

# See Through. Measure True.

## AA15P Airborne LiDAR System for Power Grid & Utility Surveying





**Partners:** Strata Geomatics



**Product Portfolio:** CHCNAV AlphaAir 15 Pro airborne LiDAR system and Bortbiz navigation software

## ► Pain Points in the Power Industry

### Significant Safety Hazards



Safety Hazards



Expensive

Manual inspection requires personnel to work close to high-voltage lines, creating risks of electric shock, falls, and other field hazards. Helicopter inspection can reduce ground exposure, but it remains costly, depends on narrow flight safety windows, and is difficult to operate in poor weather conditions.

### Severe Vegetation Obstruction



Transmission lines often cross mountainous and forested areas. Traditional visible-light cameras cannot penetrate the vegetation canopy, making it difficult to measure the clearance between conductors and vegetation. This creates a potential fire hazard and increases the risk of missed vegetation encroachment.

### Insufficient Measurement Accuracy



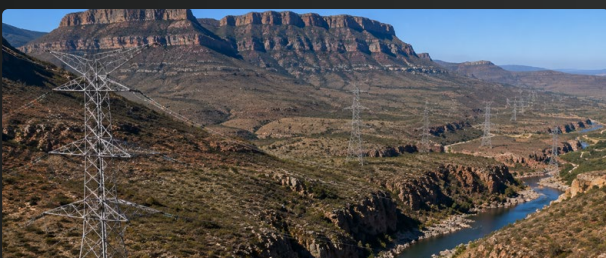
Inefficient



UAV

Traditional total station measurement has low single-point efficiency, typically covering only two to three towers per day. UAV orthophotos provide useful visual records, but they lack reliable 3D depth information, making it difficult to accurately measure sag, wind deflection, crossing clearance, and conductor-to-vegetation distances.

### Complex Terrain Limitations



Transmission corridors often cross rivers, canyons, mountains, and remote high-altitude areas. In these environments, personnel access is limited or impossible, making traditional inspection methods inefficient. Data blind spots can lead to missed hazards and increase operational risk for power line management.

## ► Customer Pain Points



The customer's existing Old equipment could no longer meet operational requirements. The system was aging, difficult to maintain, and associated with high hardware and software maintenance costs.



In South Africa, overhead ground wires vary in material and diameter, making them difficult to scan consistently with conventional inspection equipment.

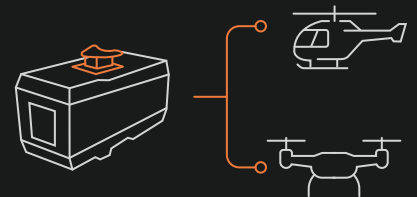


Many commercially available manned airborne LiDAR systems are expensive, bulky, and supported by complex software. This creates high learning costs for both office teams and field operators.

## ► Why Choose the CHCNAV AA15P Airborne LiDAR System?

### Lightweight and Cost-Effective Deployment

The AA15P is lightweight and cost-effective, enabling users to choose the appropriate flight platform according to project requirements. A single system can be deployed on both manned aircraft and unmanned aerial platforms.



### Intelligent Parameter Calculation

The software automatically calculates optimal scanning parameters based on aircraft type, altitude, speed, and project requirements. This reduces manual configuration work and helps operators achieve consistent data acquisition.



### Reliable Data Quality for Utility Inspection

**75°**  
Scanning field of view

Helping concentrate laser energy for clearer capture of fine power line structures



**16-echo**  
Capability improves vegetation penetration

Supports more complete ground point acquisition providing reliable data for corridor inspection and clearance analysis

## ► Project Overview

Strata Geomatic used the AA15P airborne LiDAR system to scan a 130 km power line corridor in the Komati region of South Africa.



The main objectives of the project were to verify:



Whether the AA15P could operate smoothly and collect data reliably when mounted on a manned aircraft.



The quality of the point cloud captured by the AA15P at the normal cruising speed of the aircraft.



Whether power line towers were clearly visible and whether overhead ground wires could be captured with sufficient completeness.

## 01. Equipment Assembly and System Self-Check

The AA15P LiDAR interface is highly integrated. The camera cable, GNSS cable, and power cable are consolidated into an A-shaped connector, simplifying installation and reducing connection complexity during field preparation.



The software provides a clean and intuitive interface, displaying the current device self-check status clearly. This allows operators to confirm system readiness before flight and reduce the risk of configuration errors.



## 02. Flight Data Collection

### Flight Parameters

#### Speed:

120 knots, approximately 220 km/h

#### Scenario:

130 km power line corridor

#### Altitude:

500 m



The LiDAR parameters were automatically calculated according to altitude and speed to achieve the optimal acquisition settings.



The software window provided a real-time preview of the flight plan, enabling the pilot to adjust heading and altitude based on the navigation window.



The AA15P system also automatically controlled data acquisition according to the preset flight path, helping avoid redundant data capture and improve operational efficiency.

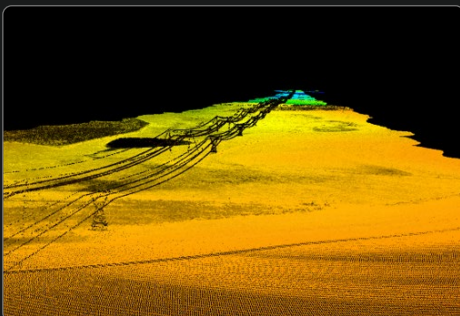
## 03. Data Processing

The processing software provided a trajectory accuracy check and highlighted areas with lower accuracy, allowing the team to assess data quality before final output.

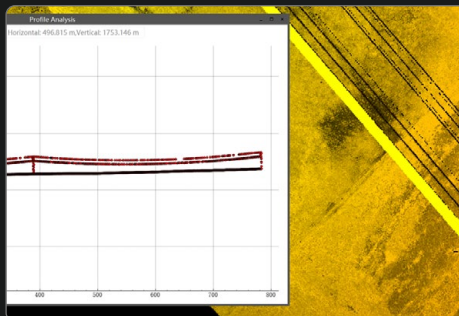


The data is complete, noise is filtered, the point cloud is clean, power line towers are clear, and grounding wires are clearly visible.

The collected data was complete, with noise effectively filtered. The final point cloud was clean, power line towers were clearly reconstructed, and overhead ground wires were visible.



Complete data coverage

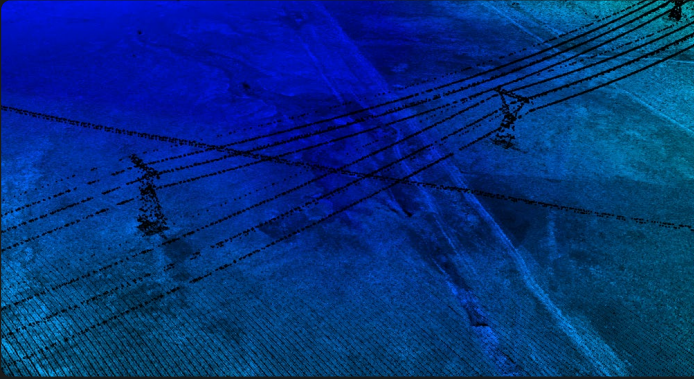


Continuous grounding wire with complete capture

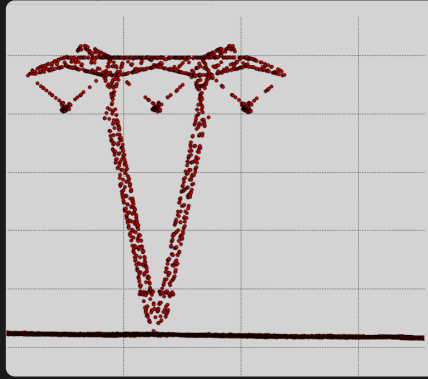


Power line point density: 4 pts/m<sup>2</sup>

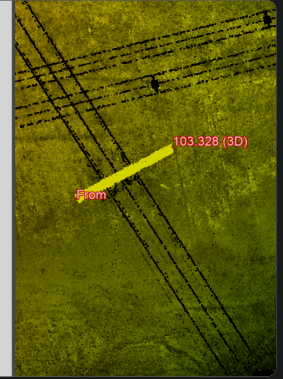
## High-Quality Point Cloud Results



The point cloud results showed clear capture of power lines across intersection areas. Fine power line structures at lower levels remained visible, supporting inspection of complex corridor sections.



The cat-shaped power line tower was fully reconstructed, with clearly visible insulators and ground wires.



## ► Project Conclusion

**2.4 million pts/s**

maximum measurement rate

**1,000 m +**

safe flight altitude

**75°**

field of view

**16 echoes**

supports up

When mounted on a manned aircraft platform, the AA15P airborne LiDAR system can maintain a safe flight altitude of over 1,000m AGL avoiding the risks of close-range inspection. With a maximum measurement rate of 2.4 million pts/s and a 75° field of view, the system delivers broad and efficient corridor coverage. For vegetation penetration, a critical requirement in power line inspection, the AA15P supports up to 16 echoes, enabling laser pulses to penetrate the canopy and reach the ground. Multi-echo classification helps calculate the minimum clearance between power lines and vegetation, providing quantitative data to support vegetation management.

**2.6 kg**

Weighing

**512 GB**

Removable NVMe SSD

**8 hours**

Continuous data acquisition

**15 minutes**

Readiness achieved

**IP64**

Protection rating

**-20 to +50 °C**

Operating temperature

Weighing only 2.6 kg, the AA15P is compatible with a range of manned and unmanned platforms, including helicopters and fixed-wing UAVs. The system is quick to deploy, with readiness achieved within 15 minutes of arriving on site. A 512 GB removable NVMe SSD enables more than 8 hours of continuous data acquisition, supporting large-scale corridor inspection missions. The system operates reliably from -20 °C to +50 °C, while its IP64 protection rating supports stable operation in demanding field environments.

## ► Comparison with Traditional Inspection Methods

| Comparison Dimension        | <br>Manual Ground Inspection | <br>UAV Orthophoto | <br>AA15P Airborne LiDAR |
|-----------------------------|---------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Worker Safety               | High risk                                                                                                     | Safe                                                                                                 | Safe, non-contact inspection                                                                                |
| Vegetation Penetration      | No penetration                                                                                                | No penetration                                                                                       | 16 echoes strong penetration                                                                                |
| 3D Coordinate Accuracy      | Low                                                                                                           | No depth information                                                                                 | 2 to 5 cm RMS                                                                                               |
| Inspection Efficiency       | Less than 5 km/day                                                                                            | Medium                                                                                               | 90 to 150 km/day                                                                                            |
| Sag Measurement             | Unable to measure                                                                                             | Low precision                                                                                        | Accuracy up to $\pm 5$ cm                                                                                   |
| Crossing and Span Detection | Manual visual inspection                                                                                      | Partially identifiable                                                                               | Automated extraction                                                                                        |



The AA15P system is highly integrated. Its onboard software automatically computes optimal LiDAR parameters based on selected flight altitude and speed, enabling a simplified configure, fly, and collect workflow. This lowers the operational barrier and reduces the risk of manual configuration errors. With a measurement rate of up to 2.4 million points per second, a 75° field of view, and up to 16 returns per pulse, the system captures high-density and high-continuity 3D point cloud data across varying flight altitudes.

The scanned power line towers showed clear structural definition. Fine elements such as insulator strings, crossarms, and ground wires were fully reconstructed, providing a reliable data foundation for tower tilt analysis, fitting defect identification, and utility asset inspection.

The AA15P handled power lines with different materials and voltage levels. Whether capturing highly reflective galvanized steel strands or lower-reflectivity ACSR conductors, the system maintained stable echo quality. From distribution lines to UHV DC transmission corridors, the wide-ranging dynamic range supported consistent point cloud integrity across different inspection scenarios.

## ► Customer Reviews



### # AA15P Airborne LiDAR System for Power Grid & Utility Surveying

★★★★★



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Our technical team used the AA15P mounted on a Cessna 307 to scan high-voltage transmission corridors, specifically validating its ability to assess overhead ground wires and towers. The results were compelling.

Assessing overhead ground wires has long been a challenge in power line inspections. Because of their small diameter and high elevation, capturing them clearly through traditional imagery or low-altitude drone scanning is difficult. With a data acquisition rate of 2.4 million points per second and a 75° field of view, the AA15P delivers high point cloud density. The resulting ground wire data is continuous and complete, making sag variations immediately visible. Issues such as broken or loose strands, which previously required manual tower climbing for visual inspection, can now be identified directly from point cloud data.



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