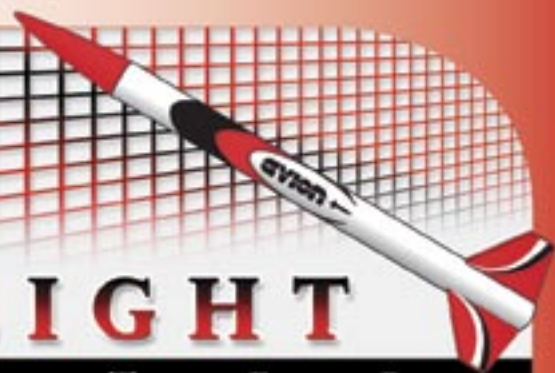




# PEAK OF FLIGHT

N E W S L E T T E R



## How to Add Decal Graphics to RockSim Design Files

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## Adding Decals to the RockSim 3D Image

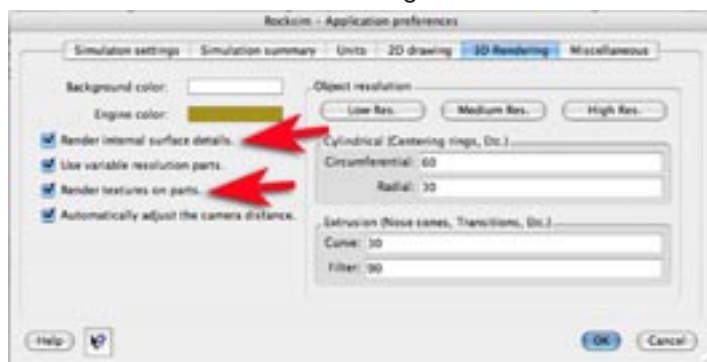
By Tim Van Milligan

In this article, I'll show you the easiest way to apply decals to a RockSim v8 design, so that your creations are really awesome looking. I know a lot of people share RockSim design files with their friends, and this will make them envious of your artistic talents.

### **Preliminaries: Setting Up RockSim**

By default, the decal feature in RockSim is not turned on. It takes a little more graphics horsepower to render the artwork on your rocket, which could slow down the 3D image, especially when you're trying to rotate it in different directions. If you have a fast computer, you probably won't even notice the slowdown.

To turn it on, go to the "Preferences" menu and then to the "3D Rendering" tab and select the checkbox: "Render Textures on Parts" as shown in Figure 1.



**Figure 1: Start by setting up RockSim's preferences to allow textures.**

There is another checkbox that says "Render internal surface details" that can also affect decal placement. We'll talk about this later in the article when we get to decal placement on the nose cone, but you'll find out that it is possible to place decals on internal parts too. You might have a tube inside a payload bay, and you can wrap it with an image of your electronics package, to make it look like a real gizmo!

### **Mistakes to Avoid that Will Save You Time**

The most common mistake people make when trying to decorate their rocket in RockSim is to try to apply a small

individual decal to the rocket in one location. The proper technique is to create a full wrap around the entire rocket from the top of the part to the base. Applying paint patterns in RockSim 8 is not hard if you think of it as applying a wrap to the rocket.

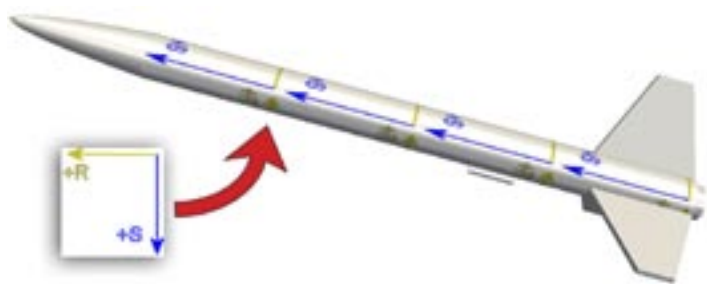
Technically, putting a pattern on the rocket image is called placing a "texture wrap." You're wrapping a "texture" image around the part. In RockSim, you can wrap a texture around any part, from the nose cone, fins, tubes, and those internal parts.

The technical aspects of wrapping textures are described in the RockSim help manual (./RockSim 8/docs/RockSim.pdf). For this article, I'm taking a lot of the information from the manual.

The first step in applying a decal is to make the artwork itself. For this, you'll need a computer drawing or painting program. Examples are MS Paint, Corel Draw, Adobe Illustrator, and Adobe Photoshop. You just want to find software that will help you create the artwork for the wrap, and save it to your computer. Find free graphic programs at: <http://www.freebyte.com/graphicprograms/>.

To make things easier, I recommend creating a new folder on your computer to store the RockSim design and the decal files. By having everything in one spot, it will be easier to share your rocket designs and the decal wraps with other folks. You can just grab and send your friends the entire folder. That way they'll have all the files they need to view your great design.

When it comes to saving the artwork you've made, you



**Figure 2: The "S" axis runs along the length of the body tube of the rocket.**

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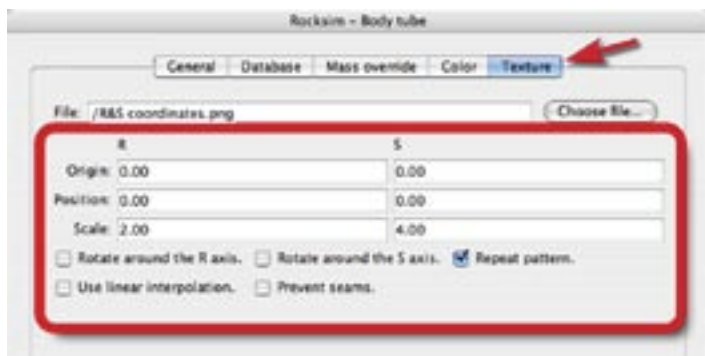
can use a number of different image formats, including .jpg, .gif, and .png. The .jpg is the most common, but .gif and .png allow for transparent parts. This is useful if you wanted to put a decal on a clear payload tube.

Before you start creating your artwork, I'd like you to try to understand the coordinate system that is used when the artwork is applied to the rocket.

The "S" axis is the long axis of the rocket, and the "R" axis is perpendicular to the long axis of the rocket. The "R" portion of the decal will wrap around the perimeter of the body tube. Figure 2 shows what a rocket coordinate system looks like.

Now here's the mentally tricky part. Your natural instinct is that the top of the rocket is going to be at the top of the paper as you're creating the artwork. But actually, the top of the artwork will be at the bottom of the computer screen. Look again at the decal shown in Figure 2. Notice that the +S direction is oriented down. When it is applied to the rocket, it points forward. Once you get your mind around this quirk, the rest is easy.

There are a number of options you have as far as positioning the wrap on the rocket as shown in Figure 3.



**Figure 3: RockSim gives you many ways to orient the texture to the part. We'll simplify for this article.**

I find it easiest to just make one wrap that will completely cover the surface of the part. For example, when making a decal to cover the body tube, I'd size it so that it covers the entire surface area of the body tube. That way you don't have to worry about adjusting some of the positioning parameters. I'll show you how this is done in this article.

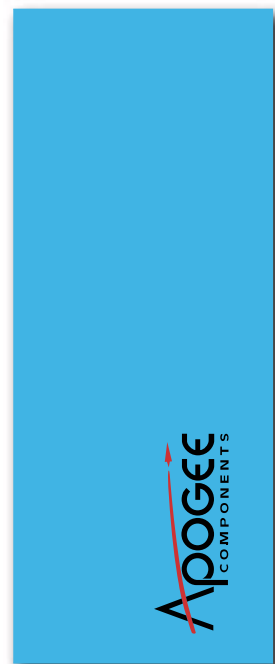
Figure 4 shows the full-wrap artwork that will be applied to the rocket. First, we have to get the size of the rectangle to the correct proportions.

For example, if you wanted to put a decal on the Apo-

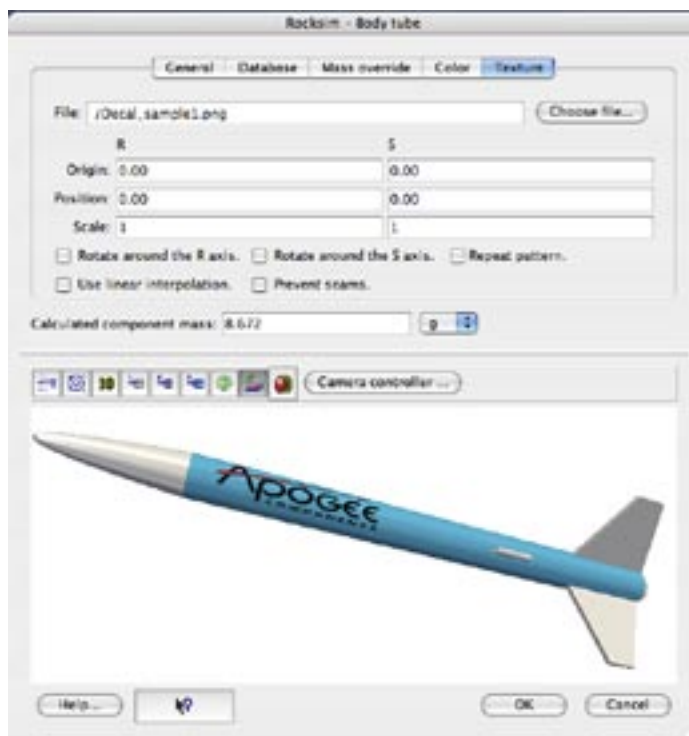
gee Avion (<http://www.ApogeeRockets.com/avion.asp>) rocket (BT-50 tube that is 11 inches long), I'd start by making a rectangle in the drawing program that is 11 inches long, and 3.066 inches wide. The width is found by multiplying the diameter times pi (3.14). Since it has a diameter of .976 inches, the circumference of the tube is 3.066 inches.

Orient the rectangle so that the long axis goes up and down on the computer. Color the rectangle the color you are going to paint the rocket. Then place your decal on the rectangle. In Figure 4, I just used the Apogee logo. In Figure 5, you'll see how it looks when applied to the rocket tube.

For the positioning on the rocket, I set the R and S origin and position to 0.00, and the scale factor to 1 for both. All the check-boxes are un-



**Figure 4: A simple decal wrap for the tube of the rocket.**



**Figure 5: The texture wrap applied to the rocket. Note the values of the origin and position are all zero.**

Continued on page 4



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## Adding Decals to the RockSim 3D Image

checked. When you do this, it should wrap the artwork completely around the rocket.

If your rocket is really big, then making a 1-to-1 scale version of the decal may not be practical. In that case, make a scale version of the decal. If everything is exactly proportional, then RockSim will automatically scale it to fit the tube. The only difference is that the decal will be more pixilated looking because RockSim had to enlarge it up a bit to fit the rocket tube.

See how simple it was to wrap artwork around the tube?

One issue that you may come across is mixing colors as the wrap is applied over the top of a colored tube. Everything I've applied to the rocket up to this point has been put onto a white tube. If you have a colored part, RockSim will mix the colors. For example, the decal in Figures 4 and 5 has a blue background. If it is applied to a yellow colored tube, the final image will be green, as shown in Figure 6.



**Figure 6: The blue wrap applied to a yellow tube will make a green rocket. Always set your parts to white.**

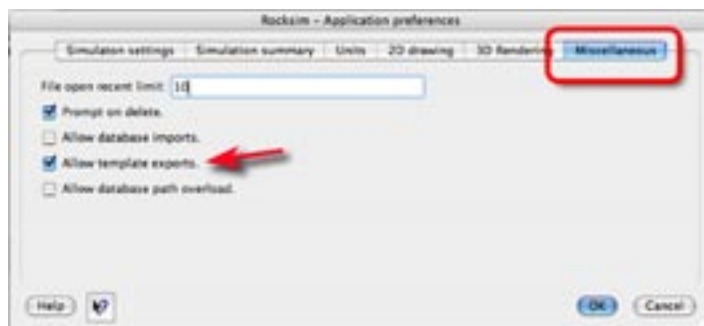
I suggest that you make your parts white, and color the background of the artwork to the color you plan on painting the rocket. That way you won't have to worry about the colors being mixed.

## Applying Decals to Fins

You can apply a texture image to any part on the rocket. The fins are probably the hardest, and I'll tell you up front that it will take a little bit more work. But I'll try to show you the simplest way.

Like the body tube, the key to getting a good looking decal placement on the fin is to create a wrap that covers the surface of the fin.

For starters, you'll need an exact fin shape pattern onto which you'll create your artwork. Getting this pattern is easy using RockSim. You simply export out the fin template. To do this, you must turn on the "Allow template exports" from the "Miscellaneous" tab in the preferences menu, as shown in Figure 7.



**Figure 7: To export fin templates, you have to turn on the feature first in RockSim's preferences.**

Once you do that, you can go to the fin editor screen, and you'll find a button on the bottom of the screen that says "Export Template" as shown in Figure 8.

When you click this button and export the template, you'll have two format choices: CSV and SVG. I choose SVG, which stands for "Scalable Vector Graphics." This file format can be opened up in a drawing program like Adobe Illustrator. That's good for me, since that is what I use to create decals for rockets.

If the program that you use to make your own decals

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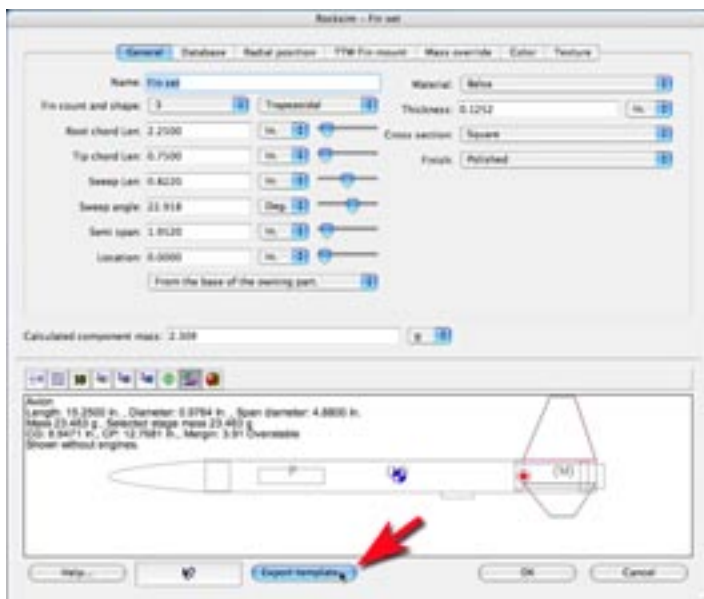
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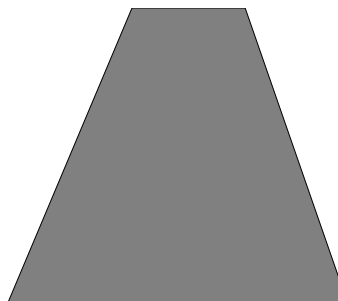
## Adding Decals to the RockSim 3D Image



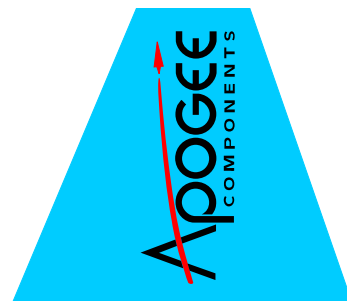
**Figure 8: The export template button is on the bottom of the part screen.**

doesn't open this format, then you'll have to draw a 1-to-1 scale drawing of your fin first.

Once you have your outline of the fin (See Figure 9),



RockSim Export



Final Artwork

**Figure 9: The exported fin planform, and the final artwork that we want to apply the fin's surface.**

you can create the artwork that will go on the fin. As before, color the background of the fin with the choice of color that you'll be painting the rocket.

As done previously, set the R and S origin and position to 0.00 and the scale factor to 1 for both. Again, all the check-boxes are unchecked. We want to keep the values simple so that it is easy to apply the decal to the right location on the rocket, as shown in Figure 10.

There are two things you'll notice in Figure 10. First, is that on one side of each fin the artwork is flipped. It will read backwards. Second, you'll notice that the edges look translucent. It is almost as if the fins were made from plexi-

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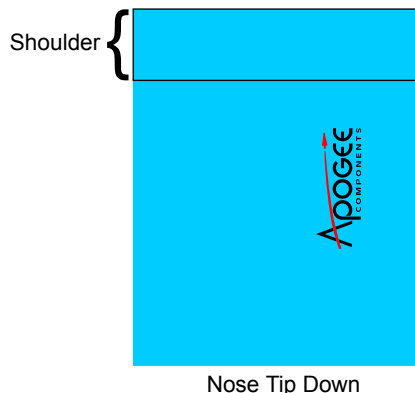


**Figure 10: The fin decal wrap applied. Note that one fin is reversed, and the edges look translucent.**

glass and then the artwork was applied to the flat surfaces. Unfortunately, there is nothing we can do about either. That's just the way RockSim's graphics placement works.

## Applying Textures to Nose Cones

Finally, applying a decal wrap to a nose cone is a lot like making the wrap for a tube. First of all, the orientation is



**Figure 11: The nose cone pattern wrap looks a lot like the body tube wrap.**

going to be "nose-tip-down" as shown in Figure 11.

The width of the decal will again be equal to the circumference of the tube. The proper length gets a little bit tricky. It depends on whether or not you have the checkbox that reads "Render internal surface details" checked. See the very beginning of this article when we turned on the prefer-

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ences for RockSim for a reminder about this..

If you have "Render Internal surface details" turned on, then the length of the wrap must include the length of the shoulder on the nose cone. So the overall length of the wrap is the nose cone length plus the shoulder length.

If you turned off the "Render internal surface details", then RockSim will shrink the wrap to only position it on the exposed portion of the nose cone. You can see the differences in Figure 12.



**Figure 12:** The wrap can span the shoulder of the nose cone if you allow it. The same artwork was applied to both noses. Note the shoulder line on the artwork.

I think you'll be able to figure out the length to make the decal pattern on the nose. Once you're done, you'll should get something that looks like Figure 13.

Because of the diameter of the nose cone varies from the tip to the base, the artwork is distorted to fit the nose. It will be skinnier towards the tip. This might make decals with



**Figure 13:** The Apogee logo decal from Figure 11 applied to the final rocket.

text a little hard to read. But this is usually advantageous. If you have a regular pattern, RockSim will automatically mold it to follow the surface of the nose cone. For example, Figure 14 shows an example of a wrap with parallel lines



**Figure 14:** RockSim will conform the rectangular pattern to the shape of the nose cone.

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that are distorted so they all meet at the point of the nose cone. This could come in really handy if your design has roll patterns on the nose cone, like the DynaStar Sky Torpedo rocket kit.



**Figure 15: Roll pattern decals applied to DynaStar Sky Torpedo nose cone in RockSim.**

## Positioning fields in RockSim

There are a lot of other ways to position the wraps in RockSim. I didn't cover them here, because they are a little harder to work with. If you want to learn about them, see the help documentation that comes with RockSim.

## Conclusion:

Adding graphics to your RockSim files is a lot of fun. Don't be afraid to play around with your artwork, as that can help solve placement issues too. I'm always amazed at how great designs look when they are completed with graphics. Give it a try, and send me some images of your rockets. I'd love to see what you come up with.

## About The Author:

Tim Van Milligan (a.k.a. "Mr. Rocket") is a real rocket scientist who likes helping out other rocketeers. Before he started writing articles and books about rocketry, he worked on the Delta II rocket that launched satellites into orbit. He has a B.S. in Aeronautical Engineering from Embry-Riddle Aeronautical University in Daytona Beach, Florida, and has worked toward a M.S. in Space Technology from the Florida Institute of Technology in Melbourne, Florida. Currently, he is the owner of Apogee Components (<http://www.apogeerockets.com>) and the curator of the rocketry education web site: <http://www.apogeerockets.com/education/>. He is also the author of the books: "Model Rocket Design and Construction," "69 Simple Science Fair Projects with Model Rockets: Aeronautics" and publisher of a FREE e-zine newsletter about model rockets. You can subscribe to the e-zine at the Apogee Components web site or by sending an e-mail to: [ezine@apogeerockets.com](mailto:ezine@apogeerockets.com) with "SUBSCRIBE" as the subject line of the message.



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