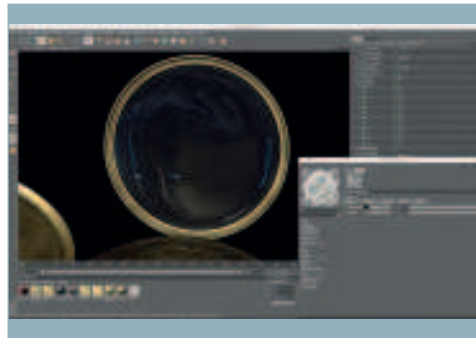


32 Let's age the gold a bit. In the Material Editor, check the Diffusion channel, then click on the arrow next to Texture. Select Layer. The original noise is stored in a layer. Now click the layer and apply the 'Grunge2' image (included in the files on the web). Change the drop-down from Normal to Multiply to multiply it over Noise and set it to 50%. Set Mix Strength to 55%. Repeat for the other gold materials.

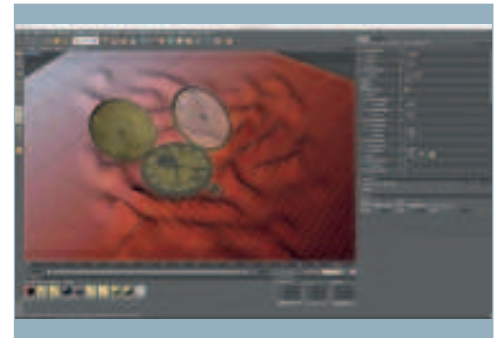
STAGE FIVE (Continued) | Texturing and lighting the watch



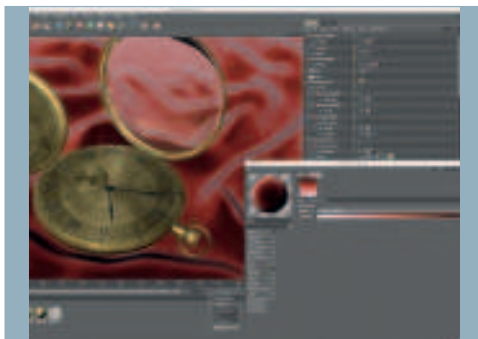
33 Let's add a hallmark. Copy the non-engraved gold shader. In the Material Editor, turn on Displacement, load HallMark.psd and match the settings to the screenshot. In Alpha, load HallMark_ALPHA.psd; turn on Invert. In Diffusion, load HallMark.psd; set Mix Strength to 100%. Use a Selection Tag to apply the hallmark. Change UVW Mapping to Flat and use the Use Texture Axis Tool with Lid selected to position the hallmark appropriately. Turn off Tile.



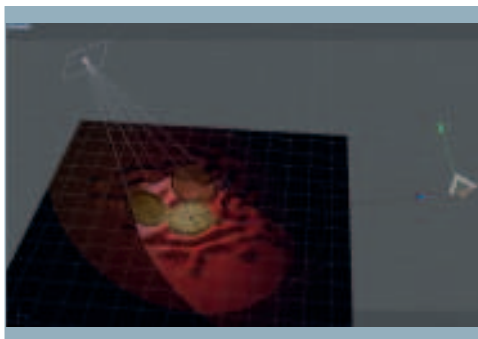
34 Now create Selection Tags for both the glass and rim materials of the watchglass. For the glass, create a new material. In Transparency, set Brightness to 98%, Refraction to 1.5, and turn Fresnel on. In the Luminance channel, add Noise set to Wavy Turbulence, and set Global Scale to 300%. Next layer on an inverted grunge map. ('Grunge2b' in the files online: use the same procedure as Step 32.) Set this to Screen, set Mix Strength to 50% and Brightness to 0%.



35 Next, we will create a silky fabric for the watch to sit on. Create a Plane Primitive with 70 x 70 segments, and scale it appropriately. In the Structure menu, select the Brush tool. Using the brush settings shown above, sculpt the geometry of the plane around the watch. Add the plane to a HN object. Make a new material and open it in the Material Editor. In the Color channel, set the new material's texture to Fresnel.



36 Edit the gradient by clicking on it and copying the colours shown in the screenshot above. Next, add Noise to the Bump channel with Strength set to 10%, Global Scale to 10%, change Space to World and Relative Scale to 100%, 100%, 1%. This will give the silk a nice subtle roughness. Apply the shader to the fabric geometry. To make the watch's numerals, hands and markers stand out from the gold, create a new material, colour it dark grey or black, and apply it. You can experiment with your own settings, or copy those in the final scene file on the web.



37 Turn on Global Illumination in Render > Render Settings. Add a Target Light from the Lights palette, matching the position of the left light above. Set Color to RGB 212, 207, 255, Intensity to 75% and add an area shadow (Shadow > Area in the AM). Add another Target Light to match the right light's position above, set Shadow Maps (Soft) and Intensity to 28%, and Color to RGB 255, 176, 88.

38 The anisotropic highlights aren't showing up with the area shadow in the first light you created. To fix this, turn off the Specular option in the General tab of the AM. Create a copy of the light, and in the copy, turn on its Specular attribute, but turn off Diffuse, and set its Shadow to Area. Now you get the best of both area shadows and anisotropic highlights on the various materials.

Experiment with the settings for the Global Illumination Strength and the Intensity of the lights to find a good balance between long render times and blown-out highlights in the rendered image. As a final touch, you could add your signature to the watch face of your finished antique pocket watch. Now the modelling, texturing and lighting is complete, you could even animate the hands, and watch time fly by! ●