Dronezone srl.

Adding OxTS Inertial Navigation technologies into their own products reduces mapping time by 50%

Reducing Survey runs by over 50% - From 4 days to 2

Summary

Company:

Dronezone

Industry:

Drone Manufacturing

Country:

Romania

Website:

www.dronezone.ro

OxTS Products:

xNAV250, OxTS Georeferencer

OxTS Technology Features:

gx/ix™ tight-coupling, combined processing

Drone:

DZX8 Heavy

LiDAR:

Velodyne VLP-16

"The first project Dronezone undertook was to map 45 km of road. With the xNAV250 and Velodyne VLP-16 they were able to reduce this by over 50% whilst simultaneously gaining superior accuracy and a true 3D representation"

Through quick and simple LiDAR integration and flexible use cases, Dronezone improved their data collection method giving their customers an improved survey and mapping solution.

This is how they did it...

OXTS Survey

Survey with confidence

Background

Dronezone are builders of professional level UAV's and drones, designed with you, the customer, to meet a wide set of requirements and project needs. They equip their drones with several sensors as required for your project to meet the needs of topography, surveillance, road or traffic inspections and agricultural projects amongst others.

As well as manufacturing drones for sale, Dronezone also contract out their drones and provide Photogrammetry and Lidar scanning services. Their family of drones include the DZ4H Orion, DZ4XL Perseus, D6 Ara and the DZX8 Heavy.

What was the overall aim of the project?

Dronezone wanted to add LiDAR scanning capabilities to their family of UAV/drone products. They include LiDAR and Photogrammetry sensor options for their custom-build drones and wanted to be sure that they were offering all the right capabilities and accuracies to suit both the requirements and budgets of their customers.

Dronezone approached OxTS with a requirement to offer an integrated INS solution that would provide their customers with the best possible accuracy for their LiDAR and Photogrammetry projects at the right cost against the final output. They wanted a flexible solution that would allow them to quickly and easily produce, highly accurate, reliable pointclouds.

The Dronezone DXZ8 Heavy

Challenges

Dronezone's initial challenge was to find a commercially viable INS product that would allow them to combine GNSS and IMU data with a LiDAR scanner, in this case the Velodyne VLP-16, to produce a georeferenced pointcloud from an aerial LIDAR scan.

They understood that LiDAR pointclouds are only as accurate as the trajectory data attached to each laser return, so a range of solutions is provided with the OxTS xNAV250 to help ensure the data meets the requirements.

Dronezone Pointcloud

Dronezone's chosen solution needed to be highly accurate and the xNAV250 fitted the bill perfectly as it has:

- **Roll/pitch accuracy** - 0.05°

- **Position accuracy** - 0.02 m RTK/PPK

- **Heading (2 m baseline) accuracy** - 0.1°

- **Features** - gx/ix™ tight-coupling, Combined Processing

Not only did the solution need to be accurate, it also needed to have a proven track record, be easy to configure AND require no custom software development.

Their existing method of collecting data was something that Dronezone identified as an area for possible improvement. Once they engaged with OxTS and spoke with their INS specialists they realised that OxTS could help them reach their goals.

After investigating several solutions, it became clear to Dronezone that there were very few commercially available products that met their needs.

Of the products they did find, Dronezone quickly realised they needed time to perform some level of integration with the Velodyne VLP-16 and time to test both the software and hardware – time and resources they didn't have.

The resources aspect was critical to their decision. Most of the solutions they found and investigated focused on hardware components and typically pointed the customer to a collection of open-source software development kits that could be used to integrate the components.

Dronezone's research had clearly identified that this level of integration, (functions that OxTS provide with NavSuite and OxTS Georeferencer), were not a trivial matter and would require skills that they did not have.

Solution

Dronezone spent some time researching the survey and mapping market and made the decision that the OxTS xNAV series of products were the best fit for their requirements.

The OxTS xNAV is a compact and lightweight INS solution specifically designed for the drone and UAV market. Whilst the form factor is small, the performance is anything but.

For Dronezone, the most important feature of the OxTS xNAV product is that it integrates seamlessly with Velodyne LiDAR. However, the advanced features available with the xNAV250 also helped make their decision that much easier. With a guaranteed pitch/roll accuracy of 0.05°, a 0.1° heading accuracy and less than 2 cm positioning accuracy, even in difficult GNSS environments, Dronezone felt that the xNAV250 would be able to ensure accuracy of data – another key requirement for Dronezone AND their customers.

Thanks to OxTS' VLP-16 hardware integration guide and a beta release of OxTS Georeferencer (prior to March's v1.0 full release), Dronezone were able to build their hardware and software workflows up with ease as soon as they received their OxTS xNAV delivery.

They also used the NAVsuite software to post-process the navigation data which utilised the trademarked tight-coupling technology gx/ix™.

Products used

xNAV 250

A high-grade miniature inertial navigation system from OxTS. It uses survey-grade dual frequency GNSS receivers and custom MEMS IMU for centimetre-level position accuracy and precise orientation and true heading. It logs the navigation on the internal storage for downloading and viewing post-mission.

For many applications like corridor mapping and precision agriculture with UAV based LiDAR platforms, the xNAV250 provides one of the best price/performance ratios on the market.

Velodyne VLP-16

The Velodyne VLP-16, or "Puck", is a 3D LiDAR laser scanning system ideal for use in UAV aerial mapping applications.

In order to create an adjusted, properly georeferenced pointcloud suitable for feature extraction and analysis, an inertial navigation system is required. When synchronised with a LiDAR system, the GNSS+IMU data fusion provides accurate, robust trajectory information that combines with the mobile LiDAR data.

gx/ix™ is made up of OxTS' own RTK/PPK navigation processing engine, as well as tightly-coupled integration of the GNSS and IMU, which combine to provide centimetre-level position accuracy and much improved performance in GNSS obstructed areas.

OxTS have designed the xNAV range of products to integrate seamlessly with the Velodyne VLP-16, and other LiDAR by designing a flexible array of connector interfaces to connect the devices and provide on-board storage within the INS to record and store the LiDAR and navigational data; thus reducing the weight of the payload in removing the necessity for an additional onboard computer and providing a simple way to post-process your data.

After working with OxTS on this project Dronezone found OxTS to be very easy to work with. All of their support requirements were picked up quickly and responses very helpful.

During the process Paris Austin, the OxTS Business Manager for Survey and Mapping was always on hand to help. Dronezone found him to be very patient and able to solve most of their issues himself.

The implementations of the solutions were very successful, although this did progress differently than first planned. Due to some of the constraints of a drone environment, there were several physical implementation issues such as cabling, antenna placement, physical integration of the xNAV & VLP-16 and mounting of the final product that Dronezone had to overcome.

To overcome some of these issues Dronezone made the decision to develop three versions of their solution. A handheld/backpack version, a car mount version and finally a drone mounted version. A 'plug and play' mounting mechanism allowed Dronezone to share the same xNAV and VLP-16 module.
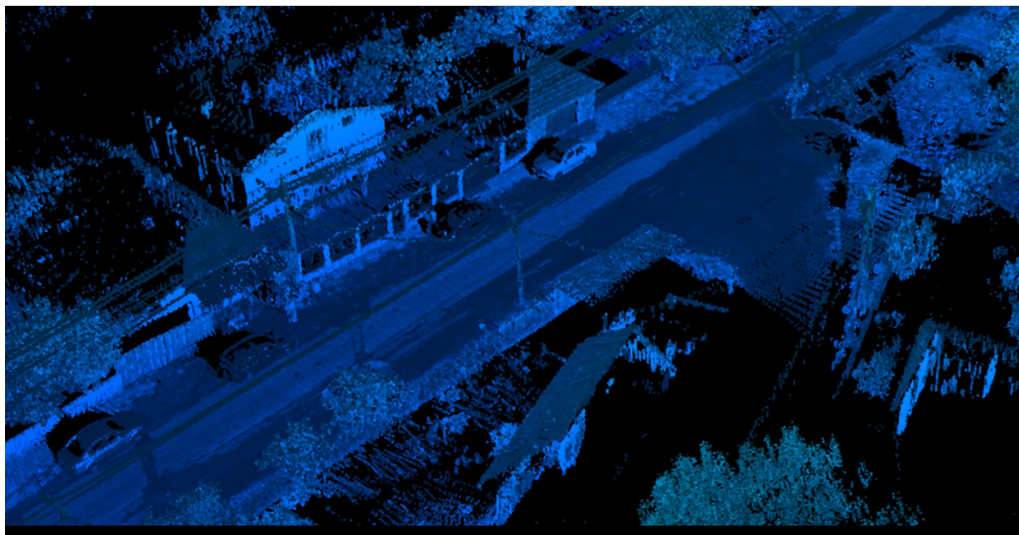
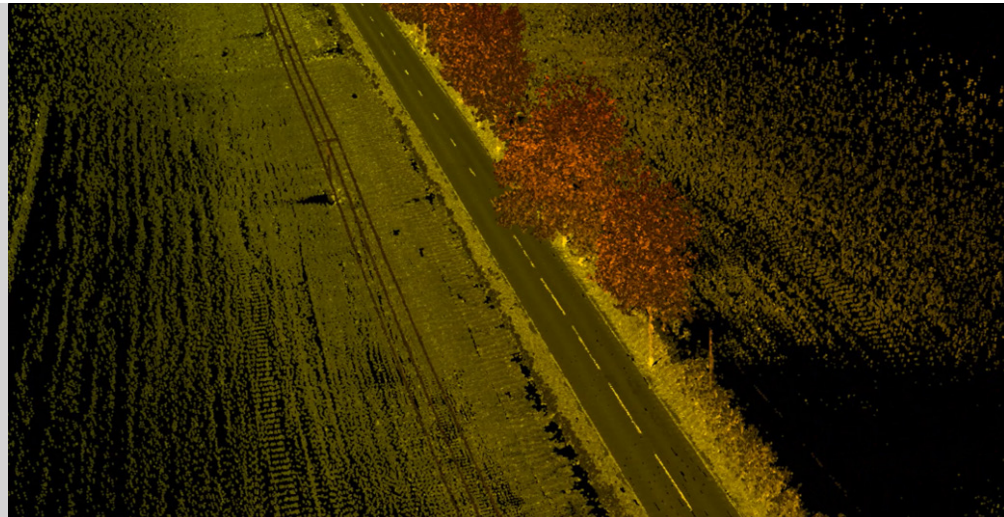Dronezone Pointcloud

Results

Dronezone tested all of their solutions in multiple scenarios. All were able to achieve highly accurate, georeferenced Pointcloud output.

The first project that Dronezone undertook was to map 45 km of road. Using their previous method this would have taken Dronezone approximately four days. With the xNAV250 and VLP16 they were able to reduce this by over 50% to less than two days, whilst simultaneously gaining superior accuracy and a true 3D representation.

The ability to use the product in several different ways will not only provide Dronezone and their customers with a much more flexible, efficient way of collecting data, it will help improve operations and save money.

"The ability to use the product as a handheld unit, car-mounted or drone-mounted solution allows our customers increased flexibility and significant cost savings."

Nora Jurca, Business Development Manager - Dronezone

Dronezone Pointcloud

It is this flexibility that has really helped OxTS stand out. As the xNAV can be used in a number of ways, it has meant that Dronezone and their customers are no longer limited to terrain restrictions, size of roads or accessibility which has meant that they have been able to collect more data and greatly improve the quality of the Pointcloud output.

They can also now serve many different clients in many different industries using LiDAR-generated 3D models.

The simplicity of the integration and connectivity of the two devices made this a simple decision for Dronezone in order to reduce complexity and provide a quick and seamless build for each customer.

OxTS also provides their NAVsuite software licence free with each device, once again providing a cost-effective solution for Dronezone customers to review, produce and export their flight data.

The OxTS team work with their customers to present the best solution for their needs

The global leaders in inertial and GNSS since 1998

Accurate and reliable georeferencing solutions for land, air and marine applications.

At OxTS we're passionate about inertial navigation and how we can help our customers with our technology. With over two decades of experience in combining the best of high precision GNSS receivers and world-class inertial navigation expertise, OxTS' products have become the industry standard for automotive testing and are widely used in other industries.

Our products provide position, roll, pitch, heading and other measurements of vehicles on land, sea and in the air. Our highly accurate RT3000 series is used by almost all car manufacturers in the world for vehicle dynamics testing, validating advanced driver assistance systems (ADAS) sensors and developing self-driving cars.

Our range of combined, compact GNSS/INS systems is used for sensor position and orientation on mobile mapping vehicles and for direct georeferencing data from airborne surveying.

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