The Value of Drones

Written by: Debra Wood for Constructor Magazine

As increasing numbers of contractors try unmanned aerial vehicles, they are finding more and more ways drones can help them avoid delays, rework, safety issues, and increased costs.

"Drone technology has proven time and time again to be valuable assets for project teams," says Erik Gronneberg, an assistant project manager and drone pilot with Columbia in North Reading, Massachusetts. "It's able to identify issues early before they become big problems, saving both time and money."

During the COVID-19 pandemic, Columbia used its drone photos to help with communication regarding project progress, saving architects and owners travel time.

"Sometimes our customers pay for DroneDeploy through their travel budget, because they do not have to travel to the jobsite," says Mike Winn, CEO of DroneDeploy of San Francisco.

But drone benefits are not limited to sharing images.

"Drone technology gives Brasfield & Gorrie the ability to provide clients and other team members with aerial progress images and videos, area-of-interest inspection photos, high-resolution aerial maps, elevation maps, 3D models, and 3D point clouds," says Ryan Hittie, innovation and operational technology specialist at Brasfield & Gorrie in Birmingham, Alabama.

"Using this information, we can calculate complex measurements, integrate site conditions with the VDC (virtual design and construction) model, monitor progress, estimate earthwork, create as-built documentation, and enhance QA/QC (quality assurance/quality control) inspections," Hittie adds.

As contractors fly drones, they discover new uses for the technology.

"I am trying to expand our use of drone photos at McHugh by creating 3D point clouds and models using Pix4D," says Dan Jordan, VDC preconstruction manager at James McHugh Construction Co. in Chicago. "It's more than a tool to take pictures with and can increase productivity throughout our company."

GETTING THE MOST FROM A DRONE

The more contractors use drones, the more value they find.

Most firms use drones to fly over a construction site and take photos or videos to document progress.

Gronneberg typically builds a flight plan using DroneDeploy software and flies a drone weekly over each project he is monitoring for Columbia. The drone takes a photo every second and creates as many as 1,000 photographs during a flight. The device follows the same flight path every time, enabling the Columbia team to compare changes from week to week.

Once the drone completes its flight, Gronneberg uploads the images to DroneDeploy's cloud-based software, which stitches them together into a high-resolution image of the entire site and a 3D model, which can be pulled into a CAD file or building information modeling (BIM). He also can overlay the image with drawings to assess whether the work completed aligns with plan specifications.

Columbia also uses drone images for elevation studies prior to the start of construction, and for safety inspections, logistics planning, and calculating volume of materials on the site.

Some firms use drones to check forms and embed placements before pouring concrete, while others may use the image to complete a final inspection. Additionally, contractors may fly a drone to create a more accurate estimate and bid. Civil as well as vertical contractors can experience a drone's benefits.

On the ONE22ONE project in Nashville, Brasfield & Gorrie deployed a drone before groundbreaking and continued to use it to monitor excavation.

"After completing excavation, we created a drone point cloud model and integrated it into the BIM model," Hittie says. "This revealed that a few faces needed to be cut back so they would not interfere with the formwork for the walls, which would be poured shortly after excavation. The team was able to use the drone data to remove that obstacle, and they maintained the pour schedule."

Contractors also use drone images for marketing and communication with clients.

"Drone images can be used throughout the entire construction process," Jordan says. "They are just the start of the technology stack that is coming down the pipeline to improve communications with clients."

FLYING A DRONE

While it may seem that starting a drone program might be as easy as ordering a commercial drone online, starting at about $3,000 and paying thousands of dollars for software to process the images, contractors should exercise caution and do their homework first.

"Don't just go out and buy a drone and start taking pictures," Gronneberg advises. "You want to do some research and due diligence and make sure you do it safely and in the right way."

To begin with, to fly a drone commercially, the pilot must obtain a Remote Pilot Certificate from the Federal Aviation Administration (FAA), which requires passing the initial aeronautical knowledge exam: "Unmanned Aircraft General — Small" and complete biannual recurrent training (https://www.faa.gov/uas/commercial_operators/become_a_drone_pilot/).

"Drone operations are regulated by the federal government," Hittie says. "Complying with their policies is of the utmost importance for all companies hoping to utilize drone technology."

Jordan recommends creating a drone plan, which should include who can fly the drone and how many hours of experience that person should have; when to fly; when not to fly; avoiding flights over workers, such as flying early in the morning; and not creating disruptions to the construction.

"Flying the drone is the easy part," Jordan explains. "Complying with the regulations and insurance is the difficult part."

For instance, contractors must discuss insurance coverage with their carrier to ensure proper protection for the company from liabilities. Many cities, towns, and states try to regulate drones and contractors should be mindful of those restrictions.

Drone cameras and the resulting images create large files, which are best managed by a cloud-based sharing site, such as Dropbox or a proprietary drone software provider. A two-minute video produces a 4-gigabyte file and 260 2- to 5- megabyte photos stitched together can take up a gigabyte of space.

"Most reputable online services have and will share their security credentials and protocol so you can rest assured your data will be safe from unwelcomed parties," Hittie says.

In addition to its files residing with DroneDeploy, Columbia also keeps them on an in-house server. Brasfield & Gorrie has done the same in some cases.

"If you need heavy civil analysis, it might be worth purchasing a custom-built computer to process data in-house," Hittie advises. "If owners and other project stakeholders want to collaborate with you, an online flight planner/processing platform might be the direction you choose to go."

SUBCONTRACTING DRONE FLIGHTS

Contractors can outsource drone flying and delivery of the photos to companies, such as DroneDeploy, which also develops reports and stores the files on its cloud.

"There are definite advantages to outsourcing, especially if you want to investigate the use of the tool," says Jordan, explaining the contractor avoids needing to build a program, recruit and train an employee to become a pilot, and figure out data management of the large files drones create. "The drone operators that have survived are specialized. That skill set is generally worth the price, because they can anticipate your needs and provide well-executed deliverables."

Insurance remains a concern even with outsourcing, Jordan adds. He also recommends investigating how many hours the pilot has flown and if the pilot has flown similar types of jobsites.

"As with any external service, contractors might lose flexibility and the cost advantage that comes with having an in-house program," Hittie adds. "I haven't met too many service providers who will wake up at 2 a.m. to fly a four-hour concrete pour — at least not without a hefty fee."

Winn reports that drone images have become more detailed and accurate.

Some clients now expect to see some form of drone technology used in project pursuit presentations, Hittie says, making it a worthwhile investment.

"Drones can be a powerful tool that can save your jobs time and money and increase efficiency and clarity," Gronneberg concludes. "Once people experience the benefits, they are always impressed and see the value."

About the Article

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