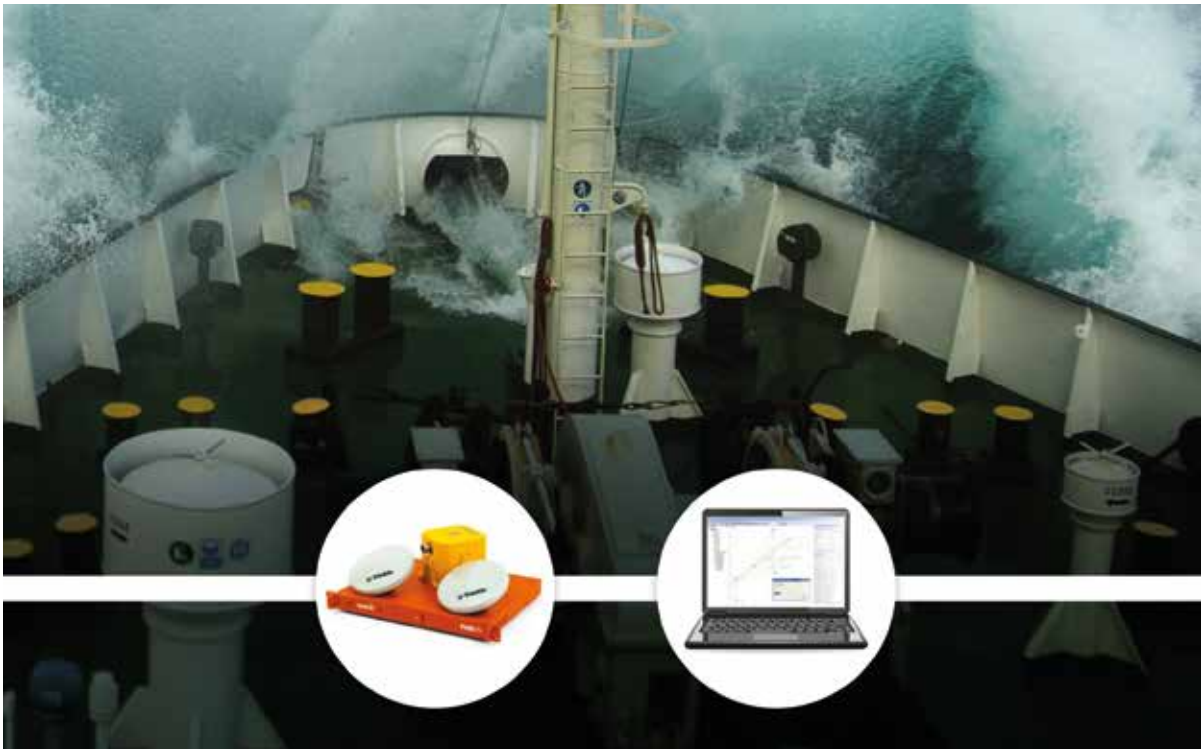
CODEVINTEC
Tecnologie per le Scienze della Terra

45° 27' 39.384" N
9° 07' 30.145" E

POS MV
Position and Attitude sensors



Applanix technology and support gives you the advantage: lower costs of deployment, faster times to completion, and improved quality of data

Applications

Applanix delivers increased productivity with:

- High reliability in all dynamic conditions
- Immunity to GNSS outages
- Robust centimetric positioning
- Post-processing capabilities
- Faster, simpler, less costly deployment
- Streamlined data workflows

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Applanix offers a complete portfolio of products and solutions to support hydrographic surveying

Applanix leads the industry in robust, reliable, and repeatable positioning and motion compensation solutions for marine applications. Proven in even the most adverse conditions, Applanix products integrate easily with multibeam sonar and 3rd party software packages, making it the right solution for any hydrographic survey.

The Applanix Marine Team – experienced, highly qualified experts ensure your success

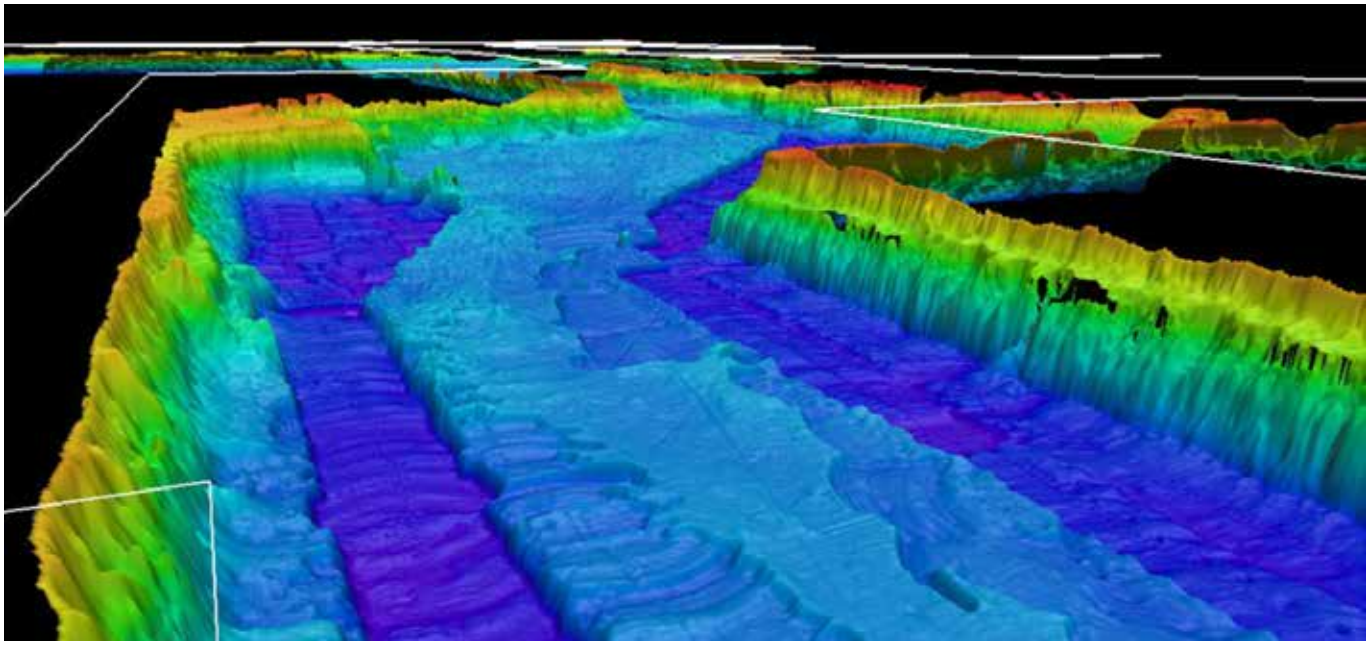
When you purchase an Applanix Marine solution, you're buying into the wealth of knowledge and expertise that has gone into the development of that solution.
Our experienced team of hydrographic surveyors, geospatial experts, and quality assurance personnel means you get the highest quality solution and the highest level of performance. Every Applanix product comes with a company commitment to world-class support. Applanix is here to ensure your success.

Applanix' POS Technology

Applanix' POS™ (Position and Orientation System) technology was originally developed and rigorously tested as part of an extensive military project. This proven technology has been enhanced, customised and packaged to yield an off-the-shelf commercial product, uniquely suited to the requirements of precision marine motion sensing, hydrographic surveying and charting called the POS MV.

Applanix Customer Care

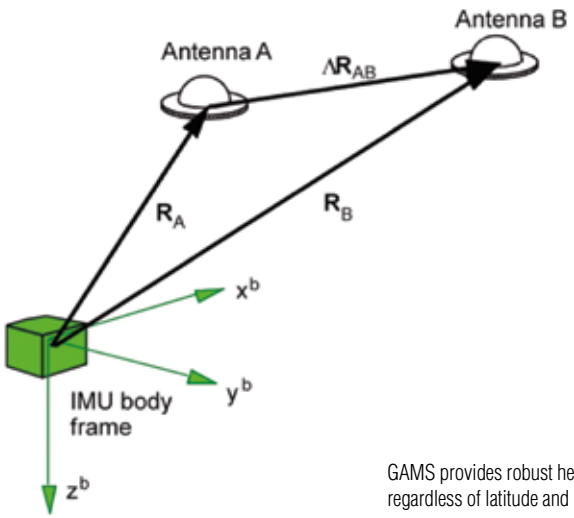
The goal of the Applanix Marine Customer Support department is to provide the industry's best technical support to our worldwide customer base. Whatever the time of day, wherever you are in the world, our team of hydrographic surveyors and engineers is available to assist you. From installation to training and on-going product support, we're here to help.



POS MV

POS MV is a user-friendly, turnkey system designed and built to provide accurate position, heading, attitude, heave, and velocity data of your marine vessel and remote sensing equipment. With over one thousand systems deployed worldwide, POS MV is field-tested and proven in all conditions.

POS MV blends GNSS data with angular rate and acceleration data from an IMU, and heading from GPS Azimuth Measurement System (GAMS) to produce a robust and accurate full six degrees-of-freedom position and orientation solution.



GAMS provides robust heading regardless of latitude and dynamics.

Whatever your requirements, there is a POS MV system right for you.

POS MV comes in 4 models:

- POS MV SurfMaster / SurfMaster One
- POS MV WaveMaster II
- POS MV OceanMaster
- POS MV Elite

All POS MV models are designed for use with multibeam sonar systems, enabling adherence to IHO (International Hydrographic Survey) standards on sonar swath widths of greater than ± 75 degrees under all dynamic conditions.

At the entry-level is the POS MV SurfMaster, which delivers robust georeferencing for small platforms, both manned and unmanned. SurfMaster is available both with a remote IMU and in single-enclosure form factor. Fully supported by Applanix' industry leading post processing software, POSPac MMS, SurfMaster delivers roll and pitch accuracy to 0.03 degrees.

Wavemaster II and OceanMaster are designed for increasingly difficult conditions and performance requirements. The POS MV Elite is for users seeking the very highest level of performance available to the industry.

**Field-tested and proven,
POS MV maximizes your ROI
in multibeam technology**

Benefits

Applanix "TrueHeave™" software improves productivity and accuracy

To improve the performance of real-time heave filters in long period swells, Applanix developed the TrueHeave processor. TrueHeave users reap the double benefits of significantly improved accuracy and productivity by eliminating the need for run-in time. TrueHeave also provides a unique and useful quality control tool for real-time heave during survey data collection.

Post-processing ensures high-quality results in difficult sea conditions

With the ability to log raw GNSS and inertial observables for later processing in POSPac MMS – Applanix' powerful GNSS aided inertial post processing package – an optimal positioning and orientation solution can be obtained even under the most demanding sea conditions. Postprocessing benefits include:

- *Improved Accuracy* – Post-processed kinematic processing and an advanced smoothing algorithm drastically improves position and orientatio accuracy.
- *Improved Reliability* – Setup errors can be corrected in post-processing.
  In addition, alternative differential GNSS sources can be found if the primary source proves unreliable.

Optimally aided architecture ensures a high-quality solution if GNSS outages occur

POS MV uses accurate inertial data aided by observables from as few as one satellite to compute a robust navigation solution. This ensures continuity of data, including position and heading, in areas where GNSS reception is compromised. This is vital for surveying under bridges, around structures (e.g. offshore platforms), or close to mountainous terrain where GNSS shading can occur.

In addition, due to the high quality of the inertial components used in POS MV, short-term loss of GNSS does not significantly degrade the POS MV roll, pitch or heading solution.

Full GNSS Support – ensures robust solution in any environment

POS MV uses both GPS and GLONASS observables to produce the most robust solution possible in any given environment. POS MV uses high performance GNSS components for excellent carrier phase tracking capability even in high multipath environments.

Decimetric positioning anywhere

POS MV provides support for the Fugro Marinestar™ GPS and GNSS services. With this integrated functionality there are significant benefits for the user including:

- *Larger area of operations*: no geographical limitations
- *Ease of use*: no additional hardware to purchase, integrate and maintain
- *High accuracy*: position data is accurate to less than 1 decimetre
- *Efficiency*: data is produced in real-time

Marinestar is available via subscription from Fugro.

Applanix' Inertially Aided RTK ensures more robust solution than standalone RTK

Standalone RTK suffers from dropouts of both the GNSS signal and the telemetry from the base station. These dropouts can be caused by other vessels, bridges, topography, buildings or other obstructions. Reacquisition of a centimetric level accuracy solution can and does take several minutes following a dropout. Applanix proprietary Inertially Aided RTK (IARTK) algorithms enable the rapid re-acquisition of fixed integer RTK positioning. Difficult GNSS environments are often encountered where accuracy requirements are at their most stringent (e.g. port areas). In these conditions POS MV with IARTK affords a significantly more robust and accurate position solution than can be achieved with standalone RTK.

Upgradeability – your investment is protected!

POS MV uses the latest Trimble 220 channel GNSS receivers with the best available GNSS antenna technology. POS MV affords a low cost upgrade path to the latest technology ensuring your investment is protected.

POS MV is designed and built specifically for marine applications

Applanix POS MV Series

POS MV is a user-friendly, turnkey system solution designed and built to provide accurate **attitude, heading, heave, position, and velocity data** of your marine vessel and onboard sensors. POS MV is proven in all conditions, and is the georeferencing and motion compensation solution of choice for the hydrographic professional.

POS MV blends GNSS data with angular rate and acceleration data from an IMU and heading from the GPS Azimuth Measurement System (GAMS) to produce a robust and accurate full six degrees-offreedom position and orientation solution.

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Performance Summary - POS MV Series Accuracy

	DGPS	Fugro Marinestar®	IARTK	POSPac MMS PPP	POSPac MMS IAPPK	Accuracy During GNSS Outage
Position	0.5 - 2 m[1]	Horizontal: 10 cm 95% Vertical: 15 cm 95%	Horizontal: +/- (8 mm + 1 ppm x baseline length)[2] Vertical: +/- (15 mm + 1 ppm x baseline length)[2]	Horizontal: < 0.1 m Vertical: < 0.2 m	Horizontal: +/- (8 mm + 1 ppm x baseline length) Vertical: +/- (15 mm + 1 ppm x baseline length)[2]	~ 6 m for 60 s total outages (RTK) ~ 3 m for 60 s total outages (IAPPK)
Roll & Pitch SurfMaster	0.04°	0.03°	0.03°	< 0.03°	0.025°	0.05°
Roll & Pitch WaveMaster II	0.03°	0.02°	0.02°	< 0.02°	0.015°	0.04°
Heading	0.06° with 4 m baseline 0.08° with 2 m baseline	-	-	-	-	0.2° (IAPPK, 60 second outage) 0.3° (RTK, 60 second outage)
Heave TrueHeave™	5 cm or 5%[3] 2 cm or 2%[4]	-	-	-	-	5 cm or 5%[3] 2 cm or 2%[4]

1) Depending on quality of differential corrections
2) Assumes 1 m IMU-GNSS antenna offset
3) Whichever is greater, for periods of 14 seconds or less
4) Whichever is greater, for periods of 35 seconds or less

POS MV Series

POS MV comes in 4 models:

- POS MV SurfMaster / SurfMaster One
- POS MV WaveMaster II
- POS MV OceanMaster
- POS MV Elite

SurfMaster & SurfMaster ONE

At the entry-level is the POS MV SurfMaster, which delivers robust georeferencing for small platforms, both manned and unmanned.

WaveMaser II

It is designed for increasingly difficult conditions and performance requirements.

Pos MV Series – Technical specifications

1. ETHERNET INPUT OUTPUT

Ethernet	(10/100 base-T)
Parameters	Time tag, status, position, attitude, heave, velocity, track and speed, dynamics, performance metrics, raw IMU data, raw GNSS data
Display Port	Low rate (1 Hz) UDP protocol output
Control Port	TCP/IP input for system commands
Primary Port	Real-time (up to 200 Hz) UDP protocol output
Secondary Port	Buffered TCP/IP protocol output for data logging to external device

2. SERIAL RS232 INPUT OUTPUT

5 COM Ports	User assignable to: NMEA output (0-5), Binary output (0-5), Auxiliary GNSS input (0-2), Base GNSS correction input (0-2)

3. NMEA ASCII OUTPUT

Parameters	NMEA Standard ASCII messages: Position ($INGGA), Heading ($INHDT), Track and Speed ($INVTG), Statistics ($INGST), Attitude ($PASHR, $PRDID), Time and Date ($INZDA, $UTC)
Rate	Up to 50 Hz (user selectable)
Configuration	Output selections and rate individually configurable on each assigned com port

4. HIGH RATE ATTITUDE OUTPUT

Parameters	User selectable binary messages: attitude, heading, speed
Rate	Up to 200 Hz (user selectable)
Configuration	Output selections and rate individually configurable on each assigned com port

5. AUXILIARY GNSS INPUTS

Parameters	NMEA Standard ASCII messages: $GPGGA, $GPGST, $GPGSA, $GPGSV Uses Aux input with best quality
Rate	1 Hz

6. BASE GNSS CORRECTION INPUTS

Parameters	RTCM V2.x, RTCM V3.x, CMR and CMR+, CMRx input formats accepted. Combined with raw GNSS observables in navigation solution
Rate	1 Hz

7. DIGITAL I/O

1PPS	1 pulse-per-second Time Sync output, normally high, active low pulse
Event Input (2)	Time mark of external events. TTL pulses > 1 msec width, rising or falling edge, max rate 200 Hz

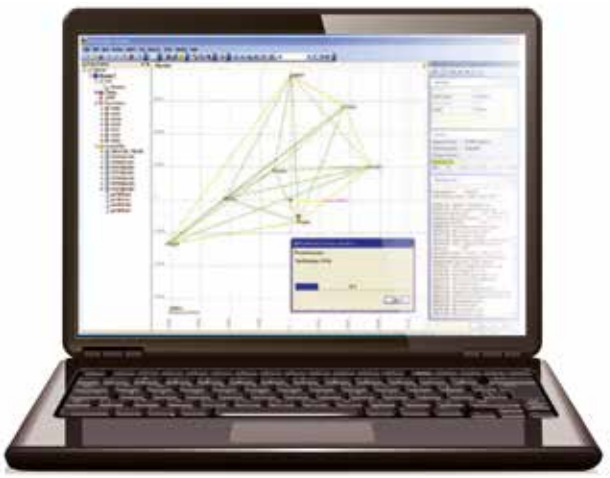
8. USER SUPPLIED EQUIPMENT

- PC for POSView Software (Required for configuration): Pentium 90 processor (minimum), 16 MB RAM, 1 MB free disk space, Ethernet adapter (RJ45 100 base T), Windows 98/2000/NT/XP/Windows 7

- PC for POSPac MMS Post-processing Software: Pentium III 800Mhz or equivalent (minimum), 512 MB RAM, 400 MB free disk space, USB Port (For Security Key), Windows XP or Windows 8/10

SurfMaster ONE
Highly integrated INS solution

POS Pac™ MMS



POSPac™ MMS for marine applications is your key to powerful, consistent, reliable, and accurate data... every time.

POSPac MMS Improves Your Accuracy and Reliability

Accuracy – Post-processed kinematic processing and an advanced smoothing algorithm drastically improves position and orientation accuracy.

Reliability – Setup errors can be corrected in post-processing. In addition, alternative differential GNSS sources can be found if primary source proves unreliable.

POSPac MMS for marine is powerful post-mission software for processing sensor data from your POS MV for highly accurate and robust direct georeferencing.

Optimised for the marine environment and compatible with a wide variety of hydrographic processing packages, this software solution achieves both maximum accuracy and maximum efficiency for direct georeferencing survey data. The complete post-processing toolbox delivers a streamlined field-to-office workflow for best results possible.

It contains all the tools required to:

- Produce highly accurate position and orientation solutions from the GNSS and Inertial data logged by your POS MV system
- Obtain maximum immunity to GNSS outages in difficult environments – under bridges, cranes and other structures
- Achieve stable, reliable, repeatable, and more accurate results
- Import, manage and assess the data from your POS MV system and GNSS reference stations
- Automate data output in a wide variety of industry standard formats or define your own
- Built-in database of GNSS reference stations enables POSPac MMS to find the most suitable reference stations.

POSPac MMS is industry-leading software for Direct Georeferencing.

Only POSPac MMS features Applanix SmartBase™ and IN-Fusion™ Technology.

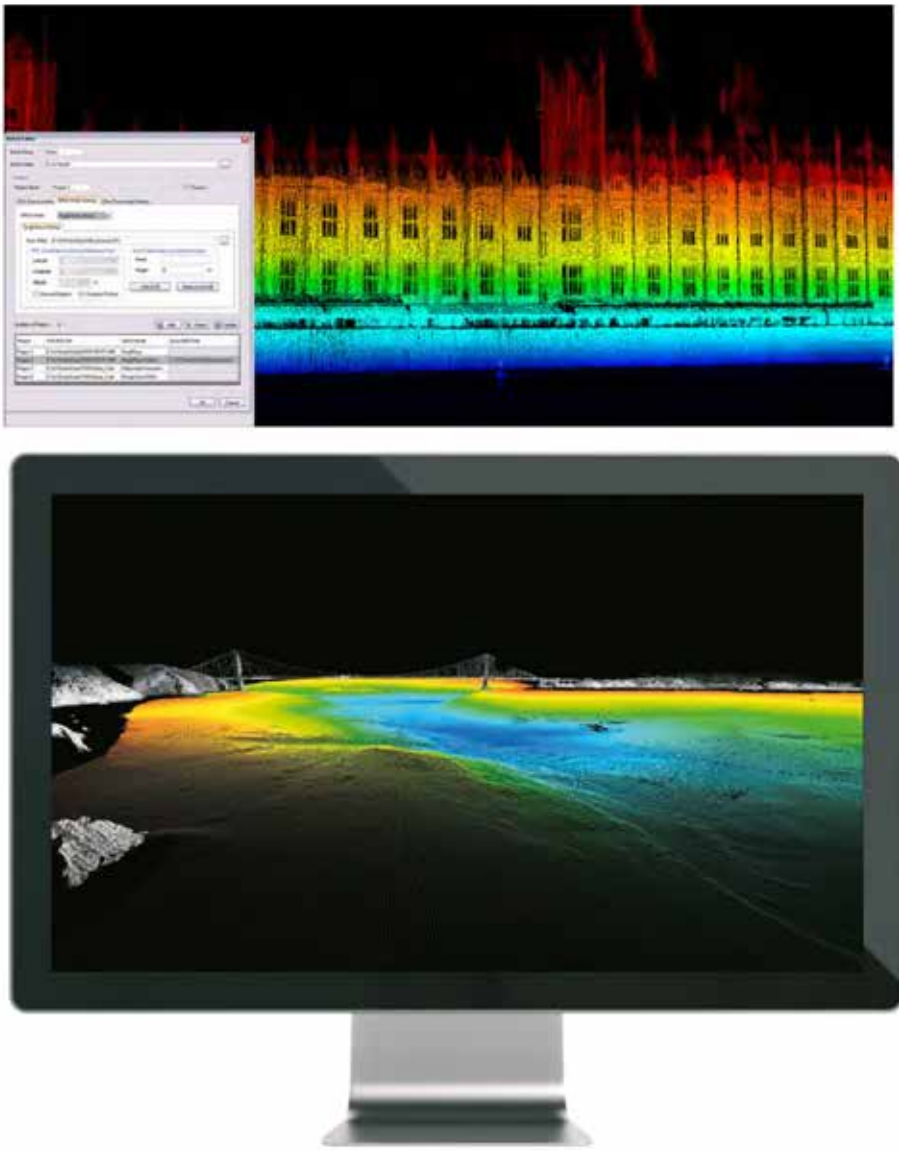
POSPac MMS for Marine includes the Applanix SmartBase™ software module with Applanix IN-Fusion™ technology.
These tools are designed to significantly **increase the efficiency, accuracy, and robustness** of **mapping and surveying** using GNSS on marine platforms.
GNSS network and inertial post-processing methods work in direct cooperation, reducing and in some cases eliminating the restrictions associated with high accuracy GNSS positioning in a marine-based environment.
Reliable centimetric accuracy can be obtained from existing reference station networks, even if the nearest reference station is 70 km or more away. In many scenarios, this completely eliminates the expense and logistical headaches associated with deploying a dedicated station close to the project area.
The Applanix SmartBase™ module uses the data logged from a network of GNSS reference stations to create a model of the atmospheric and other geometric errors across the survey area, and thus generate a set of GNSS observables at a "virtual" location close to the vessel. These and the remote receiver observables are then postprocessed 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 vessel.
The Applanix SmartBase approach ensures errors due to atmospheric delays are accurately modelled anywhere within the network of receivers, meaning the correct integer ambiguities are quickly and reliably computed. Tight integration with inertial data improves accuracy and robustness through cycle slips or full outages.

Applanix SmartBase™ and IN-Fusion™ Technology Deliver High Accuracy, Productivity

The combination of the Applanix SmartBase and the Applanix IN-Fusion technologies provides important new benefits over standard GNSS Kinematic Ambiguity Resolution (KAR). Because there is **no need to set up dedicated stations** close to the project area, and because the time spent in the office post-processing results is less, the overall expenditure associated with high-accuracy surveying is significantly reduced. The robustness of the solution however is increased, ensuring the data is captured first time, every time.

Rigorous Quality Assurance and Control

Included in SmartBase is the ability to perform a quality check on the reference station data. Using rigorous GNSS surveying adjustment algorithms, 18 to 24 hours of reference station data is processed to check the quality of both the network coordinates and the raw observations against a control you specify. Bad reference station data, antenna heights, or reference station coordinates, **are detected and corrected** with the SmartBase module **before the remote GNSS data from the vessel is touched**.



System Requirements

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

CPU	Pentium 3 at 800 MHz or equivalent
Memory	512 MB RAM
Operating System	Microsoft Windows® XP Professional (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
Internet Access	For downloading Microsoft Framework® during installation and other program operations

The recommended computer requirements for running POSPac MMS for Marine 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	1280 X 1024 pixels
Regional Options	English (US)
USB Port	2 X USB 2.0 ports for security keys
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

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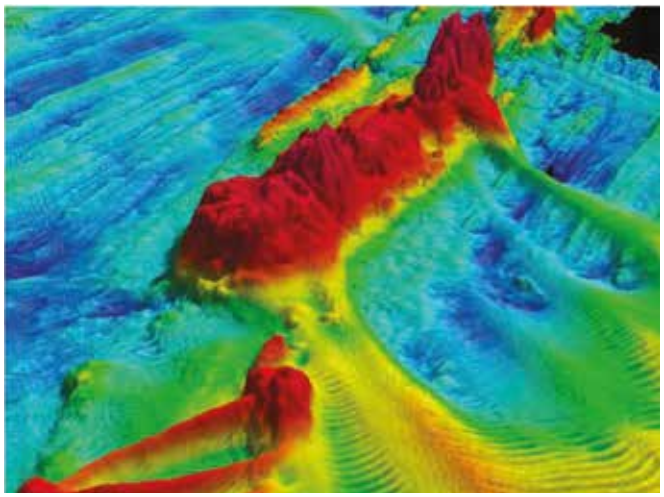
Applications

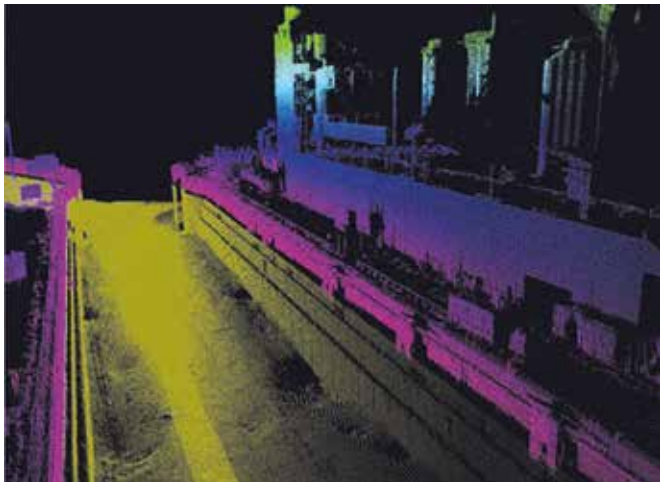
Seafloor Mapping:

Producing maps of the seafloor has always been a unique challenge. Today, multibeam sonar is the marine technology typically used by hydrographers to generate precise seafloor mapping data. Georeferencing this data using POS MV produces the most advanced and accurate solution for mapping the seafloor.



Coastline Mapping Above and Below the Waterline:

Mapping the geography, seabed and man-made structures in coastal waters means conducting highly detailed mapping exercises onboard a dynamic marine vessel, frequently in areas where bridges and other shoreline structures – the items to be surveyed – make the GPS environment extremely difficult.



Harbour Mapping:

Mapping the seabed and geography in harbour waters means conducting detailed, highly accurate mapping exercises onboard moving marine vessels in shallow, narrow, and frequently rough waters. Applanix offers proven technology for doing this. No matter what the goal - port and harbour asset inventory, coastal zone management, marine hazard mapping, or management projects to satisfy government regulations – our mobile mapping solutions on marine vessels are highly costeffective ways of acquiring quality marine infrastructure GIS data.

Performance you can rely on:

Accurate under all dynamic conditions

- Heading accuracy maintained in high multipath environments and in areas of poor GNSS availability
- Continuous sensor monitoring to ensure optimum performance
- Almost instantaneous reacquisition of RTK following any GNSS signal loss
- Automatic initialization upon power-up following a one-time calibration
- Very low noise L1 and L2 carrier phase measurements
- Superior low-elevation tracking performance regardless of latitude

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