ConnexiCore

SIMPLIFIED **UAV** DRONE FLIGHT SERVICES & SOLUTIONS

Improving data collection, analytics, & decision support for industry.

UAV Benefits for the Architectural, Engineering & Construction Industry

CHALLENGE: PROVE VALUE

Value of Drones Throughout the Construction Lifecycle

Aerial inspections and audits produce comprehensive data that supports all aspects of planning, compliance, and monitoring in the Building Design, Engineering, and Construction industries. UAV drones provide decision makers with the ability to easily assess construction sites, track construction progress, and inspect all types of structures for possible issues. Drones are now serious business in construction planning and management.

A drone program is a terrific investment for construction companies right now. They can be used through the entire construction lifecycle, from feasibility and bidding to handover and maintenance. Here's how.

Feasibility and Bidding

Drones can be equipped with cameras, geo-location sensors, infrared sensors, and more. The data can then be imported into survey software to create 3D models of existing conditions. This helps with determining feasibility, understanding constructability, and helping owners visualize what the project will look like in the end. It can also be used to identify areas of risk.

Design and Pre-Construction

Drone surveys help inject real-world conditions into design and constructability conversations. The ability to easily capture site information also improves the rate at which the design can be iterated on. Get accurate aerial information on site conditions and allow all stakeholders to visualize the scope of the project and foresee any potential challenges.

Construction

During the construction phase, drones have many current and potential uses. They help to track and communicate progress, track and manage materials and assets, reduce theft, improve owner visibility, increase safety, and provide valuable information for improving design changes. They also create a valuable documentation trail in case of problems.

Handover and Maintenance

Drone imagery and video of the final product can create customer satisfaction during handover. This data also has a practical value in property management and maintenance, providing owners and managers with visual data regarding the as-built condition of the building. Additionally, drones equipped with thermal imaging capability can detect heat leaks in a building envelope or along a long run of underground utility piping.

Project Documentation & Tracking

Gain valuable insight into the status of your projects and track progress over time. Recurring aerial imagery can improve safety, logistics and stakeholder updates, while integrating seamlessly with your BIM workflows.

Volumetrics

Recurring volumetric analysis can accurately track material usage or project progress and can compare proposed grading plans with true topographic conditions.

Structure Inspections

Reduce hazardous man hours and increase cost efficiency with aerial data for damage or defect detection and analysis on buildings and other structures.

In-House Versus Outsourcing

While the immediate cost of owning a drone has decreased substantially, the cost does not end with the purchase. It's important to also consider the costs of accessories, use, and maintenance. There is additional equipment to be purchased, planning and setup considerations, maintenance, liability, and regulations to consider. Additionally, the cost of operator headcount must be considered.

Some companies find that outsourcing their drone operation provides a better outcome. When making the decision, the three key considerations should be cost, liability, and resource capacity. Whichever you decide, it's important to ensure that your team owns the process.

CHALLENGE: DEMONSTRATE EFFICIENCY

Drone Mapping for Construction & Earthwork Work Flow Improvement

Leaders in construction and excavation can measure profitability throughout projects by accurately tracking progress and resources while invoicing clients in real-time using our managed solution. Earthwork is when you move soil or rock on the earth's surface. Earthwork can include land grading to reconfigure a site's topography such as preparing level ground for a highway or skyscraper, or to stabilize steep slopes to prevent landslides. The survey drone allows earthmovers to reach areas often inaccessible on foot and difficult to accurately survey with traditional methods as manned helicopters or fixed-wing aircraft.

Mass Haul

The cost of earthwork is a function of the amount of soil hauled times the distance. The goal of mass haul planning is to optimize these amounts to minimize the total cost.

Cut and Fill

The cut is the earth above the desired ground level that needs to be removed, and the fill is the area below the desired ground level that needs to be filled in. Ideally the cuts are moved to the fills so resources don't have to be used to transport additional earth in or out. There are several ways to estimate cut and fill quantities, including the cross -section and grid methods. Factors in choosing the best method include project complexity, accuracy level required and how fast the data is needed.

Soil Swell

When compressed earth is pulled out of the ground, it takes up more space in it's loose unpacked form. This phenomenon is known as swelling or fluffing. It means that 10,000 yards of earth in the ground will fill up much more space in dump trucks. This makes tracking earth moving progress almost impossible with traditional methods.

Cost of Machinery

Moving millions of cubic yards of earth requires an array of heavy construction equipment. These include such earth -moving machines as scrapers, bulldozers, dump trucks, loaders, backhoes and dragline excavators. Accurately estimating the amount of soil moved, lets you return or transfer equipment to new projects early, which can save tens of thousands of dollars a day in labor and equipment costs.

3D Volumetric Analysis

Drones can scan 2D and 3D precision maps with 3D volumetric analysis in near -real time with geo -referenced high definition images. You can accurately track regions all the way from inception to project completion and export CSV reports to easily see what's being moved when.

Difference of Opinion

Any disagreements surveyors, excavators and GCs may have over amount of dirt moved, etc. are cleared up with drone mapping data. It provides clear insight into the amount of dirt that is moved by bulldozers, etc.

- **Win more business**
- **Improve owner's visibility**
- **Iterate faster during the bid phase**
- **Improve asset and material management**
- **Improve invoicing accuracy**
- **Improve quality assurance**
- **Minimize rework**
- **Improve safety**
- **Mitigate litigation**

CHALLENGE: GETTING WITH THE PROGRAM

Manage your people, projects, and equipment

At the very heart of unmanned aerial vehicles is the ability to place a sensor – camera or otherwise - in a three dimensional space with relative ease. Throughout a development's construction phase (and even before) agreed flight paths over and around the site can be made to provide almost real time visual progress reporting for developers, stakeholders and even the people on site as an engaging record of how the project is going. Up to date and informative visual material can also be produced to evidence key commitments to local authorities or planning agencies such as parks, roads, greenspaces or tree protection orders.

BOTTOM LINE-

Win more business. Drone photography can be an important sales tool. Your improved surveying and planning capabilities will also set you apart from the competition.

Improve owner's visibility. Use drone photography to help owners visualize the final project and see how the project is progressing while under construction.

Iterate faster during the bid phase. Drone surveys can help you put the virtual design in the context of real conditions and thus better engage the entire team.

Improve asset and material management. Drones equipped with streaming video capability can help you monitor the job site for suspicious activity and identify theft as it's happening. Plus, your teams can easily monitor locations and quantities of assets and materials at a glance, to ensure it will be there when you need it.

Improve invoicing accuracy. Drones enable you to monitor work completion more effectively, and bill accordingly.

Improve quality assurance. Drones vastly increase your ability to complete quality inspections in large and hard to reach areas in an efficient manner.

Minimize rework. Increasing the number of inspections, you make enables you to catch more mistakes before they become a bigger problem, thus reducing the amount of rework needed.

Improve safety. Perform inspections in dangerous areas without putting anyone at risk. Drones also allow you to identify and mitigate potential hazards before they cause harm.

Mitigate litigation. Drones can increase site documentation to reduce the likelihood of litigation and increase your defensibility.