

Making Drone Technology Credible for Surveyors and Engineers

By Logan Campbell





It wasn't so long ago that the only time a surveyor or engineer would ever operate a drone was in their free time. In industries like surveying and engineering, accuracy and reliability are absolutely essential, and so surveyors have been rightly skeptical to adopt the technology until it can be proven to be reliably accurate. Today though, surveyors are doing more with less, and have quantified a 90% time savings when using the technology. Nonetheless, many people within the surveying and engineering professions still look on drone people with a very skeptical eye.

That's understandable, and I've seen many people burned by getting bad data out of drones. Even more unfortunate is seeing the people out there who are claiming to have the skills to provide the mapping services required for a given job without being able to back it up. Sometimes it's just a matter of people getting ahead of themselves. I run into many drone pilots who are excellent pilots with impeccable safety records. Many of them are extremely skilled artists and filmmakers as well. But that simply isn't the same thing as a scientist who can accurately capture and process data. It's especially frus-

trating when a company hires a pilot who thinks they know surveying, only to get inaccurate or unreliable data. This makes the company think that drones altogether are worthless, which obviously isn't true.



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It takes a lot of skill to get survey-grade accuracy out of a drone. There are dozens of small mistakes that can impact accuracy, and the standard operating procedures we've developed and refined at Aerotashave allowed us to create incredible efficiencies for our clients using drones. However, they're also the result of American Society for Photogrammetry and Remote Sensing (ASPRS) standards for positional

accuracy to measure and verify the accuracy of your data. That's just part of the reason that I wanted to be one of the first people to actually get certified when ASPRS launched the UAS Technical Symposium certification program at Commercial UAV Expo last year.

The exam covered a much broader set of topics than I would have initially expected. It covered everything from how drones work, through the basics of photogrammetry, all the way to the fundamental physics and math that supports it. I had to draw on my experience from every part of my professional career to be able to pass it, and the validity that certification represents is and will be a big deal for my business. It's an even bigger deal for the survey industry as a whole though.

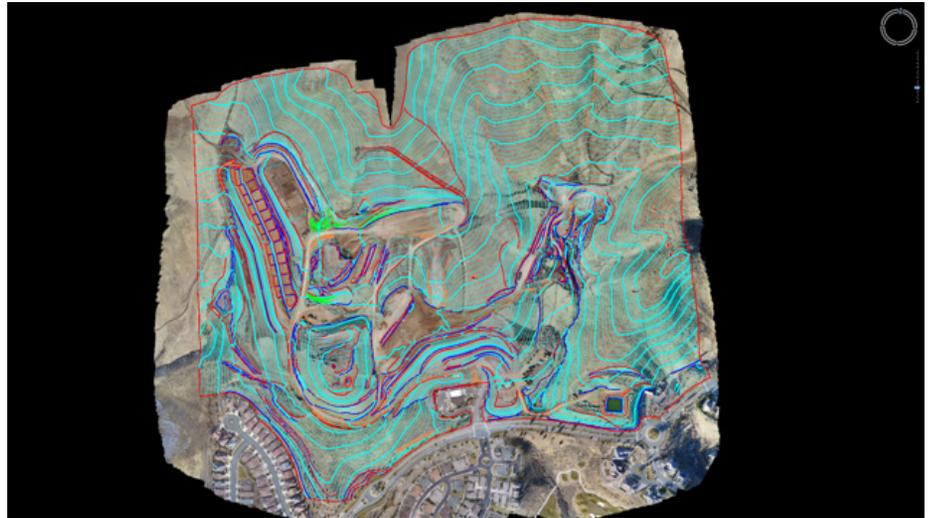


ASPRS certification matters for a variety of reasons, but for me, it all comes down to credibility. While I first sought out the certification for the perceived value, going through the process of achieving the certification has yielded more practical value than I would have initially thought. The exposure to a much broader set of photogrammetry, remote sensing, lidar, and even radar technology has really helped me understand how aerial surveying can best be done. And that's value Aerotas delivers to our clients every day.

That credibility really does mean something out in the field, where uneducated pilots can mess up an entire project by gathering bad data. We've seen flights with just a single line of oblique photos, and two or three

ground control points, where the client expects perfect topographical data as a result. As one might expect, the final data doesn't pass any quality tests, and the data has to be thrown out. However, the bigger problems associated with not having this credibility typically come up during data processing and accuracy measurement.

One notable example of this came from a linear mission project that a drone service provider flew over a 2,000 foot stretch of road. The surveyor then set 5 ground control points in a straight line down the center of the road. In processing the data, all the automated checks came out okay, and so the service provider delivered the data. What they didn't notice, is that when you have control directly in a line, the resulting data might twist around the line, leading to bad data. This is exactly what happened, and the client wound up bringing in Aerotas so that professional photogrammetrists could spot these problems and solve them. Those issues were the result of working with pilots who didn't have a deep understanding of photogrammetry that is at the core of ASPRS certification.



A look at what it means to properly capture and process data gathered via a drone.

decades of experience with photogrammetry to work in proving that photogrammetry data truly can be reliable. What's also great is that they're technologically agnostic. Whether you capture data with a camera on a stick, or on a drone, or an aircraft, or even a satellite, their experience matters. After all, the end user doesn't care whether there was a person in the cockpit or not, they care if the data was accurate. This has allowed ASPRS to smoothly make the transition from manned-aircraft photogrammetry to drone-based photogrammetry. ASPRS also has an eye on the future as well, making sure that they are ready for when lidar technology becomes more mainstream.

That's the reason we'll likely get to a point when being an ASPRS Certified Mapping Scientist is a required part of any land surveying or civil engineering job. Anyone can say they know how to do aerial mapping, but someone with an ASPRS certification can actually prove it. You wouldn't hire a doctor that isn't licensed to practice medicine, and you shouldn't hire a photogrammetrist that doesn't have an ASPRS certification. Understanding the science and practice behind surveyors should be a requirement for these types of jobs, and ASPRS certification is the best way for someone to prove they have that understanding.

Being a Certified Mapping Scientist means you comprehend the principles of mapping from aerial imagery, and can apply that knowledge in a way that makes sense for real-world projects. There are so many different types of surveys that can be completed with a drone, and they are very different. A topographic map of a real estate subdivision will require a very different workflow than a 3D reconstruction of



"There are so many different types of surveys that can be completed with a drone, and they are very different. A topographic map of a real estate subdivision will require a very different workflow than a 3D reconstruction of a historical building facade."



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ASPRS provides the academic rigor that drone surveying needs for surveyors and engineers to actually trust photogrammetry data. ASPRS puts



a historical building facade. Having the expertise to prevent errors before they happen, and catch any errors in a timely manner is the best way to save money. Several companies are starting to make drone-specific lidar sensors, but understanding where and how these tools can be best utilized isn't a simple endeavor. These are just a few of the topics that ASPRS Certified Mapping Scientists can talk through in detail.

If you want to get deeper into the field of photogrammetry, the ASPRS UAS Technical Symposium is a wonderful place to do just that. Being a professional in any career requires having the appropriate knowledge and experience to be able to provide a real value to your clients, and ASPRS makes the path to gaining that knowledge and experience a lot easier than figuring things out by making mistakes.

Whether you are just getting started on your journey, or just about to take the certification exam like I was, it gives the information you need to become better at high accuracy drone surveying.

The attitudes and opinions of surveyors and engineers when it comes to drone technology have certainly changed over the past few years, as many have come to realize that drones are ultimately tools to enable new workflows. There's still work to be done on this front though, and that's part of the reason the ASPRS UAS Technical Symposium is so important to the industry as a whole. It has already helped to enable the credibility of the technology, and that credibility is only going to become more powerful and widespread as more and more professionals understand the impact it can

enable for accuracy and reliability, as well as the bottom line.

About the Author

Logan Campbell is the founder and CEO of Aerotas. Aerotas provides complete drone solutions for land surveyors, including drone program implementation and drone photogrammetry & CAD linework drafting service. Logan holds ASPRS UAS Mapping Scientist Certificate #002. He graduated from Harvard Business School in 2015 and brings experience in a broad range of industries, including agriculture, real estate, and finance. A lifelong tinkerer and avid drone enthusiast, Logan also has hundreds of hours of flight experience over a broad set of different drone types.

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