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Progress Reports and Monitoring Construction Jobsites Using UAV's

In the past few years, drones have become one of the most interesting and beneficial construction trends. The growth in drone activity on construction job sites has been higher than any other commercial sector. Drones can help create progress reports and monitor an entire job site for several different matters. Using drones to complete these tasks make it easier for the construction team. The research of progress reports using UAVs and the many different ways that a UAV can help monitor job sites including job site security, job site safety, and overall monitoring of the job site will be examined.

Two types of drones are typically used in construction. One is the Fixed Wing Drone. These types of drones are used in mapping and scanning over longer distances. Fixed Wing Drones are used on very large commercial job sites, railroad construction, etc. Fixed Wings can fly on a set path and can reach higher altitudes for more efficient work. However, Fixed Wing Drones are only able to fly forwards, much like an airplane. The other type of drone used is a Rotary Drone. These drones have rotary blades and are more commonly used for inspection and surveillance over short distances. For closer aerial work, Rotary Drones are the best option because they are easier to control and they can remain stable to capture pictures and other information. Rotary Drones are the most common in commercial projects and buildings.

These drones are equipped with thermal and infrared sensors, GPS, and cameras to gather information on the construction site. Information collected can be sent to a computer to be further analyzed and reviewed. With the information gathered, construction job sites can be more efficient and better managed. The features a drone can offer can help with lowering costs in time and labor. This can also cut down on the risk a company would need to take without UAVs.

The use of drones increases the visibility of job sites. Drones offer aerial views that give both the construction team and the clients a better view of the project. These views help in creating progress reports. Progress Reports are put together to show the client's progress on the project. They are also used to ensure that the construction is going along as planned and is consistent with the plans and specifications for this job. The data gathered will be used to compare the actual site construction to the architectural plans and can help discover the parts of the project that may be falling behind. Drones also help to verify if the project is on schedule as planned. This data shall be discussed at the weekly/bi-weekly/monthly progress meeting between the construction team and the client. While pictures/video from the ground or from inside the job site are useful, the aerial views that a drone can provide help to give the client a better understanding of how the project is progressing. These views are extremely helpful when the client is not available to be on the construction job site.

While progress reports are mainly put together for the client to observe, they can also be useful for the construction team. According to Big Rentz, Drones have improved internal collaboration on construction job sites by 65% by gathering real-time data and pictures when creating progress reports. While a drone is flying on the job site, it can send information, data, and pictures to a construction member's computer. Managers, architects, engineers, and workers can access this information at the same time to follow along with project progress as well as catch any mistakes that may have occurred. While using a drone to capture information, they can also create documents of the information gathered. These documents can be used in any situation that the construction team may find necessary. For example, construction contractors carry significant risk on projects. There are several opportunities for a company to lose money. The goal is to mitigate those opportunities as much as possible, whether it be construction mistakes, missed deadlines, reworking projects, or being overbilled or underpaid. The documents that these drones can provide by collecting data and information help to cover these risks. They can either catch the problem before it occurs or help to fix the problem once it happens.

Security is a tough aspect of the construction industry. Even if the job site is completely fenced off, theft can still occur. Having a large piece of construction equipment stolen can leave a company out hundreds of thousands of dollars. According to Capterra, over \$300 million worth of construction equipment is stolen from construction job sites every year. Only 25% gets recovered. Seeing these numbers proves how important project security is. Using a drone for this can significantly help reduce theft and keep the job site safe. A drone can be flown over the job site to confirm that all equipment is in a safe position and is locked if possible. Another, trickier, way a drone could be utilized for the security of a job site is to do a check if there are any non-authorized individuals on site. This method is far more advanced than a typical sign-in sheet that would be on a construction site. Drone usage can prevent theft and/or damage to the job site or equipment before it occurs.

Jobsite and worker safety is the main priority of most, if not all, construction companies. According to BIM 360 Resources, falls on construction job sites account for 39% of worker fatalities. Without the use of drones, workers have to climb to high heights and work in unstable conditions to get certain measurements or fix items. Drones can replace these workers and lower their risk of injury. Members of the construction management team can also use drones to video the entire project and check for unsafe working conditions that need to be fixed or avoided. According to Big Rentz, Drones have increased safety by 55% by replacing workers in making hard-to-reach measurements and monitoring for accidents and potential hazards. With the ability of drones to do more of the dangerous tasks, there is less of a chance for injury by the construction crew.

Drones can provide information on monitoring a job site in any way. Whether it be for security or safety data collection, counting how many workers are on the job site at one time, capturing what companies are on the job site and what they are working on, or information regarding the progress of the project. There are countless ways a drone can be useful on a construction site. According to Big Rentz, the construction industry has experienced a 239% growth in drone usage from year to year since 2016. Drones are not new to the construction industry by any means, however, contractors are beginning to realize the benefits that they create. As the industry continues to grow and construction projects become more and more complex, the use of drones will continue to rise at high percentages.

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