CINEMA 4D
Release 9
Sketch and Toon

Sketch and Toon

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USA

or for the United Kingdom and Republic of Ireland to:

MAXON Computer Ltd
The Old School, Greenfield
Bedford MK45 5DE
United Kingdom

We will also be pleased to provide you with the address of your nearest supplier.

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Introduction

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Welcome to Sketch and Toon, the CINEMA 4D module for non-photorealistic (NPR) rendering. Quite simply, Sketch and Toon is the most powerful NPR software money can buy. Sketch and Toon delivers a huge toolset that allows you to achieve an unlimited number of different looks. This module doesn't just add lines to your work, it adds *style*.

Now, a huge tool set normally sets alarm bells ringing for many prospective users. Lots of features typically spells out COMPLICATED, but not in this case! Sketch and Toon has been specifically designed to cater for all users. It features three different control levels for fast, simple and streamlined workflow. User presets such as hatched lines give you instant results, while those looking for more control will love the huge variety of options on offer. And even better, once you've created your own style you can save it as a preset to use again and again.

Being a completely integrated module, Sketch and Toon works with virtually all CINEMA 4D features. Combining lines with features such as radiosity gives you even more scope for individual looks. It's not just lines either. Sketch and Toon comes complete with a powerful shading system. Your 3D objects can be filled in with colored or textured styles, for a full toon or tech experience.

"OK, so it makes very nice stills. What about us animators?" Well, naturally you can apply Sketch and Toon to your current animations to give them a toon feel. But here's something really special: you can animate lines being drawn. This means that you can literally have your scenes drawn from scratch in front of your bewildered viewers' eyes!

As an artist, you of course know better than anyone that a picture says more than a thousand words. Well, Sketch and Toon can make the same scene look different more than a thousand times. Be prepared to play into the small hours of the morning, because this module's really going to bring out the "what if?" part in you!

How to use this manual

To learn how to use Sketch and Toon, we recommend you proceed as follows:

- For a quick impression of what you can do with Sketch and Toon, see Chapter 1, “Overview.”
- To get up and running with Sketch and Toon, see Chapter 2, “QuickStart.”
- To move on to the more advanced features, work through the video tutorials located on the CD. These tutorials are your primary learning tool. They are the easiest way to learn the software.
- When you’re not sure what a function does, look it up in this manual.
- If you run into problems, be sure to check out Chapter 10, “Frequently Asked Questions.”

Registration

Registering your purchase is extremely important. The serial number included with your package is temporary and it will expire three months after installation.

To receive your final serial number, you must register. So please fill in and return the registration form at the earliest opportunity. Registering will also entitle you to technical support via telephone, fax and email. And by checking the appropriate box on the registration form, MAXON will keep you informed of the latest product information and updates.

You can also register online at register.maxon.net.

Installation

To install Sketch and Toon, run the installation program and follow the on-screen installation instructions.

Training

Training is available for Sketch and Toon and other MAXON products. For details, please contact MAXON or your local MAXON distributor.

Web Resources

Thousands of resources are available on the web, including online tutorials, discussion lists, textures, models, galleries and information on 3D books. You’ll find links to a rich selection of these sites at maxon.net, MAXON’s homepage. Another website to bookmark is plugincafe.com. Here you will find dozens of useful plugins, both free and commercial. For plugin developers, there are resources, including the SDK, tutorials and a free support forum.

Technical Support

Your local MAXON distributor will be delighted to assist you with your technical queries. You are also welcome to contact MAXON directly. Please note that you will be entitled to technical support provided you have registered your purchase.

I Overview

1 Overview

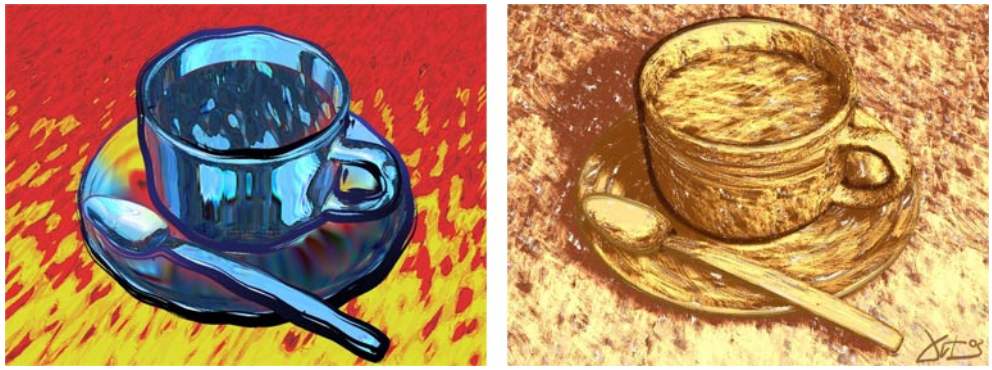
Sketch and Toon is a non-photorealistic (NPR) renderer that fully integrates into CINEMA 4D. Essentially its job is to simplify 3D scenes and represent edges with lines to give an illustrative feel to the final result.

NPR software generally has two main areas: lines and shading. With Sketch and Toon, lines are added to 3D objects using CINEMA 4D's post effects functionality. Shading is taken care of by CINEMA 4D's material system with powerful additions such as the new Sketch shaders that help you to achieve popular styles such as Manga and cross-hatching.

Superior Blend

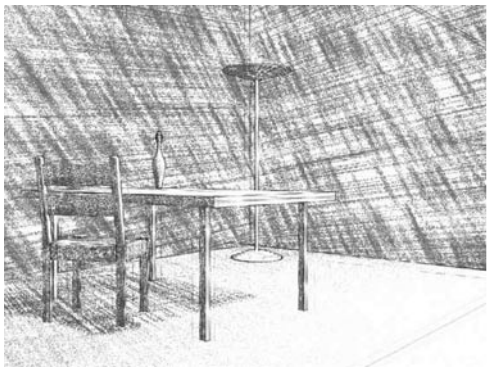
Compare this powerful CINEMA 4D module with any other NPR tool on the market and you'll come to the conclusion that Sketch and Toon is in a class of its own. It has virtually all features of the other NPR tools rolled into one. And then some!

But it's not just this superior feature set that makes Sketch and Toon stand out from the crowd: its integration with CINEMA 4D is outstanding. You can combine all of Sketch and Toon's features with practically any other feature found in CINEMA 4D and its modules, including radiosity, caustics, shaders, splines and particles. This gives you ultimate flexibility when illustrating your ideas. With Sketch and Toon, there's a million and one ways to present even the simplest object.



Same objects, but two completely different results. Images © 2003 by Artur Bala.

2B or not 2B?



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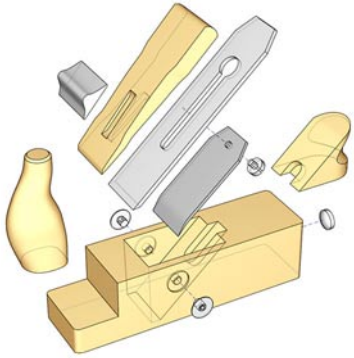
With Sketch and Toon, any style is possible, including sketch. Now you can delight your clients with sketches of the your project that look as hand-drawn as you want them to.

Technical support



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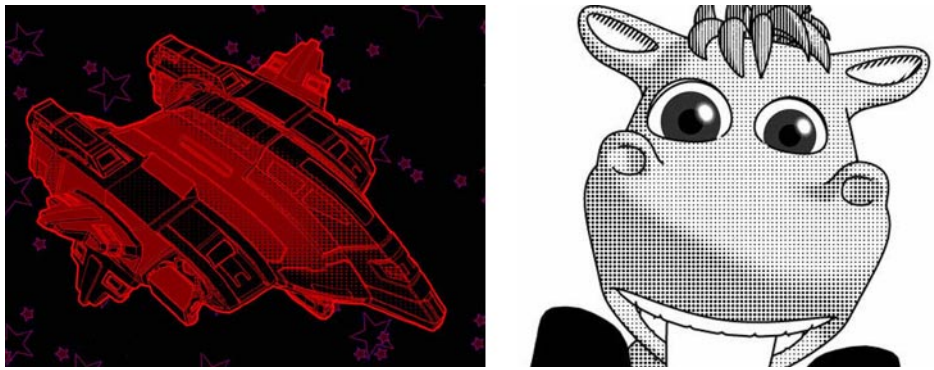
Sketch and Toon supports all areas of NPR rendering including technical style. You have tremendous control on exactly where lines are drawn.

Spot the difference



Spaceship © 2003 by Michael Welter, character © 2003 by Toshihide Miyata.

The halftone dots look is more popular the ever. You'll be pleased to know that Sketch and Toon boasts a powerful spots shader that is ideal for these effects, and more.

Manga juice

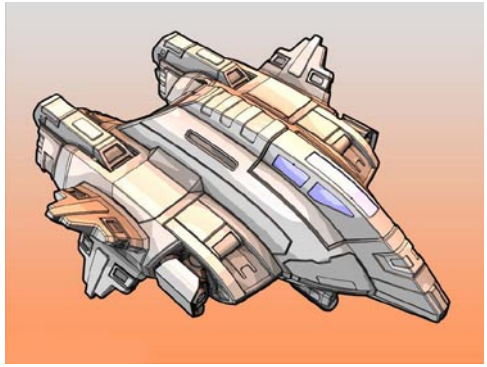


Image © 2003 by Michael Welter.

Sketch and Toon includes a new cel shader that provides color control of backfaces for Manga-style shading and much more!

Pick ‘n’ mix

Image © 2003 by Toshio Fuji.

Sketch and Toon’s tight integration with CINEMA 4D allows you to choose which objects are “sketched” and which objects CINEMA 4D should still take care of.

Where next?

We recommend you read Chapter 2 next, “QuickStart”, which will show you how to get started with Sketch and Toon.

2 QuickStart

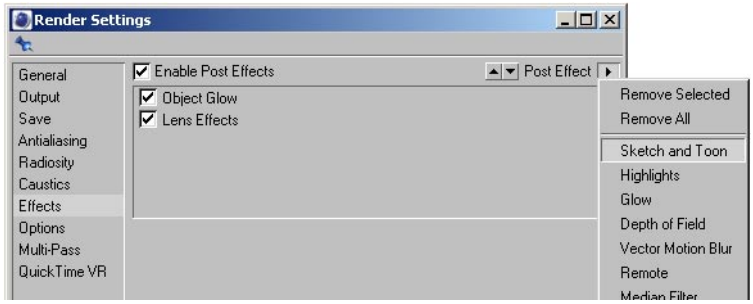
2 QuickStart

Can't wait to get started with Sketch and Toon? Then you've come to the right chapter. In these pages, you'll learn the basics of how to use Sketch and Toon, and, most importantly of all, where to find the main controls and what they do in general terms.

Adding the Sketch and Toon post effect

All it takes to add the Sketch and Toon effect to your scene is a single menu pick. First you'll need an object.

- **Create a sphere.**
- **Choose Render > Render Settings and on the Effects tab, click the Post Effect button and choose Sketch and Toon to add the Sketch and Toon post effect.**



Look in the Material manager and you'll notice a material has been added also. More about this material later...

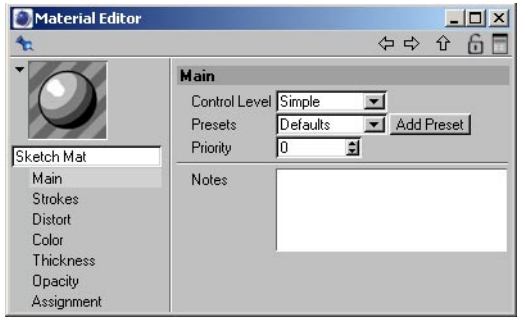
- **Render the scene.**

Congratulations! You're just rendered your first Sketch and Toon effect. The sphere has a black outline and its shading has been simplified into bands.

Adjusting the line

The material that is added automatically when you add the post effect is called the Sketch material. This controls the look of the lines, such as their color and thickness. In a nutshell, the Sketch material is the material used by the post effect to draw the lines.

- **In the Material manager, double-click the Sketch material's thumbnail to display its settings in the Material editor.**



- **On the Color tab, choose a new color for the line such as shocking pink. On the Thickness tab, set the Thickness value to 20. Render the scene.**

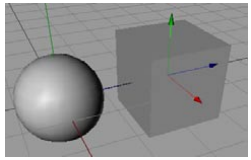
The sphere's lines are now much thicker and use the new color.

- **The pink is truly shocking... On the Color tab, set the color back to black and on the Thickness tab, set the Thickness back to 2. Rename the material to "black" using the text box below the thumbnail.**

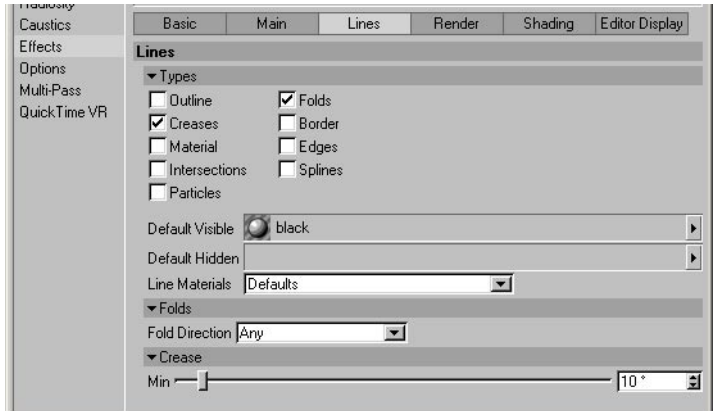
What does the post effect do?

The Sketch and Toon post effect is the main control center for the effect. Among other things, it controls the post effect shading for objects and which Sketch materials are used by the effect. To see this in action, you'll need to create a second Sketch material.

- **In the Material manager, choose File > Sketch Material to create a new Sketch material. In the Material editor, change the material's thickness to 1 and color to red. Rename the material to "red."**
- **Add a cube to the scene and move it next to the sphere in the viewport.**

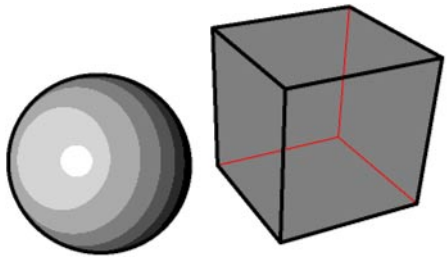


- **On the Render Settings > Effects tab, ensure the Sketch and Toon post effect is selected and click its Lines tab if it isn't already selected.**



The Default Visible and Default Hidden boxes on this tab control which materials the post effect uses for visible lines and hidden lines respectively. You can see that the "black" Sketch material is being used for visible lines. Currently the Default Hidden box is blank, which means hidden lines are not drawn.

- **Drag and drop the red material's thumbnail from the Material manager into the Default Hidden box. Render the scene.**



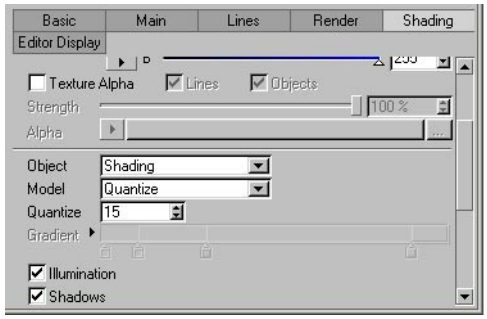
The red material is now used for the hidden lines in the scene (i.e. the lines that in real life would be hidden behind surfaces). If you were now to drag and drop the red material into the Default Visible box, the red material would be used for both visible and hidden lines. So among other things, the post effect controls which Sketch materials are used by the scene for visible and hidden lines.

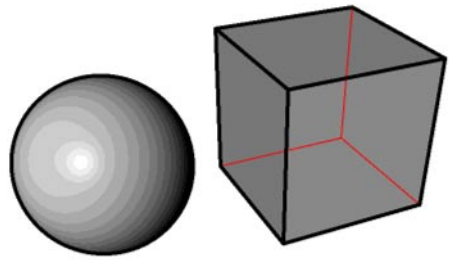
Before going on to the next step, take a close look at roughly how many brightness bands the sphere has. You'll be changing this next up.

Controlling post effect shading

As mentioned earlier, the post effect also controls the post effect shading. You'll find these controls on the effect's Shading tab.

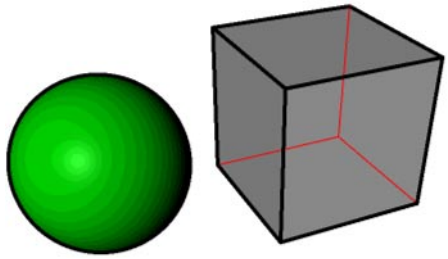
- **In the render settings, on the Sketch and Toon post effect's Shading tab, set Quantize to 15 and render the scene.**





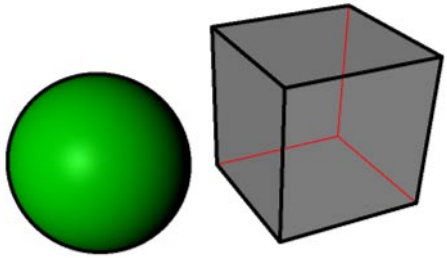
The Quantize value controls the number of brightness bands for the object (like the old CINEMA 4D cel renderer). The sphere now has many more bands.

- **In the Material manager, choose File > New Material to create a new standard CINEMA 4D material. Double-click the new material to display its settings in the Material editor. On the Color tab, set the color to green. Rename the material to "green."**
- **Apply the green material to the sphere and render the scene.**



Sketch and Toon lets you shade the objects using standard CINEMA 4D materials. The post effect quantizes the result of the CINEMA 4D rendering. If you wanted a solid color, you could simply set Quantize to 1.

- **In the render settings, on the Sketch and Toon post effect's Shading tab, set the Object drop-down list to Off and render the scene.**

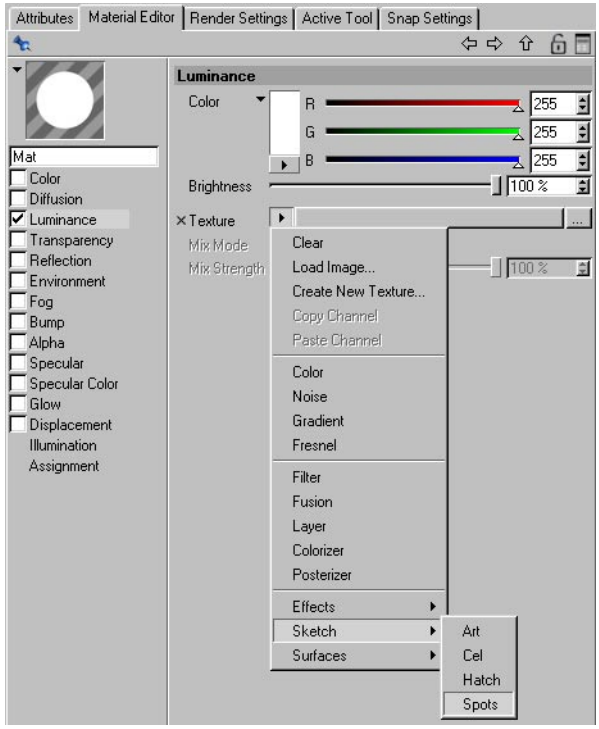


Setting Object to Off switches off the post effect shading for objects so that it doesn't affect the CINEMA 4D's rendering of surfaces. Likewise you could set Background to Off to switch off the post effect's white background and use the background rendered by CINEMA 4D instead.

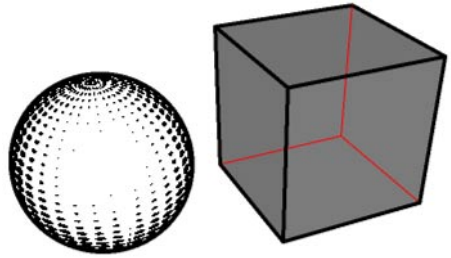
Using the Sketch shaders

Sketch and Toon includes four powerful channel shaders: Art, Cel, Hatch and Spots. These enable you to create an endless variety of effects. You can use these shaders in any material channel which accepts a texture, but in general they work best in the Luminance channel.

- **In the Material manager, choose File > New Material to create a new material. Double-click the new material to display its settings in the Material editor. Disable all material channels except Luminance. Rename the material to "spots."**
- **On the Luminance tab, click the Texture triangle button and choose Sketch > Spots to load the Spots shader into the Luminance channel.**



- **Click on the Spots preview below the Texture triangle button to access the settings for the Spots shader. Set the Scale value to 30%.**
- **Apply the Spots material to the sphere. Render the scene.**

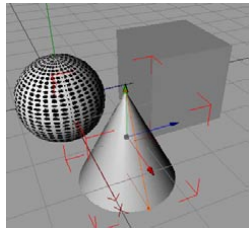


The Spots shader is ideal for a halftone dots effect. Note how the spots shrink the brighter the surface is to give a fantastic impression of light to dark shading.

Different styles for different objects

What if you want an object to use different settings to those in the post effect? For example, what if you want one object to use a different colored line? This is where the Sketch Style tag comes in. It's for objects that should use different settings to the scene-wide settings in the post effect.

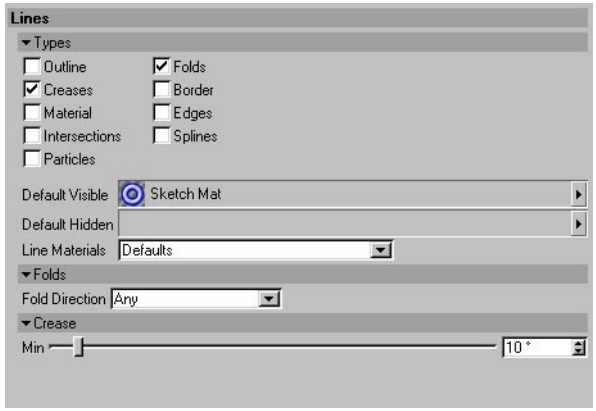
- **Add a cone to the scene and move it in front of the sphere and cube.**



- **Ensure the cone is selected and in the Object manager, choose File > Sketch Tags > Sketch Style.**

You'll see a Sketch Style tag appear to the right of the cone in the Object manager. Also, note that a new Sketch material has been created automatically (called "Sketch Mat").

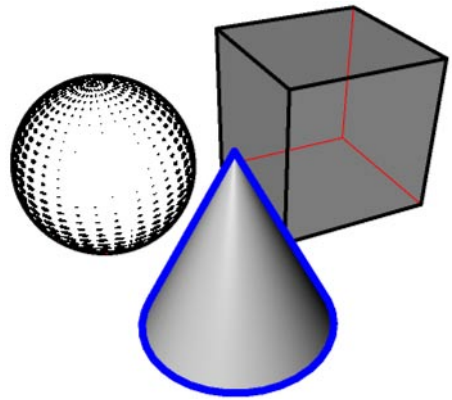
- **In the Object manager, double-click the cone's Sketch Style tag to display the tag's settings in the Attribute manager.**



The Sketch Style tag has many similar settings to the post effect. It overrides the settings in the post effect for the object. In other words, the object will use the tag's settings instead of those in the post effect.

On the Lines tab, you'll notice the new Sketch material has already been assigned to the tag. As with the post effect, you can control which Sketch materials are used by dragging and dropping the materials into the Default Visible and Default Hidden boxes.

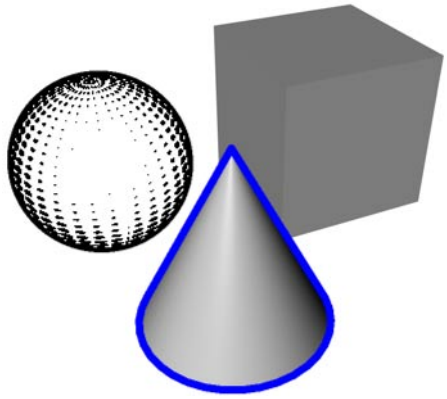
- **Edit the new Sketch material as follows: change its name to "blue", give it a blue color, and change its thickness to 6. Render the scene.**



- **Select the cube and in the Object manager, choose File > Sketch Tags > Sketch Render.**

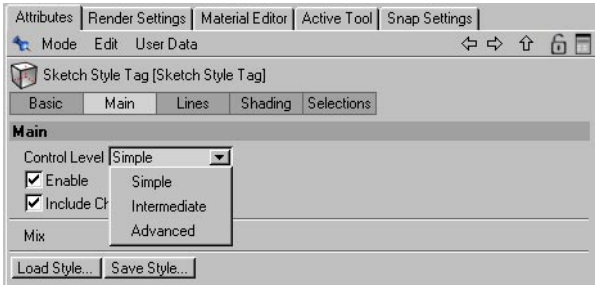
  The Sketch Render tag has a few useful render options such as the ability to switch off lines for the object.

- **Double-click the cube's Sketch Render tag to display the tag's settings in the Attribute manager. Disable the tag's Allow Lines and Allow Shading options, and render the scene.**



The post effect is now switched off for the cube.

Control Levels



Sketch and Toon's control level system is useful for hiding away the advanced controls while you are learning the software or while you are creating a basic effect where you simply don't need so many controls.

You'll find the Control Level setting on the Main tab of the Sketch and Toon post effect, Sketch material and Sketch and Toon Style tag. Setting the Control Level in one place changes the level for them all.

Where now?

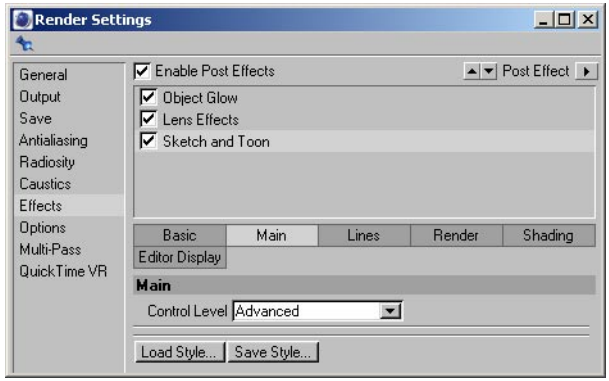
This completes the QuickStart. You now know where the main controls are and what they do in general. To recap:

- The Sketch material controls the look of the lines.
- The Sketch and Toon post effect is where you'll find the general scene-wide controls, such as which Sketch materials are used for visible and hidden lines.
- The Sketch Style tag is where you can set an individual style for an object to override the post effect's style.
- The Sketch shaders are loaded as a channel shader and are best used in the Luminance channel.

Why not take a short break then head on to the video tutorials supplied on the CD?

3 Sketch and Toon Post Effect

3 Sketch and Toon Post Effect



The Sketch and Toon post effect is the main control center and line rendering engine used to create your non-photorealistic (NPR) render. This is where you'll find the settings for the line render, post-rendered shading, multi-pass, editor display and scene-wide line styles. The Sketch and Toon post effect is to be found on the Render Settings > Effects tab. See your CINEMA 4D reference manual for general details on using the Effects tab.

To add the Sketch and Toon post effect:

- In the CINEMA 4D render settings, on the Effects tab, click the Post Effect button and choose Sketch and Toon from the menu that appears. A new Sketch material will be created and assigned to the post effect if this option is enabled in the Sketch and Toon preferences.

Alternatively, Sketch and Toon has a number of automatic setup options that enable you to speed up creating your NPR scene. These settings can be found in the Sketch and Toon main preferences located in the Sketch and Toon section of the CINEMA 4D preferences.

To add the Sketch and Toon post effect using the automatic setup:

Do one of the following:

- In the Material manager, choose File > Sketch Material to create a new Sketch material. The Sketch and Toon post effect will be added automatically and the newly created material added.
- Select an object in the Object manager, choose File > Sketch Tags > Sketch Style. A Sketch Style tag will be added to the object. The Sketch and Toon post effect will be added automatically and a new Sketch material created and assigned.

Effects tab settings

Some of the following settings are available only when the Control Level is set to Intermediate or Advanced. Look up "Control Levels" in the index.

Main

Control Level

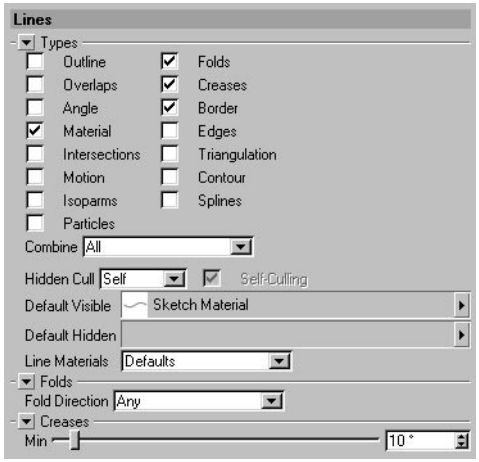
Look up "Control Levels" in the index.

Load Style, Save Style

You'll find various presets in the Sketch folder within CINEMA 4D's Library folder.

These commands enable you to load and save styles. A style is a drawing or painting style, such as thick chalky lines or leaky pen lines, as defined by the Sketch and Toon post effect and the Sketch materials it uses.

Lines



The Lines tab controls which line types (outline, intersections, polygon edges, etc.) are created and which Sketch materials are used to render them.

About lines and layers

To understand how lines work with settings such as Combine (see below), it can be helpful to think about each line type created being given its own layer (internally this is exactly what happens). When Sketch and Toon creates lines for an object, a new layer is created and the line types inserted. If Combine is enabled, all line types that can be merged are placed onto the same layer. If Combine is disabled, each line type is placed onto its own layer.

This means each object produces one or more layers (from each Sketch Style tag and the post effect). The layer priority (i.e. the order in which the layers are rendered) is defined by the tag order, post effect and material priority (defined on the Sketch material's Main tab), then during rendering the Z-depth is used, followed by the layer priority for all lines of approximately similar Z-depth (lines closest to the camera are drawn on top).

Types

For details on each line type, look up "line types" in the index.

The options in the top part of the Lines tab control which line types are created. For example, enable the Outline option to create outlines. Some options have extra settings which will appear in the bottom part of the dialog when the option is enabled.

Combine

The following line types will always be created on their own layer: Motion, Particle, Spline, Isoparm, Material alpha map lines.

The Combine mode enables you to merge line types in the following ways.

None

Each line type is created separately and rendered individually on its own layer. If more than one line type produces the same line when using effects such as transparency or patterns, you may notice unwanted results where the lines overlap. An example would be enabling Creases and Angle, which may create lines for the same polygon edges. When strokes are enabled in the Sketch material, the strokes will be limited to lines of the same type.

All

All line types that use the same Sketch material will be combined on a single layer. This helps to prevent overlapping (see "None" above). When strokes are enabled in the Sketch material, all line types in this layer are available for the strokes to draw along.

Exclusive

The line types are merged so that only lines which do not overlap between multiple types are created.

Inclusive

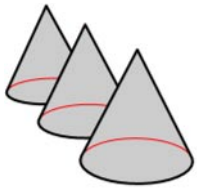
The enabled line types are merged to create lines that only exist in more than one line type; this is the opposite effect to Exclusive mode.

Hidden Cull, Self-Culling

➔ *To switch off hidden lines, set Hidden Cull to Self and clear the Default Hidden box or local Hidden box.*

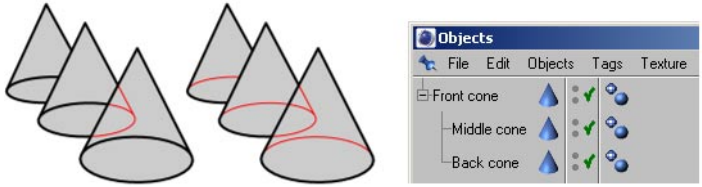
These settings control which lines are visible and which are hidden. The Hidden Cull mode sets which objects in the scene are used to find out if a line is hidden. In the following examples, the visible lines are black, the hidden lines are red.

Self



In Self mode, only the object which created the line is used to find out if the line is hidden.

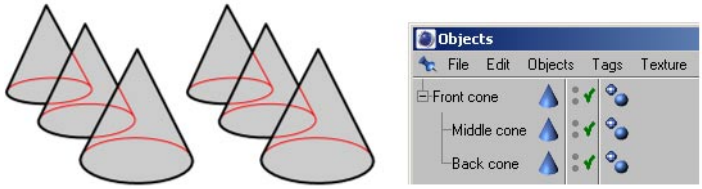
Children



Children mode with Self-Culling disabled (left) and enabled (center).

Children mode uses the parent and its children to find out if a line is hidden.

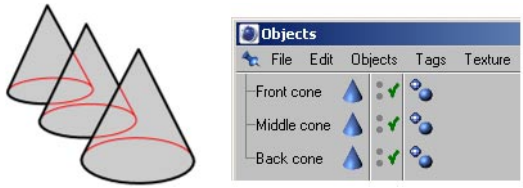
Hierarchy



Hierarchy mode with Self-Culling disabled (left) and enabled (center) — in this case, there is no difference with the option enabled or disabled.

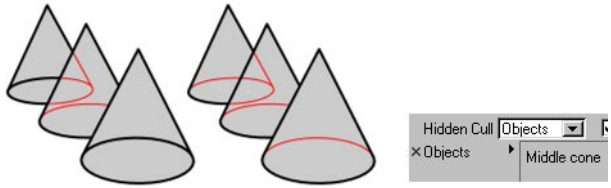
Hierarchy mode finds the top-most parent and then uses the parent and all its children to find out if a line is hidden.

Scene



In this mode, the line is checked against all objects in the scene to find out if it is hidden.

Objects

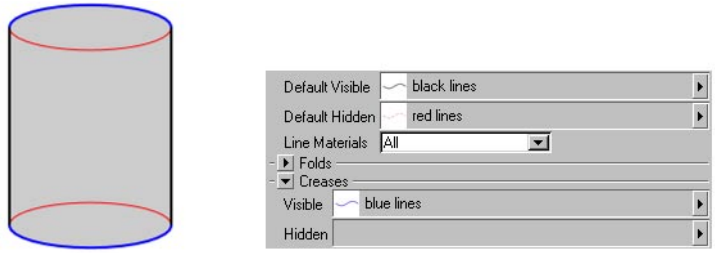


This mode uses the objects in the Objects box to find out if a line is hidden.

Default Visible, Default Hidden, Line Materials

Use the Default Visible and Default Hidden boxes to specify which Sketch material to use for visible lines and which to use for hidden lines (drag and drop the materials from the Material manager into the boxes). Leaving a box blank means those lines won't be rendered.

These are the *default materials* and they are used for all line types except those with their own materials specified in their Visible and Hidden boxes (to display the Visible and Hidden boxes, set Line Materials to Both).



To display the Visible and Hidden boxes for each enabled line type, set Line Materials to Both.

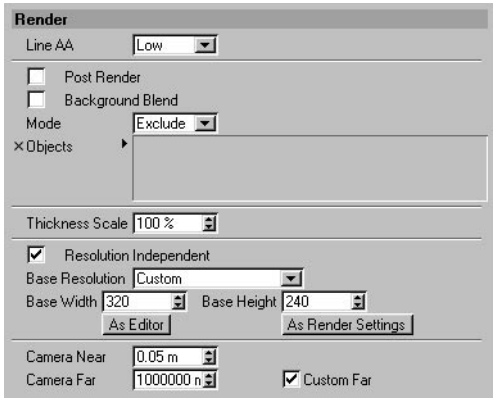
Each box has a triangle button to its right which you can click to access the following commands:

Clear empties the box. In other words, it unassigns the Sketch material.

Show In Manager activates the Material manager and scrolls it if necessary to display the Sketch material.

Select Element selects the Sketch material in the Material manager and displays its settings in the Attribute manager.

Render



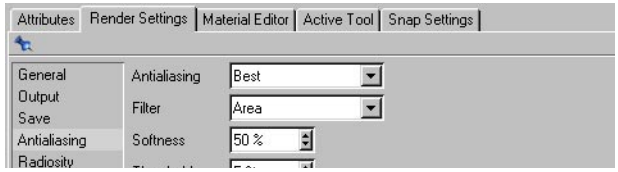
The Render tab is home to general controls for Sketch and Toon's rendering, such as the strength of line antialiasing and the global thickness of lines.

Line AA

➔ *Antialiasing removes jagged edges from the rendered image by creating a soft transition between the lines and their surrounding pixels. For general details on antialiasing, see your CINEMA 4D reference manual.*

The Line AA setting controls the strength of antialiasing Sketch and Toon applies to the lines. Increase the value for smoother lines, but keep in mind the lines will take longer to render the higher you set the value. For best results, set Line AA to Best and ensure CINEMA 4D's Filter is switched on (on the Render Settings > Antialiasing tab, set Antialiasing to Geometry or Best).

How CINEMA 4D's antialiasing affects the lines



There are two parts to CINEMA 4D's antialiasing: the Antialiasing mode (None, Geometry, Best) and the Filter option, which are both specified on the Render Settings > Antialiasing tab.

Antialiasing

➔ *If your scene needs to use CINEMA 4D's Best mode for antialiasing, you can sometimes reduce render times by setting Line AA to Off. The Sketch and Toon lines will then be antialiased by the CINEMA 4D renderer only.*

The Antialiasing mode generally has no effect on the lines. It only affects the lines if Line AA is set to Off, Antialiasing is set to Best and the Post Render option is disabled. Geometry mode doesn't affect the lines because it smooths geometry edges only and the lines are not geometry.

Filter

The second part of CINEMA 4D's antialiasing is the Filter option, which applies a filter over the whole image during rendering (provided Antialiasing is set to Geometry or Best; the Filter is switched off automatically when Antialiasing is set to None).

The Filter *does* affect the lines (because the lines are part of the image) and helps to smooth them. The one exception is if the Post Render option is enabled, in which case the filter will have no effect on the lines because the lines will then be rendered after everything else, including after all post effects and after the filter has been applied.

Post Render

➔ *The antialiasing quality is not as high with the Post Render option enabled, because then CINEMA 4D's antialiasing filter will not affect the lines (see "How CINEMA 4D's antialiasing affects the lines" above).*

Enabling this option does two things: First, it makes Sketch and Toon render after all other post effects, enabling you to apply lines over effects such as glow. Second, it allows you to access the multi-pass settings for the Sketch and Toon effect — loop up "Multi-Pass" in the index.

Rendering with the post renderer can be quicker, but the quality is not as high. Also, the post renderer does not use multiple CPUs, so if you are using a multi-processor computer, this may cancel out any speed-up.

Background Blend

If this option is enabled, the Sketch and Toon lines will blend with anything behind them, not just other Sketch and Toon lines.

Mode, Objects

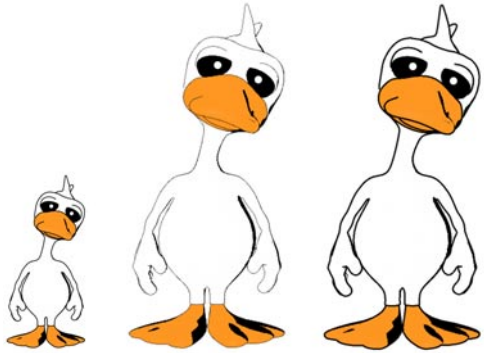
You can also control which objects Sketch and Toon renders using the Sketch Render tag and Sketch Style tag.

Here you can choose which objects are rendered by Sketch and Toon. All objects are rendered by default with Mode set to Exclude and the Objects box empty. To include or exclude specific objects, set Mode to Include or Exclude and drag and drop the objects into the Objects box.

Thickness Scale

This is a global scale setting for line thickness. A value of 100% leaves the lines unchanged. Increase the value to make all lines in the scene thicker or decrease it for thinner lines.

Resolution Independent settings



From left to right: original duck, larger render of the duck with Resolution Independent disabled (center) and enabled (right).

These settings are for resolution-independent output. They automatically scale pixel-based parameters such as Thickness to ensure the image looks the same at the new resolution, only larger or smaller.

Resolution Independent

Enable this option to switch on the Resolution Independent settings.

Base Resolution, Base Width, Base Height, As Editor, As Render Settings

If the width to height proportion of the render is different to that of the base resolution, Sketch and Toon uses the best match by taking the dimension which changes the least.

The base resolution tells Sketch and Toon the resolution on which the pixel values are based. You can choose a custom resolution (Base Resolution set to Custom) or the resolution defined in the render settings on the Output tab (Base Resolution set to Render Settings).

For example, suppose you've set the line Thickness to 10 pixels and the image is 400 by 300 pixels when you render in the viewport and 800 by 600 pixels when you render to the Picture viewer. If Base Resolution is set to Render Settings, the lines will be five pixels thick in the viewport and ten pixels thick in the Picture viewer.

To set the base resolution in Custom mode, do one of the following:

- Enter the width and height into the Base Width and Base Height boxes.
- Click the As Editor button to use the viewport's current resolution.
- Click the Render Settings button to use the current resolution defined on the Render Settings > Output tab.

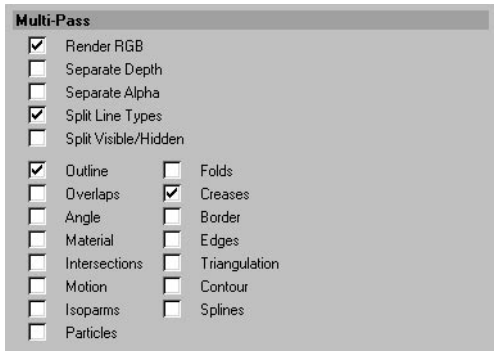
Camera Near, Camera Far, Custom Far

Sketch and Toon ignores any objects closer to the camera than the Near value or, if the Custom Far option is enabled, any objects further away from the camera than the Camera Far value. Suppose the scene has many objects in the distance that are only a few pixels tall when rendered. Creating lines for these objects would probably be a waste of render time because the lines would be so small. In such cases, use the Camera Far value to ignore the objects.

The Camera Near value also changes the near plane clipping, so moving this away from the camera will clip the lines. Usually this isn't desired. However, if you are using strokes and the Clip To Screen option is disabled, lines that go near or behind the camera can have massive projections up to millions of pixels. Moving the near plane away from the camera can reduce this.

Multi-Pass

→ *For details on multi-pass rendering, see your CINEMA 4D reference manual.*



Using the options on this tab, you can render the Sketch and Toon effect in passes. Note that this tab is hidden usually. To access it, enable the Post Render option on the post effect's Render tab.

To multi-pass render the Sketch and Toon effect:

- On the post effect's Render tab, ensure the Post Render option is enabled.
- On the post effect's Multi-Pass tab, enable the passes you want to include.
- On CINEMA 4D's Render Settings > Multi-Pass tab, click the Channels button and choose Post Effects from the menu that appears. Render to the Picture Viewer.

Render RGB

To include a pass for the complete image, enable this option and on CINEMA 4D's Render Settings > Multi-Pass tab, click the Channels button and choose RGBA Image from the menu that appears.

Separate Depth, Separate Alpha

Enable these options to include a depth pass and alpha pass for just the lines.

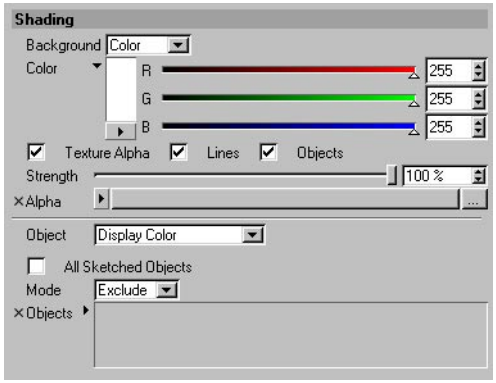
Split Line Types, Outline, Folds, Overlaps...

You can also split the line types into separate passes. To do this, enable the Split Line Types option and enable the option for each line type that you want to include as a separate pass.

Split Visible/Hidden

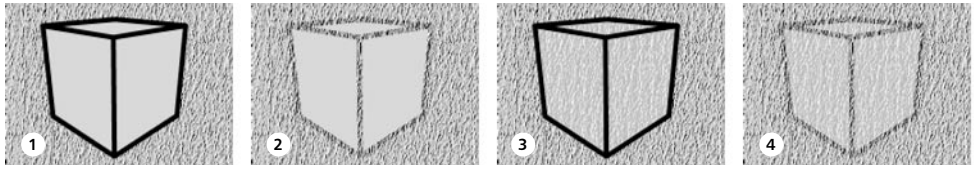
This gives you separate passes for visible and hidden lines.

Shading



The Sketch and Toon post effect has a number of shading options which you can set on the Shading tab. It is like applying a post effect in itself, but is included with the main post effect for convenience. It is an extension of using CINEMA 4D's old Cel Renderer.

Background, Texture Alpha, Lines, Objects, Strength, Alpha



***1** Background texture; **2** Background texture and the same texture used for the alpha texture with Lines enabled; **3** With Objects enabled; **4** With Lines and Objects enabled.*

The Background drop-down list lets you switch off the color for the background or pick a color or texture for the background. The Texture Alpha option gives the effect of the lines or shading being absorbed by the background, like ink soaking into paper.

You can choose whether the lines or shading or both are absorbed by the background using the Lines and Objects options. The Strength value controls the strength of absorption, i.e. how much of the texture shows through. A value of 0% means no absorption, a value of 100% means maximum absorption. Alpha is the image to use.

Object

This controls the post effect shading for the objects.

Off

Off mode switches off the post effect shading so that it doesn't affect the CINEMA 4D rendering. This is generally the mode to use if you are using the Sketch shaders such as the Hatch shader.

Display Color

➔ *The object's Display Color setting is in the Attribute manager, on the object's Basic Properties tab.*

This mode uses the object's Display Color setting, even if the object has materials. It will render as a solid color as it is shown in the viewport.

Custom Color

Pick a custom color for the objects using the color chooser.

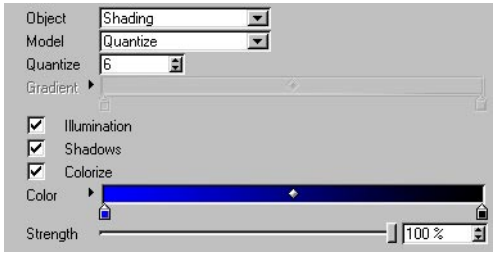
Texture

Shades the objects using a texture. The texture is placed over the whole screen image like a background.

Background

Shades the objects using the same shading as the background (i.e. this mode uses the background's settings in the top part of the tab).

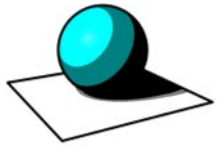
Shading



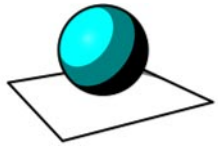
This is an extension of the old CINEMA 4D Cel renderer. It quantizes the illumination based on a set number of brightness levels (Model set to Quantize) or gradient (Model set to Gradient).

With both models, enable the Illumination option to ignore the scene's lighting and light all surfaces with 100% brightness instead, and disable the Shadows option to switch off shadows.

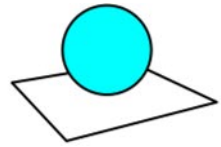
Quantize = 5



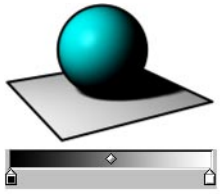
Quantize = 2

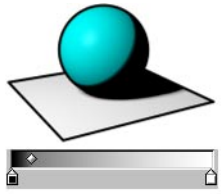


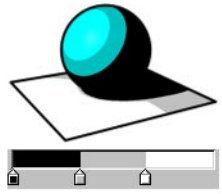
Shadows disabled

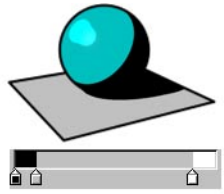


Illumination disabled

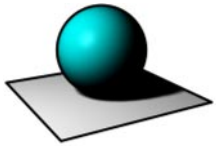




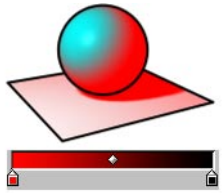




Set Model to Gradient to control the shading using a gradient



Without Colorize



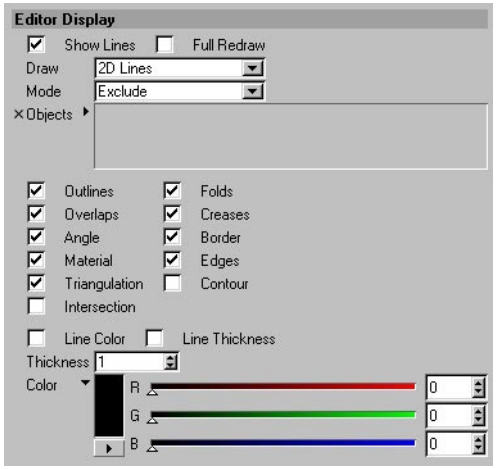
With Colorize

The Quantize model controls the number of brightness levels allowed by the post effect. The Gradient model does the same as Quantize except it uses a gradient to control which brightness values are allowed. The Colorize option enables you to colorize the shading using a color gradient — the Strength value controls the strength of the effect.

All Sketched Objects, Mode, Objects

Disable the All Sketched Objects option to shade all objects in the scene, not just those with lines. To include or exclude specific objects from the post effect shading, set Mode to Include or Exclude and drag and drop the objects into the Objects box.

Editor Display



Why wait for a render to see the lines? On this tab you can switch on the display of lines in the viewport.

Show Lines

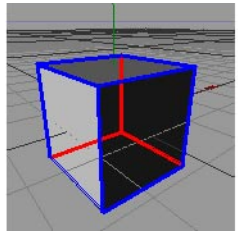
Enable the Show Lines option to display lines in the viewport.

Full Redraw

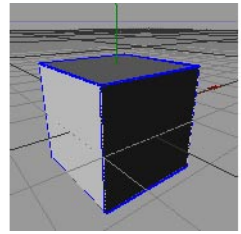
This option gives you realtime refresh of the lines in the viewport. The lines will then update constantly — try extruding some polygons with Full Redraw enabled and you'll see how useful this feature is.

If you disable the option, the lines will disappear while you are carry out actions such as moving objects and will reappear as soon as the action is complete. This helps to minimize viewport slowdown when working with complex scenes.

Draw



2D Lines



3D Lines

Sketch and Toon offers two types of viewport display line: 2D lines and 3D lines. 2D lines are drawn flat onto the viewport, 3D lines are drawn within the 3D scene.

2D lines are the best option overall because they are crisper and more accurate than 3D lines. Also, although both line types generate hidden lines as well as visible lines, you won't see hidden 3D lines in Quick Shading mode or higher because they will be blocked from view by the surfaces in front of them! 3D lines are, however, faster to draw than 2D lines and slow down the viewport less.

Mode, Objects

To include or exclude specific objects for viewport lines, set Mode to Include or Exclude and drag and drop the objects into the Objects box. Or set Mode to Active Only to draw lines for the active objects only. Otherwise lines will be displayed for all objects.

Outlines, Folders, Overlaps, ...

Enable the option for each line type you want displayed in the viewport.

Line Color, Line Thickness

If these options are enabled, you can specify a custom color and thickness in pixels for the lines in the viewport using the color chooser and Thickness box. Otherwise the color and thickness defined in the Sketch material is used.

Line types

➔ *Only enable the line types that are actually needed. Enabling each type adds to the time it takes to create the lines.*

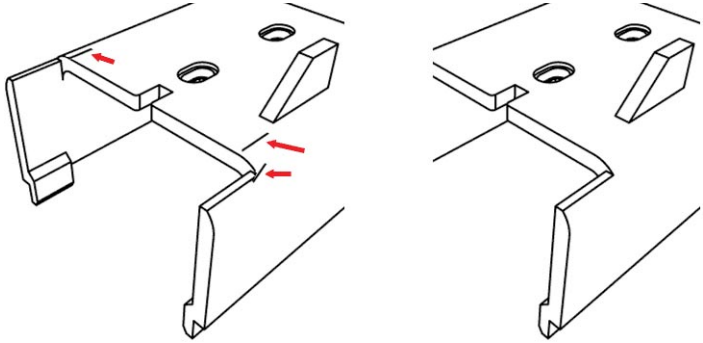
Sketch and Toon offers over a dozen line types. In these pages, you'll find a description for each line type and its settings on the Lines tab if it has any. In general, Folds, Creases and Border are all you need for a basic toon.

About line ownership

The object that creates a line "owns" it. The lines are placed onto a layer that is linked to the object that created them. This can affect things such as outlines — although an outline may look like it goes around multiple objects, internally each object owns its own section of the outline, so if you try and apply a stroke to the outline, it can only go around lines in the same layer, which also means for each object.

Cleaning up with the Sketch Style tag

➔ *For general details on using the Sketch Style tag, see Chapter 6, "Sketch Style Tag."*



The Sketch Style tag gives you a quick and easy way to remove unwanted lines.

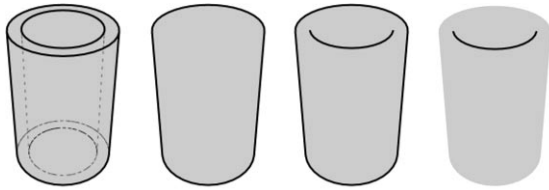
The Sketch Style tag has a Lines selection box that gives you an easy way to remove unwanted lines.

Select the polygons or edges in the problem areas or, if it's easier the other way around, select all polygons or edges which are *not* causing the problem. Create a Selection tag for the selection (Selection > Set Selection). You can create several Selection tags if you wish.

Drag and drop the Selection tag or tags into the Sketch Style tag's Lines box (Selections tab). Set Mode to Exclude or Include depending on whether you selected the problem areas or trouble-free areas. Render, and the unwanted lines should be gone.

Outline, Folds, Overlaps

- *For these lines to appear correctly, the mesh must be complete and joined and the surface normals must point in the correct direction.*
- *A quick way to get an outline around objects is to enable the Folds line type and set no culling (assign the same Sketch material to both visible and hidden lines), then set that material's Clip Render mode to Outside Geometry (Render tab).*



(Original) *Outline* *Folds* *Overlaps*

These three line types — outline, folds and overlaps — are collectively known as the *silhouette-based lines*. They appear at each polygon edge where the polygon on one side faces towards the camera (*frontface*) and the polygon on the other side faces away from the camera (*backface*).

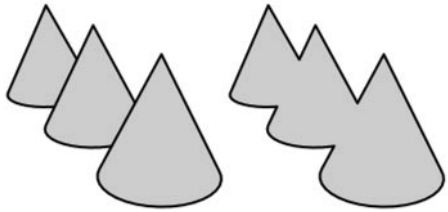
Folds are the most important silhouette-based lines. A fold is a polygon edge between a frontface polygon and a backface polygon.

Outline generally gives you just the outline of the mesh. It is the same as Folds except that it ignores edges which overlap the mesh.

Overlaps is the opposite of Outline. Overlaps are silhouette-based lines which overlap the mesh. Sometimes you may notice small unwanted overlaps. You can often remove these quickly using the Filter Strokes option in the Sketch material on the Strokes tab.

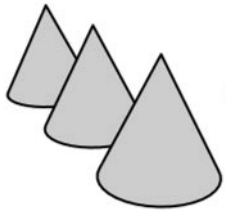
Lines tab settings

Outline Culling, Self-Culling (Outline only)



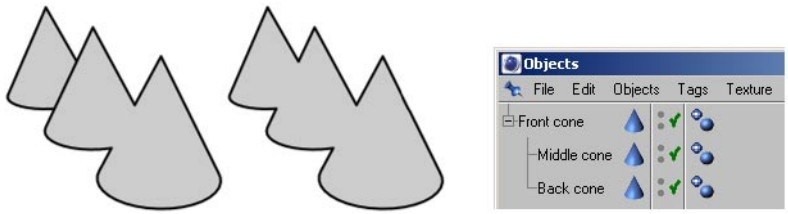
The Outline Culling mode controls which objects will combine their outlines if they overlap.

Self



Outlines are not combined between overlapping objects, but look up “Self Culling” in the index.

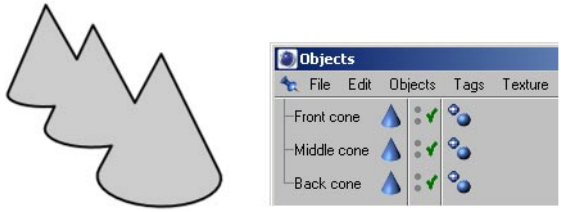
Children, Hierarchy



Children mode (left) and Hierarchy mode (center). In Children mode, the back cone has a separate outline because it isn’t a child of the middle cone.

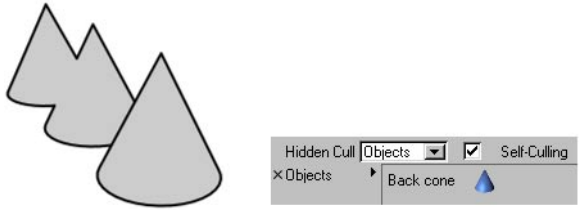
Children mode combines overlapping outlines for the parent and its children. Hierarchy mode looks for the top-most parent and then checks all children of that parent.

Scene



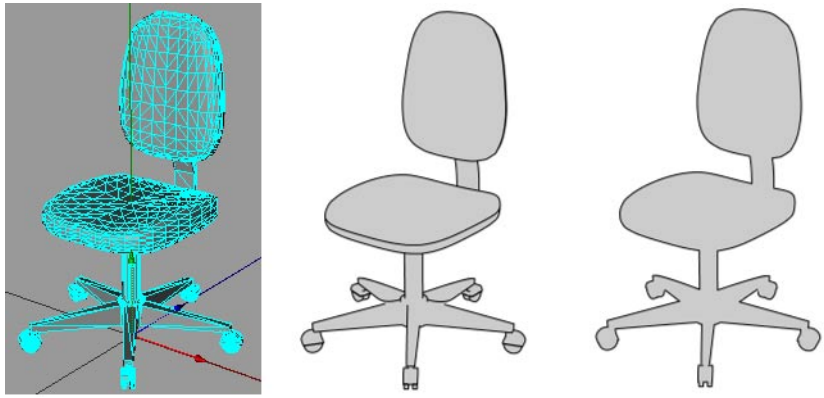
The overlapping outlines of different objects are combined.

Objects



Sketch and Toon combines the outline of each object in the Objects box with the outline of any other object it overlaps.

Self-Culling



Original single object (left), Scene mode with Self-Culling disabled (center) and Self-Culling enabled (right).

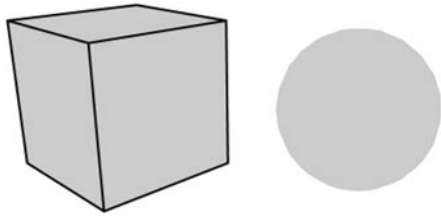
If the Self-Culling option is enabled, each object will combine its own (Self) overlapping outlines. The same applies if Outline Culling is set to Self.

Fold Direction (Folds only)

The Fold Direction setting defines which types of folds are created: all folds (Any), folds in the direction of front to back, or folds in the direction of back to front. The Fold Direction can be useful if you notice many unwanted lines forming creases. Generally the Fold Direction should be set to Any, otherwise it reduces the number of lines created, which can result in gaps.

Creases

➔ *For these lines to appear correctly, the mesh must be complete and joined and the surface normals must point in the correct direction.*



The sphere has no creases because its edges are smoothed by a Phong tag. The cube, on the other hand, has no Phong shading over its edges (angle limit less than 90˚), so each edge results in a crease line.

A crease is any edge not smoothed by a Phong tag (either because the edge has been broken using the Break Phong Shading command on the Structure menu or because the angle between the edge's polygons exceeds the angle limit in the Phong tag's settings).

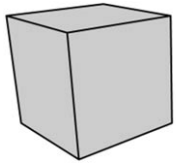
Lines tab settings

Min

The Min setting helps to prevent creases from appearing in flat parts of the mesh. Each crease is only created if the angle between its polygons is greater than or equal to the Min value.

Angle

➔ *For these lines to appear correctly, the mesh must be complete and joined and the surface normals must point in the correct direction.*



Because the polygons for each edge are 90° apart in a cube, an angle line is created for each edge with the default Min and Max values of 85° and 95° respectively.

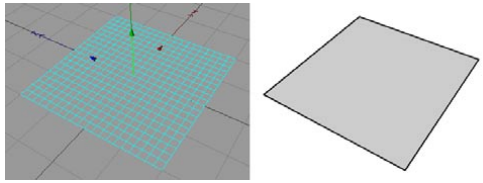
Sketch and Toon checks each edge for the angle between its polygons. If the angle is within the Min to Max range, an angle line is created for that edge.

Lines tab settings

Min, Max

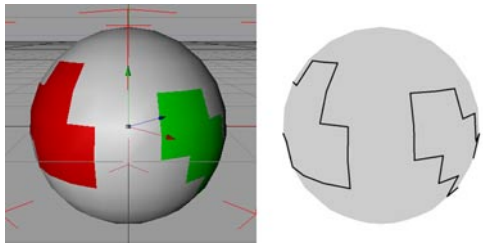
The Min and Max values define the range within which angle lines are created.

Border



A border is any edge with only one polygon attached to it, such as the outer edges of a Plane object. Borders can also be the outer edges of polygon selections; use a Sketch Style tag to specify which polygon selection tags to use (drag and drop the Selection tag or tags into the Border box on the Sketch Style tag's Selections tab).

Material



Material lines are the polygon edges around materials restricted to polygon selections or the edges around alpha maps (note that "hard" alphas work best).

Lines tab settings

These settings are available in the Sketch Style tag only.

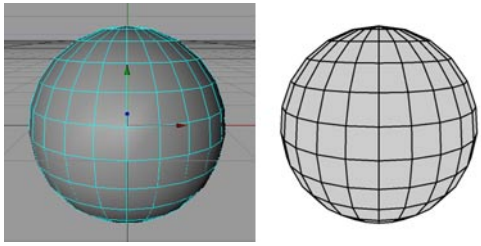
Mode, Tags

The Mode defines whether to include or exclude Texture tags for edges around alpha maps or materials. Drag and drop the Texture tags into the Tags box.

Combine

If the Combine option is enabled, Sketch and Toon will combine the outline for any overlapping alpha maps.

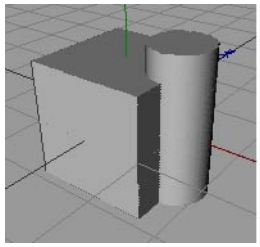
Edges



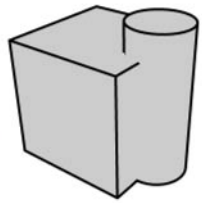
With Edges, lines are generated for each polygon edge unless edge selections are set on the Selections tab of the Sketch Style tag, in which case lines are generated for the selected edges only.

Intersections

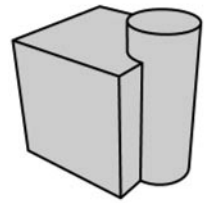
If an object doesn't have intersecting polygons, ensure the Self-intersection option is disabled, otherwise Sketch and Toon will waste time checking if the polygons intersect.



A cube and cylinder...



Without intersections



With intersections

These are lines where polygons intersect each other.

Lines tab settings

Objects

This mode defines which objects are used to find out if there are intersections.

Self

This mode only produces intersection lines where an object intersects itself.

Children, Hierarchy

Children mode checks the parent for intersections with its children. Hierarchy mode looks for the top-most parent and then checks for intersections with any children of that parent.

Scene

This creates intersections where any object in the scene intersects any other object.

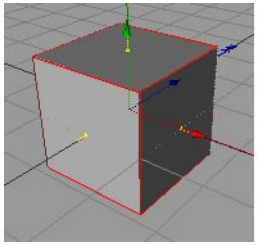
Objects

Sketch and Toon checks the objects in the Objects box for intersection with any other objects in the scene.

Self-intersection

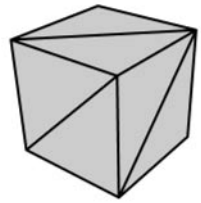
Enable this option to switch on lines for where an object intersects itself.

Triangulation



A cube...

With Triangulation

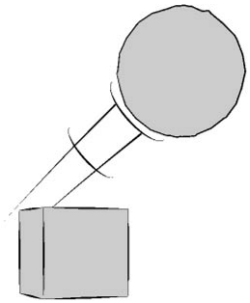


With Triangulation & Edges

This creates a triangulation line for each quadrangle.

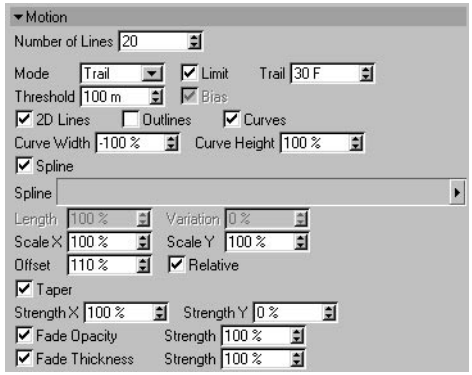
Motion

- *Motion lines do not work with CINEMA 4D Net.*
- *Render the animation to the Picture viewer to see the motion lines. They cannot be rendered in the viewport because the previously rendered frames are needed.*



These settings create motion lines when an object or polygon selection moves faster than a threshold value. Restricting motion lines to a polygon selection is useful for producing motion lines from arms, legs and so on.

Lines tab settings



Number Of Lines

The number of motion lines to create.

Mode, Limit, Trail, Bias

Velocity mode creates motion lines based on the object's current velocity — the greater the velocity, the longer the lines. The lines will only appear if the object is travelling at least as fast as the Threshold velocity. Enable the Bias option if you want the lines to be zero length at the Threshold velocity, otherwise they will already have some length at the Threshold velocity.

Trail mode creates motion lines based on the object's path. To limit the trail to recent frames only, enable the Limit option and set Trail to the desired number of frames.

Threshold

The minimum speed at which motion lines will be generated.

2D Lines

These are lines drawn away from the object or polygon selection based on a 2D projection.

Outlines

Creates from the line types enabled in the Sketch Style tag or the post effect.

Curves

Enable the Curves option to creates curves along the motion. Use the Curve Width and Curve Height settings to adjust the width and height of the curves.

Spline

Uses a spline object (the Spline LINK control). The spline is used from the XY plane with the dimensions of the Spline object (the object matrix is not used).

Length, Scale X, Scale Y

Length is the scale for the velocity. Scale X and Scale Y scale the motion lines.

Offset, Relative

The Offset is the size of the gap between the object or polygon selection and the motion lines. Enable the Relative option to make the offset a percentage of the object's size on screen — this is useful for objects moving towards or away from the camera.

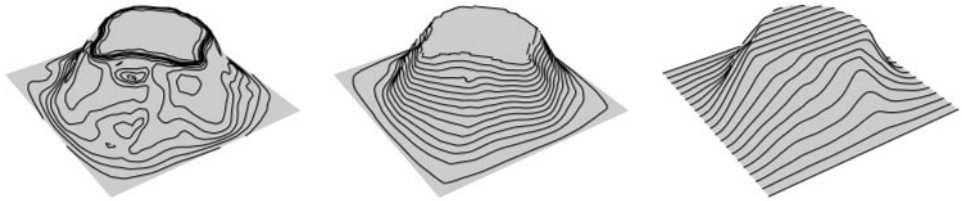
Taper, Strength X, Strength Y

Squash or stretch the motion lines as they get further away from the object or polygon selection. The Strength boxes control the strength of tapering in the X and Y directions.

Fade Opacity, Fade Thickness

Thin out and fade the lines as they get further away from the object or polygon selection.

Contour



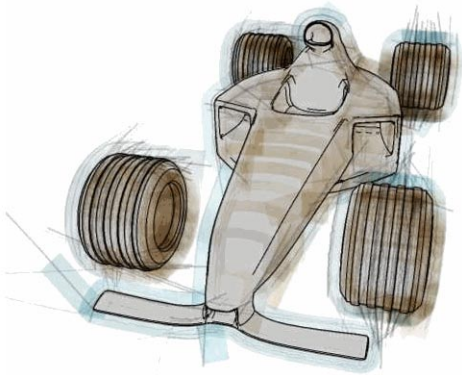
Angle mode *Position mode* *UVW mode*

Contour lines help to show the shape of an object. They are especially useful when used with a thick marker style pen such as for the racing car below. There are three modes for contour lines.

Angle mode creates lines of equal angle from the surface normal to a given axis.

Position mode creates lines of equal position along an axis, like a map's altitude lines.

UVW mode uses the object's UVW coordinates to create lines in the U or V direction.



Try using Contour lines with a marker-style pen.

Lines tab settings

Angle mode

Angle

The Angle setting defines which axis is used. You can choose the X, Y or Z-axis of the object or world coordinate system, or the view's (i.e. camera's) X, Y or Z-axis.

Min, Max

These define the range of angles over which the contour lines will be created. 0° means planar to the axis chosen (see "Angle" above).

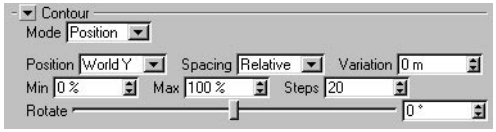
Steps

This is the number of contour lines to create.

Rotate

This rotates the axis on which the contour lines are based.

Position mode



Position

In Position mode you can choose the axis along which the contours are created. You can choose the X, Y or Z-axis of the object or world coordinate system, or the view's (i.e. camera's) X, Y or Z-axis.

Spacing, Variation, Min, Max, Steps, Offset

The Spacing mode gives you two ways to control the distance between contour lines: Relative mode and Absolute mode.

Relative mode sets the number of contour lines to create (Steps) and how far along the object they start and end (Min and Max).

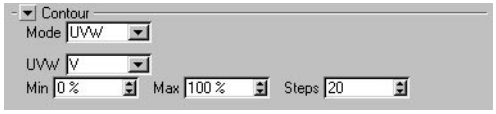
Absolute mode sets the distance between each contour line (Step). The Offset value enables you to adjust where the contour lines start along the object.

Use the Variation value to vary the size of the gap between contour lines. The default value of 0 means no variation and the lines will be equal distances apart.

Rotate

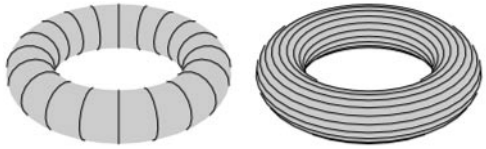
This rotates the axis along which the contour lines are created.

UVW mode



If the object has multiple UVW tags, you can specify which of these should be used via the Sketch Style tag (drag and drop the UVW tags to be used into the Contour UVW box on the Sketch Style tag's Selections tab).

UVW



U *V*

This is which coordinate to use: U or V.

Min, Max

The Min and Max values define how far along the object the lines start (Min) and end (Max).

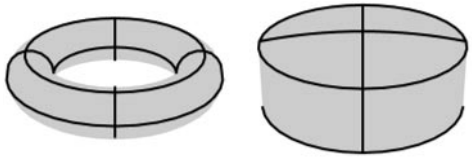
Steps

This is the number of contour lines to create.

Isoparms

➔ *Culling may not be accurate with isoparms. This is because culling uses the object's real geometry, and isoparms do not always fit their geometry exactly. Hence the polygons may cull the isoparms slightly.*

➔ *When using HyperNURBS, you can get a similar result to isoparms using an edge selection. This avoids the problems that can occur with isoparms. For a tip on how to do this, see the HyperNURBS entries in Chapter 10, "Frequently Asked Questions".*



Isoparms for a Torus and Oil Tank object.

These are isoparm lines for objects which use them, such as primitives and NURBS objects. Note that these do not work with parent deformers. Also, they do not work with some generator objects such as the Array object and the Instance object.

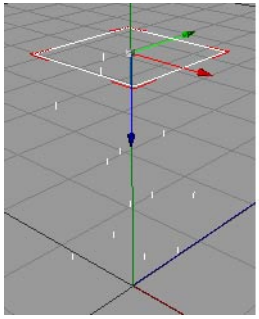
Splines

These are lines for spline objects. You can use any type of spline, including text splines and freeform splines. However, they do not work with parent deformers. Nor do they work inside generator objects such as the Array object, Instance object and Symmetry object. As a special case, they will work inside a HyperNURBS object because the HyperNURBS does not affect the spline itself.

Note that a spline segment itself defines a stroke — the direction of the stroke and the line normal (used by the From Line modifier) is taken from the direction of the spline. Enabling strokes has no effect on splines because the spline lines are already strokes.

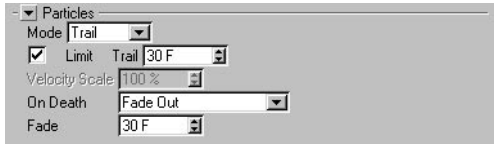
Particles

- *Particle lines do not work with CINEMA 4D Net.*
- *Render the animation to the Picture viewer to see the particle lines. They are not rendered in the viewport because the previously rendered frames are needed.*



These are lines for particles. They work for particles generated using the Thinking Particle's module or CINEMA 4D's standard particle system. As with the spline line type, enabling strokes has no effect because each particle line for a particle is already created as a stroke.

Lines tab settings



Mode, Limit, Trail, Velocity Scale

From left to right: the flight paths of two particles; Trail mode with Limited disabled to give the entire trail; Trail mode with Limited enabled to give only the most recent part of the trail; Velocity mode to produce a straight line from each particle's current position — the length of the line depends on the particle's current velocity.

There are two modes for controlling the length of the particle lines.

Velocity mode creates a straight line from each particle's current position. The line is as long as the particle would travel in one second provided Velocity Scale is set to 100%. Use a higher Velocity Scale value to lengthen the lines or a lower value to shorten them. The line points in the particle's current direction.

Trail mode creates lines for the trail (i.e. flight paths already travelled) of the particles. The Limit and Trail settings limit the length of each line to the most recent part of the trail. For example, to draw the trail travelled by the particles over the past ten frames, enable Limit and set Trail to 10 F.

On Death, Fade

The On Death setting controls what happens to a line when its particle dies.

Keep Stroke, Remove Stroke

With these modes, each line remains or disappears respectively when its particle dies.

Run Out

When each particle dies, its line gets shorter and shorter until it eventually disappears, like a train "disappearing" into a tunnel.

Fade Out

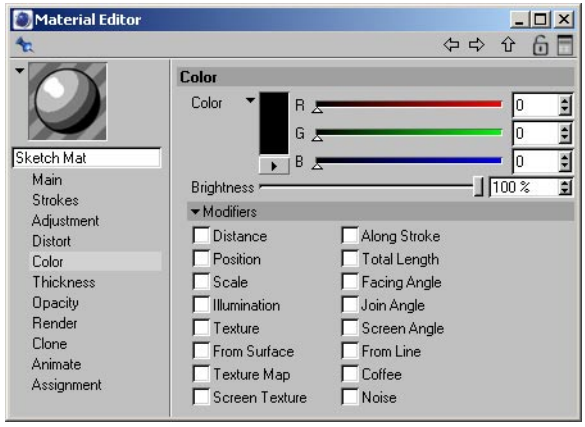
Each line fades out gradually after its particle dies. The Fade value defines how long the line takes to fade out.

CINEMA 4D

Release 9

4 Sketch Material

4 Sketch Material



Sketch and Toon's lines may each have their own material, the Sketch material. As with standard CINEMA 4D materials, the Sketch material has dozens of properties you can set on various tabs in the Material editor or Attribute manager. By combining these properties, you can create almost any look for the lines, from gritty chalk to a thick marker to advanced brush effects.

To create a Sketch material:

➔ *The first Sketch material you create is assigned automatically as the default visible material in the Sketch and Toon post effect. In other words, by default all objects will use the first Sketch material you create for their visible lines.*

- In the Material manager, choose File > Sketch Material. If the Sketch and Toon post effect has not yet been added, it will be added automatically provided this option is enabled in the Sketch and Toon preferences.

Sketch and Toon also has a number of automatic setup options to help you work faster. You'll find these settings in the Sketch and Toon main preferences, in the Sketch and Toon section of the CINEMA 4D preferences.

To add the Sketch material using the automatic setup:

Do one of the following:

- In the CINEMA 4D render settings, on the Effects tab, click the Post Effect button and choose Sketch and Toon from the menu that appears. A new Sketch material will be created and assigned to the post effect if this option is enabled in the Sketch and Toon preferences.
- Select an object in the Object manager, choose File > Sketch Tags > Sketch Style. A Sketch Style tag will be added to the object. If the Sketch and Toon post effect has not yet been added, it will be added automatically.

To assign the Sketch material globally to objects:

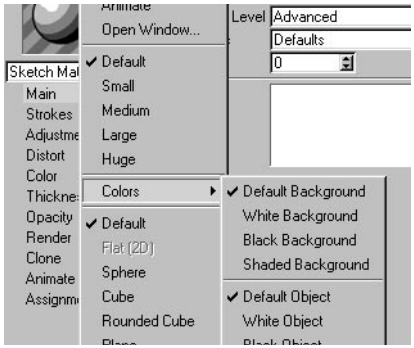
- Drag and drop the material into the Default Visible or Default Hidden box in the Sketch and Toon post effect.

To assign the Sketch material to a specific object:

Do one of the following:

- Drag and drop the material onto the object in the Object manager or viewport. A Sketch Style tag will be created with the material assigned.
- Drag and drop the object into the Sketch material's Assignments box (Assignment tab).
- Add a Sketch Style tag to the object and drag and drop the material into the Default Visible or Default Hidden box on the tag's Lines tab.

Changing the preview



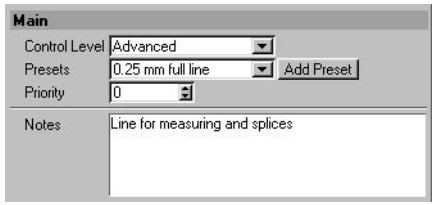
The Sketch material uses all the standard preview options from CINEMA 4D, plus some new ones for Sketch and Toon itself. To access these settings, right-click (Windows) or Command-click (Mac OS) the preview. The Shaded Background and Shaded Object settings use the post effect shading for the background or object.

Material editor settings

Some of the following settings are available only when the Control Level is set to Intermediate or Advanced. Look up "Control Level" in the index.

You'll find various Sketch material presets in the Sketch folder within CINEMA 4D's Library folder. Load these using the Material manager's File > Load Materials command.

Main



Control Level

Look up "Control Levels" in the index.

Presets, Add Preset

Presets is a list of all Sketch materials including the presets. Add Presets is just a shortcut to duplication — it creates a copy of the active Sketch material.

Priority

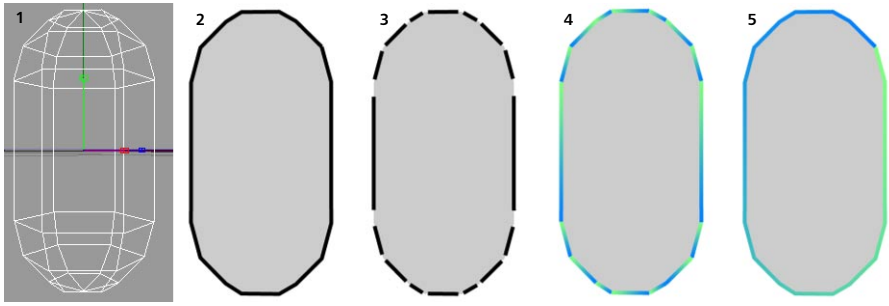
Look up "Self-Blend" in the index.

Notes

The Notes box is a place for entering notes about the material.

Strokes

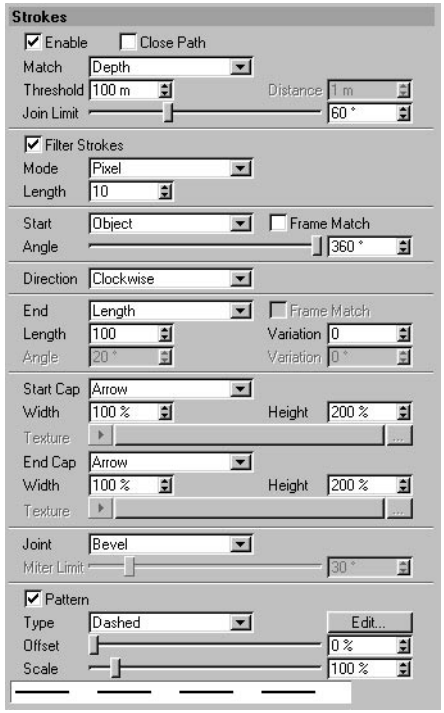
➔ *Only enable strokes if you really need them. Strokes slow down rendering, use more memory than normal lines, and generally are more prone to animation problems than normal lines.*



When Sketch and Toon creates lines for an object, the lines are initially made up of unconnected *line segments*. You can see the line segments for the capsule above clearly in Figure 3, where a gap has been placed between each line segment for illustrative purposes.

The Enable option on the Strokes tab controls whether Sketch and Toon tries to connect line segments together to form *strokes*. The advantage of strokes is that you can apply effects such as a gradient over the stroke as a whole. Figure 4 shows what happens when a gradient is applied to unconnected line segments — the gradient is applied to each individual segment instead of to the outline as a whole. Contrast this with Figure 5, where strokes have been enabled.

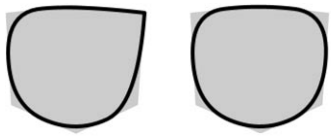
In general, enable strokes when you want to apply an effect over multiple line segments; otherwise, leave strokes disabled.



Enable

This switches on strokes.

Close Path



Close Path disabled (left) and enabled (right) for a cube's distorted outline.

If Close Path is enabled, Sketch and Toon will try to join the start and end of the stroke.

Match, Threshold, Distance

Although the lines generated by Sketch and Toon come from a 3D scene, the lines themselves are only 2D because they are drawn flat onto the screen. This means you can get line segments that overlap on the screen and could be connected that are actually from different depths of the scene. These settings tell Sketch and Toon how to deal with such line segments. You can set Match to the following modes.

Flat

This mode ignores the Z-depth and treats all lines as purely 2D; this essentially flattens the image and lets line segments be connected together even if they are at different depths in the scene.

Nearest

The Nearest mode connects to the line that is the minimum Z-depth away. Note that this doesn't always produce the desired results. Sometimes if you have lots of very small lines close to one another, the nearest connection may not be the best one! If strokes start breaking up, try using Depth mode instead, and if that doesn't help, try Flat, which allows all possible connections.

Keep in mind that when strokes break up, it is usually a sign that there are problems with the mesh; for example, perhaps the mesh contains non-planar polygons — these are best avoided when using Sketch and Toon. Use clean simple mesh for best results.

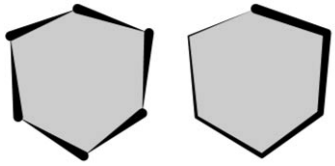
Depth

In Depth mode, you can specify the maximum difference in Z-depth to allow for connections.

World

This matches the Z in world coordinates. This is good for contour lines where you want line segments from the same contour to connect.

Join Limit



Low Join Limit value (left) and high Join Limit value (right).

This is one of the most important settings on the Strokes tab. It prevents neighboring line segments from being joined together if the angle between them exceeds the Join Limit value. This helps to prevent very long strokes and speeds up the calculation of strokes by limiting the number of possible connections.

Filter Strokes, Mode, Length

➔ *You can also filter strokes using the Total Length modifier for Thickness in the Sketch material.*

When strokes are generated, a small number of lines are often "left over" and form very small strokes or no strokes at all. These tend to look like artefacts or "blobs." Enable the Filter Strokes option to remove these unwanted lines. There are three modes for the strokes filter. Overlap is the best one and is especially good at removing overlaps and small strokes. However, it is also the slowest mode.

Pixel

The Pixel mode filters all strokes below the Length value (in pixels). However, the problem with this mode is that if you zoom the objects or scale them, the filter removes more or less because the pixel size of the stroke has changed.

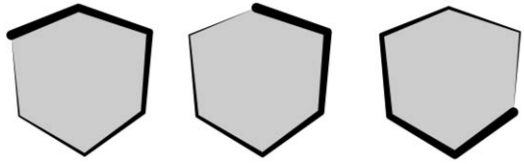
Object

This mode also filters strokes below the Length value. The difference is that in this mode the Length is specified as a percentage of the object's screen bounds maximum, i.e. its width or height, whichever is greater. This enables you to move or zoom objects without the effect changing.

Overlap

Overlap is an intelligent mode. First it looks for overlapping strokes. When it finds them, it filters the shorter stroke if it is shorter than the Length value and within the Distance value of the longer stroke, where a Length value of 100% and a Distance value of 100% correspond to the longer stroke's length and Thickness value (Thickness tab).

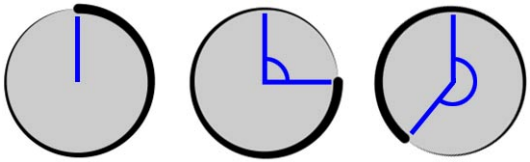
Start, Angle



Various starting positions for the stroke using the Start and Angle settings.

These settings influence the starting position of strokes. Note that the starting point is only a *guide* for Sketch and Toon. Sketch and Toon will try to start here, but the stroke may start from an earlier point if it can do so. You can set Start to the following modes.

Screen, Object



From left to right: Angle set to 0°, 90° and 220°.

Sketch and Toon will try to start drawing the strokes from the angle you specify, where 0° means from the center of the screen or object upwards (left sphere above).

Random

This starts each stroke from an available line segment chosen at random.

Mesh

In Mesh mode, the stroke starts with the "oldest" available edge (i.e. the one with the lowest index number in the Structure manager).

Left, Right, Top, Bottom

Each stroke starts with the line segment closest to the left, right, top or bottom edge that is still available.

Outer, Inner

The Inner and Outer modes start the stroke with the first available line segment closest to or furthest away from the object's center.

Frame Match

→ *This feature does not work with CINEMA 4D Net.*

Stylized strokes may lead to problems when animated. This is because the lines and their possible connections change from frame to frame, causing various "jumping" and "popping" effects. The Frame Match options are designed to help overcome these issues. They attempt to match up the strokes generated for the current frame with the strokes from the previous frame. For best results, avoid major changes from frame to frame.

Direction

This sets the direction in which Sketch and Toon tries to draw the stroke: clockwise, anti-clockwise, left, right, up or down. If a stroke isn't possible in this direction, Sketch and Toon will try to draw the stroke in the opposite direction instead. Sketch and Toon also checks the opposite direction once the end of a stroke has been reached and extends the stroke in this direction if it can.

End, Length, Angle, Variation

These settings control when Sketch and Toon ends a stroke. If End is set to Off, Sketch and Toon will create each stroke until it cannot continue anyway (i.e. until it runs out of suitable connections).

The other modes — Length, Angle and Joint — end the stroke once it is longer than a set length (defined in pixels); when the angle to the next line segment is greater than a set angle; or when the stroke meets two or more line segments and has a choice of which path to take. The Variation settings vary the set length and angle per stroke as a percentage.

Start Cap, End Cap, Width, Height, Texture

Round *Flat* *Square* *Arrow* *Custom*

These setting control the shape of the cap at the start and end of each line. You can choose from shapes such as Flat or Arrow or you can load an image and use it as a custom shape (set Start Cap or End Cap to Custom and use the Texture button to load the image).

The Width and Height settings specify the width and height for arrow caps or custom caps. Keep in mind caps take longer to render the larger they are.

Image used as a custom cap (left) and the cap applied to the end of a stroke with Width set to 800% and Height set to 100% (right). Note how the cap adopts the stroke's properties such as color and thickness — the cap effectively becomes part of the stroke.

The image for a custom cap should show the cap pointing to the right (see the double-arrow example above). Solid parts of the cap should be black, transparent parts white. Values between black and white represent semi-transparency.

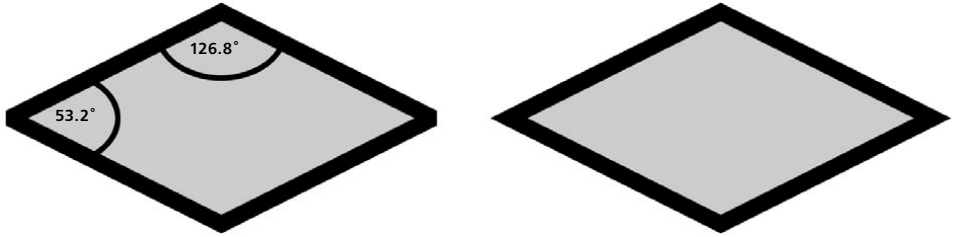
Joint

Miter *Bevel* *Round*

Choose the shape of the joints: Miter, Bevel or Round.

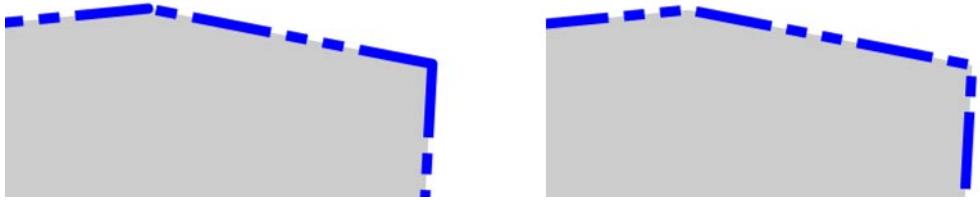
About Miter Joints

Miter joints take longer to render than Bevel joints and Round joints. However, you can optimize their rendering speed using the Miter Limit value. The optimum setting is the smallest angle of any joint.



Increase the value for faster rendering but avoid setting it higher than the smallest angle or some or all of the joints will be rendered blunt instead of sharp (left diamond).

Pattern



A pattern with strokes disabled (left) and enabled (right). Enabling strokes allows the pattern to be continuous over multiple line segments.

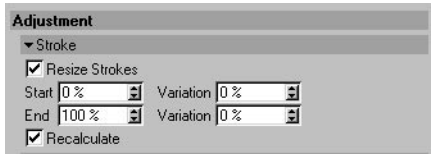
The Pattern settings give a pattern to the lines such as dashes or dots. These patterns are mostly useful for technical illustrations. If you want the pattern to be continuous over multiple line segments, ensure that strokes are enabled. You can choose from various preset patterns or, to define a custom pattern, click the Edit button and use the Edit Pattern dialog (click or drag over bars to turn black bars to white and vice versa).

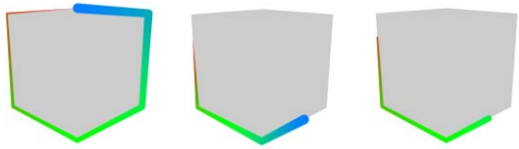
In the Edit Pattern dialog, click or drag over bars to invert their color.

Adjustment

The Adjustment tab enables you to make various adjustments to the lines. For example, you can offset the lines from the geometry, rotate them in 3D space and add overshoots.

Stroke

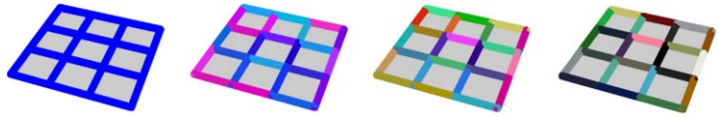




Original stroke (left), resized with Recalculate enabled (center) and resized with Recalculate disabled (right). For the center and right cube, Start and End were set to 40% and 80% respectively.

To shorten the lines, enable the Resize Strokes option and set the Start and End values to where the lines should start and end as a percentage of their original length. Use the Variation values to vary the start and end for each line. Enable the Recalculate option to fit the stroke's properties such as color and thickness to the start and end of the stroke.

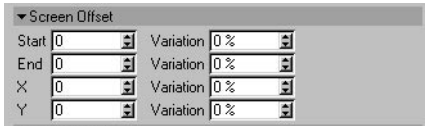
HSV

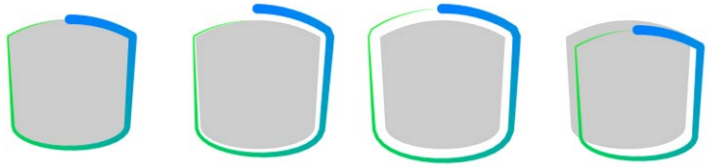


From left to right: original lines and HSV values all set to 20%, 50% and 100%.

The HSV settings vary the color of each stroke (or line segment if strokes are disabled) based on a percentage variation of the original color. You can enter a separate percentage for hue (H), saturation (S) and value (V). 0% means no variation, 100% means maximum variation.

Screen Offset

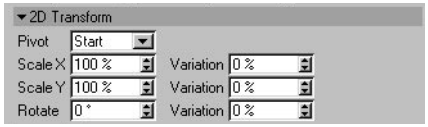




From left to right: original stroke, with Start offset, with Start and End offset, with positive X and Y offset.

The Start and End settings offset the line based on the direction of the normals at the start and end of the line (center oil tanks). You can also offset the stroke using the X and Y boxes, which define how many pixels to offset the stroke in the computer screen's X and Y directions (right oil tank). The Variation boxes vary the offset per stroke. 0% means no variation, 100% means maximum variation.

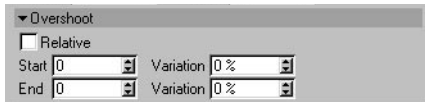
2D Transform



***1** Original stroke; **2** Stroke with Scale X; **3 & 4** Scaled stroke with Start pivot (3) and Center pivot (4); **5** Rotate value set to 10°.*

The 2D Transform settings scale and rotate the lines in the two dimensions of the computer screen. The Pivot setting defines the center of rotation and scaling: Start and End for the start or end of the line, Center for the center of the line, or Object for the center of the object. The Variation boxes vary the scale and rotation per line. 0% means no variation, 100% means maximum variation.

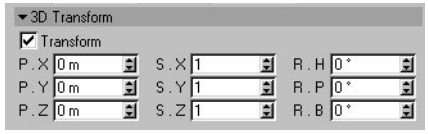
Overshoot

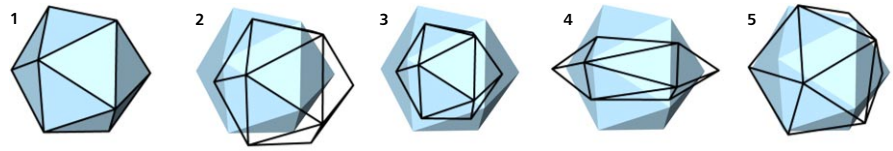


Use Overshoot to add extensions to lines. Image © 2003 by Artur Bala.

The Overshoot settings add straight extensions to the lines. The Start and End boxes define the length of the overshoots at the start and end of the line, either as a percentage of the line's length (Relative enabled) or in pixels (Relative disabled). The Variation boxes vary the length of the overshoots per stroke. 0% means no variation, 100% means maximum variation.

3D Transform

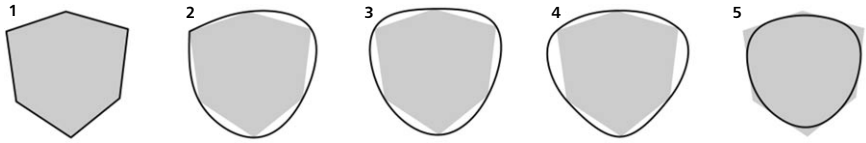




***1** Original; **2** Movement with P.X and P.Y; **3** Movement with P.Z (i.e. towards or away from the camera); **4** Scale with S.X and S.Y; **5** Rotation with R.H and R.P.*

These settings change the position (P), scale (S) and rotation (R) of the lines in three dimensions. The Transform option switches the transformation on or off.

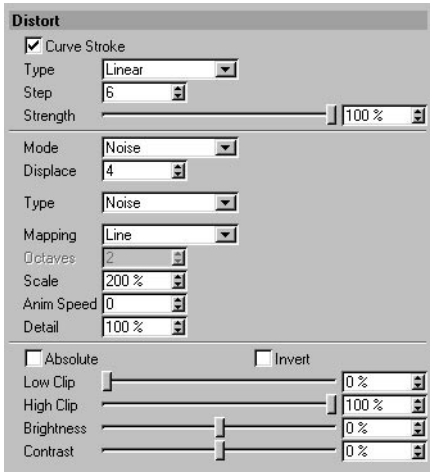
Distort



1 Original stroke; 2 Type set to Cubic and Close disabled on the Strokes tab; 3 Type set to Cubic and Close enabled on the Strokes tab; 4 Type set to Akima; 5 Type set to B-Spline.

The Distort settings enable you to add imperfections to the lines such as curves and wobbles. They are also useful for smoothing out strokes created by low poly objects.

You can optionally specify a vertex map to control which lines are distorted and by how much. To do this, assign a Sketch Style tag to the object if it doesn't have one already and set the map on the tag's Maps tab (drag and drop the tag into the Distort Map box).



Curve Stroke, Type, Step, Strength

Enable the Curve Stroke option to curve the strokes. Choose the shape of the curve from the Type drop-down list: Linear, Cubic, Akima, B-Spline or Bezier. These are the same types that are available for CINEMA 4D's spline objects. The Strength value defines the strength of the curve effect. 0% means no curve, 100% means the full effect.

The Step value is the number of pixels between each step in the curve. Decrease the value for a smoother curve, but keep in mind it will take longer to render.

Mode

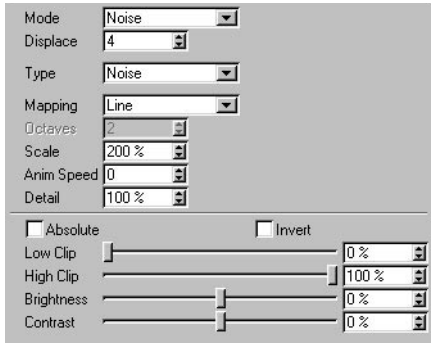
From left to right: Mode set to Sin, Noise and Spline.

The Mode settings add distortions to the lines. Choose from four modes: None (switches distortions off), Sin, Noise or Spline.

Sin

Sin mode distorts the lines based on a sine wave (left cube above). The Wavelength and Displace settings define the wavelength and amplitude respectively of the sine wave, in pixels.

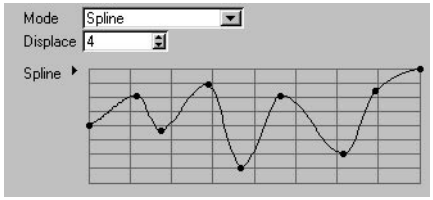
Noise



The Noise settings are ideal for adding a natural look to the lines such as wobbles. They work in the same way as the noise settings for the Noise modifier except they modify the path of the lines instead of the color, thickness or opacity. For details, look up “Noise modifier” in the index.

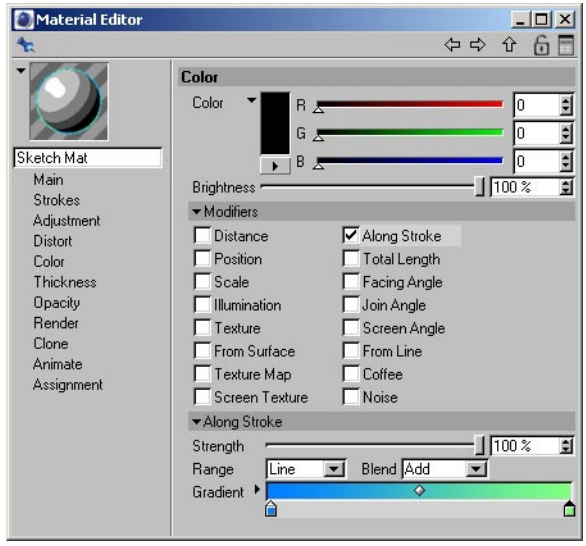
Spline

For details on using spline graphs, see your CINEMA 4D reference manual.



The Spline mode distorts the lines using a spline graph. The Displace value is the strength of the distortion.

Color, Thickness, Opacity



These three tabs give you complete control over the color, thickness and opacity of lines. They enable you to create any type of line effect, from simple lines that fade out to complex brush effects. Each tab works in a similar way:

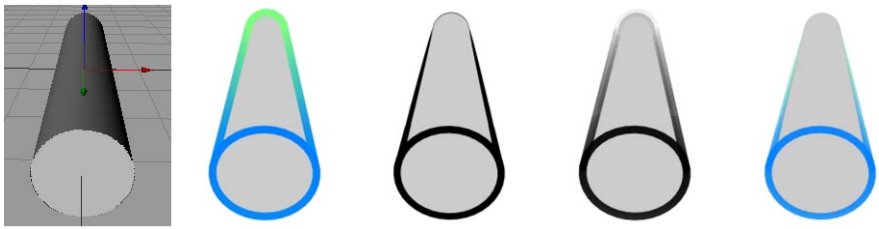
- Set the general color, thickness and opacity using the Color, Thickness and Opacity settings at the top of the tabs.
- Modify the color, thickness and opacity using the modifier options. To switch on a modifier, enable its option. You'll see its settings appear in the bottom part of the tab, where you can adjust them.

With a few exceptions, each tab has the same modifier options. For example, the Along Stroke modifier is present on all three tabs. You'll find a description of each modifier in the following pages.

Link To Thickness (Opacity tab only)

The Opacity tab has a Link To Thickness option which enables you to use the same modifier settings for thickness and opacity. Instead of setting the modifiers on both tabs, set them on the Thickness tab only and enable the Link To Thickness option on the Opacity tab.

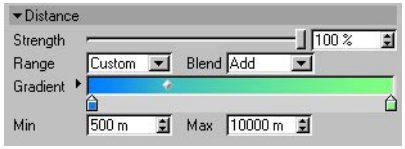
Distance modifier



(Original) *Color* *Thickness* *Opacity* *All three*

The Distance modifier modifies the color, thickness or opacity based on distance from the camera.

Material editor settings



Color tab.

Thickness and Opacity tabs.

Range, Min, Max

The Range setting defines the range over which the color, thickness or opacity is modified.

Object

This range is from the part of the object nearest the camera to the part furthest away.

Camera

This uses the camera's Front Blur End and Rear Blur End values (Depth tab) when you enable them. If the options are disabled then Sketch and Toon will use the Target Distance in place of Rear Blur End and the Camera in place of Front Blur End.

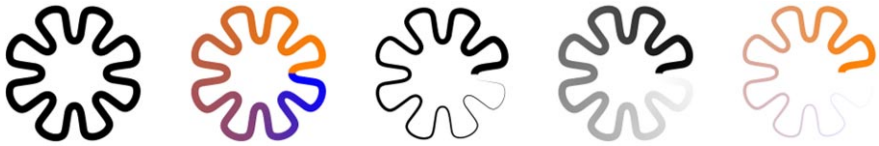
Custom

When you select the Custom range, you'll see the Min and Max boxes appear. These define the start and end of the range as distances from the camera.

Other settings

Look up "Common modifier settings" in the index.

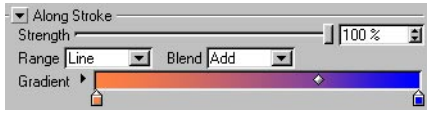
Along Stroke modifier



(Original) *Color* *Thickness* *Opacity* *All three*

The Along Stroke modifier modifies the color, thickness or opacity based on position along the stroke.

Material editor settings



Color tab.

Thickness and Opacity tabs.

Range

The Range setting is the range over which the color, thickness or opacity is modified.

Line

This range is from the start to end of each stroke (or line segment if strokes are disabled).

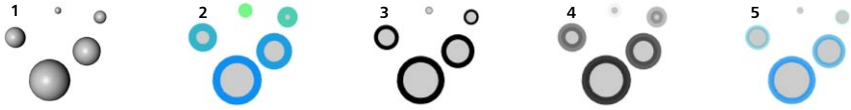
Custom

The Custom mode lets you specify the start and end of the range (Min and Max) along the stroke in pixels and the number of times the range is looped (Loop).

Other settings

Look up “Common modifier settings” in the index.

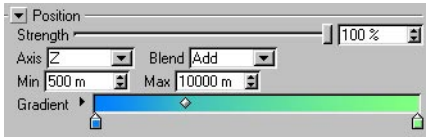
Position modifier



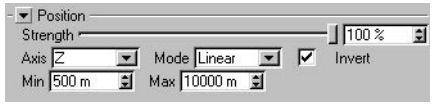
(Original) *Color* *Thickness* *Opacity* *All three*

The Position modifier modifies the color, thickness or opacity based on the object's position along the camera's X, Y or Z-axis.

Material editor settings



Color tab.



Thickness and Opacity tabs.

Axis, Min, Max

The Axis is which camera axis to use. The Min and Max values define range over which the parameter is modified. For example, if Axis is set to Z and Min and Max are set to 500 m and 1000 m respectively, the range is from 500 m to 1000 m along the camera's Z-axis.

Other settings

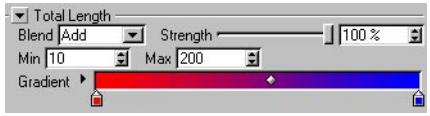
Look up "Common modifier settings" in the index.

Total Length modifier

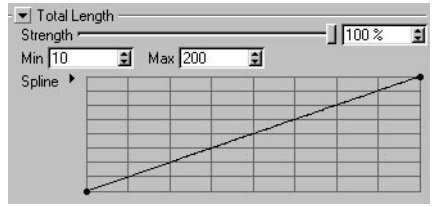
(Original) *Color* *Thickness* *Opacity* *All three*

The Total Length modifier modifiers the color, thickness or opacity based on the length of each stroke (or line segment if strokes are disabled).

Material editor settings



Color tab.



Thickness and Opacity tabs.

Min, Max

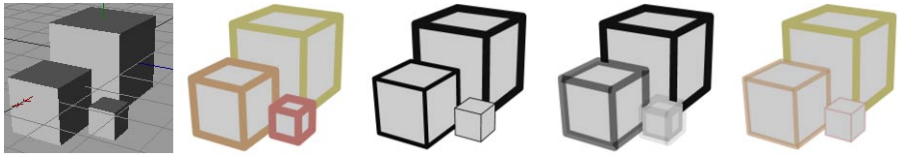
These define the minimum and maximum line length in pixels over which the parameter is modified.

Other settings

Look up “Common modifier settings” in the index.

Scale modifier

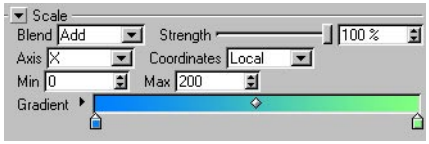
➔ *This modifier is based on the* scale *— not the* size *— of the objects!*



(Original) ***Color*** ***Thickness*** ***Opacity*** ***All three***

The Scale modifier modifies the color, thickness or opacity based on the object's scale along an axis.

Material editor settings



Color tab.

Thickness and Opacity tabs.

Axis, Coordinates

The Axis setting is which axis to use: X, Y or Z. The Coordinates setting lets you choose whether this axis is an object axis (Local) or world axis (World). For example, if you set Axis to Y and Coordinates to Local, the lines will be modified based on the scale of the object's Y-axis.

Range (Thickness and Opacity tabs only), Min, Max

➔ *A custom range is always used on the Color tab. Set the range using the Min and Max boxes — see below.*

This is the range of scales over which the parameter is modified. If Range is set to Scale, the range is from a scale of 0 to 1. To define your own range, set Range to Custom and enter the minimum and maximum scale into the Min and Max boxes.

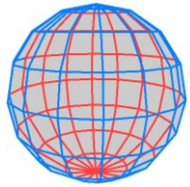
Other settings

Look up "Common modifier settings" in the index.

Facing Angle modifier

(Original) *Color* *Thickness* *Opacity* *All three*

The Facing Angle modifier modifies the color, thickness or opacity based on the direction in which the lines are facing relative to the camera. Hidden lines are also affected if shown.

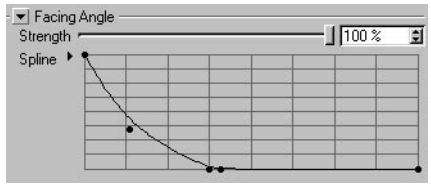


Blue visible lines and red hidden lines via the Facing Angle modifier.

Material editor settings

➔ *Look up "Common modifier settings" in the index.*

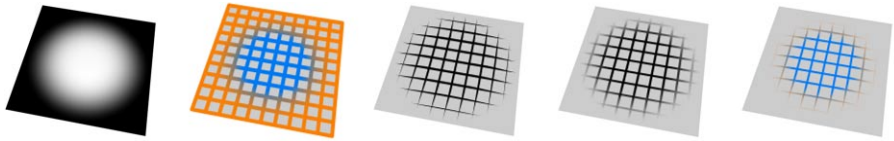
Color tab.



Thickness and Opacity tabs.

Illumination modifier

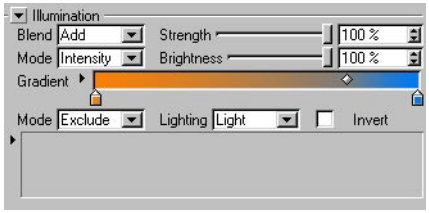
This modifier works best with spotlights.



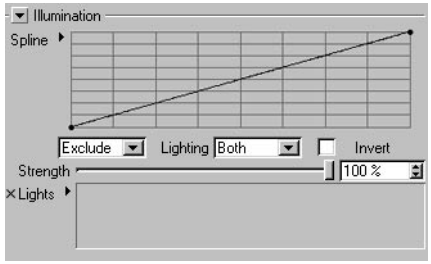
(Original lighting) *Color* *Thickness* *Opacity* *All three*

The Illumination modifier modifies the color, thickness or opacity based on the illumination falling onto the line.

Material editor settings



Color tab.



Thickness and Opacity tabs.

Mode, Brightness (Color tab)

On the Color tab you can use the modifier in two modes: Intensity and Color.

Intensity mode

This mode ignores the gradient and gives you grayscale lines whose brightness depends on the intensity of light falling onto the line. Use the Brightness value to darken or brighten the effect.

Color mode

The Color mode uses the gradient's colors. See the example above.

Mode, Lights box

Here you can choose which lights are used for the illumination. All lights in the scene are used by default. To include or exclude specific lights, set Mode to Include or Exclude and drag and drop the lights into the Lights box.

Lighting

Use Lighting to choose whether the lighting, shadows or both are used to modify the parameter.

Invert

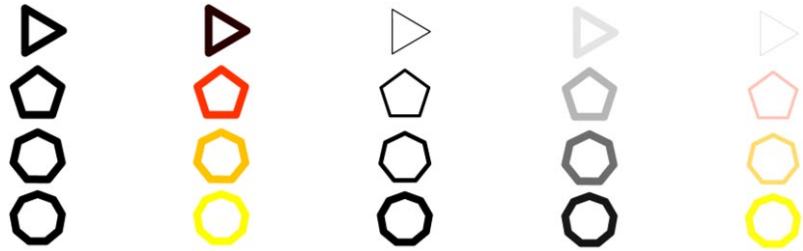
This inverts the modifier's effect.

Other settings

Look up "Common modifier settings" in the index.

Join Angle modifier

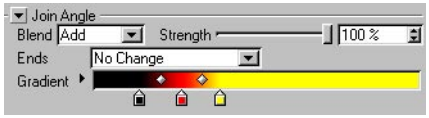
This modifier works with strokes only.



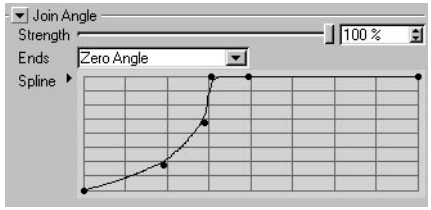
(Original) *Color* *Thickness* *Opacity* *All three*

The Join Angle modifier modifies the color, thickness or opacity based on the angle of the joints in the stroke.

Material editor settings



Color tab.



Thickness and Opacity tabs.

Ends

The Ends mode controls what happens at the ends of the stroke.

No Change

The very start and end of the stroke use the parameter's full value. For example, if you are using the Join Angle modifier on the Thickness tab and Thickness is set to 12 pixels, the start and end of the stroke will be 12 pixels thick.

Minimum Angle, Maximum Angle, Zero Angle

Depending on which of these modes you select, the ends are treated as if they are joints of the minimum or maximum angle or of zero angle.

Other settings

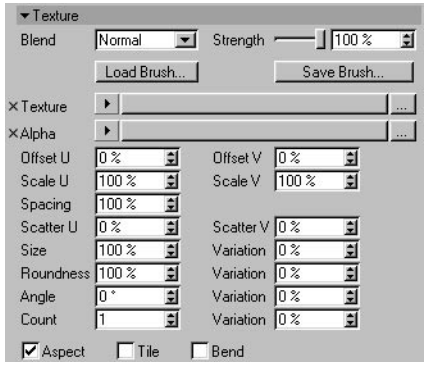
Look up "Common modifier settings" in the index.

Texture modifier

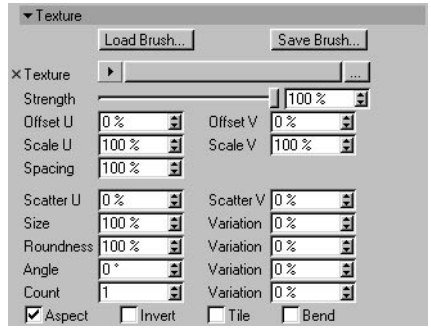
This modifier is available on the Color and Opacity tabs only.

With the exception of the Coffee modifier, this is the most powerful modifier in Sketch and Toon. It offers considerable control over the rendering of the lines and enables you to create countless brush effects.

Material editor settings



Color tab.



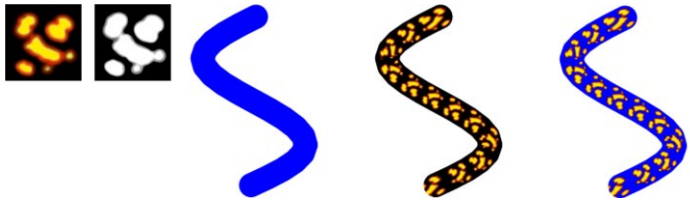
Opacity tab.

Load Brush, Save Brush

You'll find various presets in the Sketch folder within CINEMA 4D's Library folder.

These buttons enable you to load and save the Texture settings for brush-style presets.

Texture, Alpha



Texture & alpha *Original line* *Texture* *Texture & Alpha*

Here you can choose the main texture and apply an alpha to it. The alpha is available on the Color tab only. Use a normal image for the alpha, not an alpha channel.

Offset U, Offset V, Scale U, Scale V

These values offset and scale the texturing in the U and V directions.

Spacing

From left to right: Spacing set to 100%, 200% and 50%.

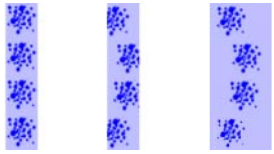
The default Spacing value of 100% places one texture tile directly after another. Use a higher or lower value to move the tiles apart or overlap them.

Scatter U, Scatter V, Count

Original *Scatter U* *Scatter V* *Scatter U & V* *Count = 8*

The Scatter values scatter the tiles in the U and V directions. 0% means no variation, 100% means maximum variation. To mix in extra tiles, increase the Count value. For example, change the Count value from 1 to 3 for three times as many tiles.

Parts of the texture that are not on the line will be cut off. See the middle line below.



Size

From left to right: Size set to 100%, 50% and 25%.

The Size controls the scale of the tiles. The Variation value lets you vary the size of each tile from 0% (no variation) to 100% (maximum variation).

Roundness

From left to right: Roundness set to 100%, 35% and 200%.

The Roundness value squashes (less than 100%) or stretches (greater than 100%) the tiles in the line's U direction. The Variation value varies the roundness of each tile from 0% (no variation) to 100% (maximum variation).

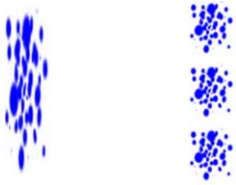
Angle

This value rotates each tile. The Variation value varies the angle of each tile from 0% (no variation) to 100% (maximum variation).

Count

See "Scatter U, Scatter V, Count."

Aspect



Aspect disabled (left) and enabled (right).

If the Aspect option is disabled, the texture tile is stretched to fit the whole line. Enable the option to use the texture's width to height ratio instead.

Invert (Opacity tab only)

The texture (left) and Invert disabled (center) and enabled (right).

Enable the Invert option to invert the texture's effect. Transparent parts become opaque and vice versa.

Tile

Tile disabled (left) and enabled (right).

To tile the texture, enable the Tile option and ensure the Aspect option is disabled.

Bend

Bend disabled (left) and enabled (right).

Enable the Bend option if you want the tiles rotate to follow the direction of the line.

Other settings

Look up “Common modifier settings” in the index.

Making a brush with the Texture modifier

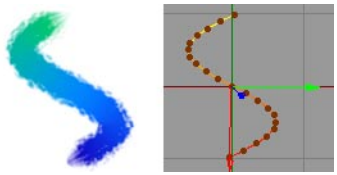


Figure 1.

- Start a new scene and draw a spline similar to the one above.
- In the Material manager, choose File > Sketch Material.
- In the render settings, on the Effects tab, select the Sketch material and on its Lines tab, enable the Splines option.
- In the Material manager, double-click the Sketch material to display its settings in the Material editor.
- On the Thickness tab, set Thickness to, say, 30 pixels. On the Color tab, enable the Along Stroke option and define a gradient.

Figure 2.

- Render to check the progress of the line (Figure 3, left line).

Figure 3.

- On the Opacity tab, enable the Texture option and in the Texture settings that appear, click the Texture triangle and choose Load Image. Use the dialog that opens to load the chalk_chunky.jpg texture from CINEMA 4D's library/pattern location.
- Set Spacing to 8% to form a continuous line of tiles (Figure 3, right line).
- The stroke looks too uniform. For a more natural effect, set the Variation value for Size to 20% and the Variation value for Angle to 10%. This varies the size and direction of the tiles (Figure 4, left line).

Figure 4.

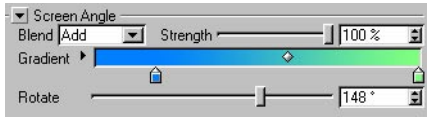
For finishing touches, try fading out the thickness and opacity at the ends of the stroke using the Along Stroke modifier on the Thickness and Opacity tabs (Figure 4, right line).

Screen Angle modifier

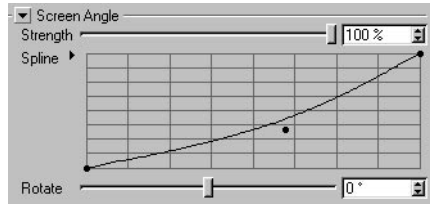
(Original) *Color* *Thickness* *Opacity* *All three*

The Screen Angle modifier modifies the color, thickness or opacity based on the line's direction on the computer screen.

Material editor settings



Color tab.



Thickness and Opacity tabs.

Rotate

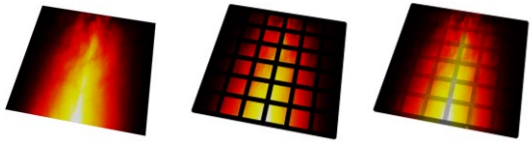
The Rotate setting lets you rotate the modifier's effect.

Other settings

Look up "Common modifier settings" in the index.

From Surface modifier

This modifier is available on the Color tab only.



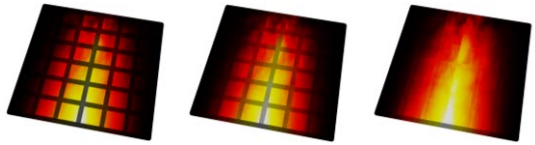
(Original) *Normal lines* *From Surface enabled*

The From Surface modifier modifies the color of the line based on the color of the surface.

Material editor settings

Color tab.

Brightness



33% *66%* *100%*

This controls the brightness of the lines as a percentage of the color sampled from the surface. In other words, the higher you set this value, the brighter the lines and the more they blend in with the image.

Illumination, Shadows

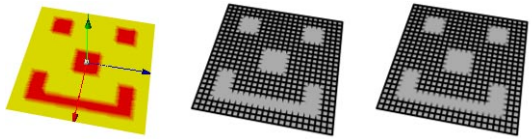
These options control whether illumination and shadows are included when the surface is sampled.

Other settings

Look up “Common modifier settings” in the index.

Vertex Map modifier

This modifier is available on the Thickness and Opacity tabs only.



(Original map) *Thickness* *Opacity*

The Vertex Map modifier modifies the thickness or opacity based on a vertex map. To choose which vertex map is used, assign a Sketch Style tag to the object if it doesn't have one already and set the map on the tag's Maps tab (drag and drop the tag into the Thickness Map or Opacity Map box).

Material editor settings

Look up "Common modifier settings" in the index.

Thickness and Opacity tabs.

From Line modifier

This modifier is available on the Color and Opacity tabs only.

(Original)

Color

Opacity

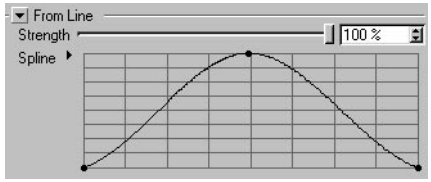
Color + Opacity

The From Line modifier modifies the color or opacity based on distance from the line's edge.

Material editor settings

Look up "Common modifier settings" in the index.

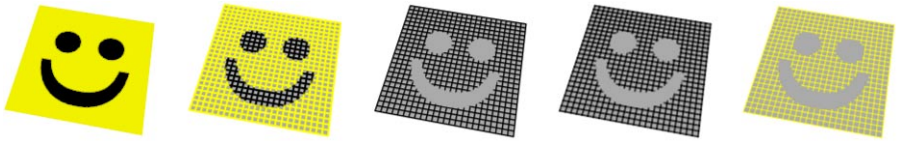
Color tab.



Opacity tab.

Texture Map modifier

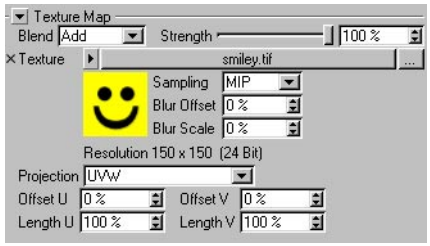
The object must have a Texture tag with a material assigned for this modifier to have an effect.



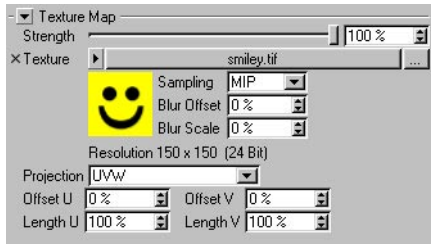
(The texture) ***Color*** ***Thickness*** ***Opacity*** ***All three***

The Texture Map modifier modifies the color, thickness or opacity based on a texture map.

Material editor settings



Color tab.



Thickness and Opacity tabs

Texture

This is the texture used to modify the lines.

Projection

For details on projection types, see your CINEMA 4D reference manual.

This is the projection to use for the texture map, such as UVW, Flat or Spherical.

Offset U, Offset V, Length U, Length V

These values offset and scale the texture in the U and V directions.

Other settings

Look up “Common modifier settings” in the index.

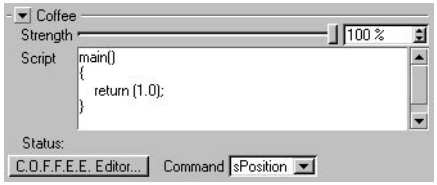
Coffee modifier

For details on the COFFEE programming language, visit www.plugincafe.com.

When using the Coffee modifier on the Thickness tab, the returned value can scale the thickness down but not up. The main parameter thickness is the maximum; all returned values are clipped to the 0 to 1 range.

The Coffee modifier enables you to create virtually any medium or style, from a simple pencil to a complex brush, using the powerful COFFEE programming language.

Material editor settings



Script, C.O.F.F.E.E. Editor

Enter a COFFEE script into the Script box or click the C.O.F.F.E.E. Editor button and enter the script into CINEMA 4D's COFFEE script editor.

Command

This acts as a quick reference to look up the names of the commands. It has no other purpose. It does not insert commands.

Other settings

Look up "Common modifier settings" in the index.

The COFFEE commands

sPosition [Real]

Position along a line in pixels (screen space).

sNormalisedP [Real]

Normalised position along a line (0 to 1).

ToLine [Real]

Distance to the line from the current render point (which is within the line's thickness). Values range from - Thickness to 0 to Thickness.

Thickness [Real]

The line's thickness as set on the Thickness tab.

StrokeLength [Real]

The total length of the stroke being rendered.

ScnPnt [Vector]

The render point in screen space (with Z).

LineOff [Real]

The offset (0 to 1) along the line segment being rendered.

wPnt [Vector]

The world coordinates for the point being rendered.

Time [Real]

Current document time in seconds.

Frame [Real]

Current frame.

FPS [Long]

Frames per second.

LineStart [Vector]

The screen space coordinates for the start of the line (LineOff = 0 at the LineStart, 1 at LineEnd).

LineEnd [Vector]

Screen space for line segment's end point.

JoinAngleA [Real]

Join angle to the line segment at LineStart (if available, or 0.0).

JoinAngleB [Real]

Join angle (0 to 2*pi) to the line segment at LineEnd.

LineNormal [Vector]

The line normal in screen space (2D, Z=0).

EdgeNormal [Vector]

The normal from the edge that created the original line segment.

LinePosA [Real]

The line segment's position along the stroke in pixels (A means LineStart, B LineEnd).

LinePosB [Real]

The position along the stroke in screen space for the line segment being rendered.

PntA [Long]

The index number of the object point or spline point that created the start of the line segment (or -1 if not available).

PntB [Long]

The point index that created the LineEnd (or -1).

PolyA [Long]

The polygon index that created the line segment (or -1 if not available, like a spline).

PolyB [Long]

The polygon index that shared the edge (or -1 if not available).

RayBits [Long]

This passes in the raybits from the CINEMA 4D render. See the CINEMA 4D SDK.

CosC [Real]

The angle between the ray and normal on the surface.

Normal [Vector]

The normal from the surface (if PolyHit is not 0, which says it hit an object).

BumpNormal [Vector]

Bumped surface normal.

Dist [Real]

Distance to the point hit on the surface (if one was hit).

PolyHit [Long]

Really only useful to know if an object was hit by a ray, which means the value is not 0.

RayPos [Vector]

World position for the ray's starting point.

RayDirn [Vector]

Direction of the ray (the ray is from CINEMA 4D).

SurfPnt [Vector]

The world coordinates for the point hit (if one was hit).

RendLeft [Real]

The render image left pixel.

RendTop [Real]

Render top pixel (left, top usually 0, but not always, e.g render region).

RendRight [Real]

Right pixel (width = right-left+1).

RendBottom [Real]

Bottom pixel (height = bottom - top +1).

ObjLeft [Real]

Object's left screen bounds pixel. This is for the object that the line came from. This is not necessarily the object hit by the CINEMA 4D ray.

ObjTop [Real]

Object's top screen bounds pixel.

ObjRight [Real]

Object's right screen bounds pixel.

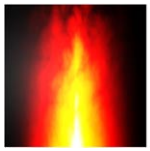
ObjBottom [Real]

Object's bottom screen bounds pixel.

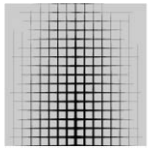
Color [Vector]

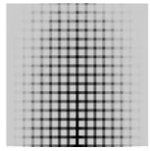
The color set in the Color tab (Color parameter only).

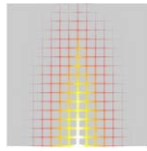
Screen Texture modifier


(The texture)

Color

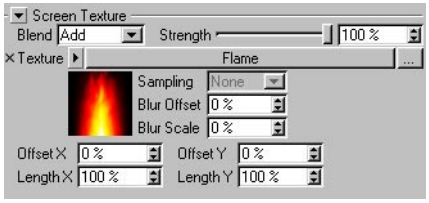

Thickness


Opacity

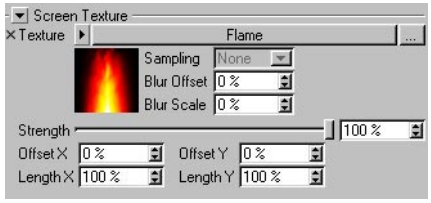

All three

The Screen Texture modifier modifies the color, thickness or opacity based on a texture map placed over the entire rendered image (the *screen*). If the object covers only part of the screen, it will receive only part of the texture.

Material editor settings



Color tab.



Thickness and Opacity tabs.

Texture

Here you can choose the screen texture.

Offset X, Offset Y, Length X, Length Y

These values offset and scale the texture on the screen.

Other settings

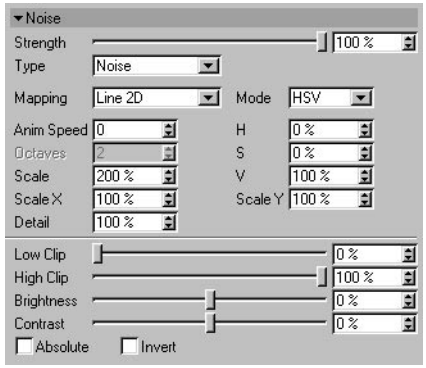
Look up “Common modifier settings” in the index.

Noise modifier

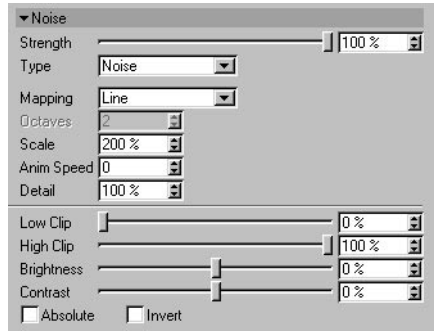
(Original) *Color* *Thickness* *Opacity* *All three*

The Noise modifier modifies the color, thickness or opacity based on a noise pattern.

Material editor settings



Color tab.



Thickness and Opacity tabs.

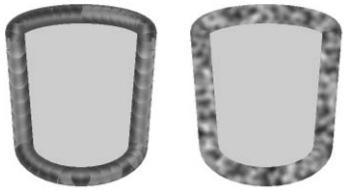
Type

Choose from 30 types of noise such as Blistered Turbulence, Dents and Wavy Turbulence. These are the same types that are available for CINEMA 4D's Noise shader — see your CINEMA 4D reference manual for details.

Mapping

The Mapping drop-down list controls which coordinates are used to generate the noise. This can affect how the noise looks, how it changes as the object or camera moves and whether the noise is continuous over line segments if strokes are disabled.

Line, Line 1D, Line 2D



Strokes disabled (left) and enabled (right).

The position along the line is used. Avoid using this type if strokes are disabled, otherwise poor results are likely (see left cylinder above).

Screen

The noise is calculated in the space of the screen. The noise will change is the object's position on the screen changes.

Object

The noise is calculated in object space and remains the same regardless of object and camera moves.

World

The noise is calculated in world coordinates. The noise remains the same if you move the camera but changes if you move the object.

Mode, RGB, HSV (Color tab only)

The Mode setting defines whether the noise uses the RGB color system or the HSV color system to modify the color. The three boxes below the Mode setting define how strongly the noise affects each color component (R,G and B or H, S and V depending on the mode).

Anim Speed

The rate at which the noise animates, in cycles per second.

Octaves

The octaves of detail in the noise.

Scale, Scale X, Scale Y

The Scale value is the global size of the noise, the Scale X and Scale Y values are the relative scale of the noise in the X and Y directions.

Detail

Used for antialiasing. In general, leave the value set to the default of 100% but if the line texture flickers when you animate, try increasing the value. Or if you are rendering a high-res still and you want crisp detail, set the value lower.

Low Clip, High Clip

The Low Clip value controls the bottom clipping value of the noise; all values below Low Clip will be clipped to zero. The High Clip value controls the top clipping value of the noise; all values above High Clip will be clipped to 100%.

Brightness, Contrast

These settings control the overall brightness and contrast of the noise. Values above zero increase brightness or contrast, values below zero decrease brightness or contrast.

Absolute

If this option is enabled, the noise is absolute, causing it to fold about its midpoint.

Invert

Enable the Invert option to invert the noise.

Other settings

Look up “Common modifier settings” in the index.

Common modifier settings

These settings are present for most or all modifiers. For example, each modifier has a Strength setting.

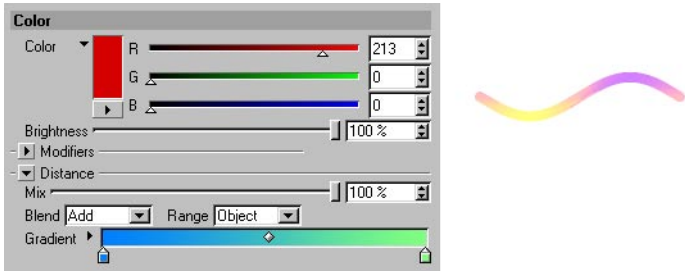
Strength

This is the strength of the modifier's effect, from 0% (no effect) to 100% (full effect).

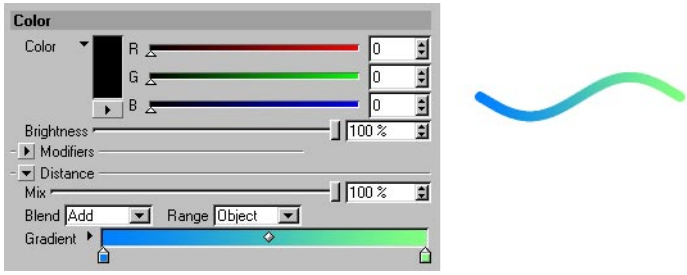
Gradient, Blend (Color tab only)

For details on the blend modes, look up "blend modes" in the index.

For details on using gradients, see your CINEMA 4D reference manual.



The Blend setting defines which blend mode is used to mix the gradient with the main color: Add, Subtract or Multiply. If you want the result to be the same color as the gradient, set the main color to black and the Blend mode to Add.

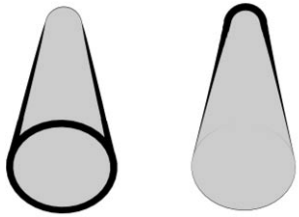


With Color set to black and Mode set to Add, the gradient's colors are applied directly to the line.

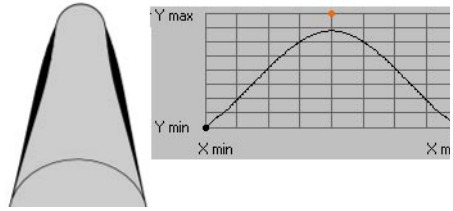
Mode, Invert, Spline Graph (Thickness and Opacity tabs only)

For details on using spline graphs, see your CINEMA 4D reference manual.

For some modifiers, such as Facing Angle, there is no choice of mode and a spline graph is always used.



Linear mode for the Distance modifier on the Thickness tab, with Invert enabled (left) and disabled (right).



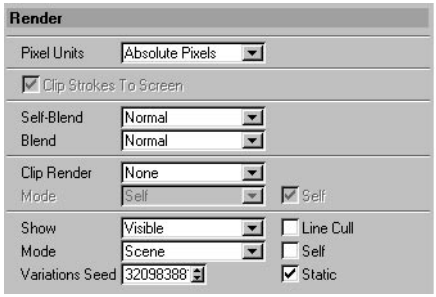
Spline mode for the Distance modifier on the Thickness tab. Here the graph specifies how the thickness varies depending on distance from the camera.

The Mode controls how the thickness or opacity is modified over the range. Linear mode fades out the thickness or opacity gradually — the Invert option inverts the direction of the fade.

If instead you set Mode to Spline, you'll see a spline graph appear. The graph defines the variation in thickness or opacity over the range. The X-axis represents the range, the Y-axis represents the thickness or opacity.

Render

Here you'll find the Sketch material's rendering controls, such as the options for render culling.



Pixel Units

In the Sketch material there are numerous settings which take pixels as their units. The Pixel Units value defines what is meant by a pixel.

Absolute Pixels

This is real pixels, i.e. 1 unit refers to 1 pixel in the image.

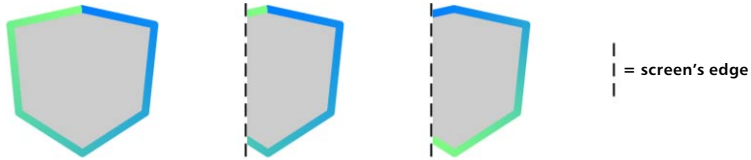
Relative Pixels

These values are all scaled relative to the object's bounds. This means that 1 pixel thickness may change based on the object's size; this is the screen size of the object, so moving the camera away from the object gives the same results as scaling the object. What matters is the size of the object rendered onto the screen.

World Space

The pixels are transformed from the world space, so a "pixel" is smaller the further away it is from the camera.

Clip Strokes To Screen



(Original) *Disabled* *Enabled*

This controls how the lines are clipped if part of the object is off-screen. If the option is disabled, the properties are chopped off at the screen's edge. If the option is enabled, the properties are redrawn to fit the on-screen part of the stroke.

Self-Blend, Blend

For details on the blend modes, look up "blend modes" in the index.

Sometimes it's useful to render the same line multiple times with different materials. For example, the character below has two outlines: a thin black outline and a thick gray one. To assign multiple Sketch materials to the same object, simply add a Sketch Style tag for each material.

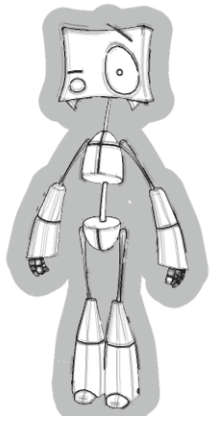
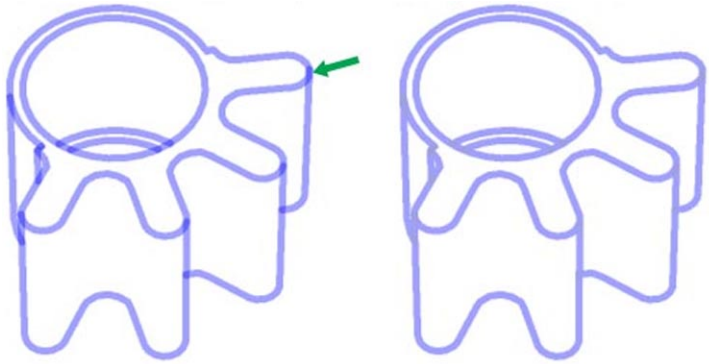


Image ©2003 by Christian Rambow.

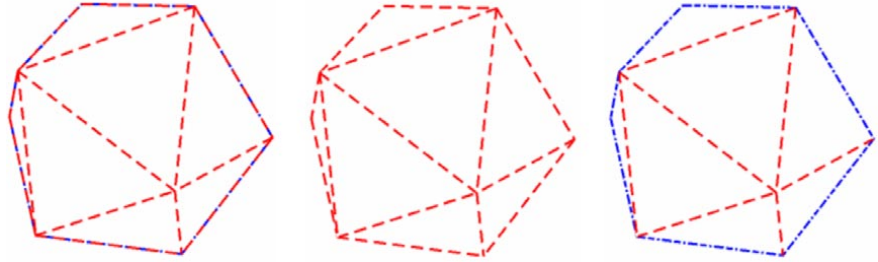
The Self-Blend and Blend settings define the blending mode for lines on the same object (Self-Blend) and lines from different objects (Blend).

Example 1 - Solving opacity overlaps



To avoid opacity overlaps, set Self-Blend to Average.

Example 2 - Solving overlapping patterns



Two line types have been enabled for this object: Crease and Outline. Both have a different pattern. Initially you can't see much of a pattern around the outline (left object) because the two lines overlap and so any gaps in one are filled by the pattern from the other line.

To remedy, first set Self Blend to Overwrite (center object). This removes the overlap, but now the blue line has been overwritten because of the drawing order (see "The drawing order" below). This is easily resolved by setting the blue line's Priority value in the Sketch material (Main tab) higher, to give the desired result (right object).

The drawing order

Suppose you've drawn two outlines for the same object, a thin red outline and a thick black one. How does Sketch and Toon know which line you want on top of the other?

Sketch and Toon follows a drawing order for the lines:

- If the lines are at different depths from the camera, the one closest to the camera is drawn on top.
- If the lines are the same depth from the camera but are generated by different Sketch Style tags, the materials are drawn according to the order of their tags in the Object manager — the left-most tag's material is drawn on top.
- If the lines are the same distance from the camera and are generated by the same Sketch Style tag, the materials are drawn in order of their priority on the Basic Properties tab — the one with the highest Priority value is drawn on top.

Clip Render, Mode

None *Inside Geometry* *Outside Geometry*

This setting lets you clip off parts of the line that are inside or outside the geometry.

The Mode setting controls how an object's clipping is affected by other objects in the scene. Enable the Self option if objects should clip their own lines as well.

Self

Clipping is not affected by other objects. The object's lines are clipped to its own geometry only.

Children, Hierarchy, Scene

In Children mode, the lines are clipped to the object's own geometry (if Self is enabled) and to the geometry of its children (Children). Hierarchy mode finds the top-most parent and then uses the parent and all its children to clip.

Object

This lets you choose which objects are used to clip the lines of other objects — drag and drop the objects into the Objects box. To make each object clip its own lines as well, enable the Self option.

Render Culling (Show, Line Cull, Mode, Self, Objects)

➔ *These settings are for advanced use only. They are designed for supporting alpha maps during rendering to allow lines to show through alphas.*

Sketch and Toon has two stages of culling: hidden culling and render culling.

Hidden culling takes place while the lines are being generated and its purpose is to separate the lines into visible lines and hidden lines. This is controlled by the Hidden Cull mode and Self-Culling option in the post effect and Sketch Style tag (Lines tab). The Hidden Cull mode sets which objects are used to check if a line is hidden. For more information on hidden culling, look up "hidden lines, culling" in the index.

Render culling takes place at render time and is controlled by the Show, Line Cull, Mode, Self and Objects settings. If a line's rendering pixel is hidden by an object that was not used in finding if that line was hidden or visible during hidden culling, it will use these settings to decide if it should render.

Show

If you set this to Visible or Hidden, Sketch and Toon will only render line pixels that are visible or hidden respectively based on the Mode settings. The default setting is visible (normally you only want to see line pixels that are not hidden by other objects).

Mode, Self

As with the other clipping and culling modes, this sets which objects in the scene are used to find out if this pixel is visible or hidden. The default is Scene, which means all other objects in the scene are checked. With the default settings, only pixels that are not hidden by other objects are rendered. The Self option is disabled by default. If you enable it, the object which generated the line will also be checked to see if it hides the line.

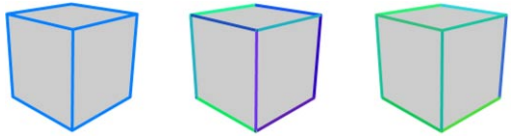
Line Cull

This changes how the render culling works. It has two methods.

Method 1 (option disabled) - this simply checks the pixel itself that is rendering. This is faster than method 2 but can result in the "line thinning" artefact where lines that are partly hidden along their thickness are culled (because it is per pixel).

Method 2 (option enabled) - this checks the line itself. It is slower than method 1 because it needs to send out extra rays from the line to check if the line point closest to the rendering pixel should be culled.

Variations Seed, Static



From left to right: original cube; cube with 30% HSV color variation set on the Adjustment tab; the same settings as the center cube except with a different Variations Seed value.

The Sketch material has many variation parameters. For example, the H, S and V values on the Adjustment tab enable you to randomize the color of each line. Suppose you don't like the particular colors Sketch and Toon has chosen, what then?

Change the Variations Seed value and Sketch and Toon will create a new random look. Changing this value is like "throwing the dice again" for all variation values. Keep changing it until you're satisfied with the result. Disable the Static option if you are rendering an animation and you want a different variation to be generated for each frame.

Clone

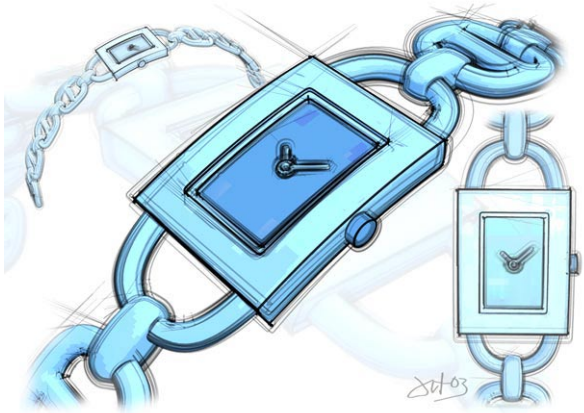
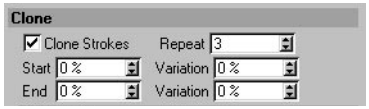


Image ©2003 by Artur Bala.

Cloning is the key to eye-pleasing sketch effects such as for the watch above where multiple faint lines are offset from the geometry.



Clone Strokes

Enable the Clone Strokes option to switch on cloning.

Repeat

From left to right: Repeat set to 1, 3, and 5.

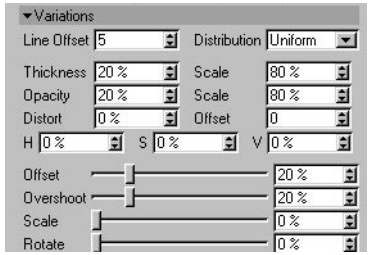
This is the number of clones per line. Keep in mind that the more clones you use, the longer it takes Sketch and Toon to render the lines.

Start, End, Variation

(Original) *Start = 20%* *End = 20%* *Start & End = 20%* *With variation*

Use the Start and End values to make the clones shorter than the original lines. They define where the clone should start and end as a percentage of the original line's length. The Variation values let you vary the start and end for each clone.

Variations



Line Offset, Distribution

From left to right: Offset set to 0, 25, and 50.

The Line Offset controls how far apart the clones are from the original line. The value defines the *maximum* distance in pixels between the original line and the furthest clone. Note that if the value is set to 0, the clones will be in the same position as the original line and may not be visible (see left line, above).

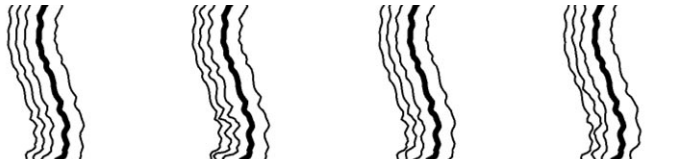
The Distribution value defines which type of random pattern is used to space out the clones: Uniform or Gaussian.

Thickness, Opacity, Scale

(Original) *Scale (Thick.) = 50%* *Scale (Opac.) = 50%* *Both Scales = 50%* *With Variation*

The Scale settings define the global thickness and opacity of the clones as a percentage of the original line's thickness and opacity. You can vary the thickness and opacity of each clone using the Thickness and Opacity boxes. 0% means no variation, 100% means maximum variation.

Distort, Offset



(Original) *Distort = 100%* *Low Distort Offset* *High Distort Offset*

These values vary any distortion effects applied to the original line (Distort tab) for each clone. The Distort value defines the amount by which the strength of the distort may vary (increase the value for more variation per clone) while the Offset offsets the position of the distortion's coordinates.

H, S, V

Original *With HSV variation*

By default, each clone is the same color as the original line. To make each clone a random color instead, enter the percentage variation for the H, S and V values into the appropriate box. 0% means no variation, 100% means maximum variation.

Offset, Overshoot, Rotate

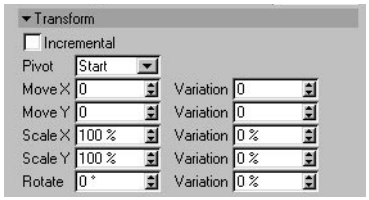
These values modify the original stroke's offset, overshoot and rotation values (defined on the Adjustment tab) for each clone. Keep in mind that if the original stroke has no adjustment properties, then changing these variation values will have no effect (100% variation of nothing results in nothing).

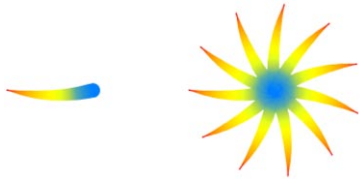
0% means no variation, 100% means maximum variation. The picture above demonstrates Overshoot set to 100% (the original line is the thick one; note how the overshoots for the clones are longer or shorter than the original line's overshoots).

Scale

The Scale value randomizes the scale of each clone. 0% means no variation, 100% means maximum variation.

Transform





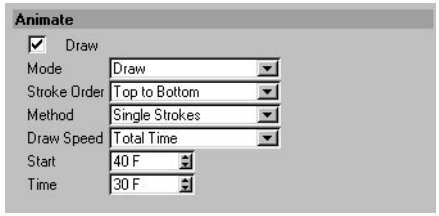
Original line (left) and ten clones with Incremental enabled and Rotate X set to 33° (right).

These settings let you move, scale and rotate the clones. The Move values define the number of pixels to move the lines in the computer screen's X and Y directions. The Pivot setting defines the center of rotation: the start, end or center of the original line (Start, End or Center) or the center of the object (Object). The Variation boxes let you vary the transformation per stroke. 0% means no variation, 100% means maximum variation.

Enable the Incremental option to transform each clone based on the previous clone's position, scale and rotation. See the flower example above.

Animate

Imagine you're looking over an artist's shoulder while he or she sketches. Soon the sketch starts to take shape. This is the type of pleasing effect you can create using the parameters on the Animate tab. In general, use these settings with static scenes only — neither the camera nor the objects in the scene should move during the animation. If they do move, there's no telling what might happen. Suppose someone were to wobble your sketch pad while you were drawing...



Draw

Enable the Draw option to activate the Animate settings.

Mode

The Mode setting controls how Sketch and Toon animates the lines. The following examples show, from left to right, the animation one third the way through, two thirds the way through, and all the way through.

Draw

The Draw mode draws each line gradually.

Length

This is the same as Draw mode except parameters such as thickness and color grow with the line.

Opacity

The Opacity mode fades in the lines gradually.

Thickness

The lines start off thin and thicken out over time to reach their full thickness.

Build

Unlike Opacity mode, which fades in lines gradually, Build mode makes the lines appear suddenly. One frame the line isn't there, the next it's completely drawn.

Stroke Order, Method

Choose whether Sketch and Toon should draw the strokes all at the same time (All Strokes) or one after the other (Single Strokes). In the case of Single Strokes, the Stroke Order controls which strokes are drawn first.

Draw Speed

The Draw Speed controls how quickly Sketch and Toon draws the lines.

Pixels

This mode lets you set the drawing speed in pixels per second (Speed) and when Sketch and Toon should start to draw (Start).

Stroke Time

Tells Sketch and Toon when to start drawing (Start) and how long to take to draw each stroke (Time).

Completion

Unlike the other modes, the Complete mode requires you to record keys. The Complete value defines how complete the drawing is. For example, to record a simple animation from frames 0 to 90, record a key at frame 0 with Complete set to 0%, and record another key at frame 90 with Complete set to 100%.

Total Time

In this mode, you can specify when the drawing should start (Start) and how long it should take to complete (Time).

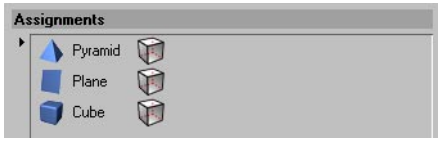
End Frame

The End Frame mode is the simplest mode of all. It tells Sketch and Toon when to start drawing (Start) and when to be finished by (End).

Animation End

Sketch and Toon will complete the drawing by the end of the animation. The Start value defines when the drawing should start.

Assignment



Here you can quickly assign a Sketch material to specific objects. Drag and drop the objects into the Assignments box. A Sketch Style tag will be created automatically for each of these objects with the material assigned.

To remove the material assignment from an object, select the object's name in the box and press the Delete or Backspace key. The Sketch Style tag will be deleted automatically and the object's name will be cleared from the box.

Blend modes

Sketch and Toon boasts a healthy selection of blend modes. There are various places where you can choose a blend mode, such as on the Sketch material's Render tab where you can control how lines should be blended together.

Average

The result is the average of the background pixel and the blend pixel.

Normal

The background pixel is completely covered by the blend pixel if the strength of blending is 100%.

Multiply

This mode multiples the background pixel by the blend pixel. Unless the blend pixel is white, the result will be darker than the background pixel.

Screen

This is the opposite of the Multiply blend mode. The background pixel and blend pixel are both inverted, multiplied and then inverted again. This mode generally gives a result brighter than the background.

Darken

The background and blend pixel are compared and the result is whichever is darker.

Lighten

This is the same as darken except the result is whichever pixel is lighter.

Difference

The background and blend pixels are subtracted from each other.

Negative

The Negative mode is the same as Difference mode except colors between white and black become brighter instead of darker.

Exclusion

This mode is the same as Difference mode except that it creates a softer effect.

Overlay

A combination of Screen and Multiply mode, depending on the background color.

Hard Light

This mode works like Multiply mode and Screen mode at the same time. 50% brightness is neutral (nothing happens). Lighter values act like Screen, darker values act like Multiply.

Soft Light

This is a combination of the Burn and Dodge modes. The Dodge mode is used for blend pixels greater than 50% brightness, the Burn mode is used for values below 50%.

Dodge, Burn

The brightness value of the blend pixel is used to brighten (Dodge) or darken (Burn) the background pixel.

Reflect

Similar to Dodge mode but the result is not as bright in some cases.

Glow

The color of the background pixel and blend pixel are swapped. The result is similar to Hard Light mode.

Freeze

The background pixel and blend pixel are inverted and the result inverted again.

Heat

Like Freeze mode but the background pixel and blend pixel are swapped.

Add

One of the simplest blend modes: the background pixel and blend pixel are added together.

Subtract

The background pixel and blend pixel are added together then white is subtracted (result = background color + blend color - 256).

Stamp

A blend pixel that is 50% bright doesn't change the background pixel; brighter or darker blend pixels produce a darker or brighter result respectively.

Xor

The background pixel and blend pixel are combined with a logical XOR.

Hue, Saturation, Luminance

In these modes, the result is the hue, saturation or luminosity of the blend pixel applied to the background pixel.

Red, Green, Blue

The result is the red, green or blue color channel from the blend pixel and the two other color channels from the background pixel. For example, Green mode gives you the green color channel from the blend pixel and the red and blue color channels from the background pixel.

Overwrite

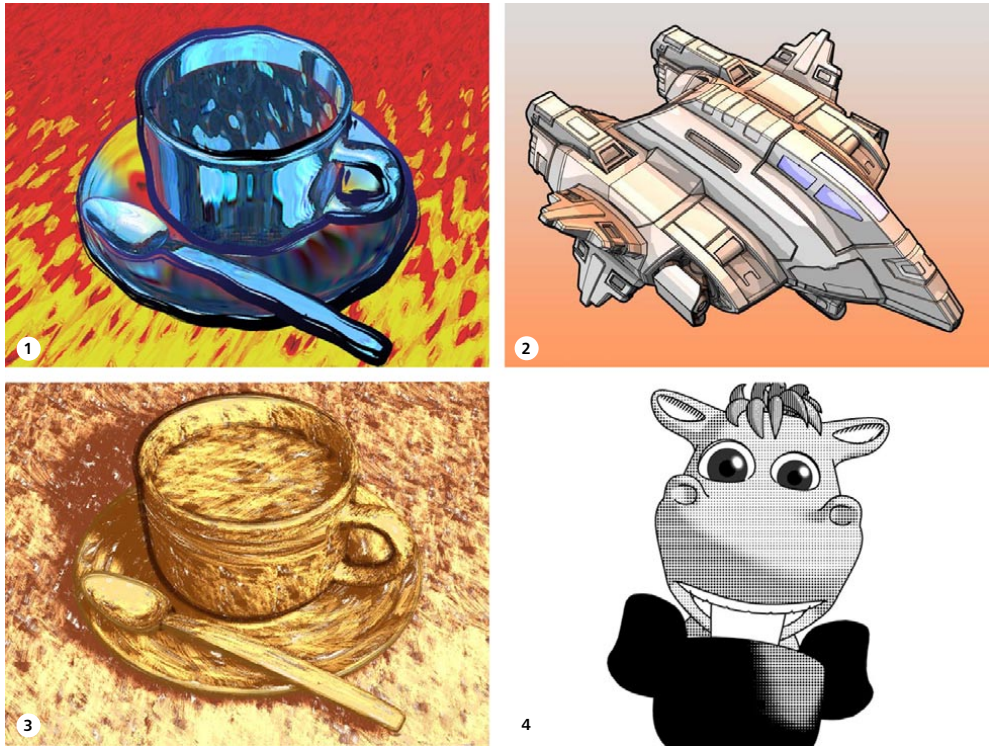
This is mostly useful for technical illustrations using patterns. It ignores any opacity (which is used to do the pattern) from behind it and overwrites the opacity so that you can always see the pattern.

Levr

The value of the blend pixel is used to apply contrast to the background pixel.

CINEMA 4D
Release 9
5 Sketch Shaders

5 Sketch Shaders



1 *Art shader;* ***2*** *Cel shader;* ***3*** *Hatch shader;* ***4*** *Spots shader. Images © 2003 by Artur Bala (1 & 3), Michael Welter (2), and Toshihide Miyata (4).*

You'll find various shader presets in the Sketch folder within CINEMA 4D's Library folder. Load these using the Material manager's File > Load Materials command.

Sketch and Toon includes four powerful channel shaders to color your scenes: Art, Cel, Hatch and Spots. In these pages, you'll find details on each shader.

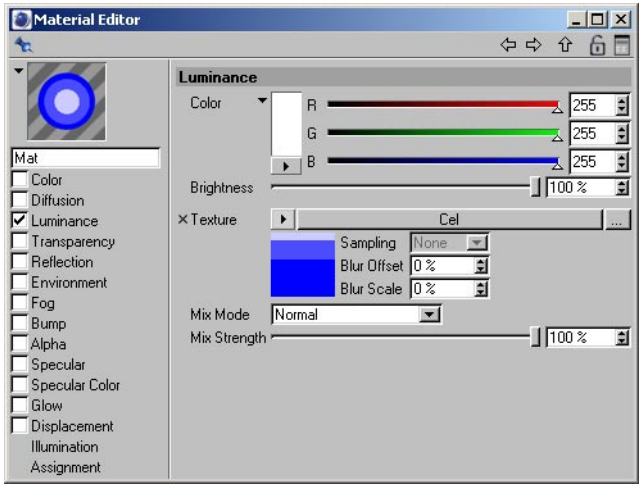
The Art shader uses a sphere to define the illumination and shading of an object. Unique shading is possible by varying the surface and coloring of the sphere. This shader can transform ordinary renders into abstract masterpieces.

The Cel shader replicates the unique shading of styles such as Manga and Anime with quantized color shading. Custom gradients make it easy to define the look you desire.

The Hatch shader creates custom hatch shading on your 3D objects based on any texture you choose. Three levels of shading and coloring combine to create colorful and artistic renders with a stunning hand-drawn look to them.

With the Spots shader, the spots (or any other image you desire to use) shrink depending on surface brightness to mimic the halftone appearance of low resolution print images.

Creating a Sketch shader



The Sketch shaders are channel shaders. You can load them into any material channel which accepts a texture, but generally they work best in the Luminance channel with all other channels such as Specular disabled.

Keep the following in mind: The Sketch shaders are rendered by CINEMA 4D, *not* by the post effect. The post effect has some shading options which will affect the CINEMA 4D rendering including the result of the Sketch shaders unless you switch off the options.

To create a Sketch shader:

- In the Material manager, choose File > New Material to create a new material.
- Double-click the material's thumbnail to display its settings in the Material editor (or access the settings using the Attribute manager if you prefer).
- In general, ensure all material channels are disabled except Luminance.
- On the Luminance tab, click the Texture triangle button and choose which Sketch shader you want to use (Art, Cel, Hatch or Spots) from the Sketch menu.
- You'll see the shader's name appear to the right of the Texture triangle button. Click the shader's name or its preview to display its settings.

To switch off post effect shading:

- On the Render Settings > Effects > Sketch and Toon > Shading tab, set Object to Off.
- If you want to switch off the post effect's background color (a white background by default), set Background to Off.

Using other shaders

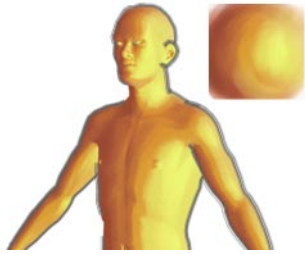
Sketch and Toon allows you to shade the object using any standard shader, not just the Sketch shaders. As with the Sketch shaders, switch off the post effect shading options unless you want them to affect the rendering. For more details, see the previous section: "Creating a Sketch shader."

Antialiasing tip

The Art shader, Hatch shader and Spots shader each use a texture to shade the objects. For example, the Hatch shader uses a picture of a stroke or block of strokes to draw hatches onto the objects. Naturally you'll want these texture strokes to look smooth and antialiased when rendered, which would usually mean setting CINEMA 4D's Antialiasing mode on the Render Settings > Antialiasing tab to Best.

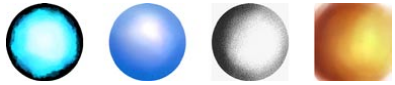
A tip to speed up rendering is to set the Antialiasing mode to Geometry instead of Best and blur the texture slightly using the texture's Blur Offset and Blur Scaling values. Although CINEMA 4D won't antialias textures in Geometry mode, this blurring will produce smooth strokes that look antialiased, and the rendering will be much faster. Ideal for when you are using thousands of hatched lines.

Art Shader



The Art shader is possibly the most fun you'll ever have coloring your illustrations. Instead of using lights and complex texture mapping for your scene, you provide the shader with a picture of a shaded sphere textured and "lit" the way you want the objects in the scene to be textured and "lit". Sketch and Toon will then apply this style to the scene's objects.

Creating the shaded sphere



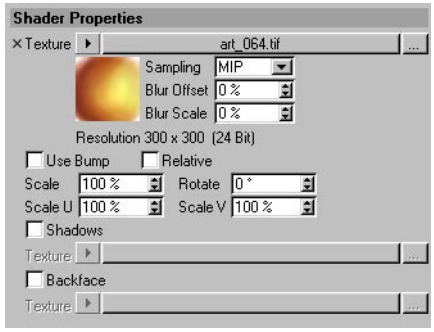
The first step when using the Art shader is to create the shaded sphere. Why not paint it from scratch in your favorite painting software such as BodyPaint 3D (www.bodypaint3d.com). Or perhaps render a sphere in CINEMA 4D and run a few filters over it in an image editor?

No lights required!

When using the Art Shader, lights are not required.

Material editor / Attribute manager settings

The Art shader works best with curved surfaces because the effect is controlled by the direction of the surface normals.



Texture

This is the texture to use. It should be a picture of a shaded sphere with the texturing and lighting drawn onto it that you want applied to the objects in the scene.

Use Bump

To apply a bump map to the shader, enable this option and set up the bump mapping on the Material's Bump tab as you would for a normal material.

Relative

Enable this option to vary the look slightly for each object. This can help to achieve a more natural look, since in a real scene the lighting normally depends on the object's position relative to the light source. However, note that the sphere texture must be stretched over the edges of the objects to achieve the effect and this may lead to artefacts.

Scale, Scale U, Scale V

These values scale the texture. This if mostly useful for controlling how much of the image is used, or for correcting gaps in the texture.

Rotate

The Rotate option rotates the texture about its center.

Shadows, Backface

Generally you won't need to use these. They enable you to use additional images for shadow regions and backfaces (surfaces which face away from the camera).

Cel Shader

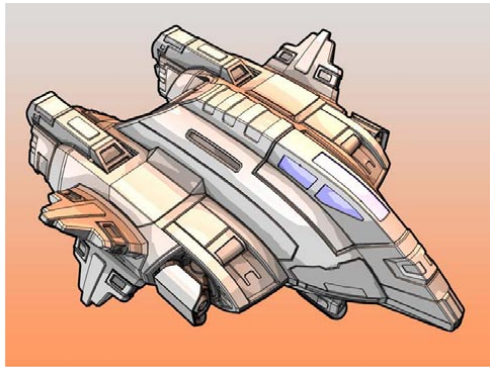
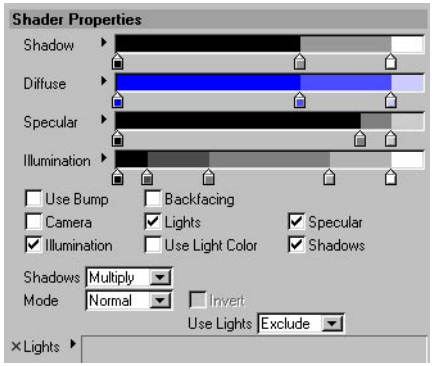


Image © 2003 by Michael Welter.

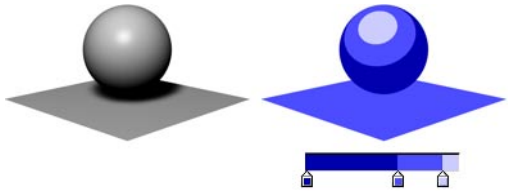
The Cel shader is for cartoon-style shading, such as Manga-style or Anime-style.

Material editor / Attribute manager settings



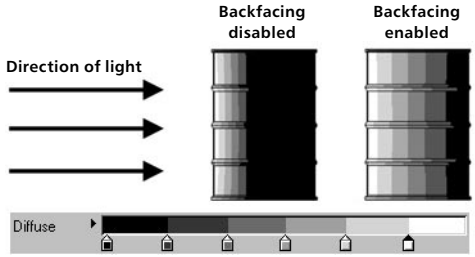
Diffuse, Backfacing

The Diffuse gradient controls the diffuse color of the objects, from areas in total darkness (left end of gradient) to areas which are fully lit (right end of gradient).



The Diffuse gradient controls the diffuse color of objects.

Backfacing



Two oil drums, both lit from the left. Enable Backfacing if you want the gradient to span frontfaces and backfaces, not just frontfaces.

Usually the Diffuse gradient controls the color of all frontfaces (i.e. faces which point towards the light), but backfaces simply take the "darkest" color (i.e. the color at the left edge of the gradient).

If instead you want the gradient to fully control the color of frontfaces *and* backfaces, enable the Backfacing option. The left edge of the gradient then corresponds to surfaces facing directly away from the light, the right edge corresponds to surfaces facing directly towards the light. Among other things, Backfacing gives you a quick way to create rim light effects.

Use Bump

To apply a bump map to the shader, enable this option and define the bump mapping on the material's Bump tab as you would for a normal material.

Camera

Enable the Camera option to use the camera as a light source.

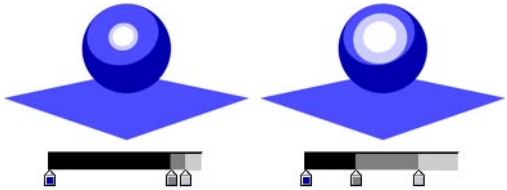
Lights, Illlumination, Use Light Color, Use Lights, Lights box

To use the lights in the scene as light sources, enable the Lights option. To use the illumination of each light (not just its direction), enable the Illumination option.

By default, all lights in the scene will be used as light sources when Lights is enabled. To include or exclude specific lights, set Use Lights to Include or Exclude and drag and drop the lights into the Lights box.

Usually the color of the objects is controlled by the Diffuse gradient. To color the objects using the color of the lights instead, enable the Use Light Color option. The Diffuse gradient then controls the brightness values for the objects.

Specular



If you want the lights to generate specular highlights, enable this option. The Specular gradient controls the color, width, height and falloff of the highlights, from areas of no specular (left end of gradient) to areas of full specular (right end of gradient).

Shadows, Mode, Invert

See “Cel shader shadows” below.

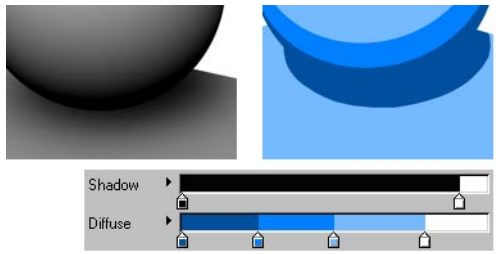
Cel shader shadows

To include shadows, enable the Shadows option and set the Shadows to Multiply, Color or Light Shadow.

Multiply

When Shadows is set to Multiply, you have a choice of four modes: Normal, Hue, Saturation or Value.

Normal mode



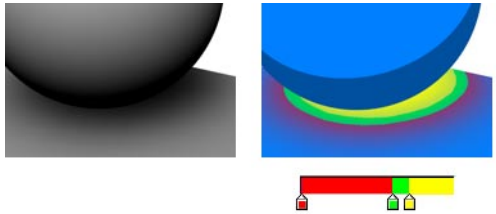
Shadow under a sphere.

In Normal mode, the Shadow gradient affects the brightness of shadows, from areas of full shadow (left end of gradient) to areas of no shadow (right end of gradient). Note that the color of the shadows is restricted to the colors defined by the Diffuse gradient.

Hue mode, Saturation mode, Value mode

These three modes enable you to adjust the hue, saturation or value (H, S, V) based on the shadow. They take either the hue, saturation or value of the resulting Cel shader color and multiply it by the shadow. The Invert option swaps the multiply so the shadow either moves the H, S or V down or up.

Color



If Shadows is set to Color, the Shadow gradient influences the color of shadows.

Light Shadow

If this option is enabled, the shadow will use the color defined on the light object's Shadow tab in the Attribute manager.

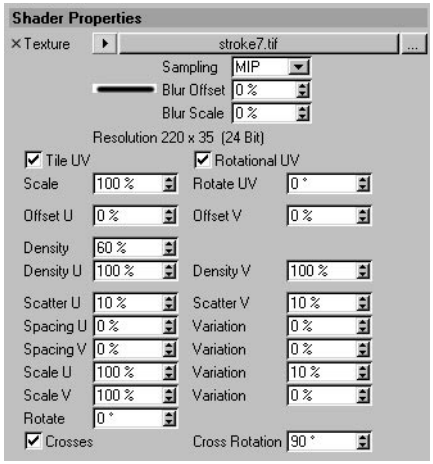
Hatch Shader

Image © 2003 by Artur Bala.

The Hatch shader is Sketch and Toon's most advanced shader. It places a picture of a stroke (or any other picture you want it to use) multiple times onto the object to create a hatched lines effect. The Hatch shader's settings give you full control over how these strokes are placed, making it possible for you to create any type of hatched lines effect.

Material editor / Attribute manager settings

Shader Properties



This tab controls how the strokes are placed and how they overlap.

Texture

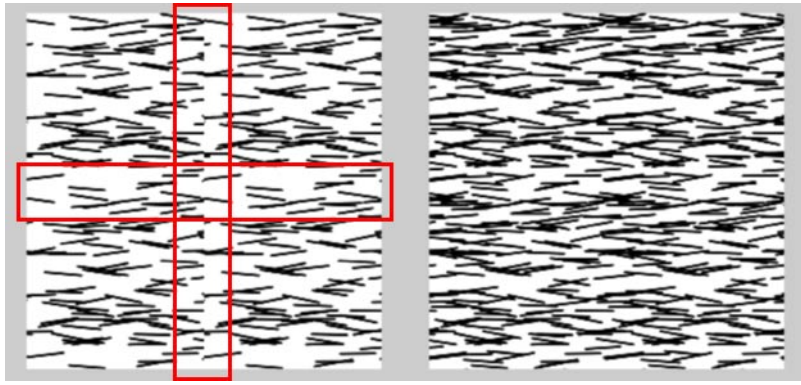
In general, use an image of a stroke or strokes as the texture.

This is the texture to use as the stroke. You can use a grayscale or a color image (color information in the texture is ignored; the color of the hatches is defined on the shader's Color tab).

The texture on a plane with full density of 100%, no overlap (Spacing 0%) and no Scatter or other variations.

To speed up rendering, consider using a block of strokes instead of a single stroke as the texture. This enables you to use a larger texture tile (Scale values), which means faster rendering.

Tile UV



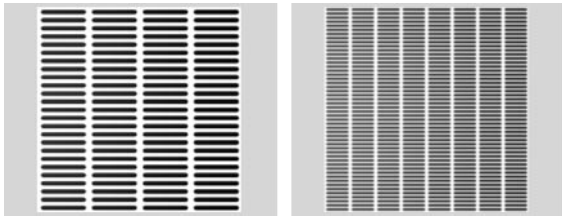
When tiling textures using the Tile X and Tile Y settings in the Texture tag, you'll probably notice seams (left, marked in red). Enabling the Tile UV option helps to remove the seams (right).

Sketch and Toon offers many ways to speed up the rendering of lines. One way is to tile the hatched lines using the Tile settings in the Texture tag (the more tiles you use, the faster the lines are rendered). Enable the Tile UV option to help remove seams from the edges of the tiles (it works by wrapping the lines over the tile edges).

Rotational UV

Sometimes you may notice seams even with Tile UV enabled. This is when the Rotational UV option can help. It rotates the hatch UV map around four times to ensure the strokes overlap all sides.

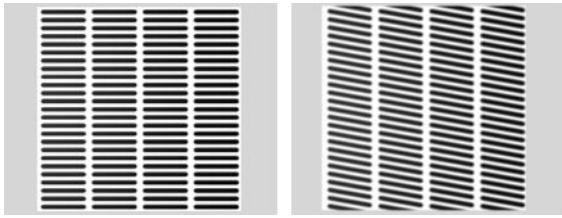
Scale



Scale = 100% *Scale = 50%*

This controls the scale of the stroke texture. A smaller texture means more strokes over the UVs, which in turn means longer render times. For smaller strokes, instead of lowering the Scale value, consider tiling the strokes using the tiling settings in the Texture tag. See "Tile UV" above.

Rotate UV



Rotate UV = 0% *Rotate UV = 10%*

Rotates the rendering UVs so the whole thing rotates.

Offset U, Offset V

From left to right: no UV offset; Offset U set to 10% and Tile UV enabled; Offset U set to 10% and Tile UV disabled.

These settings offset the rendering on the UVs. Enable Tile UV to prevent a gap in the tiling.

Density

Density = 100%

Density = 10%

This is the overall stroke density, i.e the number of strokes generated.

Density U, Density V

Density U & V = 100%

Density U = 50%

Density V = 50%

These define the stroke density in the U and V directions.

Scatter U, Scatter V

No Scatter

Scatter U = 20%

Scatter V = 10%

Scatter the strokes in the U and V directions randomly.

Spacing U, Spacing V, Variation

No Spacing *Spacing U = 50%* *Spacing U = 50%, Var. = 100%*

Space the stokes. Values above 100% create gaps between the tiles, values less than 100% overlap them.

Scale U, Scale V, Variation

Scale U = 100% *Scale U = 200%* *Scale U = 200%, Var. = 50%*

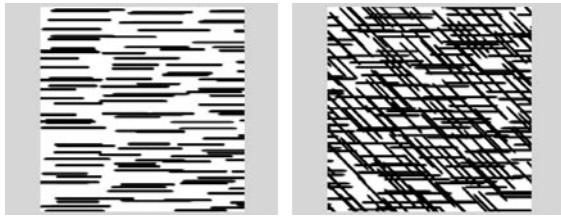
Scale the strokes in the U or V direction.

Rotate

Rotate = 0% *Rotate = 10%*

Rotates each stroke by a random amount up to the set angle value.

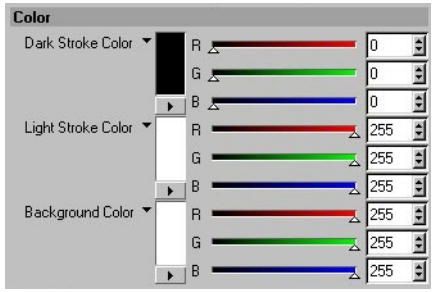
Crosses, Cross Rotation



Crosses disabled (left) and enabled with Cross Rotation set to 45˚ (right) .

If Crosses is enabled, a second pass of strokes will be rendered over the first strokes and rotated as a whole by the Cross Rotation value. This is used to create cross-hatching.

Color



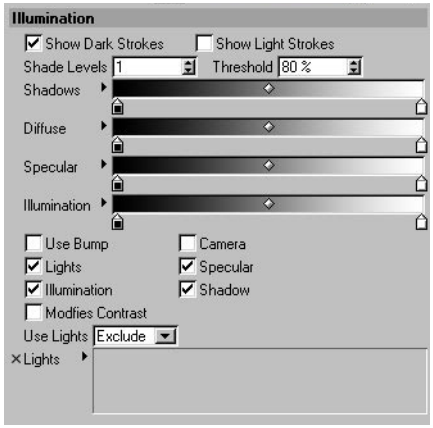
Dark Stroke Color, Light Stroke Color

Here you can choose the color of the strokes. The Hatch shader can draw two types of stroke: dark strokes and light strokes. Dark strokes are faded by light and are the main type. Light stokes, which are disabled by default on the Illumination tab, are the opposite and fade out in areas where there is no illumination.

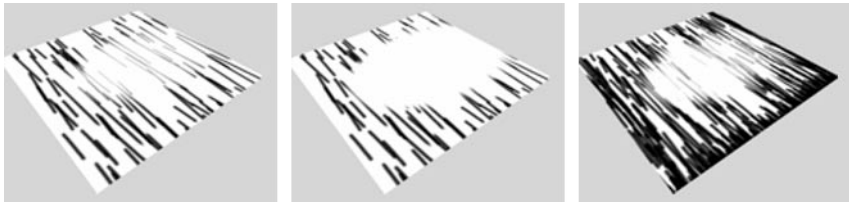
Background Color

Defines the background color of the surface.

Illumination



The Illumination tab controls how the illumination affects the rendering of the strokes.



High Threshold value *Low Threshold value* *With higher Shade Levels value*

Show Dark Strokes, Show Light Strokes

Enable these options to switch on dark stokes and light strokes.

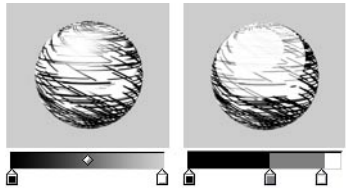
Shade Levels

In general, the higher you set this value, the more strokes you get in dark areas and the less faded the hatching looks. It works by overlaying layers of strokes (the Shade Levels value defines the number of layers), where each layer is more and more affected by the illumination.

Threshold

The Threshold controls how quickly the strokes fade out. See the examples above.

Diffuse



If Lights is enabled, the Diffuse gradient controls the brightness value of the hatches, from areas in total darkness (left end of gradient) to areas which are fully lit (right end of gradient).

Use Bump

To apply a bump map to the shader, enable this option and define the bump mapping on the material's Bump tab as you would for a normal material.

Camera

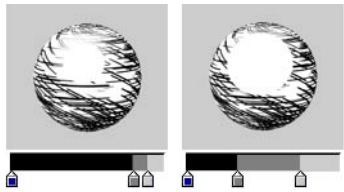
Enable the Camera option to use the camera as a light source.

Lights, Illumination, Use Lights, Lights box

To use the lights in the scene as light sources, enable the Lights option. To use the illumination of each light (not just its direction), enable the Illumination option — the Illumination gradient remaps the illumination from no illumination (left end of gradient) to full illumination (right end of gradient).

By default, all lights in the scene will be used as light sources when Lights is enabled. To include or exclude specific lights, set Use Lights to Include or Exclude and drag and drop the lights into the Lights box.

Specular



If you want the lights to generate specular highlights, enable this option. The Specular gradient controls the color, width, height and falloff of the highlights, from areas of no specular (left end of gradient) to areas of full specular (right end of gradient).

Shadow

Enable the Shadows option to take shadows into account. The Shadow gradient affects the brightness of shadows, from areas of full shadow (left end of gradient) to areas of no shadow (right end of gradient).

Modifies Contrast

This makes the Hatch shader work in a similar way to the Spots shader. The strokes will have their contrast adjusted to give the impression of larger or smaller strokes depending on the brightness of the illumination.

Spots Shader

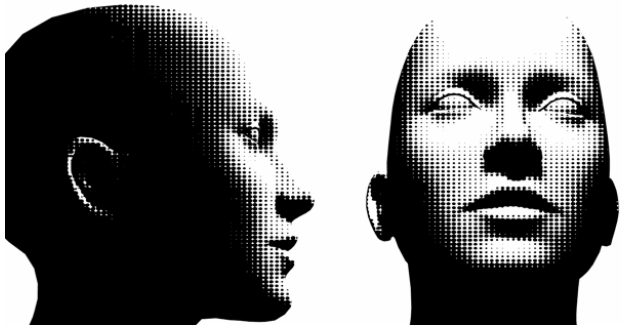
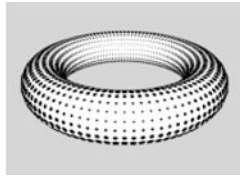


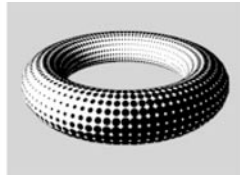
Image © 2003 by Christian Rambow.

This shader helps you to mimic the halftone appearance of low resolution print images. It generates larger or smaller spots depending on the brightness of the surface illumination.

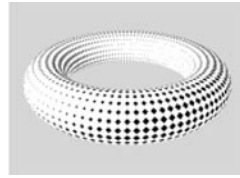
Circle



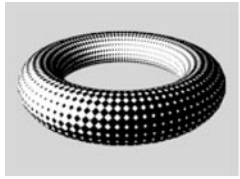
Circle with Camera



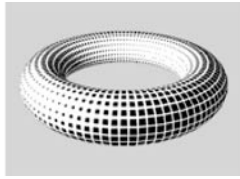
Circle with Lights



Diamond



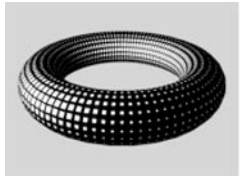
Checker



Square

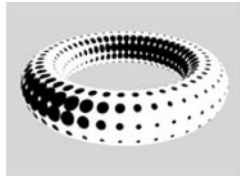
Lines U

Lines V

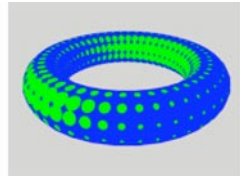


Grid

Custom texture

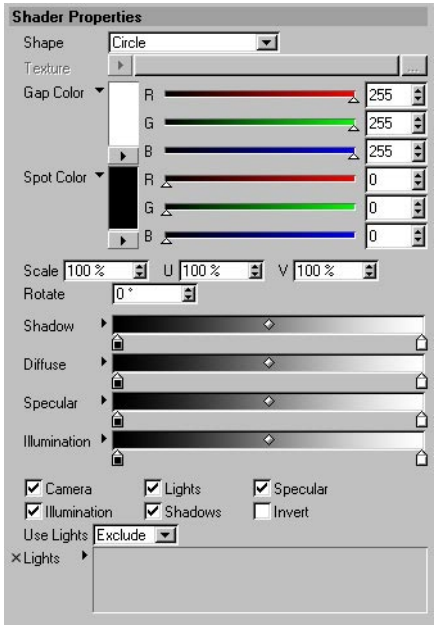


Circle with Invert



With color

Material editor / Attribute manager settings



Shape, Texture

The Shape setting lets you choose which pattern is repeated over the surface. You can choose from predefined shapes, such as Circle, Square and Diamond, or you can load a custom texture as the shape (set Shape to Texture and use the Texture triangle button to load the image).

Two custom textures (left of each arrow) and the result of using them as spot textures (right of each arrow).

When using a custom texture, keep the following in mind: The Spots shader makes the spots smaller or larger by adjusting the *contrast* of the texture. For best results, the custom texture should have a smooth transition from black to white as its outline (left spot above). If the transition is sudden (right spot above), the spots won't shrink or grow gradually.

Gap Color, Spot Color

These are the colors for the spots and the areas between the spots.

Scale, Scale U, Scale V

The Scale controls the global scale of the spots, Scale U and Scale V are the scale of the spots in the U and V directions.

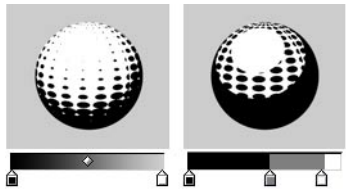
Rotate

This rotates the placement of the spots on the UVs.

Shadow

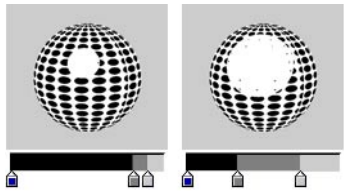
Enable the Shadows option to take shadows into account. The Shadow gradient affects the brightness of shadows, from areas of full shadow (left end of gradient) to areas of no shadow (right end of gradient)

Diffuse



The Diffuse gradient controls the brightness value of the hatches, from areas of full shadow (left end of gradient) to areas of no shadow (right end of gradient).

Specular



If you want the lights to generate specular highlights, enable this option. The Specular gradient controls the color, width, height and falloff of the highlights, from areas of no specular (left end of gradient) to areas of full specular (right end of gradient).

Camera

Enable the Camera option to use the camera as a light source.

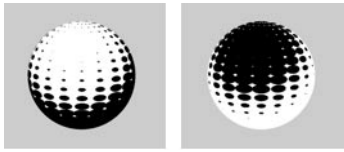
Lights, Illlumination, Use Light Color, Use Lights, Lights box

To use the lights in the scene as light sources, enable the Lights option. To use the illumination of each light (not just its direction), enable the Illumination option.

By default, all lights in the scene will be used as light sources when Lights is enabled. To include or exclude specific lights, set Use Lights to Include or Exclude and drag and drop the lights into the Lights box.

Usually the color of the objects is controlled by the Diffuse gradient. To color the objects using the color of the lights instead, enable the Use Light Color option. The Diffuse gradient then controls the brightness values for the objects.

Invert



Invert option disabled (left) and enabled (right).

The Invert option reverses the shrinking behavior of the spots. They will then shrink as the surface gets darker, instead of as it gets brighter.

6 Sketch Style Tag

6 Sketch Style Tag

The Sketch Style tag is where you can set an individual style for an object to override the post effect's style. The other main use for the tag is to specify a selection. For example, here you can restrict the edge line type to an edge selection.

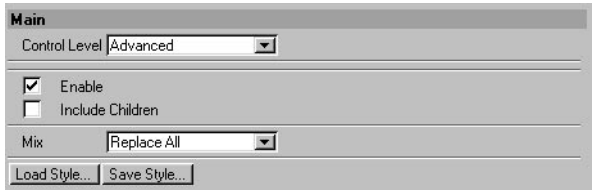
To assign a Sketch Style tag to the selected object:

In the Object manager, choose File > Sketch Tags > Sketch Style.

Attribute manager settings

Some of the following settings are available only when the Control Level is set to Intermediate or Advanced. See "Control Levels" in the index.

Main



Control Level

Look up "Control Levels" in the index.

Enable

Switches the tag on or off.

Include Children

Enable the Include Children option if you want the tag to control child objects as well.

Mix

The Mix mode controls how the tag is used in combination with other Sketch Style tags and the Sketch and Toon post effect.

Replace All

The tag replaces the lines and shading of any parent tags and the Sketch and Toon post effect. In other words, parent tags and the settings in the Sketch and Toon post effect are ignored.

Replace Lines

The tag replaces the lines but not the shading of parent tags (provided their Include Children option is enabled) and the Sketch and Toon post effect.

Add

This mode adds the tag's settings to the settings of parent tags (provided their Include option is enabled) and the Sketch and Toon post effect.

Use

This allows you to use the tag's settings for lines enabled in the post effect. This works with the post effect only, not with parent tags. Note that you need to enable the line type in the tag also. For example, suppose you have Edges enabled in the post effect. You then have a Sketch Style tag on an object and want to use an edge selection for that object. You need to enable the Edge line type in the Sketch Style tag, then simply set the edge selection and set Mix to Use. This will then use the settings from the post effect and the selections from the tag.

Now suppose you have Contour enabled in the post effect. You set up how the contour looks, but then you want to change which material is used on one object. You add a Sketch Style tag, set it to Use, then enable the Contour line type in the Sketch Style tag. This will then tell Sketch and Toon to use the material set in the Sketch Style tag (if it has one) — no settings for the line types in the Sketch Style tag will be shown when in Use (because they are not used!).

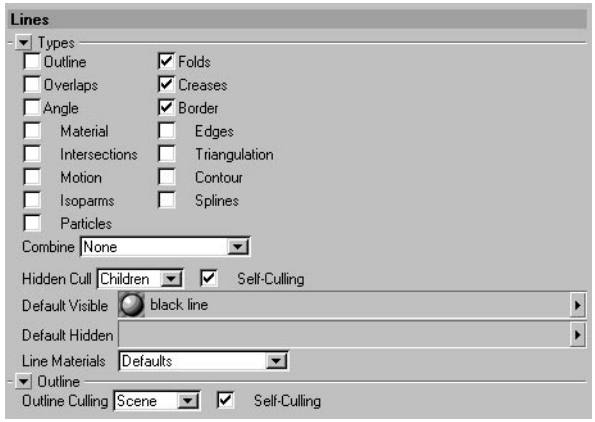
Use will take the material from the tag (if the line type is enabled and the material is set), either the material for the type or the default. Use will then also take any maps/selections from the tag.

Load Style, Save Style

➔ *You'll find various presets in the Sketch folder within CINEMA 4D's Library folder.*

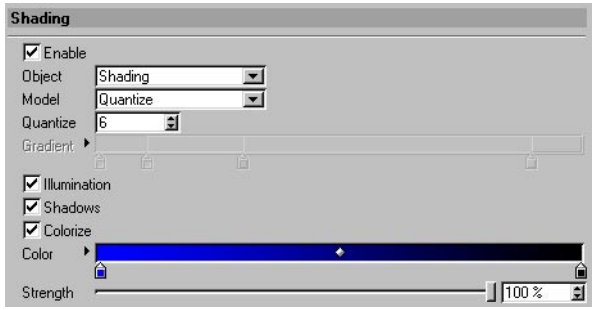
These commands enable you to load and save styles. A style is a drawing or painting style, such as thick chalky lines or leaky pen lines, as defined by the Sketch and Toon post effect and the Sketch materials it uses.

Lines



These settings control which line types and Sketch materials are used by the tag. They work in the same way as the settings of the same name in the Sketch and Toon post effect (see Chapter 3, “Sketch and Toon Post Effect”).

Shading



This tab defines the post effect shading for the object.

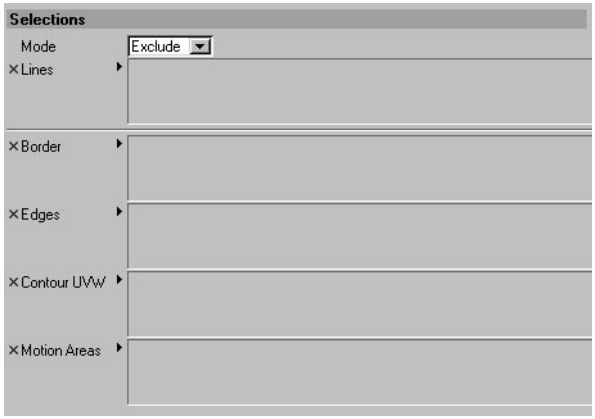
Enable

Switches on the tag’s post effect shading.

Other settings

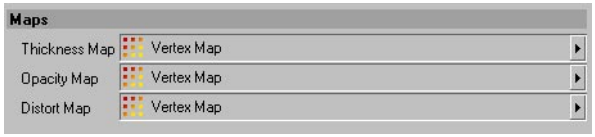
The other settings define the shading for the object and work in the same way as the object shading settings in the post effect (see Chapter 3, “Sketch and Toon Post Effect”).

Selections



The Selections tab is where you specify any selections used by the tag or post effect. For example, here you can specify which UVW tags should be used for UVW lines. You'll find more details on how to use the various selections in Chapter 3, "Sketch and Toon Post Effect."

Maps



Sketch and Toon enables you to modify the thickness, opacity and distortion of lines based on vertex maps. Drag and drop the desired vertex maps into the appropriate boxes. For details on how to use these maps, see Chapter 3, "Sketch and Toon Post Effect."

7 Sketch Render Tag

7 Sketch Render Tag

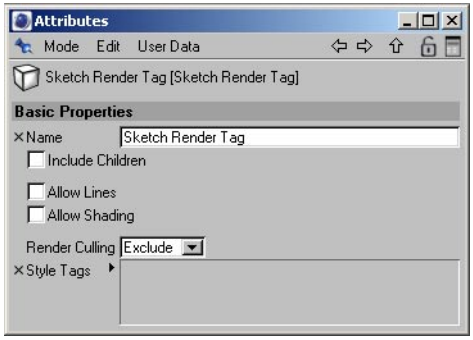
The Sketch Render tag has two main uses. First, you can use it to switch off post effect lines or post effect shading or both for the object. This is useful for mixing CINEMA 4D rendered objects with "sketched" objects. Second, the tag has optional extra controls for culling.

Use the Sketch Render tag to mix sketched and non-sketched objects. Image © 2003 by Toshio Fuji.

To assign a Sketch Render tag to the selected object:

In the Object manager, choose File > Sketch Tags > Sketch Render.

Attribute manager settings



Name

Here you can change the tag's name.

Include Children

Enable the Include Children option if you want the tag to affect child objects also.

Allow Lines, Allow Shading

Disable these options to switch off post effect lines and post effect shading for the object.

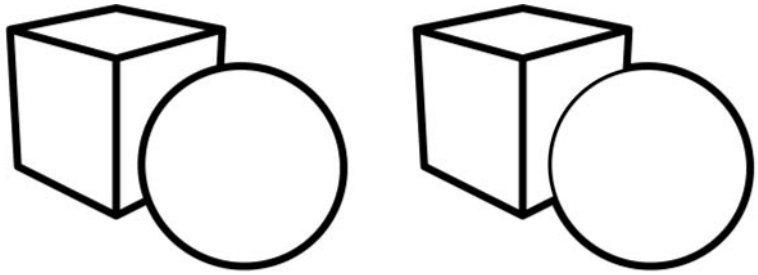
Render Culling, Style Tags

➔ *For details on how Sketch and Toon decides which lines are hidden and which are visible, look up "culling, hidden lines" in the index.*

Generally you won't need to use this mode. It is designed for exceptional culling cases, such as when you need to see lines through an alpha map. It is much like the culling options in the Sketch material on the Render tab, except the tag gives you an easy way to set the culling for a single object and then per Sketch Style tag (good for not culling facial lines against, say, hair).

For the object that has the Sketch Render tag:

- Exclude mode excludes ALL lines from the Sketch Style tags in the Style Tags box from being culled by this object.
- Forced mode forces the Sketch Style tags in the box to be culled by the object that has the tag, even if this object is behind the tags' lines.



Normal culling (left) and forced culling for the cube. Note how the sphere's outline is culled where it overlaps the cube, but remains where it overlaps the sphere.

8 Illustrator Export

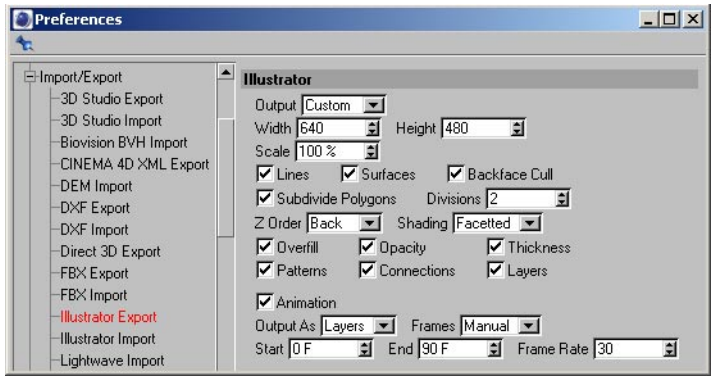
8 Illustrator Export

Sketch and Toon includes a vector exporter to the Adobe Illustrator format (version 3). Please keep in mind this is designed only for exporting the basic lines and strokes and simple texturing.

To export the scene to Adobe Illustrator:

- Set the Illustrator Export options as desired (see “Illustrator Export preferences”).
- Choose File > Export > Illustrator.

Illustrator Export Preferences



You’ll find these settings in CINEMA 4D’s preferences dialog (Edit > Preferences), on the Illustrator Export tab. Note that the Illustrator Import tab is not part of Sketch and Toon!

Output

This is the output resolution. You can choose the editor resolution, renderer resolution or a custom resolution (enter the custom resolution into the Width and Height boxes).

Scale

This scales the line thickness for the vector export.

Lines, Surfaces

Enable these option to export lines and surfaces.

Backface Cull

Enable this option to prevent backfaces from being exported. Otherwise backfaces will be included in the export.

Subdivide Polygons, Divisions

This option is useful for improving the "textured" look of the surfaces. It works by subdividing the polygons on export. The Divisions value defines the number of subdivisions.

Z Order

The ordering for the polygons/objects for export.

Shading

Defines how the polygons are exported. Facetted mode will sample the center texture color for each polygon. Object mode uses the object's display color as defined on the object's Basic Properties tab in the Attribute manager. Uniform mode uses the color of the object's first material.

Overfill

Enable the Overfill option to reduce gaps in the vector export between polygons.

Opacity, Thickness, Patterns

Enable these options to export the line opacity, thickness and patterns.

Connections

Enable this option to allow export of strokes (i.e. connected line segments). If the option is disabled, the strokes will be exported as individual line segments.

Layers

➔ *This option flattens the polygons/lines so that if you then export an animation to layers it can easily be exported to SWF with each layer as a frame.*

Disable the Layers option to flatten the export (the animation will then only have frames as layers).

Animation, Output As, Frames, Start, End, Frame Rate

Enable the Animation option to export animation. The Output As setting controls whether the animation is saved as multiple files or as multiple layers. Set Frames to All to export all frames in the animation, to Render to export the frames specified on the Render Settings > Output tab, or to Manual and enter a custom start frame, end frame and frame rate into the Start, End and Frame Rate boxes.

9 Sketch and Toon Preferences

9 Sketch and Toon Preferences

For details on the Illustrator Export preferences, see Chapter 8, "Illustrator Export."

The preferences enable you to streamline your workflow in Sketch and Toon. For example, if you tend to switch on Strokes each time you create a Sketch material, save time by enabling Strokes in the preferences. Stokes will then be enabled by default.

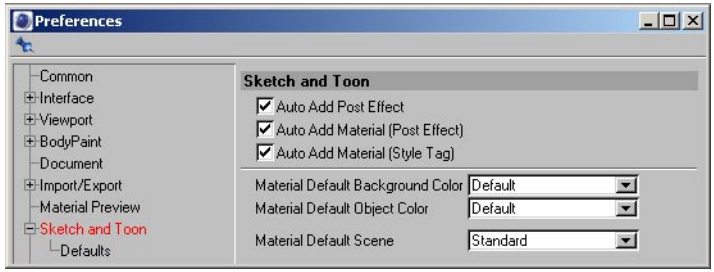
In the preferences you'll also find the default settings for the Sketch material's preview. If you want the preview to display, say, a torus by default instead of a sphere, simply select the new shape. Last but no least, the preferences dialog is also home to some auto options. For example, there's an option to automatically add a new Sketch material each time you add a Sketch Style tag. These auto options usually help, but depending on how you like to work, they may become annoying at times. Disable them if that's the case.

To access the Sketch and Toon preferences:

Choose Edit > Preferences and in the preferences dialog that appears, click on Sketch and Toon or Defaults just below it.

Preferences settings

Sketch and Toon



Auto Add Post Effect

Adds the Sketch and Toon post effect automatically when you add a Sketch material, and assigns the material to the post effect as the default visible material.

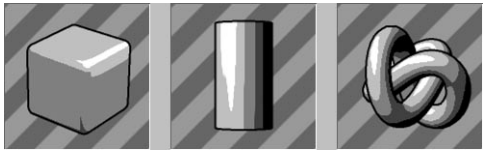
Auto Add Material (Post Effect), Auto Add Material (Style Tag)

These options add a Sketch material automatically when you add the Sketch and Toon post effect or a Sketch Style tag. The material will be assigned to the post effect or tag as its default visible material.

Material Default Background Color, Material Default Object Color

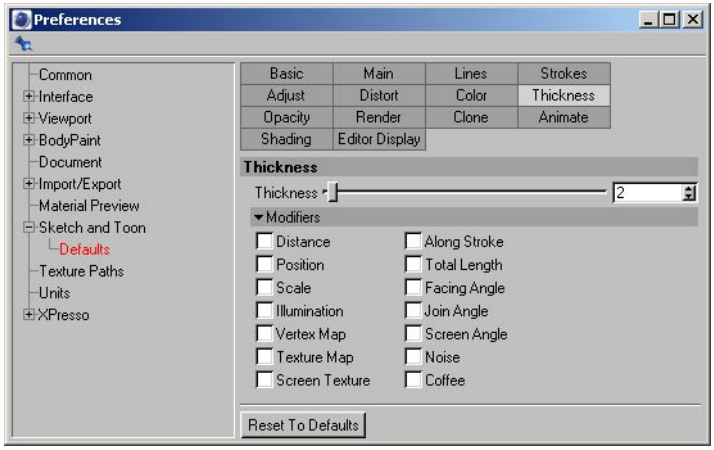
These settings control the default background and object color of the Sketch material's preview. Set them to Default to use CINEMA 4D's standard settings for material previews. (Note that the object color will be quantized, i.e. you'll see bands of color appear for the object's shading instead of a smooth transition).

Material Default Scene

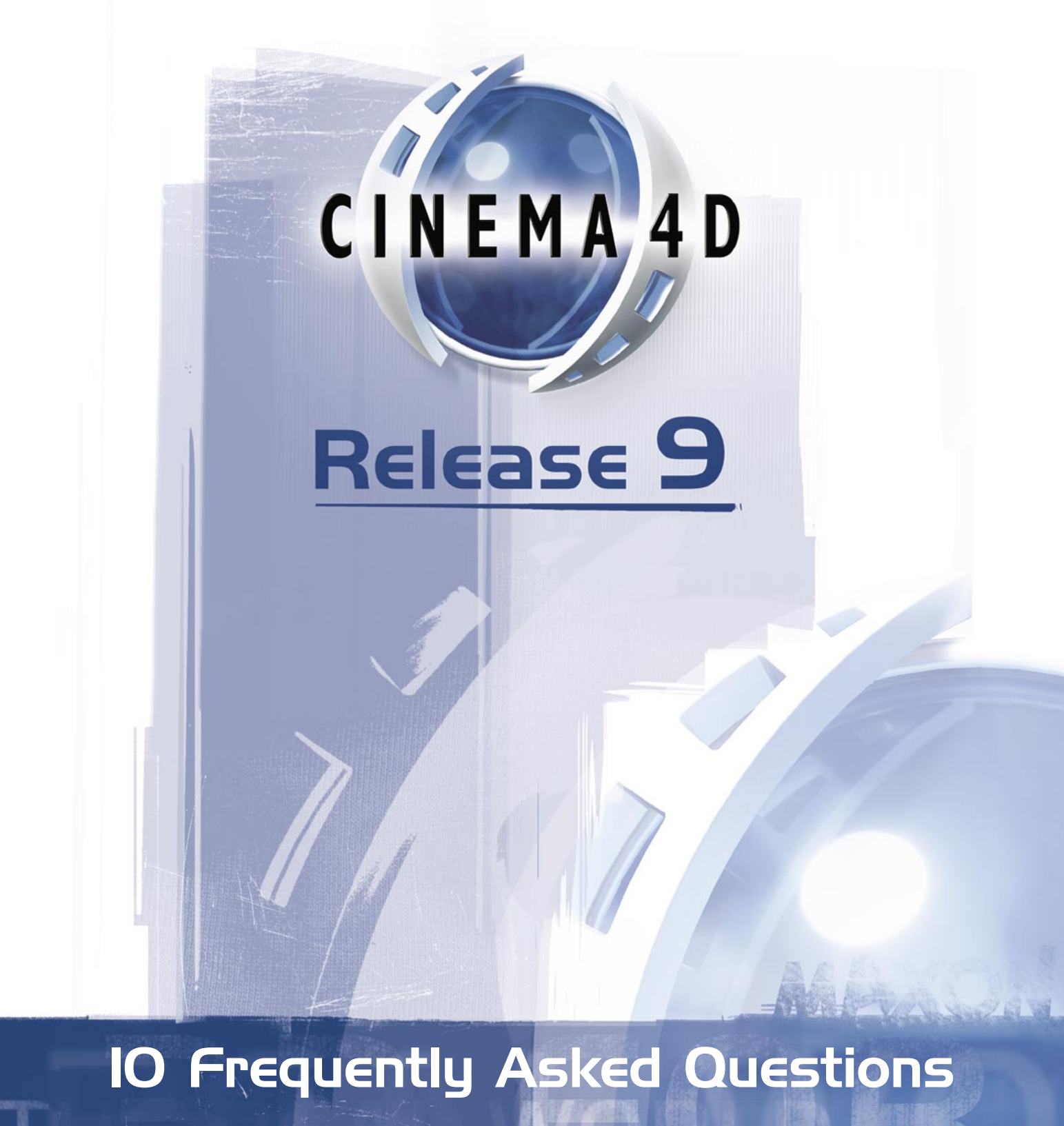


Here you can choose which scene is used to generate the preview, such as a scene containing a rounded cube, cylinder or knot. Choose Standard to use the default scene defined on CINEMA 4D's Preferences > Material Preview tab.

Defaults



This tab defines the default values for the Sketch and Toon post effect, Sketch material and Sketch Style tag. For example, if you set the Sketch material's Thickness to 5, new Sketch materials will use a Thickness value of 5 by default.



10 Frequently Asked Questions

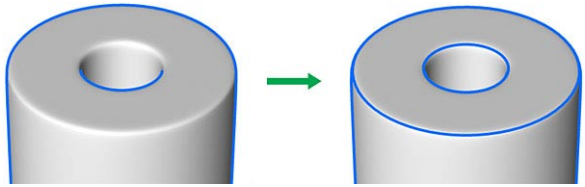
10 Frequently Asked Questions

In these pages, you'll find answers to commonly asked questions about Sketch and Toon.

- **Which viewport projection modes are supported by Sketch and Toon?**

  Not all projections are supported. The following are rejected by Sketch and Toon: Military, Frog, Bird, Gentleman.

- **How can I add lines to rounded edges on a HyperNURBS object?**

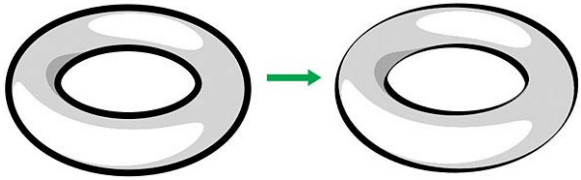


  Select the edges on the low-res mesh where you want lines to be added. Create a Selection tag to store the selection (Selection > Set Selection). Assign a Sketch Style tag to the object if it doesn't have one already, and on its Lines tag, enable Edges. On the Selections tab, drag and drop the Selection tag into the Edges box.

- **I'm having problems with isoparms for a HyperNURBS object.**

  Isoparms come with a number of limitations. For example, culling may not be accurate. With HyperNURBS, the best solution is *not* to use the Isoparm line type. Instead use Edge lines and create a selection for ALL the edges on the low-res mesh, then follow the same producure as for the HyperNURBs rounded edges tip above.

- **What can I do to spruce up outlines?**



  Use the Screen Angle modifier on the Thickness tab.

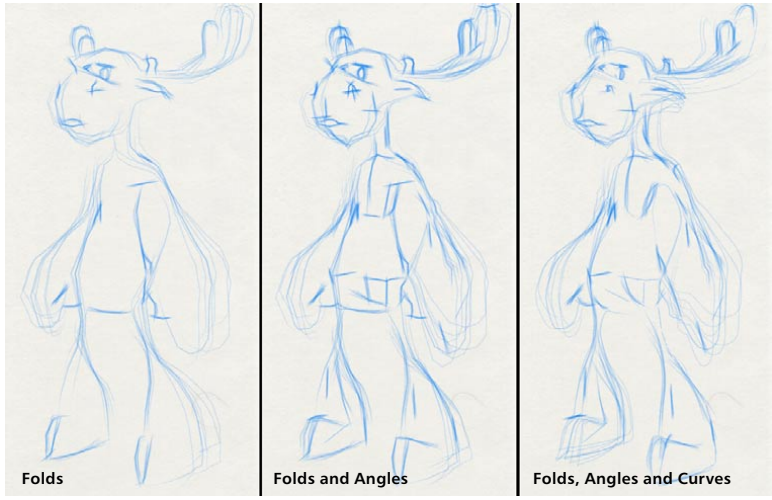
- **I want to create some marker pen lines, which line type should I use?**

  Contour lines are useful for blocking in marker pen lines. Look up "contour" in the index.

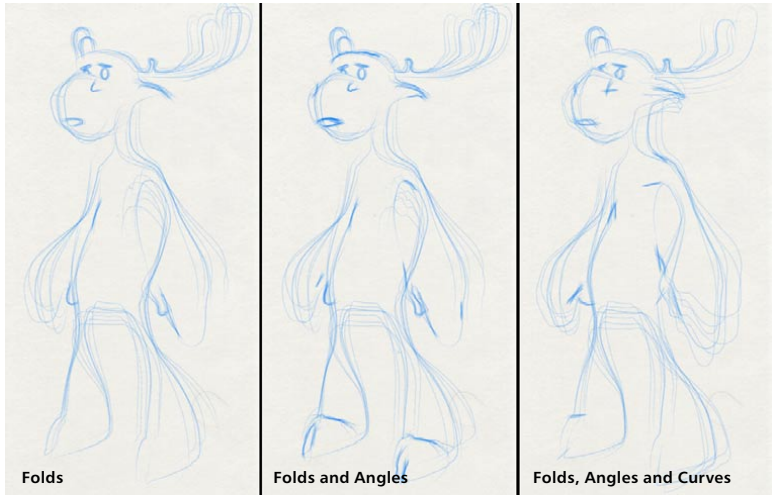
- **I need help with my cartoon characters and have two questions for you: One, how can I smooth out lines? Two, which line types should I be using?**

  Here's a tip for getting some extra lines in your sketch effects using the Angle modifier, and smoothing out the strokes to prevent that STRAIGHT sketch line style, especially on low poly objects. Check out these comparison images with and without HyperNURBS.

Without HyperNURBS



With HyperNURBS



The left moose in both figures was created with Fold lines only. This is the most commonly used line type for a hard-drawn style. It produces an okay effect, but for a rough sketch the lines are a little too accurate in their placement; an artist may have some other quick strokes to represent volume and structure for instance.

This is where the Angle line type comes in handy. To create the extra lines for the center moose, Angle lines were switched on with Min and Max set to 31° and 50° respectively (note that the model has a Phong angle of 60°). For the center moose without HyperNURBS, you can clearly see the effect in the extra detail for the mouth and hooves, and the volume or structure of the moose being represented in the chest and stomach areas. The effect is more subtle for the HyperNURBS moose because the model has been subdivided so the angles in many areas that were detected in the low-res may no longer fit in the specified range.

Last but not least is the addition of curves, which are to be found on the Sketch material's Distort tab. For the right moose in both figures, the Curve Stroke option was enabled and Type was set to B-Spline (this type allows for extremely smooth flowing lines rather then straight angular lines). You can clearly see how the strokes for his stomach, armpit and muzzle are curved and smooth rather than straight and angular. In the case of the right moose with HyperNURBS, you can see that because of the smooth, simpler curves, settings such as overshoot used in this line's material may shoot out in different directions as with the armpit and nostril.

Using curved strokes, especially on a low-res mesh, can help eliminate that low-res feel but allow for sketchier lines then would be found on a smooth high-res mesh. This combination of a low-res mesh, angles, and curved strokes set to B-spline can help to produce a more natural — yet at the same time rougher — sketch effect!

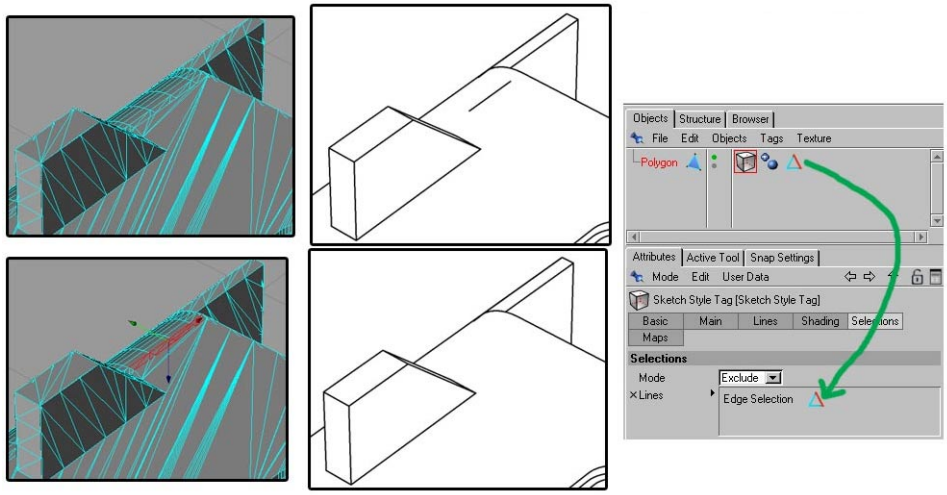
- **Some controls are missing!**

  Sketch and Toon has a Control Level system which hides away the advanced controls. This is useful for while you are learning the simpler controls or for when all you need is a basic effect. To see the missing controls, you need to switch the Control Level to Intermediate or Advanced. You'll find the Control Level setting on the Main tab of the Sketch and Toon post effect, Sketch material and Sketch and Toon Style tag. Setting the Control Level in one place changes the level for them all.

- **How can I speed up the antialiasing?**

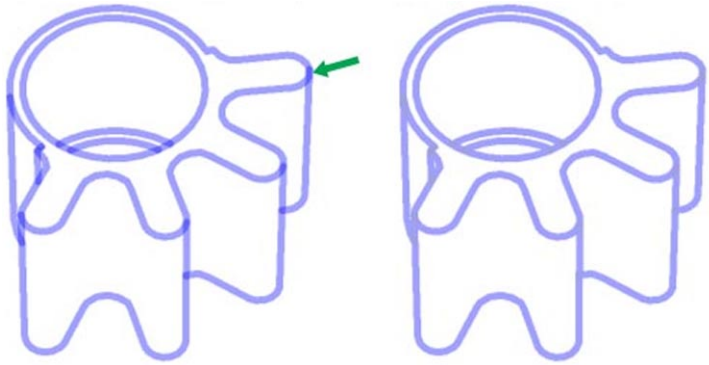
  If you are using the Hatch shader or Spots shader with CINEMA 4D's Best Antialiasing (to ensure the texture is antialiased...), switch the Antialiasing mode to Geometry and blur the hatch or spots texture using Blur Scale and Blur Offset.

- **How can I get rid of unwanted lines?**



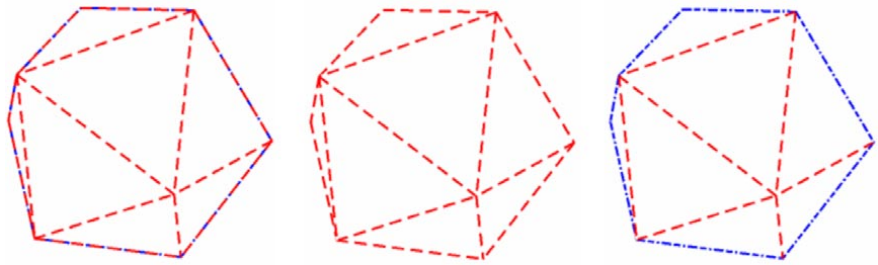
Select the edges or polygons for the problem area and exclude them from line generation using the Sketch Style tag's Lines box (Maps tab) and Exclude mode.

- **How can I get rid of opacity overlaps?**



On the Sketch material's Render tab, set Self-Blend to Average. Try the Overwrite mode also. (Which mode is best usually depends on the texturing of the line).

- **I have two patterns which overlap in places, how do I get rid of the overlaps?**



On the Sketch material's Render tab, set Self-Blend to Overwrite. If one of the patterns disappears completely (center object), it has been overwritten by Sketch and Toon's drawing order — to resolve, set the "missing" material's Priority value (Sketch material, Main tab) higher.

- **I'm having problems with a perfect sphere.**

Convert the sphere to polygons. There are many limitations with perfect spheres!

- **I don't like the random look Sketch and Toon has picked.**

If the variations (such as clone, adjustment...) are not as you would like, adjust the Variations Seed on the Sketch material's Render tab. Disable the Static option if you wish these to change per frame.

- **Gaps are appearing in the lines. Why?**

Check the polygons in the gap area. Although Sketch and Toon does its best to work with non-planar polygons, it is sometimes better to split them into triangles that give the correct surface you intend.

- **I'm getting "thin" lines in the rendered image.**

Use the Hidden Culling by setting it to either Scene or Children and so on. The fewer objects it has to cull against the better (e.g. Scene is slowest).

Another cause of thin lines can be objects too close together; try moving them apart slightly. An example might be a belt around a waist, or ring on a finger. If the objects are very close, then the lines may cull.

- **Where are the presets for shaders, styles and so on?**

You'll find various presets in the Sketch folder within CINEMA 4D's Library folder.

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