# Customizing the mantra surface shader

In Houdini 11 or 12, you can customize the mantra surface shader. This write up is designed as an aid for beginning Houdini user's to become familiar with the vop network.

The mantra surface shader is considered an "uber" shader and for beginning users often satisfies all shading requirements, however it is accessible for customization. This example is inspired by Adrian Lazar's blueberry shader.

In the Material Palette, drag a Mantra Surface Node over and then dive into the shop network. Quickly set up an object such as a sphere, with the shader assigned and a mantra render node for testing.

1. In the **shop** network, dive into the node (double click or hit i). You are now in a vop builder context with vop nodes. You will see a fairly complex vop network, however it is carefully labeled and should be readily navigatable.
2. Find the "diffuse" network box. Instead of using a single color, we are going to use a mix of two colors and make these variable accessible as the top level of the shader.
   (For ease of navigating you can collapse network boxes not currently in use by hitting the t-shaped symbol on the left. [symbol] To expand them, simply left click on them.)
   Tab to bring up the "tab menu" and type in mix to bring in a mix node.
   Middle click on the node and select *promote parameter*. This will create a lollipop sticking out the side. If you **right click on the lollipop and select *expose inputs*** you will get a parameter node. These can be modified here or in the parameter interface later.
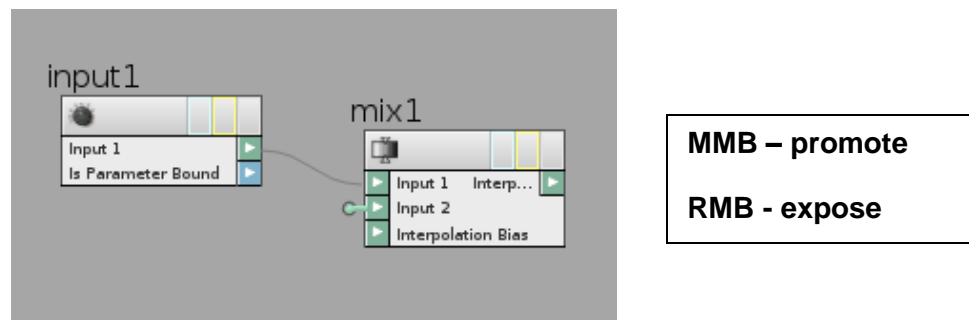
In the figure above Input1 has been promoted and exposed, input 2 has been promoted. We will be using two input colors, choose a meaningful variable name such as colorA. You will want to change the Name and Label fields and change the Type to Color in the pull down menu. Note that in Houdini, if you **rename the node** you can also **use $OS.**
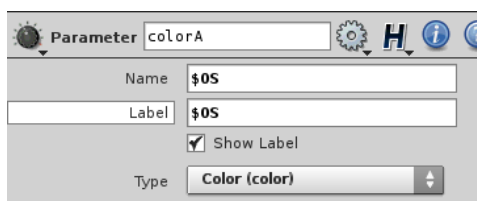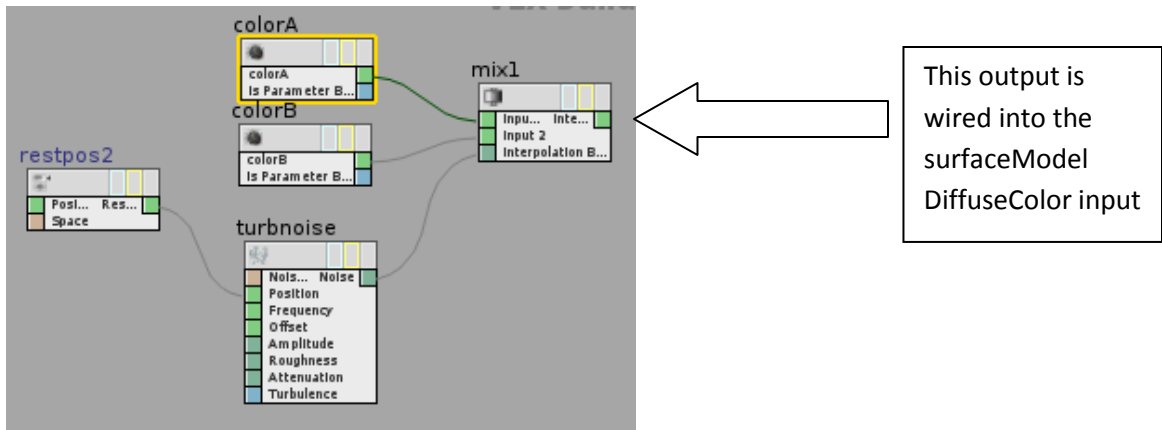

In the vop network   In the parameter interface
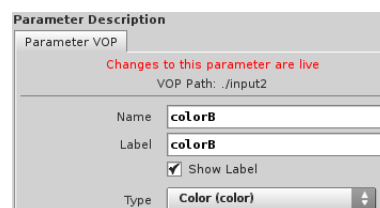
3. Do the same thing for the second input. Now we need input for the Interpolation Bias. We will use turbulent noise. Wire the output into the mix and create a rest node and wire that into the Position input on the turbnoise node.

> This output is wired into the surfaceModel DiffuseColor input

Now wire the output to the **Diffuse Color** on the surfaceModel node (the long skinny node). Now the diffuse color will be using colorA and colorB mixed according to the noise parameters. You may want to promote these parameters as well to allow the user easy access at the top level rather than diving into the vop network. You can also add a switch node to toggle on or off the mixing feature.
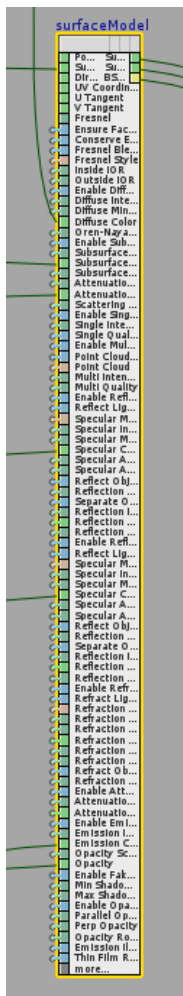

The surfaceModel node appears to the left here. Note that the vop network's input and output are color coded by type. If you see a dotted line, it indicates a type incompatibility and usually means you have missed a step or have not converted to the proper type.

As an exercise, follow the same steps to manipulate the specular part as well as the reflections. Use the same noise input and have it effect the specular color and reflection color.

In class (428) we will be exploring vex, which is the coding version of what the visual vop nodes represent. Both are very powerful tools to make Houdini customized to your needs.

Here is an image result of the shader with red and white with the following settings:
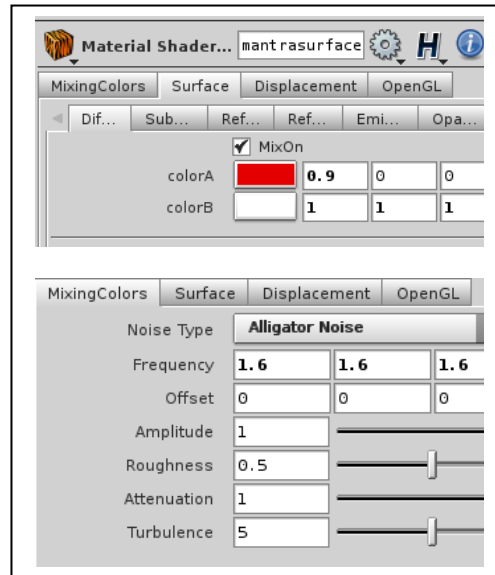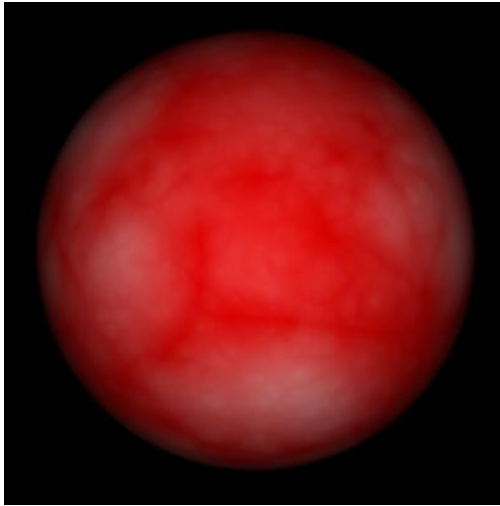
Sample sphere – note settings and H11.
This will look different in H12.

Note that the Noise Type has a large effect on the mix of colors. Below is the vops network:
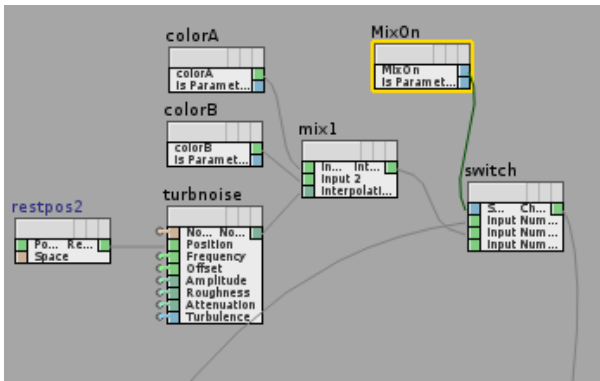
TIPS: You can use the network overview interface button to find your way around a large vop network.

Random Tip: If Houdini is hung and you want to try to kill it and save your hip file:
In Windows from a cmd window (ms-dos) type taskkill –IM hmaster.exe
In Linux type kill –segv ProcessID (to get the process idea use the ps command).