An Overview of Applanix
The Company
The Industry Leader in Developing Aided Inertial Technology

- Founded on Canadian Aerospace and Defense Industry Expertise
- Providing Precise Position and Orientation Systems for Airborne, Marine and Land-based Applications

- Firmly Established in the Commercial Sector since 1991
- A Subsidiary of Trimble Navigation
The Origins of POS Technology

Military
- GeoReferenced Camera System
- SAR motion compensation

Commercial
- road inspection & survey
- railroad track geometry
- airborne survey & topo mapping
- seafloor mapping

Helicopter Integrated Navigation System (HINS)
1986-94

Position and Orientation System (POS)
1993-present

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Aided Inertial Advantage
Position and Orientation System (POS)

**IMU Only**

**Advantages:**
- Full 6 Degrees of Freedom solution
- High dynamic accuracy with broad bandwidth
- Self-contained, requires no external data

**Limitations:**
- Solution errors diverges slowly with time

**GPS Only**

**Advantages:**
- High-accuracy position & velocity
- Moderate accuracy orientation

**Limitations:**
- Low bandwidth
- Satellite signals easily blocked and subject to multipath errors
- Slow ambiguity resolution

**Integrated Inertial/GPS**

- Integrates IMU sensed acceleration and orientation with precision GPS position and velocity
- Generates continuous, dynamically-accurate positioning solutions
- Engineered for use with a complete range of sensors

**Advantages:**
- All inertial and GPS advantages

**Limitations:**
- No significant limitations
Key Technology Attributes
Position and Orientation System (POS)

Generates Very Precise Heading and Orientation Measurements
• Provides RTK or differential-level position and orientation with high-bandwidth (200 Hz) and low-latency (<3 msec)

Is Unaffected by Satellite Signal Loss
• Provides **continuous** position and orientation measurements during GPS dropout

Comprises Off-the-Shelf Components
• Modular, rugged, interchangeable primary components

Is a Fully Supported Commercial Product
• Integrated turnkey operation, self-contained system, ready to integrate with various sensors (camera, rut-bar, laser scanner etc)
Technology Applications
Engineered for use in a wide variety of survey, mapping and positioning roles

- Airborne Survey and Mapping
- Marine Survey and Sensing
- Land Survey and Resource Exploration
- Road Survey and Mobile Applications
- Railroad Survey and Track Geometry
Technology Solution
Serving the professional and scientific communities

Providing the enabling technology behind the systems that generate geospatial information for:

- Urban and Regional planning
- Remote Sensing
- GIS Infrastructure
- Forestry
- Natural Resources
- Oceanography
- Oil and Gas Exploration
- Disaster Response Management
- Transportation Planning
- Agriculture
- Mining and Mineral Exploration
Product Line

**Airborne**
- Airborne Vehicles
  POS AV™
- Digital Sensor System
  DSS™
- Post-processing Software
  POSPac™

**Land**
- Land Vehicles
  POS LV™
- Track Geometry
  POS TG™
- Land Survey
  POS LS™
- Post-processing software
  POSPac™

**Marine**
- Marine Vessels
  POS MV™
- GPS Interface
  GRAM-S™
Airborne – POS AV
POS AV is the enabling technology behind these airborne sensors...

- Aerial Cameras
- Scanning Lasers (LiDAR)
- Synthetic Aperture Radar
- Digital Frame Cameras
- Digital Scanners

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Airborne – POS AV
Position and orientation system designed specifically for Direct Georeferencing of airborne data

Key Attributes:

• Significantly reduces airborne survey cost and turn around time
• In-air-alignment capability
• Directly measures the sensor’s position and attitude
• Achieves very high accuracy and data rate
• Offers real-time or post-processed data options
• Computes geometrically corrected and geographically coded data
• Reduces the need for labor-intensive ground control

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Airborne – POS AV
A revolution in airborne surveying and mapping

Applications:
- Digital mapping
- Corridor surveys
- DTM data capture
- Orthophoto generation
- Coastal surveying
- Block surveys
- Forestry
Airborne – DSS Digital Sensor System
Digital, medium format, rapid response remote sensing solution

Key Attributes:

• Fully integrated, modular, compact
• All-inclusive system, stores, handles and processes data
• Installed and operational in less than an hour
• Pilot operated
• Ideal for single-engine aircraft and helicopter platforms
• Offers an increase in performance, reduction in operating costs when compared to large format cameras undertaking small, localized projects
Airborne – DSS Digital Sensor System
Designed to generate high-quality, georeferenced, airborne Color and CIR digital imagery

The ideal solution for:
• Corridor/strip survey and irregular collects
• Small block survey
• Disaster response management when time-critical projects are at stake
• GIS analysis and feature identification
• 3D photogrammetric mapping
• Remote sensing applications
• Resource inventory survey

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Land Survey - POS LS
All-terrain land positioning/navigation system designed for pedestrian use...

Key Attributes:

• Maintains positional accuracy for hours in the absence of GPS
• Extremely accurate in areas where optical or GPS survey is impossible
• Simple to operate
• Minimizes environmental impact - no need for vegetation clearing line-of-sight
• Comprises a rugged, impact resistant, hard-shell backpack
• Improves productivity – faster production, less manpower
Land Survey - POS LS
Ruggedized system for accurate inertial positioning under the most demanding survey conditions

Applications:
- Single-pass survey operations
- Seismic surveys in rugged terrain with limited GPS reception
- Cadastral surveys in dense urban environments where high-rise buildings cause GPS dropout
- Continuous positioning in buildings - even underground
Land Vehicles – POS LV
Mobile position and orientation system for vehicle dynamics, road profiling and vehicle navigation

Key Attributes:
• Designed to operate under the most difficult GPS conditions found in urban and suburban environments
• Generates precise, high-rate (200 Hz), low-latency (<3 msec) real-time data
• Combines easy vehicle installation and user-friendly system operation
Land Vehicles – POS LV

The aided inertial advantage in a suburban environment – DGPS maps only 40% of the track area, POS LV maps 100%

Applications:

• Continuous data capture through:
  - Urban canyons
  - Under full tree canopy
  - In tunnels, under bridges
• Precision measurement of vehicle dynamics
• Pavement management data collection
• Vehicle testing
• Corridor surveys (video-logging)
Marine – POS MV featuring TrueHeave
Sets the International Hydrographic Organization industry standard

Key Attributes cont...

• Continuity of all data during drop-outs
• Self-calibrating for rapid deployment
• Extreme roll, pitch and true heading accuracy in all dynamics
• Enhanced heave processing for near real-time QC of heave data
Marine – POS MV featuring TrueHeave
Proven high-accuracy aided inertial navigation system for the marine industry

Key Attributes:

• The most reliable system for multibeam sonar motion compensation
• Virtually eliminates line run-ins
• Enables data collection through turns
• Provides immunity to long period swell heave errors
Applanix Marine Products

**POS MV 320**
- Roll and pitch accuracy to 0.01° in all dynamics
- True heading accuracy to 0.01° independent of latitude and dynamics

**POS MV 220**
- Roll and pitch accuracy to 0.05° in all dynamics
- True heading accuracy to 0.05° independent of latitude and dynamics
Marine – GRAM-S GPS Interface
A Precise Positioning GPS interface for military applications

Key Attributes:
- Plug-and-play GRAM-S compliant interface for military applications
- Specifically designed to accommodate Trimble Force 5 receivers
- The Force 5 corrects for Selective Availability

Applications:
- The Force 5 is used under military conditions with single/multibeam sonar systems
Track Geometry – POS TG
A precision measurement system designed to compute railroad track geometry

Key Attributes:

• Provides mm accuracy Track Geometry measurements using non-contact technology at revenue-traffic speeds

• Integrates with onboard display & control systems for a turnkey, track geometry solution of the highest quality and accuracy

• Provides submeter geographic positioning for railroad surveys

• A cost-effective and extremely accurate alternative to traditional measurement methods
Software – POSPac
Modular, precision-enhanced post-processing software

Key Attributes:
• Integrated suite of software tools
• Maximizes POS system data accuracy using forward and reverse processing techniques
• Multiple GPS base-station processing
• Automatic setup, straightforward operation

Applications:
• Computes boresight directly from POS data and ground control
• New POSEO/POSCal Modules for airborne photogrammetry
• Eliminates the need for third party aerotriangulation
• QA/QC tools allow for complete data analysis
• Computes camera/IMU calibration parameters
• Generates Direct Georeferenced output data

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GAMS

GPS Azimuth Measurement Subsystem
GAMS Function

• GAMS provides heading aiding to POS MV
• Without heading aiding, POS MV has the following performance attributes:
  – Heading accuracy is 0.25° RMS (frequent manoeuvres) to 2.0° RMS (few manoeuvres) once POS MV is aligned fully.
  – To obtain a faster alignment and better accuracy, the survey vessel must turn or perform a calibration manoeuvre once every 10 minutes.
  – Heading accuracy degrades at higher latitudes.
GAMS Function

- With heading aiding, POS MV has the following performance attributes:
  - Heading accuracy is 0.02° RMS independent of manoeuvres and latitude
  - Alignment occurs within two minutes
  - Tolerance of GAMS outages lasting several tens of minutes with no significant heading accuracy degradation
  - Re-resolution of ambiguities is 1 second