



# Making Reflective Materials

## 1 What Up

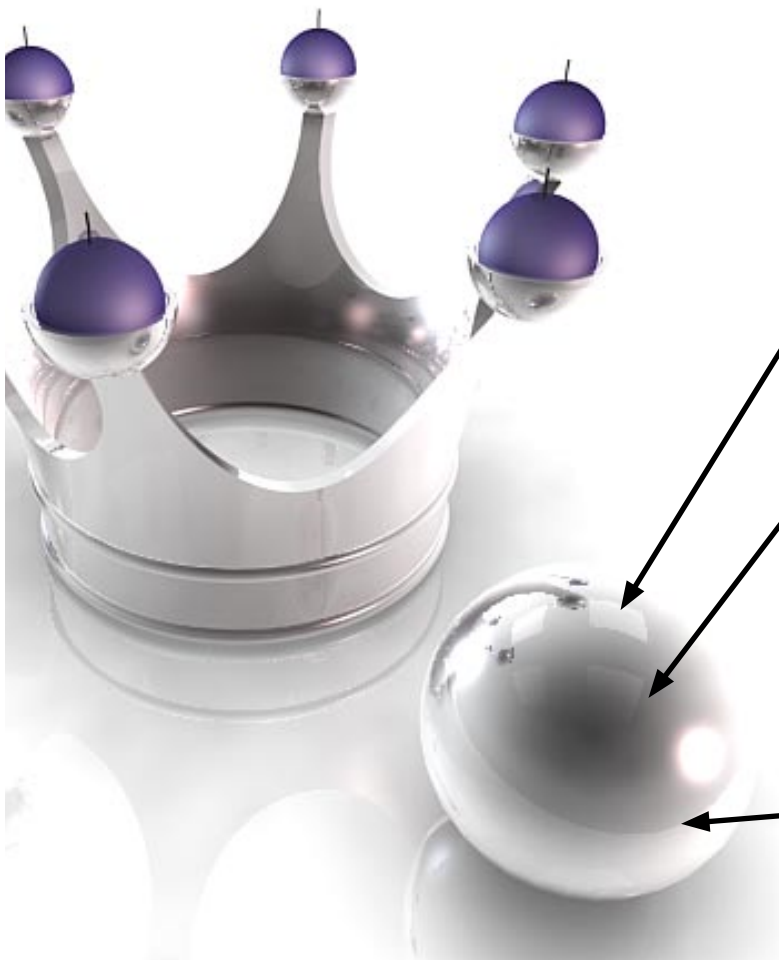
Reflectivity in the real world can be a subtle combination of the material properties -- and the environment. Always remember: a 100% reflective material is only as realistic as its environment!

This handout can be used for either more realistic chrome, or with modified settings, any other fully- or partially- reflective material. If you can make chrome look good, then everything else is easy!

## 2 Super Tip

Designing reflective materials can take a lot of trial and error. Use a couple of mirrored spheres in the scene as "helpers."

They will provide fast feedback as you adjust the lights and materials in your test renders. Also, being 100% reflective, you can see the entire scene around it and trouble-shoot easier.



In this example scene of a tabletop candleholder, please note the following:

Reflected "light sources," simulating a photo studio. These are actually boxes that only appear in reflections and do not cast shadows or block any light.

Darker environment with a black dome. Since the matte-shadow for the tabletop is set to white, the environment would also be white, which will provide no contrast at all! We need contrast to define the model's form.

The solution is to place a black dome over the entire scene. Have all the light ignore & exclude it -- so it stays black!

Edge of the table - use a cylinder to avoid edge reflections. Also used matte-shadow material so that it "disappears" unless casting a shadow (which is why the table reflections are visible.)



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app: Studio MAX 6.0  
date: February 2005  
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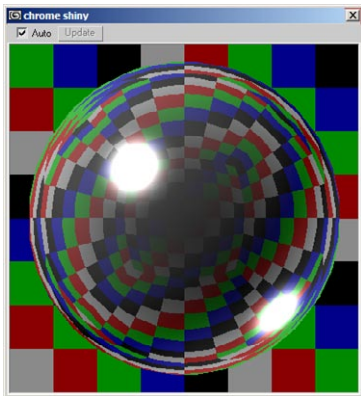
## 3 Chrome shader

The built-in metal shader doesn't work quite as well as designing your own.

- a** Set your shader basic parameters to **Blinn**.
- b** Your **Ambient** (background) should be 100% black
- c** Chrome has no color, so keep the **Diffuse** at pure black or VERY dark grey. Otherwise, the material will appear dull and boring.
- d** The **Specular** is the intense highlight color. This should be pure white. If you want tinting, use a colored light in the scene.

Is the material sample too small too see?  
Try the following:

- e** Click on the checkerboard icon to get a "reflect-able" background.



Then double-click on the material slot and a bigger sample will pop-up, like the one above. Drag any window edge to expand.

- f** Now we get to the part where it starts to actually look like metal. Input **Specular Level** at 300 +/- and the **Glossiness** at 50 +/-.

Note that the 'curve' tops out just like a metal shader highlight. Adjust as needed after test renders.

- g** The reflectivity is never equal in all directions, so we will assign a **Falloff** map type. Click on the map button for **Reflection** and go to the the next page.

The screenshot shows the Material Editor window for a material named 'chrome shiny'. The interface is divided into several sections:

- Shader Basic Parameters:** The 'Blinn' shader is selected. The '2-Sided' checkbox is checked.
- Blinn Basic Parameters:**
  - Ambient:** Set to black (100% black).
  - Diffuse:** Set to a very dark grey.
  - Specular:** Set to pure white.
  - Self-Illumination:** Color is 0, Opacity is 100.
- Specular Highlights:**
  - Specular Level:** Set to 290.
  - Glossiness:** Set to 48.
  - Soften:** Set to 0.1.
- Extended Parameters:** Includes sections for SuperSampling and Maps.
- Maps:** A list of maps with columns for Amount and Map. The 'Reflection' map is checked and set to 'Map #33 (Falloff)'.

Annotations 'a' through 'g' point to specific elements in the interface:

- a:** Points to the 'Blinn' dropdown menu.
- b:** Points to the 'Ambient' color swatch.
- c:** Points to the 'Diffuse' color swatch.
- d:** Points to the 'Specular' color swatch.
- e:** Points to the checkerboard icon in the top right toolbar.
- f:** Points to the 'Specular Level' and 'Glossiness' input fields.
- g:** Points to the 'Reflection' map entry in the Maps list.



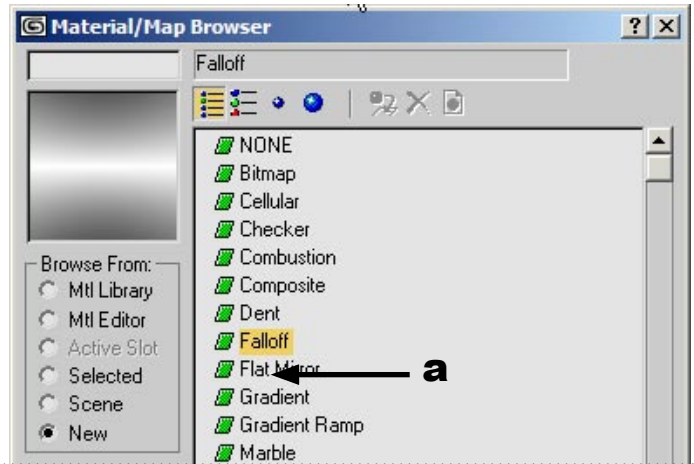
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## 4 Assigning Falloff

When you click on the map button next to **Reflection** you get the following options in the **Material Map Browser**.

- a** Select **Falloff** by double-clicking and close.



## 5 Designing Falloff

The **Falloff** map type is to keep the chrome material from looking 100% reflective in all directions, which would look weird and artificial.

The **Falloff** lets us blend between 100% reflectivity in some directions (perpendicular to the camera) and less reflectivity in the other directions (straight at the camera.)

- a** In the bottom slot, click the button and select **Raytrace** from the Material Map Browser.

The chrome material is now complete, except for all the usual testing and tweaking of cameras and lighting.

You can further tweak the falloff curve and overall reflectivity amount in the following two ways:

- b** In the curve section, edit the curve via its bezier handles to adjust the blending amounts. Be sure to watch your large material sample to see what is going on.
- c** Go back up to the top level of the material and simply change the amount of reflectivity. The smaller the percentage, the more dull it will appear and the more of its original diffuse color will show through.

