



Special Report

Georgia DOT evaluates Millimeter GPS™

Company making history advocating DOT change specs

"Trimmers are old technology - this is 2006!" said Gary Opolka, owner of Gary's Grading and Pipeline Co., Inc. (GGPC). "If we have to use a trimmer, we have to bring in a subcontracted crew. It takes a lot more time. On this job, time is a big factor."

Opolka is making history as a pioneer on the transportation frontier. GGPC is engaged in a test-study currently underway by the Georgia Department of Transportation. Gary's Grading is one of several contractors across the nation who are advocating major changes in DOT specs and policies.

The proposed changes will accommodate the use of GPS technology on DOT highway projects. Current specifications require specialized machines for subgrade preparation and labor intensive field engineering for grade control. Changes to allow the use of GPS equipment as an alternative to conventional equipment and methods will have a major impact on our nation's transportation industry. Highways will be



GGPC's Cat 163H motor grader finishes road base to a 1/4" tolerance with Millimeter GPS.

built faster, ride smoother, and cost less.

GGPC is based in Monroe, Georgia. It is currently working on a two-year GDOT contract for the widening of US 1/SR 4 from I-16 to Swainsboro. The project involves replacing 10 miles of old two-way roadway with a new four-lane highway. Vertical and horizontal

realignments will greatly improve the traffic flow along this heavily traveled route.

The project was started in January 2005. At that time GGPC crews were using conventional staking and hubbing methods to provide control for earthmoving and grading equipment.



The US 1/SR 4 widening project adds two lanes to a 9.7 mile section of highway.

Topcon's Millimeter GPS is exceeding the expectations of GGPC as well as the Georgia DOT engineers and inspectors who are closely watching the project.



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During the summer of 2005, Opolka made a decision to explore GPS technology to increase production, improve accuracy, and reduce costs.

GGPC purchased Topcon equipment from Roper Laser, based in Marietta, Georgia. The order included a 3D-GPS+ automatic system for a Cat 163H motor grader, a Legacy E long range base station, a HiPer+ rover, an FC-100 field computer, and Topcon's Millimeter GPS featuring LazerZone™ technology. Opolka saw an immediate need for Millimeter GPS on the US 1/SR 4 project - required subgrade tolerances are plus or minus 1/4 of an inch.

Working with Bill Roper, owner of Roper Laser, Opolka gathered information about Millimeter GPS and presented it to GDOT engineers. He requested that Topcon's system be allowed instead of the track-driven, stringline-controlled fine grading machine required by contract provisions. On three separate days, Opolka demonstrated the accuracy of Millimeter GPS to GDOT personnel by using stringlines to check grade over 400 to 500 foot long sections of graded roadway. The results were impressive.

"We didn't only do a stringline left to right like you would normally check grades," Opolka said. "We did an 'X' pattern, criss-crossed it, and did it every

way you could string it. Our grade was dead on the money no matter how we checked it." Subsequently, a contract amendment allowing the requested change was issued to GGPC. Further discussions with GDOT personnel at the site modified the requirements for grade checking. Hubs and stakes are now set 200 feet apart instead of 50 feet apart as specified.

By the second week of January 2006, GGPC had completed more than half of the project. Scheduled completion date is December 31, 2006. Other than wet weather that complicated crossing several creek bottoms, the project is going smoothly. Topcon's Millimeter GPS is exceeding the expectations of GGPC as well as the GDOT engineers and inspectors who are closely watching the project.

The advantages of Topcon's advanced technology can best be determined by actual performance.

Faster construction

Using Topcon's Millimeter GPS, Gary's Grading has been able to cut subgrade preparation time in half. "Without Millimeter GPS, we'd probably only be halfway to where we are right now," Mark Stancil, grading foreman, commented. "We've got two miles paved - we'd probably have just a mile without it. It doubles our productivity."

Construction is often delayed when areas are graded incorrectly and have to be reworked to meet specifications. Sometimes incorrect grades are caused by staking errors. Gary commented on this problem: "The stakes and bluetops are only as good as the guys driving the stakes and bluetops." Even if bluetops are set correctly, the machine operator must still rely on his expertise to carry the grade between them. This typically results in low spots between bluetops.

Topcon's 3D-GPS+ systems automatically control the cutting edge to match design

"Trimmers are old technology - this is 2006!"

- Gary Opolka



Gary Opolka, owner of GGPC, is making history with Millimeter GPS

grades. Accurate results are achieved the first time, and time consuming rework is eliminated. GPS+ technology provides access to GLONASS satellites in addition to GPS satellites. It virtually eliminates the downtime experienced with GPS-only systems and resultant delays in grading progress. Tracking more than one satellite constellation also improves accuracy - using more points to determine a position gives better results.

Smoother ride

Trimmers, or CMI machines, became popular in the 1960's because they were capable of fine grading wide areas in a single pass. These machines are guided



Topcon's 3D-GPS+ system enables GGPC to grade anywhere on the site without hubs and stakes.

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– Mark Stancil

Gary Opolka, Richard Marshall (GDOT construction liaison engineer), and Michael Lee (GDOT inspector)

by a stringline for grade control. Setting stringlines is subject to human error. When transitions between superelevated and standard crown sections occur, the machine operator must adjust the cross-slope manually. While CMI's were a great improvement in their day, they can't produce the results needed for today's intricately designed, high-speed roadways.

Topcon's 3D-GPS+ automatic system with Millimeter GPS continuously controls the cutting edge of grading equipment to within a few millimeters - well within the specified GDOT tolerances. The result is a smooth, continuous subgrade even through transitions.

Stancil gave an example of how Millimeter GPS is improving the smoothness of the road surface. "You can ride the other bypass - the next 10 miles north of here," he said. "It was graded with a CMI machine. It's just humps, and dips, and dives. You can ride the base course on this road - it doesn't even have a finished surface yet - and it's 10 times smoother than the old bypass up there."

Lower cost

Stancil explained that using GPS is saving money. "When we started the project," he said, "we had to have a stake and a hub every 50 feet throughout the job. Since we've changed to the Millimeter GPS, they're allowing us to

put a stake and a hub every 200 feet, just where they still have something to check it by. We've cut out over half of the stakes." Since GDOT is paying an independent consultant to inspect the project, many hours of grade checking will be saved.

Gaining confidence

Over the course of the past six months, Gary Opolka and his crews have gained confidence in Topcon's Millimeter GPS. GDOT personnel have experienced the performance of the system, and witnessed the accuracy and consistency that can be achieved.

Richard Marshall, construction liaison engineer, said that GDOT is at the very beginning of an evaluation of this new technology for future road construction contracts. The US 1/SR 4 project is the first pilot study in the state. A road project in north Georgia will also be evaluated. Feedback from field personnel about accuracy and operation will be directed to managers for further consideration.

Based on the current satisfactory performance of Topcon's Millimeter GPS system, it is likely that GPS-enabled graders will be allowed in place of trimmers on future GDOT projects. The initiative of one individual - Gary Opolka - will make a significant contribution to the future of highway construction in Georgia.

