



Trimble

PROGRESSIVE CONSTRUCTION FIRMS MOBILIZE TO PUT UAVS TO WORK

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The Year Ahead: Industry Leaders Build a UAV Flight Path for Construction

The Federal Aviation Administration's (FAA) interim policy to speed up airspace authorizations with Section 333 exemptions for small (55 lbs or less) commercial UAVs has sparked considerable interest in the building and construction world. Consider that in July 2015, the FAA granted over 150 exemptions under Section 333, with many more requests still under review. Many of these exemptions were for construction related applications such as aerial surveying, construction site inspection and monitoring, oil/gas exploration and pipeline inspections, and aerial photography and 3D mapping.

Jon Amdur, vice president and program manager for AECOM's Unmanned Aerial Systems (DCS Division) explains, "UAVs are forever changing engineering and consulting as we know it. We now have the opportunity to increase the volume, accuracy and speed in which we collect and analyze data to help us make better decisions. We're entering a whole new world of construction."

"We live in a data-driven world," adds Scott Widmann, with DPR Construction's UAV group responsible for implementation, operation and innovation. "As we compile and organize more data, we are able to make more informed decisions that lead to a variety of solutions for our clients. UAVs offer us a powerful and unmatched ability to gather data quickly, easily and accurately. The data they create often leads to better work planning and clear communication that is facilitating safer operations. We simply can't afford not to adopt and adapt these systems."

In advance of the Commercial UAV Expo in October, here's where a few top firms are finding the greatest benefit today and some insight into how the value of these high-powered data gathering solutions will grow in the very near future.



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Flying Forward

AECOM, a global engineering and construction firm, is one of a number of companies who received an FAA 333 waiver this year. The waiver allows the company to use UAVs for aerial photography, acquisition and construction site inspection and fits nicely in the company's growing efforts to commercialize the technology in the construction sector.

Amdur says, "We've been using UAVs for a number of years and are proceeding to use the technology to gather data for construction, oil/gas surveys, wildlife management and much more—now we are working to spread the word to all of our internal construction programs."

When asked about the challenges of enterprise-wide deployment, Amdur says he believes that expanding the application of UAVs is more about education. He continues, "Most construction managers don't fully understand the extent of UAV capabilities, available sensors, the evolving applications. These systems can do so much more than take pictures. We better understand daily and even, hourly production rates, which allow us to manage our jobs smarter. It also lets us bid future work with a better understanding of production costs and timing. I can't over emphasize that all this can be done safer than ever before. We don't have to put surveyors in the way of construction or slow down operations."

Increasingly common UAV construction applications include the ability to track daily changes on a construction site, calculate stockpile volumes and manage safety programs.

Barrick's Senior Manager of Mining Information Technology, Iain Allen agrees. He says, "Today, we use UAVs primarily for volumetric change measurements in our ore stockpiles. We have also used drones to manage construction projects on our sites, including tailings storage facilities and leach pads."

Allen recalls one such case where engineers had a problem with the construction of a leach pad. It is critical that the "over-liner" is always placed with a thickness of at least 70cm. This was proving problematic until the team deployed a UAV to track daily progress. This aerial view, and the volumetric data provided by the drone, allowed the engineers to resolve the issue. "These pads are vital to our business. We lose considerable time and money when construction challenges arise. Using UAV data, we were able to provide daily status reports in 3D, allowing our engineers to effectively manage and fine tune leach pad construction. That's true business value that we are building on."

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Flying Forward

One Barrick mine has almost completely replaced the traditional surveying function, including a laser scanner, with a fleet of UAVs. He adds, “The aggregate cost of the UAVs is about \$100,000, which is considerably less than the \$180,000 laser scanner. The data is just as good, is collected faster and from areas the laser scanner cannot access, and is a safer way to collect stockpile data.”

Widmann believes one of the biggest emerging applications for UAVs will be to gather as-built data and verify installed systems as a structure is built. He adds, “Drones can be equipped to take HD or 360 photos and video, take multispectral imagery, or scan sites with LIDAR. In our pursuit of delivering a perfect product, we can communicate that we are installing work to contract specifications and design intent quickly, easily, and accurately.”

DPR has used high-definition aerial imagery captured by UAVs to create project site maps to communicate scheduled work, coordinate site logistics—such as material deliveries and equipment movement—while capturing project progress for owners, subcontractors, and the surrounding community.

DPR is also exploring the use of UAVs equipped with laser scanners for exterior inspections and equipped with thermal imaging sensors for mapping water or air intrusions. These applications will strongly depend on the rapidly advancing market of powerful, lightweight sensors.

AECOM, Barrick and DPR are also tracking advancements in GPS-equipped and GPS-free solutions as well as lighter weight, higher resolution cameras and sensors.



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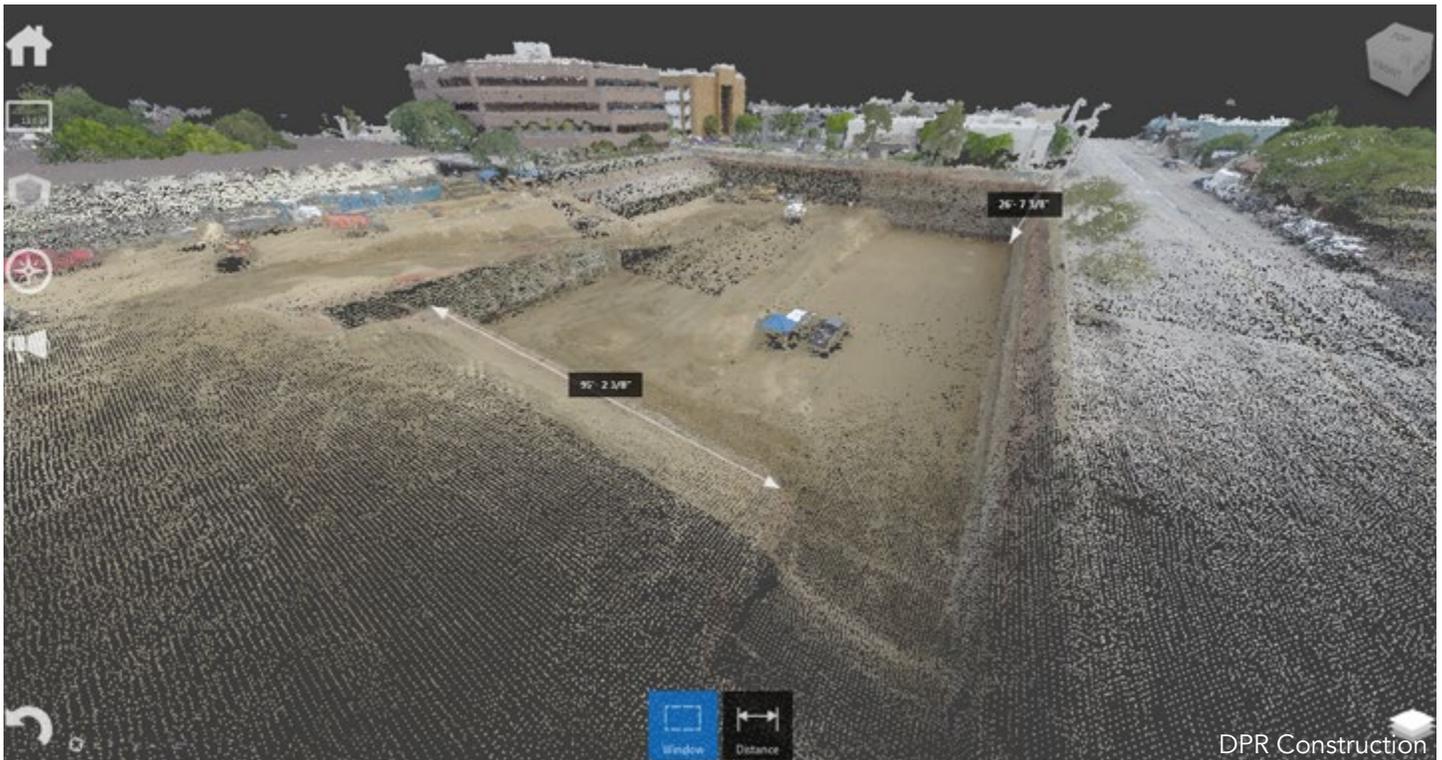
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Collective Data

Current and emerging data gathering capabilities in the air and on land (i.e., mobile apps) have also sparked greater need to focus on data management and integration.

Widmann recently summarized the challenge, saying, "The workflow to gather UAV data safely on a construction project, plus the infrastructure to post-process the data—which often includes several thousand photos, photogrammetry, laser scans and so forth—into a useful map requires planning. It is a challenge to create a system that collects and compiles all the data in a useful, easily shareable format in a live collaborative environment."

Amdur adds, "Data crunching can be complex or really straightforward. For instance, many systems, such as Skycatch, include online services for post processing data. We also have that capability in house. Down the road, we see the data gathered from a UAV incorporated into our 3D and BIM."



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Looking Ahead

Most industry watchers agree that UAV applications are just beginning to emerge and that there will be some surprises on the horizon.

“UAVs for construction are a pretty wild ride right now. I believe what we do today is different than what we’ll do in five years,” says Amdur. “By then, we’ll have a much broader array of solutions and considerably improved sensors and systems. We’ll be able to get better data and process that data in varying ways.” To prepare, Amdur noted his firm will continue to build relationships with leading solution providers to facilitate the easy, quick integration of datasets into our models and analysis tools.

Barrick’s Allen agrees, saying, “The whole field is changing. We really have no idea about how we’ll be using UAVs in five years, but we expect it to be very different. The possibilities are endless—and we look forward to our part in that evolution.”

When asked about the future of UAVs in construction, Widmann summarizes, “UAVs are a hardware component that enable us to perform reality capture at a drastically reduced price point. Over time, the real game changer is likely to be an overall increase in the number of mobile sensors on our project sites (robots or otherwise). Regardless, the data that these flying sensors are capturing and the network that has grown around what to do with that data has enabled us to implement a variety of unique tools that help address the challenges of our clients’ projects. Now that near-live aerial data is available to us, we can weave it into existing construction processes and have it act as a hub that encourages communication between team members while documenting construction progress/history.”



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October 5-7, 2015 | Las Vegas

Learn more about the challenges and opportunities for UAVs in construction and meet the UAV experts interviewed for this article at [Commercial UAV Expo](#), taking place October 5-7, 2015 in Las Vegas.



Jon Amdur – AECOM
Vice President
Manager Unmanned Aerial Systems

[Jon Amdur](#) is Vice President at AECOM and Manager of the company's Commercial Unmanned Aerial Systems (UAS) global program. AECOM has 100,000 employees in 150 countries and is one of the world's largest Engineering Consulting firms. Jon's focus has been on how UAS can improve the speed, accuracy, and safety of data collection all while reducing costs and connecting those capabilities with the needs of industry. He is a member of the Commercial UAV Expo Advisory Board.



Iain Allen – Barrick Gold
Senior Manager, GIS

[Iain Allen](#) has more than 25 years' experience in the mining industry, ranging from mapping and drilling in remote areas of Canada to his current position monitoring new and innovative technologies relevant to spatial data collection, management and analysis for Barrick Gold, with a particular interest in the growing use of UAVs. He is a member of the Commercial UAV Expo Advisory Board.



Scott Widmann – DPR Construction
Project Manager

[Scott Widmann](#) is a project manager at DPR Construction who specializes in 3D design coordination and unmanned aerial systems. He first started flying RC aircraft as a hobbyist in 2011 and since then has worked to develop drone airframes and data management systems that provide information to construction crews in the field. His overarching goal is to develop map systems that compile information from a variety of sources and process it into suggested search results for team members across DPR. He is a presenter at Commercial UAV Expo, where he will be speaking in the sessions:

- ["Insurance Considerations"](#) Wednesday October 7, at 10:00am
- ["Reality Capture in Construction – Drone Data"](#) Wednesday October 7 at 2:00pm

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About Commercial UAV Expo

[Commercial UAV Expo](#) is a conference and exhibition exclusively focused on the commercial sUAS (small Unmanned Aerial Systems) market in North America for:

- Surveying & Mapping
- Civil Infrastructure
- Process, Power & Utilities
- Mining
- Construction
- Law Enforcement, Security & Emergency Response
- Precision Agriculture

In the [Conference](#) Program, UAV industry experts will share key insights into the issues large enterprise asset owners face when implementing UAS, including systems selection and integration; developing enterprise workflows, guidelines and policies; data management and integration; and legal, safety and regulatory considerations. Plenary sessions and panels cover topics of interesting to all end-users regardless of industry while breakout sessions focus on UAV technology, applications and opportunities in the vertical markets listed above.

The international [Exhibition](#) includes sUAS vendors, drone manufacturers, component and sensor manufacturers, software providers and service companies.

About The Author

Vicki Speed is a freelance writer specializing in the building and construction industry. Over the last 25 years, she has written for a range of publications including Engineering News-Record, Inside Unmanned Systems, Velocity and other trade publications in the water/wastewater, transportation and power/energy market. Vicki has a bachelor's degree in Aerospace Engineering and master's degree in Mechanical Engineering. She can be reached at vickispeed1@comcast.net.