PEAK OF FLIGHT

NEWSLETTER

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https://www.apogeerockets.com/Rocket_Kits/Skill_Level_1_Kits/Blue_Streak

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APOGEE COMPONENTS

PEAK OF FLIGHT

A Year In Review: 2015

By Tim Van Milligan

This past year (2015) has been another banner year for Apogee Components. So I thought I'd review what we accomplished in the last orbit around the sun, and give you my thoughts for the upcoming year of 2016.

First, let me start off listing all the major new products we released this past year. It was another year of adding a lot of new products to our web site - there were over 160! There are now almost 1800 different product numbers in our shopping cart, which can give you an indication that we are trying our hardest to be your one-stop source for all your rocketry projects.

The list of new items includes:

Laser-cut rings and disks made from foamboard (https://www.apogeerockets.com/Building_Supplies/Centering_Rings/Foam_Core_Rings).

- Research Express Payloader
- Wedgie Competition Launch Pad
- Aggressor Aerospace Rocketry:
  - AGNI 1
  - Dong Feng-11A
  - Dong Feng-15B
  - KZ-1
  - Pluton
  - SAFIR
  - SHAHAB-3
  - UNHA-3
- North Coast Rocketry's Bounty Hunter
- Jolly Logic Altimeter Three
- N1: For the Moon and Mars - Book
- Micro Splash Altimeter

Figure 1: Slo-Mo Rocket Kit

- Firefly Altimeter
- Burst of Orange Tracking Powder
- Motor Tape Strips
- Styrofoam Ejection Plugs
- JST LiPo Battery Connector with Wires
- Stratus Gale Rocket Glider
- Window Decals
  - My Other Car Is A Rocket Ship
  - "As a matter of fact, I am a rocket scientist!"
  - "Rocket Geek"
- Limited Edition Apollo-Soyuz 40th Anniversary Dr. Zooch Kit
- Real Space Rockets' Atlas V with CST-100 Capsule
- Real Space Rockets' Little Joe II kit
- Slotted Body Tubes For TARC teams
- Vertical Egg Protectors (soft foam) - BT-80 size, and 3" diameter size
- Dual Deployment E-bays
  - 29mm diameter rockets
  - BT-55 size (33mm)
  - BT-60 (41.6mm) size
  - 1.9" and 2.64" diameter ebay kit for Aerotech kits
- TARC BT-80 and 3" Parts Packs
- Laser-Cut Fins
- EggStorminator
- 3D Printed Shock Cord Anchors
- Slo-Mo Rocket (**Figure 1)**
- Mini-Copter
- North Coast Rocketry's LaserHawk
- Clear (payload) Airframe Tubes 24mm, BT-55, BT-60, BT-70 and BT-80 sizes

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About this Newsletter

You can subscribe to receive this e-zine FREE at the Apogee Components website **www.ApogeeComponents.com**, or by clicking the link here Newsletter Sign-Up

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- Mad Cow Rocketry's 2.6" Tomach
- MissileWorks RRC3 Altimeter, and accessories
- Christmas Window Cling Decorations
- Forward Grooved Centering Rings (18mm-24mm)

Other Changes

In Peak-of-Flight Newsletter #395 (https://www.ApogeeRockets.com/Education/Downloads/Newsletter395.pdf) from this past July, I let you in on some of our business philosophy as well as the new staff additions that happened this past year. Those new people have already been making an impact on our operations. Some of our internal accomplishments are:

Web site upgrades

There were two significant changes to our web site. The first happened in the first part of the year when we switched to a different web hosting company. The reason was that we wanted a faster server. That was the biggest complaint we faced last year from customers, who thought our site was really slow to load. Since we changed over, the new server has been significantly faster, and customers seem to love it.

Figure 2: New website header, with search bar (holiday version)

Once the server issue was fixed, the next upgrade was a complete redesign of the web site. This upgrade was completed in August. Essentially, the shopping cart got an overhaul and all the web pages got a new look to them. At the same time, we revised our mobile version of the web site. This was a big issue for us, because nearly 30% of the visitors to the Apogee web site are using either a smart-phone or a tablet computer. And this number is only going to grow in the future, so it is important that it loads fast and keeps the bandwidth low so you're not using up all of your allowable data.

The new issue we have with the web site is the navigation menu. With so many categories of products and so much educational information available, navigating to the right page with the information you need is tricky. So we want to rearrange the menu and make it less quirky to use. In the mean time, use the search feature to find what you're looking for. It is the little "magnifying glass" near the top **(Figure 2)** of each page of our site. The search feature is probably the strongest feature of the site, because it is fast and comes up with the right thing that you're looking for. I use it about 20 times a day to get around the site.

Figure 3: New vinyl printer

As far as equipment goes, our most significant purchase was a new vinyl printer to make decals. We purchased our first vinyl printer in 2014, but the thing was a piece of junk. It

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kept breaking down and sucking up expensive ink. Fortunately it was under warranty, and I was able to trade it in on a much better printer **(Figure 3, Page 3)**. I'm really happy with the newer one, as the quality of the decals is much better. We're trying to use this printer for all of our newer rocket kits. We've still got a way to go to utilize it more, and that is one of our goals for 2016. So look for new decals and range-box stickers.

Figure 4: Real Space Rockets Atlas V CST-100 Kit

The rocketry industry is constantly undergoing a churning of suppliers, and that affected us too. Two of our suppliers, Real Space Rockets (**Figure 4: an image of a Real Space Rocketry kit**) and Rouse-Tech both decided that their personal lives needed some reorganization, and they both announced they were going to suspend production of their product lines. They both make good products, so we didn't want to see customers do without their offerings. We found a way to team up with both of them, and Apogee will be producing their products in the future. In the case of Real Space Rockets, it may be temporary for just a couple of years. He indicated that he does want to make a comeback in the future when he has more time to make the rocket kits himself. We look forward to that day too!

In the case of Rouse-Tech, the only product they were still producing is the CD3 deployment systems. That line of items will turn into an Apogee product in the coming year.

Our overall theme for 2015, if I had to sum it up in a couple of words, was "getting more organized." And I think we made some good progress on that front. Internally, we all worked on our processes and tried to nail down what we're doing. As I'm sure you realize in your own life, there are a lot of things we do during the day that don't make sense. This was Apogee's situation too. So our mission this past year was to look at what we were doing, and evaluate it using two criteria: is it beneficial to our customers, and does it make sense.

That brings us to "what's next?"

What's coming in 2016?

If getting more organized was the theme of 2015, our theme for 2016 is "increasing our efficiency." Now we need to look at our processes and internal systems, and make them more efficient.

One area of efficiency is our warehouse. To be honest, we've been in our current facility since March of 2007, and we're starting to feel squeezed in by lack of room. But I

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dread the thought of moving, and I'd like to stay here at least one more year. So we need to be more efficient in how we manage our inventory. I recently bought 30 new shelves so that we can try to maximize the room we have by going vertical with storage. In the next month, we'll be rearranging and getting everything relocated. It is a big job, but a lot less expensive than moving.

Figure 5: Early design of in-development mid-power two stage rocket kit

Our customers probably won't notice anything different, but personally I'm hoping that the increased efficiency will help solidify our bottom line. We need to continue to grow, and the money for that growth can only come from increased profits. If the incremental growth continues, we want to add more new items, like larger rocket engines, and more of our own rocket kits.

I've got two new rocket kits in the pipeline right now to be released in the beginning of 2016. One of them is a mid-power two-stage rocket to use the Estes 29mm diameter black-powder motors. If you've seen our Facebook posts (https://www.facebook.com/apogeerockets/), you got a sneak peak at the naked (unpainted) version of the rocket (**Figure 5**). The other rocket is a beginner type rocket.

The one thing I've decided is that all the new rocket kits that I come up with from this point on will likely include through-the-wall fins. Looking back from the list of Apogee's kits of 2015, you'll notice they are all through-the-wall fins too. I just can't imagine coming out with a rocket that has surface mount fins, since I can easily laser-cut the slots in the tubes (**Figure 6**). Through-the-wall fins are so much stronger, and they eliminate the issue of getting the fins on parallel to the tube. It just is stronger, safer and more convenient for our customers. And since our mission is to make sure your rocket project is successful, and I think through-the-wall fins are a major step forward toward that objective.

We'll probably add more kits from other suppliers, but I'll be more selective about which ones to carry starting in 2016. The reasons are that inventory space will continue to be limited, and because of the amount of time and resources that are required to put a new product on our web site. One of the things that makes Apogee different is the volume of information on our web site, and it takes a lot of time to create that product page. I'll reveal a secret here: we go

Figure 6: Slotted tubes for through-the-wall fin placement

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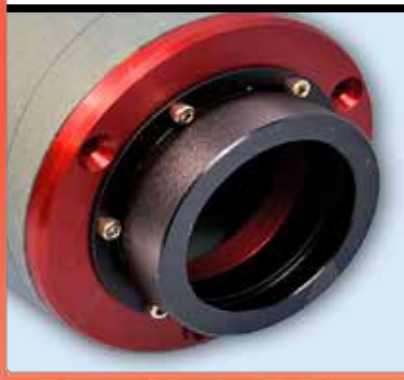

Experienced HPR Builders Use Thrust Plates

- Eliminates Shear Forces on Centering Rings
- Mates with AeroPacks Flanged Engine Retainers
- Fits Standard HPR Tubes, Blue Tubes, and Fiberglass Tubes
- Made from Aircraft Grade Aluminum

https://www.apogeerockets.com/Building_Supplies/Thrust_Plates

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through an 80-item checklist when new products are added to our web site. It literally takes weeks to complete them all. But if we don't do them all, we aren't able to answer questions that our customers have about the new products. So if I'm going to invest the resources to put them up on our web site, I want to be certain that the outside product is special or we have some exclusivity on the item. In reality, what this probably means is that you'll see more Apogee kits and components in 2016 because that is the obvious way to have exclusivity.

Looking Beyond 2016. What is the future?

I'm not only planning for 2016, but beyond too. I see a couple of trends in the industry, and I want to be ready for them.

The first trend is a continued churning of manufacturers and vendors in the industry. Companies come and go, and this can be both a challenge and an opportunity. I try to look at it as an opportunity. The reason is that it allows Apogee to bring new products to our customers.

Therefore I try to make alliances with new suppliers as they pop up. This has been one of the reasons Apogee has been successful in the past, and I want to strengthen it in the future. When we start selling a supplier's products, we aren't just a "distribution channel" for them. Initially, that is what our suppliers want from us - just more sales. But eventually they come to find out that Apogee Components is a resource that they can tap into to get the pulse of the customer. We've been listening to customers for a long time, and because of that we have some insight into what they want. This information is valuable, because it allows our suppliers to make products that are desired by customers.

I want to strengthen this in the future by adding more suppliers and to bring in new types of products and services that customers want. There is a desire for new products, and if you're interested in becoming an entrepreneur, come talk to me. Some of the products that I'm still looking to carry at Apogee are listed in Newsletter #234 (https://www.ApogeeRockets.com/Education/Downloads/Newsletter234.pdf).

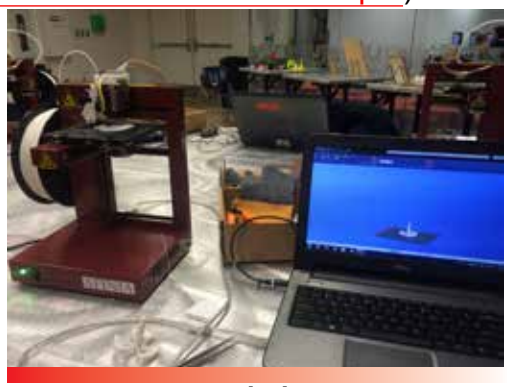

Figure 7: 3D Printing technology

The other trend that is racing towards us is parts made using 3D printers (**Figure 7**). Typically, the limiting factor for starting a model rocket company was getting nose cones. In order to get nose cones for kits, you'd have to invest heavily, either making them yourself from turning wood or

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Gyro Chaser Helicopter Rocket

- Unique 'transforming' rocket - looks like a normal rocket, but then rotor blades pop out at ejection
- Competition efficiency: high flights and long descent time
- Features curved rotor blades and free-spinning hub, just like those used in international competitions
- Versatile: can use any 18mm diameter motor
- Comes with video instructions for error-free assembly

www.apogeerockets.com/Rocket_Kits/Skill_Level_4_Kits/Gyro_Chaser

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pouring resin, or buying expensive injection or blow-mold tooling and outsourcing production.

It looks like the next 3D printing revolution is about to happen. In that, I mean quality and production speed are likely to come up to a point where a garage-shop business can compete head-to-head with established companies like Apogee Components. There are some parts that are being 3D printed right now, like those from Robert Rosenfield (https://www.apogeerockets.com/Rosenfield-Aerospace).

In the past, 3D printers just couldn't match the cost or quality of manufactured parts. They are slow and therefore it was expensive to make parts. What's more, the finished product was structurally weak, and the surface quality was poor. Because of the limitations, there is limited use for 3D printed parts. I've been using them mainly to make molds and special tooling, so that other methods can be used for the actual manufacturing of the usable rocket parts. For example, in the next newsletter (http://www.ApogeeRockets.com/Education/Downloads/Newsletter408.pdf), I'll show you how I made a new vacuum-formed canopy from a 3D printed prototype.

But as I said, the 3D printer technology is about to change. I've been following the 3D printer technology since I saw my first one when I worked at Estes in the early 1990's. I'm excited about the possibilities and I want to be ready for it.

It isn't the 3D printed nose cones that I'm excited about. Yes, they will be significant and they are the primary item that will allow a new model rocketry manufacturer to gain entry into the industry. But nose cones are a commodity item compared to the other things that you might be able to manufacture using 3D printers. I'm thinking of things like "scale rockets."

The current issue with making scale rockets is all the little details on the outside of the model. In a traditional sense, they are hard to make. But 3D printing them will be easy. Because of that, I foresee an explosion in the number of new scale models in the next ten years. Already manufacturers like Real Space Rockets and Aggressor Aerospace are 3D printing parts to make some very nice models. And I think there are a lot more to come, as it opens up niche markets for lots of new manufacturers.

To be ready for the change in technology, I'm re-training myself on the latest CAD software. If you are ever considering being a rocketry entrepreneur, you might also want to start training yourself as you're going to need it too. We published an article 5 years ago on how to use Google Sketch-up to create a rocket, and you might start there for introductory information (http://www.ApogeeRockets.com/Education/Downloads/Newsletter261.pdf).

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Star Lift Mega Lander

Build It - Launch It - Stick The Landing

The Excitement Builds All The Way To Touchdown

- Large Size Rocket Flies on the Impressive Mid-Power Motors.
- Articulating Lander Legs Fold Up During Launch.
- Laser Cut Plywood Parts for a Strong Rocket.
- Pre-Slotted Tube Makes Construction Easier.
- Vinyl Decal for Visual Appeal.

https://www.apogeerockets.com/Rocket_Kits/Skill_Level_5_Kits/Star_Lift_Mega_Lander

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The final trend that is occurring is that I'm getting older. I turned 50 this past year (**Figure 8**) , and I've got more grey hair on my head now. I still feel pretty good, but I need to start planning for the day when I have a hard time getting out of bed. Years from now, I'll have to hire a general manager to take over the day-to-day operations of the company. I started the process of writing a job description of what I'd want a general manager to do (see: https://www.apogeerockets.com/Company/Job_opportunities). But before you get all excited about applying, let me state that I'm not hiring immediately for this position. I'm going to take my time to make sure that I find someone just like me because there is a lot riding on it. For example, I won't hire an outsider that doesn't have experience owning a company. I feel that the mindset and hardships of entrepreneurship are vastly different from being a manager. So if you want to run a company like Apogee Components, you should be thinking of starting a company so you can gain some ownership experience. I anticipate that I'll be looking at other rocketry company owners as the pool of talent when it comes time to replace myself in the corner office.

Conclusion

All said and done, I think 2015 was a great year for Apogee Components. I hope you gained some insights in reading this article. I'm looking forward to great things in 2016, even if I don't know what they are yet. It should be fun.

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/educa- tion/. 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.
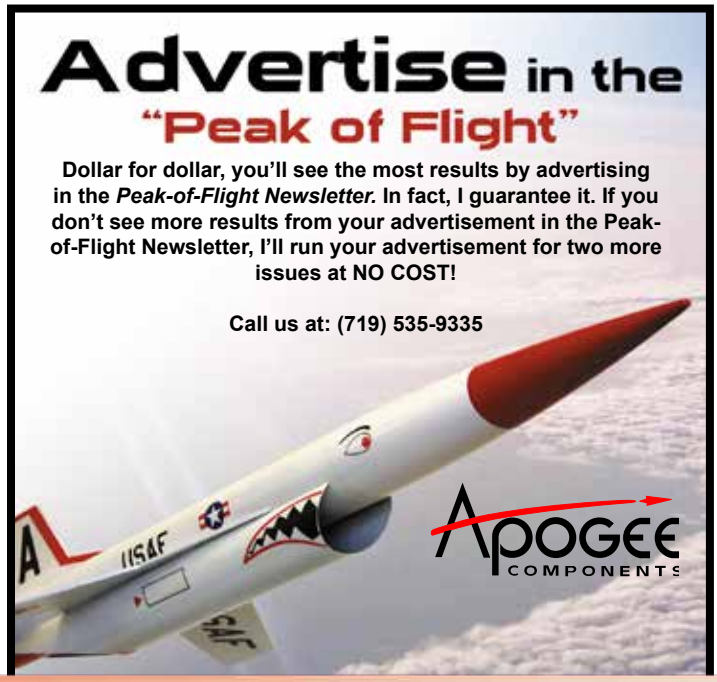
Figure 8: 50th Birthday Party celebration, complete with rocket-shaped cake