

# OEM Spotlight on GNSS

As a Canadian supplier to surveying equipment manufacturers, NovAtel offers a unique perspective.

# Q&A

**T**he market for Global Navigation Satellite System (GNSS) products is evolving, driven by the growing availability of multiple satellite constellations and augmentation systems that broadcast on multiple frequencies. NovAtel Inc. is one of just a few major GNSS manufacturers. They're based in Calgary, Alberta, Canada with more than 300 employees. Founded in 1983 as a provider of telecommunications equipment, today NovAtel, now a subsidiary of the Hexagon Group, Sweden, is wholly focused on the GNSS precise positioning market. Below they answer our editor's questions about the industry and their role in it.

## What niche does NovAtel occupy in the overall scheme of GPS equipment suppliers?

As a GNSS OEM provider, NovAtel develops GNSS components and subsystems including card-level receivers, enclosures, antennas, and firmware features that are integrated into high-precision positioning applications worldwide. Land survey is one of these many applications.

Over NovAtel's history, the company has developed strong business relationships with survey system integrators. Leica Geosystems and Sokkia are among end-user survey system developers that NovAtel works closely with to develop GNSS technology and features specific to their market requirements. NovAtel has also formed close relationships with system integrators across various other market segments.

Having this relationship with end-user integrators allows NovAtel to develop targeted technology and software features geared towards specific market needs. From multi-constellation receivers, to precise positioning algorithms such as the AdVance RTK engine, to the Pinwheel antenna technology, NovAtel's



▲ NovAtel's test lab facility for GNSS components and subsystems

focus in the survey market is to provide industry-leading OEM solutions.

## How much of your business ultimately comes from land surveyors? Is that increasing or decreasing?

Adoption of GNSS receivers in land survey equipment is more established than in other emerging markets, although growth rates are still projected between 10 to 18 percent. As more constellations are launched into orbit, greater satellite availability is provided, which allows the technology to work under harsher or more densely covered environments. Improvements in accuracy, reacquisition times, and longer baseline performances in augmentation positioning algorithms such as RTK have provided surveyors with a more flexible and robust technology. The fast expansion of RTK networks over recent years has also encouraged more surveyors to adopt GNSS technology in the survey practice.

## How do you typically work with manufacturers that produce GPS receivers for surveyors?

NovAtel's focus is to provide a common OEM platform for their customers and customize features for specific requirements. The system integrator will ultimately implement the "value-added" for their individual market. NovAtel employs application engineers who work with manufacturers to resolve integration issues.

## What trends are you seeing in the GPS equipment, both in general and for land surveyors?

The survey market depends particularly on reliable and accurate positions and measurements, low power consumption, and small-sized and light-weight GNSS engines. Having these advantages provides surveyor system integrators the ability to develop an ergonomic and light-weight all-on-the-pole survey system.

Land survey and construction applications often require highly accurate positions with a low margin of error to conduct effective pre-planning to minimize rework, avoid equipment wear and tear, and ultimately reduce costs. On-Machine applications generally require centimeter-level accuracy positions for blade control use cases and centimeter to sub-meter-level for guidance applications.

Among the evolving trends in the GNSS industry is the integration of multi-sensor systems to enhance the performance and supplement the limitations of GNSS technology. NovAtel has made large development investments into its SPAN (Synchronized Position & Navigation) technology, which combines GNSS with inertial functionality to provide continuous operation with accurate position and attitude measurements. Having inertial technology to augment GNSS provides attitude data and ensures a position solution is maintained through times when the GNSS solution is degraded or unavailable. Land and aerial mapping markets benefit greatly from this technology. These types of applications require highly accurate attitude data not available with standalone GPS and often in limited visibility environments.

### What geographic markets do you cover?

Due to the global nature of the GNSS industry and NovAtel's OEM focus spanning across a range of market segments, NovAtel's business covers an international customer base, including countries in North and South America, Europe, the Middle East, Africa, and Asia. Customers from different regions often have different requirements and market characteristics that NovAtel considers during the development of their products. Certain regions may demand lower cost products with only basic GNSS functionality while other customers require the features and robustness of a higher-priced product.

### How far along is the GNSS concept, meaning GPS working with GLONASS, Galileo, etc., and how have you addressed that?

Currently, most high-end GNSS receivers offer GPS+GLONASS capabilities. As the GLONASS constellation is improved and revived, increased satellite availability will continue to offer greater improvements in position availability, reliability, and signal acquisition under limited visibility environments.

NovAtel is currently working with Thales Alenia Space Italia (TAS-I) on the continued development of the Ground Reception Chain (GRC) reference receiver for Galileo, Europe's GNSS. TAS-I, NovAtel, and Space Engineering were initially selected by the European Space Agency and began work on the program in June 2005. The ground reference receiver, for which NovAtel continues to develop receiver components, forms part of the GRC and is used in the Galileo Ground Mission Segment (GMS).

NovAtel's OEM products will be prepared for the future Galileo constellation, and NovAtel intends to also support Compass if and when the information becomes publicly available. As more GNSS constellations become operational, increased global awareness of GNSS technology will result in increase of adoption rates in many existing, emerging, and new markets and applications.

### What accuracies can surveyors expect with GPS today?

Users of GNSS can expect horizontal RMS accuracy of 1.5 meters for single-point positions without any augmentation algorithms on dual frequency receivers. Sub-meter DGPS (differential GPS) options are available to improve accuracy to sub-meter or decimeter-level positions. RTK users can expect to see centimeter accuracy positions using either dual or single frequency receivers.

*SARA MASTERSON is the product manager for all multi-frequency, multi-system GNSS receiver cards at NovAtel Inc. The professional survey market is the primary user of these cards and Sara has worked extensively with various survey integrators and manufacturers of end-user survey equipment. She has a Bachelor of Science degree in geomatics engineering.*



◀ NovAtel's head office in Calgary, Alberta

