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APOGEE

PEAK OF FLIGHT

NEWSLETTER

How to Make a Diagonal Cutting Pattern Sheet



APOGEE
COMPONENTS

1130 Elkton Drive, Suite A
Colorado Springs, CO 80907 USA
www.ApogeeRockets.com
orders@ApogeeRockets.com
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Make A Diagonal Cutting Pattern

By Tim Van Milligan

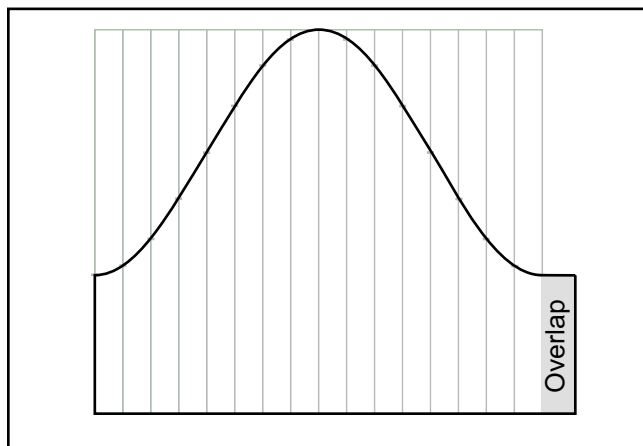
Making odd looking models is a lot of fun. One way to make them unique is to angle the end of the tube, like shown in the photograph below. But how do you go about doing this.

One way to do it is to cut it on a band saw. The only problem is that most modelers don't have a band saw, and the saw blade leaves a jagged edge. Fortunately, it is possible to make a fairly clean edge using a hobby knife.

To create a tube that has an angled end, you'll need to make a marking/cutting pattern sheet. You might have seen these in some old classic kits. They look like the figure to the right. By the way, if you want to practice cutting, you can print out this pattern. If you print out at 100%, it will fit a standard 18mm diameter (BT-20 size) body tube.

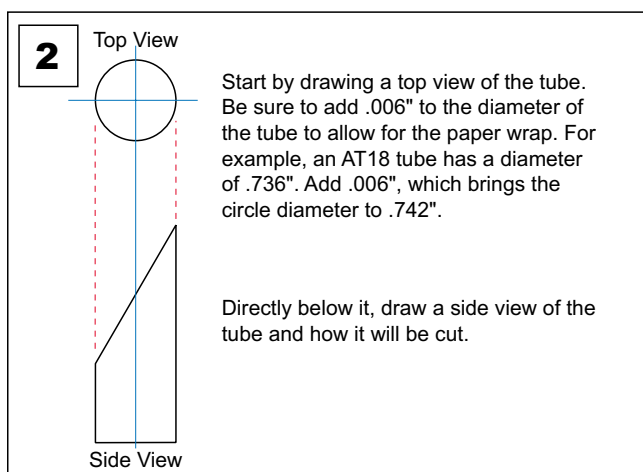
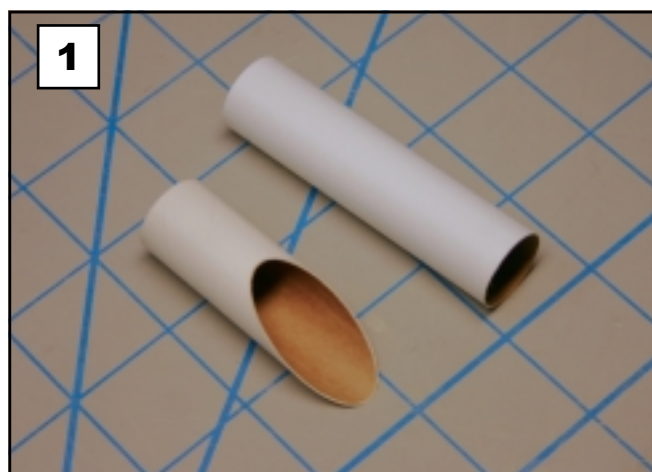
The majority of the illustrations in this article will take you step-by-step through the process of creating your own pattern sheet. Once you know how to do it yourself, you can make one for any size tube, and any cut angle. The one shown here was designed for cutting a 30° bevel on a 18mm diameter tube.

What do you need to get started? It doesn't take much. You use a pencil and some simple drafting instruments like a T-square and right-triangle. I personally use a simple drawing



program on a computer. I've been making these types of patterns for years, and most any drawing program that allows you to draw straight lines and circles will work fine. I'm currently working on a Quicktime video that will show you how I do it on my Mac computer. You'll find this video on the Newsletter Archive CD-ROM if you are interested.

Once you have your pattern sheet made (like the one shown in step 14 on page 4), you will cut it out using a hobby knife. Then wrap it around the tube and tape it into position,



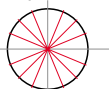
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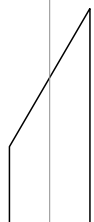
PEAK OF FLIGHT

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Top View



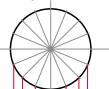
Divide the circle into equal parts. The more segments you have, the more accurate the final wrap will be.



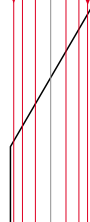
Side View

4

Top View



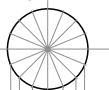
Extend lines down to the side view, starting from: the intersection of the radial lines and the edge of the circle.



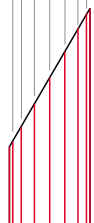
Side View

5

Top View



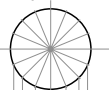
Just a note. The lines on the side view are "true-length" lines. We will use the lengths of these lines later in step 9.



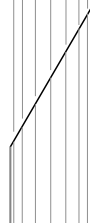
Side View

6

Top View



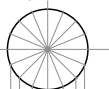
Now draw a rectangle to the right of the side view. The height will be equal to the maximum height of the side view. The width is equal to the circumference of the circle. In this case, our circle has a diameter of .742". The circumference is $.742" \times \pi = 2.331"$.



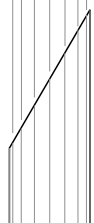
Side View

7

Top View



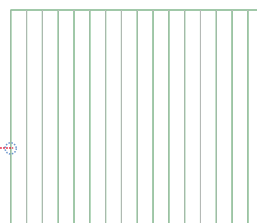
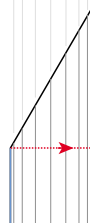
Divide the rectangle up into columns. The width of each column is equal to the circumference divided by the number of sections in the circle. Our circle (left) has 16 sections. The circumference in this example is 2.331". So the width of each column is: $2.331 \div 16 = .146"$.



Side View

8

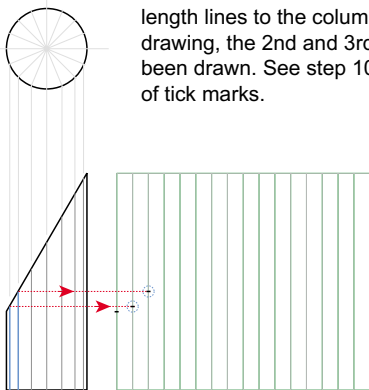
Starting with the left side of the part, extend a line across to the first line in the rectangle. You only have to mark where it crosses the line.



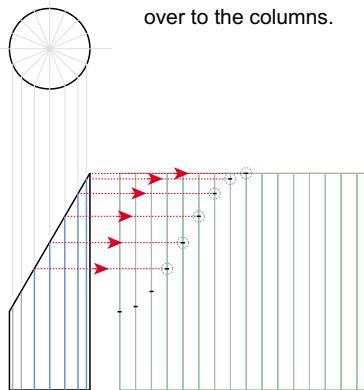
PEAK OF FLIGHT

9

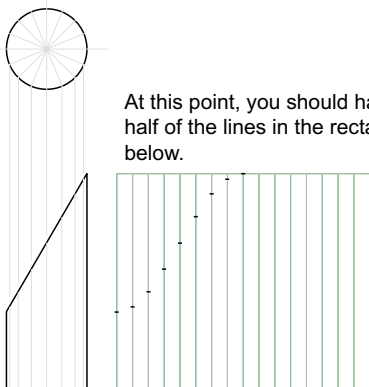
Continue to draw across from the true length lines to the column lines. In this drawing, the 2nd and 3rd tick-marks have been drawn. See step 10 for the next series of tick marks.


10

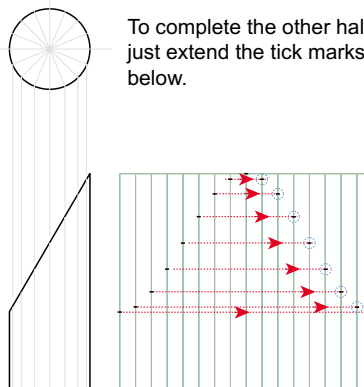
Continue to extend the true-length lines over to the columns.


11

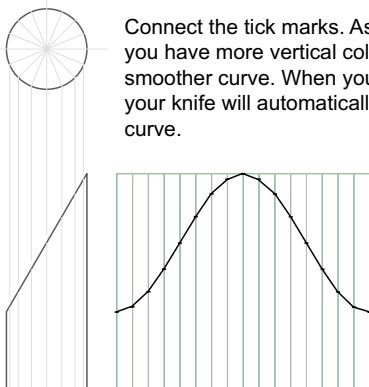
At this point, you should have tick marks on half of the lines in the rectangle as shown below.


12

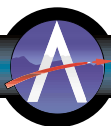
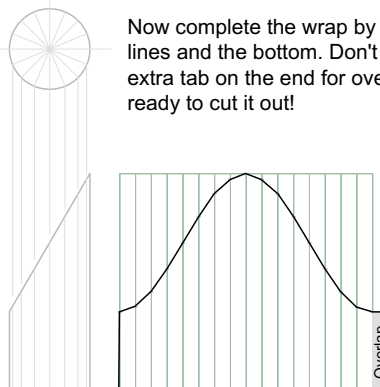
To complete the other half of the rectangle, just extend the tick marks across as shown below.


13

Connect the tick marks. As you can see, if you have more vertical columns, you'll get a smoother curve. When you cut it out later, your knife will automatically smooth out the curve.

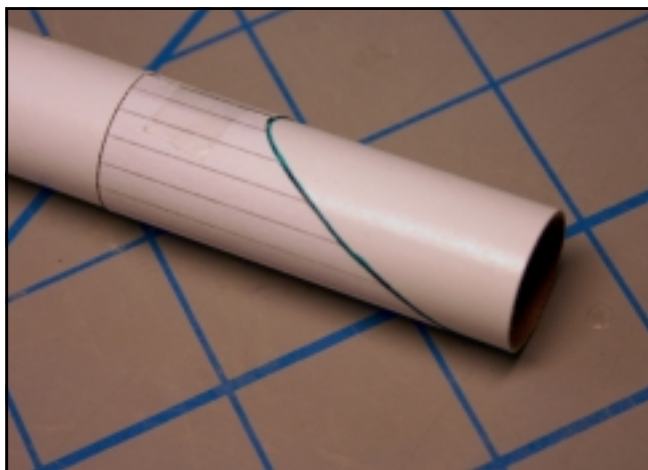

14

Now complete the wrap by drawing the side lines and the bottom. Don't forget to add an extra tab on the end for overlap. You're now ready to cut it out!



Tube Cutting Pattern

Continued from page 2



Position the pattern sheet in the correct location, and mark with a pencil.

as shown in the photograph above. You can then take a pencil, and carefully trace along the edge to mark where you are going to cut with the hobby knife.

Cutting with the knife is a bit tricky. Just work slowly and always use a very very sharp blade. You will need to come back and clean up the edge with sandpaper. Actually sanding it smooth is much easier to do when the tube is beveled than



Carefully cut with a sharp hobby knife.

when the edge is at a 90° angle. Just lay the sandpaper flat on a table, and press the edge against it. You'll see how easy it is to do once you give it a try.

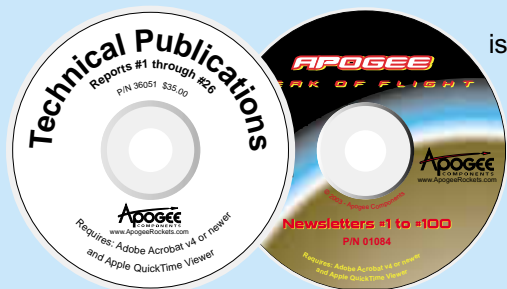
You will probably end up with a paper burr on the inside of the tube after cleaning up the edge with sandpaper. To remove it, wrap some sand paper around a wooden dowel, and just sand it down. Again, this is a simple step to perform.

OK, once you have the tube beveled, what can you do with it? The picture here shows just one use for a beveled tube on a rocket using "tube-fins" for stabilization. You can also

Continued on Page 6.

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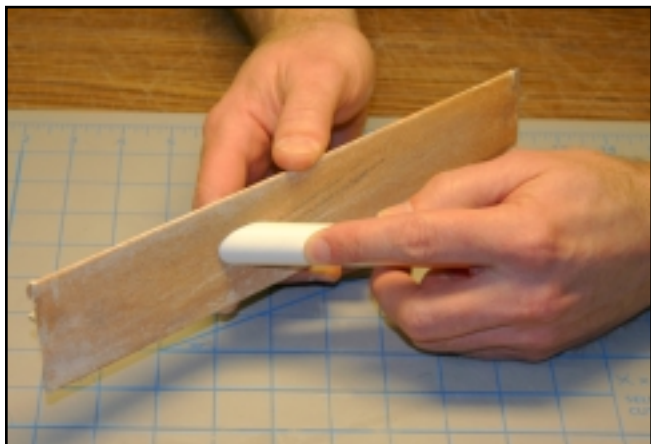
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Tube Cutting Pattern

Continued from page 5



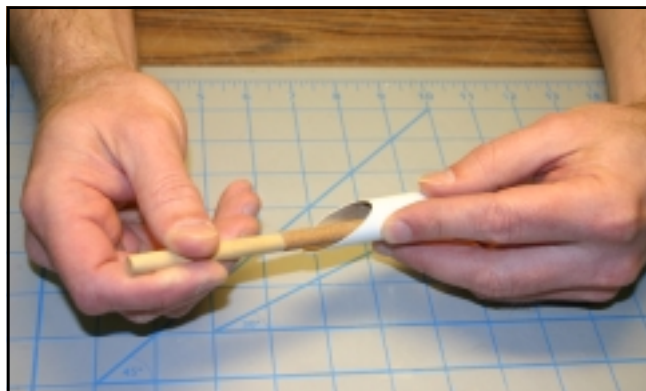
Sanding the tube is done with a sanding Tee, or with sandpaper placed on the table.

use them as simulated air scoops on models that look like jet fighters. Finally, you might try capping off the beveled end, and making a strap-on booster for a rocket. It should look cool!

Finally, I do want to point out one last thing. The technique for making the pattern is exactly the same whether the bevel is flat or curved. So you aren't limited to tubes with straight bevel cuts! In some future articles in this newsletter, I may show you some other simple paper pattern sheets you can use to make great looking rockets.

About the Author:

Tim Van Milligan is the owner of Apogee Components (<http://www.apogeerockets.com>) and the curator of the rocketry education web site: <http://www.apogeerockets.com/edu->



If there is a paper burr on the inside, sand it off with sandpaper wrapped around a dowel.

cation. 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 the FREE e-zine newsletter about model rockets. You can subscribe to the e-zine at the Apogee Components web site, or sending an email to: ezine@apogeerockets.com with "SUBSCRIBE" as the subject line of the message.



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