
Drone Technology in Architecture, Engineering and Construction

A SoKo Aerial Proposal

**FEBRUARY 2, 2021
SOKO AERIAL ROBOTICS
Burma Camp**

Introduction

Small unmanned aerial vehicles (UAVs), commonly called drones, are gaining in popularity not only among the general public and consumers, but also among professionals working in the AEC industry.

Architectural projects stand to benefit from an aerial vantage point and thanks to drone technology, it is quicker and easier than ever to get an eye in the sky that is able to collect video, photos and data that you can put to work on a project.

Drones can assist with activities such as site inspection, planning and health and safety thanks to their ability to deliver a bird's eye view of the entire construction area. In more detail, drones can be used to quickly and efficiently survey a job site and build maps; this service drastically reduces the need for human resources, heavy machinery and expensive surveying tools, which means surveying projects are completed in half the time, with less money spent and with more accurate results. They can also be used to show clients progress of projects, monitor sites and keep the project both on track and to budget.

Drone Technology Applications in the AEC Industry

Drones and aerial data provide construction engineers, architects and project managers with accurate processed data which can be used to make faster and better decisions. Drone data is so versatile, it can be used throughout the

entire construction lifecycle, from feasibility and tendering to delivery and maintenance.

- **Site Planning:** Drones can be used in taking high-resolution images which can be used to accurately plan project sites before actual construction commences. The very same images collected by drones can then be used as part of the planning process, providing the foundation for the work of others, such as architects, local authorities and engineers. With drone orthophotos and 3D models, you can overlay buildings onto their environment to get a clear sense of how a new building might look next to an existing one. You can assess how the new project will impact the area from both a practical and an aesthetic viewpoint. 3D models also allow analysis and visualization of cast shadows and outlooks/views. You can also extract precise data such as curbs or manholes measurements and import them into your CAD or GIS software to enrich existing data.

These images provide a quick overview of the project site hence bringing great insight to the project planning process.

- **Safe and Quick Inspections of Structures:** Drones make it much easier to inspect tall structures. Cranes, scaffoldings, towers, and skyscrapers can all be investigated in real-time; sending live footage and images of any anomalies to their controllers who are safely away from any dangers that can result from the inspections.

The use of drones provides a quicker means through which these inspections can be done as compared to sending a team of inspectors up to investigate the integrity of structures. It is also safer, too, as the only

potential for damage is to the drone itself and not to a team of rope or scaffold access personnel. The footage from drones also covers more area and records every square centimeter of the structures being inspected, making it close to impossible to miss anything important. Ensuring quality maintenance of assets is not always easy to do at a reasonable cost, hence by sending drones in the air, companies can visually inspect large assets or those located in hard-to-reach areas more quickly and cost-effectively.

- **Health and Safety Inductions:** Through the use of drones equipped with sophisticated cameras, it is possible to produce walkthrough video presentations which reflect the hazards and conditions of construction projects.
This allows for the quick and efficient update of site plans to show exactly where different works are taking place so as to ensure the safety of project operatives.
- **Projects Progress Monitoring:** SoKo Aerial provides project managers with drone mapping services which prove to be indispensable tools during all phases of construction. During the construction phase, site managers have to control and validate completed work in order to permit continued work. The faster you are able to check and validate a task, the faster you can move on to the next task, saving time along the overall construction process. Given the relatively low cost of using a drone to collect visual data on a construction site, it is possible to carry out surveys on a regular basis and build up a record of progress. This

timeline of information can be used to control and validate tasks more quickly, saving time and ensuring that deadlines are met.

- **As-built vs. as-design:** One of the most striking advantages of accurate site visualization is the ability to overlay the CAD on the orthophoto generated from drone and aerial data. This allows site managers and contractors to compare what was actually built with the intended plan and make sure that they fit together. Site managers can then go ahead to identify differences between planned and real-time progress and steer projects accordingly.

Benefits Drones bring to Construction, Infrastructural and Architectural Projects

The first and most obvious benefit of drones in the construction industry is the ability to obtain precise visual data of a site faster and cheaper than with terrestrial techniques or manned aircrafts. However, that's only one of the many benefits drones can bring to construction companies.

- **Fast, reproducible on-demand image acquisition:** On a construction site, there is always a contractor, an engineering company, an earthmoving company and a number of subcontractors to execute specialized work. In addition to involving a lot of teams, deadlines are tight and require frequently-updated records to drive decisions and align multiple stakeholders. This is where a major advantage of drones

lies for construction site managers. Drones provide a complete picture of the construction site on-demand and within a few hours. The sharp, detailed images produced by drones enable site managers to track work progress and make accurate decisions based on up-to-date data and comprehensive reconstructed site maps instead of relying on plans or incomplete data that may not reflect reality. The aerial images also act as a visual aid when communicating with all parties, so that everyone can see for themselves what has already been done and what remains to be done.

- **Accurate and comprehensive data:** In addition to having detailed aerial photographs, the same data collected by a drone in a single flight provides a complete map of the site with GPS points, in 2D and 3D. These maps allow accurate measurements of distances, surfaces, elevations and volumes. From there, photogrammetry software also generates elevation models such as digital terrain models (DTMs) and digital surface models (DSMs).
- **Cost and time saving:** Drones significantly reduce time-intensive data collection in the field and its associated labor costs. It would be very time-consuming to go outside and walk for three to four hours and get about 500 points and make calculations while a drone could be flown for a half an hour to collect and process aerial data, to produce the same or even better results. In the end, drone data saves time and money across all stages of a construction project.

- **Better documentation and faster reconciliation with subcontractors:** Easy and repeated surveying means that the site will have more complete documentation throughout its life cycle. In cases where a project progresses on top of faulty construction, it is difficult if not impossible to trace where the mistake was made or who made it. Drone data provides clear, accurate and retrievable documentation at frequent points in the construction process. This allows stakeholders to review and pinpoint where mistakes occurred and settle these disputes out of court since the evidence is clearer. Another benefit of better documentation is that the data collected can be analysed to draw lessons from it and compare it for benchmarking purposes.
- **Increased safety:** Being able to monitor and inspect hard-to-reach places or areas in the middle of machinery without entering them obviously reduces workers' exposure to accidents. Add to this that safety on a construction site is also about securing the work area as accessible only to qualified personnel. So, drone imagery can help to locate a breach in the perimeter of a site more quickly, preventing civilian entry and potential accidents. But the greatest improvements in safety can be found in inspections and maintenance work. Instead of climbing electric poles, using ropes to inspect features of a facility, or working along busy highways, workers can fly a drone and inspect images without putting themselves at risk.