

The Future of Surveying All Over Again

When I was invited to attend the rollout of Trimble's new survey instrument, and told I would be seeing "the future of land surveying!" I have to admit I rolled my eyes a bit. I have only been surveying since 1990, but already I have lived through several "futures of surveying". There was the integration of data collection (COGO, and CAD), servo-driven and then robotic total stations, reflectorless total stations, GPS of course; and most recently, LIDAR scanning. But in fairness, all these new technologies *did* change surveying, *did* revolutionize work flows, and *did* become, if not *the* future of land surveying, certainly a major component of the future.

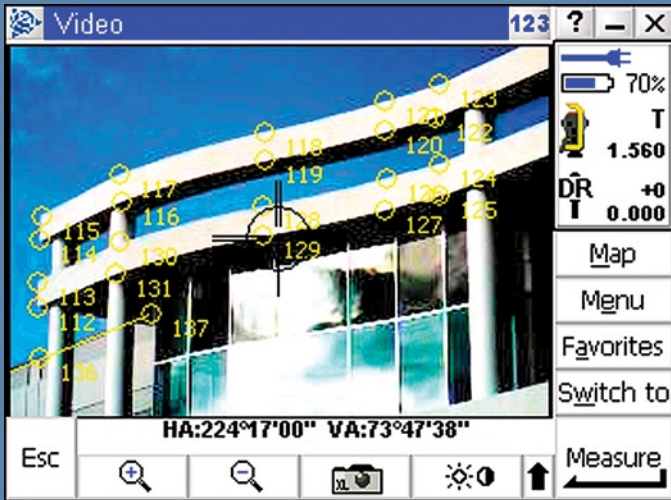
And that's just what Trimble's VX is going to become: a major new part of the land surveyor's life, whether using one... or competing against somebody using one.

So, What's it Do?

Just as Trimble has been a pioneer in integrating optical and GPS surveying, the VX Spatial Station combines three technologies – optical positioning, 3D scanning, and an excellent implementation of video streaming – into one slick package. The new instrument looks and operates very much like a businesslike gray version of the Trimble S6, intentionally so; Trimble hopes the familiar form factor will raise the comfort level of users. They *didn't* want the VX to look like a bulky scanner; rather, the VX is more of an "S6 plus" (my wording) that will do everything the S6 does, better, and adds significant scanning capacity.

So if you like (or have lusted after) the S6, you'll like the VX for all the same reasons. The VX incorporates the same futuristic MagDrive servo technology, so it spins faster than a 2008 presidential candidate and autolocks in two to ten seconds. The

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VX instrument screen



VX will collect a single prism shot at well over 8,000 feet and, in reflectorless mode, will collect a shot from an 18% reflective gray card at a 1,000 feet or so, and from more reflective surfaces up to 5,000 feet away.

But you don't really need the details. The VX is a brand-new instrument from a top maker, and you can be forgiven for blithely assuming that the optical specs are superb – in optics, the formerly inconceivable has become routine; and besides, is your choice of next instrument going to come down to a 1.2 second single prism shot versus, say, a 1.8 second shot? Or will you pass on a gun that doesn't collect a triple prism shot, like the VX, from at least 18,000 feet?

I think not. And let's just get this out of the way: the VX is listing in the neighborhood of 70,000 smackders, so it's not going to be selling on the strength of its optical capabilities. Excellent optics will be taken for granted, and the VX is going to live or die on the strength of the video streaming and scanning capacities.

Breakthrough Streaming

The VX's "scanning with a total station" is indeed an amazing selling point of this new instrument, and I'll be getting to that, but the former field guy in me was more immediately taken by the video streaming, for reasons not obvious to the former survey manager in me. In practice, the advantage of the video streaming is as simple and obvious as this: *one rarely, if ever, has to look through the eyepiece.* Sure, that's been coming, but now it's arrived. The operator's experience is much like playing a handheld

video game. The wireless controller (and I don't know why you'd go with any other option) has a good-sized, high resolution screen that constantly streams video from the VX. Using a stylus, the operator zooms and pans, selects shots with a tap, can take 3.2 megapixel pictures to be stored as JPEGs in the data file, and has instant access to all the other features you expect from a good data collector. And here's a neat thing: shots taken show up as points on the video stream, and can be reviewed.

By avoiding the messy biological necessity of human eyes refocusing to peer through an eyepiece, not to mention the arduous business of actually moving one's head several inches back and forth to get said eyes physically close to said eyepiece, the VX also avoids much of the remaining delays in instrument operation. When doing reflectorless topo (not to mention scanning) there's no particular reason the operator can't set the VX up on an eight-foot tripod and work from a hammock in the shade... and though that seems wrong, somehow, it would sure *feel* good. And for robotic work, the ability to see the instrument view constantly and review shots on video brings a new level of confidence to the prism end.

And taking high-res photos at will is also a very nice thing: think of all the sketching it will replace. And think, too, of the CAD tech back in the office. Instead of trying to decipher a hastily drawn, low-res sketch, he will instead be looking at a 3.2 megapixel JPEG file of, say, a storm drain and wingwall, with all shots labeled and precisely located. His level of confidence will be much higher,

and he'll be making far fewer calls to the field crews, those calls that start, "Do you remember..."

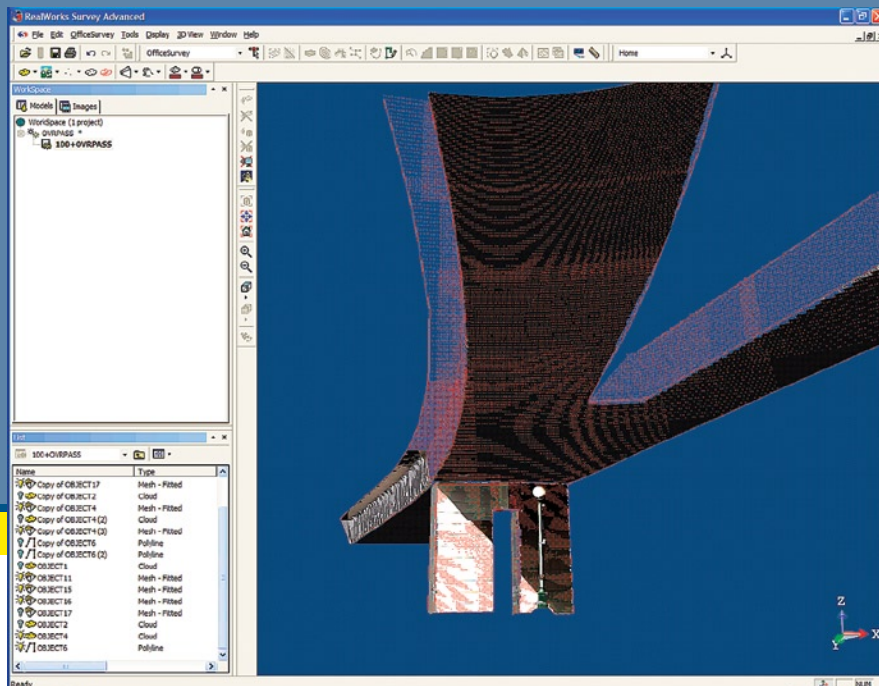
So the new Trimble VX Spatial Station promises to speed up topo and asbuilt surveys dramatically, just with the video streaming. Faster point collection, less sketching, better communication with office staff the intelligently implemented video streaming alone makes the VX a very desirable total station.

But wait, that's not all...

Scanning for the Masses

At the recent Autodesk University in Las Vegas, one company was demoing a scanner that could gather half a million points per second, which made me recoil in horror. I did the math, and that's, like, a million points *every two seconds* and I've been known to work for up to 30 seconds at a time...

But seriously. The sheer volume of point cloud data has been something of a mental barrier to land surveyors trying to get a handle on the scanning phenom-



RealWorks screen

enon. They seem like such ridiculous overkill for the day in and day out work of a typical surveyor's office. Of course scanners like this have their place, but Trimble's guess is that their place isn't in the back of the average surveyor's truck. I think they're onto something.

Trimble makes a scanner of course, the GX 3D Scanner, which gathers data at the rate of 5,000 points a second. The VX scans at a more modest rate, just 15 points a second maximum, with five points a second being more typical. Too modest, maybe? Not really; my calculator tells me five points per second works out to 9,000 points in half an hour, and 9,000 points would be a pretty good *month* for some crews. It's not really the *rate* that's important, it's the automaticity of the point collection.

Really, the VX shouldn't be thought of as a scanner, or even a scanner that does stakeout. It's a total station with some scanning capacity. At the rollout event I suggested, half seriously, that the words *scanner* and *point cloud* shouldn't be used in connection with the VX. Instead, I think it should be called a topo monster.

Suppose a crew is doing asbuilt on, say, a complex retaining wall. Shots can be taken conventionally around the wall, establishing original ground and so forth and then, without any special setup, the operator can use his stylus to tap the corners of the wall's video image, thus establishing an area to scan, and with a couple more taps he can select shot spacing and set a few more variables. And

then the VX just goes to work, quickly gathering hundreds or thousands of points in a few minutes, while also recording an image of the wall for later reference. The data stream into CAD is straightforward, as file sizes aren't ridiculously big. And, if desired, high quality visualizations can be produced in the office about as easily as conventional drawings.

When the advantages of the video streaming are considered alongside seamlessly integrated scanning, I don't think it's crazy to assume that field time for topographic and asbuilt surveys will drop dramatically, perhaps by two-thirds or more. And the accuracy will be greater, and the richer data sets will create more options back at the office.

Suddenly, \$70K doesn't seem completely out of the question. You can always fire someone...

Welcome to the Future

For some shops, the VX is never going to make sense. If your practice is largely cadastral, and you like it that way, this is not the gun for you. But surveying and engineering firms that are interested in rapid growth will have to exploit expanding industry niches.

Ambitious surveyors, increasingly, must embrace their role as expert measurers. By making the needed investments and developing unique skills, surveyors can benefit from two of the clearest infrastructure trends: the ever increasing representation of the

world in GISs and their 3D equivalents, and the increasing use of 3D models for digital prototyping and design.

When surveyors quickly supply accurate 3D data to designers and planners – and tax collectors – the bar for such data will rise, and 3D accuracy will be expected. Aerial views of rooftops will no longer be acceptable. Even now there are several large cities – Seattle, Dubai and London, to name three – that are represented accurately by 3D “super-models” and it will be strange indeed if more and more cities don't see the advantages of such 3D models. Similarly, engineers, planners and designers are getting used to working with high quality visualizations of exteriors and interiors, and data of this quality is never going to be provided by a guy with a handheld GPS unit.

The Trimble VX Spatial Station handles, superbly, all the tasks of a conventional total station, while also adding a new capacity for rapid scanning. It's a good investment for those companies looking for growth opportunities, and it's technology that can put surveyors in the driver's seat of industry trends. Trimble seems to have gotten a lot right with the VX, and in fact the cliché “future of surveying” may be perfectly accurate in this case. *AS*

Angus Stocking worked for 17 years as a land surveyor in several different states. Nowadays he writes professionally (see www.ColoradoWriting.com) and specializes in surveying and related topics. And also, of course, he is occasionally called to settle survey-related happy hour disputes.