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...an Engineering and Construction Feat!

"Edwards Claims Sharpie 500" stated a news release from the Bristol Motor Speedway. It went on to detail how Carl Edwards, in his #99 car, earned his first win ever at the Speedway during the Saturday night race on August 27. He took the lead on lap 371 and led the rest of the race.

"This is the biggest win of my career," said Edwards, who performed his usual celebratory backflip in front of the crowd of nearly 160,000 fans. "I think in the big picture this is a transition race. You've gone from an older style car at the track that's been the way it's been for however many years to a new style race track. It looks a lot the same, but sure isn't the same..."

The .533 mile (0.86 km) track at Bristol is definitely not the same track it was earlier this year. Speedway Motorsports Inc., owners of the track, made the decision to completely remove and replace the track and surrounding structures between the spring and fall races. All of the work would have to be completed in a 13 week time frame. Missing the deadline was simply unthinkable.

The Sharpie 500, the first race on the new surface, was already sold out. Approximately 160,000 fans had their tickets already in hand for the race, and going to Bristol is the ultimate experience for a NASCAR fan. Bristol is annually voted the #1 track by NASCAR fans and the Sharpie 500 is one of the Top 10 Hottest Tickets in all of American sports. According to ESPN.com, it rivals



Baker's crew poured under the lights at Bristol Motor Speedway. Just 13 weeks later, the new track was premiered in a series of NASCAR racing events.

such sporting events as golf's Masters, baseball's World Series, and football's Super Bowl.

But Bristol's track was failing. Its asphalt track was replaced in 1992 with post-tensioned concrete. Over the years, several design flaws with the post-tensioning and drainage system revealed themselves.

"It was just falling apart," Steve Swift, Construction Manager for Speedway Motorsports, explained. "We had numerous places where the track had failed through the years that we had patched. You can look at old pictures and see all of the patches. It was a constant battle just to repair. We debated whether to keep it concrete or go back to asphalt, and wanting something that would last the longest, we decided to go back with concrete."

They contacted Baker Concrete Construction Inc., based out of Monroe, Ohio, to help them build their new track and other structures at the Speedway.

Baker would be responsible for building 2900 feet (884 m) of perimeter crash wall, 3380 feet (1030 m) of interior crash wall, 4000 square yards (3344 m²) of seven inch (178 mm) apron paving, 13,000 square yards (10,869 m²) of four to six inch (102 to 152 mm) lean concrete base, and 13,000 square yards (10,869 m²) of seven inch (178 mm) continuously reinforced concrete pavement.

Demolition of the old track began the day after the spring race, the Food City 500, on March 26.

"We mobilized on April 9 and were given 13 weeks to complete our portion of the project," Jim Hosea,



GOMACO designed and built special brackets to hold the rail in place along the top wall of the track. Baker used 705 of the brackets during the paving process. Project Manager for Baker Concrete, said. "Our work involved the total reconstruction of the track, the perimeter crash walls, interior crash walls, pit row pavements, and pit row walls."

Long before Baker ever mobilized at the track, they were working with Speedway Motorsports and outside engineering firms designing Bristol's new track. Racing at Bristol, for a number of years, had been limited to single file. If a driver wanted to pass, they had to bump the car ahead of them out of the way. The owners wanted to see that changed.

"We talked to a lot of the drivers and got input from them, what they would like to see, and we took all that information to our engineers," Swift explained. "The old track's transitions were very short where they come out of the turns and come into the straight-away. There's a transition there that rolls the car over from being in the high bank to a relatively flat bank. It actually had a crown in the old track. That's why they ran one groove at Bristol for so long, because in the second groove the track rolled over and it would push them into the wall.

"This new track has just the

opposite. It's a parabolic shape so the higher they go, the faster they can go and keep up with the bottom car. The upper car can keep up with the lower car and overcome distance with speed."

The design looked good on paper, but it had its paving challenges. First off, they would be paving on slopes up to 30 degrees. The track's parabolic shape added another degree of difficulty. Smoothness of the final product was also another major concern. Baker Concrete chose GOMACO to manufacture their equipment and turned to the company's engineering department for some additional design help.

"Early on we selected GOMACO to furnish the paving equipment," Hosea said. "The engineering was tricky on the job and it required an awful lot of input from the machine manufacturer, as well as the track designer."

"Actually, the engineering department at GOMACO is one of the reasons we chose them for the job," Rob Ford, Project Coordinator for Baker Concrete, added. "They have a very strong engineering department and we knew they could handle it." GOMACO's answer was an SL-450

"It's unbelievable," Todd Bodine, the 2006 NASCAR Craftsman Truck Series Champion, said. "This is the way a track should be built... The old Bristol was classic and everybody either loved it or hated it. Now, I can't see how everybody can't love it. This is by far the best revamping of a track ever. No doubt about it. The people here knew how they wanted to make this place with the re-do and they went out and did it. This is the way it should be done."



In full super elevation, the leg on the SL-450 is actually inside the back face of the wall.



As the machine moves out of the full super, the leg moves away from the wall.

In the straight-aways it is as far away from the wall as possible. The design allows up to 14 inches (356 mm) of vertical and 18 inches (457 mm) of horizontal movement.



slope finisher with some added features. Two work bridges would follow behind the finisher for handwork, brooming and curing. All of the equipment would run on a rail system and the top section of rail was mounted to the new crash wall using specially designed brackets.

"GOMACO designed a special bracket that was able to accept 18 inches (457 mm) of horizontal movement and 14 inches (356 mm) of vertical movement to handle how the paver adjusted as it went around the track," Ford explained. "The key was to keep the end of the C-450's frame close to the wall to minimize the amount of hand finishing. There was a lot of intensive engineering involved in that process to get the machine in the right place everywhere on the track.'

At the bottom of the track, a footing was poured to mount the rail brackets on. The footing varied in its location relative to the track, both in height and horizontal distance. Each one of the rail cradle heads had to be shot in by a surveyor using a total station to guarantee their correct placement, and ultimately the correct grade on the track through all of the transitions.

"There was major surveying

A close-up of the auger spreading the lean concrete base material.

"When I heard they were digging it up, I'm like 'What? How can they make it better?' I was surprised when they said they were digging it up, but like everything Bruton Smith (Bristol's owner) does, it's first class and it's spectacular," David Starr, the 2002 NASCAR Craftsman Truck Series Most Popular Driver, said. "It's just incredible. It's a 12 (on a scale of 1 to 10) -- It's not even on that scale. When I walked in the gate over turn 3 it definitely had that 'Wow' effect to it."

involved because of the slope changes," Dennis Ernst, Service Manager for GOMACO, explained. "The rail height would change as the slope changed. All of those grade changes were shot into the rail by the surveyor. As the track widened through the transition, the rails would widen and adjust horizontally so we could keep a constant grade."

The key to accomplishing those changes easily were fully automated legs with slope sensors on the SL-450. The legs would automatically adjust to plumb, or a true vertical position, as the rails changed widths through the transitions. No manual

adjustments were necessary.

"We had fully automated legs so as you came out of the lower slope sections and you went into what they call full super, the legs automatically adjusted vertically," Ford said. "We didn't want to have to be doing that by hand."

Before each pour, the SL-450 was dry run to make sure the machine was hitting grade. The surveyor was on hand to shoot various points across the length of the pour to ensure an accurate final product.

The track was paved on top of a massive subbase. One of Bristol's old issues was substantial water and



The SL-450, with a seven inch (178 mm) lowering kit on the drum, finishes the track's lean concrete base. It was also equipped with an auger to give the surface a rougher finish.



SL-450 down seven inches (178 mm),

it would have shifted it sideways and

that was not acceptable," Ernst said.

"The two parabolics in each of the

lifts, the lean base and the concrete

To overcome this, we used a seven

inch (178 mm) lowering kit and set

everything to to the top surface of the

track, would not have matched then.

Bristol's new track has a parabolic shape with a six degree dip to allow side-by-side or two to three car wide racing.

drainage problems. Bristol's new subgrade started with the removal of 3.5 to four feet (1.1 to 1.2 m) of dirt all the way around the track. A geotech matting was laid on top of freshly cut dirt. Two feet (0.6 m) of four to five inch (102 to 127 mm) stone was placed on top of the matting. A six inch (152 mm) lift of 0.5 to 0.75 inch (13 to 19 mm) stone was placed on top of the larger rock. Three feet (0.9 m) of a ground shell material was then added for fill. The top layer was six inches (152 mm) of crushed stone with a 13 percent lime content.

The next step for the track was a new four inch (102 mm) thick lean concrete base. Baker's crew finished the lean base with their SL-450. The roller on the SL-450 was replaced with an auger to give the lean base a rougher finish. The rough surface would help create a better bonding surface when the concrete was poured on top of it. The machine was also equipped with a seven inch (178 mm) lowering kit on the drum.

lean base." A huge amount of steel reinforcing was placed on the new lean base to help form the final layer of the track, the continuously reinforced concrete (CRC). Longitudinal steel bars were

placed 4.5 inches (114 mm) apart at the top third of the track, five inches (127 mm) in the center third and 5.5 inches (140 mm) in the bottom third. Perpendicular bars were every 30 inches (762 mm). A total of 188 tons of reinforcing steel went into Bristol's new track.

The concrete was a standard mix design with a 4000 psi (276 MPa) strength. Slump averaged 1.75 to 2.5 inches (44 to 64 mm). Both the lean base (1200 psi (83 MPa)) and concrete

"They did a nice job of redoing it," Matt Kenseth, the 2003 Winston Cup Champion, said. "There are some differences, but they're subtle differences. I think it's nice. I think most drivers

liked it, the fans loved it, and it was hard to make it a lot better."

were mixed at a mobile batch plant set up just outside the entrance to Bristol Motor Speedway. Both mixes were placed with a telebelt placer because of the stiff slump of the mix designs.

Paving production on the CRC averaged 45 to 60 feet (13.7 to 18.3 m) per hour. The automatic advance feature on the SL-450 was set to advance eight inches (203 mm) on each pass.

"On the supers and the transitions into the supers, production was a little less because we were going from a 15 percent to a 50 percent or 25 percent to a 50 percent," Hosea said. "Once we got into the straight-aways, production would increase for us."

"Getting those transitions right was the key to this whole project," Ford continued. "There was a lot of complex geometry that was going on during this entire process."

Two work bridges followed behind the SL-450. The finishers worked from the first work bridge performing handwork operations and surface corrections. Finishers worked from the second bridge applying a light broom texture and spray cure.

Joints were saw cut into the track's front stretch and back stretch in the transverse direction every five feet (1.5 m). In the slopes, the

"If we had lowered the entire

transverse joint was every ten feet (3 m) on center. Two joints were cut longitudinally, one was 14.5 feet (4.4 m) from the top wall and the second was 14.5 feet (4.4 m) below the first one. Saw cutting the joints on the steep slopes proved an interesting challenge.

"We had to develop a saw that was capable of working on a 57 percent incline," Hosea said. "Most conventional saws, if they're gas powered, will run out of oil or run out of gas at that slope. We modified a Soff-Cut G2000 saw with a three-phase electric motor and built a frame that housed it, ran it off the wall, and accomplished all of our sawing on the superelevations with the saw rig."

Developing a smoothness specification for the new track surface was difficult. The track's new parabolic shape and the steep slope of the banks made profiling with a standard device almost impossible. Plus, just deciding on what the specification should be was hard to determine. Finally, the measure of acceptable smoothness was left up to the drivers and if they liked racing on the new track.

After 13 intense weeks of demolition and rebuilding, Bristol Motor Speedway was ready to unveil its new track. NASCAR legend and nine-time winner at the World's Fastest Half-Mile, Rusty Wallace, stopped by the track near the end of July to take a test drive. His verdict?

"On a scale of 1 to 10, what do I think?" Wallace said. "It's a 10. This place is great. I love the transition. The straight-aways are so smooth.

"It looks fantastic. I didn't really know what to expect before I got here. I was a little worried about how this was going to turn out, but I tell you, these guys did an unbelievable job. I've been through a lot of these (resurfacings) at different places. This ranks right up there at the top. I don't know how these (Nextel Cup) guys can't love this. It's so, so much better. Man, it's really good."

The week of August 20 would bring all of the NASCAR events to Bristol, the Craftsman Truck Series, the Busch Series and the Nextel Cup. As each race went by, the drivers had nothing but rave reviews for the new track.

"All I can say is the feedback we got from the drivers... they were all pumped up," Hosea said. "It was a new Bristol for them. They didn't have to bump people out of the way.



The SL-450's legs were fully automated. Slope sensors mounted on all four legs would tell them when to adjust, both horizontally and vertically, to automatically accommodate the many transitions and grade changes in Bristol's track. A stabilizer, mounted to the top of the SL-450, ran along the side of the wall and helped hold the machine on line through transitions.

"It's definitely way smoother than it was before," Ryan Newman, the 2003 NASCAR Winston Cup Driver of the Year, said. "The transitions are good and there's a little relaxation coming off the corners."



 ${
m The}$ SL-450 ran on a rail system that was mounted on a specially poured footing. Each rail cradle head was shot in by a surveyor to guarantee their correct placement.



Baker had to modify their concrete saw and build a special housing for it to be able to cut joints in the track's steep inclines.



A Baker Concrete employee waves the checkered flag as they finish up their last pour and win against the tight completion deadline.

They could run around them on the low groove, the medium groove or the high groove to pass traffic, as needed. They were all enthusiastic that we had given them something that is truly special."

"The drivers were very, very appreciative of the track and the way that it drove," Swift said. "Baker Concrete and GOMACO have given us an excellent track and we are more than happy with their product. All the teams that we had, they were the best of the best. We were lucky to have the best contractors and the best suppliers. We honestly feel that way, because if we would have had somebody else, it wouldn't have worked."

It was an outstanding job of planning and partnership to complete a challenging project in a short amount of time.

"Our guys put a lot of effort in and worked some long hours," Ford said. "Everybody had a goal and they were pushing for it. We would pave sometimes 18 hours straight and the guys would still be charging hard, trying to meet all their goals, not slowing down and not giving up."

"Our working relationship was outstanding with GOMACO," Hosea said. "It was a wonderful working relationship and things went very, very smooth."

Editor's Note: Congratulations to Baker Concrete and Speedway Motor Sports! They were recently awarded the prestigious Harold J. Halm Presidential Award from the American Concrete Pavement Association. The award is in recognition of their outstanding concrete work at Bristol Motor Speedway. Thank you to Bristol Motor Speedway for supplying the driver's quotes in their news releases and for sharing the photos of race day on the following page.



A view from a spotter's nest on top of Bristol Motor Speedway shows the massive size of the total project.



Concrete the way it Ought'a be!

A close-up of a sign that hung from the SL-450 during paving.



Single lane racing was the norm on the old Bristol track, but with new track in place, cars were driving two, sometimes even three lanes wide.



Carl Edwards backflips off his #99 car as he celebrates winning the Sharpie 500 at Bristol Motor Speedway, the first race on the new track.



Island Hopping with the GT-3600 on a Curb and Gutter Project in Wisconsin

Black Diamond Group, Inc., first started in the construction industry in 1959 in Oak Creek, Wisconsin. The company has always maintained the vision of being the easiest company to do business with. Their philosophy includes business with not only their customers, but also suppliers, subcontractors and equipment suppliers. When the company decided to create a concrete division in 2005, their first choice for a curb and gutter machine was GOMACO.

"We strive to live our vision every day," Mark Pichler, Concrete Division Manager for Black Diamond, said. "The construction industry is very challenging, especially in our climate and the seasonality of where we're located. You have to be on top of your game. We separate ourselves from the competition by being easy to do business with. GOMACO has the same values as Black Diamond and that's why we've picked them as a treasured partner in the relationship."

The company currently owns three GOMACO GT-3600s and slipforms a variety of applications with them. Their subdivisions and parking lot work include several different profiles for curb and gutter, sidewalk and barrier wall. They are currently at work at the Wheaton Franciscan Hospital in Franklin, Wisconsin. They have approximately 5000 feet (1524 m) of sidewalk and 25,000 feet (7620 m) of curb and gutter to slipform. Two of their GT-3600s, including their new 2007 model, are on the site slipforming the work.

Concrete for the project is supplied locally and has 395 pounds (179 kg) of cement and 170 pounds (77 kg) of fly ash in the mix design. Slump averages 1.25 to 1.5 inches (32 to 38 mm). The non-reinforced sidewalk on the project is five feet (1.5 m) wide and four inches (102 mm) thick. Joints are tooled in every five feet (1.5 m) with expansion joints every 100 feet (30 m). The GT-3600 is simultaneously trimming six feet (1.8 m) wide through four inches (102 mm) of crushed limestone base.

"On this particular job we were averaging 1000 feet (305 m) of slipped sidewalk production per day," Stan Maertz, Concrete Project Manager, said. "Our production just depends on the job-site conditions. On a good subdivision, we'll average around 2000 feet (610 m) per day."

The second GT-3600 on the project is slipforming the 18 inch (457 mm) wide curb and gutter. Municipal requirements for green space on developments are increasing each year in the state and requiring more islands on projects. This hospital



Black Diamond will slip an 18 inch (457 mm) curb and gutter around a two foot (0.6 m) radius.



10

Black Diamond currently owns three GT-3600 curb and gutter machines, and all of them are at work on this hospital project in Franklin, Wisconsin.

"We construct numerous parking lot projects yearly with a variety of different island profiles and complexities," Teglia explained. "Customers count on us for quality, timeliness and attention to detail. When performing these types of projects, we take pride in being their contractor of choice."

parking lot has approximately 50 islands with several two and three foot (0.6 and 0.9 m) radii in the design.

"We construct numerous parking lot projects yearly with a variety of different island profiles and complexities," Deb Teglia, President of Black Diamond, explained. "Customers count on us for quality, timeliness and attention to detail. When performing these types of projects, we take pride in being their contractor of choice."

Black Diamond isn't afraid of slipping the 18 inch (457 mm) curb and gutter around a two foot (0.6 m) radius with their GT-3600s. It's something they've become quite successful at, which is a handy asset to have on a project like this one.

"We just slide the right, front leg of our GT-3600 out and go with a 12 inch (305 mm) offset," Maertz explained. "We use stringline on the straight-aways and use fiberglass rods to set the radii..."

"We also trim a little deeper out in front so the mold doesn't catch as we go around the radius," Pichler continued to explain. "We lose a little bit of concrete on a tight radius, but that's not a big deal. We just send the machine right around and if we've got a good mix design, we have minimal tearing around a two foot (0.6 m) radius with an 18 inch (457 mm) curb and gutter."

Curb and gutter production averages 1600 feet (488 m) per day, even with all of the radius work. Finishers work behind the GT-3600 cutting in joints every 10 feet (3 m), with expansion joints every 300 feet (91 m), or one per island.

It's surprising to learn that the most challenging aspect of their project isn't the number of tight radii, but simply job-site logistics and tight working spaces.

"It's a fairly good-sized site, but in some of the smaller sections, we are dealing with 10 subcontractors in a quarter-acre area," Pichler said. "Keeping those guys out of our way and out of our curb and gutter is a challenge."

The hospital project is almost complete for Black Diamond and their GT-3600s. They'll be onto the next challenge soon and looking towards the future and what the next season of work will bring. The company is always searching for new innovative ideas and are currently looking into stringless paving.

"We want to be innovative," Pichler said. "We want to find ways to be easier to do business with and we envision stringless as being a way to do that. We like to be in the forefront of being prepared. Even though our customers aren't demanding stringless right now, we want to be ready for it when it becomes desired in the market place."

They have the right machines to accommodate their vision. Black Diamond's GT-3600s are as innovative as the company that owns them.

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Photos from the roof of the new hospital show the challenging parking lot design.



Black Diamond slipforms as much of the project as possible, even the tight radii with their GT-3600.



The parking lot's design includes approximately 50 islands with several two and three foot (0.6 and 0.9 m) radii.

The First End-Around is a Success

It is the first of its kind on an American airport. In fact, there is a major airport, and it's in Frankfurt, Germany. It's called an end-a completed on one at Hartsfield-Jackson International Airport in A

Taxiway Victor (V) is the nation's first Federal Aviation Administration (FAA) approved end-around taxiway. Before Taxiway V opened, the approximately 700 airplanes a day that landed on the airport's northern most runway, Runway 8L/26R, had to wait in line for clearance to taxi across the other active runway, Runway 8R/26L, to get to taxiways Echo (E) and Foxtrot (F) or to the terminal gates.

Now, when the planes land on Runway 8L/26R, they just travel to the end of the runway and turn onto the new 4200 feet (1280 m) long Taxiway V. The taxiway dips 30 feet (9.1 m) below the level of the adjacent runway before emerging at the gate area. The dip in the taxiway allows planes to keep taking off from the runway without any interruptions.

FAA studies have predicted a 30 percent improvement in overall runway efficiency because of the new end-around. Airlines are hoping to save an estimated \$26 to \$30 million per year, because their airplanes won't be sitting on the runway as long waiting to take off or waiting to taxi. It also means less delays for travelers and a safer traveling experience. Taxiway V eliminates the need for aircraft to cross an active runway.

Archer Western Contractors, based out of Atlanta, won the bid for the end-around at the airport. A tight company imposed deadline of 30 days or less to complete the 50,000 square yards (41,805 m²) of concrete paving was given for the project. The company mobilized their GOMACO paving equipment and went to work on the unique project.

Concrete was supplied by LaFarge, and Archer Western worked closely with them to develop a durable mix that could stand up while being slipformed and meet the project's required flexural strengths.

"We had some problems with the initial mix design and some of the super plasticizers and other exotic ingredients in it," Don Cowan, Paving Coordinator for Archer Western, said. "We worked together to simplify the mix, but still meet the project requirements. It had to meet flexural requirements of 650 psi (45 MPa) at 28 days. The final result was a wonderful mix design that stood up well and left a really nice finish."

Security on the airport created some delays in concrete delivery, as the trucks passed through a main check point. To compensate, more end-dump trucks were utilized, averaging 15 to 18 trucks on the project. The trucks carried nine cubic yard (6.9 m³) loads of concrete and dumped into a 9500 placer working in front of the GOMACO GHP-2800 two-track paver.

"For placing concrete on this project, we preferred

"Overall though, the project and the smoothness we achieved on it has passed everyone's expectations v flying colors," Cowan said. "I heard secondhand that pilots are having to put on their brakes as they go around the end-around taxiway because it's so smo



All the Way Around -

only one other like it in the world on a round, and work has just been Atlanta, Georgia.







using a 9500, because we don't have to worry about getting on the reinforcing steel or baskets or anything like that," Cowan said. "It also puts down concrete very fast and effectively. We've had production of 250 cubic yards (191 m³) an hour and that's very good, especially when you're considering traffic, working in a secured area, and other factors that can slow down production."

The end-around taxiway is 130 feet (39.6 m) wide and 4200 feet (1280 m) long. It was slipformed in four paving passes with the GHP-2800 paving 25 feet (7.6 m) wide, 20 inch (508 mm) thick jointed concrete with 26 inch (660 mm) thickened edges on the slab. A Commander III slipformed 15 feet (4.6 m) wide shoulders over continuous steel reinforcing to complete the new taxiway.

"Both of the pavers on the project were very well suited to the kind of work they did," Cowan said. "The GHP-2800 is the right machine to do dual-lane paving and it handled the thick concrete very well. We were working both pavers hard and they produced a beautiful slab."

A T/C-600 texture/cure machine followed behind the pavers applying a burlap drag and light broom finish.

"It was definitely an interesting project for us," Cowan said. "It was challenging in several aspects. We were pouring on a cement-treated base and we had to watch the cure times on that. It was a relatively cut up job and the sequencing of the work and dealing with the variable factors was challenging.

"Overall though, the project and the smoothness we achieved on it has passed everyone's expectations with flying colors. I heard secondhand that the pilots are having to put on their brakes as they go around the endaround taxiway because it's so smooth. The concrete guru, who is also the airport's owner, is extremely pleased with the project. If he's pleased, then we know we did a good job." It was a successful project for the company all the way around. They beat their company imposed deadline and finished the project in just 24 days. Concrete paving production averaged 1200 to 1500 cubic yards (917 to 1147 m³) per pour.

With work complete on the new taxiway, Archer Western started on another project at the airport. They're currently at work on a 20-phase apron replacement project and are using their brand new two-track GHP-2800 paver.

"The guys are loving our new paver and it's doing a really good job for us," Cowan said. "I'm very pleased with all of our GOMACO equipment and the support they provide is superior. I can call any number of people at GOMACO or their Georgia distributor, Tractor and Equipment Company, and get the answers I need. There has never been an issue that we haven't been able to resolve, and that means a lot to us in the field."



The new Taxiway V is 130 feet (39.6 m) wide, 4200 feet (1280 m) long and 20 inches (508 mm) thick.



Taxiway V will save airlines approximately 30 million per year, because airplanes won't have to wait to taxi or take off.



Paving an Important Development Project in India



The city of Indore is located almost in the center of the country of India. It is the largest metropolitan city within the state of Madhya Pradesh, and has a large corporate presence established there. Indore is the hub for the country's automobile, steel and alloy industries; agribusiness, especially in soybean processing; the garment industry; and is also in the middle of the Indian software services industry boom.

The Indore Development Authority (IDA) is constantly working to develop affordable housing within the city for the many workers in the various industries. IDA Scheme 140 is a new public works development project creating a large colony of lowcost housing plots. The new colony is an important project within the city, and all of the new roadways within and leading up to the project are being paved with concrete.

B.R. Goyal Infrastructure Pvt. Ltd., based out of Indore, won the contract for the concrete paving on the project. They needed a new concrete paver for the project and turned to GOMACO for help. They wanted a paver that could slipform passes varying in width from 3.5 meters (11.5 ft) up to seven meters (23 ft). The paver they chose was the GOMACO two-track GP-2600. It would be the first twotrack GP-2600 to operate in India.

"When we were looking to buy a machine, we looked at several factors," Rajendra Kumar Goyal, Director of B.R. Goyal, explained. "The most important things were the reliability of the product, including a good hydraulic system, a machine that is economical to operate, service backup, and the easy availability of spare parts."

Paving on IDA Scheme 140 began in May 2007. The new colony will feature a city approach road 5 km (3.1 mi) long and 14 meters (46 ft) or four lanes wide. It is being slipformed in four passes with the GP-2600 paving 3.5 meters (11.5 ft) wide.

New roads within the colony create an additional 5 km (3.1 mi) of concrete paving to the project. The width of the new roadways varies between five and seven meters (16.4 and 23 ft). Concrete depth on both of the projects varies between 200 and 330 mm (7.9 and 13 in).

They are paving on a 300 mm (11.8 in) thick granular subbase with dry lean concrete for the city approach road. Dowel baskets are placed on grade every 4.5 meters (14.8 ft). The colony's roadways feature a 200 mm (7.9 in) granular subbase with dry lean concrete, and baskets are placed



on grade every three meters (9.8 ft).

Indore is a city with a population of approximately 1.5 million people and the biggest obstacle to production is simply getting concrete to the site. Concrete trucks are constantly getting delayed in the city's heavy traffic. A continuous supply of concrete that is a consistent mix is the biggest challenge B.R. Goyal faces, but it's one that they're learning to overcome. Production is averaging 500 meters (1640 ft) per ten hour shift.

"The performance of our GP-2600 is good and we are getting a nice smooth finish," Goyal said. "We chose GOMACO because of their machines' good reputations and the company has good paving experience. Their equipment is economical and easy to operate and they provide good followup service after the sale.

"The GP-2600 has met our expectations and it is a quality machine. I am able to get good production and a quality product because of it."



A two-track GP-2600 slipforms a new roadway for an important housing colony in Indore, India.

Another High-Production Day for Shirley Concrete...

The Willow Oaks subdivision project in Shelby County, Alabama, had over 16,000 feet (4877 m) of 30 inch (762 mm) valley gutter. It would be a typical project for Shirley Concrete Company and their GOMACO Commander III.

Walter Ivory had been on site for three days in advance running the company's motor grader and getting the grade properly prepared. James Shirley and his stringline crew spent two days setting up 8000 feet (2438 m) of line each day with approximately 2500 pins, and finishing up the work on the third day, setting the remaining 400 feet (122 m). The company's threetrack Commander III was driven off its low-boy trailer and set on line. Slipforming was ready to begin on this typical project.

This typical project quickly became anything but that. Hilary Shirley, Vice President, and Wendell Shirley, President of Shirley Concrete, and their employees had something to prove within their company. You see, the company had four curb and gutter slipforming world records and they are the current holders of the record at 16,625 feet (5067 m) in 11 hours and 10 minutes. That record was set on October 11, 1986, with their GOMACO GT-6300.

The Willow Oaks project wouldn't give them a chance to break that record in actual feet, but it would be a

test to see if they could beat the time. It was a challenge for both the company and their machine.

"This is the first job that we've had in a long time with so many feet on it," Wendell Shirley explained. "We know that if you have a good machine, a good crew, and a good ready-mix man, you can accomplish a lot in a day. Every once in a while we just have to prove within the company what we can do and remind ourselves that we can still do it. Hilary put everything together and orchestrated the whole pour and he did an excellent job with it."

The project included seven cul de sacs, 26 radii that were 25 feet (7.6 m), and 42 inlets. Shirley Concrete used their Commander III, serial #900100-605, for the long pour. Concrete was supplied by Ready Mix USA.

By the time the day was finished, Shirley Concrete had slipformed 828 cubic yards (633 m³) and 16,357 linear feet (4986 m) of valley gutter in nine hours and 23 minutes. It's an astounding feat of planning, organization, skill and determination.

"All of the credit for this pour goes to Hilary, James our lineman, Robert Shirley our operator, and Steven Shirley my nephew," Wendell Shirley said. "Seven men, including myself, working on the pour that day each has over 35 years of experience with Shirley Concrete and have been

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on all of our record pours. It was just a combination of a good ready-mix company and our own good people.

"Basically we just did the same thing we do every day. It just happened that instead of two separate 8000 feet (2438 m) jobs, we had one

Wendell said, "I asked Robert Shirley, our machine operator, several different times during the pour, 'How fast are you running?' He said wide open! We were pouring 50 feet (15.2 m) per minute at different times on this job. Overall, we averaged 100 cubic yards (76.5 m³) per hour, which meant a truck every five minutes."



Shirley Concrete slipformed 16,357 linear feet (4986 m) of valley gutter in nine hours and 23 minutes.



Their Commander III slipformed 828 cubic yards (633 m³) of concrete during the pour.

16,000 foot (4877 m) job."

The pour started at 6 a.m. on a Thursday morning. Ready Mix USA had several trucks on site and Shirley's crew had them in position. It's one of the keys to their success... the proper staging and slumping of the trucks. Hilary's son and Wendell's nephew, Steven, was in charge of the ready-mix trucks that day.

"We had 14 ready-mix trucks on hand that day from Ready Mix USA. They wanted to make sure we didn't have to wait on any mix and we did not," Wendell said. "I asked Robert Shirley, our machine operator, several different times during the pour, 'How fast are you running?' He said wide open! We were pouring 50 feet (15.2 m) per minute at different times on this job. Overall, we averaged 100 cubic yards (76.5 m³) per hour, which meant a truck every five minutes."

Two men were working the chute position, getting trucks in and out, and also watching out for rocks. The site was filled with grapefruit-sized or larger rocks that had to be moved out of the way. Four finishers worked behind the machine applying a broom finish to the valley curb. Joints were tooled in every 10 feet (3 m).

Three laborers were in charge of setting headers at the 42 different inlets on the project. A crew led by Randy Booth goes into the project the following day to set the inlets and finish around them.



A Ready Mix USA truck feeds one of the 92 nine cubic yard (6.9 m³) loads of concrete onto the belt of Shirley's Commander III.

"The boxes are set low enough so the trimmerhead and mold don't catch on them," Wendell said. "Hilary goes in before the pour, removes the silt fence and lays a piece of plywood over the box to keep the dirt from getting in the inlet. It's what's so wonderful about this machine of ours. We just put it on the stringline, pour up to the box, sit down on the other side of the box, and keep on going down the line."

By 3:23 p.m. that afternoon, the day's pour was finished and the company had 16,357 feet (4986 m) of curb and gutter on the books. Fifteen of Shirley Concrete's men, including one on the grader, one on a backhoe, one checking line, a machine operator, two chute men, two checking slump and spotting the trucks, four finishers, three laborers setting headers at inlets, and Wendell's dog, Lucy, had completed the pour.

The figures associated with the day's pour are astounding. The concrete alone for the day consumed 1,531,800 pounds (694,824 kg) of stone, 1,126,080 pounds (510,790 kg) of sand, 298,000 pounds (135,173 kg) of cement, 121,520 pounds (55,121 kg) of fly ash, and 25,668 gallons (97,164 L) of water.

"Just think about that conveyor on the Commander III having to carry all of that up," Wendell said. "It makes me tired just to think about it!" The company has once

again proven what they can accomplish. The successful long pour has built up excitement within the company and with area developers. A record breaking project of 20,000 feet (6096 m) of curb and gutter is hopefully in the works for next year.

"We think we have a job next year with 20,000 feet (6096 m) on it so we can get a new record," Wendell said. "We've got a good crew, everybody knows their jobs, and we have a machine that isn't even broken in yet. We want to get a job big enough to see what the real potential of this machine is, because we haven't really had a chance to test it out yet. We are learning and when this machine gets broken in and we get a little more experience, we hope to give you some higher figures."



17



Preparation Meets Opportunity on a Record-Setting Day



Axis Curb slipformed 542 cubic yards (414 m^3) of concrete, taking an average of 12.5 minutes to unload each ready-mix truck. The original seven trucks had to be increased to 11 to keep up with the GT-3600's fast production speed.

Almost ten years had passed since Axis Curb had set a company record for one day's curb and gutter slipforming production. Their record was 6,003 feet (1830 m) of curb and gutter in a single day and it was set using their GOMACO Commander II with the Analog control system.

The company record came close to falling a couple of different times since then, but never has... until now. One of their projects, a semi-industrial area near Woodburn, Oregon, had approximately 15,000 feet (4572 m) of curb and gutter built into it. Conditions were finally right for the company to make another recordbreaking attempt. This time they would be using their GOMACO GT-3600 curb and gutter machine to set the new record.

Everyone, including the slipforming crew, the prime contractor, the ready-mix plant and the ready-mix drivers, knew what was at stake before the pour began.

"When I first saw how this job laid out, that it was about 15,000 feet (4572 m) in total and had some really nice pulls on it, I knew that we had to try to beat the record," Mike Blakley, Concrete Superintendent for Axis Curb, explained. "We made sure everybody was fired up for it and I kept preaching to them that this was preparation meeting opportunity. Everyone out there was on-board with setting a new personal record. We didn't think we'd get over 10,000 feet (3048 m), but we were going to be disappointed if we didn't make it over 6000 feet (1829 m)."

By the time they called an end to their pour at 4:30 p.m., they had slipformed 10,712 feet (3265 m) of 24 inch (610 mm) wide curb and gutter with a six inch (152 mm) thick gutter and 12 inch (305 mm) high curb. They had shattered their old company production record by over 4700 feet (1433 m).

Preparation was one of the keys to success. Axis Curb worked closely with their concrete supplier, Walling Sand and Gravel. The project was located 25 miles (40.2 km) away from the batch plant. Seven ready-mix trucks, each capable of carrying either 10 or 11 cubic yard (7.6 or 8.4 m³) loads, were assigned to the pour. "The GT-3600 ran flawlessly," Blakley said. "Our full-speed pouring capability with the curb machine was right at 39 feet (11.9 m) per minute and we did that for several loads throughout the day. The product came out nice. The inspectors in that area, who are notorious for not being easy, all said it was nice looking curb. It was almost a fantasy how well it ran."

Stations were also created throughout the job site for the readymix drivers to drop their receipts off and to wash out after emptying. This was done in an effort to keep drivers in their trucks, ready to move when they were needed.

"We wanted the drivers on-board with us so we could move those trucks as efficiently as possible," Blakley explained. "We knew it would be important to get the trucks in and out, because if the GT-3600 wasn't moving, we weren't going to break the record."

Grade preparation was essential as well. The prime contractor, Emery and Sons Construction, was in charge of preparing the grade and leaving 1.5 inches (38 mm) of trim for the GT-3600 to cut through as it slipformed.

Two days before the pour, a fiveman stringline crew was on-site setting up the first 8000 feet (2438 m) of stringline. Survey work wasn't completed yet for the entire project. The morning of the pour, the crew was once again at work setting up the remainder of the stringline. With everything in place, all that was left to do was bring in the company's 2002 GT-3600 and begin the record-setting pour.

"We started the morning off really strong with a 2500 foot (762 m) perfectly straight run without any pickups," Blakley said. "We ran that out and picked up and moved to an island that was 5000 feet (1524 m) by itself. We were halfway around the island and everybody was laughing and in really good spirits."

They poured a total of 542 cubic

yards (414 m³) of concrete throughout the course of the day. On average, it took 12.5 minutes per ready-mix truck to dump its load onto the GT-3600's conveyor belt. The original seven trucks was increased to 11 after the first 10 trucks had unloaded. Seven trucks just wouldn't have been capable of keeping up with the GT-3600.

"The GT-3600 ran flawlessly," Blakley said. "Our full-speed pouring capability with the curb machine was right at 39 feet (11.9 m) per minute and we did that for several loads throughout the day. The product came out nice. The inspectors in that area, who are notorious for not being easy, all said it was nice looking curb. It was almost a fantasy how well it ran."

All the while the slipforming crew of 12 kept working away. They quickly surpassed their record of 6003 feet (1830 m) and soon were over 7000 feet (2134 m), 8000 feet (2438 m) and then 9000 feet (2743 m). And it was just mid-afternoon with several thousand more feet of stringline already set up on the site.

"I was talking to the crew, talking to ready-mix and asking them, 'How about 10,000 feet (3048 m)?' Everybody said they were on board," Blakley said. "It was running so well they weren't even tired."



Working towards a record-setting day...

They went on to slipform 10,712 feet (3265 m) of curb and gutter and at 4:30 p.m., they ended the day's pour. They could have gone further, but didn't want to leave their readymix supplier without a project for the next day.

"We stopped pouring at 4:30 p.m. because we didn't want to put readymix in a position of having seven trucks to find some place to go the next day," Blakley explained. "But the owner, once he found that out, said we should have kept pouring! We are certain we could have done 12,000 feet (3658 m) and we think we could have pushed 14,000 feet (4267 m), but that would have been a bad thing to do to ready-mix."

The company also acknowledges that they couldn't have beaten their old production record without the cooperation of their partners on the project and some good equipment, which includes the GOMACO GT-3600.

"The GT-3600 is very versatile, very adaptable from project to project, and that includes both width and height," Blakley said. "We like the vertical-lifting and sideshifting trimmerhead and mold, its ability to turn a tight radius, and the fact that it backs up really tight on line. We like the ability to move the tracks around in relationship to the pour. If we have an asphalt edge or other obstacles that we're working around in relationship to the curb, we can find a position to set the mold and the tracks to avoid the obstacle. We also get some fabulous service from GOMACO and Jim Preston, who is our salesman from GOMACO's Oregon distributor, CONAGGBIT Inc.

"This project's success was a team effort and Axis Curb could not have done this by ourselves. We relied on the general contractor to prepare it well, the concrete supplier to produce and deliver concrete within the tolerances needed and our own crew to work the project. Everyone deserves to be proud of what they accomplished. It really was a phenomenal day."



The crew celebrated the end of the day with a photo. The number on the sign is actually incorrect, after a full accounting of the day's pour, it was discovered they slipformed 10,712 feet (3265 m) of curb and gutter.

The Commander III -The Chicago-Land Workhorse



Lorig's Commander III is the company's workhorse, and gives the company the flexibility of moving from project to project in the Chicago, Illinois, area.

After several years of planning, several hurdles jumped, and several miles of new concrete slipformed, Chicago's south extension of I-355 is scheduled to open soon. The new 12.5 mile (20 km) long I-355 corridor will run through 13 suburbs from the I-55 interchange in Bolingbrook/ Woodridge, to I-80 in New Lenox. The project is part of the south extension of the North/South Tollway by the Illinois Department of Transportation (IDOT) and Illinois State Highway Toll Authority (ISHTA).

Lorig Construction, based out of Des Plaines, Illinois, is just finishing up their second season of work on the massive project. They've had their full line of GOMACO equipment at work on the project, including both a 9500 trimmer and 9500 placer, a C-450 bridge deck finisher, a PS-2600 placer/spreader, GHP-2800 four-track paver, T/C-600 with skewed tining kit, and a four-track Commander III.

As the projects wind down, Lorig is finishing up work on the shoulders and ramps portion and utilizing their Commander III and 9500 placer. "We did the initial pave with our GHP-2800 and PS-2600, and that was paving 24 feet (7.3 m) wide," Wally Simpson, Senior Project Manager for Lorig Construction, said. "We're following that up with the Commander III to add on the 12 foot (3.7 m) shoulder lanes and the 16 foot (4.9 m) ramp lanes."

Working conditions on the project are less than ideal, especially for the ramp work. The paving lane is usually surrounded by steep banks that leave very little room for the finishers to work and no room for a haul road for the concrete dump trucks.

Lorig Construction is an expert at dealing with Chicago's tight job-site conditions and knows how to work around them. It's where their 9500 placer is most effective. The 9500 works out in front of the paver, running on the grade. The concrete dump trucks can back down the ramp, empty into the 9500's hopper and drive out again. Laborers work directly behind the 9500 placing and installing baskets at 15 foot (4.6 m) intervals. The Commander III follows "We have jobs all over the city, so this equipment is always mobile. It doesn't sit here and wait for the next pave. It moves. It's one of the reasons the Commander III is so nice. We just pack it up and go. We'll be pouring in one place today and we'll pave again tomorrow somewhere else. The Commander III is just a workhorse for us," Simpson said.

the placer and slipforms the new ramp 16 feet (4.9 m) wide and 12 inches (305 mm) thick.

By the time the entire project is completed, Lorig will have paved approximately 190,000 square yards (158,859 m²) of concrete pavement. All of the concrete is produced by local ready-mix suppliers and is an IDOT and ISHTA-approved mix design. Slump averages 1.5 inches (38 mm).

Production averages 170 square

yards (142 m²) per hour in the tight conditions.

"The project determines our production rate," Simpson explained. "It always varies, but in some of these tight corridors, we've kicked out 240 square yards (201 m²) per hour. The equipment can handle the high speeds and volume if we can get the area to work in."

All of Lorig's pavement on the project has to meet certain smoothness requirements to earn bonus. Smoothness is measured by using the zero-blanking band.

"It adds another level of difficulty to this project," Simpson said. "Anything under a 20 on the zeroblanking band qualifies us for bonus and we always seem to fall right in that range of quality pavement."

Finishing work behind the paver is kept to a minimum. An Auto-Float[®] mounted on the back of the Commander III finishes and seals the surface of the new ramp. The Auto-Float is a feature that, according to Simpson, was a must have, especially when dealing with the zero-blanking band requirement.

Finishers behind the paver work with bull-floats, tine the new slab on a skew and cut in joints every 15 feet (4.6 m).

With the day's pour complete, it's time to load up the Commander III and take it to the next project in the Chicago-land area. Lorig's machines never stay in one place for very long and their mobility and ease of transport is one of the features that drew them to GOMACO.

"For us, in this market, we have to be very flexible and the Commander III gives us the option to pick up and go," Simpson said. "We have jobs all over the city, so this equipment is always mobile. It doesn't sit here and wait for the next pave. It moves. It's one of the reasons the Commander III is so nice. We just pack it up and go. We'll be pouring in one place today and we'll pave again tomorrow somewhere else. The Commander III is just a workhorse for us."



Tight conditions on the project require a 9500 placing concrete, with workers setting baskets on grade behind the 9500, directly in front of the four-track Commander III.







The Commander III is slipforming the new ramp 16 feet (4.9 m) wide and 12 inches (305 mm) thick.

GOMACO University's 2008 Class Schedule

GT-3200/GT-6200: January 8-10 at the Paving Center. (Class begins on Tuesday) Three-day course covering Network controls, setup and operation, maintenance and advanced diagnostics.

GT-3400: April 1-April 3 at the Paving Center. (Class begins on Tuesday) Three-day course covering G21 controls, setup and operation, maintenance and advanced diagnostics.

GT-3600: January 7-10, January 14-17, January 21-24, March 3-6, March 17-20, March 24-27, March 31-April 3 at the University. A four-day course covering G21 and Network controls, setup and operation, maintenance and advanced diagnostics.

Three-Track GT-6300: April 7-10, April 14-17 at the University. A four-day course covering Network controls, setup and operation, maintenance and advanced diagnostics.

Three-Track Commander III: February 11-14, February 18-21, February 25-28 at the University. A four-day course covering G21 controls, setup and operation, maintenance and advanced diagnostics of the three-track machine.

Four-Track Commander III & GT-6300: January 28-31, February 4-7 at the University. A four-day course covering G21 and Network controls, setup and operation, maintenance and advanced diagnostics.

Cylinder Finishers: January 22-24 at the Paving Center. (Class begins on Tuesday) Three-day course covering the proper setup and operation of all GOMACO cylinder finishers. Machine maintenance and diagnostics of the various hydraulic systems and electrical circuits will round out the week.

Trimmers: January 15-17, January 29-31 at the Paving Center. (Class begins on Tuesday) Three-day course covering the setup and operation of the 9000 and the 9500 for trimming and concrete placing operations. Sessions on machine maintenance and diagnostics will also be covered.

Two-Track and Four-Track Pavers: February 4-7, February 11-14, February 18-21, February 25-28, March 17-20 at the Paving Center. A four-day course covering G21 and Network controls, setup and operation, paving to profilograph specifications, maintenance and advanced diagnostics. Primary emphasis will be placed on the GP-2600, GHP-2800 and the GP-4000.

IDBI: March 25-27 at the Paving Center. (Class begins on Tuesday) Three-day course covering the setup and operation of the IDBI (In-The-Pan Dowel Bar Inserter). Sessions on machine maintenance and diagnostics will also be covered.

For further information, please contact: GOMACO Training Department, GOMACO Corporation, PO Box 151, Ida Grove, IA, 51445-0151 or Phone: 800-831-2320 or 712-364-3347, or e-mail: gomacou@gomaco.com. Students can also register for classes online or print out forms at http://www.gomaco.com/university.



Students listen to instructions for their hands-on shop time during their week of training at GOMACO University.





John Pantuso, Jr., from Zachry Construction in San Antonio, Texas, earns his five year letter jacket.

Gary Godbersen, GOMACO's president and CEO, addresses the students at Thursday night's graduation program.



First time University attendees from Gallatin Asphalt Inc., in Bozeman, Montana, proudly display their diplomas



Over 650 students from around the world, and as far away as India, attended classes at GOMACO University in 2007.



Joint partners K-Con Company and Kajima Road Company Ltd., slipform a new highway inside of the Ayabe Road Tunnel in Kyota, Japan. They are using their four-track GHP-2800 and Commander III to complete the paving on the project.



Miller Paving Ltd. slipforms a new airport parking lot in Toronto, Ontario, Canada. Their four-track GHP-2800 is slipforming 24 feet (7.3 m) wide on 2000 foot (610 m) long paving passes.







LaFarge Construction Materials trims a new roadway project to grade with their GOMACO 9000 with monolithic trimmerhead in Calgary, Alberta, Canada.



Virgin Island Paving in St. Croix, Virgin Islands, finish a new bridge deck on the island with their older style C-450.



S.M. Morris Ltd. slipforms 900 mm (35.4 in) tall European step barrier with their Commander III. The project is on the N11 Highway, just outside of Kilpedder, Ireland. 23



GOMACO's booth at CONEXPO-CON/AGG 2005 was a busy one. We can't wait to see you again in Las Vegas in 2008!

Come See Us in the Central Hall at CONEXPO-CON/AGG 2008!

CONEXPO-CON/AGG 2008 will be March 11-15, 2008, in Las Vegas, Nevada. Our display will include both a right-side and left-side pour GT-3400. The new GT-3400 is the first curb and gutter machine to be remote controlled. Stop by and check out the GT-3400, as well as our full line of curb and gutter machines.

We will be introducing our new optional G22 digital control system in the United States. The G22 has a dual language feature and an easy to understand graphical display with colored pictograms depicting the machine's functions. Several machines in our booth will have the G22 system featuring the various languages of the world.

The GOMACO booth will also feature our complete concrete paving line for all of your airport, highway, city streets and ramp projects. A complete paving train, a PS-2600 placer/spreader, GHP-2800 paver, and T/C-600 texture/cure machine, will be just one of the highlights in our booth. A GSI® (GOMACO Smoothness Indicator) will complete the paving train. The revolutionary GSI provides smoothness for both wet or cured concrete and asphalt slabs. With the GSITools[™] software application, it can also be used ahead of the paving operation to provide a grade accuracy analysis of the subgrade and/or stringline before the paving takes place.

A four-track Commander III with V2 variable width mold will be part of the paver display. The V2 makes width changes fast and simple and can make the changes on-thego for tapered slabs.

The new C-450 and C-750 cylinder finishers will be on display showcasing our new features to finish flat slabs, bridge decks and slopes.

GOMACO will be in Booth #C-5657 in the Central Hall of the Las Vegas Convention Center. We can't wait to see you there to discuss your concrete paving needs for 2008!

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