



GNSS/INS Post-Processing Software

Benefits

Easy integration with NovAtel's SPAN™ GNSS/INS system

Streamlined Project Wizard for quick startup

Single-step GNSS and IMU processing for efficient workflow

Built-in processing profiles for airborne, ground, and marine projects

Support for multiple base stations

Precise Point Positioning (PPP) processing

Features

Loosely and tightly coupled GNSS/INS processing

Boresight module for solving angular offsets between IMU and camera frames

NovAtel's AdVance® RTK

Post-Processing for Improved GNSS/INS Accuracy

When combined, GNSS and Inertial Navigation Systems (INS) provide a very robust and accurate position, velocity and attitude solution. The real-time accuracy of GNSS/INS however, is limited by the view of the satellites by the user and the dynamics experienced by the system. Further, in many applications where absolute solution accuracy is critical, the solution information is not required in real-time. For these applications, the accuracy of the GNSS/INS solution can be greatly improved by post-processing. With post-processing, the raw GNSS and IMU data is collected and stored for later use. Post-processing software takes advantage of features like local base station differential processing, processing forwards and reverse in time, backwards smoothing and application of precise satellite clock and orbit information, to generate a much more accurate solution than is possible in real-time.

Why Inertial Explorer?

Inertial Explorer, from NovAtel's Waypoint® Products Group, is a powerful and highly-configurable processing engine that allows for the best possible GNSS/INS accuracy using all available GNSS data. Tightly-coupled GNSS/INS processing uses GNSS observation data, even when only two satellites are available in order to constrain error growth when no GNSS position can be computed. The software also has multiple quality control features built in so that the quality of the solution is never in question. The base station download utility allows access to thousands of publicly available, continuously operating reference stations, and Precise Point Positioning (PPP) means that for many applications, no base station is required at all.

A Range of Inputs and Outputs

Inertial Explorer easily imports data from NovAtel's SPAN GNSS/INS system. It can also import GNSS data from multiple receiver manufacturers and has a generic IMU data import tool.

A variety of export formats are also available for the solution once your data is processed. A configurable export wizard allows customized ASCII output.

If you require more information about our software, visit novatel.com/products/waypoint-software



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Inertial Explorer Interface

- GNSS and IMU processing under one common interface
- Simultaneous forward and reverse processing for both GNSS and IMU data
- Numerous GNSS and IMU specific quality control plots
- Shows GNSS and IMU data coverage and gaps
- Interpolates up to two external event triggers
- Flexible export tool permits reproduction of most ASCII formats
- Outputs specialized variables such as IMU rates and accelerations
- Position can be translated to another location on vehicle
- Attitude can be corrected for orientation difference between IMU and another sensor

- Outputs w-p-k angles for photogrammetry
- Solves for camera-IMU orientation difference given w-p-k angles from an external source¹
- Saves processing history
- Precise Point Positioning (PPP) Module

GNSS Processing

- Multiple receiver manufactures supported(see GrafNav™ product sheet)

IMU Processing

- Coarse, fine and kinematic alignments available
- Pre-loaded with error models for most popular IMU types
- Users can create their own error models
- Supports IMU only processing
- Extensive control over GNSS update measurements

- GNSS-IMU lever arms can be entered or solved
- Automatic ZUPT detection
- Supports coordinate updates
- Uses DMI/odometer measurements
- Includes built-in RTS back-smoother
- Permits utilization of external trajectories
- Support for non-standard orientation installation
- Loosely and tightly coupled processing options
- Multi-pass processing
- Automated alignment routine

Additional Features**Utilities**

- IMU and DMI raw data conversion
- IGS, CORS, IGN, GSI, CDDIS, OLG, ARGN, BKGI, UNAVCO and ASI GPS data services can be downloaded, converted and resampled from the Internet

Supported IMU Formats²

- NovAtel SPAN (all IMUs)
- Honeywell HG1700
- IMAR FMS/FSAS/RQH
- Inertial Science DMARS/ISIS
- Litton LN2000
- Motion Pack
- Tamagawa

Upgrade/Support

Any versions released within one year from purchasing is available at no charge. Technical support by phone and e-mail is also free for one year after date of purchase.

Inertial Explorer post-processing performance during complete GNSS outages³

| Outage Duration | IMU | Position Error ⁴ (m) | | Velocity Error (m/s) | Attitude Error (degrees) | | |
|-----------------|-------|---------------------------------|----------|----------------------|--------------------------|-------|---------|
| | | Horizontal | Vertical | 3D | Roll | Pitch | Heading |
| 0 s | LCI | 0.010 | 0.015 | 0.020 | 0.005 | 0.005 | 0.008 |
| | LN200 | 0.010 | 0.015 | 0.020 | 0.005 | 0.005 | 0.008 |
| | AG58 | 0.010 | 0.015 | 0.020 | 0.007 | 0.007 | 0.011 |
| | FSAS | 0.010 | 0.015 | 0.020 | 0.008 | 0.008 | 0.012 |
| | AG62 | 0.010 | 0.015 | 0.020 | 0.015 | 0.015 | 0.035 |
| | CPT | 0.010 | 0.015 | 0.020 | 0.030 | 0.015 | 0.030 |
| 60 s | LCI | 0.110 | 0.030 | 0.030 | 0.007 | 0.007 | 0.010 |
| | LN200 | 0.110 | 0.030 | 0.030 | 0.008 | 0.008 | 0.011 |
| | AG58 | 0.110 | 0.030 | 0.030 | 0.009 | 0.009 | 0.016 |
| | FSAS | 0.130 | 0.040 | 0.030 | 0.010 | 0.010 | 0.016 |
| | AG62 | 0.340 | 0.030 | 0.040 | 0.022 | 0.022 | 0.046 |
| | CPT | 0.290 | 0.100 | 0.040 | 0.018 | 0.018 | 0.049 |
| 120 s | LCI | 0.400 | 0.110 | 0.030 | 0.007 | 0.007 | 0.012 |
| | LN200 | 0.330 | 0.090 | 0.030 | 0.008 | 0.008 | 0.012 |
| | AG58 | 0.400 | 0.110 | 0.030 | 0.010 | 0.010 | 0.018 |
| | IMAR | 0.570 | 0.070 | 0.040 | 0.012 | 0.012 | 0.018 |
| | AG62 | 1.460 | 0.090 | 0.070 | 0.028 | 0.028 | 0.056 |
| | CPT | 1.210 | 0.270 | 0.070 | 0.022 | 0.022 | 0.049 |



Version 4 - Specifications subject to change without notice.

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For the most recent details of this product:

novatel.com/assets/Documents/Waypoint/Inertial Explorer.pdf

¹ Requires separate photogrammetric adjustment package to determine camera exterior orientation angles.

² Please contact the Waypoint Products Group if support for another IMU type is desired.

³ Outage results were calculated by taking the RMS of the maximum combined and smoothed (forward and reverse) processing errors over a minimum of 30 outage periods. Each outage was followed by 200 seconds of full GNSS availability before the next outage was applied. High accuracy GPS updates (fixed ambiguities) were available immediately before and after each complete outage. No wheel sensor (DMI) was used to generate these results.

⁴ 1 ppm should be added to all values to account for additional error due to baseline length.

⁵ LN200 attitude accuracy derived with comparisons to aerotriangulation -please see our paper "Aerial Photogrammetry Test Flight Results" for additional information: <http://www.novatel.com/Documents/Papers/D11716.pdf>

