

Q&A WITH CHRIS TREVILLIAN ON THE TRIMBLE R12i

GNSS Rover Developments Give Surveyors a New Edge



During the early days of Global Positioning System (GPS) technology in the 1980s and 1990s, surveyors had to chase satellite geometry and spend long hours collecting data in order to get quality solutions. With the arrival of Real Time Kinematic (RTK) in the mid-1990s, the productivity of these systems greatly improved the ability of users to get positions faster, but it was still the era of

satellite visibility and geometry constraints.

The skies in those days were dominated by just two systems: GPS and GLONASS, the de facto standard for about 10 years. Then, with the emergence of the Galileo and BEIDOU constellations, satellite geometry was less of an issue. Since then, GNSS technology has continued to improve the ability of these instruments to operate better in poor conditions, as demonstrated today by the [Trimble R12i](#) receiver, a high-performance Global Navigation Satellite System (GNSS) surveying solution launched in September 2020.

In this question-and-answer interview, Chris Trevillian, director of product management for the GNSS hardware portfolio within Trimble's Geospatial division, shares his thoughts on

the evolution of GNSS technology and the breakthrough represented by the Trimble R12i, the company's flagship integrated GNSS receiver.



Trimble's Chris Trevillian shares his thoughts on GNSS technology and the Trimble R12i GNSS receiver.

Question: How is the Trimble R12i different from its predecessor, the Trimble R12?

Answer: The Trimble R12i is different in that we are now using inertial measurement unit (IMU) technology and fusing that together with our industry's leading ProPoint™ engine to get TIP tilt compensation measurements in a much more significant portion of the user's workflow. Now calibration-free and immune to magnetic disturbances, the R12i takes GNSS further than ever thought possible. Users also don't have to worry about the integrity of their measurements. The Trimble R12 is based on Trimble's SurePoint technology, the industry's first tilt-compensated technology that was released in 2012. While this technology still allows for measuring tilt compensated points, the use cases are more limited than with the R12i. Both receivers utilize Trimble's ProPoint GNSS engine.

Question: Who is the R12i designed for?

Answer: It's designed for the professional GNSS user looking to get the highest level of performance and productivity without compromising data integrity.

Question: What are users finding most exciting about the R12i?

Answer: Flexibility, traceability and robustness of the position solution in traditionally difficult GNSS environments.



Using the R12i's TIP technology, a surveyor is able to capture points in hazardous locations such as the edge of a steep embankment without getting in harm's way.

Question: How does the R12i impact workflows?

Answer: Developments in GNSS field systems have always been geared toward simplifying the workflows, improving accuracies and

increasing customer productivity, which means that over the years more and more surveyors started utilizing GNSS as their main survey workflow. But with the GNSS workflows, certain limitations prevented even greater adoption. For example, the pole needed to be exactly vertical, which takes time for normal observations, is prone to random error and causes problems measuring certain objects like buildings or points obscured by overhanging objects. This has been solved by incorporating an IMU to compensate for tilted measurements, which takes the surveyor into environments where they can now measure with more flexibility and more accuracy. We're obviously not going inside buildings or structures with GNSS, but we can now operate right up to the fringe of buildings. Those were traditionally difficult spots to measure. The strength of our ProPoint technology enables GNSS measuring closer and closer to the fringe, thereby reducing the need for conventional instrument setups. It enhances customer productivity because surveyors can utilize this one tool for a larger percentage of their daily workflow, which is less cumbersome and takes less time.

Question: What are the users saying about the R12i?

Answer: The user feedback from the introduction of the R12i has been unanimously positive. The speed of initialization, the robustness of the positioning solution and the way the workflow has been streamlined in Trimble Access field software stand out as the most positive and consistent points of customer feedback. Our customers appreciate the simplicity of the workflow in Trimble Access and the fact that the solution works almost all the time. It's not uncommon for me to hear our customers quote large % productivity gains for their GNSS surveys, whether it's for topographic projects or stakeout routines.

Question: There are other GNSS-inertial products on the market; what's different about the R12i?

Answer: Trimble's ProPoint GNSS Engine is unmatched - no one else has it. There are a lot of systems out there, but for surveyors that need to use GNSS with tilt compensation in all the environments they survey in, the R12i outperforms any other system on the market today. These environments include tree canopy or against building corners—the places where you need to take tilted measurements the most are the places that often have the worst effect on GNSS positioning performance and that is where the R12i with ProPoint really shines.



The R12i with ProPoint technology enables surveyors to effectively work in challenging GNSS environments, such as near tree canopy.

Question: How does the R12i work with the Trimble RTX positioning service?

Answer: [Trimble RTX](#) is an advanced Precise Point Positioning (PPP) technology, providing real-time GNSS correction services via IP/cellular or satellite delivery worldwide. This positioning service utilizes a global network of Trimble reference stations to precisely estimate satellite orbit and clock information, along with modelling global and regional atmospheric effects. This enables accurate, real-time, 2 cm level positioning without the need for a base station or local reference network connection. The R12i and specifically the ProPoint GNSS engine interact seamlessly with this service to provide our users with the flexibility to measure anywhere with confidence. Additionally, for many countries in the world, the latest advancements in Trimble Access field software deliver the most accurate real-time transformations into our user's local reference datum, allowing our users to integrate this GNSS survey method easily into their existing workflows.

Question: Trimble SPS986 has had this technology for a while; what's different about R12i and why was it released later?

Answer: Trimble's Construction division makes great products optimized for those working conditions and these products share much of the underlying knowledge base. However, the R12i is optimized for the professional surveyor in all situations. Special calibration procedures and attention to detail have been made in the manufacturing process to ensure the most reliable position once in the hands of the user. Position integrity is of utmost importance and the R12i is the most precise and reliable GNSS system Trimble has ever created for surveyors. We spent a lot of time designing, testing, and iterating until we had the perfect solution for a professional surveyor. Surveyors expect that our Geospatial division will give them the best possible products, because their businesses and reputations depend on it. That's what they get with the R12i.

Question: In what ways are GNSS workflows being simplified?

Answer: The introduction of new sensors is improving overall measurement quality while increasing speed and flexibility, because you rarely have to level the pole anymore. From these sensors we're also getting improved data traceability from the field into the office software, because the tilt measurements are associated with the position measurements to help eliminate a large source of random errors in the everyday field workflow. Our customers can focus on measurement of the exact location and less on other contributing errors. As Trimble, we will ensure data quality on a technological level, so that's one less thing for the user to worry about.

[Learn more about Trimble R12i](#)