

Testimony of
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Before the
U.S. House of Representatives
Committee on Small Business

Hearing on
Taking Flight: Small Business Utilization of Unmanned Aircraft.

July 15, 2015

Good morning Chairman Chabot, Ranking Member Velazquez and Members of the Committee. It's a pleasure to be here today to discuss an entrepreneur's perspective on the emerging unmanned aircraft systems industry.

Opening Comments

Unmanned systems hold the potential to truly revolutionize our economy and way of life in the United States. Unmanned Aircraft Systems, or UAS, provide innovative new tools to the common man, which are being employed in uncommon ways. A new industry is being born resulting in the creation of many new small businesses.

UAS enjoy wide coverage in the media. However, much of it is negative due to the irresponsible behavior of those who don't know or don't follow the rules. All of us in this industry are genuinely concerned about the proper use of UAS and want to see violators dealt with comprehensively and effectively. We understand and appreciate the need for rules.

However, the highly restricted nature of the current interim rules and the slow pace of permanent rulemaking continue to stifle the ability of small business to capitalize on this market's potential. Furthermore, the lack of permanent, uniform rules is spurring state and local governments to establish their own restrictions that are creating an inconsistent patchwork that will be difficult for small business to navigate.

Small business people like me are slugging their way through the obstacles and bureaucracy to fulfill our dreams of creating this new industry. We are pioneers, determined to succeed and believe the country and world will be beneficiaries. I welcome the opportunity to be here today to inform the Committee of our story and explore how Congress can foster a more accommodating environment for small business, which also ensures safe operations and protects privacy.

Creating a Startup UAS Company

My colleagues and I created 3D Aerial Solutions, LLC in 2013 to leverage our expertise working with military unmanned aircraft and transition advanced technology know-how to solve civilian problems. We focus on applications that utilize:

- Automated flight planning and aircraft control
- Automated sensor control and data processing
- Advanced man-machine interfaces

We self-funded 3D Aerial through an initial round of owner-investment and began buying aircraft and equipment. We purchased a senseFly eBee aircraft because it is highly automated, easy to use, and precise. We are now a sales agent for this product line. We began flying under Academy of Model Aeronautics (AMA) 'hobbyist' rules and became experts on this equipment.

3D Aerial became an affiliate member of The Entrepreneur's Center, a technology business incubator in Dayton, OH, to gain access to business advice and meeting facilities. This is proving to be a positive relationship from which we are pursuing additional investment funding for capital investment and business expansion.

Well-intentioned state economic development funding is now being deployed to help foster the creation of new businesses in my area, and includes a special interest in the UAS industry. However, it appears to be directed primarily to public colleges and universities and has been of no benefit to the startup of private companies like 3D Aerial Solutions.

Getting our Wings

Despite owning aircraft we were expert at flying, our small private business was not eligible to apply for a Certificate of Authorization (COA) in order to fly commercially. We were limited to demonstration flights and we began marketing future projects with no idea when we would be allowed to perform them.

3D Aerial believes we in the UAS industry have a responsibility to reach out and educate the public of the benefits and restrictions associated with responsible UAS operation. To this end, we started the Dayton Drone Users Group for community outreach and completed a volunteer community service project, producing a promotional video for a local YMCA camp.

We collaborated with the Ohio/Indiana UAS Center and Test Complex and were able to fly on a COA they established. For the most part, however, we spent a year and a half in a holding pattern awaiting authority to make money flying unmanned aircraft.

3D Aerial submitted our request for a FAA Modernization and Reform Act of 2012 (Pub. L 112-95) Section 333 Exemption on October 14, 2014. We received and responded to a FAA's request for information in February and were granted an exemption on March 3, 2015. We were the 2nd company in Ohio to be granted a Section 333 exemption.

3D Aerial received the corresponding COA on March 23. It took over a month to get the registration for our eBee aircraft from the FAA, which came May 7th. With these steps complete, we are now authorized to legally perform commercial flying services, limited to only flights of the eBee aircraft and only for the agricultural applications that we requested. The blanket COA allows us to operate throughout the United States but is subject to a large number of significant restrictions.

Benefits of UAS to Agriculture

Precision Agriculture is an information and technology-based agricultural management system used to identify, analyze and manage variability within fields for optimum profitability, sustainability and environmental protection (ref. USDA web site). These practices allow producers to determine precisely what their needs are for fertilizer, herbicide insecticide and water at every point throughout a field. Modern farm equipment allows them to apply exactly the prescribed amounts at the required location to maximize yield. This saves farmers money, maximizes yield reduces environmental risk from over application of unnecessary chemicals.

Aerial imaging using satellites and manned aircraft has been used for years in agriculture to augment on the ground techniques of soil sampling and crop scouting to support precision agriculture. Field techniques are highly accurate, but are labor intensive, time consuming and result in limited sampling. Aerial imaging offers greater coverage by sampling every point in the field at the camera's image resolution. Small UAS like our eBee can fly much lower than manned aircraft and can offer extremely high image resolution (to less than 1 inch per image pixel). They can also operate very inexpensively and virtually "on-demand".

What the Images Tell You

The images record reflected sunlight at different wavelengths, or 'colors'. Different cameras are used to collect in different spectral bands (i.e. visible, near infrared and thermal infrared) to provide a variety of techniques for analysis. Multispectral cameras efficiently collect multiple colors simultaneously.

Early in the season, farmers may be imaging to perform plant counting, so areas that don't initiate can be replanted. Throughout the season, producers are looking for things like chlorophyll indication, plant stress, and moisture analysis. These conditions and more can be detected and localized in the field through the proper processing of aerial imagery using the various colors.

Collected images are ortho-rectified and geo-registered so each point in an image can be tied to its corresponding location on the ground. Image processing software

stitches these images together into high-resolution, wide area 'maps' called orthomosaics. Also, 3 dimensional point clouds can be extracted through triangulation processing. Image analysis software applies algorithms to compute vegetation indices and other health metrics. These can be used to create treatments to address various crop health problems. These prescriptions can be turned into a geographic 'shapefile' and loaded onto farm equipment for precision application of nutrients, etc.

3D Aerial is now providing UAS flight services to perform aerial imaging of crops using the eBee. We also process the imagery into the desired image products, which are provided to the farmer. We are in the process of hiring more pilots and buying more aircraft.

Permanent Rules

The FAA has stepped up the issuance of the Section 333 exemptions and 714 exemptions approved as of the end of June 2015 (ref: Bloomberg News).

The FAA issued its Notice of Proposed Rule Making (NPRM) for Operation and Certification of Small UAS on February 23, 2015. Implementation of final rules is not expected until mid 2016 at the earliest. While there are still many restrictions, the current rules as proposed will represent a big step forward for the small UAS industry.

Positive aspects:

- *Pilot certification requirements are reduced.* A full private pilot's license is not required.
- *No FAA airworthiness certification required.*
- *Aircraft performance limits accommodate operating range.* These will foster broad range of commercial UAS applications.
- *Most of the remaining requirements are similar to what we operate under now.*

3D Aerial's concerns as a small business operator:

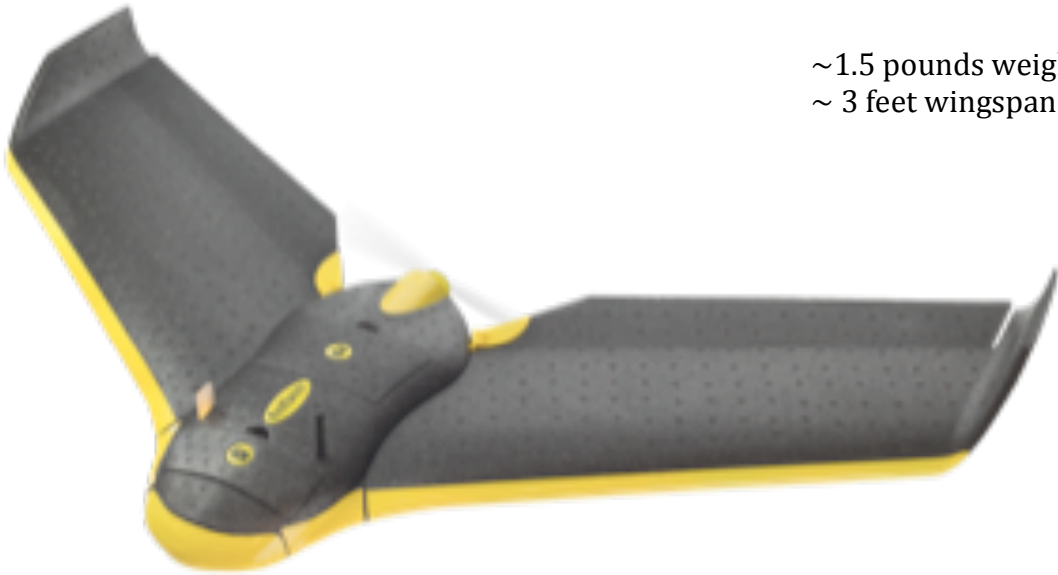
- *Cost to gain FAA operator certification.* The NRPM's Regulatory Flexibility Determination estimates that out of pocket costs for a small UAS operator to be FAA certified is less than \$300. This estimate appears quite low. Specific training and testing requirements are currently unknown.
- *Phase in period for compliance with the new rules.* Will currently approved operators (with private pilots with 2nd class medical certificates) be suddenly ineligible to perform their duties until new certification requirements are met?
- *Impact of state and local rules restricting UAS operations.* Will our small business be forced to learn and comply with a wide variety of rules that change state-by-state and city-by-city?

- *Enforcement of regulations.* Will FAA have the ability to prevent UAS businesses that don't have the certifications and don't follow the rules from operating and undercutting business from those of us who do?

In Summary

It's exciting to be on the ground floor of the emerging commercial small UAS industry. If fostered through a reasonable balance of regulations to protect the national airspace and accommodating economic policy, small businesses will be a significant engine of growth, delivering on the promise of new jobs and an expanded tax base that will benefit our economy. Furthermore, the advanced technical capability we offer today will continue to improve and provide growing value to our society. On behalf of my colleagues at 3D Aerial Solutions, I thank you for allowing the opportunity to speak to you today.

SenseFly eBee Aircraft:



~1.5 pounds weight
~ 3 feet wingspan

Automated flight planning, automated flight control, automated camera control.



How it works:



eBee Operations



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