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PEAK OF FLIGHT

NEWSLETTER

What's The Hardest Step in Designing a Rocket?

By Tim Van Milligan

For me, the hardest step in designing a rocket is getting the original idea of the model. The reason is that when I design a rocket, I want it to be unique from any other rocket I've ever built before. I don't want to make a rocket that looks or operates like "ordinary" model rockets.

I think that this problem of generating ideas for new rockets is a fairly common one shared by other modelers too. Since most experienced modelers have already built the classic designs from Estes; and since Estes isn't producing models anymore that demand a higher level of craftsmanship -- they reach a conclusion of "what is there next to accomplish?" I think they have the same problem that I come across. That is, "How can I do something out of the ordinary?"

For a lot of modelers, the answer they come up with is simply: "bigger rockets."

Quite the opposite has been true for me. Making miniaturized models has always been more difficult and more fulfilling. In a way, I found that I was recreating the early days of the American space program. I try to force myself to look for creative ways to use the available engine power, and do 'more' with it. In the case of the space pioneers, they had to miniaturize the components of a satellite. For me, I look for ways to make models more efficient, and get more "bang for the buck."

So for me, "bigger" isn't necessarily more satisfying. It doesn't by itself, fill my need to be creative. I get just as much of a rush by watching a small rocket take off, as I do a bigger one. And since it is less costly on my budget to build smaller, I have found a compelling reason to explore the "creative" side of rocketry; and to look for challenges within the bounds of a limited budget.

I think that there are a lot of modelers that like the same challenge of designing their own rockets. There are a ton of modelers that do, and more and more are trying it all the time.

"But what should I design next?" This gets back to my the first paragraph of this article. The desire to be original is probably the most compelling to me as a designer. If my rocket looks like someone else's, then I don't get the same level of satisfaction.

When I got layed off from Estes in 1994, I was trying to figure out how to start my own rocket company. I knew that competing against other companies was going to be tough. I needed to have rockets that were totally unique. So for about 6 months, I just started building different models. After finishing one, I always hit a roadblock: "what should I build next?"

Finally, I got smart, and came up with a system to come up with the "idea." Even though it was still hard to generate the "idea," having a system in place made the ideas flow at a faster rate.

For those that have read my book *"Model Rocket Design and Construction,"* what comes next will be a little bit familiar. I talk about this subject on the first page of the very first chapter. I felt then, as I do now, that it is an important topic.

Here is the system that I use to generate an original idea.

First, what is the type of rocket that I'd like to build next. Generally, the "type" of model will narrow the focus of my thought. For example, if I'm going to design a "generic sport model," (some people call them 3FNC; or as we in the Estes R&D department called them: "Tubers") it will force me to ignore "gliders" and "helicopters."

After I decide which "type" of rocket I'm going to design, my next roadblock is the general layout of the model. What shape nose cone and fins should I use. This usually comes down to personal preference. For the most part, I initially try to follow the K.I.S.S. principle. This would dictate a model with the "classic" rocket shape and standard fins.

Selecting a nose cone is easy, but I always seem to get hung up on the fin shape. A friend of mine has a theory that there are less than 20 different fin patterns that appeal to modelers. He bases this on the popularity of old rocket kits that are considered to be "classics." He just went through old rocketry

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catalogs, and sketched out the fin shapes of the most popular models. The proportions may be slightly different, but he claims that the number of different "shapes" is less than 20.

This doesn't sit well with me. Since Apogee's RockSim program can allow modelers to design unlimited shape fins, I don't want it to be limited to those 20 shapes. So from now on, I'm out to prove him wrong.

The next part of my system is to do research. I want to know what models of my chosen type have been built in the past. So I started a personal library of my own, so that I can look through it when I design rockets.

And I'm always adding to it. My idea library consists of:

1. Old rocketry catalogs. These are invaluable for seeing what was done previously. Particularly for color schemes. On page 14 of my design book, I try to show that just by painting the rocket differently, can have a drastic effect on how it looks and effects the emotional state of the builder.

2. Rocketry magazines; particularly the technical articles. I'm constantly looking for tips and techniques to accomplish different tasks and make the rocket more efficient.

3. Good rocketry books. One I wished I had a long time ago is the one I wrote. It would have helped me in my early design career to make nifty rockets. (I apologize for the advertising plug, but I do think the book is worth the investment).

4. A binder full of pages I've torn out of magazines. I tear out all the artist concepts of future space craft and odd-ball looking aircraft. I'm sure that a lot of kit designs have come out of a resource like this. Two magazines that seem to be on the cutting edge are Popular Mechanics, and Popular Science. They both have a "what's new" section with pictures of future rockets.

5. A list of potential names for rockets. Believe it or not, but this is a great way to start a rocket design. For example, the name "Thor's Hammer" will spark a different image in your mind than the name "Unicorn." So whenever I come across a nifty name that could be used on a rocket, I jot it down at the bottom of my list.

6. U.S. Patents. If the model is to be complex and perform some type of function, a design patent search is a good place to do some research. And there are many model rocket patents to look up. You can find many of them listed in the Appendix of my design book: Model Rocket Design & Construction (http://www.ApogeeRockets.com/design_book.asp).

As I said, my library of rocketry ideas is growing all the time. I use it constantly to come up with my next project. In conclusion, I hope that you find this article useful in helping you come up with your next project too.

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/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 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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