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PEAK OF FLIGHT

NEWSLETTER

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How To Quickly and Easily Cut Lots of Body Tubes To Length

Bart Hennin

If you've ever had to cut your own body tubes to various custom lengths to build your own custom rocket designs, modify a kit or repair a damaged rocket, then you've likely found Tim Van Milligan's instructional videos *"How To Cut To Length Small Diameter Body Tubes"* www.ApogeeRockets.com/Rocketry_Videos/Rocketry_Video_05.asp and *"How To Cut To Length Large Diameter Body Tubes"* www.ApogeeRockets.com/Rocketry_Videos/Rocketry_Video_06.asp very helpful.

Photo 1: The Apogee Components web site shows you how to cut tubes to length.

Tim does an excellent job of explaining HOW to easily cut small and large body tubes to any length.

What follows here is a neat improvement on Tim's method shown in the videos which makes the tube cutting process even easier, while also increasing the quality and precision of cuts too.

In this method, we follow the same initial steps as in the 1st video. Namely, we start by fastening a piece of aluminum angle to a flat surface using double sided tape (or you can use single sided tape folded into a loop sticky side out). The video uses a flat board but I used a flat piece of glass sheet. Use whatever flat surface you have available.

Next in the video Tim uses a large paper clasp (available at any stationary supply) to clamp a small block of wood against the inside of the aluminum angle. This acts as a "stop" for the end of the body tube. Reference the videos above for full detail.

Here's the added "trick" that simplifies and speeds up everything. Using the SAME paper clasp, we also clamp a steel ruler to the outside (front) of the aluminum angle! (reference photo 2 below). To keep the steel ruler from slipping we also lay a piece of double sided tape underneath (blue strip visible in photos).

Photo 2: In this modified set up, we use a large paper clasp to clamp a small wood block to the inside, and a steel ruler to the outside of our aluminum angle which is in turn fastened down to a flat surface via two sided tape. Two sided tape is also used to keep the ruler from "slipping" once positioned.

The set up illustrated above is similar to that shown in the video but we've added a steel ruler to the outside (front) of the aluminum angle, held in place by the same paper clasp that holds the small block of wood to the inside of the angle. The wood block acts as a "stop" that the body tube end is pressed up against. The steel ruler can be slid back and forth to "set" it to any length of tube we wish to cut.

In this example we want to cut 4" off the body tube so we position the ruler with the 4" mark exactly even with where the body tube end meets the wood block. To cut different lengths, we simply reposition our steel ruler accordingly. This puts the end of our ruler at the precise spot we want to make our cut! Our hobby knife blade rests flat against the end of the steel ruler and this is where the actual BT cut will take place (see photo 3 on the next page).

From here we just follow the cutting technique shown in the video. That is, with our free hand, we roll the tube

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About this Newsletter

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

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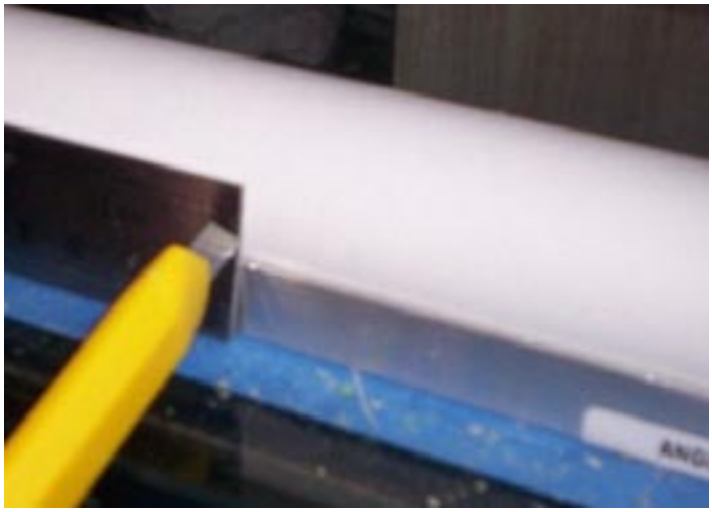

Photo 3: Once the ruler is positioned and clamped in place, it acts as a firm guide for keeping our knife blade accurately positioned throughout the entire cutting process.

while keeping it flat and pressed up against the wood "stop" block. As we roll the tube, the knife blade tip gradually cuts into the tube (multiple light knife passes work better than a single heavy cut).

The flat face of the knife rests against the end face of the steel ruler. The ruler thus acts as a firm cutting guide (that can be positioned precisely to any desired length of tube to be cut) This provides a significantly steadier set up than the semi-free hand methods shown in the videos. This ensures a very precise, flat and uniform 360∞ cut around the tube. After the cut is complete, sand the tube end(s) lightly as shown in the videos and you're done!

For larger diameter body tubes, we simply use a larger aluminum angle and larger clamp. Also with larger tubes, instead of taping the ruler (via 2 sided tape) to the table surface, we may need to tape it (via 2 sided tape) to the angle front face. However it is still the same principle.

In summary, this "modified" technique for cutting model rocket body tubes has the following advantages:

1) It's no longer necessary to mark the cutting positions on the rocket body tube(s) themselves. We need simply position the ruler and we're good to go!

2) Because the knife blade is firmly supported from from the side, cuts are very precise, uniform and factory perfect!

3) We can cut multiple tubes to exactly identical lengths if making multiple tube fins, side pods, or parallel stages for our rocket.

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4) It's faster. Since we need not measure and mark each body tube individually prior to cutting, we save time! The steel ruler can be quickly and precisely repositioned between cuts giving any desired length!

Interestingly, this set up is also handy for making precise "circumference marks" around a body tube. Just replace the hobby knife with a mechanical pencil and you can draw precision circular lines around the outside of the body tube at any position you like!

Such circumference lines are very handy to ensure fin placements are precisely even (see photo 4).

In the example photo, a circumference line is being drawn 1/4" from the tail end of rocket body tubes to ensure all fins are positioned an even and exact distance from of the base of the rocket.

Other possible uses for "circumference lines" might include marking off parts of the rocket to be masked off for painting and/or marking guide lines for application of decals or paper wraps.

Author's Note: I would like to thank Tim Van Milligan for his tremendous help and inspiration from his many articles, videos and emails without which the author would not only have never been able to come up with the above method, but would have floundered in many other areas as well. The author is thrilled, excited and HONORED be included in Tim's high quality and exciting *Peak-of-Flight Newsletter!*

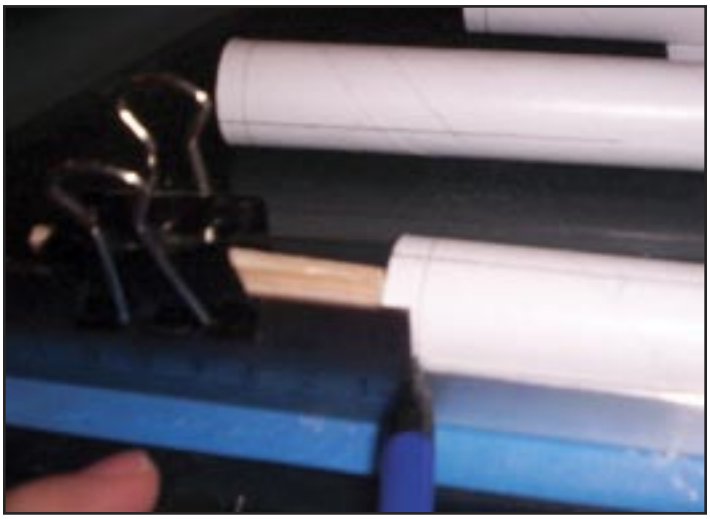


Photo 4: The same set up to mark perfect "circumference lines" around any tube at any position desired.

About the Author

Bart Hennin graduated in 1984 with a BaSc in Mechanical Engineering from the University of Windsor, Ontario. His senior year thesis was "Optimization Of A Model Rocket For Highest Altitude" which earned a top of the class mark of A+. Following graduation, Bart worked for several years in auto manufacturing engineering, then migrated to technical sales, and eventually ended up in general sales and marketing.

Bart is currently married and is living in New York state. Bart says that his family consists of one obnoxious cat named Thor.

Reader Comments and Questions

By Tim Van Milligan

Apogee A Big Part Of My Level 2 Success

Todd H. Treichel writes: "Hello to the Apogee team. Last Friday I attended the 2011 Midwest Power Launch and decided to bite the bullet and take the NAR Level 2 written test and fly my latest rocket. I was successful flying a J400 and both of my home-made rip-stop parachutes worked very well.

I thought you might get a kick out of the attached photo (to the right) where I added a summary of my Apogee purchased material (I'm sure I missed a few things but you get the idea). Thanks again for all the fast service and quick follow-ups to my many questions over the past months."

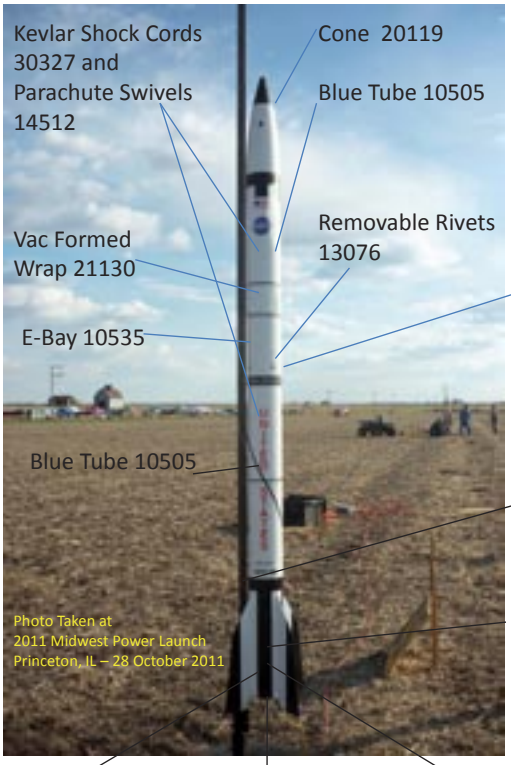
Tim writes: *Congratulations on your L2 Certification. It is a big achievement, and we're happy to hear that we contributed in some some way. Keep up the good work!*

Scout Master Is A Master Of The Skies

Norm Dziedzic writes: "I wanted to share with you pictures of the rocket I just built using parts from Apogee. I know how you are into education and outreach so I thought a Boy Scout themed rocket might be interesting to you.

This is the first bird I have built in several years. My son's boy scout troop was interested in pairing a campout with a rocket launch, so we set our sights on the biggest launch in the midwest called Midwest Power. I knew I had to build something for the occasion so I came up with the idea for *"On My Honor,"* a boy scout themed rocket.

Scratch Built Dual Deployment Rocket



Rocket Name: Treichel Redstone (by: T. H. Treichel)

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Of course, since a scout is thrifty, I used a 3" mailing tube my wife gave me for the body but bought a nose cone, motor tube, centering rings and bulkheads from Apogee. I also made extensive

use of RockSim (www.ApogeeRockets.com/rocksim.asp) to pick a motor and delay.

The 5 ft. tall, *"On My Honor"* made its maiden voyage on Oct 29th on a CTI H110-W 38mm reload and had a perfect flight to approximately 2500 ft."

Tim writes: *Yes. I do like the Boy Scout theme rocket. The quality of your work looks great. I wish I could have been there at Midwest Power to see the flight.*

Apollo 12 History

Dr. Chuck Hall Writes: "The article about Apollo 12 (www.ApogeeRockets.com/Education/Downloads/Newsletter295.pdf) was well written and enjoyable to read.

The references were on the light side, as they were all websites with only one being NASA. NASA published a technical history series on the Apollo program between 1978 and 1980. They occupy about 5" on the bookshelf, but NASA has released many titles electronically so they may be found online. "Stages To Saturn" (SP-4206), "Chariots for Apollo" (SP-4205) and "Moonport" (SP-4204) form the trilogy. Information from these and other books and manuals would have aided in fuller discussion of the lightning strike of the Apollo 12 launch.

I agree with the author in that Conrad would have been justified in aborting the launch. However, Conrad had more information than what is mentioned. While the CM lit up like a Christmas Tree, from the "Seat of the pants" there was no change which indicated that the booster was still operating nominally. The Q-Ball (shown in the article) had a display that did not go thru the Apollo computer and indicated to Conrad that there was no build up in angle of attack/sideslip. Another indication that the Saturn V was still functioning. This gave them time to resolve the problem.

The author mentions that the Saturn V was "miraculously" kept on course. He also mentioned that Saturn V had an independent guidance and control system. It wasn't

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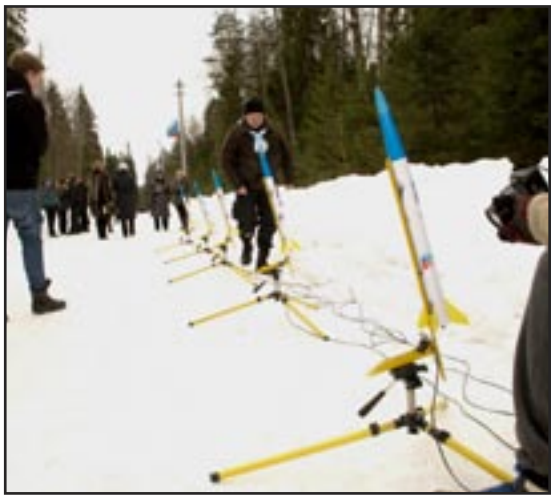
a miracle but "good engineering." Early in the program, NASA HQ had Saturn guidance and control being performed by the Apollo flight computer. The von Braun team was able to get NASA HQ to have a separate systems. Part of the technical argument was that the top of the S-IVb was closer to the CG and in a more rigid location (thus less vibration). This arrangement also allowed the gimbal platform to be aligned to an external reference, thus better accuracy. The Apollo gimbal platform was aligned to the body of the CM. Another thing the von Braun team always did, to be conservative, was to have all electrical cabling internal to the airframe.Thus, there was no path for the lightning to get into the booster system. For integrity of the Apollo heat shield there was an umbilical arm from the SM to the forward slope of the CM, and this was the path for the lightning to enter the CSM electrical system."

Tim Response: *"Thanks for the additional information Dr. Hall. 'Good engineering;' I like that."*

More Feedback on the Apollo History Article

Tim Winters from Austin, Texas writes: "Fantastic article, I really enjoyed it. Thank you Tim and thanks to the author. Very well written and captivating. I am old enough to remember the launch however I did not find out about the extent of the trouble they experienced until years later. You've got the best rocketry site on the web. Every time I visit is sparks my lifelong interest in recketry."

Model Rocketry in Russia

"Dear Tim Van Milligan. my name is Fomin Sergey. I live in Moscow. I go in for rocketry about 30 years. I am an engineer as you. I develop educational programs for schoolboys and students. I have seen first time your site twenty years ago. Here are some pictures for you to enjoy."