

Ultralight Aircraft and Lidar Acquisition of Power Lines

In August 2015, IMAO performed its first flights with an Ultralight Savannah ST – a two-seat ultralight aircraft – for Lidar and photo acquisitions in the south-west of France for Omexom (Vinci Energies Group). This was the first project in which IMAO had used an ultralight aircraft for power-line applications. Its success bodes very well for future acquisitions in this field.

IMAO had been very closely interested in this new tool for a while. The company, which specialises in acquiring aerial photos and Lidar by aircraft, began last year and purchased the ultralight.

This summer, IMAO flew 300km sections of high-voltage lines for Omexom, in various French regions including Limousin, Midi Pyrénées, Languedoc and Aquitaine. This Lidar acquisition reaches ultra-high density about 50 pts/m² and is useful for the inventory and maintenance of infrastructure. This data collection appears to be a very competitive alternative to the helicopter. Ultralight has proven its potential in this type of low-speed corridor flights such as for the electrical grid, roads, highways and railways.

Adaptation

The idea of using an ultralight was formed in IMAO's mind at the end of 2014. Once the model of Ultralight was selected, it was adapted by an external workshop in order to create two hatches which are used to receive camera and Lidar. The rest of aeronautical adaptations are then held by the IMAO mechanical workshop. They have created custom brackets to receive the disks, navigation system, INS/GNSS computer and so on.

Instead of the passenger seat, hatches receive the Lidar and 60MP medium-format camera. On top of that, a GoPro camera has been installed to provide a continuous video stream. The screens are positioned above and orientated towards the pilot who operates thrice systems. The seasoned pilot is alone in the ultralight, hence operating the flight and controlling data at the same time. Ergonomics in the cockpit was essential.

Methodology

The methodology has improved after several flight sessions. Coordination has been held at the start of the mission with our client Omexom and GE Infra (unit of surveyors) in charge of the classification. IMAO has found the good way to anticipate the breakdown into powerlines sections and to mature the customer demand.

The flight strategy has been planned with Lidar acquisition as a round trip slightly of the powerline axis. Then it's been decided to evolve into a single flight.

Sylvain Pejean of Omexom stated the quality is beyond their expectations, since junctions details on pylons are visible which was not the case in previous Lidar acquisitions.

The goal in the future is to reduce the density from 50 to 40 pts/m² to meet the customer demand. 40 pts/m² seems to be the good compromise between the details that make the success of this acquisition and the data size to be processed. Once the data acquired, reducing corridor width and selecting MNS points without the DTM is an option to optimise processing. The flights have produced 200Gbits of Lidar data, 1,000 images and 6 hours of video.

Data quality is checked throughout the workflow of data collection in order to provide reliable georeferenced points and images. Many details are identified either on pylons or cables with very little hidden parts. According to IMAO, this gives an optimal data quality for a result that meets customer expectations.