georeferenced by
APPLANIX
aided inertial technology

POS AV™

position & orientation system airborne vehicles

POS AV - Airborne Vehicles

***The Next Generation* - The POS AV is specifically designed for direct georeferencing of airborne sensor data. By integrating precision GPS with inertial technology, POS AV enables geospatial projects to be completed more efficiently, effectively, and economically. Supported by Applanix industry expertise and technological innovation, POS AV is engineered for aerial cameras, scanning lasers, imaging scanners, synthetic aperture radar, and LIDAR technology.**

DIRECT GEOREFERENCING

Compact, reliable, and a revolution in airborne surveying and mapping, directly georeferenced sensor data is generated with:

- An accurate solution for all motion variables
- Precise, image-specific Exterior Orientation parameters
- No requirement for aerotriangulation
- No requirement for a complete ground control survey (check points only required)

INCREASED PRODUCTIVITY AND ACCURACY

The next generation POS AV system is easily integrated with today's airborne sensors. Combined with the system's ability to geometrically correct and geographically encode sensor data, POS AV allows for:

- Increased savings in operational costs
- Increased savings in time
- Increased productivity
- Increased accuracy

UPGRADE STRATEGIES

A convenient upgrade path is available for current customers, including:

- IMU compatibility
- GPS card replacement
- Upgraded communications interface

Global Customer Support is available 24/7 with:

- Maintenance programs
- Integration support
- Extended warranties
- Full upgrade path
- Scalable options

STRENGTH BUILT ON EXPERIENCE

Applanix' engineering expertise and innovative technology solutions drive the largest user community in the airborne sensor market.

Applanix has priority access to state-of-the-art GPS technology, as part of the Trimble family's extensive experience and industry awareness.

Applanix' continued leading-edge status and dedicated customer service is assured.

www.applanix.com/posav

POS AV™ airborne vehicles

POS AV now includes these features:

• **PCS**	Light-weight, small-format
• **IMU**	Inertial measurement unit
• **GPS Receiver**	State-of-the-art technology provides improved position and velocity measurements utilizing 10Hz GPS data
• **CPU**	Fast processing with redundant data logging
• **Track 'Air FMS**	Seamless integration
• **Power Supply**	Low-power operation
• **POSPac**	Post-processing software bundle

REDEFINING THE WAY YOU SURVEY

Film Camera Applications

Client: AeroMap

Film Camera Overview

Producing 23cm square, high-resolution color, color infrared, and B&W photography, aerial film cameras have been a standard within the industry for many years. Stable and robust, and now fitted with FMC, gyro-stabilized mounts, and various navigation and GPS subsystems, aerial film cameras are an efficient and complete photographic unit.

AeroMap U.S. is a division of Aero-Metric Inc., one of the largest photogrammetric companies in the United States. AeroMap is based in Anchorage, Alaska, and is a full-service Geographic Information and Mapping Sciences firm, with expertise in all areas of aerial survey, airborne remote sensing, and satellite image processing. AeroMap's clients include government agencies and private sector organizations which use airborne imagery for various applications, from environmental monitoring to engineering design work.

CHALLENGE

Faced with limited good flying weather and the rugged Alaskan environment, AeroMap was tasked with capturing color aerial photography for the Federal Bureau of Indian Affairs. The Class II Orthophotography project involved generating images for approximately 500 native allotments in the Calista Native Lands area of western Alaska. The allotments were scattered throughout the region, and could be as far apart as 200 miles or share a common boundary, and vary in size between 20 and 150 acres. "It was a difficult assignment in which to capture the images efficiently, so precise coordination was required," Dean Cimmiyotti explained. "As the orthophotos would be used to assess the timber stands in each allotment, positional accuracy was an important consideration, particularly as vector data was to be overlaid to show the individual property limits."

Film Camera Applications

Client: AeroMap

SOLUTION

With accessibility and logistical concerns associated with carrying out a complete ground control survey in this area of Kuskokwim, AeroMap decided to use their POS AV system to generate direct georeferenced imagery, eliminate the need for aerotriangulation, and easily meet the Class II requirement of 5' horizontal positioning. "Using the POS AV allowed us to fly single lines with as few as 3 or 4 images per allotment. To verify the accuracy of the georeferenced data we used a minimum amount of ground control as a QC check," said Cimmiyotti, "and it exceeded our expectations."

RESULT

The final georeferenced imagery was used to generate a Digital Elevation Model, which allowed the orthophotos to be produced quickly. Digital vector data, provided by the Bureau of Land Management, was then accurately overlaid to illustrate the individual allotment boundaries. Since incorporating the POS AV system into its workflow, AeroMap has found that increased productivity and additional accuracy are readily attainable under the difficult conditions encountered in Alaska, streamlining their airborne surveys into a precise and efficient operation.

"The POS AV system enabled us to complete this project very cost effectively because we could georeference our aerial imagery without surveying multiple ground control points."

Dean Cimmiyotti, Project Manager, AeroMap U.S.

Digital Frame Camera Applications

Client: 3001 Inc.

Digital Frame Camera Overview

Designed around CCD (Charged Coupled Device) imaging elements to ensure rigid image geometry, a digital frame camera uses radiometric pixel resolution to generate standard perspective, high-resolution digital imagery. Producing four color channels in red, green, blue, and near-infrared, projects can now be undertaken in low light conditions with excellent results.

3001 Inc. is an international spatial data corporation with offices located across the United States. Its geospatial expertise has been utilized in numerous projects throughout the Americas, providing technological leadership and innovative solutions to the engineering, surveying and geomatics community, with a dedicated team of aerial survey, GIS and photogrammetry professionals. Using leading-edge technology 3001 Inc. continues to harness the power of geospatial information in an everchanging world.

CHALLENGE

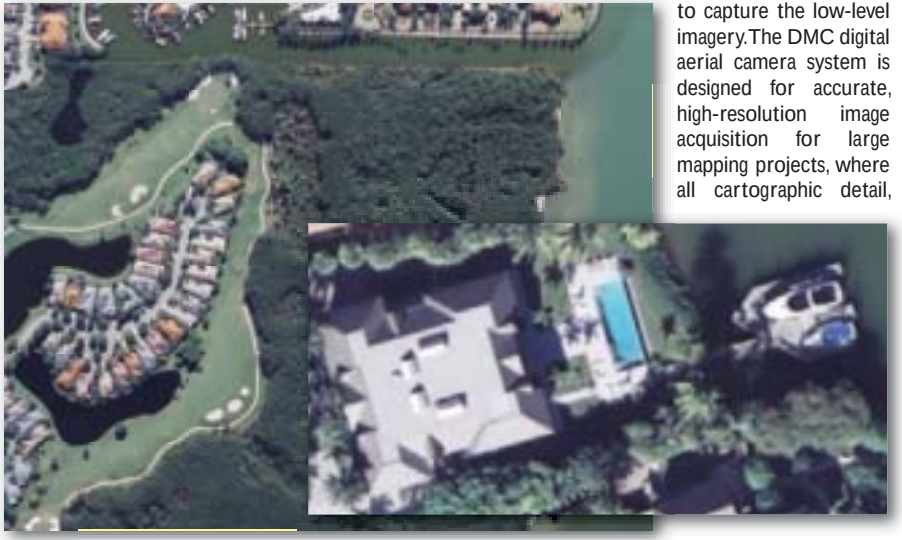
In December 2003, the company was tasked with providing a series of high resolution color digital images of Collier County in southwest Florida, as part of an on-going GIS update program involving digital orthophotography, stereocompilation, and planimetric mapping. Collier County is bordered on the west by the Gulf of Mexico, and five other counties to the north, east, and south. This portion of the project covered approximately 800 square miles of varied terrain, including large areas of swamp found along the coastal regions of western Florida. The digital imagery would be used to generate digital orthophotos and photogrammetric mapping data using stereoscopic image coverage. The final orthorectified imagery and vector mapping data would be input into the county's GIS system and accessible through the Collier County Property Appraiser's web site.

SOLUTION

To meet the project's specific requirements, 3001 Inc. used their Z/I Imaging DMC (Digital Mapping Camera) equipped with an Applanix POS AV integrated inertial position and orientation system,

Digital Frame Camera Applications

Client: 3001 Inc.



to capture the low-level imagery. The DMC digital aerial camera system is designed for accurate, high-resolution image acquisition for large mapping projects, where all cartographic detail, such as vegetation, transportation networks, hydrography, and buildings, can be clearly defined. It provides excellent visibility in areas of shadow and generates a bright, sharp image, ideal for this type of application.

RESULT

Within two weeks the flying portion of the project was completed, and image processing and data capture started. Flown at an altitude of 4500', the color digital imagery generated a 0.45' pixel size and a final delivery accuracy of 0.5' for the orthophotos. The company found the POS AV system enabled them to attain a tighter aerotriangulation result by utilizing its direct georeferencing capability in areas where image tie point matching was particularly difficult.

Greg Horrall explained. "There were areas along the coast that were completely covered in swamp. Identifiable ground features, such as small islands, were few and far between, so we took advantage of the POS AV direct georeferencing capability. By taking the exterior orientation parameters for the images covering those areas, and using them as part of the aerotriangulation adjustment, we were able to achieve a much more accurate result."

"The POS AV system enabled us generate a stable and complete aerotriangulation adjustment in areas where it was most needed."

Greg Horrall, Aerial Triangulation Specialist, 3001 Inc.

Using the POS AV-equipped DMC system, 3001 Inc. successfully completed the Collier County project, and provided positionally-accurate and highly-detailed digital imagery, ideally suited to the orthophotography and data update requirements.

LIDAR Applications

Client: MD Atlantic

LIDAR Overview

***Li*ght *D*etection *A*nd *R*anging is the basis behind LIDAR, a system that uses return-signal-intensity laser light, for the acquisition of Digital Terrain Model information. It is a very effective tool for generating accurate topographic data over large areas of featureless terrain.**

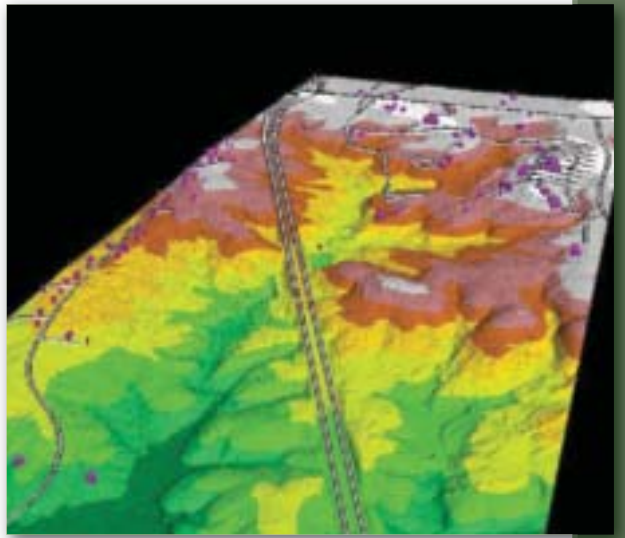
MD Atlantic Technologies is a leading supplier of geospatial information, digital aerial photography, photogrammetric mapping, airborne LIDAR data, and GIS database information. The organization provides geographic and spatial solutions to state and federal agencies, municipal governments, and the private sector. With a team of highly skilled professionals, MD Atlantic maintains its position as a leading-edge company at the forefront of the geospatial industry.

CHALLENGE

MD Atlantic was asked to undertake an extensive mapping project of Montgomery County, Alabama. A comprehensive dataset of geographic information was to be incorporated into the county's GIS system as part of its expanding GIS program. Planimetric and topographic data was required for an area covering approximately 790 square miles of rolling terrain, to include transportation networks, hydrographic features, and urban structures for all towns and cities, including Montgomery, the state capital. Color orthophotography was required together with a DTM (Digital Terrain Model), which would accurately define the topography of the county, and be used to generate 2' contour information.

SOLUTION

To effectively complete the project, MD Atlantic's solution was to use two types of sensors to capture the information, an Optech 1210 LIDAR system, and a Leica RC30 aerial camera. Both technologies use integrated POS AV systems to generate sensor-specific position and



LIDAR Applications

Client: MD Atlantic

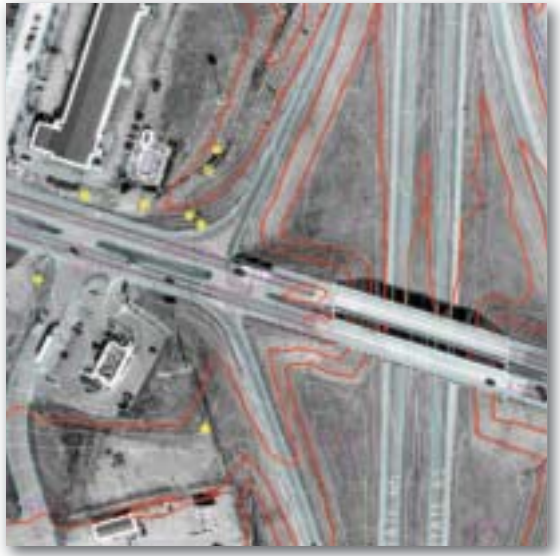
orientation information. "We were confident that the accuracy of the POS AV would allow us to integrate both the LIDAR and the mapping data perfectly," Steve Ashbee explained. "Rather than produce a complete DTM using stereocompilation, LIDAR will generate it in a fraction of the time. We then supplement the LIDAR mass point data with breaklines, road edge and hydrographic features captured photogrammetrically from the aerial photo, to produce a very accurate and true depiction of the terrain."

"With the point cloud density achievable with LIDAR and the accuracy of the integrated POS AV system, we were able to precisely position both terrain data and aerial imagery, which made for a very efficient workflow."

Steve Ashbee, General Manager, MD Atlantic Technologies

RESULT

Flying at an altitude of 3,280' the elevation data was acquired very quickly, with overlapping parallel swaths generating accurate XYZ point cloud information ready for mission post-processing. The terrain data was easily integrated into the project workflow and the required contour information generated. Although the LIDAR data was captured independently of the aerial photography, the accuracy of the POS AV on both systems ensured the datasets were compatible, allowing the development of a highly accurate topographic model from which 2' contour information was developed.



Synthetic Aperture Radar Applications

Client: Orbisat

Synthetic Aperture Radar Overview

Synthetic Aperture Radar (SAR) systems generate high resolution imaging using the long-range, broad-area characteristics of radar, and its unique frequency response to terrain and cultural detail. SAR systems are unaffected by adverse atmospheric conditions.

Orbisat da Amazônia is a leader in the application of Remote Sensing technology for use in mapping, geomatics, and geospatial information gathering. The company's expertise lies in its use of Interferometric Synthetic Aperture Radar (InSAR), which provides fast, accurate, and cost-effective solutions for the professional and scientific communities engaged in activities such as urban and regional planning, environmental analysis, and resource exploration and mapping.

CHALLENGE

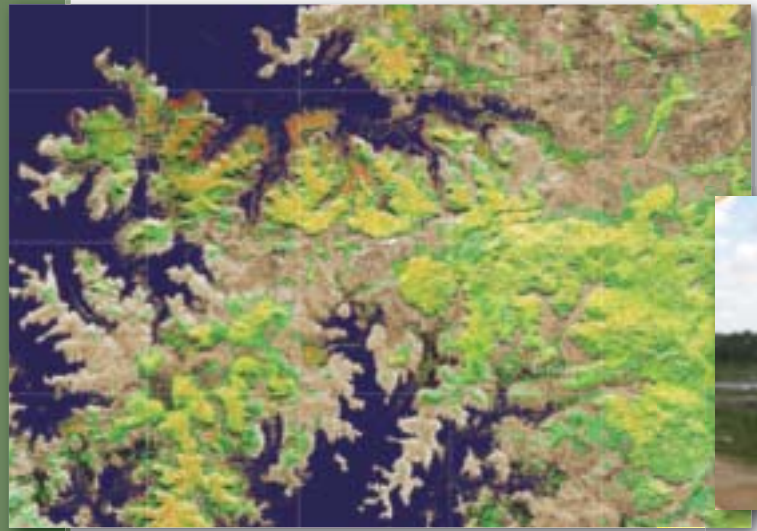
The CartoSUR II project was established in Venezuela in 2003 as a national cartographic venture to acquire radar-based mapping data covering approximately 1/3 of the entire country. Located at the northernmost end of South America, Venezuela has a total area of 912,050 km². Included in the CartoSUR II project area was the state of Bolivar, which contains some of the oldest land forms in South America. The rugged mountains, steep cliffs, and plateaus, rise to over 3000 m in places, and contain one of the highest waterfalls in the world, Angel Falls. The terrain gradually flattens out and drops down to the Delta Amarcuro on the east coast. Densely covered with forest and scored with tributaries of the Rio Orinoco, this whole region is often under thick cloud cover, and as such can be a very difficult area to map effectively.

SOLUTION

Orbisat immediately saw the solution to generating accurate cartographic data for this type of environment. The InSAR technology, with its all-weather operational capability, is unaffected by cloud, rain, poor visibility, and ground vegetation, and can very quickly produce accurate, detailed imagery, including digital terrain models. Installed aboard a Gulfstream Aerocommander aircraft, OrbiSAR-1 simultaneously uses two radar bands

Synthetic Aperture Radar Applications

Client: Orbisat



to generate image data, a result of the unique response of terrain and cultural targets to radar frequencies. The X-band reflects off surface objects such as trees, and buildings etc., to produce a Digital Surface Model, and the P-band reflects below the vegetation and produces a Digital Terrain Model.

RESULT

Within three months of starting the airborne operation, and 700hrs of air time, all image acquisition was completed. Flying at an altitude of 23,000', and using a dual pass for P-band interferometry with an 80 m baseline, the 3D imaging data was generated and made ready for processing. Dieter Leubeck, Project Manager, Orbisat, explained. "As well as providing position and orientation information for the radar imagery, the POS AV system also generates a real-time navigation solution that is incredibly accurate. We can fly a 120 km line and stay within a 1m horizontal variance quite easily. These attributes make the OrbiSAR-1 system extremely effective in undertaking radar mapping projects, and it's the POS AV that provides the spatial orientation accuracy." Final data delivery to the Geographical Institute of Venezuela Simon Bolivar (IGVSB) totaled 518 map sheets at a scale of 1:50,000, and covered an area of more than 263,000 km². Contour information was illustrated on the X-band orthoimage maps, and digital terrain model and full polarimetric P-band image data was made available for the complete project.

"We have incorporated the Applanix POS AV as the enabling technology behind our Synthetic Aperture Radar system OrbiSAR-1, to provide truly accurate elevation and image data."

Dr. Markus Rombach, Commercial Director, Orbisat da Amazônia

Digital Scanner Applications

Client: EarthData

Digital Scanner Overview

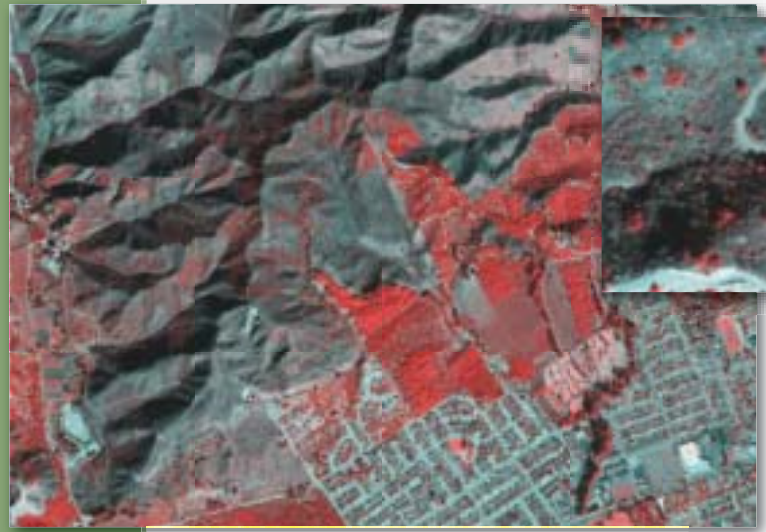
Airborne digital scanners are high-performance digital sensors capable of generating accurate, multispectral data. Using panchromatic CCD (Charged Coupled Device) lines, together with various multispectral lines, the system can simultaneously capture multiple, wide-area bands of detailed information.

EarthData is a leader in the airborne imaging, mapping, and Geographic Information Systems (GIS) field. Its fleet of specially configured survey aircraft collects a variety of information about the Earth's surface, using aerial cameras and various types of airborne sensors. The company transforms the data into customized mapping and GIS products and services. For close to 50 years, EarthData's clients have used this geospatial information for design infrastructure, terrain modeling, transportation engineering and environmental research, to better understand the Earth and its resources.

CHALLENGE

In October 2003, the State of California suffered one of the most devastating wildfires in its history. It caused extensive damage to property and the environment and posed a potential threat to the state's energy systems, which included transmission lines, major natural gas pipelines, and various oil refineries located in the immediate area. The fires were spread across more than 300,000 acres of land, with states of emergency being declared in Los Angeles, San Diego, Ventura and San Bernardino counties, where the authorities were battling fires on 10 separate fronts. EarthData, working in conjunction with ESRI and Horizons Inc., was tasked with generating accurate and detailed aerial imagery of the affected areas, to enable damage analysis to begin, in support of rapid response and recovery efforts.

Digital Scanner Applications



SOLUTION

Using a Leica Geosystems ADS40 digital sensor, equipped with an Applanix POS AV system, EarthData's Piper Navajo Chieftain was airborne over the worst affected areas of the fire, at short notice, to capture color-infrared imagery. Mitch Jordan, EarthData's project manager, explains, "The POS AV system integrates very well with our airborne sensors, and its direct georeferencing capability is a big plus, especially for emergency response operations such as this one, where there is no time to carry out ground control surveys. Accurate georeferenced digital images can be generated very quickly with this system."

RESULT

The acquisition of detailed digital imagery was completed within 14 days, as a result of the combined airborne operations of EarthData and Horizons Inc. The quick data turnaround was made possible with the ADS40 digital system and POS AV image georeferencing attributes, which together prove a very efficient combination. In total 3,143 square miles of severely burned terrain were captured and processed. With the image acquisition complete, state and local authorities were able to access the data immediately for use in damage assessment and recovery. Image analysis experts at ESRI used the digital orthophotography and corresponding DTM data to map the fire-damaged environment, and analyze the drainage patterns as a precaution against the potential risk of mudslides now that ground cover vegetation had been destroyed.

Client: EarthData

"The POS AV system has enabled us to maximize positional accuracy with our ADS40 digital sensors."

Mitch Jordan, Project Manager, EarthData.

Direct Georeferencing Advantages

Direct Georeferencing **is the direct measurement of image exterior orientation parameters, using a POS (Position & Orientation) system to enhance the functionality of an imaging sensor, such as an aerial camera (digital or film-based), multi-spectral or hyper-spectral scanner, or LIDAR. The POS serves as the georeferencing component and the sensor as the imaging component.**

Raw positioning data generated by the POS, are processed together with camera (sensor) location measurements, to calculate accurate position and orientation values for each image. These are referred to as Exterior Orientation parameters.

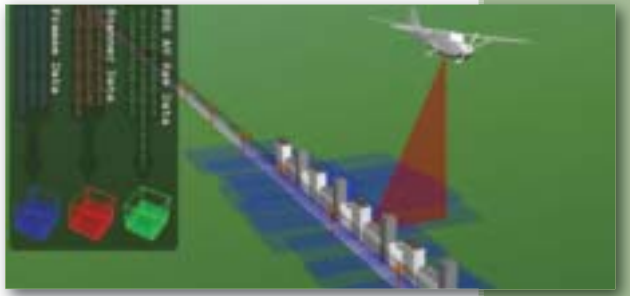
The Exterior Orientation parameters, together with the digital imagery, are input into a digital photogrammetric workstation, and data capture or image orthorectification performed.

THE ADVANTAGE OF DIRECT GEOREFERENCING

- The requirement for project wide tie-point matching and aerotriangulation (AT) can be drastically reduced or eliminated completely, resulting in enormous savings in data acquisition and processing time
- Limited ground control may be required only for quality control check point purposes, eliminating the need for a full ground survey
- Data workflow and quality control are streamlined and automatic
- Tight project deadlines are more achievable by eliminating extensive ground survey, and AT preparation/processing tasks

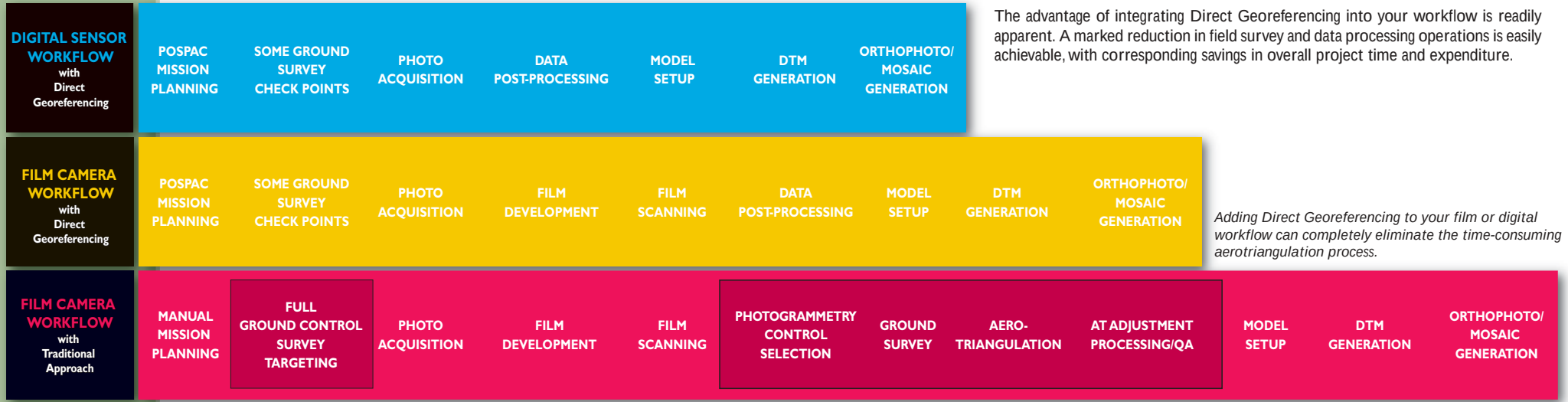
POS AV-DERIVED DIRECT GEOREFERENCING ALLOWS FOR:

- *Stereo Model Mapping* – typical photogrammetric model setup using a stereopair of photos or digital frame images used to determine 3D object point coordinates
  Advantage: reduction in time and cost – eg: projects involving medium-scale forested areas where point matching is difficult, georeferenced processing time is drastically reduced
- *Single Photo Orthorectification* – making use of currently available DTM data to generate accurate ground object position for digital orthophotos
  Advantage: stereo coverage unnecessary, fewer photos required, corresponding reduction in film/scanning costs, short project turnaround times achievable



In addition to improving the productivity of more traditional aerial mapping applications, Direct Georeferencing is ideally suited to situations where ground control is simply not available, such as inhospitable environments, or in developing countries where ground surveys may be limited. It is also ideal for rapid mapping applications where ground control is not needed – in emergency situations such as forest fires and floods, or where environmental disasters have occurred, such as oil or chemical spills.

Direct Georeferencing Workflow



The advantage of integrating Direct Georeferencing into your workflow is readily apparent. A marked reduction in field survey and data processing operations is easily achievable, with corresponding savings in overall project time and expenditure.

Adding Direct Georeferencing to your film or digital workflow can completely eliminate the time-consuming aerotriangulation process.

System Specifications

1. Performance - POS AV Absolute Accuracy Specifications (RMS):

	C/A GPS	DGPS	RTK	Post-Processed
	Model 310			
Position (m)	4.0 - 6.0	0.5 - 2	0.1 - 0.3	0.05 - 0.3
Velocity (m/s)	0.05	0.05	0.01	0.075
Roll & Pitch (deg)	0.03	0.03	0.03	0.015
True Heading[1] (deg)	0.10	0.08	0.07	0.035
	Model 410			
Position (m)	4.0 - 6.0	0.5 - 2	0.1 - 0.3	0.05 - 0.3
Velocity (m/s)	0.05	0.05	0.01	0.005
Roll & Pitch (deg)	0.015	0.015	0.015	0.008
True Heading[1] (deg)	0.08	0.05	0.04	0.015
	Model 510			
Position (m)	4.0 - 6.0	0.5 - 2	0.1 - 0.3	0.05 - 0.3
Velocity (m/s)	0.05	0.05	0.01	0.005
Roll & Pitch (deg)	0.008	0.008	0.008	0.005
True Heading[1] (deg)	0.07	0.05	0.04	0.008
	Model 610			
Position (m)	4.0 - 6.0	0.5 - 2.0	0.1 - 0.3	0.05 - 0.3
Velocity (m/s)	0.03	0.02	0.01	0.005
Roll & Pitch (deg)	0.005	0.005	0.005	0.0025[2]
True Heading[1] (deg)	0.030	0.030	0.020	0.0050

POS AV Relative Accuracy Specifications:

	Model 310	Model 410	Model 510	Model 610
Noise (deg/sqrt(hr))	0.15	0.07	0.02	0.005
Drift (deg/hr)[3]	0.5	0.5	0.1	< 0.01[4]

[1] *Typical mission profile, max RMS error*

[2] *May require local gravity model to achieve full accuracy*

[3] *Attitude will drift at this rate up to a maximum error defined by absolute accuracy in the table above*

[4] *Drift (deg/hr), 1 sigma*

2. Sensors

	Model 310	Model 410	Model 510	Model 610
IMU	300 Hz High performance MEMS quartz gyros, accelerometers	300 Hz High performance MEMS quartz gyros, accelerometers	200 Hz High performance FOG gyros, silicon accelerometers	200 Hz High performance RLG gyros, quartz accelerometers
GPS	12 channel dual frequency (L1/L2), low noise, DGPS ready, 10 Hz raw data	12 channel dual frequency (L1/L2), low noise, DGPS ready, 10 Hz raw data	12 channel dual frequency (L1/L2), low noise, DGPS ready, 10 Hz raw data	12 channel dual frequency (L1/L2), low noise, DGPS ready, 10 Hz raw data

3. Physical - All Models PCS:

Temp. Range:	-20 deg C to +55 deg C (Operational)
Size:	279 L x 165 W x 91 H mm (11.0L x 6.5 W x 3.6 H inches)
Weight:	2.90 kg
Power:	20-34 Volts DC - 30 W, Max

System Specifications

Physical - IMU:

Model 310	
Temp. Range:	-40 deg C to +71 deg C (Operational)
Size:	105.4 L x 105.4 W x 106.8 H mm (4.15 L x 4.15 W x 4.21 H inches)
Weight:	1.7 kg (with top-hat and plate)
Power:	20-34 Volts DC 48 W, Max (supplied by PCS)

Model 410	
Temp. Range:	-40 deg C to +71 deg C (Operational)
Size:	105.4 L x 105.4 W x 106.8 H mm (4.15 L x 4.15 W x 4.21 H inches)
Weight:	1.7 kg (with top-hat and plate)
Power:	20-34 Volts DC 48 W, Max (supplied by PCS)

Model 510	
Temp. Range:	-54 deg C to +71 deg C (Operational)
Size:	97 D x 86 H mm (3.8 D x 3.4 H inches)
Weight:	1.00 kg (with top-hat and plate)
Power:	20-34 Volts DC 20 W, Max (supplied by PCS)

Model 610	
Temp. Range:	-40 deg C to +70 deg C (Operational)
Size:	163 L x 165 W x 163 H mm (6.4 L x 6.5 W x 6.4 H inches)
Weight:	4.49 kg
Power:	20-34 Volts DC 28 W, Max (supplied by PCS)

4. I/O

Ethernet (100 base-T)

Parameters	Time tag, status, position, attitude, velocity, track and speed, dynamics, performance metrics, raw IMU data (IMU rate), raw GPS data (10Hz)
Display Port	Low rate (1 Hz) UDP protocol output
Control Port	TCP/IP input for system commands
Primary Port	Real-time (up to IMU rate) TCP/IP protocol output
Secondary Port	Buffered TCP/IP protocol output for data logging to external device

Logging

Parameters	Time tag, status, position, attitude, velocity, track and speed, dynamics, performance metrics, raw IMU data (IMU rate), raw GPS data (10Hz)
Media	External: Removable 1 Gbyte Flash Disk (2 supplied), Internal: Embedded 1 Gbyte Flash Disk for redundant logging

RS232 NMEA ASCII Output

Parameters	NMEA Standard ASCII messages: Position ($INGGA), Heading ($INHDT), Track and Speed ($INVTG), Statistics ($INGST)
Rate	Up to 50 Hz (user selectable)

RS232 High Rate Binary Output

Parameters	User selectable binary messages: Time, position, attitude, speed, track, PAV30 output, Yaw Drift Correction,
Rate	Up to IMU rate (user selectable)

RS232 Input Interfaces

Parameter	Gimbal encoder input, AUX GPS Input (RTK, NavCom Starfire, OmniStar HP), RTCM104 DGPS Corrections Input
Rate	1 Hz to IMU rate

Other I/O

1PPS	1 pulse-per-second Time Sync output, normally high, active low pulse
Event Input (2)	Two time mark of external events. TTL pulses > 1 msec width, max rate 100 Hz.

5. User Supplied Equipment

PC for POS Controller (Required for configuration)

- Pentium 90 processor (minimum)
- 16 MB RAM, 1 MB free disk space
- Ethernet adapter (RJ45 100 base T)
- Windows 98/2000/NT/XP

PC for POSPac Post-processing Software

- Pentium III 800Mhz or equivalent (minimum)
- 256 MB RAM, 400 MB free disk space
- USB Port (For Security Key)
- Windows 2000/XP

OEM System Specifications

The POS AV system has been successfully integrated with a number of original equipment manufacturers producing various types of sensors for the aerial survey and remote sensing industry.

The OEM version of the new POS AV has been designed with OEM requirements in mind, and contains the following features to allow for a more flexible installation and operation process:

- Light weight, smaller format
- Remote power ON/OFF capability
- Non-removable PC card for internal data logging, or logging over the Ethernet to save power
- Designed to be used with OEM custom-manufactured cable systems

1. Physical

Temp. Range:	PCS	-20 deg C to +60 deg C
Size:	PCS	239 L x 158 W x 82 H mm (9.4 L x 6.2 W x 3.2 H inches)
Weight:	PCS	2.54 kg
Power:	20 - 34	Volts DC
	PCS	25 W, Max (not including IMU)

2. General - Sensors

IMU	GPS
Model dependant	12 channel dual frequency (L1/L2), low noise, DGPS ready, 10 Hz raw data

3. I/O

Ethernet (100 base-T)

Parameters	Time tag, status, position, attitude, velocity, track and speed, dynamics, performance metrics, raw IMU data (IMU rate), raw GPS data (10Hz)
Display Port	Low rate (1 Hz) UDP protocol output
Control Port	TCP/IP input for system commands
Primary Port	Real-time (up to IMU rate) TCP/IP protocol output
Secondary Port	Buffered TCP/IP protocol output for data logging to external device

Logging

Parameters	Time tag, status, position, attitude, velocity, track and speed, dynamics, performance metrics, raw IMU data (IMU rate), raw GPS data (10Hz)
Media	Embedded 1 Gbyte Flash Disk

RS232 NMEA ASCII Output

Parameters	NMEA Standard ASCII messages: Position ($INGGA), Heading ($INHDT), Track and Speed ($INVTG), Statistics ($INGST)
Rate	Up to 50 Hz (user selectable)

OEM System Specifications

RS232 High Rate Binary Output

Parameters	User selectable binary messages: Time, position, attitude, speed, track, PAV30 output, Yaw Drift Correction
Rate	Up to IMU rate (user selectable)

RS232 Input Interfaces

Parameter	Gimbal encoder input, AUX GPS Input (RTK, NavCom Starfire, OmniStar HP), RTCM104 DGPS Corrections Input
Rate	1 Hz to IMU rate

Other I/O

1PPS	1 pulse-per-second Time Sync output, normally high, active low pulse
Event Input (2)	Time mark of external events. TTL pulses > 1 msec width, max rate 100 Hz.
Remote Power	ON/OFF control via remote signal

4. User Supplied Equipment

PC for POS Controller (Required for configuration)

- Pentium 90 processor (minimum)
- 16 MB RAM, 1 MB free disk space
- Ethernet adapter (RJ45 100 base T)
- Windows 98/2000/NT/XP

PC for POSPac Post-processing Software

- Pentium III 800Mhz or equivalent (minimum)
- 256 MB RAM, 400 MB free disk space
- USB Port (For Security Key)
- Windows 2000/XP

POSTrack V5 Specifications

POSTrack
One Compact Solution

Combining the precision of POS AV Direct Georeferencing with the versatility of the Track'air XTRACK Flight Management System

POSTrack is the first fully integrated, real-time direct georeferencing and flight management system designed for the airborne geospatial community.
Purpose-built to reduce the costs associated with the preparation and implementation of airborne surveys, POSTrack minimizes mission planning and operational workload. Utilizing a combination of specifically developed software and hardware tools, the system combines the best of both technologies with all the functionality necessary to simplify and streamline today's aerial survey and remote sensing operations.

POSTrack incorporates the latest integrated inertial/GPS direct georeferencing technology from Applanix, with the Flight Management System (FMS) expertise of Track'air, the industry's leading FMS manufacturer. Unlike other IMU/GPS/FMS configurations, which utilize independent components for in-flight task automation and mission planning, POSTrack is engineered as a single system, compact, convenient, and easily installed on all types of aircraft without a complicated network of cables and connectors.

Compact, Simplified Cockpit Configuration
Configured to control and trigger various airborne sensors in addition to handling the GPS/IMU functions, POSTrack will ensure the highest levels of precision are maintained. The XTRACK component monitors the real-time position and orientation of the sensors computed by the POS AV, then instructs the system when to perform certain tasks. The in-flight automation enables exact flight path guidance and accurate sensor positioning, which translates into optimized airtime over the target area for the most economical and efficient mission capability.

With sensor-compatible interfaces, mission status display, flat panel pilot screen, and planning and reporting software, POSTrack is the ideal system for single-pilot or pilot/navigator crew configurations who want a streamlined, cost-effective airborne operation.

Complete Upgrade Path
As with all Applanix products, POSTrack has a clear upgrade path to ensure the system provides the best results and continued service.

POSTrack V5 Specifications

1. Physical

Computer System

Temp. Range:	-20 deg C to +55 deg C
Size:	279 L x 330 W x 91 H mm
Weight:	5.9 kg

Pilot Touch Screen Display

Temp. Range:	-10 deg C to +50 deg C
Size:	45 L x 215 W x 175 H mm
Weight:	1.34 kg
Power:	20 - 34 Volts DC, 110 W, Max (including IMU, GPS, pilot display)

2. I/O

Ethernet (100 base-T)

Parameters	Time tag, status, position, attitude, velocity,track and speed,dynamics, performance metrics, raw IMU data (200 - 300Hz), raw GPS data (10Hz)
Display Port Low rate	(1 Hz) UDP protocol output
Control Port	TCP/IP input for system commands
Primary Port	Real-time (up to 300 Hz) TCP/IP protocol output
Secondary Port	Buffered TCP/IP protocol output for data logging to external device

Logging

Parameters	Time tag, status, position, attitude, velocity, track and speed, dynamics, performance metrics, raw IMU data (200 - 300 Hz), raw GPS data (10Hz)
Media	External: Removable 1 Gbyte Flash Disk (2 supplied), Internal: Embedded 1 Gbyte Flash Disk for redundant logging

RS232 NMEA ASCII Output

Parameters	NMEA Standard ASCII messages: Position ($INGGA), Heading ($INHDT), Track and Speed ($INVTG), Statistics ($INGST) Rate Up to 50 Hz (user selectable)

RS232 High Rate Binary Output

Parameters	User selectable binary messages: Time, position, attitude, speed, track, PAV30 output, Yaw Drift Correction,
Rate	Up to 200 Hz (user selectable)

RS232 Input Interfaces

Parameter	Gimbal encoder input, AUX GPS Input (RTK, NavCom Starfire, OmniStar HP), RTCM104 DGPS Corrections Input
Rate	1 to 200 Hz

Other I/O

1PPS	1 pulse-per-second Time Sync output, normally high, active low pulse
Event Input (2)	Two time mark of external events. TTL pulses > 1 msec width, max rate 100 Hz.

4. Sensor Interfaces

3-axis Mount

Drift Correction	T-AS (analog/ RS232), PAV30 (RS232), GSM300(RS232) DSS Azimuth Mount (RS232)
Levelling Control	PAV30 (RS232), GSM3000 (RS232)
Gimbal Encoder	T-AS (RS232), PAV30 (RS232), GSM3000 (RS232) DSS Azimuth Mount (RS232)
Stab. Control	GSM3000 (RS232)

Frame Camera

Triggering/MEP	RC20/30, TOP RMK, LMK 2000, Vexcel UltraCam Generic
Data Interface	RC20/30 (RC20 w/o data annotation), TOP RMK, Vexcel UltraCam, LMK2000 (requires additional interface module) Generic

LIDAR

Logging On/Off	ALS40/50, Riegl Q240

5. User Supplied Equipment

PC for POSPac Post-processing Software

- Pentium III 800Mhz or equivalent (minimum)
- 256 MB RAM, 400 MB free disk space
- USB Port (For Security Key)
- Windows 2000/XP