

# MAXIMIZING DRONE TECHNOLOGY ON CONSTRUCTION PROJECTS

With rapid advancements in unmanned aerial vehicles (drones), operating a drone has never been cheaper or easier. As a result, many construction companies have explored using the technology to capitalize on the various benefits they provide. With drone technology, organizations can:

- Improve surveying processes
- Safely and efficiently perform building inspections
- Visually communicate the status of a project
- Leverage a competitive marketing advantage

Bringing a drone onto a project site, though, does not inherently add value to that project. The contractor must know for what objectives they use drones, how to properly operate them, and what to do with all their gathered data.

**Improve traditional methods of site surveying and mapping.** Compared to human surveying techniques, aerial surveying performed via drones is way more efficient. With site surveying, drones provide lower operating costs to perform the activity, better accessibility, and an ability to efficiently capture a broad field of view from a variety of perspectives. Using 3D photogrammetry, project teams can create models allowing them to orient structures and elevations across a site and access inaccessible or potentially dangerous areas.

**Communicate a project's status.** Drones provide superior perspective and maneuverability for capturing project photography and video. With drone control software, such as the Drone Deploy app, the pilot can direct a drone to a precise location with GPS coordinate data. With this automated approach, a project team can consistently capture pictures or video from the same perspective. Through this application, construction teams can create engaging project timelapses to communicate a project's progress to stakeholders.

Additionally, project teams can use these images to illustrate the real-time status of a project to stakeholders and trade contractors. For example, project teams can create a 2D or 3D model of the job site by capturing images from several elevations, and then overlay the design documents to confirm the accuracy of as-built conditions. With this application, construction managers can eliminate any doubt surrounding appropriate task completion.

**Efficiently perform inspections.** Drones provide the ability to inspect out-of-reach areas that otherwise would require the labor-intensive setup of scaffolding or the use of a vehicle like a boom lift. With drones, project teams can eliminate the risks associated with high-elevation inspections, like inspecting caulking joints on a tall building. Drones can be a part of your organization's approach to supporting its safety culture. Additionally, instead of waiting days for an onsite inspector to arrive, project teams can use drones to facilitate a virtual inspection. Drones equipped with a 4k lens can capture sufficient-quality video so offsite experts can verify the proper installation of almost any type of work, including MEP and drywall.

**Assess building conditions with thermal sensing equipment.** Drones equipped with a thermal camera can capture heat signatures emitting from the building's façade. This application is useful for identifying:

- air leaks
- water infiltration and humidity
- defective insulation
- the energy-efficiency of the building's façade and systems

Many structural issues, like those listed above, can be identified with thermal sensing equipment, making drone technology an effective tool for eliminating issues before they escalate into costly fixes.

**Enhance your marketing capacities.** Marketing departments can use these drone-captured images in proposals and interviews to illustrate their organization's approach to completing projects. With drones, project teams can assess the actual conditions of a structure or site, providing more accurate cost estimating services, and the project team can build a schedule around real data. Through these benefits, marketing teams can create more persuasive proposals. Additionally, organizations can use the drone to capture a birds-eye perspective during events, like at column-raising ceremonies or topping-out events, for use across social media and other digital platforms. Furthermore, organizations can use drone technology to attract younger generations into the construction industry.

# MAXIMIZING DRONE TECHNOLOGY ON CONSTRUCTION PROJECTS

## USING DRONES ON THE JOB SITE

At Vaughn Construction, our virtual design construction (VDC) department handles all drone services in-house. We currently use the DJI Mavic 2 Enterprise Dual drone model, outfitted with a 4K lens and thermal lens, and are continually researching new drone models as they become available. The VDC team organized a file structure by project to house the data captured by the drones for efficient recall. The VDC team trains individuals on how to use the drones and operate the Drone Deploy software. Through their efforts, each project team can use the drones on their project site. On top of controlling the drones, each pilot is responsible for manually taking the images and videos from the drone's SD card and inputting them into the project's image folder as well as publishing the captures to Drone Deploy.

**Training pilots.** The Federal Aviation Administration (FAA) regulates commercial drone usage. Anybody on a jobsite using a drone must receive a drone license by passing a test administered virtually by FAA. In preparation for this difficult exam, the VDC department provides an online training program. Every 24 months thereafter, pilots must take a recurring exam to remain licensed to fly the drone. Proactively managing each pilot's license status will help ensure your organization's project teams comply with FAA rules.

## PROJECT EXAMPLES

- On the University of Texas Southwestern Medical Center's Brain Institute and Cancer Center project, we used drone technology to determine how much soil had been hauled offsite. The project team flew the drone over the dirt pile to capture the status of the soil pile; with this image, the project team overlaid a rendering of the original pile of soil and calculated that the trade contractor had removed 42,000 CY of soil at that time. With this raw data, the project team could communicate to the Owner and design team that this portion of the project was on schedule, and that the trade contractor had been paid proportionally for the work completed.
- On the University of North Texas's new Frisco Campus project, while installing new underground utilities, the project team captured the as-built conditions of these utilities with geotagging software. With geotagging, the project team knew exactly where on the 50-acre site the trade contractors had laid the piping. Later, when planning the installation of equipment like new light poles, the project team used this real data to prevent clashes in the field.
- On Texas A&M University's Research Innovation Center, we used drones to navigate pre-determined routes and communicate our site progress to Texas A&M weekly. Drone technology avoided having multiple inspectors on the sloped roof. We maneuvered the drone for the inspector to visually inspect each individual weld through a livestream without exposing the inspection team to any hazards.
- On Austin Community College District's Public Safety Training Center project, we used drones to take aerial and progress photos, verify utility and structural installations, and analyze site conditions. We overlaid our drone surveys with drawings and satellite images to verify the project layout and to better plan our site logistics and controls.
- On Southern Methodist University's Harold Clark Simmons Hall project, the project team needed to inspect the window detailing of the out-of-reach cupola's windows to verify it could properly prevent water infiltration. They used a drone to inspect the cupola's windows in lieu of someone physically inspecting the window located on its roof, four stories high.
- The University of North Texas at Dallas requested that we inspect a stone, which seemed ready to fall over a pedestrian area, on a dormitory façade. Because the stone was located six stories high, reaching it would have been impractical without drone technology. With the drone, we maneuvered the stone to assess its condition and implement a strategy to resolve the issue with the Owner, all from the convenience of a trailer.

## ABOUT VAUGHN CONSTRUCTION

Vaughn Construction is a Texas-based construction company that specializes in construction, renovations and additions to civic, health-care, education and research facilities. The privately-held company has offices in Austin, Bryan/College Station, Dallas/Fort Worth, El Paso, Houston, Lubbock, San Antonio, and the Texas Medical Center (Houston). For additional information, visit [www.vaughnconstruction.com](http://www.vaughnconstruction.com).