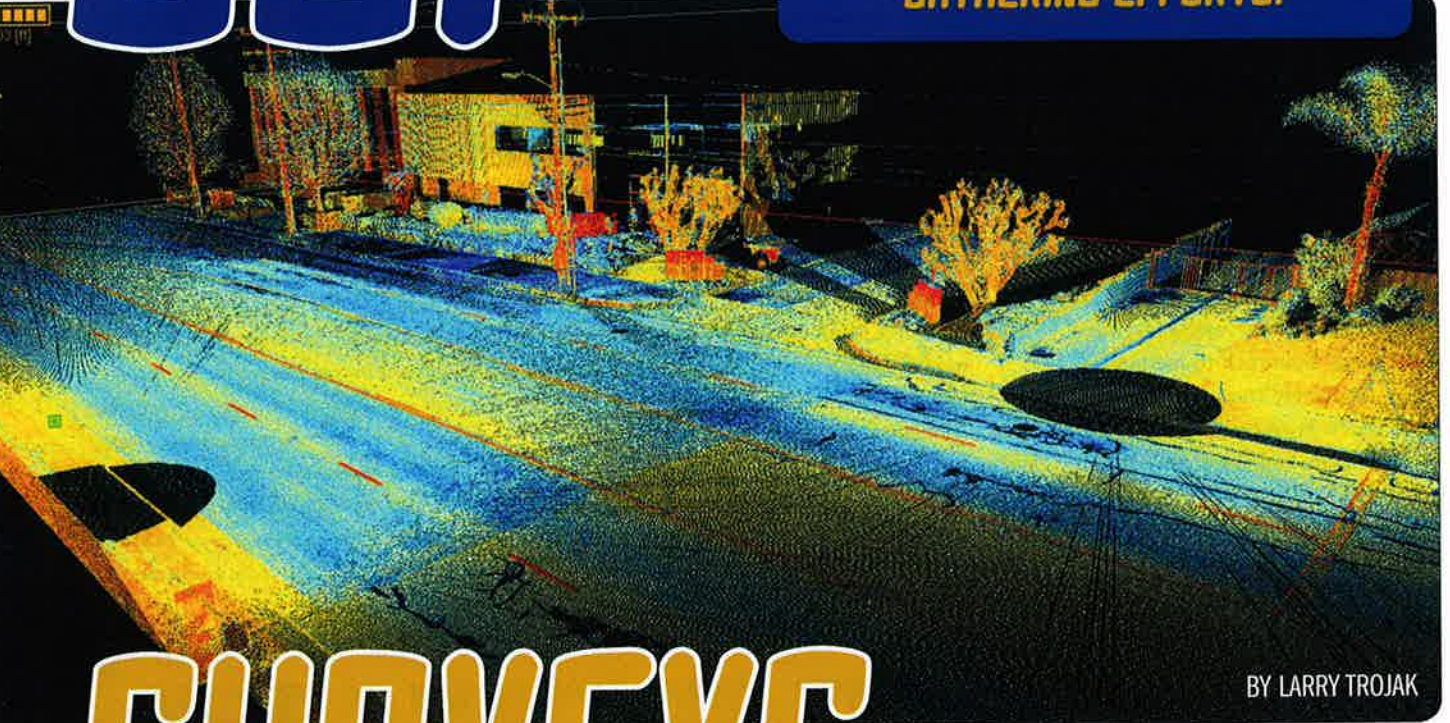


# CSI:

**A FORENSIC ENGINEERING FIRM TAPS NEW TECHNOLOGY TO ENHANCE INFORMATION-GATHERING EFFORTS.**



BY LARRY TROJAK

## SURVEYS

**W**hen your business is centered on accident reconstruction and other forensic tasks, having the greatest amount of detail at your disposal is key. For years, Momentum Engineering Corp. (MEC) relied on traditional surveying techniques (specifically, a total station and prism pole) to gather its critical on-scene data and then used that data to reconstruct a particular event or scenario. Looking to improve that effort by eliminating many of its limitations, the company recently added a GLS-1000 laser scanner from Topcon Positioning Systems to its toolbox. The result has been a streamlined information-gathering process, a reduction in the need for reshoots at the scene, and an unimagined level of detail that offers a host of additional benefits.

### **The Proof is in the Points**

Forensic engineering, the ability to reconstruct an accident or mechanical failure to determine its likely cause, is a practice that demands both a solid scientific

skill set and a great deal of experience. Though MEC has only had its doors open since 2008, the company's co-founders, Jon Landerville and Ed Fatzinger, each brought a wealth of experience with them when they founded the company. "Jon and I have been in accident reconstruction for over a decade now, most of which was spent working for other people," Fatzinger says. "We started Momentum Engineering, and today we employ about a dozen people at our Torrance, Calif., office. We specialize in accident reconstruction, animation, mechanical failure, re-enactments and visibility studies—essentially everything that could be considered forensic engineering."

For example, Fatzinger cites a generic case in which a car goes around a curve, loses control and goes down an embankment. "In a case like that, a client—whether it is a party trying to prove driver negligence or a law firm representing the driver trying to cite underlying issues that could have caused the crash—will hire us to survey the crash site in order to get an accurate representation of the curve, the cross-slope in the road, the embankment they rolled down, and so on. We go to the site and gather as much information as possible to accurately recreate the crash scene for our client to plead their case in court."

In the past, working such a case would have meant physically surveying the critical areas of the crash site. If that site included a busy intersection or a section of interstate highway, it was a time-consuming and, more importantly, risky effort. "There are actually a number of shortcomings of manual surveying," Fatzinger says. "First, you are limited to shooting things at grade; no overhead measurements can be easily taken. Second, use of a prism pole and total station often demands that two people be onsite, which for a company like ours is not the best use of resources. Third, we had to be selective with our shots yet still shoot enough points to get an accurate representation. Fourth, detailed info from a heavily trafficked site means

and the quality of work it generated and knew it was the way to go."

### Game Changer

Working through Lewis & Lewis, a southern California Topcon dealer, MEC took delivery of a Topcon GLS-1000 laser scanner in the fall of 2009—a move that has dramatically changed the way the firm does business. "There is, of course, the tremendous advantage of now being able to work in heavy traffic conditions," Fatzinger says. "We simply set up the scanner, let it do its thing, bring it back to the office and begin the post processing that will ultimately give us our scene for reconstruction."

Fatzinger's description of letting the GLS-1000 "do its thing" refers to the

a photograph. And with that scan, we can literally go in, find lane lines, skids, etc., and start drawing lines to get our scene trace. That, in turn, gives us a very accurate 3D representation of the roadway (or intersection or whatever we're shooting), which we can then model or put into our reconstruction program."

He adds that the Topcon unit also takes a photograph at the same time it is scanning. So, if the crew chooses to tag items at a site using a reflector or some other method, they can then zoom into that tag and there will be several points indicated on the scan from that tag. "We just pick one of those points, move on to the next tag and so on. It is a real plus for us in terms of speed and accuracy."



Laser scanning a crash site eliminates the need for a physical survey, which can be both risky and time consuming. In addition, because a laser gathers thousands of points per second, the resultant image (opposite) is a much more accurate representation of the site.

repeated shots with the prism pole. It was not uncommon for us to be at a site for the better part of a day dodging traffic; that's neither time-effective nor safe."

About a year ago, the firm worked with a civil engineering company that used laser scanning in its operations. According to Fatzinger, that experience was an eye-opener. "We saw the capabilities it offered

unit's ability to emit a laser beam that captures data at thousands of points per second at a range of 500 feet (150 meters) to a typical surface. With more-reflective surfaces, that range is extended to 1,100 feet (330 meters). The end result is a point cloud that can then be rendered into a 3D image using a secondary CAD program. "Our approach to working a scene now is far more different than it was in the past," he says. "The resultant scan from the GLS-1000 is so detailed that you might think you were looking at

### No Return Visits

Another shortcoming to the use of traditional surveying techniques in forensic engineering has been the need for revisits to the scene. Whether it is to shoot items that might have been overlooked on the initial visit or because the focus of the investigation has shifted, the need to gather additional information was costly in both time and resources.

"That has been essentially eliminated with the laser scanner," Fatzinger says. "Simply put, the scanner scans everything."

With the 3D model created, Momentum can easily change the point of view, allowing a different look at the scene and identifying possible obstructions.

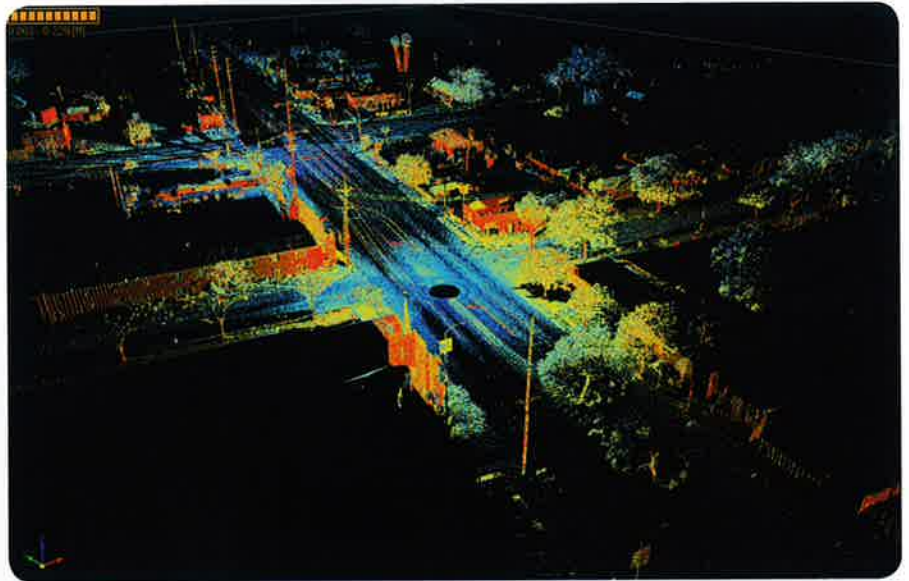
So in the past, if, during the course of our work, we realized that we missed a utility pole or the location of a guardrail, we would have to go back and reshoot those items. With the scanner, we know it's already in our data; we just have to pull up the file and redraw it. That's a really nice timesaver for us."

### Put it in Reverse

In addition to scanning and modeling the crash scene, MEC will also generally document and scan the vehicle involved if it is available. If that vehicle struck another car, guardrail, wall, etc., the scans can be used to determine the amount of crush that is present. "We will do a series of scans of the car to model it," Patzinger says. "We want to know how far, for example, the right wheel got driven back in the crash, and we can do that quickly by comparing it to the wheelbase of an exemplar we also have on

file. Once we have the car and the scene modeled, we bring it into a collision simulation program we use called PC-Crash, start moving cars around, colliding them and asking, What are the speeds? What was its position at impact, at rest? How did it get there? Was it steered there? Did it brake? etc. We are essentially reverse-engineering the accident."

He adds that scanning a car using the GLS-1000—shooting about a million points on each side—can be done in about 10 minutes. "By comparison, for a full 360° sweep of an intersection where I need detail throughout, I will increase the number of points, so a scan like that might take 30-35 minutes," he says. "In such a scenario, we generally establish



There are

# NO BOUNDARIES

FOR WHAT YOU'LL  
WILL FIND @ THE

AEC STORE

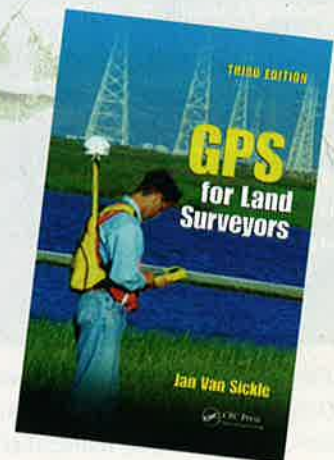
At  
AECStore.com  
you will find:

- Awards for Surveyors
- Gifts for Surveyors
- Technical & Non-Technical Books & DVDs for Surveyors
- Continuing Education Courses for Surveyors

### BESTSELLER

#### GPS for Land Surveyors, Third Edition // \$96.95

A perfect working guidebook for surveyors, mappers, geographers, planners, managers, GIS practitioners, civil engineers, environmental engineers, consultants, regulators, and students. From fundamental theory to practical application, the book covers GPS without excess pages of complicated math, yet it is not over simplified. This user-friendly manual gives you all the tools to understand and use GPS techniques in everyday practice. In a concise format, this book teaches the basics of GPS technology, common hardware, surveying methods, survey design, planning and observation, and much more!



The AEC Store offers over 70 Unique Surveying Products!

Visit [AECStore.com](http://AECStore.com) to view our full line of products. Call 248/244.1275 to place orders by phone.



**Laser scanning captures the curvature in the mountainous roadway of Angeles Crest Highway in California.**

three targets, set the scanner and take photos of the scene. In the photos we can see our targets, so we point to each one and scan it, and then we do our full scan. We then move the unit to another location in the intersection and repeat the process: taking the pics, selecting the targets and scanning again. Then it is very simple to lace the individual scans together in our ScanMaster program.”

**A Streamlined Process**

To further enhance onsite safety and efficiency, the GLS-1000 offers built-in wireless capability and USB 2.0 connectivity,

meaning MEC engineers can collect images and scanning data on a laptop from a nearby car. “Having this tool at our disposal has definitely given us a competitive edge,” Fatzinger says. “A lot of smaller firms probably can’t justify the capital investment but, because of the volume of work we do, the detail that we need and the results we’ve gotten, we definitely can.”

Because the new unit has streamlined the process that takes MEC from the initial crash site visit to the point where they have a working animation for use in court, Fatzinger says they have been able to take on additional business. And, he adds, the

support they’ve gotten with the scanner from both Topcon and Lewis & Lewis through the startup phase—and beyond—has been impressive. “Topcon has been excellent in working with us to tweak the GLS-1000 to our best advantage and we, in turn, have been happy to act as something of a beta test site for them as they grow the scanner side of their business. It’s really been a nice relationship that could develop further. We are opening an office in San Diego in the near term and are also looking at another business venture, so another scanner purchase just might be in our future.”

*Larry Trojak is owner and president of Trojak Communications, a Ham Lake, Minn.-based marketing communications company. For more information about MEC, visit [www.momentum-eng.com](http://www.momentum-eng.com). More information about the GLS-1000 can be found at [www.topconpositioning.com](http://www.topconpositioning.com).*



Search

Survey Markers

**“You have one of the most user friendly shopping sites on the web and you’re selling customized benchmarks! Site is top notch.”**

**David O’Brien, President  
SurvTech Solutions Inc.  
Tampa, Florida**



**Berntsen International Inc.**

[www.berntsen.com](http://www.berntsen.com)  
PO Box 8670  
Madison, WI 53708-8670  
(877) 265-2290

Open Weekdays 8am-4:30pm CST  
More information >>

**Berntsen International Inc. > Home**

Berntsen International, Inc. is a major manufacturer and supplier of all types of markers, including survey markers, survey monuments, utility markers, ... [www.Berntsen.com/](http://www.Berntsen.com/)

Monuments  
Rebar & Pipe Caps  
Concrete Markers  
Carsonite Posts

Reflective Targets  
Survey Nails & Washers  
Schonstedt Magnetic Locators  
Cobra Combi Gas Drill/Breaker

**Berntsen**  
Marking the Infrastructure of the World.  
[www.berntsen.com](http://www.berntsen.com)  
1-877-265-2290