

Drones and Your Building Envelope



Justin Tudor, P.Eng.
Keller Engineering



Drones seem to be everywhere right now. Advancement in camera technology have long assisted in developing new techniques in assessment and maintenance of buildings. The infrared camera allowed us to look at specific wall conditions without exploratory openings. Articulating cameras on borescopes allow us to inspect cavities using only small openings. Endoscopic cameras allow us to assess plumbing and sewer lines otherwise inaccessible.

Recently, engineers have been handed a new tool in the form of Unmanned Aerial Vehicles (UAV) or Drones. UAVs or drones have been around for years, however, due to their increasing quality and decreasing costs they have become more prevalent in accessible commercial purposes as of late.

The ability to easily and cost-effectively fly a camera at varying altitudes outside your building has blown open the doors for the future of building element inspection and assessment.

HOW CAN DRONES IMPROVE BUILDING INSPECTIONS?

Drones can improve building inspections in two ways: Simplifying access requirements and improving the reliability and permanence of the inspection data.

Historically, to inspect exterior building elements, engineers would inspect from balconies, from the ground or adjacent buildings using binoculars, or from suspended equipment such as swing stages and bosun's chairs. Drones have now allowed us to put eyes on the building without ever leaving the ground. Even just for a preliminary inspection, without cumbersome stages, limitations of what you can see from balconies we can get a much closer vantage point than available with just binoculars.

Following a drone inspection, an engineer will be provided with photographic or video documentation from the drone. As much as this does not replace the engineer's eyes, directly against the building

element, the value of the permanence of this data set, and the ability to go back and review the whole inspection footage as much as you'd like, cannot be understated.

WHAT DO I NEED TO INSPECT? WHAT TYPE OF DRONE DO I NEED?

Drones come in varying sizes. The size of the drone will determine its permissible payload, which in our case, is the camera. Depending on the level of detail you require in your inspection, the style of drone will vary. Different weather conditions or heights of the inspection will further adjust the type of drone required.

External repairs cannot be performed by drones (yet), and a qualified visual engineering inspection by way of swing stage may ultimately be required, however, UAV inspections can allow for a prompt preliminary inspection of localized elements. For a preliminary inspection of a localized building envelope element, you would consider using a drone with as high resolution of a camera as possible – typically requiring a larger drone.

The most practical applications of drones in building elements comes from assisting in full exterior envelope surveys or thermal roof scans. Whether you are looking to assess the visual condition of the brick veneer for all building elevations or if you are concerned about heat loss throughout the façade or roof, infrared and detailed camera inspections can provide a permanent picture of the entire building.

WHAT YOU GET FROM THE INSPECTION?

Largely the information is provided to you in a raw data or visual format. You will need to consider how you obtain this data and what you do with it to turn it into a report, useable to the building owners and managers.

Will you need an inspector on the ground directing the drone to specific areas or is it an entire building survey?

Will the pictures be sufficient or how will the data be interpreted to determine the condition of the building element or a surveyed quantity of deterioration?

POTENTIAL TIME AND MONEY SAVINGS

As discussed, on smaller element inspections, the drone essentially serves as a set of eyes on the building, before you put a swing stage and perform an inspection. The biggest value in the technology comes when substituting comprehensive visual surveys of entire building facades, typically done over weeks by a team of inspectors, can now be done over 2 days with three operators. The need for costly swing stage set up and relocation is removed entirely.

Using specially designed software, quantities and condition are assessed in the office after the inspection.

IT CAN'T BE THAT SIMPLE?!

It's not. As with all technologies, it has its limitations.

- Owners and neighbors have to be appropriately notified and provide permission where applicable.
- For the time being, the drone can only fly where the pilot can maintain direct line of site.

- The drone pilot and company must meet regulatory standards and file appropriate documentation before each flight.
- Trees may obstruct some area from the drone's line of sight, requiring supplemental, standard investigation techniques.
- Traffic must be controlled under the drone while it is flying, restricting the flow of vehicles on a private laneway or ruling out the UAV inspection almost entirely above a busy street.
- Regulations are constantly evolving requiring constant attention to where the industry is going.

Working within these limitations however, companies of varying sizes and capacity are showing up to bring this technology to building owners in overdue effort to decrease investigatory costs while increasing the reliability of these results.

Drones are changing our future for building science inspection, and their versatility should not be overlooked. Next time someone suggests performing a visual inspection or survey using a conventional technique, push a bit further and see if this is a project that can benefit from an introduction into the 21st century. ■

Justin Tudor, P.Eng., Keller Engineering



ONTARIO'S MOST TRUSTED LED RETROFIT COMPANY

UNMATCHED EXPERIENCE

HIGHEST NUMBER OF LED PROJECTS ACROSS ONTARIO - 8,000+ RETROFITS

MAXIMIZED SAVINGS

OUR RETROFITS SAVE UP TO 50% ON YOUR ENERGY BILL WITH PAYBACKS AS LOW AS 9 MONTHS

LARGE INVENTORY

START SAVING SOONER WITH THE FASTEST INSTALLATIONS IN THE INDUSTRY

BOOK YOUR FREE AUDIT TODAY

1.855.586.3649 | INFO@LUMENIX.COM | WWW.LUMENIX.COM