

Aerial Imaging: Draganfly Advances Digital Data Collection



University of Saskatchewan Inc. 2019®

Draganfly Innovations Inc. is an award-winning, industry-leading manufacturer and innovations developer within the commercial UAV space. For over two decades the company has created quality, cutting-edge unmanned vehicle systems (UVSs), turn-key robotics, remote sensing platforms, and software that revolutionizes the industry. Driven by passion, ingenuity, and efficiency, the team ensures first-class services to customers around the world, saving time, money, and lives.

Digitally Documenting Crop Characteristics

The University of Saskatchewan Plant Sciences team conducts extensive agricultural phenotype research and requires precision imagery for digital phenotyping and genomics for crop breeding. Driven to improve the documentation and processing of crop characteristics, the team is constantly searching for innovative technologies to help them to do so.

Traditionally, phenotypers walk through fields, documenting plant growth and characteristics, which is very laborious, time-consuming, and challenging especially considering the scale and high-frequency requirements. Results would also tend to be less accurate due to the subjective nature of manual data collection.

Scientists leverage precise digital phenotyping and genomics while using drones to image crops, essentially photocopying fields, to better document and understand crop characteristics. With digital collection, phenotypers can quantify their

observations and run images through Convolutional Neural Networks (CNNs) to more rapidly identify changes and trends that may not have been easy for researchers to identify in the past.

In 2018, Draganfly and the Plant Sciences team sought a new solution with higher resolution images to help achieve more actionable insights. The University team had been collecting data using a Draganflyer X4-P system with cameras that required separate flights for RGB and multispectral imagery. While the imagery was satisfactory for most of their research, it was very time-consuming and proved challenging when trying to obtain the resolution required to document the emergence of very small plants.

“As our research advanced and became more sophisticated, we required more image and spectral resolution. Phase One Industrial’s 100MP camera with larger sensor would enable us to cover more area and achieve improved productivity”

- Prof. Steve Shirtliffe,

University of Saskatchewan Plant Science team.

The University’s goal with the project was to simultaneously capture high-resolution RGB and multispectral imagery for plant phenotype research. By using a dual payload that included a much higher resolution color camera with a larger sensor and an additional multispectral camera, they could cover more area in a day and collect more data, while achieving increased spatial resolution.

Improve Data Collection with High-Resolution Imagery

Draganfly had been working with Phase One Industrial for a year and recommended their 100-megapixel camera along with the MicaSense RedEdge 3. Phase One's 100MP solution provided a significant resolution increase over previously used cameras and fit the size and weight envelope of many commercially available UAV systems. The 1kg payload capacity of the University's Draganflyer X4-P system was insufficient for the recommended dual sensor setup. The DJI Matrice 600 Pro proved to be the best platform to build the solution as it had a payload capacity of 5kg, which was sufficient for both cameras, it had an SDK that Draganfly would be able to work with, and it was at a favorable price point.

“The Phase One Industrial camera is really easy to use. All the information needed to operate and integrate the camera is provided. The level of detail in the integration guide and technical documents far exceeds what we have seen from other camera manufacturers”

Cory Baker,

Draganfly Innovations Production Manager

The medium-format camera was integrated alongside the multispectral sensor onto the DJI platform, operated by the Draganfly Surveyor mission planning software. Design and fabrication of mounting components were required to make both cameras fit on the gimbal together. Although the physical installation was fairly straightforward, the team was challenged in the communication between the UAV operating system and both cameras side-by-side. Phase One Industrial cameras automatically integrate with the DJI M600 UAV, however, customized operating hardware and software development was required in order to trigger both cameras simultaneously.

A purpose-built interface circuit board was designed and software was written to act as a bridge between the DJI A3 Pro autopilot, each of the cameras, and the Draganfly Surveyor mission planning software. In flight, the A3 Pro autopilot runs the automated flight plan and sends camera control and shutter commands through the same interface circuitry to simultaneously trigger the cameras at the correct time. With the custom integration completed, the development team realized a significant improvement in both productivity and image quality when compared to previous data collection methods.

Twenty Times More Efficient

The increase in spatial resolution by using the Phase

One Industrial 100MP camera has resulted in the University becoming **20 times more efficient at collecting data!** They are able to **cover up to 10 times more area per flight** versus previously used hardware, which gives them similar color image resolution, and saves time as the collection of the multispectral imagery no longer required separate flights.

When directly comparing flights to collect color imagery with a GSD of less than 4mm, Phase One Industrial cameras are able to provide approximately 10 times more land coverage per 15-minute flight. To image a quarter section of land (160 acres or 65ha) at <4mm GSD, it would take approximately 10 flights with the M600 and Phase One setup, while the previously used Draganflyer X4-P and Sony QX100 would require approximately 100 flights. Because of the efficiency of imaging with two cameras simultaneously, the number of flights required has been further reduced, resulting in 20 times more data collected for the equivalent flight duration.



Platform	Draganflyer X4-P	DJI M600 Pro
Camera	Sony QX100 (20MP)	Phase One iXu-1000 (100MP)
GSD	3.5mm	3.8mm
Required Altitude AGL	15 m	45 m
Max Coverage Per 15 Min Flight	0.5 ha	5.0 ha

Takeaways

- Draganfly achieved full integration.
- RGB and multispectral imagery captured simultaneously on a single flight.
- 2000% more efficient.
- Cover up to 10 times more area per flight.
- 20 times increased productivity.

About Phase One Industrial

Phase One Industrial is a division of Phase One A/S that researches, develops, and manufactures specialized industrial camera systems and imaging software solutions. The division focuses on specific applications such as aerial mapping and surveying, ground and aerial inspection, agriculture, machine vision and homeland security.



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