Four considerations to make when selecting an INS for Mobile Mapping

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Mobile mapping is helping to accelerate the progression of some of the most difficult engineering challenges on the planet, including those around autonomous driving and advanced surveying techniques (for example using a LiDAR).

The complexity of those challenges mean that the outputs from a mobile mapping INS have to be as accurate as possible. Centimetre-level accuracy is therefore vital, as is precise heading, pitch and roll measurements amongst others.

You know this stuff already - and that's why you know you need a high-performing INS in your mobile mapping setup. A high-performing INS will make the most of any available GNSS signals, with the aim of giving you centimetre-level accuracy even in areas where GNSS alone performs poorly, for example in urban canyons.

It will also give you vital data on pitch, roll and heading, allowing you to maintain the integrity of your survey data even as your vehicle moves across large areas.

But there's a wide variety of INS devices on the market. Which one is right for you?

In this document, we've collected some criteria that will help you evaluate the different INS propositions out there for your mobile mapping project.

1) How tightly integrated is the IMU and GNSS data?

Being able to provide accurate location data in as many environments as possible is one of the main reasons you need an INS – which means you need to know how effectively the data from your IMU supports the GNSS data. In technical terms, this means evaluating whether the sensors are tightly integrated at all, and if so, how well.

The reason GNSS struggles in urban canyons and under tree canopies is that it is unable to get the six satellite signals necessary for an RTK lock. In this situation, the GNSS will give readings that may be incorrect, as it's essentially trying to solve an equation without having all the numbers. A tightly integrated GNSS and INS data stream will select the most reliable signals and use those to determine the position of the vehicle. If the data streams aren't tightly integrated, then the INS' ability to counteract GNSS issues is more limited, and the accuracy of your data less reliable.

This is one of the most important things to evaluate when looking at an INS, unless you are 100% certain that you will only ever be mapping under open skies. Without accurate positioning, your scans will lose accuracy and even become completely incoherent the longer you scan – making them unreliable at best, unusable at worst.

2) Trading off accuracy and cost

There will come a point where the extra you're paying for increased accuracy isn't worth the benefit you get. Although accuracy is vital in mobile mapping, there are INS devices that will provide data that's far more accurate than you actually need for your purpose. Since, generally speaking, greater accuracy equals greater cost, you may be paying more than you need to.

That said, the scale of accuracy/cost isn't necessarily linear. An INS half the price of the most expensive on the market won't be half as accurate. Look at each offering carefully to see what it includes, and decide what level of accuracy and features are vital to you. You may be able to make some savings by eliminating unnecessary levels of precision or additional software features you don't need.

3) How rugged is the device?

Your mobile mapping vehicle will likely be out in the dry, the wet, the hot, the cold, the mud, and the snow. It will almost certainly be in nearly constant use for long periods of time. So, you need to know that none of the above will stop the INS working at peak effectiveness.

Look for what IP rating your INS has (IP65 is essential for general weatherproofness and protection against shocks and dust) and ask what the average lifespan is of a device.

4) Can you get the device properly calibrated?

Any INS is only as good as its calibration. Without calibration the sensors in any INS can become misaligned and therefore give inaccurate readings – and devices will generally need multiple recalibrations in their lifetime. Talk to your vendor about their calibration processes – do they work to a nationally recognised standard of calibration like ISO 17025? Do their calibrations account for variations in temperature or humidity?

It's also worth considering how often sensors need recalibration. Recalibration is a chargeable service from most vendors, meaning that if the more you need to recalibrate, the more you'll have to pay – and the more delay you may incur, if you need to send your unit abroad to have it recalibrated (or even just to see if it needs recalibration)..

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Our products provide position, roll, pitch, heading and other measurements of vehicles on land, sea and in the air. Our highly accurate RT3000 series is used by almost all car manufacturers in the world for vehicle dynamics testing, validating advanced driver assistance systems (ADAS) sensors or developing self-driving cars.

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