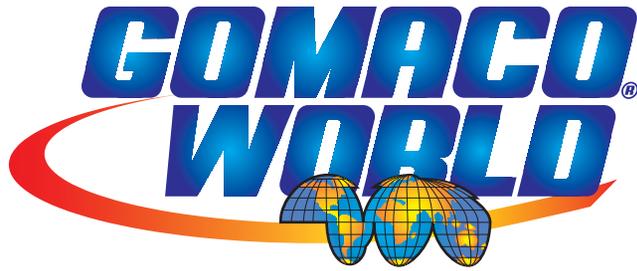


**3D Guidance
Tight Radii
Island Paving**



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G+® and 3D: Putting the *Fun* Back Into Curb and Gutter



Photos by Kelly Krueger CG-061435-D15

England Contracting is slipforming radii as tight as 2.5 feet (0.8 m) with their GOMACO GT-3600 curb and gutter machine with Topcon mmGPS system on a parking lot project in Murfreesboro, Tennessee.

England Contracting LLC, based out of Murray, Kentucky, specializes in curb and gutter. More specifically, they specialize in tight radius island paving and other parking lot challenges with their GOMACO GT-3600 curb and gutter machine.

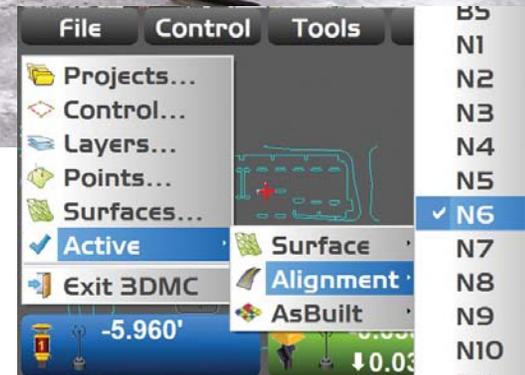
"The GT-3600 is the only thing I've ever run and I know pretty much everything there is to know about them and if it has a problem, I can troubleshoot it," Scott England, owner and GT-3600 operator for England Contracting, said. "I prefer an auger over a conveyor mainly because it will carry a little bit more concrete through a radius. We have probably 30 different

molds in our inventory. Some we've used one time and will never use again and some that I trade every three years because we wear them out."

In 2013, they added another new GT-3600 to their inventory and were introduced to the concept of 3D stringless paving for curb and gutter. Vinnie Miller, GOMACO's Southeast District Manager, pitched the concept to England. After researching the 3D systems, they went and watched another GOMACO GT-3600 at work in Tennessee with a Topcon mmGPS system. After watching it work, England was convinced he needed 3D on his projects, too.

He has worked closely with the GOMACO 3D controls group, Topcon, and Billy Price from Roper Laser, the local authorized Topcon dealer. England put his new system to work on a parking lot project recently in Murfreesboro, Tennessee. They had approximately 15,000 feet (4572 m) of curb and gutter to slipform, including 43 islands with 2.5 to four feet (0.8 to 1.2 m) radii. The curb and gutter profile was an 18 inch (457 mm) wide, six inch (152 mm) tall gutter with a six inch (152 mm) curb.

"We've had 20 years of looking at stringline on our pours and then there's none there," England said. "It was a big

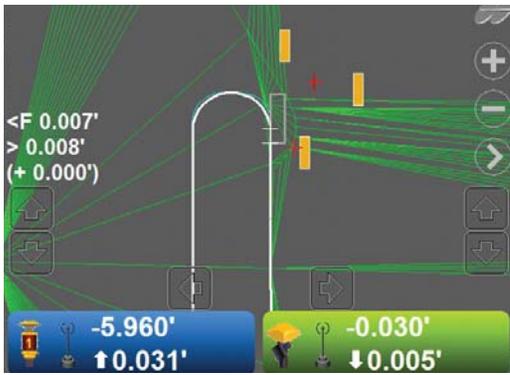


Each island on the project can be named, so it's just a matter of choosing the next island on the computer screen and traveling the GT-3600 to the location.

change for us."

On the first day with his new system, England slipformed 16 islands. Without the 3D system, he would have still been setting stringline with no concrete on the ground.

"We figure about 25 stakes per island and with 16 islands, that's 400 stakes that have to be set," England explained. "It would have



The GT-3600 starts slipforming another island and the Topcon computer shows the curb and gutter machine's correct location on the project map as it travels around the island.

probably taken us a day and one half to string, then a day of pouring, so 2.5 days for 16 islands. Instead, we did it all in one day. And at the end of the day, after we're done pouring, we didn't have any stakes or stringline to pick up. That, as much as anything, is going to save me a lot of overtime."

England's Topcon 3D equipment inventory now includes three mmGPS laser transmitters, a GPS base station, and a GPS rover used to check grade. On the GT-3600, hardware was added including an integrated GPS antenna and mmGPS receiver, a dual GPS receiver, a GPS antenna and a GX-60 control box which is Topcon's user interface using their 3DMC software.

The GPS antennas on the GT-3600 are used to track the machine's movement and calculate its position and heading. The mmGPS lasers are used to control elevation, and long and cross slope are controlled by GOMACO's G+ control system. The lasers are set up over an established survey point that is included in the control file to ensure the elevation accuracy of the curb and gutter.

"We use a rotating laser type of technology which actually puts out a 33 foot (10 m) band of vertical information,"

Brian Lingobardo, System Manager for Topcon, explained. "Steering is coming from GPS and then we're augmenting the vertical accuracy through the mmGPS laser. It's what gives us our two to three millimeter (0.08 to 0.12 in) accuracy, which is required for most concrete paving applications."

The model for the curb and gutter is built from the same 3D data used by the dirt contractor on the project. A 3D alignment for the GT-3600 is added to the model and resides in the GX-60 controller

which in turn sends the steering and grade corrections to the G+ controller. The G+ controller then keeps the machine on line and at the correct elevation during slipforming when traveling on uneven grade. The GX-60 communicates with the GOMACO G+ control system using G+ Connect™.

A map of the entire job site and each individual island can be viewed on the Topcon GX-60's display screen. The islands are named and it's simply a matter of choosing which island to slipform next in

the system software. As England watches the next island approach on the display screen and gets the GT-3600 near the designed location, he puts the curb and gutter machine into automatic and lets the 3D system take over from there.

England still has to carefully meter the concrete supply. He uses the auger on his GT-3600 to fill the hopper full, and then fills the auger as well, and it will carry him through the radius and halfway around the island.

"All in all, there's no comparison



CG-061430 D20

between 3D and stringline island paving,” England said. “The entering and exiting of the radius is smoother and straighter. I think that’s because you can’t set your string in as perfect of an arc as the GPS is telling it to turn.”

The GT-3600 with All-Track Steering is built for turning tight radii. The Topcon system uses algorithms for tight radii that simulates how steer sensors on stringline work and automatically adjust in and out of a radius. The software also

has definable parameters to help sharpen cornering, as well as transitions in the entry and exit of a radius to provide smoother results than stringline can offer. And with the project model loaded into the computer with the upcoming design elements, the 3D system is able to anticipate and adjust to the radius accordingly.

“All-Track Steering combined with our steering algorithms and the G+ control system working with our system

allows us to accomplish some really tight radii and curves,” Lingobardo said.

England and his new GT-3600 with G+ controls would go on to finish the entire project in less than five days... The 43 islands were slipformed in only 2.5 days. Another 1.5 days were spent slipforming the perimeter curb and gutter for the parking lot. On the fifth day, they were loading up and heading out to their next project.

“I know I’m not going to be able to

use the 3D system on every parking lot project, but I’m going to hate it when I have to go back to stringline,” England said. “I guarantee I’ll recommend it to anybody that asks me.

“I looked at the different 3D systems and bought the Topcon system mainly because of the price. From what I know now, I would probably choose Topcon no matter what. It’s actually put fun back into slipforming curb and gutter.”





England approaches the island, puts the GT-360 into automatic, lowers the trimmerhead, and the 3D system takes over.



The entire model of the project, showing each island, is illustrated in a screen shown above.



The GT-360's All-Track Steering, combined with Topcon's steering algorithms, allow for smooth entrances and exits and tighter cornering for tight radii work on parking lots.



On the first day with the new 3D guidance system, England Contracting and their GT-360 slipformed 16 of the project's 43 islands. The GOMACO GT-360 is England's curb and gutter machine of choice for slipforming tight radii.

"We figure about 25 stakes per island and with 16 islands, that's 400 stakes that have to be set," England explained. "It would have probably taken us a day and one half to string, then a day of pouring, so 2.5 days for 16 islands. Instead, we did it all in one day. And at the end of the day, after we're done pouring, we didn't have any stakes or stringline to pick up. That, as much as anything, is going to save me a lot of overtime."



The GT-360 completes another island, perfectly lining up again at the beginning.



A two-track GHP-2800 slipform paver with Topcon mmGPS 3D guidance system slipforms a new bypass around the city of Columbus, Nebraska.

Bypass Paving with 3D GPS

Gehring Construction Company was founded in 1949 by Walter Gehring as a construction company specializing in residential concrete flatwork. They branched out to the ready-mix supply business in the early 1970s.

They bought their first cylinder finisher from GOMACO in 1973 and started a relationship between the two family-owned companies that has lasted over four decades. As concrete paving technology has changed, Gehring has adapted and changed with it. Their most recent purchase has moved them into 3D stringless paving with Topcon's Millimeter GPS paver system.

"We've been using Topcon GPS systems, the 3DMC, on all of our dirt work equipment for the last few years," Kevin Gehring, Paving Superintendent for

Gehring Construction, said. "Because of that, we already had a surface model of this project and we already had control points, so we started looking at the Topcon paver system.

"We went to World of Concrete in Las Vegas and saw first hand exactly what we were talking about doing with the millimeter GPS receivers and the transmitters. It just seemed like it would be a good fit and hopefully cut down on some of the problems that you typically see with stringline. We think it will save us time and money, and also maintain the product or maybe even make it better with those lasers."

They put their Topcon system to the test on a bypass road around the city of Columbus, slipforming a 1.5 mile (2.4 km), four-lane section of the project. Gehring prepared the grade for the bypass with

their GOMACO 9500 trimmer using the 3D system. Then, they brought in their GOMACO paving train, which included a 9500 concrete placer, a two-track GHP-2800 slipform paver, and a T/C-600 texture/cure machine. The Topcon components used for trimming were outfitted on the paver.

"In addition to the added speed and accuracy, another advantage of going with Topcon mmGPS was the fact that both the trimmer and the paver essentially share one single system," Gehring said. "Once both machines are set up, we can use the system on the trimmer, trim the subgrade to tolerances within 1/100 of a foot, and then move it over to the paver. There, after about a five minute switchover, we can work off the same 3D model, set the offset to reflect the thickness of the pavement and get equally impressive results on the paving."

The concrete for the new bypass

was batched from two Gehring Ready-Mix plants, both within approximately two miles (3.2 km) of the paving site. The concrete was a standard state of Nebraska mix design with slump averaging around 1.5 inches (38 mm). Twenty ready-mix trucks supplied concrete to the paver. At the paving site the trucks, mostly two at one time, emptied their 11 cubic yard (8.4 m³) loads into the 9500's hopper in

Gehring Construction's GOMACO 9500 places concrete in front of their paver.



approximately 2.5 minutes. The 9500's 34.7 foot (10.6 m) long belt placed the concrete onto the grade and over dowel baskets set on grade at 16.5 foot (5 m) intervals.

Gehring's GHP-2800 paver slipformed the new bypass in two 28 foot (8.5 m) wide paving passes. The roadway is 10 inches (254 mm) thick with a four inch (102 mm) integral roll curb on one side of the paving. A front-mounted center bar inserter inserts tie bars every 33 inches (838 mm) for the longitudinal joint.

"We have an engineer come on the job site and give us some control points with a known elevation and a northing and an easting," Gehring explained. "Then I'll come in, set up my GPS base station and tie into their control points, make a control file, add that to my surface design, and then I know our elevations will match up with their print. We don't have to have the job staked out. We have some survey points where we set up the millimeter transmitters, but that's every 200 feet (61 m). When we set paving hubs, we'd normally have them set every 50 feet (15.2 m) on a straight and 25 feet (7.6 m) on a curve, so we've saved a lot of hubs.

"Our alignment runs off GPS coordinates and the millimeter laser transmitters are getting the tolerances we need to pave. We have two of the Topcon millimeter laser transmitters on the job site, but the machine is only using one at a time. It will control both receivers on the paver and the grade check rover. In fact, just like any laser, it will control any amount of equipment within range. We have our hubs 200 feet (61 m) apart, but because they're so close to the slab and the paver we are going past the next hub 100 feet (30.5 m) before switching, so really we're getting 300 feet (91.4 m) out of each transmitter. That seems to be about the maximum for concrete. Trimming is a little

different story and I don't think it would be uncommon to get 500 feet (152.4 m) out of a transmitter on a trimmer."

Gehring's switch from stringline to 3D paving has been a relatively easy one with just a few pointers learned along the way. Personnel from GOMACO's 3D team and Topcon were on hand to help with training and offer tips and suggestions.

"There's been a few things we needed to learn, all right," Gehring said. "You have to make sure where you set up your millimeter transmitter is on a surveyed point so those points need to have good elevations. That way, when you switch to the next one, you don't see any elevation difference.

"We've also learned there are some common factors that can create issues like wind especially. Through Topcon's recommendation, we learned to sandbag the tripod and that helped to stabilize them and get all the vibration out of those laser transmitters. But as far as the GPS itself, we haven't had any problems. Occasionally there are certain times of day when you might have less satellites than others and it will have to initialize, but that's usually just for 30 seconds at the most. The GPS part of it has been great."

Paving production on the project averaged approximately 2500 feet (762 m) per day. Behind the paver, a GOMACO T/C-600 texture/cure machine applied a two-pass white spray cure finish and longitudinal tine. With no stringline on the project, a new method of control had to be developed for the texture/cure machine.

"That's another thing we had to get new since there's no stringline to go off anymore," Gehring explained. "GOMACO came up with sonic sensors and they've worked perfect. Steering is referenced off one edge of the slab and grade is referenced on both sides. The sonic sensors bounce the sound beam right



A T/C-600 texture/cure machine applies a longitudinal tining with double white spray cure finish. Sonic sensors are used to guide the texture/cure machine on the 3D stringless project.



Sonic sensors placed in front and behind the track reference steering and grade for the T/C-600. According to Gehring, the system is a simple stringless solution, and has been working perfectly on the project.

off the existing slab and the T/C machine has been following it just fine. It's a pretty simple system."

Gehring Construction started in 3D paving with the hope the system would save them time and money on their projects. It was certainly true with their first project.

"In the three months we were on that job, mmGPS probably helped us knock a couple of weeks off the overall project length," Gehring added. "There is some savings in not having to go back and

correct for high or low spots. However, the real impact comes from not having to stake the job or put up stringline, and the fact all of our Topcon-equipped machines are working off the same base and surface model also improves efficiency and lowers paving costs. It's been working out really well for us."

Since this project, Gehring has continued to have success with their 3D paving on a variety of different projects, from subdivision work to highway concrete slipform paving. 



Photos by Jim Hayward CG-061327 D16

Loewenhardt Construction Ltd. and their new zero-clearance GT-3200 sidewalk paver is at work on a subdivision project in Regina, Saskatchewan, Canada, slipforming three different widths of sidewalk.

Sidewalk Success with a New Zero-Clearance Sidewalk Paver

On June 12, 2013, at 8:30 in the morning, the first concrete went through Loewenhardt Construction Ltd.'s new GOMACO GT-3200 sidewalk paver on a subdivision project in Regina, Saskatchewan, Canada. At the end of the day, the company had slipformed 175 meters (574 ft) of 1.5 meter (5 ft) wide sidewalk, switched molds on the paver, and then slipformed an additional 130 meters (426.5 ft) of 2.4 meter (8 ft) wide sidewalk. By six o'clock that night, they were washing down the new machine

and Jorg Loewenhardt, President of Loewenhardt Construction, had a big smile on his face.

"Jim Hayward, GOMACO's Western District Manager, was with us that day and he said to me, 'You look happy,'" Loewenhardt said. "I said yes. He asked if I had made money that day and after doing some quick calculations in my head, I again said yes. I actually turned a profit on the maiden voyage and that's unbelievable. There wasn't a bigger smile around than the one that was on my face."

The company had been looking for a high-production sidewalk paver, one that could work within the limited and tight-clearance working conditions on Canadian subdivisions. They had been handforming all of their stand-alone concrete sidewalk, but were falling further behind with their schedule and were having to sub out some of the work. Loewenhardt's business partner took a trip to World of Concrete last year and had the chance to look at all the options available for sidewalk paving. It was during that trip that the decision

was made to buy the GOMACO GT-3200 sidewalk paver.

"My partner phoned me from Las Vegas and said, 'This is the one, Jorg,'" Loewenhardt explained. "We placed the order and the rest is history."

The GT-3200 sidewalk paver has several features that make it the ideal machine. At only 2.6 meters (8.6 ft) wide, it's able to get into and maneuver through tight-clearance conditions. All-Track Steering (ATS) also offers enhanced steering and mobility. For grade



CG-071310 D18

As the GT-3200 sidewalk paver approaches the obstacle, the operator loads the sidewalk hopper with concrete.



CG-071310 D11

The paver keeps slipforming sidewalk as the ground person operates the conveyor belt and starts to fold it up.



CG-071310 D12

It only takes a matter of a few seconds to fold up the 4.3 m (14 ft) long conveyor belt.



CG-071310 D15

The hydraulic pivoting conveyor rotates 90 degrees from center to help clear obstacles.



CG-071310 D17

The GT-3200 sidewalk paver slipforms past the obstacle and then the ground person can begin to lower the conveyor.

preparation, the sidewalk paver can be equipped with an aggregate base mold with a spreader auger or a trimmerhead for fine grade trimming. Loewenhardt's is equipped with a 1.8 meter (6 ft) wide trimmerhead.

The zero-clearance sidewalk paver has a 508 millimeter (20 in) wide, 4.3 meter (14 ft) long, hydraulic pivoting and folding conveyor. The conveyor's extra-long reach allows ready-mix trucks to discharge from the street instead of having to drive over the existing curb. The conveyor can rotate 180 degrees to allow for easy loading of concrete into the hopper from either side of the machine.

Then, when the GT-3200 paves up to obstacles such as light poles and trees, the ground person can swing and fold the conveyor to slipform past the obstacle. The conveyor can also be raised without being folded to avoid smaller obstacles like fire hydrants and utility boxes.

"You couldn't ask for anything more ingenious than that conveyor belt," Loewenhardt said. "This way the concrete truck can stay on the road and doesn't sink out of sight into the mud. We've got light standards and fire hydrants in the way and if we didn't have that conveyor belt that swings back and forth and folds up out of the way, we'd be messing up

about 10 to 12 meters (32 to 39 ft) of walk that we'd have to come back and form by hand. We come up to an obstruction, fill up the hopper, move the conveyor belt, collapse it, move ahead past the obstruction, down goes the conveyor belt and we keep on going. It's wonderful."

The sidewalk mold has hydraulic adjustable sideplates to form the GOMACO edge, while a trailing stainless pan provides the smooth finish to the surface of the new sidewalk. The molds can be equipped with a bar inserter for placing transverse bars into the slab if that is a project specification. Loewenhardt ordered three different molds for their



CG-071310 D18

The conveyor belt is unfolded and the ready-mix truck, parked on the paved street, starts discharging concrete once again.

sidewalk paver, 1.2 meters (4 ft), 1.5 meters (5 ft) and 2.4 meters (8 ft) wide. All of the sidewalk is 127 millimeters (5 in) thick.

On their subdivision project in Regina, Loewenhardt has slipformed 1.8 kilometers (1.1 mi) of sidewalk so far, and soon they'll be using their 1.2 meter (4 ft) mold for the first time, simultaneously trimming and slipforming the sidewalk.

"We do our grade preparation ourselves, lay our own subbase and grade it," Loewenhardt explained. "We'd trim it with the GT-3200 and then go back and pour it, but now with the 1.2 and 1.5 meter (4 and 5 ft) sidewalk, we're going to trim and pour at the same time. My partner went to a GOMACO University class in Edmonton that our distributor Chieftain Equipment Inc. put on. He talked to a lot of operators there who said all they do is trim and pour those widths. We know we can't trim an awful lot, but 50 millimeters (2 in) would be no problem."

The concrete for their sidewalk is specified by the city of Regina. It's a 32 MPa (4641 psi) mix design with the slump not to exceed 40 millimeters (1.6 in). Each ready-mix truck carries a five cubic meter (6.5 yd³) load, with five trucks supplying the GT-3200 during the pours.

"I wish we had better concrete supply," Loewenhardt said. "When we were pouring 2.4 meters (8 ft) wide, we could unload a truck in about eight minutes and then we'd have a good 10 to 15 minute wait in between truck loads. That day we slipformed 40 cubic meters (52.3 yd³) of concrete, which was 130 meters (426.5 ft) of sidewalk in three hours. If we could have had two more trucks and less wait time in between, we could have doubled our production."

Even with slow concrete delivery, the GT-3200 sidewalk machine's production easily outperforms anything they could have produced handforming the sidewalk.



CG-061326 D6

The conveyor on the GT-3200 sidewalk paver can be hydraulically raised without being folded to avoid smaller obstacles such as fire hydrants.

"You couldn't ask for anything more ingenious than that conveyor belt," Loewenhardt said. "...We've got light standards and fire hydrants in the way and if we didn't have that conveyor belt that swings back and forth and folds up out of the way, we'd be messing up about 10 to 12 meters (32 to 39 ft) of walk that we'd have to come back and form by hand."

"It would have taken forever," Loewenhardt said. "Forever! You have to set your forms, put your base in, and then hand pour it. One hundred meters (328 ft) would probably take two days to form, prep and pour. The machine certainly does pay for itself and with a lot less work and wear and tear on the labor."

The subdivision work consists of several short pours, so efficiently moving

and transporting the sidewalk paver was a concern. The GT-3200 can be transported fully assembled, with the trimmerhead and mold attached.

"We just drive it right onto a flatbed trailer and away it goes," Loewenhardt said. "The conveyor belt folds up and swings to the back of the machine over the sidewalk mold, drive it onto the trailer, and off it goes to the next part of the subdivision.

"This machine works really good within the constraints that we have to pour sidewalk under. The sidewalk comes out really nice and there's minimal handwork to prep it for the actual finish. It can get so close to obstructions and then we just have to move the conveyor belt and pave right past. That's a huge time and labor savings for us." 

Working Smarter, Not Harder, On New York's Bridges

D.A. Collins Construction Co., Inc., based out of Wilton, New York, has just finished up work on a two year, 350,000 square foot (32,515 m²) bridge overlay project. The concrete overlay took place on bridges and interchange ramps along Interstate 787 between Exits 3B and 4 in the heart of Albany, New York. Traffic had to be maintained at all times for the 122,000 commuters who travel I-787 each day, and construction was carried out in tight-clearance conditions and under a tight completion deadline.

"It's a New York State Department of Transportation (NYSDOT) job that has to be done while we maintain traffic, very tight deadlines, very small windows to do the work in so we have a very rapid pace schedule," Ken Blizzard, Project Superintendent for D.A. Collins, explained. "We're using hydro-demolition to take four to 4.5 inches (102 to 114 mm) off the deck, remove all of the old rebar, and remove all of the full depth joints, basically four feet (1.2 m) wide by the width of the bridge. Once we get all of that done, we put our rebar back in and pour the new concrete overlay between five to 5.5 inches (127 to 140 mm) thick."

The company, who has always used GOMACO C-450s for their bridge deck work, added a new C-450 to their inventory at the start of the project two years ago. Last year, to help further accommodate the aggressive two-year completion schedule, D.A. Collins purchased another new C-450 for the I-787 project.

"We've been working with C-450s for a long time, so we're very comfortable with them," Blizzard said. "The new models are really nice. They have a little longer drum so it touches the concrete surface a little more. The new legs have the screw jack type legs versus the old hand crank and they work a little nicer."

"The new machines we run five feet (1.5 m) in the air so we can walk underneath the machine without having to try to walk around it. We're pouring 65 feet (19.8 m) in the air so we don't have much of an option to walk around it."

D.A. Collins is only allowed a six inch (152 mm) wide granite curb to place their rails on. The curb is butted up against a concrete safety barrier further minimizing their working area.

"It's very tight up there and there's



A concrete pump truck works below the bridge on Interstate 787, right next to the Hudson River, pumping the concrete with microsilica up to the GOMACO C-450 finisher.



CL-071309 D17

The C-450's undercarriage is equipped with a 36 inch (914 mm) lowering kit, dual augers, five foot (1.5 m) long externally-vibrating double cylinders, and double float pans with a double burlap drag. It also features a fogger system to keep the microsilica concrete from sticking to the finishing cylinders.

not a lot of room to work... not a lot of room to move," Blizzard said. "We literally have only six inches (152 mm) to run our machine on."

The main bridge decks on the project average five to six lanes wide with a 10 foot (3 m) shoulder. The on and off ramps to the bridge are roughly 25 feet (7.6 m) wide. One reason D.A. Collins likes the C-450 is because it can easily be converted to the different widths each bridge requires. Framework sections can be added or removed to reach the required width. Also, their C-450s are equipped with self-widening capability allowing up to 10 feet (3 m) of on-the-go adjustment.

With the C-450s raised higher than normal, they are equipped with a 36 inch

(914 mm) lowering kit so the undercarriage reaches the concrete. The carriages are equipped with dual augers to strike-off the concrete, five foot (1.5 m) long externally-vibrating double cylinders to compact and level the concrete, and double float pans with a double burlap drag to provide the final finish and texturing on the concrete.

During one phase of the project, D.A. Collins had just 76 days to remove and replace 90,000 square feet (8361 m²) of bridge deck. The clock started ticking as soon as the first barriers were placed on the roadway separating out the construction zone from the live traffic traveling by at speeds up to 70 miles per hour (113 km/hr).

The new C-450 at work on a 2200 foot (670.6 m) long bridge was set up to finish

three lanes of deck, 38 feet (11.6 m) wide in each finishing pass. A concrete pump truck worked from down below, at street level, placing concrete in front of the C-450. The concrete is a NYSDOT required Class DP mix design created for overlays and high-performance decks.

"The Class DP mix uses smaller stones for the thinner overlays," Blizzard explained. "It has a lot of microsilica in it and a lot of cement in it so it's very sticky concrete to work with. Since it is extremely sticky, it makes it very hard to finish and seal up."

To counteract the sticky issue, D.A. Collins asked the DOT if they could outfit their C-450s with an optional fogger system. A set of misters mounted to both sides of the undercarriage, ahead of the



CL-071305 D20

finishing cylinders, keeps the concrete from sticking to the cylinders and helps create a smooth, sealed finish.

"The foggers are absolutely awesome and I don't think we'll pour another bridge deck without them," Blizzard said. "Before them, the concrete liked to tear open and with the foggers, the concrete just seals right up. The foggers are the cat's meow."

The C-450's attachments and finishing capabilities have allowed D.A. Collins to reduce the number of laborers they have on each bridge deck pour. The foggers are just part of the equation. They also like the float pans and double burlap drag to help them achieve just the right finish that NYSDOT requires on their bridge decks.

"We're about as lean as you can get on a concrete crew and we have some automation things

we've hooked up to the C-450 and let it do the work," Blizzard explained. "We place the concrete, the C-450 knocks it off and finishes, and the double turf drag gets the right texture that the state likes to see. They're very happy with it and it eliminates a guy off our crew. It also gives you a nicer finishing job because you're not pushing and pulling manually. It's all mechanical and once you get it set up, it's very efficient and does a nice job."

On an overlay project, average production isn't measured by yardage, it's measured by the length of the pour.

"I'm pretty happy if we're pushing 60 feet (18.3 m) an hour with the machine," Blizzard said. "Sometimes we get a little faster, but if we're doing a 360 foot (109.7 m) pour for the day, from start to finish which is set up to clean up, we'll do it in about

seven to seven and one-half hours. Our guys are working smart up there, they aren't having to work too hard. The GOMACO C-450s make it easy."

Ten feet (3 m) behind the C-450, workers use a GOMACO Spanit[®] Work Bridge to place wet burlap and soaker hoses for a seven day wet cure. After curing is completed, saws are brought in for a longitudinal grooving. Once it's grooved, the whole deck is washed, cleaned, dried off, and a waterproof seal is applied before the newly overlaid lanes are opened to traffic again.

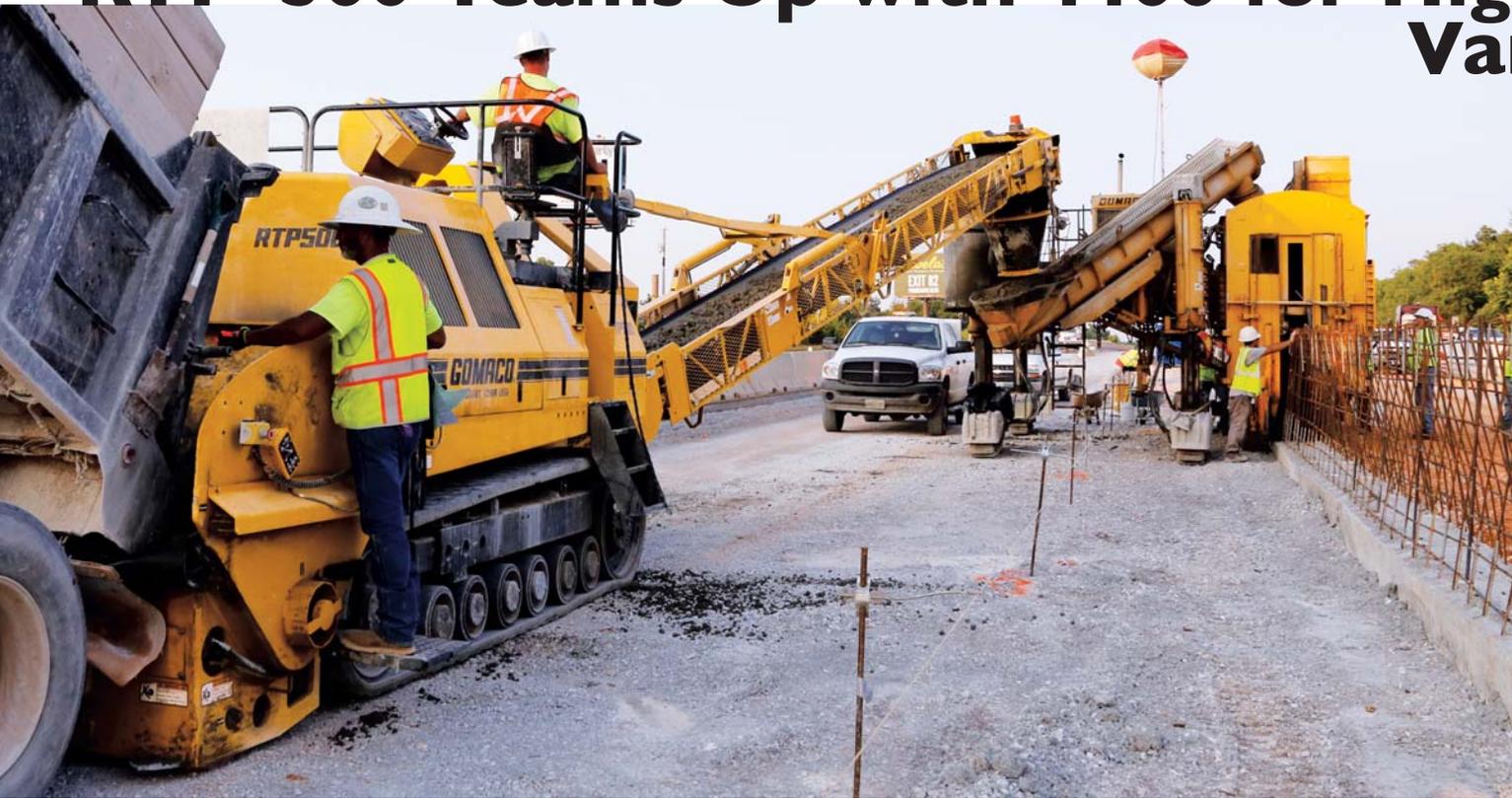
"We're going to be closing in on 350,000 square feet (32,515 m²) on this project and it has all gone well," Blizzard explained. "The C-450s are very versatile and that's why we use them." 





“The foggers are absolutely awesome and I don’t think we’ll pour another bridge deck without them,” Blizzard said. “Before them, the concrete liked to tear open and with the foggers, the concrete just seals right up. The foggers are the cat’s meow.”

RTP-500 Teams Up with 4400 for High-Production Variable Barrier



Photos by Kelly Krueger, CG-081401 D14

concrete barrier wall median type C and it varies anywhere from an inch (25 mm) all the way up to our tallest section having 56 inches (1422 mm) of variable height,” Blake Driskell, Vice President of Gerdan Slipforming, said. “When the wall is less than 78 inches (1981 mm) tall, we slip it in one pass. When it’s over 78 inches (1981 mm), we pour it in two passes. The bottom wall is 42 inches (1067 mm) tall and the top wall, in the second pass, is variable from 36 to 56 inches (914 to 1422 mm) tall. The interesting fact for the wall, from the bottom of the footing to the top of the tallest section is approximately 10.5 feet (3.2 m). It has presented us with several challenges.”

Challenges included dealing with the continuous steel cage reinforcing, perfecting a concrete mix design and slump for tall wall, a job-site with limited access within a heavily-traveled interstate, and learning how to slipform variable barrier.

The design of the steel cage only called for a #4 rebar, which wanted to rack. The cage wanted to push forward with the direction of machine travel, because of the weight and the pressure of the amount of concrete required for the tall wall. Gerdan found themselves adding #6 bar within the existing cage to strengthen and reinforce it. During the first two weeks of paving, the mix of the concrete was fine-tuned. They found the best concrete for the variable barrier was a modified Class SAE mix similar to what they use when slipping bridge parapet. They added more cement to the mix design and specified a concrete slump of 0.75 inches (19 mm).

“It was a challenge finding the right point for the mix and finding the right

Gerdan Slipforming is achieving high-production variable barrier with their GOMACO RTP-500 rubber-tracked placer and 4400 barrier machine. Production averaged 600 feet (183 m) per night slipforming 76 to 78 inch (1930 to 1981 mm) tall wall over steel-cage reinforcing.

Gerdan Slipforming was founded in 1990 by Gerry Driskell, president and CEO, and her husband Dan, project manager, with a used GOMACO Commander III and the dream of someday being barrier specialists in Missouri. Marketing was key back then, because slipformed barrier wall and parapet wasn’t a standard specification in the state. Project owners and engineers needed to be sold on the idea that it would succeed. The Driskells borrowed a video camera, filmed test pours with the Commander III in the yard at their company’s headquarters in Cape Girardeau, Missouri, and ultimately produced a product presentation video. They traveled around the state with a

13 inch (330 mm) television/VCR combo and met with every official, engineer, and owner they could to show them their presentation.

They succeeded and so has Gerdan Slipforming. Now, almost 25 years later, their company has grown to include multiple states, and an inventory of four GOMACO GT-3600s and a three-track Commander III. Just last year they added a new GOMACO 4400, a barrier paver for the barrier specialists.

Since its purchase, it has been transported around the states of Missouri and Arkansas slipforming parapet and barrier projects. It usually stays on a project for a day or two before being

transported again to the next location.

The I-49 project near Springdale, Arkansas, has been a different type of project for the company. They have to slipform five different profiles of concrete barrier wall along the 2.64 mile (4.2 km) stretch of reconstructed interstate. The project has also required Gerdan to slipform their first variable barrier. They knew going into the project that the variable barrier would require a learning curve and it would have to be learned quickly. The entire I-49 widening project must be completed in 99 working days or they will be fined \$27,000 liquidated damages for every day past the deadline.

“The variable height barrier is called

slump,” Driskell said. “Because it’s so tall, you hear that you have to pour it so dry. What we found, when we fell below a 0.75 inch (19 mm) slump, it would be so dry that it would want to push the rebar and create more racking. If it was too wet, then you obviously have the slumping factor.”

Early on with the project, the ready-mix supplier decided they would set up a central mix batch plant. When that was decided, the Gerdan team met with GOMACO personnel and Tom Held from Fabick CAT, their local GOMACO distributor, and the unanimous decision was made to use dump trucks and a concrete placer to feed the 4400. Gerdan chose to buy a new RTP-500 rubber-tracked placer after researching the used market and the rental possibilities.

“It was a big leap for us to add an RTP-500 because we’re not a large paving contractor and we’re very specialized in what we do,” Driskell explained. “Our background and our bread and butter is in bridge parapet, so we had this fear that we were going to buy an RTP and it would be sitting in our yard 10 months out of the year. I can tell you, since we’ve gotten it, it hasn’t been back to our yard and I don’t know when it will be back, either.”

The first stage of the project involved slipforming a concrete footing with a rebar stem wall. With the footing in place, the variable barrier production could begin.

Concrete is delivered to the site with dump trucks carrying nine cubic yard (6.9 m³) loads. The project only has four access points into the construction area, two at the far ends of the project and two in the center. Sometimes, trucks would have a long distance to back down to the RTP-500. Once there, they dump their load into the RTP’s large receiving hopper.

The RTP-500 provides a continuous flow of concrete into the 4400’s auger hopper. The auger’s four-way hydraulic



A 5000 pound (2268 kg) counterweight package is positioned on the right side of the paver.

positioning, and an added 24 inch (610 mm) long auger extension, allows it be placed for optimum concrete receiving and delivery into the large double-variable barrier mold.

Gerdan runs the stringline underneath their 4400, between the four tracks. They have equipped their barrier paver with a 5000 pound (2268 kg) counterweight to offset the size of the double variable barrier mold. They have also positioned two smaller counterweights over the right-side tracks.

Behind the 4400, a broom finish is applied to the new wall followed by a white spray cure. Control joints are placed at 30 feet (9.1 m) spacings and expansion joints are saw cut every 120 feet (36.6 m) after the concrete cures.

Together, the 4400 with the RTP-500 out in front have created some impressive production figures along Arkansas’ I-49. Slipping 76 to 78 inch (1930 to 1981 mm) tall wall, production averaged 600 feet (183 m) per night. It’s the 4.5 to five foot (1.4 to 1.5 m) tall wall, though, where Gerdan really hit their production stride. On their best night, they slipformed 1309 feet (399 m), and in two consecutive night pours, they produced a total 2535 feet (773 m) of the variable wall.

“This project has been a challenge, but it’s also been a lot of fun,” Driskell said. “I think the key for success has been perseverance while swallowing a little bit of pride and asking for advice. We sought a lot of counsel and invited other contractors to view our job site, concrete mix design, machine set up, and more. I know this is going to sound like a quote just for the magazine, but I’m serious. The paving community and how much they were willing to help us out is just amazing.”

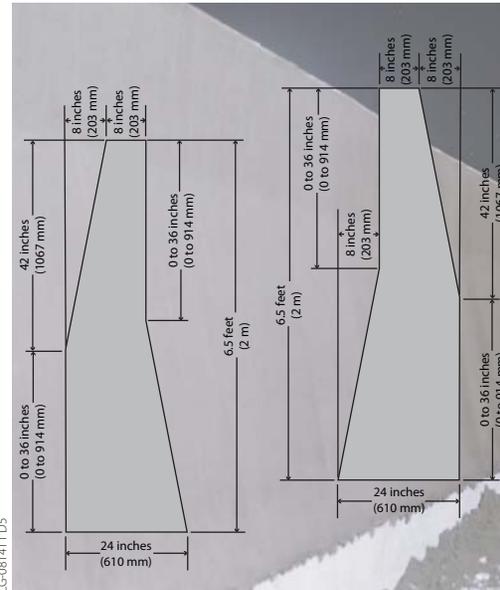
“The 4400 has handled the mold and it’s done the job,” Driskell said. “We’ve had that machine for one and one half years now and have put some serious hours on it. It has been a very good paver to us. We’re also really happy with our RTP-500. I honestly do not believe this wall could be poured out of a ready-mix truck. The RTP is a production machine that allows for seamless paving and now that we’ve had one, there’s no way I’d let it go.”



The GOMACO barrier mold features a hopper that telescopes for hydraulic height adjustment.



All of the barrier was slipformed at night because of the challenge of dealing with heavy traffic on I-49.



The mold requires two cubic yards (1.5 m³) of concrete to fill, has 36 inches (914 mm) of variable height adjustment on each side and can reach a wall height as tall as 6.5 feet (2 m).





Paulsen Inc. is slipforming a half-width concrete overlay with their GOMACO two-track GP-2400 with Leica Geosystems 3D guidance system on the Darr Link near Cozad, Nebraska.

Photo by Kelly Krueger, HW-101 304 D16

Overlay Success on an Important Nebraska Link

Darr Link is an important little road connecting Interstate 80 with Highway 30 near Cozad, Nebraska. It was scheduled to receive a new concrete overlay as part of the larger reconstruction of 12.5 miles (20.1 km) of Highway 30. Darr Link's overlay was scheduled right in the middle of Nebraska's fall harvest and consideration had to be given to the farmers whose fields bordered Darr Link, as well as the daily traffic traveling between the two major highways.

Instead of paving Darr Link in one 25 foot (7.6 m) wide pass, it would be paved half-width, one lane at a time, while

allowing access to the fields for the farmers and other traffic. Paulsen Inc., based out of Cozad, is the contractor on the Highway 30 project, and they brought in their new GOMACO two-track GP-2400 paver with Leica Geosystems 3D guidance system for the half-width overlay.

"This was a project for the Nebraska Department of Roads, approximately 7800 feet (2377 m) long and 25 feet (7.6 m) wide," Dave Neill, Concrete Paving Assistant Manager for Paulsen, explained. "The road was existing asphalt and they wanted to update it to concrete for the longevity of it."

Five inches (127 mm) of the existing asphalt roadway was milled off, leaving two to three inches (51 to 76 mm) for a base. Then, Paulsen slipformed a new five inch (127 mm) thick concrete overlay on top of the milled and swept base. They had used their Leica Geosystems 3D guidance system before on the company's GOMACO GP-2600 paver, but this was the first time for the GP-2400 and its paving crew.

"Preparation is very important, especially with the surveyors," Neill said. "When we purchased the system, we hired two surveyors and they've been a real

advantage. Still, we were pretty cautious on our first pour with the stringless technology, but it's pretty straightforward. If you see the paver heading towards the ditch, you know something is wrong, shut it down. Thankfully, that didn't happen to us and once we started using the system we saw so many advantages.

"You don't have to set any stringline stakes, which takes a lot of time and labor. You don't have finishers hitting a stringline and that all makes a big difference. On this project, where we had to maintain traffic as we poured one lane at a time, the biggest advantage was we didn't need

the extra four feet (1.2 m) of offset for the stringline.”

The concrete for the project is supplied by two of Paulsen’s own ready-mix plants located in Cozad and Lexington. Fourteen to 16 ready-mix trucks supplied the GP-2400 paver, each carrying a 10 cubic yard (7.6 m³) load. The concrete is a state specified 47B mix design with slump averaging two inches (51 mm).

“A reading from 56 to 68 earns 102 percent bonus and 43 to 56 earns 104 percent bonus. We averaged a 63 with our incentive close to 103 percent, which we felt was really good dealing with the IRI and that many joints in the pavement.”

“We run our concrete a little wetter than a lot of people just for the fact of workability,” Neill said. “I just feel that it lets the vibrators do their work a lot easier and you get better consolidation and a better finish behind the paver.”

Paving production on the overlay averaged around 5000 feet (1524 m) per day with very little finishing work done behind the paver. They use five Leica

total stations, set up at 300 foot (91.4 m) intervals, on their paving projects. They feel the extra total stations help them achieve a higher production rate. The two company surveyors set up and monitor the 3D guidance system and total stations throughout the day’s pour and are also in charge of the leapfrogging process with the total stations.

Paulsen uses a Spanit® work bridge

outfitted with a cure pump and spray bar to apply a burlap drag finish and white spray cure. They also modified their GOMACO PS-30 placer/spreader to apply the longitudinal tining on the new overlay.

“We revamped our PS-30, took the spreader head off and hung a tining broom on it,” Neill said. “We’re still steering it with the sensors, but instead of running them outside underneath where you’d normally have the string, we reversed and dropped them down. The steering sensor is running along the edge of the slab to keep everything straight and we’re running the grade sensors off the top of the slab. It’s doing a really good job for us.”

The Nebraska Department of Roads requires longitudinal and transverse joints be saw cut into the new roadway every six feet (1.8 m). The Department also uses the IRI (International Roughness Index) to measure the smoothness of their new concrete roads.

“We need a reading from 68 to 93 for 100 percent pay, and anything above that they start taking a deduct,” Neill explained. “A reading from 56 to 68 earns 102 percent bonus and 43 to 56 earns 104 percent bonus. We averaged a 63 with our incentive close to 103 percent, which we felt was really good dealing with the IRI and that many joints in the pavement.”

The company credits good preparation and consistency of the concrete mix as the key to their smooth ride results. Overall, Paulsen is very pleased with their new two-track GP-2400 paver and Leica 3D guidance system.

“I’ve been with Paulsen now for 40 years and I have to admit I’m pretty old school and didn’t know what to think about all of this new technology,” Neill said. “It’s all worked out well for us and we’re just realizing how much we can really do with it.” 



The existing asphalt surface of the road was milled off and swept clean before the GP-2400 could slipform the new five inch (127 mm) thick concrete overlay.



Photo by Robbie Pope HW-101343.D5

Paulsen credits a consistent concrete mix with good project preparation for smooth rideability results.



Photo by Robbie Pope HW-101345.D14

A GOMACO Spanit work bridge applies the burlap drag and white spray cure while a modified PS-30 applies the longitudinal tining to the new overlay.

GT-3600: The Machine of Choice for Two New Contractors in Belgium



Photo by Johan DeRaes CG-051302 D9

Aannemingen Sico BVBA is a Belgian contractor new to slipforming and have added a new GT-3600 to their inventory for curb and gutter, sidewalk and other specialty applications.

Two new companies in Belgium are braving their country's struggling economy and starting concrete slipforming businesses. They both plan on specializing in curb and gutter and sidewalk/bike path and they both chose the GOMACO GT-3600 as their slipform paver to help launch their new businesses.

Aannemingen Sico BVBA is located in the small town of Hoogdele, and n.v. VAN HUELE gebrs. is located in Ostend on the coast of the North Sea. Ostend is also the home office for GOMACO's distributor, De Bruycker N.V., and being so close to a GOMACO distributor was one of the deciding factors for both contractors when they were making their decisions on which piece of equipment to purchase.

Aannemingen Sico BVBA specializes in curb and gutter and sidewalk

slipforming. And even though they're new to slipforming, they're not afraid of taking on specialty projects. The village of Watou, near Poperinge, was prone to flooding from a nearby creek. To solve the problem, the road next to the creek was raised and a concrete flood defense wall was slipformed on top of the newly raised road. Sico and their GT-3600 were hired to slipform the flood defense wall.

"The road next to the creek was raised 800 millimeters (31.5 in) to act as a flood wall," Thomas Cool, a co-owner of Sico, explained. "Then, we were hired to slipform a retaining wall on each side of the roadway for added defense. The wall is 500 millimeters (19.7 in) wide, 600 millimeters (23.6 in) tall, and each section of wall was 400 meters (1312 ft) long."

Cool isn't just a co-owner of the



Photo by Pieter Lambert CG-101204 D8

n.v. VAN HUELE gebrs. is also a new slipforming company in Belgium specializing in curb and gutter projects, along with sidewalk and cycle track up to three meters (9.8 ft) wide.

company, he's also the GT-3600's operator.

"This GT-3600 is our first machine and it has really helped with the start up of our new business," Cool explained. "It was easy to learn how to operate, and being able to operate in our Dutch language really helps."

The concrete for the flood retaining wall was a standard Belgian mix design with slump averaging 40 millimeters (1.6 in). It was delivered to site by ready-mix trucks carrying nine cubic meter (11.8 yd³) loads. Concrete delivery slowed slipforming production. Trucks one at a time had to back down the length of the existing roadway, which was only three meters (9.8 ft) wide, to reach the GT-3600.

Hand-finishing work was kept to a minimum behind the GT-3600, no joints were necessary in the flood wall and Sico

completed the special application in one day's time. Then, they loaded up the GT-3600 onto their low-bed trailer and transported it to the next job site.

"The GT-3600 is the correct size for our type of work and offers us all the necessary options," Ward Simoens, co-owner of Sico, said. "It was a good value for our money, it offers a solution to our projects at a good price, and it gives us the flexibility and ability to pour curbs, sidewalk, or cycle track."

n.v. VAN HUELE gebrs. is also a new concrete slipforming company specializing in public works projects and curb and gutter. They also have the capabilities of expanding into sidewalk and cycle track when projects become available.

"The GT-3600 model suits all of the paving requirements in Belgium and has



Photo by Johan Derhaes, CG-051302 D13

Sico slipformed the retaining wall for flood defense 500 millimeters (19.7 in) wide and 600 millimeters (23.6 in) tall using their new GOMACO GT-3600 curb and gutter machine.

the ability to pave three meter (9.8 ft) wide sidewalk and cycle track,” Xavier Van Huele, owner of n.v. VAN HUELE gebrs., said. “It’s easy to transport between our yard and job sites. Dealer support was also very important when we were choosing a machine to purchase, and De Bruycker is located just over the road. The experience we have had of dealer support has been excellent.”

VAN HUELE has been traveling with their GT-3600 slipforming a variety of curb and gutter profiles. On a project in Koksijde, on the northern coast of Belgium, they slipformed 1700 meters (5577 ft) of curb and gutter. The concrete was a standard C30/37 Belgian mix design with slump averaging

between 35 to 40 millimeters (1.4 to 1.6 in).

The GOMACO mold profile features a 100 millimeter (3.9 in) tall by 135 millimeter (5.3 in) wide curb on a 450 millimeter (17.7 in) wide by 200 millimeter (7.9 in) thick gutter. The curb and gutter mold is also equipped with a guillotine-style curb depressor for driveway cutouts. The depressor has a straight blade that enters the face of the curb while slipforming through driveways and helps eliminate wasted concrete.

Slipforming production for the new GT-3600 owners has averaged up to 700 meters (2297 ft) per day. Only two finishers work behind the machine to tidy

up around the outlets and driveway cutouts. Expansion joints are saw cut the following day after the pour at four meter (13.1 ft) intervals in the straight runs and three meter (9.8 ft) intervals on their radii.

VAN HUELE also purchased a sidewalk mold with their GT-3600 but have only used it so far on a test pour at their company headquarters. The sidewalk is three meters (9.8 ft) wide by 200 millimeters (7.9 in) thick and workers applied a stamped pattern into the surface. The company feels that owning the GT-3600 and being able to slipform both curb and gutter and sidewalk applications will ultimately benefit them as the Belgian economy recovers.

“The GT-3600 produces a high quality product and is capable of a high production rate,” Van Huele explained. “We are fairly new to slipform paving and the Belgian economy is not so good at the moment, but we will be ready when things start to pick up. Our slipforming experience so far will put us in a good position.”

VAN HUELE slipforms a unique profile with their GT-3600 on a project in Koksijde, Belgium.



Photo by Andy Lijham, CG-021308 D11

Two-Track GP-2600 Handles the Challenges of Municipality Paving



Wick's GOMACO GP-2600 paver is equipped with a 5000 series open front, auger forward mold and three 5400 series bar inserters. The bar inserters are loaded from the work bridge on the back of the paver and the bars are inserted in front of the mold. G+ control boxes manage the placement of the bars every 30 inches (762 mm) into the new city street.



Photos by Ric Moser, HW-101353 D18

HW-101353 D13

Wicks Construction Company in Decorah, Iowa, specializes in municipal projects. When it was time to replace their aging paver last year, they chose the GOMACO two-track GP-2600 with G+ controls because of its smaller size while maintaining the ability to pave a city street with integral curb in a single pass.

One of the projects they've completed with their new paver was 28 blocks of city street in Windom, Minnesota. The city of Windom, with an approximate population of 4600 citizens, did a complete removal and replacement of the 50-year-old sewer system and 30-year-old streets within those 28 blocks. In total, Wicks Construction slipformed 35,200 square yards (29,431 m²) of Portland cement concrete (PCC).

"This project was bid as an asphalt alternate, but the city chose concrete due to the fact that it was less maintenance and a longer life," David Clark, Project Manager for Wicks Construction, explained. "From there, it was slipform all the way. We had just purchased the GP-2600, so we moved it in and began the work."

Wicks Construction's GP-2600 is outfitted with a 5000 series open front, auger forward mold. A power transition adjuster (PTA) in the mold controls the crown, up to 4.5 inches (114 mm), in the city street. The paver is also equipped with three rear loading, front inserting 5400 series bar inserters. The bar inserters are loaded from the work bridge on the back of the paver, while

the bars are inserted in front of the mold.

The three 5400 series bar inserters placed a 36 inch (914 mm) long, #4 bar into the six or seven inch (152 or 178 mm) thick street. The diameter of the bars was 0.5 inches (13 mm). A G+ controller mounted to the rear of the paver by the bar boxes managed the bar placements at 30 inch (762 mm) consistent spacings.

It's been a long time since the company has bought a new paver, so the G+ control system was a big upgrade for them, but not one that their operator found challenging. In preparation for the new paver, Wicks Construction sent their operator to GOMACO University the past two winters, attending the pavers class in 2013 and the advanced pavers course in 2014.

"This is our first paver with a computer, so I don't have anything to compare the learning experience to, but I think it's great," Jack Kolka, Paver Operator for Wicks Construction, explained. "You don't need prior experience with it to learn how to use it. It's pretty easy to navigate through."

"I don't think I can name just one favorite feature on this paver. I like the split sideforms because you're able to get closer to the headers when you back up the following morning, the rear steer, the bar inserters, the GP-2600's quiet engine, and so many other things."

The concrete for the project was a 3A21 Minnesota Department of Transportation mix design with water

reducer added. Slump averaged two to 2.5 inches (51 to 64 mm). Ready-mix trucks delivered the concrete to the paving site and dumped on grade directly in front of the GP-2600 paver.

"We had over 150 box outs on that job, too, for manholes and intakes," Clark said. "We had to set them all on the fly because we had to maintain access to get the concrete trucks in there, too. It kept our guys busy."

"Even with a four foot (1.2 m) offset, there were still trees, utility poles and

fire hydrants to contend with," Larry Berg, Paving Superintendent for Wicks Construction, said. "Behind the paver we had to build the box outs for the manholes so we had some challenges to deal with, but overall, the GP-2600 performed great."

Wicks Construction's city street paving production averaged 90 cubic yards (68.8 m³) per hour, with their best production as high as 110 cubic yards (84.1 m³) per hour with consistent concrete delivery. Transverse joints in the

new city street were every nine feet (2.7 m) with longitudinal joints every 12 feet (3.7 m).

"From the first load we put through the GP-2600, the thing has built just excellent edges with no slump," Clark said. "All we have to do behind the paver is run a bull float and apply the burlap texture drag."

Wicks Construction has had their GP-2600 at work on other city street projects, both in Minnesota and Iowa. They are happy with the versatility of their

new two-track paver and the support they receive from GOMACO.

"For our type of work, the GP-2600 is just the most versatile piece of equipment," Clark said. "It handles the different widths we need in the different municipalities and builds the integral curb beautifully. Plus, the 24 hour support we get from GOMACO's service department and the training they provide through GOMACO University is just top notch."



Wick's paving crew had to deal with over 150 box outs for manholes and intakes as they slipformed the 28 blocks of city street in Windom, Minnesota.



An Innovative Solution at Montana's Colstrip Power Station



Photos courtesy of Matt Costello, CG-021228 D17

The ground near Colstrip, Montana, often shakes without causing alarm to the local residents. The ground movement is the result of dynamite blasts at Western Energy Company's Rosebud Mine, a 25,000 acre (10,117 ha) surface mine complex with three active pits. Almost all of the coal is supplied to the 2200 megawatt Colstrip Power Station, which is located close to the mine and was built to burn the Rosebud coal.

The Colstrip Steam Electric Station, operated by PPL Montana, produces enough electricity to supply approximately 1.5 million homes. The plant burns the coal to heat water into steam, which powers the turbine generator creating electricity. A large system of concrete drainage channels carry the excess water to a retention pond at the facility.

Total Asphalt Repair Inc., in Billings, Montana, won a contract that originally called for the handforming of nearly 5000 feet (1524 m) of drainage channel at the electric station. The profile called for a channel with a seven foot (2.1 m) wide and

Matt Costello met with Jim Hayward at GEC in Ida Grove, Iowa, to inspect the channel mold and to review final details of the project before delivery.



The water channel's large profile was designed to withstand ground movement caused by dynamite blasting from a nearby surface coal mine complex.



Three strands of rebar are inserted into each of the sidewalls through the front of the mold.

10 inch (254 mm) thick floor, and 40 inch (1016 mm) tall side walls. The channel has to be built strong enough to withstand the constant dynamite blasting and subsequent earth movement.

"When we first started on this project, we handformed 400 feet (122 m) of the channel which took six weeks to accomplish," Matt Costello, owner of Total Asphalt, said. "Then, one night I looked at my superintendent, Del Aparicio, and we were both exhausted from handforming all day, and I told him there has got to be an easier way to do this."

Their search for an easier way led them to the World of Concrete trade show in Las Vegas, Nevada, and into the GOMACO booth where they were introduced to Jim Hayward, GOMACO's Western District Manager.

"I've known the GOMACO name since way back," Costello said. "That's all I've heard is GOMACO. I know there are other brands out there, but when Jim Hayward gave us the service we needed, that cinched it right there. He spent a lot of time with myself and the engineer with the power plant making sure everything was just right."

Total Asphalt went about purchasing a reconditioned machine from Godbersen Equipment Company (GEC) and special channel mold even though slipform paving at the power plant was not yet approved. The only way to gain approval was to slipform a test section, allowing plant officials to see the slipform paver work and then test the results. The plant agreed to an approximately 250 foot

(76 m) long test run. The results would determine if Total Asphalt would be able to slipform the rest of the project, or go back to handforming.

The days leading up to the test pour were busy ones for Total Asphalt. Costello traveled to Ida Grove, Iowa, for a final inspection of his GT-6300 with channel mold attached. As that was accomplished, an 18 foot (5.5 m) wide trench was being excavated at the power plant to accommodate the GT-6300. The trench was dug as an extension of an existing channel. Then, the GT-6300 was moved into position and the test could begin.

"The feeling of butterflies in my stomach just kept building and building up to the day of the pour," Aparicio said. "Finally, the day of the pour arrived and it was good, and we knew the second day would only get better. And then we were able to breath again."

The company didn't conduct any test pours before taking the machine on site. They simply drove the GT-6300 into the trench, ordered the concrete, and started slipforming for the first time in the history of Total Asphalt Repair Inc. Hayward, from GOMACO, was on hand during the pour as well, to help with any potential issues.

"We were learning fast and hard," Costello said. "We had a bit of a learning curve with the slump of the concrete and getting the mix to feed out of the ready-mix trucks. We poured a 4000 psi (30 MPa) concrete, which is a six sack mud in Montana."

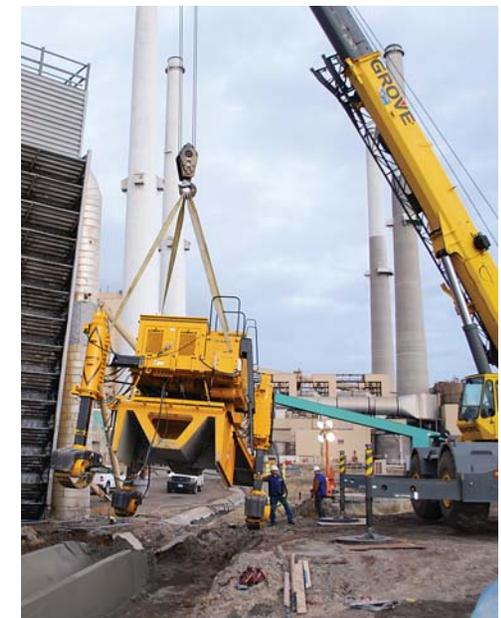
The water channel is slipformed over steel reinforcing, with three rebar inserted into the wall of the channel on each side of the profile. Behind the GT-6300, finishers work with hand floats and then apply a light broom finish to the surface.

"We just had to get past the fear of slipforming and using the machine for the first time," Costello explained. "After that,

it was really a rather simple process. The machine does the work for you and you just ride along. It is really impressive to watch this machine work and do as good of a job as it does."

Officials and engineers at the power plant were impressed, too. So impressed, that they are allowing Total Asphalt to slipform the rest of the water channel for the contract, as well as more channel projects in the future. Not only will they be busy at the power plant, but they are also considering other applications for their GT-6300.

"We're going to start changing from asphalt over to concrete and are looking into different applications," Costello said. "They've got a lot of bike trail around the city of Colstrip that would be great for slipforming. There's also a lot more canal work to be done and by investing in this machine and mold, we've put the company in a good position to acquire that work."



After the pour, the GT-6300 is lifted by crane out of the trench dug for the new water channel.

CG-021230D6

CG-021227D9

High-Volume Grade Preparation for Sidewalk Paving

High-volume sidewalk paving has become an increasingly popular application. GOMACO introduced the new GT-3200 sidewalk paver last year to fulfill contractors' requests for a zero-clearance sidewalk machine. (See the *GOMACO World* story on page 9.) This year, a new request was made for a sidewalk trimmer, because high-volume paving requires high-volume grade preparation. The result is the new GT-3400 trimmer for narrower, zero-clearance flat or monolithic sidewalk and curb and gutter.

The GT-3400 sidewalk trimmer is compact, transports at the width of the trimmerhead, and can easily fit between existing trees, utility poles and other obstacles in residential sidewalk paving. The three-track design features All-Track Steering for easy maneuverability between obstacles, getting on and off stringline, and loading and unloading the machine.

The GT-3400 sidewalk trimmer is capable of trimming standard and monolithic sidewalk profiles up to eight feet (2.4 m) wide. It also has a folding and swinging conveyor that allows the GT-3400 trimmer to operate in tight-clearance areas and avoid obstacles. Its

trimmerhead features a hydraulically-controlled front gate that can be raised to trim through windrowed material or lowered for standard trimming.

It has two conveyors to move the material. It has a 15 foot (4.6 m) long, 15 inch (381 mm) wide transfer conveyor. Its discharge belt is 19 feet (5.8 ft) long and 20 inches (508 mm) wide. The discharge belt can be hydraulically folded and then swung 90 degrees from center to avoid obstacles such as trees and utility poles. It can also discharge the trimmed material onto the ground or it has a high enough reach to unload into trucks.

The GT-3400 is operated by a wireless remote control allowing the operator the freedom to move around the job site while operating the machine.

GOMACO has also recently introduced the new Commander III trimmer, a high-production trimmer capable of widths up to 11 feet (3.4 m). The Commander III trimmer features the same framework as the curb and gutter model, but with a few modifications.

The right, front track has been switched to a pivoting front track to accommodate

zero trimmerhead clearance on both sides. The front tracks are parallel and the trimmerhead is undermounted. The vibrator hydraulics for paving applications have been removed and replaced with special hydraulic pumps for a bigger, closed-loop trimmer pump. It has been equipped with the most powerful trimmer ever to be put on a Commander III.

The powerful trimmerhead has 114 horsepower (85 kW) of the total engine power dedicated to it and is capable of trimming flat or monolithic sidewalk profiles up to 11 feet (3.4 m) wide. It features adjustable length teeth, so the contractor can make minor changes to monolithic profiles. The trimmerhead has three air shocks to keep it stable during the trimming process. Also, in the event it would hit a large rock or other object, the air shocks reduce some of the force of impact into the Commander III's main frame.

The Commander III trimmer has two conveyors to move the material through the machine and away from the trimmed grade. The transfer conveyor moves material from the trimmerhead on the front of the machine towards the discharging conveyor



A GT-3400 trimmer's long placing belt moves the trimmed material away from the machine and over the stringline. It is trimming 1.9 meters (6.2 ft) wide on this project in Canada.

at the back of the machine. Each belt is 11 feet (3.4 m) long and 20 inches (508 mm) wide. The discharge conveyor has seven feet (2.1 m) of sliding capabilities to place the material over the stringline, away from the trimming operation, and can also discharge to the center of the roadway.

The Commander III trimmer was built to be easy to transport. Its shipping width is only 11 feet (3.4 m) and it can be driven onto a trailer and transported as a single unit.

The trimming conversion can be retrofitted to higher horsepower existing new generation Commander IIIs with the G21 or newer GOMACO control systems.



The GT-3400 sidewalk trimmer is operated with a wireless remote control, features a folding and swinging conveyor, and a hydraulically-controlled front gate to trim through windrowed material.



The Commander III sidewalk trimmer features an undermounted trimmerhead capable of preparing grade for flat or monolithic sidewalk up to 11 feet (3.4 m) wide.

GOMACO® Snapshots



A four-track Commander III with a sidemounted mold slipforms tight-clearance sidewalk in Penrith, New South Wales, Australia.



The GOMACO Commander III is at work slipforming 52 miles (83.7 m) of barrier wall along the Moscow-St. Petersburg Motorway in Russia.



A four-track GP-2400 slipforms a county highway in Montgomery, Indiana, utilizing Trimble 3D guidance.



A GOMACO GT-3600 slipforms a six foot (1.8 m) wide, 10 inch (254 mm) thick swale curb in Edmonton, Alberta, Canada.



Old meets new on a 104 foot (31.7 m) wide skewed bridge deck project in Edmonton, Alberta, Canada, as an old style GOMACO C-450 finisher with overhead truss works side-by-side with a new C-450 that has transitional framework.



F.H. Paschen, S.N. Nielsen and Associates, LLC., is working on the I-90 westbound reconstruction and widening project in Marengo, Illinois, with their GOMACO GHP-2800 with IDBI. The four-track GHP-2800 is also equipped with a front-mounted center bar inserter, a rear-mounted side bar inserter, and an Auto-Float® attachment. On August 27, 2014, they achieved a record-setting day for their company. The details are listed below:

GHP-2800 paving width: 26 foot (7.9 m)

Two-lift pavement: 8.25 inch (210 mm) thick black rock ternary concrete and a top layer of three inch (76 mm) thick Illinois Department of Transportation Class PV concrete

Length of paving day: 14.5 hours

Total amount of concrete paved: 5505 linear feet (1678 m), 5370 cubic yards (4106 m³)

IDBI placed: 8418 dowel bars for 366 transverse joints

Side bar inserter placed: 2752 tie bars

Front-mounted bar inserter placed: 2202 tie bars

Prl on Zero-Blanking Band: 22.2 inches per mile (0.35 m/km)

IRI: 64.7 inches per mile (1 m/km)

14 day concrete strengths: 4496 psi for black rock and 6625 psi for the PV concrete

Dowel placement MIT scan results showed zero defects

Tie bar pull tests resulted in zero failures



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Commander III Slips a Variety of Wall on a Texas Interstate

Austin Bridge & Road Company in Irving, Texas, is currently at work on the Interstate 30 project in Dallas and Tarrant counties. The project includes replacing the single HOV lane with two new lanes that will be open in each direction. Austin Bridge & Road has their fleet of GOMACO equipment at work on the project, including their three-track Commander III, which is slipforming a variety of different barrier and rail profiles along the 18.3 mile (29.5 km) project.

"The largest wall profile on the I-30 project is a single slope barrier that is

42 inches (1067 mm) tall," Chris Smith, Operations Manager for Austin Bridge & Road, explained. "It has a base that is 24 inches (610 mm) wide and has a nine inch (229 mm) top cap. It's just one of several different profiles of the 213,000 linear feet (64,922 m) of wall and rail that we'll be slipforming on I-30."

The three-track Commander III with exclusive G+ controls was purchased specifically for the I-30 project.

"We have a GOMACO four-track GT-6300 that we do barrier wall with, but knew we needed to add a machine to help handle the volume of work on this project," Smith said. "We went with a three-track Commander III because of its mobility and the ease in which we can load and unload it for transport. On this project we may spend a week working in Dallas County, then pick up and load the Commander III for another section of wall in Tarrant County next week. We just drive it onto a lowboy trailer and head out."

The wall is slipformed over continuous steel reinforcing that has drainage slots on 12 foot (3.7 m) centers in the base of the wall. Styrofoam is inserted into the drains to keep concrete out during slipforming, and later has to be removed.

Austin Road & Bridge's wall production is limited to the amount of hours they're allowed to work. For example, on days when the Texas Rangers have a baseball game, their working hours are limited to accommodate the heavier traffic load of fans trying to reach the ballpark.

Production averages 100 linear feet (30.5 m) per hour on the single slope barrier, with up to 1500 linear feet (457 m) per day on larger production days. The concrete for the wall is a standard Texas Department of Transportation mix design with slump averaging between 1.5 to two inches (38 to 51 mm).

"Monitor the slump of the concrete closely, because if it's not right by being too wet or too dry, then your wall is not going to be right," Smith said. "On our projects, the dump man is the most important man on the job site because he monitors the concrete constantly to maintain the perfect slump. If you have a good slump, you'll have a good wall."

Austin Bridge & Road's work on the I-30 project began last fall and is scheduled for completion in spring 2015. The company specializes in heavy highway construction and bridge projects in the Dallas-Fort Worth metroplex.



Austin Bridge & Road is slipforming over 18 miles (29 km) of barrier wall on a Texas interstate project with their GOMACO three-track Commander III.



CG-101-425 DS

Photos courtesy of Chris Smith CG-101425 D3