

Technology

Canada's ING Robotic Pioneers Beyond-Line-of-Sight UAS Ops

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ING Robotic Aviation

Canada has been more progressive than most in permitting commercial use of unmanned aircraft systems, but—like other countries seeing a rapid growth in demand—it is wrestling with how to take the next steps in integrating UAS into civil airspace.

As in the U.S. and Europe, commercial operations are limited to small UAS flying within visual line of sight of the operator. Now ING Robotic Aviation, an unmanned-aircraft manufacturer and operator based near Ottawa, has been contracted to conduct the first Transport Canada-approved beyond-visual-line-of-sight (BVLOS) operation, says CEO Ian Glenn.

The mission is to take high-definition aerial images of areas around Elliot Lake Airport in Ontario to help wildlife researchers look for moose footprints. Flying below 2,000 ft., the Serenity fixed-wing UAS is photographing a series of 10 X 26-km (6 X 16-mi.) plots with 2-cm (0.8-in.) resolution, taking one image per sec. over a 5-hr. flight. Flying up to 26 km from the airport, the UAS is accompanied by a chase plane, but this first approved BVLOS operation is a big step, says Glenn.

ING's founders are former members of the Canadian armed forces, where they gained experience operating the Boeing Insitu ScanEagle long-endurance unmanned aircraft. Their focus now is on building and operating "industrial" UAS that can fly in harsh conditions. "These are robust systems that can work in Canada," Glenn says, citing the cold weather and ever-present winds—conditions beyond the scope of most consumer-grade small UAS.

Wind-turbine inspections, for example, require the UAS to maintain a 10-meter (32-ft.) safe standoff distance along the length of a blade in winds up to 50 kt. "Consumer quadrotors max out well before that," Glenn says. ING's Responder is an unmanned helicopter, with fully controllable rotor, not a quadrotor, and includes features such as heated batteries, transponder and sonic altimeter for automatic landing.

Although it builds and sells the UAS it designs, ING's main business model is to operate the aircraft and provide packaged data-collection services to customers. "The drone is just a tool to get the data," he says. "The sweet spot for drones in industrial data collection is 1-5-cm resolution." Already able to provide commercial services in Canada, the company was recently approved to operate in the U.S. under a Section 333 exemption from the [FAA](#).

ING views its small UAS as pickup trucks and works with customers to develop specialized payloads. "We do a lot of paid research and development for customers," says Glenn. One example is a high-speed winch developed to inspect the insides of industrial chimneys. The UAS lands on top and winches a camera and lights down into the chimney to provide real-time 3-D images.

Another is a method of delivering herding agents onto oil spills to enable controlled in-situ burning, a response technique particularly suited to remote, ice-covered waters. The agent causes the oil slick to contract, then a flare is dropped to burn it off. This task is now performed by helicopters flying at 40 ft., says Glenn, where the rotor downwash disperses the oil; the risk of a crash is high.

"We are building a solution for the top nine oil and gas companies," he says. ING has developed a payload for the Responder that disperses the herding agent at the droplet size and delivery rate required and includes a mechanism that then lights and drops a flare. In early 2015, the Responder was operated from the Canadian icebreaker MV Arctic, Glenn says.

Many of ING's missions are in isolated parts of Canada, and even the fixed-wing Serenity and its control station are designed to pack into cases that can be loaded on board a Twin Otter and flown to a remote location. The UAS can launch from a runway, grass strip or catapult. The latest addition to the Serenity is the high-definition camera being used in the moose hunt.

The market for industrial UAS is primarily "monitoring, inspecting and mapping," Glenn says. "It's an aviation activity, and we have to do it correctly and safely." Payloads with which ING is working include a magnetometer for mining; lidar and multispectral cameras for forestry; and ionizing radiation detectors to detect natural sources of radiation. Another technique in development is to inspect buried pipelines by "sniffing" for gas.