

# CONSTRUCTION TODAY

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## TAKING TECHNOLOGY TO NEW HEIGHTS

STAY AHEAD OF THE CURVE:  
TRENDS AND PREDICTIONS FROM THE EXPERTS

*plus*

The STEM Education Effect

Commercial Real Estate Outlook

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IS YOUR ORGANIZATION

READY FOR  
**DRONES?**



by Kenneth S. Sands II, Ph.D., Assistant Teaching Professor, Construction Management, Drexel University

Unmanned aerial vehicles (UAVs), more commonly referred to as drones, is an emerging technology that has become a buzzword in the construction sector over the past few years, and there is no sign that interest in the adoption and use of this innovation will dissipate anytime soon. According to JBKnowledge's 2017 Construction Technology Report, which surveyed over 2,600 construction professionals regarding the use of technology in the construction industry, the use of drones has been identified as the technology that a significant percent of construction companies are currently using or are testing out for future use. Considering the significant impact this adoption is having on the construction industry, there is value in at least understanding the technology and how it may impact your future in the industry.

The use of drones in the construction industry can vary based on scope of work, repeatable workflows, and an organization's ability and desire to innovate. The typical use of drones for various construction types involves capturing aerial progress photos, providing significant value for this workflow; however, photogrammetry, surveying, surveillance, high-risk inspections, asset management, big data accumulation, and other functions that may be tied to possible cost savings, safety, and marketing efforts, may be worth exploration. The internet is littered with information on potential uses of drones for various sectors of the construction industry, but first, as an organization yet to consider or adopt, certain implications of use should be known.

### Implications for your organization

Once you've done a thorough internal assessment of your organization to understand how drone operations may be able to improve any of your organizational workflows or add value in some way, you should then consider the investment that will be undertaken. For our purposes, we will consider that drone operations will be done in-house and that your organization has very low experience with commercial drone operations.

Commercial operations of a drone require that an individual in your organization be

commercially certified as a drone pilot (\$150 for the aeronautical knowledge exam) and they must recertify every two years (\$150). Also, considering that the aeronautical knowledge exam for this certification is specific to areas such as airspace classifications, weather, small unmanned aircraft loading, radio communication, aeronautical decision-making and judgment, airport operations, and other topics, a training program is highly advised (approximately \$299 for an online training course) and there needs to be study hours dedicated to this material to successfully pass the first time around (variable salary cost).

Concurrently or thereafter, a decision needs to be made about the system to employ. As stated by JBKnowledge's construction technology report, DJI is the brand of choice for drone operations in construction; therefore, they will serve as the exemplar provider for this article.

There are various components that make up the unmanned aerial system (UAS) which, for this definition, includes everything necessary to perform successful flight operations again and again. The core of this UAS will include the UAV (drone), remote-control device, and a basic camera with gimbal (\$1,500 to \$4,000 for typical construction drone operations). You will need a dedicated tablet for the system, preferably with cellular data connectivity (approximately \$500 for iPad mini plus monthly data plan cost, which is variable by carrier) and software for flight operations, mapping, and processing of data captured (approximately \$250 per month). You must protect your equipment with protective gear (\$50 to \$200), ensure proper data storage (approximately \$35 to \$750, depending on device type), and have replacement propellers on hand and other spare parts to avoid interruption of operations (\$10 to \$20 per part). Considering that flight operations per drone last roughly 20 to 30 minutes on a single charge, you will need extra batteries (approximately \$160 per battery) to avoid interruption. The basic system can be enhanced with a variety of additional cameras and sensors such as forward looking infrared (FLIR) (approximately \$1,000 to \$3,200).

The dedicated remote pilot-in-command (PIC) will need actual experience with piloting the drone possibly requiring in-person, hands-on training (approximately \$600) in addition to the hours necessary for out-of-training practice (variable salary cost) and possible coordination/training of and visual observers (VO) working with the PIC. Risk aversion is essential to construction operations, and an organization must employ a risk control technique that ensures protection in the event of an incident due to drone operations, which may include losses to the drone, project assets, or even injury to personnel. Therefore, liability insurance (damage and claims to third parties) and drone hull insurance (damage related to the UAV) is necessary and can cost as little as \$500 to \$800 a year per drone, depending on volume, experience, etc.

### The future of drone use

With a generation of digital natives who can be considered technocrats, the adoption of drone technology will only improve as younger generations become more technocentric. Companies can leverage this understanding coupled with the use of technology, such as drones, to recruit top prospects who are more willing to adopt innovation as new competencies for field personnel and superintendents advance.

With a 10 percent increase in drone use from the previous year noted by participants of JBKnowledge's 2017 Construction Technology report, adoption of drone technology will increase for years to come. As advancements are made in multi-dimensional imaging, automation, asset management/tracking technology, and increased payload capacity, the industry may be forced into broad adoption to remain competitive. This article should not serve as a deterrent to drone adoption, it should serve to prepare you for future expectations. ■