Photo Montage: Karolina Grabara / Shutterstock / Topcon

Scaling the heights

Scotland may not have the world's highest peaks, but it's still tough going for surveyors. For one enterprising business, it called for some extra help, as Matt Kellett reports

Established in 1989, Inverness-based Caintech (www.caintechltd.co.uk) cut its teeth as a quantity surveying business. Yet over the past nine years, its focus has shifted to land surveying – conducting topographic, bathymetric and laser scan surveys.

In 2014, the firm elected to expand its capabilities and undertake more detailed surveys over wider areas. In doing so, the harsh conditions of the Scottish Highlands were a key issue for the company's survey teams, often imposing limitations on the scale of their work. Teams were spending weeks in the field, working across tough terrain and in extreme weather.

An Unmanned Aircraft System (UAS) seemed an ideal platform, not only to complement and assist the ground teams, but also as a means of diversifying and expanding the company's business offering. It would allow it to take on projects of a greater scale and complexity and open up opportunities in new industry sectors.

Tim Riome, chief pilot at Caintech, who was responsible for choosing a suitable aerial mapping system for the firm, takes up the story

"Our surveying teams were using terrestrial laser scanning and photogrammetry to image capture across some of the UK's most remote locations," he says, adding, "Information was gathered from multiple setups and merged into a single dataset during processing. This required pre-surveyed Ground Control Points (GCPs) which restricted the areas we could cover."

Strict requirements

Needless to say, and thanks to his aviation background, Riome had strict requirements for a robust and reliable UAS. "We needed a solution that was durable enough to overcome the limitations of the hostile environment while limiting the time the team spent on the ground."

Following a detailed evaluation, Caintech chose the Sirius Pro aerial mapping system from Topcon (www.topconpositioning.co.uk/mass-data-collection/aerial-mapping/sirius-pro) as it can create aerial maps and digital terrain models and remain fully operational in constant wind speeds of up to 50kmph, gusts of up to 65kmph, and even in rain.

The Sirius Pro surveys to a high degree of accuracy across demanding areas and its built-in navigation system (RTK-GPS) eliminates the need for GCPs, making it ideal for challenging projects such as those undertaken by Caintech.

"From an aviation point of view, we found that the Topcon Sirius Pro was the most robust system out there, offering the most stable and steady platform with high quality imagery, zero vibration and steady landing," says Riome.

Keeping safe

One of the firm's most notable surveys using the Sirius Pro was that for a new cable track over a Scottish mountain at elevations above

The Sirius Pro surveys to a high degree of accuracy across demanding areas, with its built-in RTK-GPS navigation system eliminating the need for GCPs

Highland Fling! Being launched by hand, there is no need for a cumbersome catapult or launch rails. The radio remote control (lower right) is used to command the platform which has a 1.6 m wingspan and a take-off weight of under 3 kg

860m. Jim Main, managing director at Caintech, explains: "It required the UAS to travel at an altitude of around 1km above sea level to survey the mountainous regions.

"It meant that we no longer need to expose our staff for long periods of time to hostile and possibly dangerous locations. Large projects that previously demanded two or three survey teams working on-site for several weeks now require just one operator in the field for a maximum of four to five days."

The introduction of the Sirius Pro has also helped bring in new business, from wind farms to power lines and quarries – all of which cover vast areas. "We can now take on all the projects that we are approached to undertake and offer competitive prices as we have the technology and, therefore, the capacity," says Main.

Surveying the scene

On one occasion, a client needed to know how far excavation had progressed on a construction project and called on Caintech to determine the volume of material excavated. Tim Riome explains how the UAS was deployed to survey the scene.

"The first thing we did was to call up the map of the location for the site, then we carefully marked out the exact area we wanted to survey. I then pressed a button on the system and it created the UAS' flight plan. All we then had to do was just take it to the site and it was ready to go.

"The flight plan was uploaded onto the UAS wirelessly from a laptop at the site, and the unit was then launched by hand – with no cumbersome catapult or launch rails to install in the ground to set it off.

"On this particular project, the Sirius Pro surveyed 40 hectares in just 25 minutes. When it returned to its landing location, it let me know by circling over a point which then allowed me to manually land it in a safe location. I then uploaded the collected data onto the laptop and removed the SD card which holds all the imagery.

"Back in the comfort of the office, we used the information to create a digital elevation model. Orthographic photos of the site were then literally draped over the model to produce a dimensionally accurate model that showed all the site's features.

For Caintech, the Sirius Pro has brought huge safety benefits for staff and introduced cost and time efficiencies, too. For Tim Riome, the future looks bright. "As the business continues to expand exponentially, we are looking to purchase more Sirius Pros and recruit more operators," he concludes.

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