

Adhesive & Sealant Convention 2014



BUILDING SURVEYS

DRONE TECHNOLOGY REACHES NEW HEIGHTS

Assessment of energy loss and building integrity is being revolutionised by cameras in the sky



Entire building surveys can be undertaken

A drone's eye view

Use of remote-controlled aerial drones could be a cost-effective solution for evaluating entire building structures rapidly and with reduced risk

CYNTHIA CHALLENGER VERMONT, US

Energy efficiency is a leading topic for discussion in the construction industry today. The US Department of Energy estimates that 40% of the energy used to heat or cool most existing buildings is wasted due to air leakage. To address this problem the sources of air flow must be identified, which is a laborious proposition and often too expensive for most building owners.

The physical integrity of a building impacts the way air and moisture can enter and leave it, the indoor air quality (IAQ) and the thermal comfort. It also affects maintenance requirements and costs, the productive life of the facility and the overall operating performance including the energy efficiency of the structure.

Potential sites for heat flow and water penetration exist both on the roofs and the vertical walls (at various junctions between the wall and the ground, the windows, balconies and roof).

Adhesive, sealant and membrane technology is critical for addressing any such gaps in the building envelope. To apply such solutions,

however, the problem areas must be identified, which conventionally has required the use of extensive labour, scaffolding, time and other resources, as well as risk to personnel.

However, Canada-based Tremco Roofing and Building Maintenance has developed an alternative approach, using unmanned aerial vehicles from Toronto-based Industrial SkyWorks (iSW). Called SkyBEAM (Building Envelope Asset Mapping), the technology is a cost-effective and safer alternative.

“We are not in the surveillance business, nor are our customers”

MICHAEL COHEN
President, Industrial SkyWorks

“As a company focused on managing building life-cycles for customers, we are always searching for better ways to gather information that can be used to improve the operating efficiency of buildings. Drone technology presents a significant opportunity for Tremco to rapidly and much more cost-effectively pinpoint sources of air/heat

and water penetration and egress throughout an entire building envelope,” says Charles Houk, president of Tremco Commercial Sealants & Waterproofing.

“Our division of Tremco has obvious interest in the roofing division’s implementation of the SkyBEAM service given the fact that sealants and adhesives are critical materials for solving many of the problems that can occur in the building envelope.

“Drone technology will allow building owners to efficiently assess building connectivity and maximise the long-term performance of the product systems they have invested in – quickly identifying restoration needs before there is a greater issue or identifying an application shortcoming in new construction,” he adds.

REMOTE IMAGING

SkyBEAM uses unmanned aerial vehicles equipped with high-resolution infrared and video cameras to help customers locate and photograph areas where their facilities may be leaking energy through gaps in the roof, facade or elsewhere, where wet insulation is present and where there may be other poten-

tial problems. A thermographic camera on the aerial robot graphically depicts energy inefficiencies by showing temperature variations within the building. A video camera on the drone is also used to simultaneously photograph the building so that other potential problems, such as the need for appropriate rooftop safety equipment, can be identified.

One of the key advantages of using remote-controlled drone technology for assessing the condition of the building envelope is the ability to avoid putting personnel into risky situations. "Detection of water damage and heat loss via infrared technology is best performed at night when the difference between problem and non-problem areas is most distinct.

"With conventional technology (hand-held infrared cameras), that necessitates having a crew work at night, which can be dangerous, even when using appropriate safety systems. With SkyBEAM technology, the crew remains on the ground and operates the unmanned aerial vehicle (UAV). The data is then evaluated and the crew can return in the daytime to mark any locations for repair when it is much safer to do so," says Houk.

Because SkyBEAM collects data on the entire building envelope, it is possible to rapidly generate both two-dimensional and three-dimensional models of the building that indicate the precise locations of any defects. These models and the original data obtained from both the infrared and traditional cameras are formulated into a report that is made available through a cloud-based application.

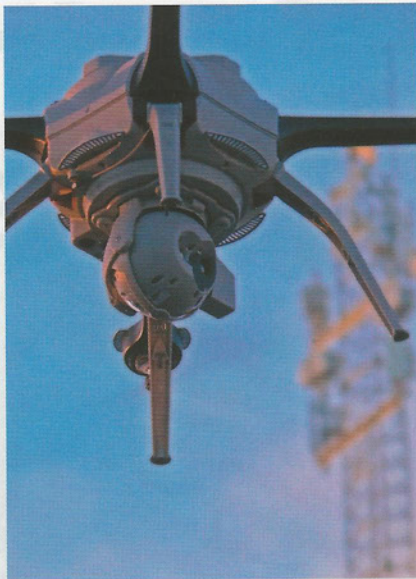
Furthermore, additional photographs can be uploaded by on-site technicians that verify the data, and equally importantly, data can be relayed to the technicians, who can use ge positioning technology to find the precise location of problems, thus limiting the work site to only those areas that require repair.

Houk also notes that the UAVs can often obtain information on areas of the building that have in the past been very difficult to scan manually. The drone is programmed in advance to fly in a very tight pattern that covers the entire roof and walls of the building. In addition, the thermal images and visual photos are taken at a very rapid rate.

"Having access to such comprehensive data is invaluable for our customers; it is a huge asset to Tremco to be able to provide such rapid service while reducing the risk to our employees," he adds.

COST BENEFITS

"The use of thermal imaging cameras is not new. What is novel, however, is the ability to gather such comprehensive data much more quickly and safely than has been possible to date," states Houk. Not surprisingly, the use of drone technology for evaluating the building envelope is more efficient than the traditional



The drone has thermal and optical cameras

approach, which requires people to be up on the roof or on scaffolding on the sides of the structure. Because this application is new, both Houk and Michael Cohen, president of Industrial SkyWorks, are waiting to determine the actual figures with respect to the possible cost savings using SkyBEAM. However, they are both confident the savings will be significant.

Cohen points to the elimination of any need for scaffolding as one area where the cost savings can be significant. He and Houk also point to the ability to obtain the data much more rapidly and to precisely locate problems, which enables focused repairs.

"Overall, the use of UAVs to evaluate the performance of a building envelope is a more cost- and resource-efficient approach to doing work that is already being done," says Houk. He expects that the technology will expand the number of buildings that undergo comprehensive evaluations.

"We see SkyBEAM being particularly useful for identifying problems that are not visible to the naked eye and where it is difficult for people to physically get on to the roof or access the walls in order to conduct thermal scans. In addition, we anticipate that because this technology is more affordable, building owners who are concerned about the performance of their structures but would not have

"The goal of introducing the SkyBEAM technology is to help our customers pinpoint problems more cost effectively"

CHARLES HOUK
President, Tremco Commercial Sealants & Waterproofing

had an assessment performed using the conventional approach due to the high cost will be more likely to consider a SkyBEAM assessment," Houk observes.

The potential impact for the adhesives and sealants industry is significant. Most heat loss and water leakage problems are addressed either directly with adhesives and sealants, or indirectly with technologies that rely on adhesives and sealants. With greater numbers of buildings subjected to the comprehensive envelope evaluations, there will be greater numbers of repair projects require adhesives and sealants.

"The goal of introducing the SkyBEAM technology is to help our customers pinpoint problems more cost effectively and we definitely see that translating into increased demand for sealants and adhesives," Houk states.

Drone technology also has the potential to increase awareness of the significant need to address the energy efficiency of older structures. "Most people are increasingly aware of the impact of their lifestyles on the environment. Many do not realise, however, the extent of the impact that existing structures have on the environment in terms of greenhouse gas emissions. We believe that the use of drone technology could have an impact in this area," notes Houk.

THE SECURITY QUESTION

Drone technology is generally associated with US government activities and there have been many questions raised about the use of UAVs by corporations. Privacy is the main concern. As a manufacturer of drones for use in a wide range of industries, Cohen is aware of these issues and believes his company has taken the necessary steps to address them.

"We are not in the surveillance business, nor are our customers. In addition, while the use of drones is new, the information they are collecting is information that is already obtained manually," he states. Cohen also notes that thermal imaging cameras cannot see into walls. While they can see through windows, the resolution is quite low; a window washer can see far more details.

In addition, before drones are used, Industrial SkyWorks and Tremco, with the assistance of the building owner and manager, ensures that all occupants are aware of the evaluation process and when it will take place, so that they can close curtains or otherwise prepare. Furthermore, all of the data is processed offsite and extensive privacy policies are in place that comply with Canadian laws, which is where the SkyBEAM technology is currently available. All company executives and managers are committed to these policies. When SkyBEAM is available in the US, which both companies are working to achieve, privacy policies will be implemented that meet any relevant laws and regulations there. ■