

Waypoint software

Best-in-class GNSS and GNSS+INS post-processing



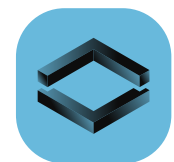
Waypoint software



EXCEPTIONAL POST-PROCESSING

Enhance your post-mission position, velocity and attitude accuracy

Post-processing with Waypoint software generates a reliable and accurate source of truth by refining GNSS-only or GNSS+INS data by processing forward and reverse in time, then combining the results. Built on decades of GNSS algorithm expertise, Waypoint software's portfolio includes built-in environment and application profiles to streamline post-processing and quickly export at the required data rate in the coordinate frame required. A Command Line Interface (CLI) and Software Development Kit (SDK) are available for engineering professionals to customise their entire processing workflow and enable post-processing at scale.

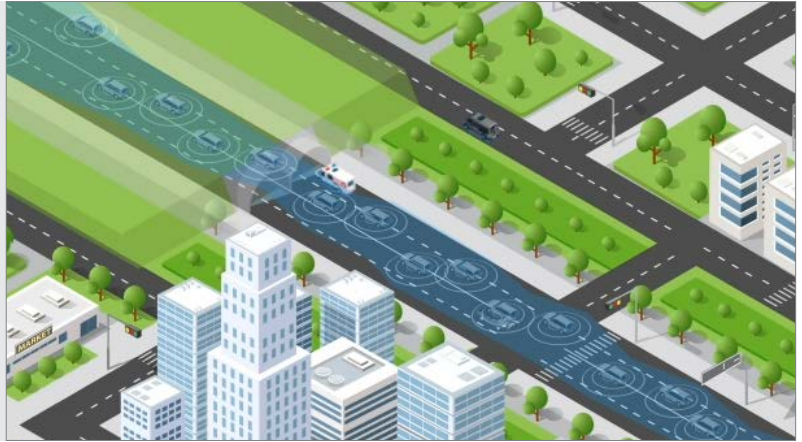


Features	Inertial Explorer	Inertial Explorer Xpress	GrafNav	GrafNav Static
GNSS-only processing	✓	✓	✓	✓
GNSS+INS processing	✓	✓		
Precise Point Positioning (PPP)	✓	✓	✓	✓
Differential Processing (PPK)	✓	✓	✓	✓
Kinematic data processing	✓	✓	✓	
Multi-base station support	✓		✓	✓
Unlimited project area	✓		✓	✓
GrafNet network adjustment			✓	✓
Optional add-ons				
TerraStar-NRT	✓	✓	✓	✓
Extended support plan	✓	✓	✓	✓
Command Line Interface (CLI)	✓		✓	✓
Software Development Kit (SDK)	✓	✓	✓	✓

STEP 01

Capture raw GNSS or GNSS and IMU data in real-time then import data into Waypoint.

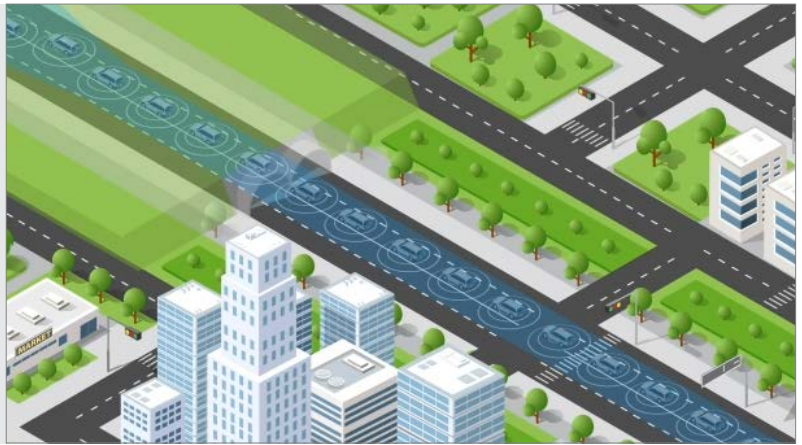
View the trajectory on a satellite map, road map or coordinate grid.



STEP 02

Begin processing the collected data forward and reverse in time.

Process in PPP or PPK modes using a profile tailored to unique applications.



STEP 03

Combine and smooth the processed results to deliver an unparalleled level of accuracy not achievable in real-time.



STEP 04

Use a suite of visualisation and diagnostic tools to perform quality assurance.

Export the truth trajectory with flexible and customisable formats to streamline workflows.



Inertial Explorer



THE FLAGSHIP FOR GNSS+INS PROCESSING

Maximising post-processing accuracy

Inertial Explorer (IE) maximises the performance of your GNSS+INS hardware by processing and outputting a truth trajectory with the position, velocity and attitude accuracy your application requires. The tightly coupled integration of GNSS and inertial data delivers precise results, even when using lower-grade inertial sensors.

IE supports a range of applications, including mobile mapping, aerial and hydrographic surveying and truth trajectory generation for autonomy R&D. With full support of major constellations, frequencies and GNSS corrections processing, IE ensures your data are reliably precise no matter where in the world you operate.

Maximise post-mission accuracy

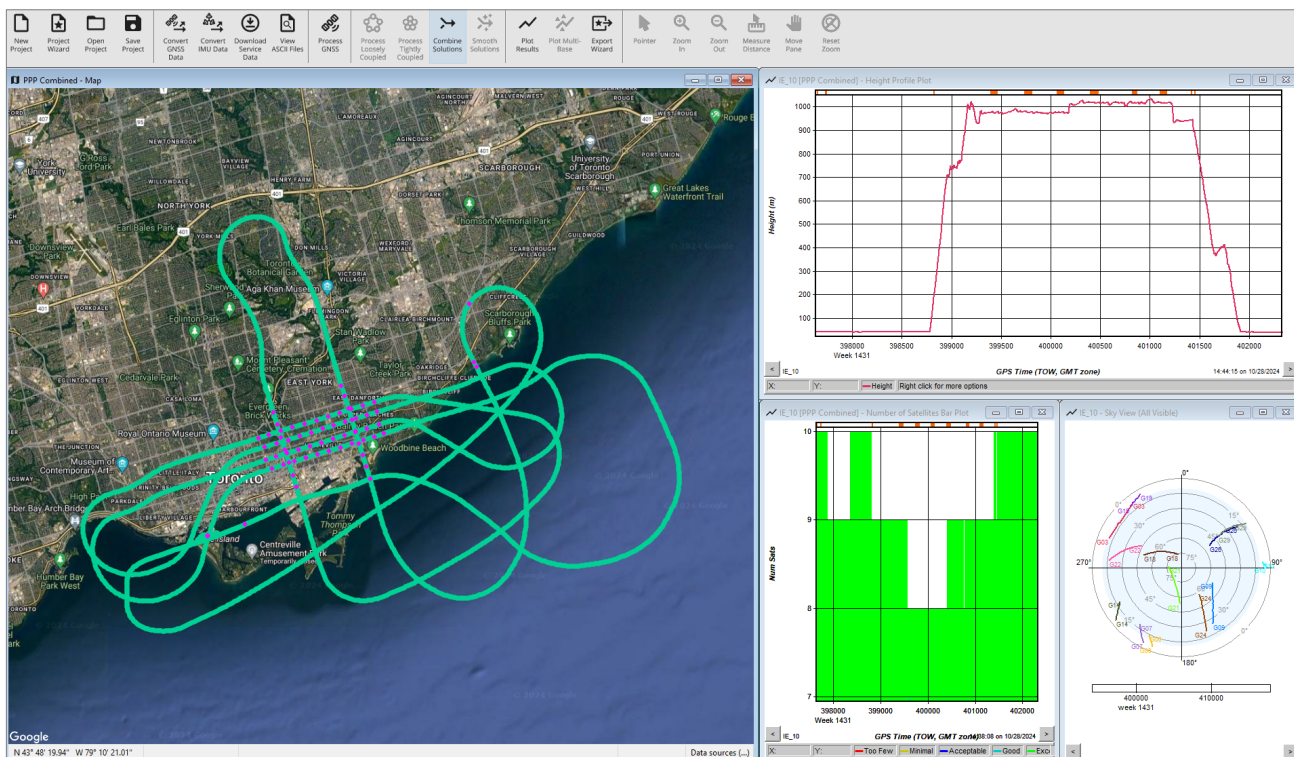
- High availability of GNSS signals for resilient positioning during data collection
- Download base station data from thousands of reference stations across the globe through public networks and/or HxGN SmartNet
- Streamlined workflow with Project Wizard for quick startup
- Built-in processing profiles and constraint models to achieve best results in airborne, ground, pedestrian, UAV and marine projects
- Built upon decades of GNSS expertise

Flexible workflow capabilities

IE has built-in workflows to match your business and your expertise. A project wizard offers intuitive, efficient guidance for GNSS+INS users of all experience levels with importing their data, processing and outputting with accurate quality control and across formats efficiently.

Automated profiles for aerial, ground vehicle, pedestrian and marine enable appropriate processing to streamline your workflow, reduce your learning curve and start producing quality results quickly. For more experienced users, a wide range of processing configuration options are available to fully customise your workflows for your unique application.

With access to worldwide base station data from thousands of reference stations, users can use the most accurate base station data without needing to set up their own RTK infrastructure. Inertial Explorer provides powerful reprocessing options, quality analysis tools and world-class customer support to ensure the success of your application.



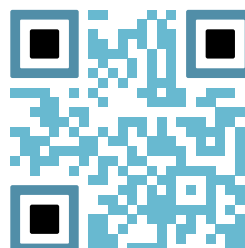
Powerful features for diverse applications

- Full support of all major constellations and frequencies, including GPS L1/L2/L5, GLONASS L1/L2, BeiDou B1I/B2I/B3I/B1C/B2A, Galileo E1/E5a/E5b & QZSS L1/L2C/L5
- Support for up to 100 base stations in each project
- Boresight module for computing angular offsets between IMU and vehicle or camera frames¹
- Estimate or refine lever arm offsets between IMU and GNSS antenna
- Loosely and tightly coupled GNSS+INS processing
- Differential (PPK) and precise point positioning (PPP) processing
- Flexible Export Wizard outputs results at any vehicle location in the required data format, rate and coordinate frame
- Direct output to Google Earth, RIEGL POF/POQ, DXF, SBET and custom formats
- Generate HTML quality control reports in one click
- Support for various third-party GNSS+INS products and generic data formats
- Easy integration with SPAN GNSS+INS technology
- Integrated support for distance measurement instruments (DMI) updates

Try Waypoint software for yourself

Request a trial and discover why Waypoint is trusted by companies building maps for the world.

Go to <https://novatel.com/contactus/request-a-trial> or scan the QR code.



Inertial Explorer Xpress



GNSS+INS POST-PROCESSING FOR LOCAL AREA MAPPING

Transform your workflow

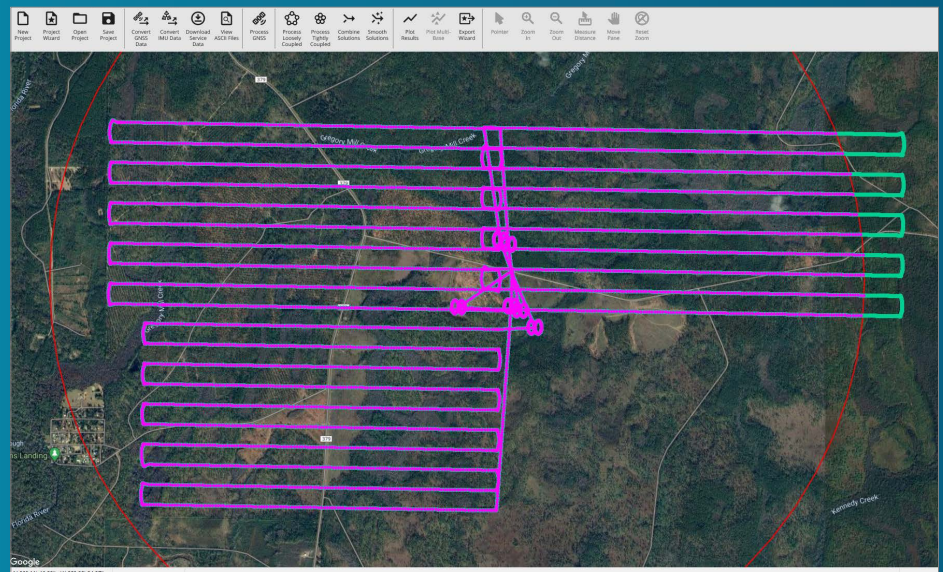
Tailored for UAV markets and small area surveys, Inertial Explorer Xpress provides the same core processing and utilities as Inertial Explorer with simplified functions and streamlined workflows at a lower cost. Post-process data efficiently with centimetre-level position and attitude solutions compatible with LiDAR, camera and other sensor data. Xpress supports various third-party GNSS+INS products and generic data formats.

Streamlined post-processing solutions

Reduce complexity and processing time with single base station processing. Differential (PPK), precise point positioning (PPP) and tightly coupled processing for GNSS+INS datasets are supported. Xpress also provides extensive quality analysis tools and plots to assess your solution prior to export.

Inertial Explorer Xpress centroid circle

In Xpress, a small area of GNSS+INS processed points within a centroid circle is selected for export. The centroid circle encompasses a three-kilometre radius around the project centroid, an average of all non-stationary processed coordinates in the project.





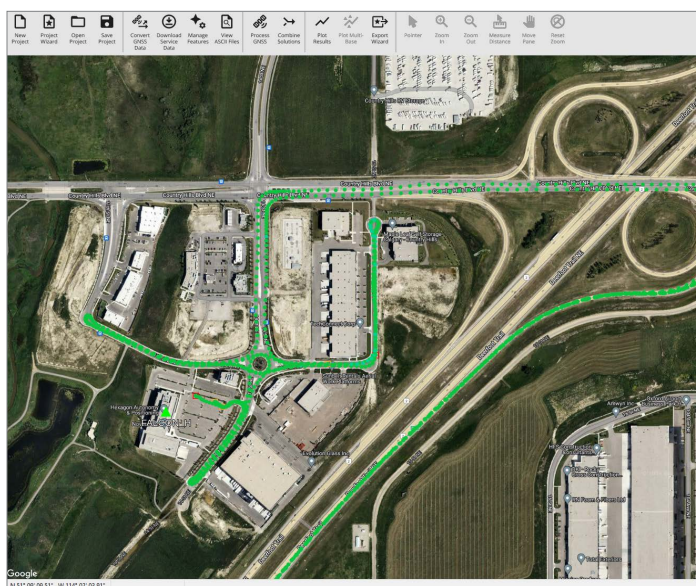
FOR STATIC OR KINEMATIC GNSS-ONLY POST-PROCESSING

Enhanced GNSS accuracy

Waypoint GrafNav post-processing software is a powerful, highly configurable processing engine providing the best possible static or kinematic accuracy using all available GNSS data. Supporting data formats from third-party single and multi-frequency commercial receivers, GrafNav includes a full suite of visualisation and diagnostic tools for quality assurance.

Multiple processing options

No matter your project, GrafNav is configurable to optimise your results. Up to 100 base stations can be added to each project, including publicly available satellite clock and orbit data from thousands of global reference stations. Users can achieve centimetre-level position accuracy post-mission using PPP with kinematic trajectories.



Powerful, highly configurable processing

GNSS technology computes position and velocity for various real-time applications, including vehicle navigation and tracking. However, additional technologies like correction services and post-processing are needed to maximise both GNSS availability and accuracy.

GrafNav refines your raw GNSS data by resampling, concatenating and splicing, processing forward and reverse in time then combining the results to generate a final trajectory. Moving baseline processing is supported, as well as heading determination using two fixed antennas on the same moving vehicle:

- Built-in processing profiles for airborne, ground, pedestrian, UAV and marine projects
- Easily make use of project specific base station data and a network of publicly available ground station networks
- Compatibility with various third-party receivers and generic data formats
- Interpolation of coordinates for station markers and camera trigger events
- Supports multi-base processing for large areas
- A float static solution for long and/or noisy baselines
- Built-in ionospheric processing improves accuracies for dual-frequency users

TerraStar-NRT

IMMEDIATE POST-PROCESSING WITHOUT A BASE STATION

Generate faster results

Adding TerraStar-NRT, a multi-constellation corrections service, to your Waypoint software provides centimetre-level post-processing accuracy without having to wait for open-source correction data. Precise ephemeris is available every 15 minutes to provide low noise precise point positioning (PPP) trajectories when processing with Waypoint software.

Access enhanced PPP-AR engine

TerraStar-NRT provides access to an advanced PPP processing mode with ambiguity resolution (PPP-AR).

When used with NovAtel receiver data, the PPP-AR engine has ready-available access to all GNSS frequencies and constellations to unlock improved accuracy, convergence and reconvergence time that consistently outperforms traditional PPP in typical conditions.

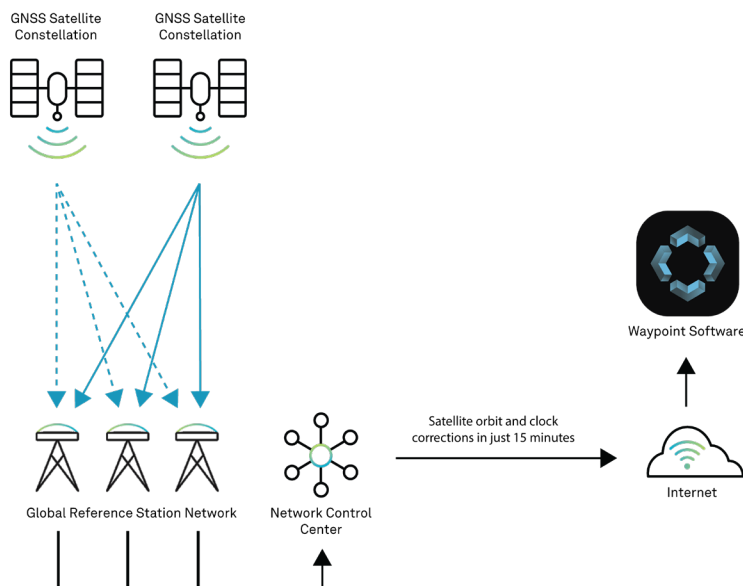
TerraStar-NRT licence

A TerraStar-NRT licence is available as a yearly subscription and can be purchased by [contacting a NovAtel sales representative](#).

Immediate post-processing

Post-processing using Waypoint with TerraStar-NRT, enables PPP and PPP tightly coupled solutions almost immediately after data collection with accuracy equivalent to products that are currently only available more than two weeks post-mission.

- Save time and achieve accurate post-processing results directly after data collection
- Improved PPP accuracy and convergence time with the PPP-AR engine
- Consistent accuracy through a global network of independently owned and operated GNSS reference stations
- Simplify data collection work flow by eliminating the need for a base station
- Use TerraStar-NRT to supplement incomplete GPS, BeiDou or Galileo broadcast ephemeris data within a Waypoint project



Waypoint SDK



GNSS AND GNSS+INS POST-PROCESSING SOFTWARE DEVELOPMENT KIT

Customise and automate your GNSS or GNSS+INS post-processing

The Waypoint Software Development Kit (SDK) delivers complete control over the GrafNav and Inertial Explorer post-processing functions. Base station downloads, data conversion, data processing, solution output and quality control can all be customised to meet the requirements of any application.

Powerful functionalities

- Static and kinematic processing
- Forward/reverse and triple-pass processing
- Tightly coupled differential processing and tightly coupled PPP processing
- Data decoding of multiple receiver and IMU formats
- Trajectory smoothing
- Local base station, multi-base station and PPP
- GPS, GLONASS, BeiDou, Galileo and QZSS support
- Data download for reference stations and precise satellite orbit and clock data
- Easy import of SPAN GNSS+INS technology data
- Flexible solution export
- Data and solution quality and assurance tools
- Coordinate system and datum support

Fast and efficient survey quality control

With complete access to the trajectory information, the Waypoint SDK allows you to set rules for determining if the survey meets your accuracy requirements. Whether you have a few systems or hundreds, automated post-processing improves results while saving time and money by increasing the speed of your workflow.

Software integration

Nearly all of functionality contained in Waypoint's GrafNav and Inertial Explorer software is accessible. Embed GNSS or GNSS+INS processing functionality right into your software, provide an optimised workflow for your customers and increase the value of your software products. Two separate interfaces are available:

- C++ (Windows or Linux)
- .NET (Windows only)

Software licencing

- Software-based licensing with support for remote/virtual desktop
- One-time software activation through the Internet
- Term-based licensing with scalable pricing option

System requirements

Windows

- Microsoft Visual Studio 2015 or newer
- Microsoft Windows 10 or 11
- Microsoft .NET Framework 4.8 or newer

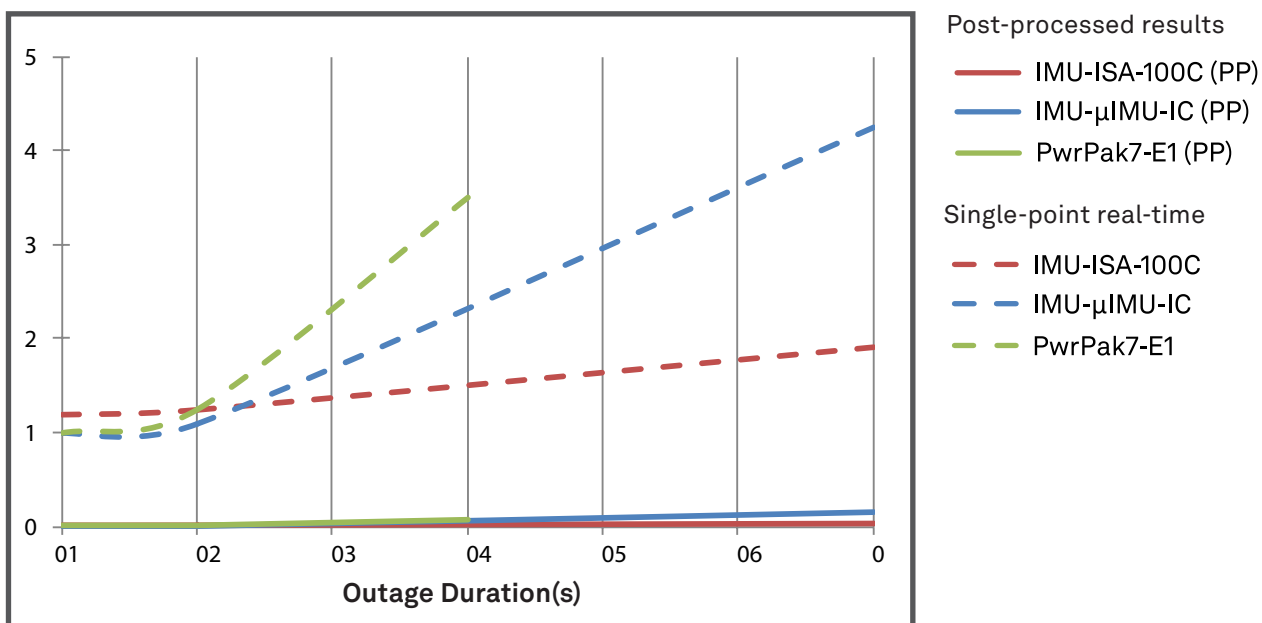
Linux

- Ubuntu 20.04 and newer
- glibc 2.31 or newer
- 2 GB RAM or more

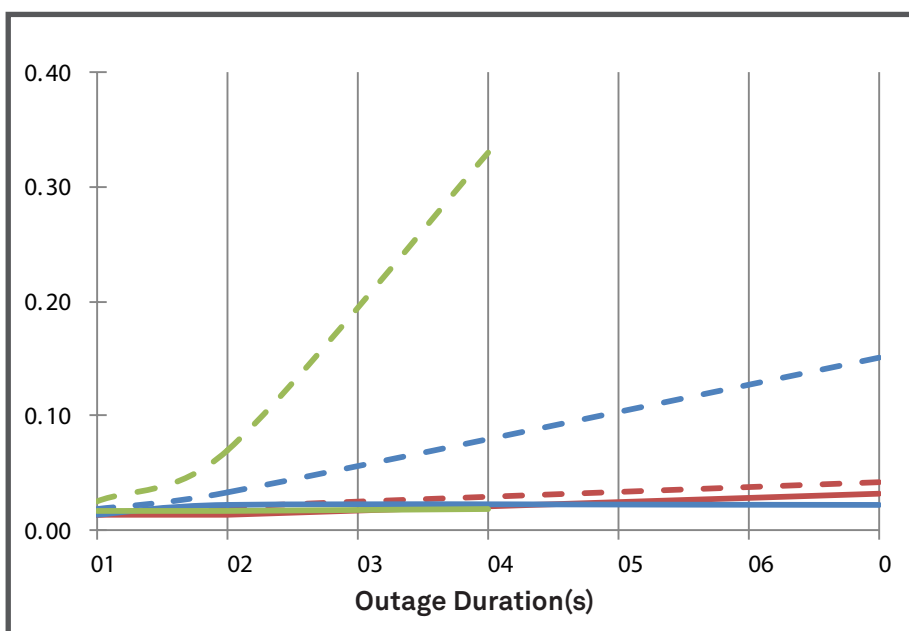
STEADY STATE POST-PROCESSED PERFORMANCE¹

Waypoint software gives you unmatched confidence when you require a source of truth for post-mission position, velocity and attitude trajectories. The following graphs detail Waypoint's post-processing compared to real-time positioning across three different inertial products. In every case, accuracy was significantly improved when results were post-processed.

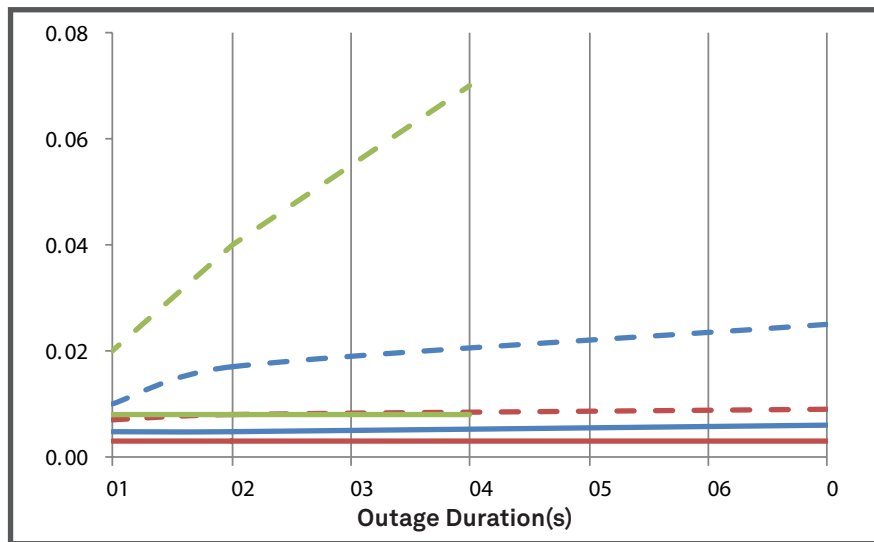
Horizontal Position Error (m)



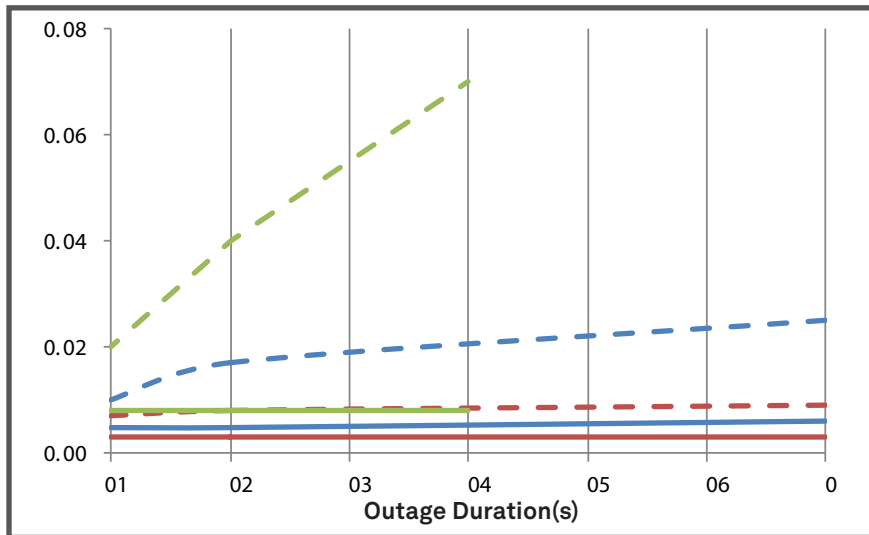
3D Velocity Error (m)



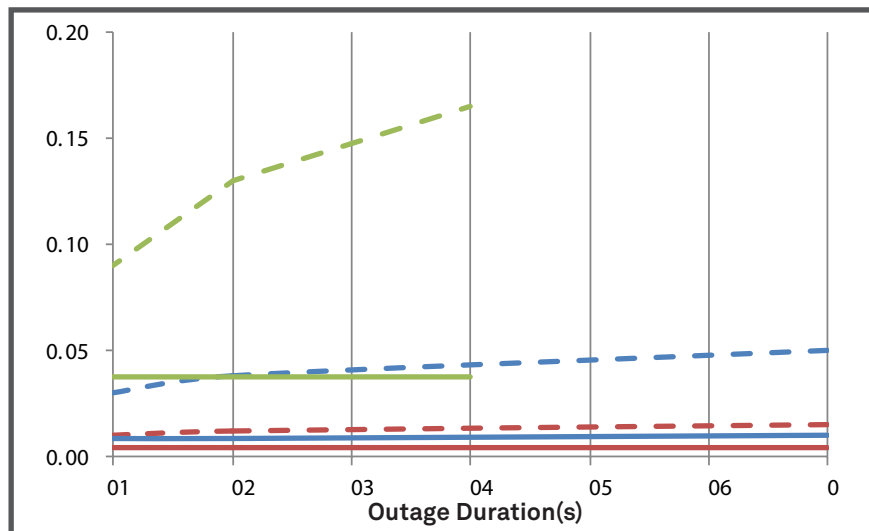
Roll Accuracy (degrees)



Pitch Accuracy (degrees)



Heading Accuracy (degrees)





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Hexagon is the global leader in digital reality solutions, combining sensor, software and autonomous technologies. We are putting data to work to boost efficiency, productivity, quality and safety across industrial, manufacturing, infrastructure, public sector, and mobility applications.

Our technologies are shaping production and people-related ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

NovAtel, part of Hexagon, is a global technology leader, pioneering end-to-end solutions for assured positioning for land, sea, and air. NovAtel designs, manufactures and sells high precision positioning technology developed for efficient and rapid integration. Its solutions are empowering intelligent positioning ecosystems in vital industries that depend on the ability to tackle the most complex challenges in the most demanding environments. Learn more at novatel.com.

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Version 12
D18034
April 2025