POSPac™ MMS

LAND MAPPING APPLICATIONS

Technical Notes

Leading the way with increased reliability.

Industry-leading post-processing software designed to maximize the accuracy potential of your POS LV (Position and Orientation System – Land vehicles) system. POSPac MMS for LAND sets the standard for accurate, reliable and repeatable results under the most difficult GNSS conditions.

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Applanix POSPac™ Mobile Mapping Suite (MMS): Land Mapping Applications

Applanix POSPac MMS for Land is powerful post-mission software that processes data from your Applanix POS LV integrated GNSS/Inertial system to perform highly accurate Direct Georeferencing of your land-based mapping sensor.

Optimized for land-based environments and compatible with a variety of sensors, this smart software solution achieves both maximum accuracy and maximum efficiency for Direct Georeferencing. The complete post-processing toolbox delivers a streamlined field-to-office workflow for best results possible. It contains all the tools that you need to:

- Produce highly accurate position and orientation solutions from the GNSS and Inertial data logged by your POS LV system
- Obtain maximum immunity to GNSS outages in dense urban environments and vegetation covered areas
- Achieve stable, reliable, repeatable, and more accurate results
- Utilize post processing with raw GNSS outages virtually anywhere
- Import, manage and assess the data from your POS LV system and GNSS reference stations
- Automate data output in your choice of format (Support for numerous mapping applications)

Featuring the new revolutionary Applanix SmartBase™ module and Applanix IN-Fusion™ technology, POSPac MMS for Land provides an unequalled level of productivity, accuracy and robustness to the land-based mapping professional.

POSPac MMS for Land is your key to powerful, consistent, reliable, and accurate data… everytime.

An All-New Easy-To-Use Interface for an All-New Level of Productivity

POSPac MMS for Land introduces an all-new modern and customize-able user interface, letting you work the way you want:

- User definable toolbar buttons and menus - option for adding external tools directly to the toolbar
- Display simultaneous open multiple user views (3D, 2D, and Points Tables)
- All Views are in layers allowing view selections: real-time, post-processed, both, basestations only, etc.
- User defined display style configuration for trajectory by type: real-time vs. post-processed, Position RMS, or by Processing Mode
- Interactive display plots with multiple selection feature for overlaying plots
- Collapsible project explorer menu with quick access to properties of various mission levels: real-time, post-processed, basestations, etc.
- Unified project management/settings for convenience (i.e., single location for setting all project settings)
- Project management and report options
- Background settings in black or white
- Batch Manager provides capability for processing large volumes of data with a minimum of user interaction.

Post-Processing Advantages

Improved Accuracy - Dedicated base stations and reverse smoothing algorithm can drastically improve position and orientation accuracy.

Improved Reliability - Setup errors can be corrected in post-processing. In addition, alternative differential GPS sources can be found if primary source proves unreliable.
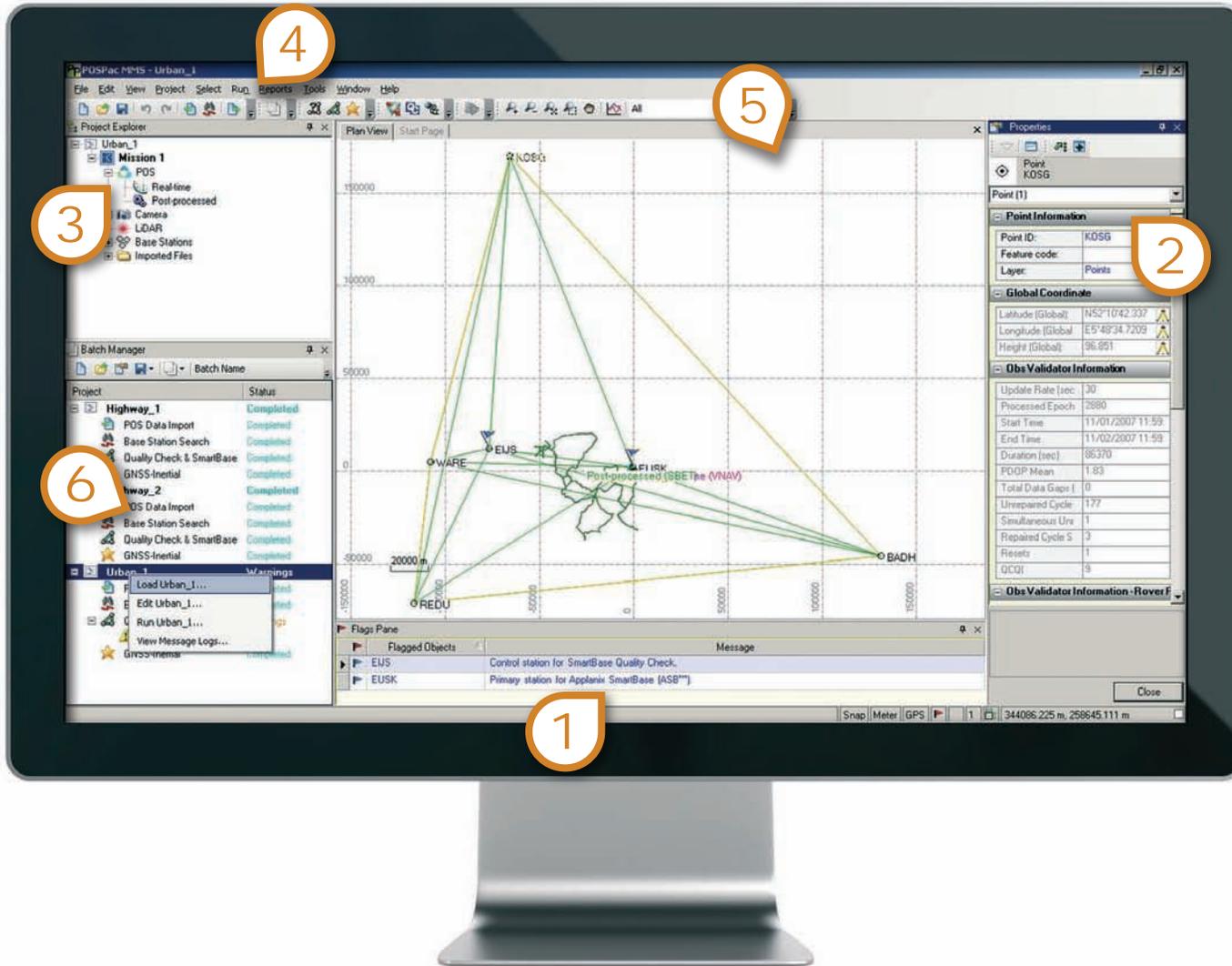
An Intuitive, Customizable Interface
1. Customize the way you view detail
2. View the details of any object in the Properties Pane
3. Quickly navigate through your data with the Project Explorer
4. Put commands right where you need them for easy access with customizable menus and toolbars
5. Easily and quickly tab between windows
6. Batch Processing for multiple datasets and multiple missions

> POSPac MMS for Land: A Start to Finish Workflow for Direct Georeferencing of Land-based Sensor Data

1. IMPORT AND ANALYZE YOUR DATA

Importing data from your POS LV into POSPac MMS for Land has been simplified and is now easier than ever. Just browse to the logged POS file on your computer or flash card and click go. POSPac MMS for land automatically analyzes the files and imports what it needs. POSPac MMS for Land will then run an automatic quality check on each and every file and let's a user quickly know if there are any issues that might affect data post-processing. For more detailed analysis, the real-time position and orientation and solution status are easily plotted.

2. DOWNLOAD DATA FROM THE INTERNET

Reference station and precise ephemeris data are imported from the internet in one easy step. With a single mouse click users can search, preview, and download all reference stations in an optimized multi-base network.

Automated Configuration of Network: Find Base Station command "Smart Select"

"Smart Select" automatically selects and downloads the best available Applanix SmartBase network of reference receivers and imports them into the project. Smart Select not only attempts to choose the tightest network fully encompassing the trajectory, it also does a validation of the observation data quality to determine if the stations are suitable for the network.


3. PROCESS A GNSS-AIDED INERTIAL SOLUTION

As a land-based mapping professional, you know that success of your business relies on producing a high quality product at the geometric accuracy required by the customer in the most efficient and robust means possible. Mission execution time and crews are expensive, so you need the re-assurance that your direct georeferencing solution is the right one for the job; re-dos are not an option. Whether you are mapping thousands of kilometers of highway center line with a sub meter accuracy requirement, or you are conducting engineering-level LIDAR surveys of bridges or other structures where every cm counts, you need the right tool for the job.

With its full range of processing options ranging from Precise Point Positioning (PPP) to Differential GPS+GLONASS to the new Applanix SmartBase module and IN-Fusion technology, the GNSS-Aided Inertial Processing Tools supplied in POSPac MMS for Land provides you everything you need… including peace of mind.

Steps 1, 2, and 3 are automated allowing for batch processing of multiple missions!
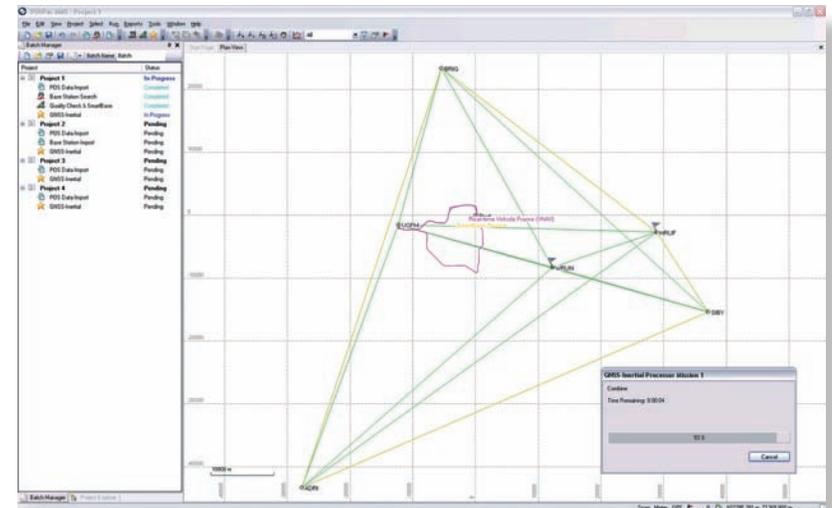
> Applanix SmartBase™ and IN-Fusion™ Technology Deliver an Unequalled Level of Accuracy and Productivity

Existing in the GNSS-Aided Inertial Processing Tools in POSPac MMS for Land is our Applanix SmartBase™ software module and Applanix IN-Fusion™ technology, which significantly increases the efficiency, accuracy, and robustness of mapping and surveying using GNSS on land-based platforms. GNSS network and inertial post-processing methods have been engineered to work in direct cooperation, reducing and in some cases eliminating the restrictions currently associated with high accuracy GNSS positioning in a land-based environment. Reliable (decimeter level or better) accuracy can be obtained from existing reference station networks without having a dedicated station located close to the project area.
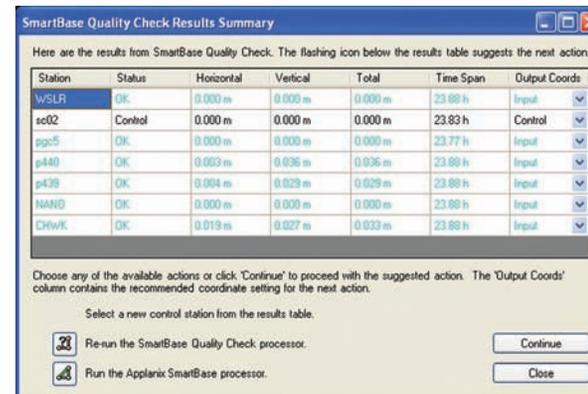
Based upon the industry leading Trimble VRS™ technology (adapted for the large areas typical in a mobile mapping project), the Applanix SmartBase™ module uses the data logged from a network of GNSS reference stations to generate a set of GNSS observables corrected for the atmospheric and other geometric errors at the location of the remote receiver in the vehicle. These and the remote receiver observables are then post-processed along with data from the Inertial Measurement Unit using the Applanix IN-Fusion technology, to simultaneously solve for the GNSS ambiguities and position and orientation of the vehicle. The Applanix SmartBase corrections ensure that the error due to atmospheric delays is significantly reduced anywhere within the network of receivers, meaning the correct integer ambiguities can be quickly and reliably computed. The tight integration with the inertial data allows the software to maintain memory of the ambiguities during cycle slips or even full outages.

SmartBase™ + INFusion™
= *Accuracy + Productivity*

> Higher Accuracy, Improved Robustness, Reduced Cost

The combination of the Applanix SmartBase and the Applanix IN-Fusion technology represent a major shift in operational efficiency for mobile mapping and surveying that provides important new benefits over standard GNSS Kinematic Ambiguity Resolution (KAR). Reliable decimeter level or better accuracy can be obtained from existing reference station networks without the need to set up a dedicated station close to the project area. This has the benefit of reducing the expenditure of conducting a high-accuracy land-based survey, by reducing the costs associated with setting up a reference station infrastructure, and by reducing the time spent in the office post-processing the results. At the same time the robustness of the solution is increased, reducing the cost associated with the need to re-drive a mission. Up to 50 reference stations can be processed at a time, with a minimum of four recommended for accuracy and robustness.

The Applanix SmartBase and IN-Fusion technology currently includes supports for L1 and L2 GPS observables. This will be expanded to include support for additional GNSS observables such as GPS L2C and GLONASS L1 and L2 when they become more readily available.

> Rigorous Quality Assurance and Control

Included in the Applanix SmartBase module is the ability to perform a quality check on the reference station data. The quality check module brings the concept of "best survey practices" to the world of land-based mapping. Using rigorous GNSS surveying adjustment algorithms, 18 to 24 hours worth of reference station data are surveyed in to check the quality of both the network coordinates and the raw observations against a control that you specify. Bad reference station data? Bad antenna heights? Bad reference station coordinates? Unlike traditional multiple reference station GNSS processing, each of these errors is detected and then corrected with the quality control step in the Applanix SmartBase module before the remote GNSS data from the vehicle is even touched. By the point you start your land-based trajectory processing, you know that your network coordinates, data, and antenna heights are correct, eliminating the uncertainty of having to sort this out during or after the trajectory processing.

> POSPac MMS for Land DELIVERS BETTER RESULTS

POSPac MMS increases the accuracy of your survey particularly when operating in locations with problematic GPS reception, such as tree-lined streets or a downtown core where tall buildings block GPS signals or cause multi path effect.

Even in these difficult environments, you will achieve:
- Maximum immunity to GPS outages
- Improved data positioning and orientation accuracy
- Stable, reliable and repeatable results
- Accurate post-processing with raw GPS data from as few as one satellite, using POS LV tightly-coupled configuration
- Support for numerous mapping projections (UTM, Gaus-Kruger, TM, Lambert, Orthographic, US State Plane, etc) allows automatic data output in your format of choice

> FEATURES

Specifically engineered for the challenges of land-based mobile survey operations, POSPac MMS for Land applications is the smart software solution for road surveying, pavement inspection, GIS and asset management, as well as non-conventional applications such as, autonomous vehicle navigation and high performance vehicle dynamics. POSPac MMS sets the new industry standard for accurate, reliable and repeatable results under the most difficult GNSS conditions. Features include:

- **ADVANCED PLANNING:** A powerful, standalone tool with the ability to support various types of satellite data. Visible satellite plots can be generated to help you determine the best times for data collection to ensure field time is productive
- **DATA IMPORT:** Designed to extract real-time navigation and sensor data from the raw data logged by POS LV
- **APPLANIX SMARTBASE™**: For land-based applications a significant productivity improvement in Real-Time Kinematic (RTK) positioning has been achieved using the concept of a "Virtual Reference Station" (VRS). Here observables from a dedicated network of GNSS reference stations are processed to compute the atmospheric and other errors within the network.
- **GNSS-INERTIAL PROCESSOR:** Imports the output data generated using the extract module to produce a tightly-coupled navigation solution. The GNSS, DMI, GAMS integrated navigation data is post-processed in both forward and reverse directions culminating in a smoothing routine to produce the best results possible.
- **EXPORT:** Transforms the real-time or post-processed data from WGS84 to various user-defined coordinate systems
- **DISPLAY:** Plots and tabulates the output data for easy analysis and QA/QC tasks
- **BATCH:** Automates processing steps for multiple missions for efficient processing of a large number of data sets.

> BENEFITS

This complete post-processing toolbox delivers a streamlined field-to-office workflow resulting in the best possible results and many specific advantages to the operators. POSPac MMS for Land will:
- **Increase Your Scope:** By removing the barriers that have been limiting the efficiencies of high-accuracy mobile mapping, higher accuracy missions can now be done at a lower cost over larger areas in less time.
- **Increase Your Accuracy:** Applanix Smart Select technology automatically selects, downloads and imports the best available Applanix SmartBase™ network of reference receivers
- **Increase Your Robustness:** The rigorous quality checks and advanced algorithms used in the Applanix POSPac MMS software ensure the first solution is the right solution, minimizing re-work
- **Increase Your Productivity:** The Applanix POSPac MMS software allows you to reduce deployment costs, extend distances and areas for mapping, reduce re-work and production costs through rigorous quality checks

> INTEGRATED TOOLS AND NEW TECHNIQUES FROM ONE COMPLETE SOLUTION

POSPac MMS represents an easy step in land-based data post-processing with an integrated functionality for today's professionals using Applanix integrated inertial/GNSS technology. Take advantage of the new powerful tools and techniques designed to provide complete processing solutions from mission startup to project completion.


> SYSTEM REQUIREMENTS

The minimum computer requirements for running POSPac MMS for Land are:

CPU	Pentium 3 at 800 MHz or equivalent
Memory	512 MB RAM
Operating System	Microsoft Windows® XP Professional (32 and 64 bits), Windows® Vista (32 and 64 bits)
Free Disk Space	400 MB for installation, 1 GB for navigation data
Screen Resolution	1024 X 768 pixels
Regional Options	English (US)
USB Port	2 X USB 1.1 ports for security keys
PC Card Reader	For reading POS data
Internet Access	For downloading Microsoft Framework® during installation and other program operations

The recommended computer requirements for running POSPac MMS for Land are:

CPU	Pentium 4 (32 bits) at 2 GHz or equivalent
Memory	1 GB RAM
Operating System	Microsoft Windows® XP Professional (32 and 64 bits), Windows® Vista (32 and 64 bits)
Free Disk Space	400 MB for installation, 4+ GB for navigation data
Screen Resolution	1028 X 1024 pixels
Regional Options	English (US)
USB Port	2 X USB 2.0 ports for security keys
PC Card Reader	For reading POS data
Internet Access	For downloading Microsoft Framework® during installation and other program operations
User Interface	Several commands in 2D and 3D view modes are more accessible using a 3-button mouse
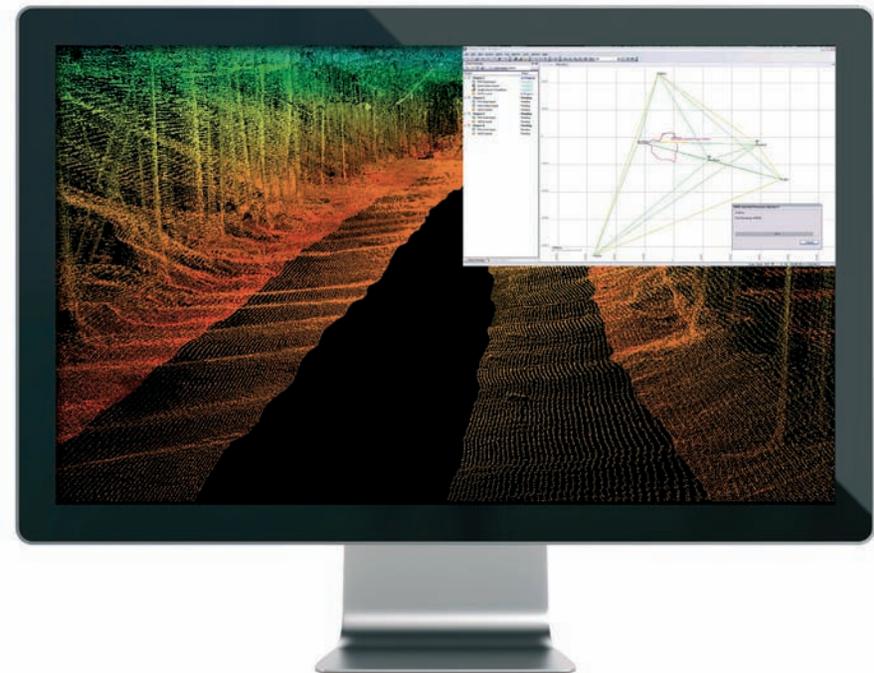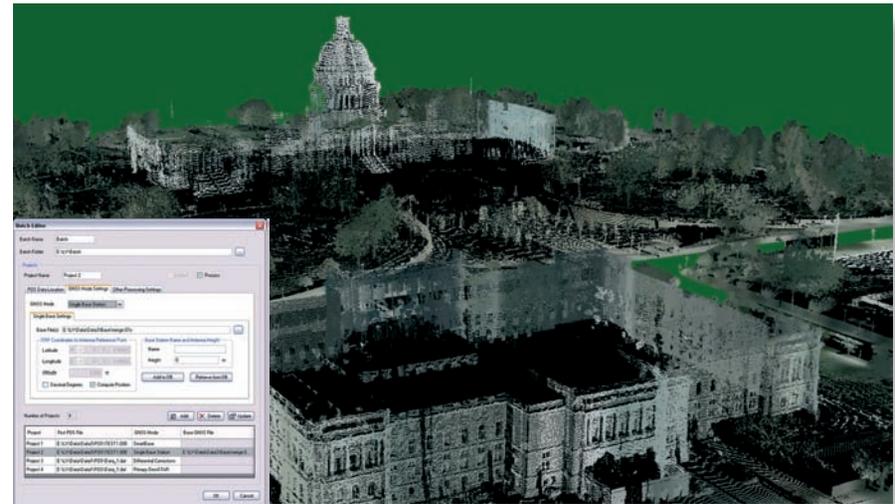
The POSPC module in POSPac MMS is used to combine the raw Lidar range measurements with the navigation data to generate point cloud data as above..

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