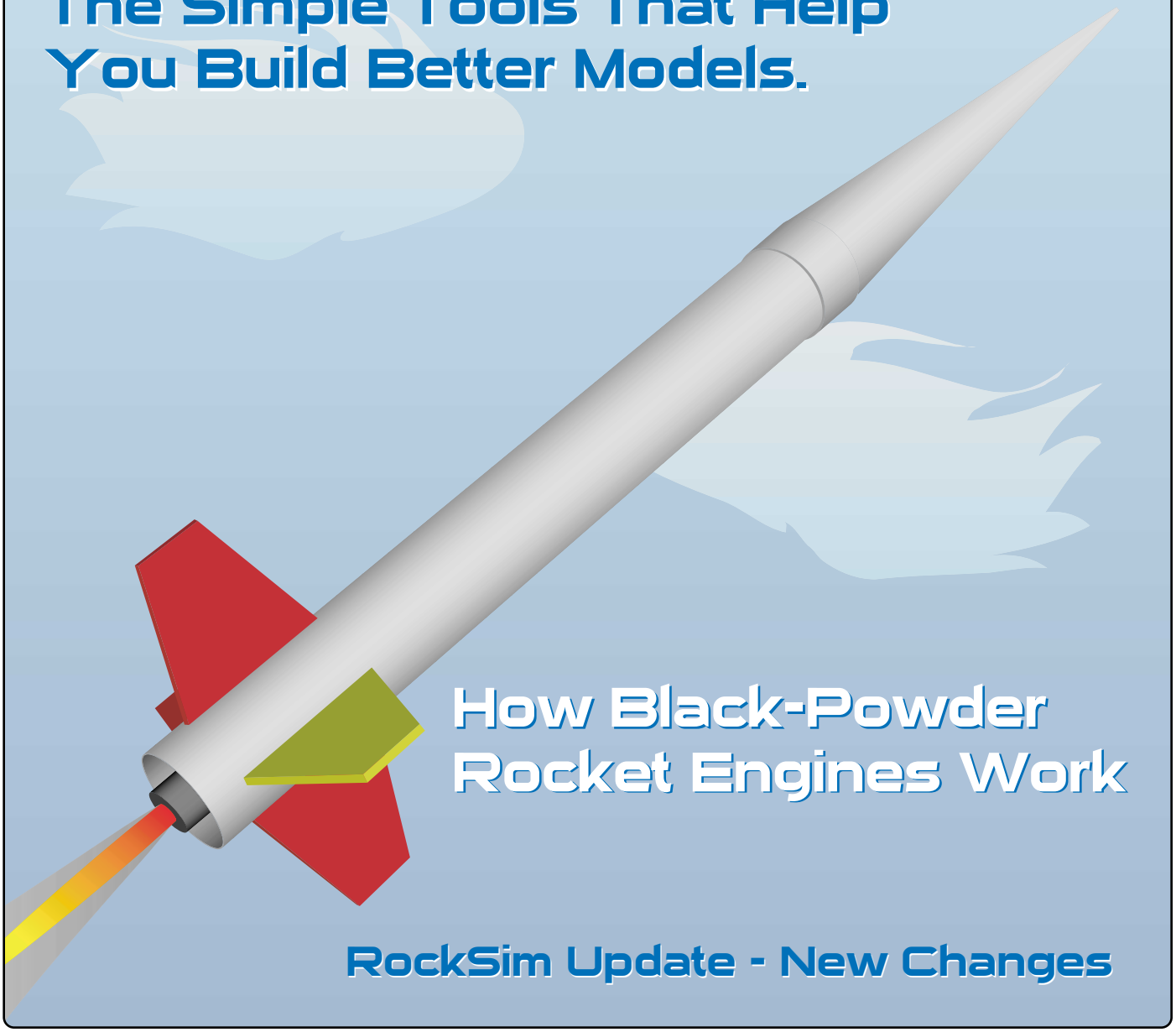
ISSUE 114, NOV. 7, 2003

APOGEE PEAK OF FLIGHT NEWSLETTER

The Simple Tools That Help You Build Better Models.



How Black-Powder Rocket Engines Work

RockSim Update - New Changes

APOGEE COMPONENTS
1130 Elkton Drive, Suite A
Colorado Springs, CO 80907 USA
www.ApogeeRockets.com
orders @ApogeeRockets.com
phone 719-535-9335 fax 719-534-9050

ISSUE 114 - NOVEMBER 7, 2003

APOGEE

PEAK OF FLIGHT

RockSim Update: New v7.03

The leading rocket design and simulation program has a new updated that fixes a few glitches. This new version 7.03 is a free upgrade via download for users of version 7.01. Contact Apogee Components for download instructions.

RockSim allows rocketeers to design their rockets on their computer, and see how how they will fly with any size rocket motor. It is different from all other rocketry computer programs, because it calculates the dynamic stability of the rocket. In other words, it determines how the rocket will react when wind is blowing (which always happens in real life). No other computer program does this! With RockSim you get the most accurate simulations, keeping your flight safe and successful.

What is new in this revised edition? Version 7.02 Changes:

1) Added a patch to the OpenGL offscreen render code. The offscreen renderer was crashing on some older Windows OS versions. In Particular (Windows 98, Windows 2000).

2) Added code to the simulation recovery system deployment system to prevent duplicate entries in the list of recovery devices.

3) Fixed the 3D rendering of Radial Angle for body tubes, launch lugs, Etc. They were off by 90 Degrees relative to the 2D base view.

4) Added code to save the 3D camera state whenever Export to 3D image is selected. This insures that the exported image matches what the user sees on the display.

5) Added code to store the Joystick/Trackball and Wireframe/Solid 3D viewing options with the rocket design. The main view screen and the component edit screen states are both tracked.

6) Fixed a printer bug that was causing clipping, and incorrect aspect ratios on some systems.

Continued on page 3

Are You New To Rocketry? Want To Learn More?

Have You Tried The Apogee Components website?
It is your "How-To" source for rocketry information.

Check Out These FREE "How-To" Articles

How-To Get Started In Rocketry
http://www.ApogeeRockets.com/beginner_rockets.asp

How Do Multi-Stage Rockets Work?
Read Newsletter #98

How-To Start A School Rocketry Program
See Newsletter #112

How-To Track A Rocket's Altitude
Jump to Newsletter #93

About this Newsletter

You can subscribe "FREE" to receive this e-zine at the Apogee Components web site (www.ApogeeRockets.com), or sending an email to: ezine@apogeerockets.com with "SUBSCRIBE" as the subject line of the message.

RockSim v7.03

Continued from page 2

7) Fixed a centering ring mass calculation error. If "Auto calculate known dimensions" was not set, then the mass calculation was not taking the hole in the ring into account. This had a minor effect on CG/Mass, and caused templates to print without the center hole drawn.

8) ENGINE EDITOR: Fixed a bug that was causing unsaved screen data to be lost whenever a graph point was changed.

9) ENGINE EDITOR: Fixed a bug that was causing extra points on the end of the thrust data whenever a point was deleted.

10) Fixed the 2D Zoom In / Zoom Out logic to produce more reasonable zoom steps.

11) Fixed the drift to loss calculation for competition flights.

12) Fixed a bug in the simulation summary grid that could cause rocksim to hang when adding new simulations.

Version 7.03 Changes

1) Moved the Launch guide length setting to the Launch conditions page.

2) Fixed a bug in simulation data export: If you selected a subset of columns to export into the CSV file, then incorrect data was being exported.

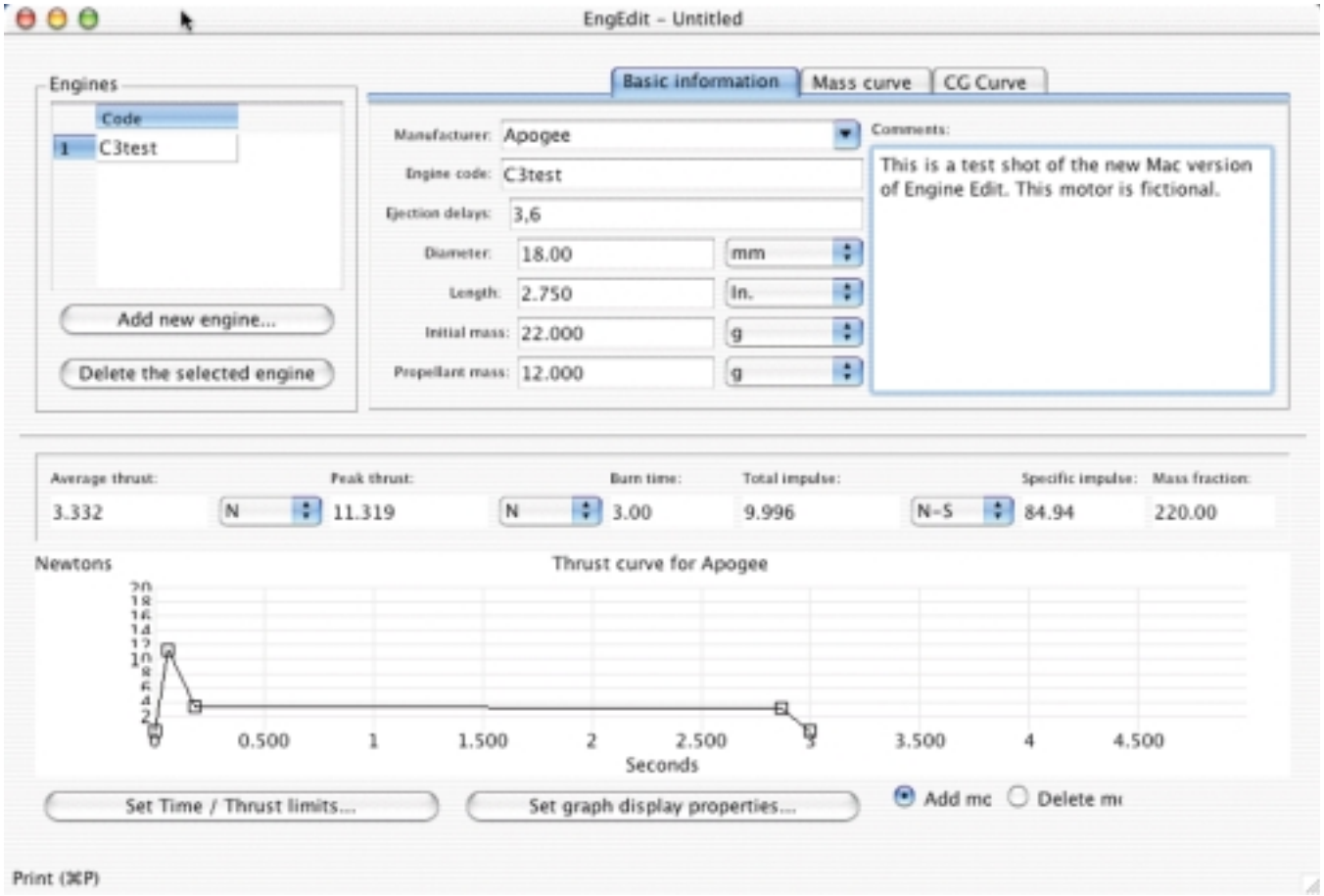
3) Fixed the color selection display in the 2D flight profile preferences screen

4) Moved the wind vector origin down a bit to account for the thermal rise vector display.

5) Fixed the launch guide angle error. This bug only existed in the 7.02 build.

What's Coming In The Future?

A Macintosh version of the program. Right now, Paul (the programmer) is converting RockSim for Mac OS X. The release will be as soon as possible (2004). See the image below as what the Engine Editor will look like.



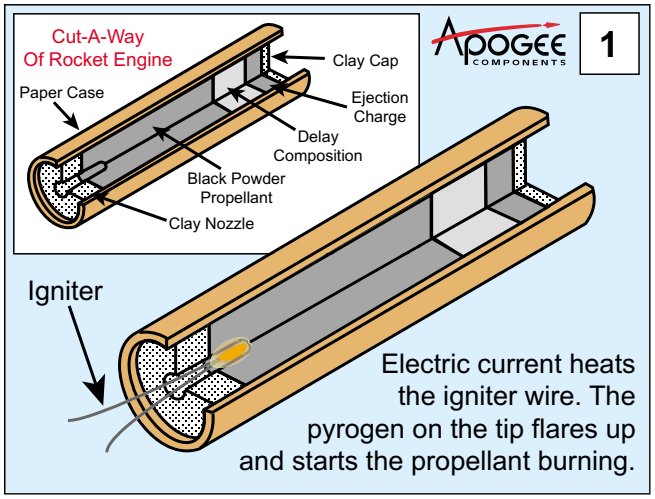
Our current project is to convert RockSim for Macintosh users. Here is the Engine Editor program in OS X format. The EngEdit program will get a major overhaul for both Windows and Mac users.

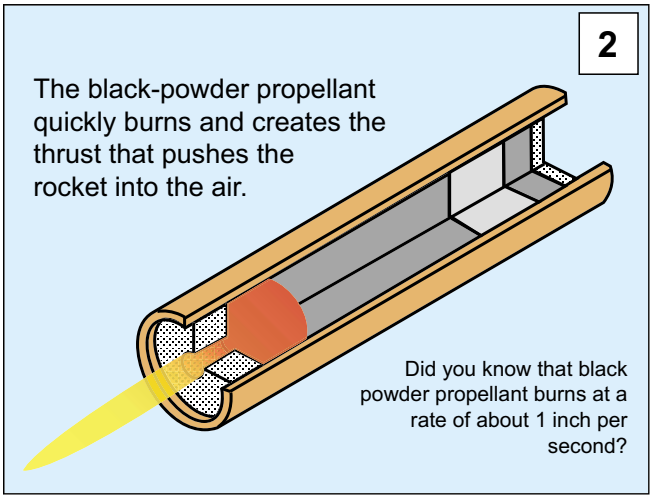
ISSUE 114 - NOVEMBER 7, 2003

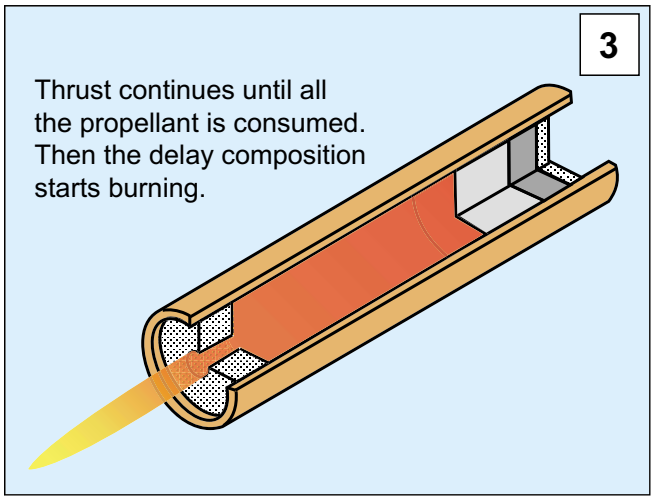
APOGEE

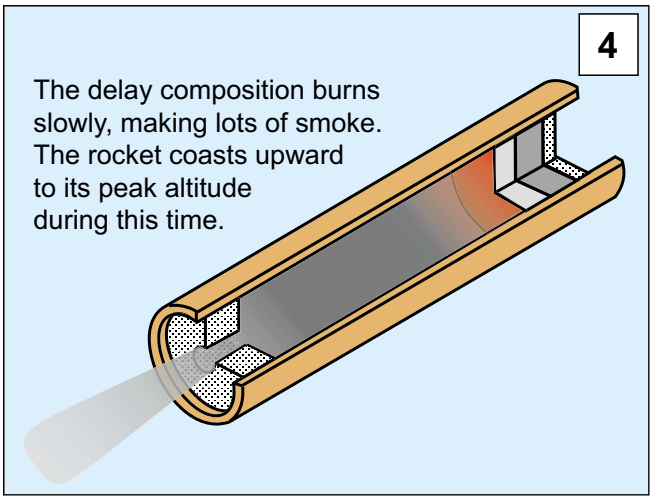
PEAK OF FLIGHT

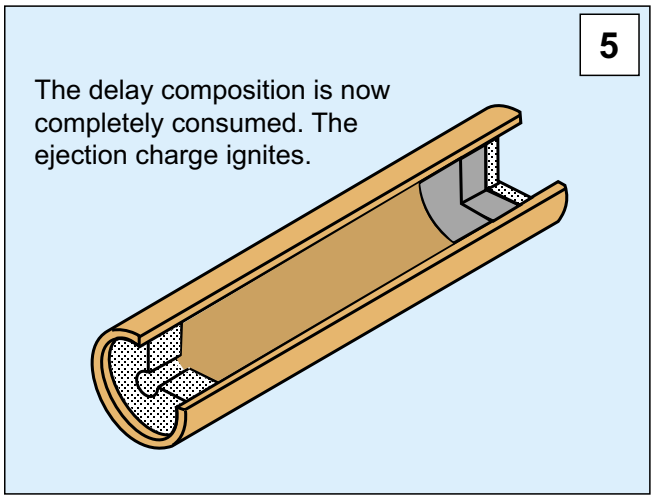
How Black Powder Rocket Motors Work

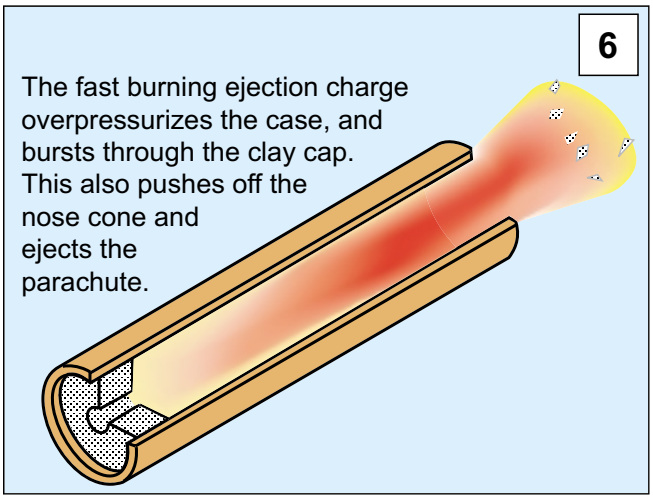












Tools That Will Save You Money!

By John Pursley

Many take for granted the "simple" common tools that we all use or "make do" with but have given little thought to how the quality of those simple tools can really affect the ease with which models can be built and the ultimate quality of the finished product.

In this article, I'll talk about some common tools that every modeler should have, and that will actually save you money!

Special Sanding Materials That Make You Better From The Start

Sandpaper and the trusty sanding block has its place but it really does require constant cleaning and, more importantly, replacement at frequent intervals to give you the results you really need. What if there was something that stayed just as good as a brand new piece of sandpaper that could be cleaned with a brush? Well, there is. Perma-Grit Sanders are something that I think every modeler should have in his toolbox. Moreover, I would especially encourage beginners or even the "occasional" modeler to take the plunge and purchase at least one of the 2" x 5" (give or take) Perma-Grit Sup-R sanders in 150 grit. Okay, so it will set you back twelve to fourteen dollars but it will outlive most any sander, knife, or file you can think of and actually save you money.

The Perma-Grit sanding materials are actually bits of super-hard tungsten carbide that are brazed to a metal base. The Sup-R sanders are great palm-sized blocks that are color coded according to the "grit" of the sanding surface that is a permanently bonded to the block. The block also comes with a little brass brush to clean the face of the sander (which has a built-in compartment for the brush so you don,t misplace it easily). You can use it wet or dry. Check your local hobby shop or online supplier (I can't say enough good about www.micromark.com).

You can also get round Perma-Grit sanding sticks in size from 1/4" to 3/4" which come in handy for sanding the insides of just about anything. For those times when a rigid flat sander isn't quite right but trying to manage a floppy piece of sandpaper is too tedious and imprecise, you can find "Flexi-Pad" sanders which measure about 2"x3" in oval shape with sandpaper bonded to both sides of a simi-rigid 1/8" thick rubber foam.

These things are great for sanding relatively large surfaces, body tubes, and putting airfoils on fins with compound shapes. I've seen them at hobby shops and hardware stores (particularly in furniture refinishing departments).

A similar tool, one that looks like a modified fingernail sanding stick is the "Flexi-File." A number of companies make them and they are half-inch wide by 6-inch long "sticks" of semi-rigid foam with a sanding surface bonded to each face. The nice thing about these sanders is that the quality of the sanding material is excellent and, with a little care, last many times longer than the trusty fingernail sander. Yes, they are a bit expensive at about five-dollars for a set of two but the life and results make them well worth it.

One other sanding tool that is worth investigating, particularly if you regularly sand very large flat surfaces (like the fins of large rockets) or large rounded surfaces (such as large body tubes and nosecones) is the abrasive foam sander. These are simply blocks of foam wherein the foam itself is an abrasive. Bear in mind that they do wear out but they are also relatively inexpensive and available at most hardware stores. They are most commonly used for furniture refinishing.

Though I tend to cringe a bit when someone says they use emery boards or fingernail files, I do so primarily because the reference is almost always to really cheap items. There are some REALLY GOOD files and boards that are great for hobby use but you won't likely find them hanging on the rack at the local drug store. The next time you get your hair cut or trail your sister/girlfriend/wife/female type (it's best to trail someone you know) to the beauty salon, ask the resident manicurist about her/his source of files and boards. Many times they will sell you what they use. Professional manicurists, like professional level modelers, use good tools in their trade.

Conventional Sanding Materials Used Better (or Properly)

It doesn't pay to buy cheap sandpaper. I have discovered over many years of modeling that a name-brand such as 3M is worth the investment. I prefer wet-or-dry types for three reasons. Most obvious is that you can wash them if they get clogged. Secondly, the grit is bonded better to the paper carrier and doesn't wear out as quickly (most sandpapers "wear out" not because the grit gets "dull" but because the grit gets pulled from the paper). Lastly, the paper of wet-or-dry types is simply more durable and less susceptible to tearing during use.

Unless you have a special reason to do so, try to get "open-grit" sandpaper. It clogs fare less frequently and is easier to clean. Keeping your sandpaper clean is important to good cutting, crisp finished results, and longer paper life. We all have toothbrushes that wear out as we use them for their intended

Building Tools

Continued from page 5

purpose. Rather than throw these brushes away, use them to scrub the surface (it doesn't take much) of your sandpaper as you use it. You'd be surprised at how much better an "old" piece of sandpaper will cut after a simple cleaning with a toothbrush.

I constantly have need for "custom" sanding blocks and sticks of various sizes and shapes. The problem almost aways boiled down to how to get the sandpaper to stay on those custom sanders. Well, now I keep a roll of "double-stick" tape (tape with "stick-um" on both sides) hanging right over my work are (comes in handy for all kinds of things). Just completely cover the face of the stick or block to which you want to apply sandpaper stick the paper to it. If you use a good sandpaper as I recommended above, you can easily pull the paper off of the stick or block and apply a new piece two or three times before the tape looses enough tack to require replacement itself.

Many times, simply rolling a strip of sandpaper into a cylinder makes for an ideal "hole" sander. You can make a handy "variable diameter" sander of this type by taking about a two-inch wide strip of paper that is six or more inches long and wrap it tightly about itself. The push out the middle to make a conical sander that will neatly fit in just about any hole. You can do much the same thing by making a more substantial "hole" sander from a wooden dowel. Simply cut a slot across the end of a dowel. Slip one end of the sandpaper strip into the slot and roll the paper around the dowel.

Scissors

We all use scissors in this hobby but they are usually hand-me-downs or we generally find the ones we do have poorly suited for that “gotta do it now” task.

I have quite an assortment of “surgical” scissors in a variety of sizes and shapes. Some have curved cutting blades, some are long and slender, some short and blunt, and some just look like expensive “school” scissors. The one thing they all have in common is that they all cut very well, last a long time, and are cheap. Where do such creatures come from? Well, I discovered that almost every ACE Hardware store that I have walked into has an assortment of precision surgical scissors (and other similar instruments such as forceps, tweezers, and knives) at a cost from about a dollar to five dollars. These really are surgical instruments that have been recycled into the non-surgical market (rules prohibit the re-use of such instruments for surgical purposes) and are perfect for hobby use.

Another kind of hand scissor is the “kitchen” scissor. These are generally heavy-duty types that are made for cutting through bone and other tasks that a hobbyist would never think of using scissors for (they are also generally tough enough to cut thin metal and moderately heavy plastic and G10).

Parts Storage

Ever find yourself eying that “Tupperware” container

Newsletter Archive On CD-ROM - *FREE!*

Get the entire collection of Peak-of-Flight newsletters on CD-ROM in pdf format. It’s absolutely FREE when you buy the Apogee Technical Publications (#1-#35) set.

Not only do you get the great technical reports, you get all of the first 112 issues of the Peak-of-Flight newsletter on a seperate CD-ROM for no extra charge.

The Peak-of-Flight CD-ROM gives you much more than the web-site archives. You also get:

- All issues are in PDF format. This allows you to print them out quickly so you can share them with your friends.
- Images are high-resolution, so they print out great.
- Many of the earlier articles have been re-written and updated with new information and illustrations.
- QuickTime videos have been embedded into many issues to show action sequences (11 movies total).
- Many extra reference articles included - So you don’t have to download them from the internet.
- Shrox plans, decals, and RockSim design files included.
- Plus excel spreadsheets, programs, and much more...

APOGEE PEAK OF FLIGHT

Newsletter #1 to #100

Order Today, and also receive #101-#112

http://www.ApogeeRockets.com/technical_publications.asp

Building Tools

Continued from page 6

thinking that it would be ideal for storing your supply of used-but-good nosecones? Even looked at those multi-compartment storage boxes but decided to pass because it was too expensive and you still couldn't locate parts in the ones you do have?

I have discovered in my local supermarket a treasure trove of inexpensive storage containers in all many shapes and sizes from tiny 4 ounce "custard cups" to multi-pint rectangular "cake storage" containers. There are several brands now on the market but the easiest to find are the "Glad Ware" brand. I picked up a box of eight 4 ounce see-through containers with lids for under two bucks.

While you are browsing the supermarket shelves also look for the "zip-lock" type of "baggies". I'm talking about the ones with an actual zipper-like slider. I have discovered that these types will seal better and faster than the classic style that you have to pinch with your fingers to seal. They come in sizes from sandwich-size up to sizes big enough to store a turkey. I find them ideal for storing parachutes and motors. When storing plastic chutes, toss in an ounce or so of talcum powder and shake.

Check out your local print shop for the cores and boxes that the various films and sheet material that they use which comes on rolls. The tubes also make excellent body tube material for larger rockets and the materials vary from "Estes-like" body tubing to rigid plastic types with end caps. Most shops will give them to you. Ask if they will save them for you and be sure to make occasional trips to pick them up. Sure beats paying hard-earned dollars for pretty much the same things at the "container store."

Craft Sticks

How many times have you looked around for something to mix up a batch of epoxy or a bit of paint and ended up cutting something from a prime piece of building wood when something "cheap" would have done the trick? Have you ever needed just a sliver of hardwood to shim up something but look as you might in your workshop you found none? Have you ever been tempted to pick up a 10-pack of "stir sticks" at the hobby shop but just didn't feel it was worth a buck for what amounted to ten popsicle sticks?

Well, the solution to the problem is to find your local crafts store such as a Hobby Lobby or the like and look for a box of what are called "Craft Sticks." They generally come packaged 1000 to a box and cost between $1.25 and $1.75. They look, smell, and taste like stir sticks and measure the same, too. At between one and two tenths of a penny apiece, you might be tempted to repackage and sell the things for a profit. Plus, they are a good source of hardwood for smaller applications.

File It

Some modelers use files and sandpaper interchangeably. Files are more properly used for precision work where precise amounts of material in well-controlled areas must be removed. Also, there are files and sanding materials that seem to bridge between what we would consider sandpaper and classic files (such as the aforementioned Perma-Grit types).

Many think of files as being for metals or very hard materials. Well, this is true to a degree but if a file works on a hard material it will generally give good results on softer materials. However, the opposite is not true. For most modeling, we use materials that are relative soft so it makes the task of selecting a file that will satisfactorily cut our materials much easier. Files will come in handy for precisely shaping materials such as resin castings, plastics, G10, ply wood, and the like.

One of the handiest files I have in my toolbox is a 6" Mill Bastard" file. I picked mine up at a Sears Hardware store for about $6 with a handle. It's tempting to get files without a handle…of course, they're cheaper…but having the handle makes the thing so much easier to use. This file will do a great job on plastic, resins, and ply as well as most metals.

Another kind of file that is perfect for Scale or Plastic Model Conversion work is the needle file. As the name implies, these are very small files and generally come in sets with a flat, round, triangle, square, and maybe one or two other shapes. If you know that all you will be filing is soft non-metalic materials, then just about any hardened steel file set will do. However, one of the best "awards" I have ever gotten at a rocket contest was a set of "diamond" needle files (I'd rather get something like this than a trophy any day…). The set that I got just happened to come with molded-on handles but most come without handles. Diamond needle file sets will cost between $10 and $20. Try to get a set with handles or purchase a universal handle to fit. Though diamond files will cut metal in a pinch that's not their intended use. If you are going to do a lot of metal filing, then get Tungsten Carbide need files. They cost about twice as much as diamond files but will last a lifetime even when used on hard metal.

About the Author

John Pursley is a master builder of highly detailed scale-model rockets. He has started a little company and website called *"John Pursley's Rocketry and Spacemodeling"* (http://www.accur8.com). Besides CD's full of scale data, John is producing a 1/12th scale model of the Mercury Liberty Bell 7 capsule.