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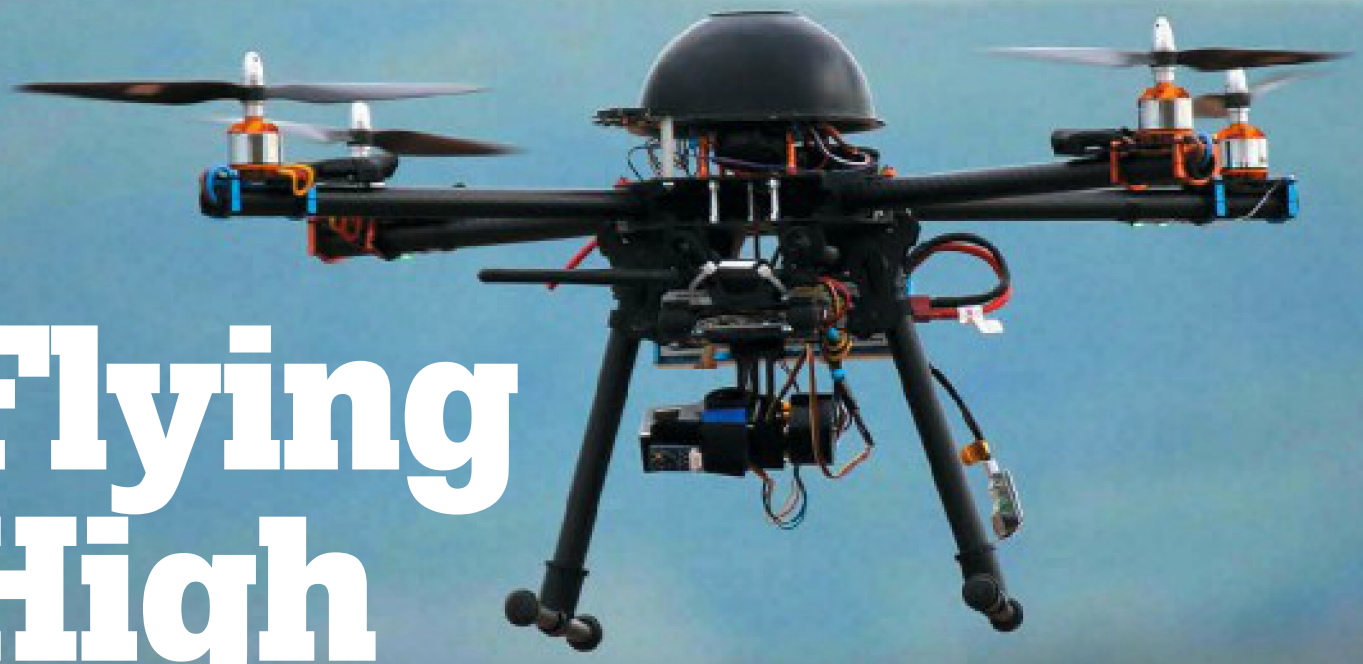

Flying High

Why the industry needs drones to get off the ground

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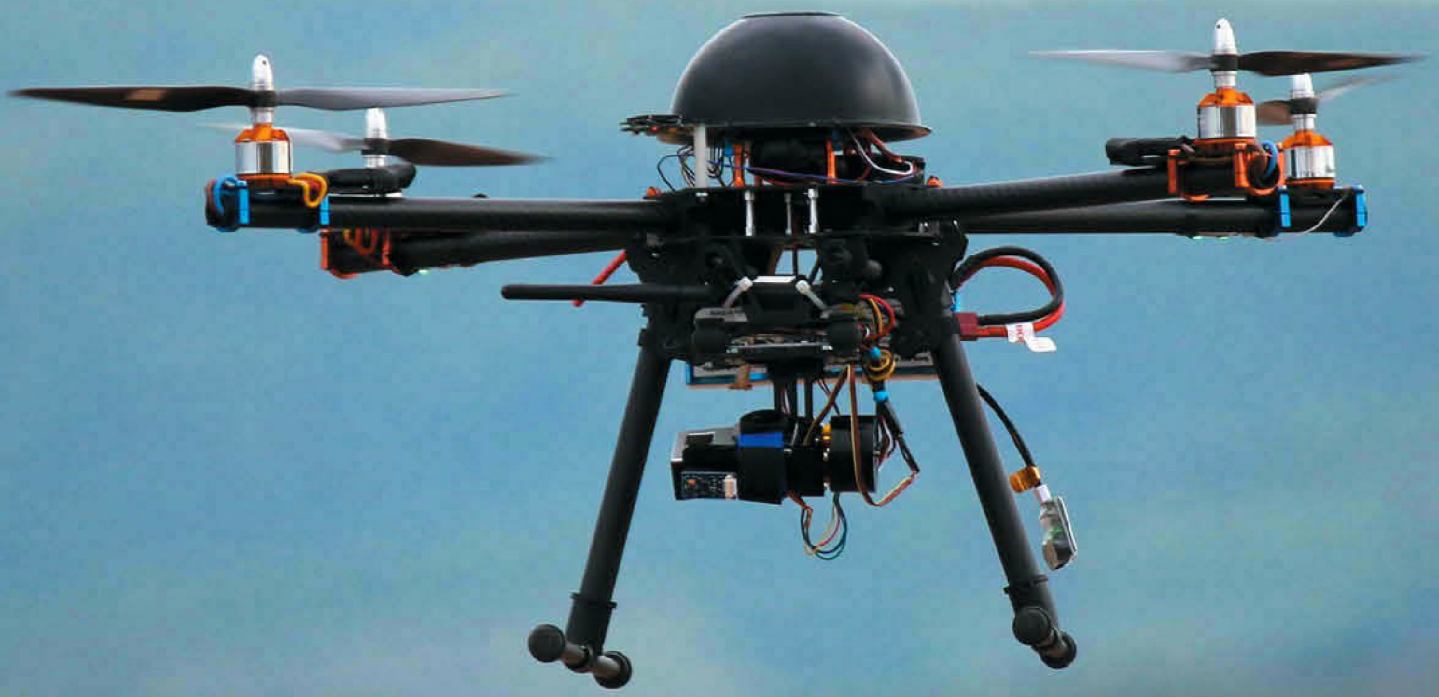


WHY THE INDUSTRY NEEDS DRONES TO GET OFF THE GROUND

BY KATIE KUEHNER-HEBERT

THERE IS GREAT POTENTIAL for use of unmanned aerial vehicles, commonly referred to as drones, on construction jobsites for all kinds of purposes – including creating marketing and business development materials, as well as for determining whether work is being performed safely, with quality and in compliance with all regulations. In the future, drones may even be able to haul small parts and handheld tools across jobsites or to high places.

Currently, the U.S. Federal Aviation Administration (FAA) is only granting permission to use drones commercially for experimental or exceptional purposes. However, the agency in February proposed a rule to allow those who hold a recreational or sport pilot certificate to operate drones under 55 pounds for "non-recreational operations," provided they fly in daylight, remain under 400 feet and continuously maintain visual line of sight, among other proposed restrictions.

The rule would allow, but not require, an operator to work with a visual observer who would maintain constant visual contact with the aircraft. The operator would still need to be able to see the drone with unaided vision, except for glasses. The FAA is asking for comments on whether the rules should permit operations beyond line of sight, and if so, what the appropriate limits should be.

The agency is also asking the public to comment on another possible classification, an additional, "more flexible" framework for "micro" drones less than 4.4 pounds, to determine whether the FAA should include this option as part of its final rule.

Experts say the benefits of drone use on construction jobsites would be enormous, whether or not contractors ultimately are able to operate the aerial vehicles in-house or outsource to companies authorized by the FAA.

Javier Irizarry, an associate professor at the School of Building Construction at the Georgia Institute of Technology in Atlanta, has been conducting research to determine how drones could be integrated into the construction workflow to increase productivity and safety. Irizarry has been partnering with unmanned aerial systems company 3D Robotics in Berkeley, California to conduct experiments on closed jobsites of several members of AGC Georgia.

"It's all about having a different perspective on the jobsite, and drones enable contractors to view places where they personally cannot go without costly equipment — including logistics, traffic, material delivery and storage, housekeeping on the jobsite," Irizarry says.

BNBuilders Inc. in Seattle, an AGC of Washington member, previously used drones on jobsites until the FAA put a hold on widespread commercial use until its rules were clarified, says Pete Campbell, safety director.

"We started using drones mostly for generating marketing materials and aerial views of our projects, but in that process we found out that we could use drones for all kinds of things," Campbell says. "We could take a close-up aerial photo of a concrete pour, to document the locations of post-tension cables, conduits and rebar built into the concrete. It's relatively difficult to document that without drones, so we were able to take photos with drones, and within minutes photoshop them over as-built plans to determine exactly what is located in the concrete."

Drones could also be used to photograph documentation of steel erectors to determine how much completion there is on steel roofs, and to inspect high roofs without having to actually go up on the roof, he says. Infrared cameras could be installed on the drones to detect problems with water infiltration on building envelopes.

David de Yarza, director of innovation at BNBuilders Inc., said that more vendors are developing drones to be automated, contending it's safer. Moreover, soon there may even be drones that can change their batteries themselves and then automatically fly over jobsites three or four times a day.

Rob McKinney, safety director, J.M. Wilkerson Construction Co. Inc. of Marietta, Georgia, an AGC Georgia member, says that drones could be used to conduct safety inspections "with a better set of eyes."

"They could also be used to determine whether there are quality issues, such as leakage issues, in places where I can't easily go to, such as on top of roofs," McKinney says.

It also could be possible to install thermal imaging cameras on the bottom of drones, to see where there may be a heat loss or an air conditioning loss problem within the envelope of a building, says Cory Montgomery, project manager at R. K. Redding Construction Inc. in Bremen, Georgia, another AGC Georgia member.

For years, contractors have employed helicopter pilots to take photos or create videos of construction progress or completed projects, which typically is very expensive, says James Benham, president of JBKnowledge Inc., an AGC Georgia and TEXO member, in Bryan, Texas. Using drones could be a much less costly alternative.

"Contractors could use these photos and videos for business development pitches, to determine existing conditions before projects start, as well as to monitor progress during construction, and determine results after projects are completed," Benham says. "Other interesting research includes the use of aerial photography for photogrammetry, and the use of two-dimensional photos to make a 3D point cloud, to model progress on jobsites."

This also would allow contractors to better compare BIM models, as they could produce 3D point clouds to automatically interpret what has been accomplished, and what was supposed to have been accomplished on any given day on the jobsite, he says. Drones are very well suited for taking these kinds of images, and they can take any degrees. Drones could also take infrared photos and scan jobsites with onboard 3D scanners.

"I feel like SkyCatch is leading the way in this space with a cloud-controlled autonomous drone that even recharges itself and flies all day over a jobsite according to scan areas the user defines in a web browser," Benham says. "The drone captures images and 3D scans and automatically relays all of this data back to the cloud system to compare, manage, view and measure daily scans and models of the jobsite."

Other drone manufacturers are considering whether to develop drones that, in the future, could haul cargo across jobsites, Benham says.

"I think we're years away from drones replacing cranes or cargo-bearing helicopters, but perhaps future drones can handle carrying small parts and small handheld tools," he says.

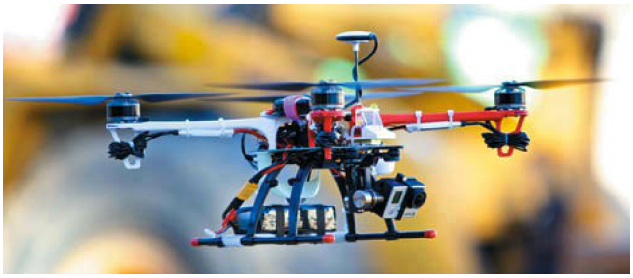


Photo courtesy of David de Yarza.

Soon there may even be drones that can change their batteries themselves and then automatically fly over jobsites three or four times a day.

Currently, the weight of an average drone ranges from a half a pound to several pounds, so future drones that could haul small parts, tools and construction material would have to have much bigger engines and bigger batteries.

The "touchpoint" between JBKnowledge and drones is through the firm's SmartReality mobile app, which is augmented reality through the use of handhelds mounted on, or integrated with, drones, Benham says. Drones would be able to fly over jobsites and take photos of laminated paper targets, to render 3D models to scale on a dirt jobsite.

"This is the merging of virtual data with real world imagery, and contractors would be able show these models on their phones with video fed live from the air," he says. "It's currently in the early stages, proof of concept internally, but we see a lot of potential in the next two years as the imaging technology improves."

The base hardware is still needed to get better production-ready positioning systems, Benham says. But currently SmartReality apps are commercially available for use for someone holding their mobile devices and seeing augmented reality near field or using Oculus Rift or Oculus Gear VR to view the models in virtual reality.

JBKnowledge launched the app suite in October 2013 and started selling production projects last April. There are now thousands of registered users of the app, and dozens of projects have been completed.

Ernest Brown, a construction and aviation attorney at the San Francisco law firm, Smith Currie & Hancock LLP, a member of multiple AGC chapters, says that contractors should consider outsourcing drone use to a company that hold FAA's initial permits for specific uses, such as to perform elevated inspections of power lines or structural steel frame buildings, or to determine waterproofing details on otherwise inaccessible windows.

"Let a fully permitted and aviation-insured company perform these tasks," Brown says. "Drones currently can't legally be used for any commercial purpose, so if you are an employee of a construction company and you use a drone in business, then you are breaking the law. You may very well be facing fines and even imprisonment — if you are so unfortunate to be spotted buzzing people in public or crashing a prototype on the White House lawn."

Several insurance carriers are now offering "one-off" UAV coverage under a separate aviation policy, says John L Babel, senior risk engineering consultant, North American construction at XL Group, an Austin Chapter member.

Such aviation policies cover bodily injury and physical damage, and may also cover consequential damages and catastrophic loss, Babel says. "Companies considering UAV use should examine their CGL policy. Is the UAV considered an 'excluded aircraft under their CGL policy?" he says. "Many are now considered aircraft."

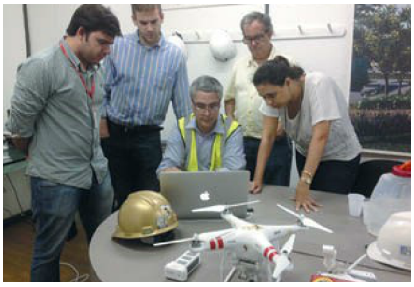
Bradley Meinhardt, area president and managing director, aviation, Arthur J. Gallagher Risk Management Services, Inc., a member of multiple AGC chapters, says, "If you operate drones for commercial purposes and you do not have the appropriate waiver from the FAA, you risk the potential of the insurance not responding to a claim if the drone causes property damages or bodily injury."

To address the use of small drones used to document jobsites, the International Organization for Standardization is working on an "unmanned aerial vehicle endorsement" to the contractor's general liability policy, which is expected for implementation in June, Babel says. This coverage will be for bodily injury and physical damage.

Drone manufacturers are considering whether to develop drones that, in the future, could haul cargo across jobsites.

If contractors don't already use aircraft, or have an aviation policy, they can either ask their insurance broker and carrier for a separate aviation policy, or ask for the ISO UAV endorsement to their general liability policy that would cover the incidental use of drones, he says.

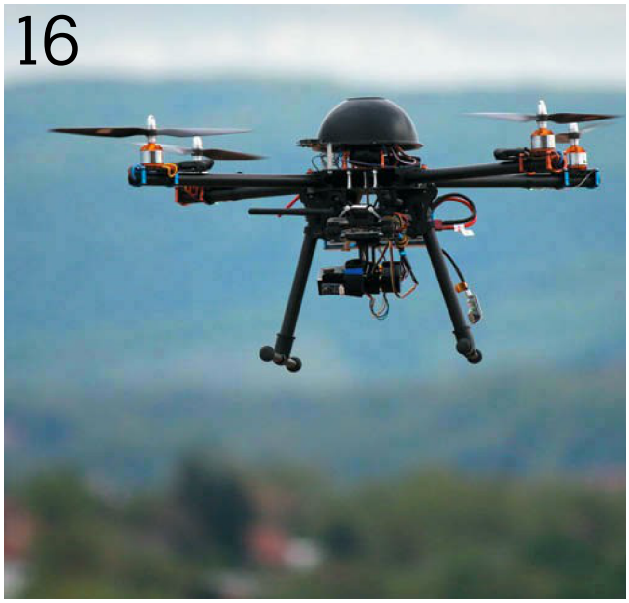
"Contractors will have to decide whether to take on the additional risk of operating UAVs in-house, or subcontracting that work," Babel says. "Naturally, the subcontractor would have to go through rigorous screening by the contractor to ensure that proper insurance coverage, safety procedures and risk management are in place."



Georgia Institute of Technology researcher Javier Irizarry (center) and colleagues analyze data collected by a drone.

If the contractor decides to take on the risk of drone operation, there are a "plethora" of issues to consider, including the type of drone needed, pilot training, developing flight plans, operating area, regulations triggered by use of the drone in that area, weather, and other hazards, he says.

"With respect to operator or pilot training, Australia and Canada have very specific training for UAV pilots that does not require the operator to necessarily be a general aviation pilot, but still possess the skill set for understanding civil aviation and national airspace, and hopefully the FAA will require something similar," Babel says. ◆



On the cover: The industry remains grounded while the FAA finalizes its rules on the commercial use of unmanned aerial vehicles.

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