State of the Model Aviation Hobby and the Industry that Supports it

May 10, 2018

Introduction

Mankind has enjoyed model aviation for centuries, yet it wasn't until the turn of the 20th century that the hobby of aeromodelling became mainstream in the United States. Some of the first model aviation clubs were formed in 1907 and 1908 in cities like Chicago and New York. As club events and contests blossomed, the Academy of Model Aeronautics (AMA), the National Aeronautic Association (NAA), and Fédération Aéronautique Internationale (FAI) began managing and sanctioning modeling operations. In the decades that followed, the hobby thrived and was instrumental in launching thousands of careers, including those of astronaut Neil Armstrong and contemporary aviation engineer and Spaceship One designer Burt Rutan.

After decades of prosperity in the model aviation hobby, the industry has recently faced stagnated growth and suffered the loss of many local, family-owned businesses. A newfound interest among consumers in multi-rotor platforms, commonly called drones, has also influenced the hobby.

In this report, AMA explores the current state of the model aviation hobby and the many businesses that support it. We completed 13 in-depth interviews with key players in the industry from July 2017 through April 2018. We asked these experts to help AMA better understand the factors that have changed the model aviation hobby and the related industry. We analyzed this expert insight and combined it with our own eight decades of experience to compile the research findings included in this report.

Some of the changes in the model aviation hobby and industry are positive. In addition, some of the business realities described in this report are simply part of the modern retail environment. Other trends in the industry appear to have been influenced by the threat of increased federal regulation and implementation of increased regulation at the state level.

The goal of this report is to help those who may be less familiar with the hobby of flying model aircraft understand the challenges this community currently faces. And, importantly, to help identify a path forward that will preserve this century-old hobby for generations to come.

Who is AMA?

AMA has represented those who fly model aircraft for recreational and educational purposes for more than eight decades. We are also the world's largest organization of model aircraft hobbyists with 200,000 members across the U.S. and Puerto Rico.

Since 1936, before the Federal Aviation Administration (FAA) was founded, AMA has been publishing community-based safety standards and offering training programs for our members. AMA quickly gained national and international standing with the NAA and FAI. Most recently, AMA's National Model Aircraft Safety Code has been recognized by Congress as well as state legislatures as a safe and effective means of managing model aircraft enthusiasts.

Today, our members have an unparalleled safety record because they know where and how to fly safely, and to stay well clear of any manned aircraft. Our members fly at 2,400 designated flying sites across the country, often with families and close friends.

Methodology

AMA began work on this research project in July 2017. We started with a simple goal – to better understand the positive and negative trends in the model aviation hobby and the industry that supports it. As a longtime fixture in the modeling community, one of AMA's best assets is the network and relationships the organization has throughout the model aviation community. We leveraged this network heavily to arrange in-depth interviews with industry experts for this report.

First, we generated a list of in-depth interview questions to discuss with key players in the industry who were willing to participate in this research project. These questions cover everything from basic information about each person's business and/or role in the industry, to open-ended questions about what they felt was the biggest challenge facing the industry over the last five to ten years. A full list of these questions is included in the appendix of this report.

Second, we approached more than 20 different businesses involved in various aspects of the hobby – big and small, manufacturing and distribution, brick-and-mortar stores, as well as larger companies that sell online. As expected, some people in the industry declined to participate in this research project, but thirteen organizations said yes. We are thankful for their willingness to participate, which has allowed us to create this report.

Third, we completed in-depth interviews with individuals at the thirteen businesses in the model aviation industry that agreed to participate, creating the foundation for this report. During these interviews, we gathered as much intel as possible about changes in their business, trends in the hobby, challenges they face and the impact of regulations. To encourage greater sharing and honesty, these interviews were held in private and limited to only one business at a time.

It is important to note that the information and quotes shared in this report are not attributed to any specific business. We agreed to protect the interviewees in this way to allow people to speak freely about sensitive topics like sales, manufacturing, diversification of their products, overall business strategy and more. A full list of organizations that were interviewed for this report are included in the appendix.

Research Findings: Executive Summary

AMA's research into the state of the model aviation hobby produced a wide range of responses from interviewees. Some in the industry feel strongly and passionately about specific factors that affect the hobby and the industry that supports it. Other interviewees have agreed that the hobby is changing but couldn't quite pinpoint the exact cause of the changes.

We synthesized all the different responses and insights we received during the lengthy in-depth interview process. In addition, we drew upon AMA's eight decades of experience educating and managing hobbyists to inform this report. In the end, this project resulted in three major findings:

First, the recreational community is evolving. Although hobbyists are still building their own models, there has been an increased interest in ready-to-fly aircraft. The recreational community seems to have branched into two categories: the traditional model aircraft hobbyist and the casual recreational operator who is flying more technology centric and easy-to-operate platforms.

Second, changes in the retail industry overall are also affecting the model aviation hobby and the industry that supports it. For example, consumers are buying more online, and manufacturing in the U.S. is decreasing.

Third, and perhaps most importantly, the threat of increased and changing regulations on model aircraft, especially at the federal level, is creating a disincentive for hobbyists, putting an already fragile industry at serious risk of decline. The number of state regulations on hobbyists have also increased in recent years.

Research Findings: The recreational community is evolving

One of the largest manufacturers and distributors of model airplanes provided the simplest answer when asked about the state of the hobby today: "It's not like it used to be." This is a theme that interviewees echoed throughout more than a dozen in-depth interviews. A lot of what used to be true about our community 25 years ago has simply changed.

Hobbyist interests in two categories

One example of the hobby's evolution is the different platforms that recreational operators are flying today, compared to what traditional aeromodelers like to fly. Whereas traditional aeromodelers spend hours building their own model airplanes, tinkering with the landing gear, adjusting the transmitter and more, a new segment of recreational operators emerging in the marketplace today are primarily interested in ready-to-fly platforms. The hours that hobbyists used to spend in garages and basements across the country simply getting ready to fly are no longer the standard. Instead, many newcomers to the hobby are buying model aircraft-related products that require little to no setup or construction. These ready-to-fly planes obviously require far less time and tend to require less of a financial investment.

New technology has also changed the hobby. For example, lighter weight and sturdier foam technology has led to a renewed interest in "foamies." Foamies are small and affordable airplanes that are ready to fly out of the box.

The most significant change in the recreational community, however, is the increased interest and availability of drones. This has had a significant impact on the hobby. According to several interviewees, the dramatic increase in consumer drones has taken some people away from the traditional hobby of flying model aircraft. The Consumer Technology Association (CTA) confirms the dramatic increase in drones in its semi-annual study published in July 2017. According to CTA, "Total drone sales are expected to reach 3.4 million units (40 percent increase) and $1.1 billion in revenue (44 percent increase) for the first time in 2017."

Some interviewees expressed a positive outlook on the increasing interest and availability of drones, noting that drones are bringing some new people into the hobby of flying model aircraft who otherwise would not have been interested. One model aircraft manufacturer has pointed out how easy new drone technology makes it for new people to fly. That's a good thing, the company believes. Also, some people in the model aviation industry believe that increasing interest in aviation generally, even if it is primarily an interest in drones, is good for the hobby.

At the same time, however, some interviewees expressed reservations about those who fly drones. These interviewees have pointed out how not everyone who likes to fly a drone also likes to fly a model airplane. Furthermore, drones have helped accelerate the trend toward ready-to-fly model airplanes and away from self-built models.

Many local hobby shops are closing

Another major theme throughout the in-depth interviews is a concern about the increase in hobby shops closing locations or going out of business all together. According to one model airplane manufacturer, 30 percent of the model aircraft hobby shops in the U.S. have closed in the last 10 years. Another company that makes traditional model aircraft kits has estimated that there were between 4,000 to 5,000 hobby shops in the U.S. about twenty years ago. Today, he has shared, there may only be 1,200 shops left. That's about a 75 percent decline.

CASE STUDY: HOBBICO CLOSES

Founded in 1971, Hobbico grew to become the largest U.S. distributor of radio-control and general hobby products. On January 10, 2018, Hobbico announced it was filing a petition for relief under Chapter 11 of the US Bankruptcy Code, citing an "increasingly competitive industry" and "market headwinds" as factors in the company's financial troubles. In March 2018, Horizon Hobby agreed to buy several units of Hobbico for a combined $18.8 million.

This is a significant change for hobbyists. Local hobby shops have historically been a fixture in the model aircraft community. In the past, hobby shops were a place where enthusiasts would go to ask questions about model airplanes, learn from the experts and get to know others in the community. Unfortunately, many of these local shops are experiencing a significant decline in sales and have been forced to close. As one manufacturing company shared, "We do everything we can to keep a hobby shop open – but they're still closing."

What is the true cause of the decline in hobby shops? Many of the interviewees have offered varying answers to this question. And, undoubtedly, the answer is probably a little different for each specific hobby shop location that is forced to close.

However, the evolution of the hobby is playing a role. For example, while hobbyists are still building their own models – many new customers are now more interested in ready-to-fly planes. As a result, the supplies and expertise that hobbyists once sought at the local shops tend not to be needed quite as much. In addition, technology has made a lot of traditional models more affordable, which is great for consumers but cuts into profit margins for businesses. Also, many more people are now interested in flying drones, which sometimes are not sold at traditional hobby shops.

Some interviewees have also pointed to customers' willingness to accept a lower quality product as part of the problem for hobby shops as well. One manufacturer of radio control and foam model airplanes described this as the "Walmart mentality." He believes that, for most customers, shopping has become all about how cheap the product is, how quickly they can get the plane and then immediately fly it. He holds the opinion that customers simply don't care about quality as much as they have in decades past.

Differences between seasoned hobbyists and younger generations

The final example of how the recreational community is evolving is hobbyists themselves. Many interviewees have recognized that the more experienced, traditional model aircraft hobbyist tends to haves more time and interest in building aircraft. The younger generation of newcomers

to the hobby, by contrast, tends to be more interested in ready-to-fly and affordable platforms, like drones. This change further contributes to the factors described above. Younger people are less willing and motivated to spend their free time and money building model airplanes. There are also fewer hobby shops around for young people to visit and learn about the hobby.

One of the biggest companies in radio control aircraft and accessories has said they "don't recognize the customer anymore." They noted, "The customer we knew five years ago is significantly different than today." The new, younger generation of hobbyists is simply more interested in ready-to-fly and cheaper models than ever before. That's a significant change for the model aviation industry and the hobby overall, compared to past decades.

Research Findings: Broader changes in retail have also impacted the model aircraft industry

Throughout interviews with many in the model aviation industry, it has become clear that some of the challenges the industry faces are not necessarily unique. In fact, several of the trends described by interviewees mirror what we know to be true about the retail industry in general.

In 2017, the traditional retail industry reported a record breaking 7,000 store closings and 66,500 net job losses, according to CNN. Those in the model aviation industry echoed this trend of increased store closings and job losses, as described in the previous research finding. As one of the larger hobby retail shops has pointed out, "Mom and pop businesses are getting tougher to run." In the sections below, we describe a few more of the major trends in the retail industry that have also affected the model aviation industry.

The internet impacts sales and marketing

One of the biggest changes in the model aviation industry has been an increase in online sales, heavily concentrated on a few large retailers, as opposed to in-person sales at smaller shops.

The increase in online sales in the retail industry overall is a widely reported trend. According to *Internet Retailer,* online retail sales grew by more than 15 percent in 2016 compared to the previous year. This represents the biggest increase in online sales since 2013, when online sales grew by more than 16 percent compared to the previous year. The trend is obvious – people are buying more and more online every year. Also, Amazon continues to dominate online retail sales overall. According to the same article, "Amazon comprised 65.9% of the $53.1 billion growth in U.S. online retail last year, and 27.4% of the $127.6 billion increase in the total retail market."

The trend of increasing online sales, concentrated within a few companies, is true in the model aviation industry as well. Modelers who used to buy everything at their local hobby show now tend to buy a lot more online via big box stores like Best Buy or even Amazon, and a lot less in-person. Interviewees have pointed to this development as having a major effect on the model aviation industry. One of the largest chain retail hobby shops in the country shared how internet sales have created unprecedented pricing pressures and an "ultra-competitive" environment. With the internet, hobby shop customers can easily compare prices online and simply buy the least expensive option, and probably get free shipping as well. As customers have shopped more online, the older brick and mortar hobby stores have taken a financial hit. Model aviation businesses that resisted online sales, tended to struggle.

The internet has also changed marketing and product releases in a way that has negatively impacted the hobby. In past decades, the model aircraft trade shows, expos and other industry events were the best place for companies to debut and sell new products to customers. However, as customers have started shopping more online, it has become less effective for businesses to do product releases at periodic industry events. Customers want the latest and greatest right now, without waiting for a trade show. As such, many model aviation businesses now feature new products online. And as a result, customer and manufacturer attendance at trade shows has declined. As one of the largest retailers noted, "There was a time when we were at every show, the largest exhibitor. That time has ended."

U.S. manufacturing is decreasing

Similar to how increased internet sales are affecting the model aviation industry, a steady decrease in U.S. manufacturing over the last few decades has changed the industry. Overall manufacturing in the U.S. has been on the decline since the 1960s, according to CNN. In the 1960s, about a quarter of U.S. workers held manufacturing jobs. In 2016, the percentage of workers in manufacturing decreased to just 8 percent. Similarly, the interviewees for this report confirmed a decrease in U.S. manufacturing in the model aviation industry.

In addition, the biggest hobby retailers we spoke to have all worked with at least a few Chinese partners to bring their product to market. Some in the industry view overseas manufacturing as substandard compared to U.S. manufacturing. Nevertheless, all have agreed that it is hard to argue with lower prices. Customers want less expensive and more ready-to-fly products, and in recent years, moving manufacturing overseas has been the best way to meet this expectation.

Not only are some model aircraft products built inexpensively overseas, it is also relatively inexpensive to get those products into the U.S. On the flip side, small manufacturers in the U.S. who still make model airplanes here are finding it highly expensive – almost cost-prohibitive – to ship model aircraft products within the U.S. to customers. Some newer, bigger planes are especially expensive to ship domestically. Unfortunately, customers have simply not been willing to pay that price. For at least one of the model aviation businesses we spoke to, the cost of shipping was the straw that broke the camel's back. They were forced to close because of it.

More competition, more products in the industry

Also in recent years, more competitors have started to sell model aircraft-related products that were traditionally sold only at hobby stores. Drones are an especially good example. The latest products – everything from a Star Wars-themed toy to a DJI Phantom – are now available online and at the corner drug store or electronics shop. Another large hobby shop we interviewed has experienced this trend first hand: "Every drug store has begun selling RC drones and even RC cars. There's now 300 places [in our city] to buy a drone. What pie there was, split up among

Diversification of model aircraft products in the industry has been another major issue. This issue cuts a few ways for the model aircraft hobby. First, customers now demand more product diversification in the store. They want all the options – foam planes, drones, kits, accessories of all types and price ranges. Second, they want more than just airplanes. One manufacturer and distributor of model airplane kits has pointed out that "anybody that has been able to survive has some aspect of diversification outside of model aircraft." That's because, for many customers, the hobby now also includes radio control cars, trains, boats and more. A hobby shop that only sells model airplanes is less attractive to customers.

Customers want more options and, in order to survive, businesses have had to provide it. Some of the businesses we spoke to have learned to adapt to this new environment and are succeeding. Others have chosen to stop competing in the market all together. Either way, as one of the largest hobby retailers has noted, times are changing: "Thirty years ago, 80 percent of the hobby was model planes. There's a lot of other product categories now."

Research Findings: Threat of increased and changing regulations, especially at the federal level, is a disincentive for hobbyists — state regulations are also increasing

For decades, modelers have operated safely and responsibly in our nation's airspace. Many of the interviewees for this report believe that the hobby has done a good job of self-regulating in the past, and that this should continue. They also recognize that more education is needed for newcomers to the hobby, and especially for the emerging group of drone hobbyists.

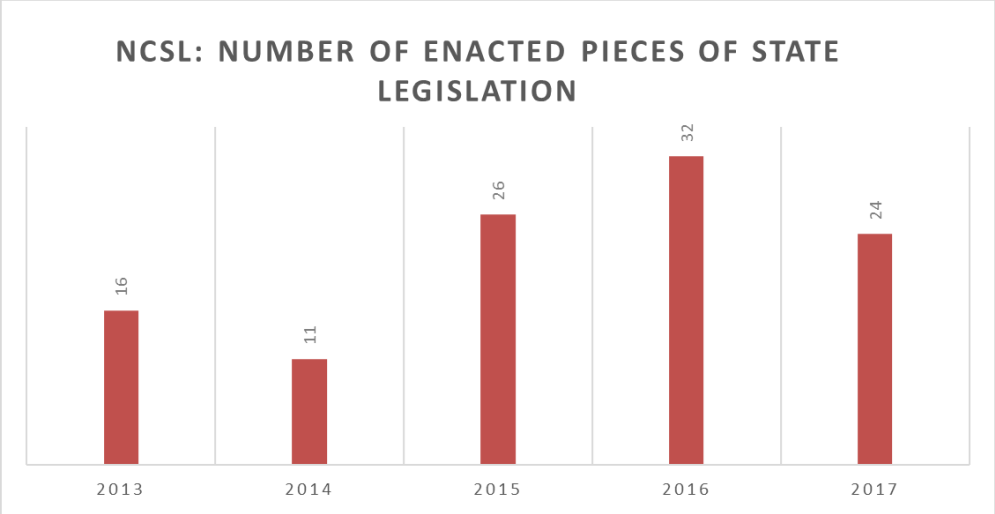
At the same time, many in the industry have noticed that the threat of further regulation, and in some cases increased regulation, has been a disincentive and caused the fragile model aviation industry to suffer more. This is especially true at the federal level, but data has also shown that regulations have increased at the state level, as well.

At the federal level, modelers have had to adhere to a new registration requirement that originally went into effect in 2015, was temporarily retracted for AMA members, and then reenacted in December 2017. This back and forth is both confusing and frustrating for many in the industry.

For the most part, however, hobbyists have been permitted to operate under the management of a community-based organization like AMA due to Section 336 of the FAA Modernization and Reform Act of 2012, also known as the Special Rule for Model Aircraft.

Unfortunately, in recent years, there have been a number of proposals in Washington to amend or eliminate Section 336 and impose new restrictions on hobbyists, creating uncertainty for those in the hobby. These threats of additional regulation have sent a chill through the community of responsible model enthusiasts who have operated safely and harmoniously in the airspace for more than 80 years – before the FAA was even created.

While there have been threats of new regulation at the federal level, at the state level, many new restrictions are already in place. Many organizations have documented the growth in legislation, both proposed and enacted. According to the National Conference of State Legislature's Current Unmanned Aircraft State Law Landscape, 38 states considered legislation related to UAS in the 2017 legislative session. In total, 302 total UAS-related bills were introduced according to GovHawk, 24 of which were enacted. Furthermore, the graph on the next page shows the number of enacted pieces of legislation relating to UAS at the state level over the last five years.



http://www.ncsl.org/research/transportation/current-unmanned-aircraft-state-law-landscape.aspx

Another report completed by the Center for the Study of the Drone at Bard College in March 2017 also described an increase in legislation around UAS at the local level:

> *"Over the past few years, the United States has witnessed a growing trend of state and local drone-specific regulations that extend beyond the guidelines and restrictions established for non-recreational and recreational drone users by the Federal Aviation Administration (FAA)…We have identified 133 localities across 31 states that have enacted local rules governing the use of drones. These localities are home to over 30 million people."*

The largest distributor of radio control airplanes and accessories also emphasized the difference between the newcomers and the traditional modelers: "At this point, we [AMA members] have all operated independently in the past and have been successful at regulating ourselves, and AMA has been a part of that. On the airplane side, there's no need for any new regulation. The difference is that the drone consumer can fly literally anywhere - living room, local park, any square foot of space." The distributor also noted that "now, we need to let the consumer know when it's acceptable to fly and when it's not acceptable to fly."

Education is needed

Greater education around the existing regulations that apply to modelers and new drone flyers has been a major challenge for the hobby. One company has complained that people are not sure what the rules are: "Some [customers] are still confused, is it regulated or is it not regulated?"

New state regulations, as well as the threat of increased federal regulation, have created a lot of questions for everyday hobbyists of all types. Interviewees have reported that many

NEW KBYF INITIATIVE: EVEN THE SKY HAS LIMITS

In March 2018, AMA joined the Consumer Technology Association (CTA), Association for Unmanned Vehicle Systems International (AUVSI), American Association of Airport Executives (AAAE), the Toy Association, Experimental Aircraft Association (EAA) and Aircraft Owners and Pilots Association (AOPA) to launch a new initiative of KBYF called Even the Sky Has Limits.

This campaign included a new educational video and, through online advertising, generated 3 million ad impressions and over 900,000 video views during the campaign.

hobbyists are unsure what rules to follow and are sometimes unwilling to jump through extra hoops to fly. While some may disagree about what regulation is needed for the hobby, if any, all interviewees have agreed that whatever the rule is – it needs to be communicated consistently to operators.

The model aviation industry is willing and able to help educate operators about how to fly legally and safely. Many of the companies and businesses we spoke to support efforts like Know Before You Fly, a campaign launched by AMA a few years ago to help educate newcomers to the hobby. A new advertising effort around this campaign was recently completed in April 2018.

Threat of increased regulation harms the hobby

Given all the pressures on the hobby of flying model aircraft, as described in the first two research findings, the implementation of state regulation and threat of federal regulation disrupts an already fragile industry. "You don't want overregulation," one large retailer in the model aviation industry has noted.

There is consensus among those in the industry that the threat of additional regulations on model aircraft and drones over the last several years has been a disincentive for hobbyists. Even those who have been flying for years are sometimes turned off or discouraged by new and often confusing laws on where and how to fly – some laws are simply proposed and debated, while others are enacted but seem to contradict federal preemption. Everyone agrees that safety is a top priority, but the message from these industry representatives was clear: the hobby can't take much more of a regulatory burden or it may break. The hobby needs clear and simple regulations to thrive.

"We don't want to lose our hobby," noted one of the biggest manufacturers we spoke to. "We will follow the rules but we don't think they are all necessary," they said. Another manufacturer and distributor of radio control planes argued that it is unfair to "put a fear in potential gift giver's minds." He has thought that some people "might want to give a model as a gift, but seem to remember having heard something about regulations and privacy." As a result, he has explained, some people decide not to buy the gift all together, which hurts the industry tremendously.

Similarly, one of the smaller companies we spoke to, which unfortunately is now out of business, advocated for making policies "less confusing." They argued that the "FAA hurt us" and regulations "could be one of the reasons that the business is declining."

The hobby has reached the point where the overwhelming discussion of increased regulation has a tangible impact on the model aviation industry, negatively impacting the livelihoods of many who work in the business and those who simply love to fly.

Most people in the industry have agreed that self-policing for traditional hobbyists, which has been a cornerstone of the hobby for decades, continues to be the most effective way to ensure model aircraft are flying safely. When it comes to model aircraft hobbyists, the system that's already in place is working. Many in the industry have urged regulators to be cautious when considering changing this system.

Background: Model Aircraft Regulatory Landscape

In 2012, Congress planted a flag and directed the FAA to allow community-based organizations to manage model aircraft operations, in Section 336 of the FAA Modernization and Reform Act of 2012 (the Special Rule for Model Aircraft). Under this provision, Congress provides hobbyists a path to safely enjoy traditional modeling operations as long as specific requirements are met, including operating within the safety guidelines of a community-based organization like AMA.

Congress by no means intended to grant a free pass for individuals who operate their model aircraft in a manner that intentionally places manned aircraft in danger. However, it clearly intended to leave risk mitigation and the development of appropriate safety guidelines for the operation of model aircraft devices to nationwide CBOs.

In the five years since Congress passed Section 336, there have been continued attempts at regulating the hobby, starting with the Interpretative Rule. The FAA released its "Interpretation of the Special Rule for Model Aircraft," (referred to as the "Interpretive Rule") in June 2014. The Interpretative Rule imposes new restrictions on the use of model aircraft by expanding the definition of 'aircraft' to include models, giving the FAA authority to regulate their use. We believe this is in direct contradiction to Section 336 and against the intent of Congress.

The Interpretative Rule endangers the industry that has, and continues to, support the model aircraft community and the future of this decades-old, family-oriented, and community-based recreational activity. For these reasons, AMA filed a lawsuit against the FAA's directive in September 2014, which is currently in abeyance.

Today, there are two options for model aircraft hobbyists and/or recreational hobbyists to fly. By default, recreational pilots should fly under the FAA's Small Unmanned Aircraft System (UAS) Rule, known as Part 107. This requires taking an FAA-administered test in order to receive a remote pilot certificate.

The only exception to operating under Part 107 is to fully comply with the criteria of Section 336 (FAA's Part 101 regulations) and fly within the programming of a community-based organization like AMA. Federal regulations require that everyone must operate, and be held accountable, under one of these two options.

AMA members flying in accordance with AMA's safety programming, currently operate under Section 336. Recreational operators who are not a member of a community-based organization, like AMA, do not satisfy Section 336 and are therefore mandated to follow Part 107 regulations.

Policy Recommendations

We acknowledge the need to refine the existing federal framework for the safe and responsible integration of UAS or drones into the National Airspace System. Congress should empower the FAA to address the new emerging group of recreational UAS operators while also narrowing and preserving Section 336, the Special Rule for Model Aircraft.

First, given the nearly 1 million registered recreational UAS operators, Congress should create a new regulatory path for this group, one that educates these operators about how to fly safely and places them under the full authority of the FAA.

Second, Congress should keep Section 336 and protect the valuable private-public partnerships with CBOs, and AMA should continue to manage their members as they have done safely over the past 82 years. At the same time, Congress should narrow Section 336 to clearly define which aircraft and operators satisfy the requirements for the Special Rule for Model Aircraft.

Model aviation enthusiasts have been the cradle of innovation for both the manned and unmanned communities for decades. Many mistakenly believe drones are a recent innovation. To the contrary – the AMA community has helped to develop and advance the platform since the 1930s. Even today, as drone technology continues to improve, modelers are dreaming up new ways to apply and use this technology every day.

We believe this two-pronged approach is the best path forward for the safe and responsible integration of recreational UAS into the airspace and will encourage continued technological innovation.

Conclusion

AMA's State of the Model Aviation Hobby report resulted in several key takeaways. First, the recreational community is evolving and some of the changes are neither good nor bad. The industry is learning to adapt to these new trends and the two groups - those interested in traditional models and those interested in ready-to-fly products. The popularity of drones has also had a major impact on the model aviation community.

Second, and at the same time, there are clear challenges facing the industry. Increasing online sales and decreases in U.S. manufacturing are two of the biggest trends. Some in the model aviation industry are adapting to these trends, embracing more marketing online and importing the products that their customers want to buy from overseas. These tend to be the companies that are succeeding in the model aviation industry today.

The last research finding is perhaps the most important, especially for regulators and policymakers in Washington, D.C. The threat of increased federal regulation on hobbyists, especially the possible elimination of the Special Rule for Model Aircraft, has been a disincentive for old and new hobbyists alike to keep flying model aircraft and drones. At the same time, hobbyists have also had to deal with an influx of regulations at the state level – 38 states considered new rules and ordinances in 2017 alone. Increased regulation causes confusion and creates extra work for consumers, which ultimately leads some to pursue a different activity as opposed to flying model airplanes.

The situation is close to a crisis point. If policymakers and regulators don't proceed towards preserving the Special Rule for Model Aircraft, they will likely push an already fragile industry to the breaking point.

Sadly, the decline of the hobby of flying model aircraft could have far-reaching ramifications that those outside the modeling community may not be aware of. That's because flying model aircraft is much more than just hobby. It is an effective tool for teaching science, technology, education and math (STEM) to many kids and teenagers, including more than 50,000 youth members of AMA.

For many young people, the hobby leads to successful careers in aviation and engineering – jobs that are increasingly vital to our future. In fact, many famous aviators started flying model airplanes at a young age, including astronaut Neil Armstrong and aerospace pioneer Burt Rutan.

Model aircraft enthusiasts love their hobby tremendously. At the end of the day, this is one of the most powerful and important takeaways from this research project. They have a passion for planes and aviation that is unlike any other. They are a fun-loving, enthusiastic group of people who are truly committed to their hobby. Although they are facing adversity, the model aviation industry will no doubt continue fighting to survive. For this, we know many modelers across the country are thankful.

APPENDIX

In-depth Interview Questions

General:

- What is your role/position in the organization?
- How long have you been in this position?
- What have you observed about the hobby in recent years?
- Do you see any trends, positive or negative, in the hobby? How would you describe what's hap pening in your own words?
- Have new technology or entrants into the industry affected the hobby? If so, in what way and can you provide examples?
- What do you see happening at hobby shows or competitions? What's new and what is not so popular anymore?

Regulations:

- Do customers, staff, colleagues or friends talk about regulations? Federal, state or local?
- If they discuss regulations, what specific regulations do they talk about most? What do they say?
- How do these regulations influence the hobby? Would you describe this influence as positive, negative or neutral? Why?
- What regulations do you believe are most helpful and conversely, most harmful for the hobby overall? For you personally or your work or both?
- Specifically, what do you believe are the effects of these regulations? Can you provide any exam ples or anecdotes?

Retail:

- How do you define the market/hobby that you are in?
- Talk about sales of traditional model aircraft. What have you seen over the last few years?
- Do you have any data available that would back up these examples and trends? Sales online vs. in-person, number of brick and mortar stores?
- How many people do you employ, how has that changed? Have you had to lay anyone off?
- Who is the average model aircraft customer? Who is the average drone customer? How is this changing?

Other:

- Do you notice any geographic trends in the hobby?
- Are there areas more popular or less popular for model aircraft or drones than another? Where are most hobby stores located?
- Do you find that the hobby of model aviation and/or UAS leads to aviation-related careers? Do you know anyone who is an example?

List of Participating Organizations

Balsa USA
201 3rd Ave, Menominee, MI 49858

Bob Smith Industries
8060 Morro Rd, Atascadero, CA 93422

Castle Creations, Inc.
540 N Rogers Rd, Olathe, KS 66062

Dave Brown Products
4560 Layhigh Rd, Hamilton, OH 45013

Desert Aircraft
1815 S Research Loop, Tucson, AZ 85710

Hitec RCD USA, Inc.
12115 Paine St, Poway, CA 92064

Hobbico
2904 Research Rd, Champaign, IL 61822

Hobby Bench
8058 N 19th Ave, Phoenix, AZ 85021

HobbyTown USA
1133 Libra Dr, Lincoln, NE 68512

House of Balsa, Inc.
10101 Yucca Rd, Adelanto, CA 92301

Luke's RC Planes
7188 Warren-Sharon Rd, Brookfield Township, OH 44403
*Now out of business

Pegasus Hobbies
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