

Site **Prep**

VOLUME 3 | ISSUE 5



Up and
Running with
**Machine
Control**

PLUS+ **Land
Clearing**
Equipment & Attachments

Up and Running with Machine Control

A dealer, contractor and engineer in New Hampshire team up to accurately—and quickly—build roads with GPS machine control.

AS TOLD TO KAREN CUMMINGS



The Team



Dealer:
Tim Edes,
owner/partner,
Eastpoint Lasers
(Hooksett, N.H.)



Contractor:
Andy LePage,
owner/foreman,
SUR Construction
(Rochester, N.H.)



Contractor:
Jeff Brownell,
supervisor,
SUR Construction
(Rochester, N.H.)



Engineer:
Kent Brown, PE,
owner/president,
Brown Engineering
LLC (Pittsfield, N.H.)

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dealer, a contractor and an engineer ... while this may sound like the start of a joke, these three recently came together as a team to complete two New Hampshire state road projects accurately, ahead of time and under budget. The combined efforts of Eastpoint Lasers, SUR Construction and Brown Engineering resulted in the successful application of GPS machine control to two road projects—one for \$16 million and another for \$17.2 million. Here's the story of how they got started—and how it's started to pay off.

TIM EDES (owner/partner of Eastpoint Lasers): Technology in the construction business has outpaced the skill sets of the workforce. Like anything else, if you just keep your head down and rely on just working harder than the other guy without looking at new products or new ways to be more productive in this competitive market, you could be going backwards. So, two years ago I invited Bill Creteau, one of the owners of the progressive New Hampshire contractor SUR Construction, to meet another contractor who had just purchased Carlson Grade on a bulldozer.

Contractors all read trade publications and SUR knew that GPS automation was the way to go. They had gotten to a point where they had way more work than they could effectively lay out. While they had already automated their estimating with Carlson Takeoff and were already using GPS for layout, they had yet to put anything on a piece of equipment.

Within minutes of seeing the machine-mounted components, the software and how easily the system mounted on a bulldozer, Bill Creteau said to me, "When we get the right project, we'll put Carlson on our bulldozers."

Well, the right project came along for SUR a year ago—a state project to widen and extend the Spaulding Turnpike, the main corridor heading north from Portsmouth on the east side of New Hampshire.

ANDY LePAGE (owner/foreman, SUR Construction): Spaulding Turnpike is being extended north with divided highway all the way through four more exits to exit 16, about six miles. It's all fully state-funded and -designed.

Prior to getting our first job at Exit 12 [on the turnpike] we had been using another estimating software, but Tim switched us over to Carlson Takeoff. We use it for all our estimating and earth quantities now.

The DOT, which works in MicroStation, provides 2D plans on paper, and gives us electronic files via disk. They all have to be converted to the 3D models that we can work on with Carlson machine control to get away from all of the staking and lessen the need to have a grade foreman with every task at all times. We're using Carlson Takeoff to make the models.

Our problem was that when we started working with it, we didn't have anyone on staff who could work in Takeoff, a CAD-

based software, and who knew CAD well enough to take the state's plans and do all the modeling for the project.

Tim recommended we work with Kent Brown [owner/president of Brown Engineering LLC] until we could get up to speed ourselves. So, we started working with Kent when doing the \$16 million first part of the project building a new ramp and widening the southbound side of the road.

We're now working on the second job that we've done at Exit 12, doing the northbound side of the road, where we used Carlson for the bidding, too. It's an amazing program—so much easier.

Our work now includes building new on and off ramps, widening this side of the road to two lanes, and preparing and putting in a pond on a 6-acre mitigation site. E.D. Swett, a subcontractor for SUR, is constructing the bridges on the project.



Egide "Frenchie" Boucher, age 68, an operator for SUR Construction, wishes he had had GPS and machine control years ago.



The necessity for staking is very limited for operators grading the on and off ramps to the Spaulding Turnpike.

KENT BROWN (*owner/president, Brown Engineering*): Contractors have traditionally looked to engineers and surveyors for assistance in layout. That help came in the form of benchmarks, base lines, data preparation and actual layout.

As equipment technology has improved, contractors have become more adept at providing more of those services in-house

Spaulding Turnpike

SUR Construction's contracts are part of the New Hampshire DOT's total project to widen and extend the Spaulding Turnpike, the main corridor heading north from Portsmouth on the east side of New Hampshire.

PROJECT 1: Build the new southbound barrel of the Spaulding Turnpike for 8,000 feet, including the southbound Exit 12 interchange.

Timeline: Scheduled for completion in August 2009.

Scope: Includes more than 230,000 cubic yards of excavation and 88,000 cubic yards of embankment. Also includes placing more than 76,000 cubic yards of select material (sand, bank-run gravel and stonebase).

PROJECT 2: Build the northbound barrel of the same area. Includes Exit 11, Exit 12 and 3,500 feet of road and utility work on Route 125.

Timeline: Scheduled for completion in June 2011.

Scope: Includes more than 81,000 cubic yards of excavation and more than 31,000 cubic yards of embankment. Also includes placing more than 80,000 cubic yards of select materials (sand, bank-run gravel and stonebase).

and their reliance on the engineer and surveyor has diminished. However, there is still a certain amount of interaction going on. At Brown Engineering, we are committed to continuing a construction service element of our business.

The latest tool contractors are using for layout is GPS. When a contractor doesn't have someone on staff who can do the modeling so that they really can utilize their GPS, Tim sends them to us.

As a team member with SUR, Eastpoint Lasers and Carlson Software, our role on their first project on this site was to provide a 3D digital model from electronic data and paper plans for use in the machine control equipment. The creation of that digital terrain model utilized our experience in all aspects of engineering design and surveying.

It is important to remember that virtually all projects are designed to be distributed as paper plans, not electronically—and certainly not as a 3D digital model. The value of using us instead of doing the model in-house is in our experience in the design and production of electronic plans. This experience helps us sort through the various information given to the contractor in a variety of formats. And then we can create a model with the information needed for construction in a format familiar to the contractor and acceptable for machine control. We worked with Carlson Takeoff software in order to offer competitive pricing to our customers. It has an ease of use that was second to none.

EDES: We think that SUR is the first in the state to use machine control on a state project. A lot of construction firms are using GPS, but they aren't using it to its maximum capabilities. It just makes sense to connect these companies that are switching over to GPS/machine control to an engineering firm that can build the models for them.

LEPAGE: Using Carlson Takeoff, we are able to raise our production levels and cut our grade foreman time in half. We put 3,000 feet of road together from subgrade to paving in six weeks—we probably saved about a third of the time it used to take us. We would have needed so much more manpower. Actually, what we really saved was Jeff [Brownell] and I being here 'til eight o'clock every night putting in stakes. Now that we've automated, staking is so limited. It's just so much less labor intensive for us—much less need for the supervisor's time.

We've also saved on materials as we're much better at controlling quantities. We used to have to make up mistakes with gravel, which is much more expensive.

And, the operators love it. Take "Frenchie" [Egide Boucher], who is 68 years old and didn't even know how to turn a computer on—he was scared to death of it. But when we had him use it, he picked it

up right away. Then when we put him on a temporary section that we hadn't modeled, he said, "What's this? Why can't I use my computer?" Now he says he wishes he had it a long time ago. We have him out working on the mitigation site with only stakes for the edge of the pond. No need for Jeff to go out there and keep restaking.

Another one of our younger operators [Phil Bruce] loved it after his first day. "I can get it within an inch," he told me. It makes our guys better operators.

We run the Carlson Grade system on two [Caterpillar] D5 dozers, a D7 dozer and an 824 rubber-tired pusher off a Trimble radio base mounted on our office. We added radio repeaters to extend the base range and now get coverage on three different jobs. The next piece of equipment we want to automate is our 143H grader.

JEFF BROWNELL (*supervisor, SUR*): Personally, once you get past being intimidated, I found it was relatively easy to pick up. It takes someone to focus on it, and a lot of companies aren't big enough to have someone to do this. I actually learned a lot watching the free Webinars on the Carlson Web site and am now doing all of the modeling for the second project.

We've saved at least 75 percent of the stakes. We used to have to set the stakes by calculator and field book, manually figuring where all the stakes would go. This had to be done every day. Now, we get it from the model.

It would have taken us a good two 40-hour weeks to figure the whole job, and I'd say we did it in less than half that time. I had the whole job figured, plus the model, in less than five days.

As soon as the operators see how it works, they love it. Other foremen who see it are amazed, too.

LEPAGE: We used to spend hours, weeks really, figuring those books, picking those grades from the paper plans. Now, the program just prints those out as Jeff builds the model. It's invaluable to have people, like Frenchie out at the pond, be able to keep working and not have to worry about stakes falling over.

Since we learned to use it last year, we're finding more uses for it and getting more creative. Anything we can use it for, we use it. Jeff even built a model to pick up our reclaim. By having a model and knowing the thickness of the pavement, we were able to remove the maximum amount of reclaim and not leave any behind. We reclaimed all the pavement on the job and reused it as stone base. Having the model to work from allowed us to have the use of all the material, which was a real cost savings.

BROWN: It's still a big step to go from working the old way to automating your work site—engineering firms can help construction companies make that step. While this equipment is available to everyone, it's important to remember that not every company has an employee capable of making the 3D working models. Engineering and surveying companies like ours can be a great resource in integrating GPS layout with machine control.



Mountains of paper plans are reduced to easy-to-follow on-screen models with the use of Carlson Takeoff and Carlson Grade software and GPS.

EDES: It's gratifying to see the difference the GPS-based equipment has made on this Spaulding Turnpike project for SUR. There's no question that it has greatly reduced the number of stakes needed, but it's also made their operators better, reduced grading time, eliminated rework and kept material overrun costs in check. But the addition of this technology wouldn't have done them any good without having Kent and Brown Engineering do the initial modeling for them.

When it comes to implementing technology, contractors don't have to feel like they're all alone out there. They can get help from service-oriented dealers or from an engineering firm. SUR was smart enough to know that they needed this help to get up and running. Contractors can choose what works best for them—subcontract it out for every project or do it in-house—but not utilizing the new technologies because you don't have someone on staff who can work with them is a mistake that, in this economy, no one should make. **SP**

Karen Cummings is the director of marketing and public relations for Carlson Software.