FEATURE

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# Drones: A Useful Tool in the Building Science Professional's Toolbox

From the shelves at Walmart to massive, coordinated light displays during the halftime show at the Super Bowl, drones continue to become more prevalent in our world today. It's true that drones are capable of some incredible things, but what about their application to asset management? Are drone inspections of buildings really all they are cracked up to be? Just like any tool in our toolboxes, drones can help or hinder. A skilled professional understands when and how to use the tools of their trade to the maximum effect.

When a professional considers using a drone to help inspect a building, some advantages they consider are that drones can:

- Be a cost-effective way to inspect large areas that may otherwise have only been reviewed using a sampling approach.
- Be outfitted with several different types of cameras depending on your goals. There are options for video, or still images, as well as infrared thermography or LiDAR (Light

*Photograph 1: Marketing photo of a large concrete restoration project taken by drone.*

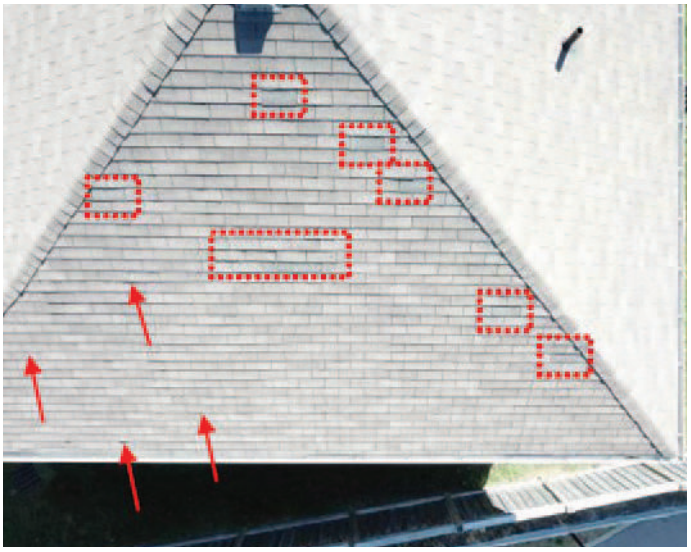
Detection and Ranging) mapping, which can generate models that can be used for accurate measurements and quantity take-offs.

- Provide safe access to roofs that are very steep, high, or otherwise difficult to access physically. [This is often where the cost savings are found, as alternatively a contractor may be required to set up a ladder and temporary tie-off points on the roof.]
- Capture some incredible images that can be used for marketing.
- Be outfitted with the best cameras on the market, with extremely powerful zoom lenses and high-resolution photos that allow for significant digital zooming.

On the flip side, professionals need to be wary of the following limitations and risks:

- Sometimes, there is no substitute for a hands-on inspection. One of the shortcomings of drones is that they cannot probe sealants, check bonds, etc.
- The flight time of the drone is limited by the battery capacity. Most providers will plan their flight based on the need to return to ground and change batteries at appropriate intervals.
- It can be challenging to sort through all the photographs and data collected after the flight. Ensuring that the provider has a method of tagging the photographs by location - which may include a proprietary software or reporting program - can help to mitigate this issue.
- Drone flights are heavily dependent on weather conditions. Even moderate wind can be very problematic, requiring a flight to be rescheduled.

*Photograph 2: Drones can provide excellent supplemental information, but some deficiencies are difficult to uncover without a hands-on approach.*

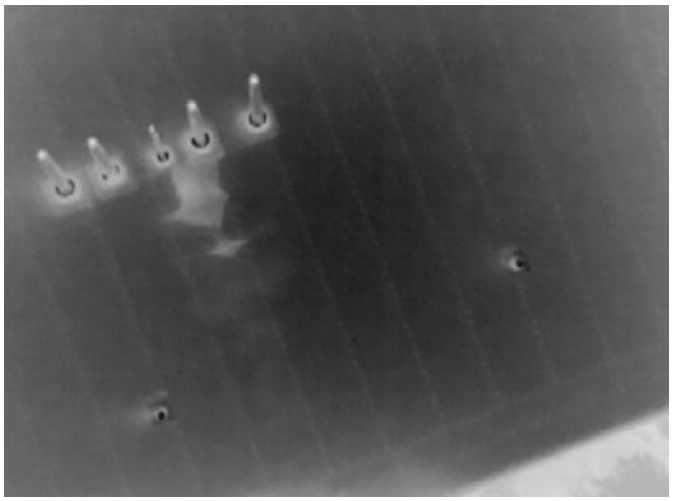


*Photograph 3: Curling and buckling of shingles, and localized shingle replacement areas identified as part of a report summarizing the results of a drone inspection.*

- Drone pilots must always maintain a line of sight with the drone. This can be challenging depending on the staging area, surrounding trees, buildings, and other obstacles.
- Buildings within 5.6 kilometers of airports or 1.9km of heliports, or within controlled airspace will require Advanced Operations, which triggers several additional training and documentation requirements with Transport Canada. These additional measures may impact the cost/benefit of the drone flight as compared to a traditional visual inspection and would need to be evaluated on a case-by-case basis.

So, once a professional has weighed all these considerations and is recommending a drone inspection at your building, what can you expect the drone to uncover? How much can really be seen using only a camera? Some of the typical deficiencies that are visible in drone photography include:

- Missing, broken, or damaged areas. This could include curled edges of shingles, or sections of the roof membrane that are missing altogether. It can also include missing or damaged roof accessories like vents or flashings.
- Potential areas of water collection on the roof by identifying staining or organic material growth.
- Deficiencies or damage to other rooftop equipment like antenna, dishes, skylights, etc.
- Damaged or blocked gutters and damage to the fascia or downspouts.
- Suspected areas of leakage. These can be located by using infrared thermography to identify potential moisture within the insulation. [It should be noted that this technology is only



*Photograph 4: Area of potential leakage identified by Infrared Thermography.*

effective on certain types of roof membranes and configurations and would need to be reviewed on a case-by-case basis.]

When working with your consulting team, there are a few important points for condominium Owners and Managers to consider when the use of a drone is proposed:

- Ensure that the company providing the service employs staff with valid drone pilot licenses, as recognized by Transport Canada, and has registered their drones.
- Request a copy of the ground control plan. This plan should outline how the team will ensure that the area below the flight is free of pedestrians. Transport Canada requires that pilots maintain a minimum of 30m horizontal distance from any bystanders for basic operations.
- Confirm the deliverables that will be provided. Specifically, if they will include stills, videos, an orthomosaic image of the whole site, or any combination.

While using a drone may not be a feasible solution to all investigation problems, it is a powerful tool in the right hands. It is important to review each building and project individually and weigh the pros and cons, along with the project objectives, carefully to determine if a drone is the right tool for the job.

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*Photograph 5: High quality photos allow for digital close-ups of deficiencies.*