Inertial Explorer®

GNSS + INS Post-Processing Software

Benefits
- Easy integration with NovAtel’s SPAN® GNSS + INS products
- Powerful IMU processor built on top of familiar GrafNav® interface
- Streamlined new Project Wizard for quick startup

Features
- Loosely and tightly coupled GNSS + INS processing
- Tightly coupled Precise Point Positioning (PPP)
- NovAtel’s AdVance® RTK for fast and reliable ambiguity resolution
- Support for multiple base stations
- Built-in processing profiles for airborne, ground and marine projects
- Boresight module for solving angular offsets between IMU and camera frames

Post-Processing for Improved GNSS + INS Accuracy
For applications that require high levels of accuracy and do not require the results in real-time, post-processing is a natural solution. Post-processing leverages the ability to combine forward and reverse processing results, thereby maximizing the accuracy of the trajectory and providing an indication of both solution reliability and accuracy. Advanced processing techniques, such as backwards smoothing, can be applied in post-processing which removes up to 95% of position error over complete GNSS signal outages as compared to a real time solution.

In order to achieve high levels of GNSS + INS accuracy in real time, a data link must be maintained in order to receive corrections such as RTK or L-Band. This adds complexity to the field procedures and may require a subscription. Further, maintenance of a data link is sometimes not possible due to signal obstructions.

Inertial Explorer: Easy to use, Feature Rich
Easily create your first project using Inertial Explorer’s New Project Wizard. Automated processing environment detection (Aerial, Ground Vehicle, and Marine) allows appropriate GNSS + INS processing settings to be automatically loaded prior to your first processing run. This simplifies workflow and reduces the learning curve needed to start producing quality results.

Features such as automated alignment, robust automatic ZUPT detection and the application of phase and range updates helps ensure the best possible accuracies are achieved, even in conditions challenging to GNSS signal reception.

Inertial Explorer provides maximum flexibility to suit your application and preferences, including support for both tightly and loosely coupled processing, multiple base station support for large project areas and tightly coupled Precise Point Positioning (PPP) for applications that do not require a base station.

Inertial Explorer provides access to over 50 quality control plots in order to help gauge the level of accuracy of your survey and provide confidence in the solution. If problem areas are identified, Inertial Explorer provides access to powerful reprocessing options and the best customer support in the industry to help ensure your success.

A Range of Inputs and Outputs
Inertial Explorer easily imports data from NovAtel’s SPAN GNSS + INS products. It can also import GNSS data from multiple receiver manufacturers and has a generic IMU data import tool.

A variety of export formats are provided in addition to a configurable ASCII export wizard.
Inertial Explorer®

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
- Flexible export tool permits reproduction of most ASCII formats
- Outputs specialized variables such as IMU angular rates and body frame velocities and accelerations
- Position can be translated from the IMU to another sensor location
- Outputs w-p-k angles for photogrammetric applications
- Solves for camera-IMU orientation difference given w-p-k angles from an external source
- Saves processing history

GNSS Processing
- See the GrafftNav product sheet

IMU Processing
- GNSS only and tightly coupled Precise Point Positioning (PPP) Module
- Loosely and tightly coupled processing
- Automated alignment
- Automatic ZUPT detection to help maximize performance in challenging environments
- Includes RTS back-smoother which removes up to 95% of position error over GNSS outages as compared with a real-time solution
- Multi-pass processing to maximize attitude accuracy in low dynamic surveys
- Extensive control over GNSS and IMU processing options
- Heading updates decoded automatically from NovAtel’s ALIGN® system help maximize accuracy in low dynamic applications
- Support for DMI data to further maximize performance in challenging environments

Additional Features
- Utilities
  - Simultaneous GNSS, IMU and DMI raw data conversion if using SPAN
  - Download utility provides access to thousands of publicly available base stations

Steady State Post Processed Performance

<table>
<thead>
<tr>
<th>IMU</th>
<th>Position Error (m)</th>
<th>Velocity Error (m/s)</th>
<th>Attitude Error (degrees)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2D</td>
<td>Vertical</td>
<td>3D</td>
</tr>
<tr>
<td>LCI</td>
<td>0.01</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>LN200</td>
<td>0.01</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>AG58</td>
<td>0.01</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>FSAS</td>
<td>0.01</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>CPT</td>
<td>0.01</td>
<td>0.02</td>
<td>0.02</td>
</tr>
<tr>
<td>AG62</td>
<td>0.01</td>
<td>0.02</td>
<td>0.02</td>
</tr>
</tbody>
</table>

3D Position Accuracy Performance During Complete Outages

Version 5 - Specifications subject to change without notice.
©2012 NovAtel Inc. All rights reserved.
Waypoint, AdVance, NovAtel, SPAN, ALIGN, GrafftNav and Inertial Explorer are registered trademarks of NovAtel Inc.
Printed in Canada. D00708
Inertial Explorer August 2012
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 Outage statistics were calculated by taking the RMS of the maximum errors over a minimum of 75 outage periods. Each outage was followed by 120 seconds of full GNSS availability before the next outage was applied. High accuracy GNSS updates (fixed ambiguities) were available immediately before and after each complete outage. A baseline length of 5 km or less was used to generate the outage statistics.
3 1 ppm should be added to all values to account for additional error due to baseline length.
4 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
5 For full velocity and attitude outage performance information, consult the NovAtel IMU data sheets.