

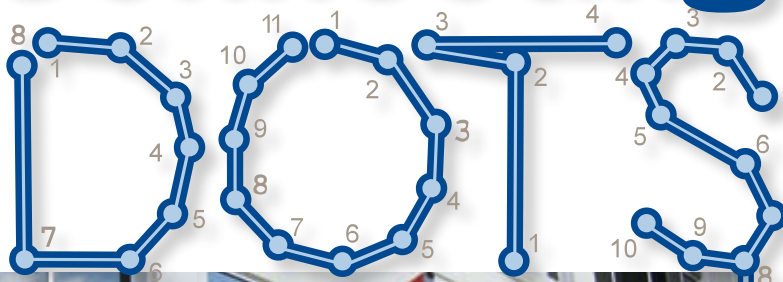
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# POB

POINT OF BEGINNING

## The Business of Scanning

# Connecting the



## Winning the business case for laser scanning requires patience and persistence.

BY MARY JO WAGNER

**Above: Todd Beers, PLS, associate and survey group director for Nolte Associates Inc.**

Creating a compelling case for investing in new technology can feel much like a game of dot-to-dot. The crusader starts at point one—the demystifying dot—and slowly moves from one dot of persuasion to the next, waiting for each stakeholder to experience his or her “aha” moment, until all the business-case dots are finally connected, the new business picture is complete and the big box with the new technology arrives at last.

Survey champions of GPS technology will likely remember that journey well. And now a new team

of crusaders is following that same quest with laser scanning technology. Professional land surveyor Todd Beers is one such person who has successfully completed two laser scanning campaigns. Although Beers has been triumphant, he readily admits that championing technology can challenge a surveyor’s resolve more than any ordeal in the field.

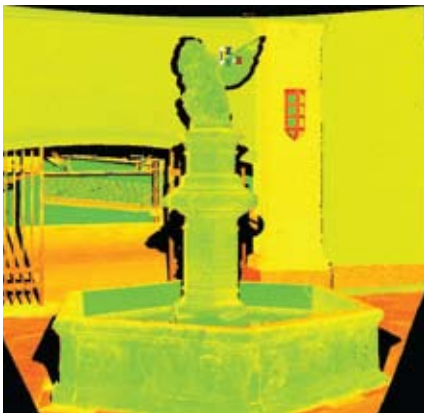
“Laser scanning is still a foreign concept to people in the industry, which makes them fearful and skeptical of it,” says Beers, an associate and survey group director for Nolte Associates, a 500-person engineering, survey and construction management company based in Sacramento. “The most typical question you hear both from surveyors and executives is, ‘What can you use it for?’ And that’s because they don’t understand the technology, its value and its benefits to the business. To change that mind-set, you have to be prepared to educate them, prove that the technology works and that it makes good business sense. Some connect the dots quickly; for others, it can take a very long time to appreciate the business case.”

### Beginning the Journey

When Beers joined Nolte’s Denver office in June 2007, he had already been carrying the laser scanning banner for several years and understood the dot-to-dot game well. Six years ago, the small survey firm Beers was working for in Texas did not have laser scanning capabilities in-house. But after reading several articles on the technology and speaking with experienced colleagues, Beers searched for the chance to change that. The opportunity came in the form of a large survey project that historically has always been the domain of total station and leveling technology: an as-built survey of an airport runway. Beers, however, saw the project as a “no-brainer” case for laser scanning. “The scope and demands of the project made laser scanning the perfect choice,” Beers says.

The project required surveyors to collect an as-built survey of 40,000 feet of runway and associated taxiways at Denver International Airport, including surrounding features such as lights and the asphalt edge. However, the airport had to remain operational during the survey. “Technically you can survey at night with conventional tools, but it would be very *painful*,” Beers says. “It would require much more setup and more surveyors and would take much longer.

“We needed to complete the work as quickly as possible with as little impact on the airport operations as possible. We needed to work very efficiently, and, most importantly, we needed to ensure that we captured all the feature detail they needed the first



**Top Left: A colored point cloud with a digital photo overlay. Above: A point cloud of a statue based on scan density and reflectivity of the material surface.**

**Left: A computerized rendering of the point cloud (3D model).**

time. We didn't want to have to request permission to return if something was missed. With HDS [high-density scanning], we were confident we would collect all the required data."

Not everyone at Beers' firm viewed laser scanning as the appropriate technology for the job. However, Beers and his team convinced the client—the Federal Aviation Administration—that laser scanning would provide the accuracy, design and feature detail and efficiency the project needed.

Beers subcontracted the survey work to another company to enable his firm to gain in-field experience with the scanner and validate the technical feasibility of using laser scanning for as-built runway surveys. However, because scanning was new territory, Beers was careful to take extra "conventional" steps to ensure the methodology and results would be above reproach. Such verification entailed the use of a digital level and prism to establish highly accurate bench-mark tie-in points for vertical control as well as running a conventional-scanning comparison test area.

Targeting a 1,000-foot stretch of taxiway, the team mounted a prism on a digital level rod and then shot about 500 points along that section. They then used a Leica HDS3000 to scan the same

stretch. According to Beers, of those 500 digital points, 98 percent of the Leica HDS3000 scanned points matched vertically to within 1/100th of a foot.

"To my knowledge, that was the first runway as-built project performed with HDS, and it certainly proved the technology," Beers concludes. "We completed the survey in eight days. It would have taken us multiple weeks with conventional technology for the same—if not slightly less—accuracy."

The proof-of-concept exercise was not enough validation, however, to secure the needed buy in for the firm to purchase its own scanner. After all, subcontracting laser scanning services and owning a scanner are two very different costs. Beers would need to subcontract several more laser scanning projects over the next two years before company executives would agree that laser scanning could add value to the bottom line and elevate the firm's image as a market leader. In 2004, the survey firm purchased the newly released Leica ScanStation 2.

"After my experience with the HDS3000, I researched other vendors' scanners, software and support and found Leica to be superior," Beers says. "Leica is at the forefront in the HDS arena. It invests heavily in R&D and provides very good support and has a superior product. The ScanStation 2, for example, offers a dual-axis compensa-

**Right: A high-density point cloud and a colored point cloud of the statue.**

tor to enable surveyors to closely parallel traditional survey traversing techniques but at a much faster speed—you can record up to 50,000 points a second."

### A New Dot-to-Dot

When Beers joined Nolte with the knowledge that laser scanning was not in-house, he knew that convincing executives to invest in laser scanning (typically \$100,000 or more) would hinge on successfully winning the return on investment (ROI) argument.

"Laser scanning is a tough technology to quantify because you won't be able to pay off the equipment in one or two projects, but that is typically what executives expect," Beers says. "Instead, the selling point is that it is a business-development tool that can





## From “Nice to Have” to “Need to Have”

Convinced you're ready for a laser scanning campaign? Beers offers some tips from the trenches:

- Clearly understand the business value of the technology. Arguing that “it's great” will not do.
- Demystify the technology.
- Be a patient teacher.
- Identify new business opportunities.
- Show how integrating the technology into your daily operations will increase revenue.
- Don't give up.

### A digital photo of a railroad crossing.

integrate into your daily operations to both secure new business and to increase revenue without increasing staff because the technology allows you to complete jobs quicker. To quantify that, you need to demystify HDS by proving it in the field.”

Soon after joining Nolte, Beers began producing a business-case plan for the company's management committee to review. The committee returned a list of specific questions about the technology, which was a very promising sign. It indicated that they saw potential value in the investment but needed more information to move ahead. Beers then systematically began to search for ways to resolve the outstanding questions.

One of his first strategies was to organize a Leica ScanStation 2 field demonstration with the help of Leica Geosystems' personnel. About 10 Nolte employees gathered at a road intersection near their office and were taken through the steps in real time of how the scanner collects data, how the data is processed and how much data detail there is. It was an eye-opening experience, Beers says, and it helped to jump-start the internal HDS momentum.

Beers also secured a few scanning projects through a subcontractor to prove the technology and provide “no-cost” field training to Nolte surveyors. “The bulk of the capital outlay for HDS is in the equipment and software and training,” Beers says. “I subcontracted the scanning projects on the condition that they train us in field operations and allow us to process the data. Some of the training cost then could be covered by knowledgeable people working on the project.”

Two of those test projects involved a downtown Denver revitalization project and a railroad project—again, the typical domain of total station technology. For the revitalization project, surveyors needed to produce a detailed current-condition survey of the face of the buildings that lined both sides of a street, including the positions of the doorways, sidewalks, trees

and curbs. And for the railroad project, the field team had to produce an as-built survey of three and a half miles of existing track in Pueblo, Colo. Beers says both were successful examples of how laser scanning could augment Nolte's service portfolio while at the same time providing the opportunity for three surveyors to learn how HDS works.

After each successful training project, Beers would return to the management committee with a more detailed and refined business strategy for HDS. And with each revised plan came fewer and fewer questions in return until Beers had connected enough dots for Nolte executives. In October 2008, Beers had his hands on the company's first Leica ScanStation 2.

According to Beers, the “aha” moment for Nolte executives occurred when they realized that HDS technology will give Nolte a more diverse business portfolio and take the company to a higher level. “They learned enough about laser scanning to be able to understand its value,” says Beers. “And they understood that we need to move into this realm if we are to stay ahead of our competitors and hold true to our mission of being an innovative company.”

### On the Right Track

One week after receiving the scanner, Beers and another surveyor put it to work on an as-built railroad project in Brighton, Colo. The assignment was to scan two and a half miles of existing track to provide top-of-rail position and elevation data and locations of associated features such as transition points and frogs, the grooved

pieces of iron set where tracks cross. The two-person crew set up to six scan targets along the track section for point-cloud registration control and scanned the entire track in five days, including surrounding features such as overhead power lines. The scanning data were then processed and converted to a CAD drawing of the top of the rail for the client.

“The real benefit of using the ScanStation 2 for this project is that it allowed us to be off the track,” Beers says. “For railroads



**Above: A laser scan point cloud of the railroad crossing. Below: A screen shot of a 180-degree laser scan overlaid on a digital photo.**

in the U.S., there is a 25-foot safety corridor that you can't be within [if you don't have] additional safety training and railroad personnel. With the ScanStation we could always operate outside of that.

"Technically, we could have approached this with total station methods, but you would only collect discrete points about every 100 feet," he adds. "The problem with that is what if you miss something? What if something happens between two areas? What if the client wants to know if there are any power lines overhead or if there is any deterioration on the ballast? You won't have [those details] with a conventional survey. With scanning, you have all of it. It's a much more comprehensive and cost-effective method."

Since that initial project, Nolte field crews have been applying the scanner to a variety of projects and are actively pursuing new business. In November, Beers gave an HDS presentation to 500 Nolte employees. He demonstrated not only the positive business results from completed projects but also how much new business



**Todd Beers using a high-definition surveying system.**

potential they have with existing and new clients. For example, engineering clients can now see the data value of laser scan surveys, and survey clients can reap the data benefits for engineering design.

"With laser scanning, people really need to be able to understand it and work with it to truly appreciate it," Beers says. "I knew people would leave that presentation wondering how the technology could benefit them in their operations and how it would help Nolte differentiate itself from others. So now all of the sudden we have 500 HDS marketers. It's exciting." 🌐

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