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Smoothness Incentives Achieved

by Daniel C. Brown

For a whole host of reasons, Mike Viehdorfer really likes the stringless control system on his new GOMACO GHP-2800 concrete paver. He works for Manatts Inc., a diversified, family-owned construction company based in Brooklyn, Iowa, USA. Mike is the project manager for the U.S. Highway 71 project in northwest Iowa, his second major stringless paving project.

The 7 million € ($9 million) project involves repaving a four-lane divided highway for a 14 km (9 mi) stretch in Clay and Dickinson Counties. Manatts is placing a 15 cm (6 in) concrete overlay atop the milled asphalt pavement. In the same pass, the GOMACO GHP-2800 paver widens the roadway from 7 to 10 m (24 – 34 ft) with 20 cm (8 in) of concrete on each side.

Strong Incentives

A concrete paver is typically controlled by two stringlines set at precise locations on each side of the lane being paved. 3D machine control, on the other hand, saves contractors considerable time and money by eliminating all of the detailed survey, manual labor and associated transportation costs normally incurred on a highway or runway. Automated 3D control also eliminates the potential for human error

Seamless Integration and Smooth Sailing

With over 13 years of engineering and commercial collaboration between Leica Geosystems and GOMACO, since the first U.S. street was paved by the two partners using 3D controls back in 1999, it is perhaps not surprising how well-integrated the Leica Geosystems controls are on GOMACO equipment. On any GOMACO paver or trimmer, Leica PaveSmart 3D regulates the steering, grade, draft and crossfall of the paver with no need to retrofit complex hydraulics. The system guides the paver in relation to a digitized 3D model of the highway, running on the Leica Geosystems machine computer onboard the paver.

The GOMACO paver is equipped with two prisms, mounted above the machine, as tracking targets for the two Leica Geosystems robotic total stations. The two total stations then follow the movement of the two prisms on the paver and communicate the paver's precise location via radio link to the machine computer. This then computes the differences between the paver's actual location and the digital terrain model. Knowing those differences, the Leica Geosystems machine computer then instructs the GOMACO GHP-2800 to regulate the mold's steering and grade fully automatically.

Two additional total stations are set up, one ahead and one behind the GOMACO GHP-2800, to use in checking the new pavement. As the GOMACO GHP-2800 passes the next total station in front of it, the crew moves the rear station around in front, "leapfrogging" the total stations down the highway. The GOMACO GHP-2800 never needs to stop – a capability unique to Leica Geosystems' technology.

with stringline and its logistical restrictions around the paver.

For this project and others to follow, Manatts' new GOMACO GHP-2800 concrete paver is fitted with a Leica PaveSmart 3D stringless control system. "In the old days, when we were paving on stringline, if you got 50 % of the available smoothness incentive payments on a project, that was good," says Viehdorfer. "Now with our Leica Geosystems paving system, we expect to earn 70 to 80 % of the smoothness incentives on any given project."

And on Highway 71 the Manatts crew was bettering that – earning maximum incentive on about 95 % of the pavement placed. Naturally, Viehdorfer gives a great deal of the credit for smoothness to the quality of the GOMACO GHP-2800 paver and the experience of the crew. Manatts is running the Profile Index (PI) system for measuring smoothness, calculated as the sum of measurements taken at various stations along the surface. The Iowa Department of Transportation says it takes a PI of less than 35 cm of deviation per kilometer (22 in/mi) from a zero blanking band to earn the maximum smoothness incentive. On Highway 71, Manatts has been consistently running between 20 and 24 cm of deviation (13 – 19 in/mi).

Tim Tometich, machine control manager for Manatts, says his company benefits alot from the GOMACO-Leica Geosystems combination. "The value that we have is that GOMACO has built their computer to talk to the Leica PaveSmart 3D computer. The GOMACO computer was built with Leica Geosystems' stringless technology in mind, and the two computers talk really well to each other."

Benefitting the Bottom Line

We asked Manatts' Viehdorfer why he likes the stringless system. "I love the ease of access to the project," he says. "You don't have strings that people are stepping on and tripping over. I think one of the greatest benefits is that we get smoother pavements. When you can do cross sections every 1.5 m (5 ft) on a vertical curve compared to 7.5 m (25 ft) with stringline, you just end up with smoother pavement. And you get finer yield control."

Manatts has two GOMACO GHP-2800 pavers that run stringless with the Leica PaveSmart 3D system. "We also have a couple of GOMACO 9500 trimmers that we can run stringless," says Viehdorfer. "And we have two road mills that also operate with the Leica Geosystems machine control system for profile milling."

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A crew member checks elevations on the new concrete surface with a Leica Geosystems total station.

Manatts also used a PaveSmart 3D system to control the milling machine that re-profiled the asphalt ahead of the paver. Hence the grade and slope of the milled asphalt is set precisely, meaning that actual concrete quantities paved do not overrun the estimated measured quantities by very much at all. The goal is to get a yield close to 100%.

"Before we started stringless milling, our yields were always 110% and greater," says Viehdorfer. "Now that we are using stringless systems for both milling and paving, we are controlling the concrete yields to the 104 to 105% range." Naturally, this material cost saving drops directly through to Manatts' bottom-line, meaning they can bid confidently, and even more competitively, for paving projects in today's tough economic climate.

Plug-and-Play Systems for all Tasks

Leica PaveSmart 3D is fully "plug and play" with the asphalt milling process. "The Leica Geosystems paving system works really well on the milling machine," says Tometich. "We can control line and grade within a couple of hundredths – the same tolerances that we get with the paver. The only thing that you have to be cognizant of is your teeth wear on the mill. The teeth wear changes, so we change teeth more often. And we check grade often with the rover. But the system controls grade really well."

In fact, in 2010 Manatts built an entire project – 10 kilometers (6 miles) of Interstate 35 near Ellsworth, Iowa – with no stakes or stringline whatsoever. The company has Leica Geosystems GPS systems on two bulldozers and one motorgrader, so that equipment did the earthmoving. "Then we used the same GPS dozers and motorgrader to lay the base rock," says Tometich. "We used a stringless GOMACO 9500 to trim the base rock, and a GOMACO paver running on the Leica Geosystems machine control system to pave the Interstate." ■

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