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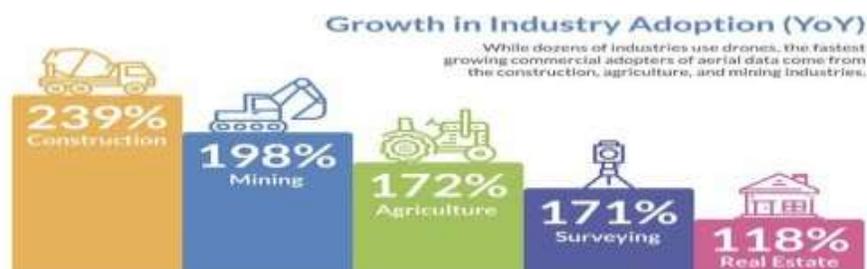
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Construction Surveying with UAVs

Today's construction industry is booming with new projects by the thousands. Like any other profession, construction companies are trying to implement new forms of technology into their work to both increase efficiency and improve quality at the same time. Using drones in the construction surveying industry is a great example of implementing new technology into the field. The current construction industry has a large problem with efficiency and completing projects on time, and drones are a great way to help reduce inefficiency in one area of the project. The use of drones in construction provides proof of timeline during any point of the project, brings accountability, decreases the costs of surveying, increases accuracy, and provides an instant image of what has been completed and what is yet to be completed.

In the last 5 years, drones have made a steady increase in presence within the construction industry. Drones are mainly used in construction for surveying and inspection. "Surveying is a profession that requires patience and accuracy. Companies across many industries need surveyors to evaluate large plots of land and provide them with detailed mapping and measurements. From construction crews to archaeologists, having an aerial view or 3D model of a worksite is essential to starting and finalizing their work. Without these images or models, workers cannot make informed plans about where to dig, what to fill, or where to start building. But surveying in the traditional methods and creating precise mapping takes time. There are many answers to how drones are used in construction. Companies need surveyors to start almost any project, but they especially require their help on large-scale builds. Drone imaging aids them in establishing plot boundaries, creating legally acceptable subdivisions, and evaluating the suitability of the land before beginning any foundations. With the provided information, construction companies can make important preliminary decisions that ensure optimal safety and legality for the project" (TOPS Marketing). This is just a briefing on how construction, both commercial and civil, can benefit from the use of drones.



Above is the industry adoption for drones in the year 2018, with construction being the highest.

As stated in the introduction, proof of progress is a large part of construction. With many investors and contractors involved, it is important to keep a current progress report so everyone involved with the project can communicate and be on the same page. “One of the biggest winners in the advent of drones in construction work has been the clients. With drones making it easier and easier for companies to provide visual data on the progress of a construction project, clients can now get quick updates on how things are proceeding. These updates include detailed maps of the entire site with GPS points, which allow you to zoom in and view small details of the area. Detailed visual reports can then be shared with stakeholders, helping everyone involved in a construction project to see what has already been done and what work is remaining” (Dukowitz).

The specifics of drone surveying take training and practice to get perfect but over time it can be done and provides a result that is easier achieved and more accurate. “A drone survey refers to the use of a drone, or unmanned aerial vehicle (UAV), to capture aerial data with downward-facing sensors, such as RGB or multispectral cameras, and LIDAR payloads. During a drone survey with an RGB camera, the ground is photographed several times from different angles, and each image is tagged with coordinates. From this data, photogrammetry software can create geo-referenced orthomosaics, elevation models, or 3D models of the project area. These maps can also be used to extract information such as highly accurate distances or volumetric measurements. Unlike manned aircraft or satellite imagery, drones can fly at a much lower altitude, making the generation of high-resolution, high-accuracy data, much faster, less expensive, and independent of atmospheric conditions such as cloud cover” (Perroud).

Along with surveying, drones are useful for many things unthought of. “Drones can be practically everywhere at the same time. They do not just reduce theft and keep workers safer; they create an around-the-clock, real-time monitoring system that has already been adopted by many construction companies. They elevate onsite security and safety by a tremendous margin” (Burger).

Another added benefit to drones in the construction industry is safety. “The ability for a drone to carry out a visual inspection of high-risk areas can save time and reduce H&S risks. Drone footage can be recorded from the safety of the site cabin and then sent to project stakeholders quickly and effectively. Site inspections can be undertaken more regularly, cover larger areas more efficiently and do this while being safer too. Using a drone to fly over a site can show new site operatives H&S risks in real-time. Enabling site managers to demonstrate moving vehicles, moving cranes, or active excavation areas, etc. Each induction would be site-specific outlining the risks that are relevant to that site and in return reduce the risk of accident or injury on each site” (Ayemba). There are many unsafe environments in construction. The use of drones prevents workers from sometimes having to enter the hazard. “Drones can also assist owners and contractors in inspecting both long horizontal projects, such as power lines, pipelines, and rail lines, as well as tall vertical structures, such as bridges and high rises” (DeCamara).

To touch on regulation, The Federal Aviation Administration (FAA) has a set of basic construction standards for the use of drones in the construction industry. In 2016, the FAA introduced regulations for the commercial use of small unmanned aircraft systems, in 14 CFR. Part 107. “Drones are becoming increasingly valuable to the construction industry for their ability to improve safety, gather data and perform challenging work on the job site. Here are a few points on the key elements of the proposal, as well as a roundup of articles covering the new drone regulation proposal. Drones will only be able to fly

during daylight. Drones subject to a 55 lb. weight limit. Drone operation will require certification that will have to be renewed every 2 years. Certified operators must be at least 17 years old and have passed a written exam. The maximum altitude proposed is 400 ft. The maximum speed proposed is 100 mph. Drones must be close enough to operators to be seen by the naked eye” (RedTeam).

In conclusion, the use of drones in construction surveying is greatly beneficial to everyone involved. Drones help increase efficiency in many ways, provide current images or videos of progress which can be recorded for timelines, can map and provide very detailed models of the areas surveyed, provide security, provide a safer work environment, and much more. Like any other profession, construction companies are trying to implement new forms of technology into their work to both increase efficiency and improve quality at the same time, and using drones in the construction surveying industry is a great example of implementing new technology into the field. The use of drones in the industry has ‘propelled’ in recent years and there is no sign of that slowing as new-found uses for drones continue daily.

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