Issue 2 **2013**

PAVING NEWS

A Caterpillar publication serving the global paving industry

Seismic Change

Bay Bridge Project a Paving Marvel

Revamped Runway

Intelligent Compaction, 3D Paving Key to Project

CATERPILLAR®

Computer Savvy and Street-Smart

Jim McReynolds
President,
Caterpillar Paving Products

Being computer savvy and street-smart sounds like the description of a person who grew up in the Bronx and now works in Silicon Valley. In reality, it describes a lot of the people working in the asphalt paving industry.

That fact was brought home to me when I read the job stories in this issue of *Paving News*. Talk about a range of skill sets.

The story, "Revamped Runway," (pages 4-7), illustrates just how far paving technology has advanced in recent years. Granite Construction completed resurfacing of the middle runway at Salt Lake City International Airport using three-dimension milling and paving, plus intelligent compaction.

As the project manager points out, all the information regarding profiles and elevations is programmed into a digital model. No stringlines or elevation grid references marked on the runway. The equipment is controlled by information sent from robotic total stations.

It took some training, but the crews responded to the challenge of learning new technology and met the tough FAA specifications.

Follow that by reading "One Piece at a Time" (pages 8-10), the story of how TC Construction handled the logistical complexities of a massive street overlay program in San Diego. The paving crews do the work, but especially in this case, the paving estimator had to figure out how to efficiently schedule the resources for dozens of street projects.

Each project had its own unique requirements and there was tremendous pressure to track production details and meet local restrictions on traffic control, truck routes, noise permits and starting times. Managing the constantly changing conditions and communicating with numerous governmental agencies takes a special set of skills—what I call street smarts.

Finally, read about the complexities faced by O.C. Jones & Sons while paving the Oakland Bay Bridge. That story, "A Seismic Change," (pages 12-17), shows that paving contractors sometimes face the combined challenges of new technology and stressful logistics.

Any bridge project takes extra planning and management. Throw in the requirement to use a new material, Epoxy Asphalt Concrete, that is extremely sensitive to time and temperature and you've got to be both a chemical engineer and a traffic cop.

I am constantly impressed by the people in the paving industry. They invest heavily in technology. They invest in training and education. The asphalt paving industry truly has integrated brainpower with manpower. ■

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Feature Articles

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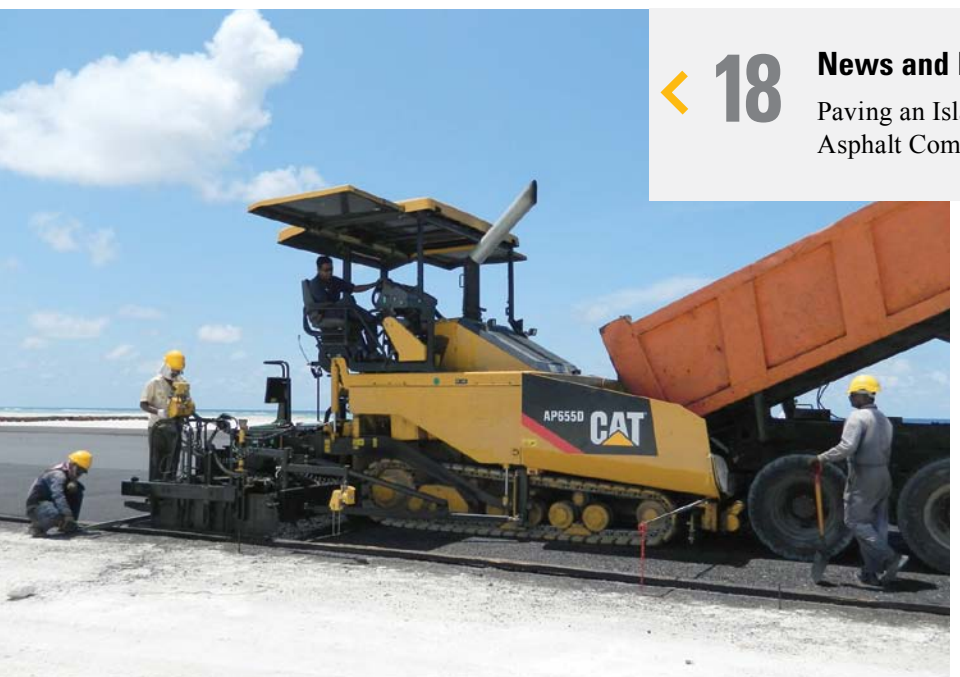


Revamped Runway

3D Paving, Intelligent Compaction Key to Project

It was 10 years ago that Granite Construction milled and resurfaced the middle runway at Salt Lake City International Airport. The work is mandated to occur about every decade, so earlier this spring Granite crews were back at the airport. It was the same city, same airport, same runway—and a very, very different plan.

"A lot has changed in 10 years," said Kyle Smith, project manager at Granite. "Ten years ago, we completed this job with one crew and wireline. This time we used two crews, a wireless system and 3D paving in echelon—and we are using intelligent compaction."

The Project

The project called for profile milling and resurfacing of a runway and all the taxiways. Crews removed 102 mm (4 in.) of asphalt during milling and replaced it in two 51 mm (2 in.) lifts. During the job, 72,600 metric tons (80,000 tons) were placed. Time, of course, was a factor as well. The entire project had to be completed within 60 days.

Specifications required paving to an elevation, and echelon paving was used to minimize the number of cold joints. The echelon requirement meant wireline could not be utilized for elevation control.

This led Granite to launch the use of a Trimble 3D paving system. "We use 3D grading all the time," Smith said. "As we looked at the need for echelon paving, and the tight tolerances of the FAA, we concluded that 3D paving was our best option."

Preparation

The 3D paving process required surveying technology that Granite had utilized on previous projects. The elevation was created digitally and referenced during both milling and paving. "We had been using it on motor graders for finish grading for years," Smith said. "The technology itself is not new to our surveyors."

It was new to paving crews, and changed their roles. The pavers—a Cat® AP1055D and AP1055B—received information from up to 12 robotic total stations as they moved down the runway. That information directed the screed to be raised or lowered to meet the elevation requirements. All screed adjustments were automatic.

Smith acknowledged starting the process was stressful, particularly given the strict FAA standards. Granite arranged training through the local Cat dealer, which spent more than a week on the jobsite ensuring all crew members were up to speed. The training included paving with sand to provide the crew with hands-on experience.

Paving

The preparation for 3D paving takes a great deal of work, Smith said, but when work starts it moves along quickly. "The prep work is all basically done by building the model,"

The pavers worked at a pace of 6.1-7.6 m (20-25 ft.) per minute.

Smith said. “We don’t need surveyors setting elevations and installing wireline. That prep work is done prior to the start of the project, so we can just get out there and pave.”

FAA specs required the utilization of material transfer vehicles. Belly dump trucks, with capacities of 34 metric tons (38 U.S. tons), delivered mix to the jobsite.

The trucks were 30 minutes from the plant. The paving began in April—“There was still snow in the mountains,” Smith said—so quickly cooling mix was a concern.

The paver worked at a pace of 6.1-7.6 m (20-25 ft.) per minute during the early, cooler days. “That pace is driven by surface temperatures,” Smith said. “With the 2-inch mat, we can’t let the paver outrun the rollers. The pace is strictly a function of compaction and has nothing to do with the technology.”

The paver operator steers the machine and sets the pace. Screed personnel are responsible for switching the signal reception from one station to the next as the paver moves down the runway. They also monitor an on-board display to ensure the screed is responding properly.

“Ten years ago, we completed this job with one crew and wireline. This time we used two crews, a wireless system and 3D paving in echelon—and we are using intelligent compaction.”

– Kyle Smith
Granite Construction

Fundamentals, such as proper head of material, are crucial no matter what technologies are utilized.

Data was available to operators, and stored for later analysis.

The pace was slowest at the start of the project while crews adjusted to the echelon paving process, and the volume of machines and personnel. "Trying to get two pavers to work side-by-side, it's a challenge," Smith said.

The pavers worked within 30 m (100 ft.) of each other. Mix was 160˚ C (320˚ F) when it left the plant, between 149˚-154˚ C (300˚-310˚ F) when it arrived, and between 138˚-143˚ C (280˚-290˚ F) behind the screed.

Specified tolerances were 2/100 of a foot, and the crews consistently hit or exceeded that goal. A quality control surveyor worked behind the screed, double-checking tolerances.

The pavers worked at a width of 4.6 m (15 ft.) on the first 51 mm (2 in.) lift and 5.8 m (19 ft.) on the second lift. "We started with a narrow approach so the crew could become comfortable with the 3D system while working with a more traditional width," Smith said.

Compaction

Compaction was a concern early in the project because of the cool temperatures and relatively thin lifts.

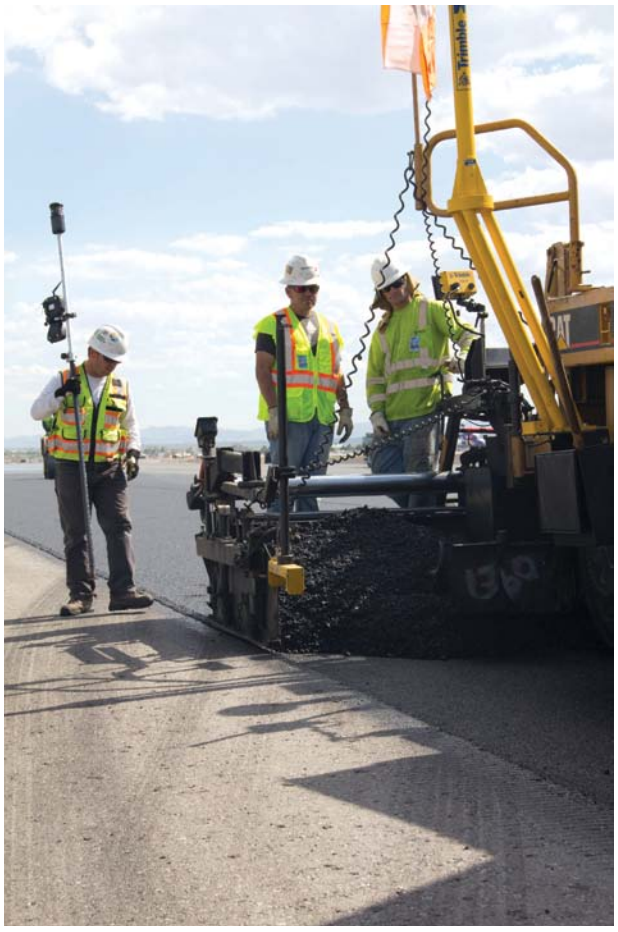
Compaction also marked the crew's introduction to another technological change: intelligent compaction.

The system utilized was Cat Compaction Control. Six compactors were used—three behind each paver. Four of the rollers—the two breakdown and two intermediate rollers—utilized intelligent compaction.

"The intelligent compactors have GPS," Smith said. "We utilized pass counts and mapped temperatures. Operators had screens on their rollers. They could easily see where they had been and they knew the mat temperatures and whether they should be working faster or slower to avoid the tender zone."

The quality control supervisor also had access to the data. "He could make adjustments to improve consistency," Smith said. The machines were equipped with a Trimble® wireless modem that relays pass-count and temperature information in real time.

Each compactor was also equipped with Product Link™, a fleet management solution that allows contractors to



A quality control supervisor ensured standards for paving and compaction were met.

Granite Construction crews will utilize Intelligent Compaction on other projects, particularly those with quality control incentives.

remotely monitor their machines.

The IC and Product Link data is then accessed through VisionLink® software, which enables it to be analyzed by crew leaders on the jobsite and others back at the office. Both long- and short-term adjustments are made from that data.

The project specified the use of two IC rollers, but Granite chose to use four. "We saw this as a testing ground," Smith said. "Intelligent compaction is something we can utilize across our fleet. It can have an impact on highway and other paving projects. Quality control incentives on DOT jobs can be substantial, and intelligent compaction should help us reach those targets."

Four of the compactors were Cat CB64s, the fifth a CB564D. All rollers made three passes, with a movement forward and back counting as a single pass. Breakdown and intermediate rolling was done with full vibration, as was the first pass or two of finish rolling.

The temperature was between 99˚-110˚ C (210˚-230˚ F) after completion of breakdown rolling; between 82˚-93˚ C (180˚-200˚ F) after intermediate compaction; and between 71˚-82˚ C (160˚-180˚ F) after finish rolling.

Cutting Wheel Debut

The FAA specs mandated cutting off a 76 mm (3 in.) edge on all longitudinal joints. This was accomplished through the cutting wheel option on the CB54B. "The last roller operator cut all the joints per project specifications," Smith said. "He completes his pattern, then drops back and cuts the edge."

Conclusion

Much has changed in 10 years. Still, in some ways Smith feels like the technology is helping Granite keep pace more than break new ground. "As technology is introduced, I think the specs are getting tighter and tighter too," he said.

"Customers are requiring more from us in terms of tolerances, and they're asking us to work faster. The new technologies help us meet their expectations and—somewhere along the way—become necessities." ■

One Piece at a Time

Many Small Projects Create Challenges

The City of San Diego breaks its overlay paving projects into many pieces, both large and small. Turning a profit essentially means putting the pieces together in an orderly fashion so the crew is uninterrupted and productive.

Yet organizing the jobs can be a challenge, in part because the size varies greatly from one to the next. Work on thoroughfares can require as much as 13,600 metric tons (15,000 U.S. tons), while smaller streets might use as little as 109 metric tons (120 U.S. tons).

"The total tonnage was 84,000 (U.S. tons) on the overlay bids we won, but it was spread out over dozens of individual projects," said Art Hernandez, paving estimator at TC Construction Inc. of Santee, Calif.—just outside San Diego.

Regardless of size, nearly every project had its own logistical challenge, including approvals from various governmental agencies and a last-minute—and time-consuming—adjustment to the milling process.

Additional challenges fell well outside the scope of everyday paving. "At one point we had to notify 500 people that we wanted to pave at night, and ask them if it was OK," Hernandez said. "We've never done that before."

Project Description

The city overlay is actually two separate projects: One for about 58,000 metric tons (64,000 U.S. tons), the other about 18,140 metric tons (20,000 U.S. tons). The individual streets are not grouped in any particular order, but instead spread out across the city. They included not only overlay, but full-width mill-and-fills, countless dig-outs and hundreds of pedestrian ramp upgrades.

After winning both bids, TC made plans to combine the jobs. Hernandez posted a map and marked each and every overlay. He then developed a plan on how to efficiently handle each street repair.

This made sense in terms of efficient usage of the crew and equipment, but created other challenges. The more efficient the field operations became, the more details there were to track from an administrative standpoint. For example, each street and its associated mix had to be billed against a specific project.

"We came up with a coding system for the tickets," Hernandez said. "It wasn't anything special, but the point is that while we were combining these projects, we also had to keep them separate, too. Sometimes it became confusing."

Milling Challenges

Specifications required milling 51 mm (2 in.) of existing asphalt and then placing 76 mm (3 in.) of new material. The milling, and later asphalt, were tapered so existing curb and gutter matched.

TC partnered with a subcontractor to handle the milling. TC planned to let those crews do their work and then come back a day later and complete the overlay.

The city, however, wanted the paver to work immediately behind the mill to minimize the length of the street closures. That meant adjusting the process so the paving crew worked 122-152 m (400-500 ft.) behind the mill.

"We preferred to work separately, but the city had traffic concerns," Hernandez said. "It wasn't stipulated in the specs, but understanding the importance of relationships, we wanted to keep the city happy. We adjusted."

The change wasn't without its challenges. First, the subcontractor only had a single mill allocated to the job. He planned to take two passes with the one machine.

With the new direction, there wasn't enough time for that process. "There had to be two mills," Hernandez said. "We needed that productivity because we had to finish the paving quickly, too."

Adding a second milling crew had its own drawbacks. "Having two milling crews there, along with our paving crew, made for a crowded jobsite," Hernandez said.

Paving so close to the mill had other repercussions. "You're adding an entirely new layer of machines and labor, all of which can impede or halt production at any time," Hernandez said. "Sometimes on these streets, you have no idea what's underneath. One time the milling crew hit an old set of railroad tracks that nobody knew were there."

The breakdowns were rare, but still caused significant problems that needed to be handled efficiently when they occurred.

In addition, achieving a continuous pavement mat meant trucking the asphalt through the Southern California traffic. "We utilized about 15-20 trucks per day," Hernandez said.

Paving crews had to be sure they could use the mix that was in transit, even if the mill had problems. "We typically ground far enough ahead so that if there was a breakdown, we could use the asphalt that was in transit," Hernandez said.

The milled surface also had to be swept before tack could be applied. "Cleanup was a big issue during the milling process," Hernandez said. "At first we utilized only one sweeper. We convinced the subcontractor to add a second."

At the early stages of the project, sweeping left the surface too wet for tack. That was remedied easily enough by adding the second sweeper, but it quickly became clear that more attention to the milling and cleanup operation was vital.

Paving

Asphalt was delivered utilizing booster trucks with strong arms, with hauling capacities of 30,000 kg (66,000 lbs.). The maneuverability and efficiency of those trucks were a perfect match for San Diego's traffic.

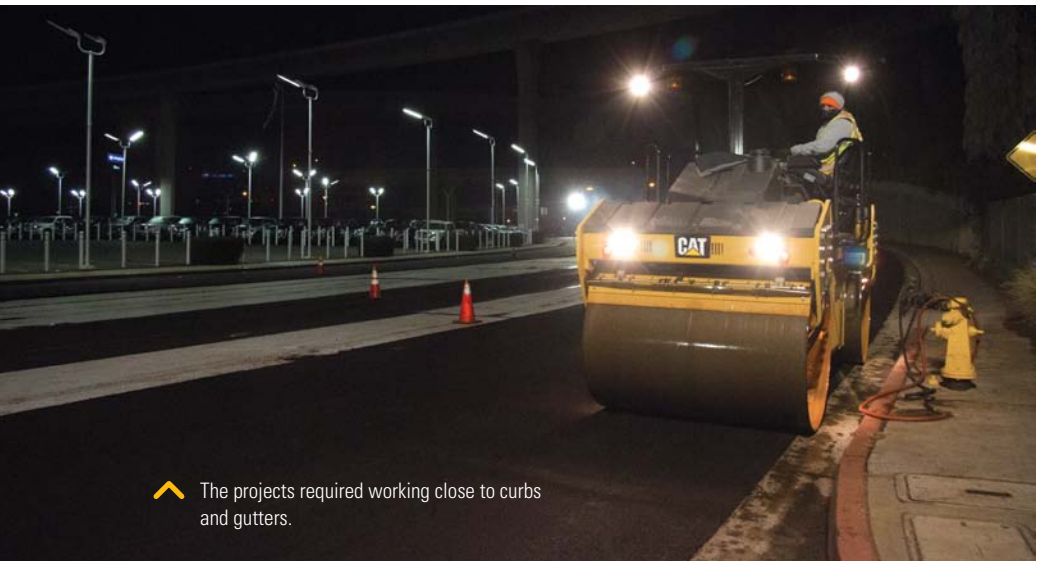
The projects inolved more night paving than originally planned.

Paving widths were usually 5.5 m (18 ft.), though the contractor occasionally utilized the screed's wing extensions to achieve a width of 6 m (20 ft.). "Sometimes the city would require a certain width because they wanted the joint line under the striping," Hernandez said.

Sourced from two plants, the mix utilized 13 mm (½ in.) aggregate. "The fact it came from two plants was another consideration," Hernandez said. "Fortunately we rarely received mix from both plants on the same day, but we did alternate plants day-to-day. It meant adjusting to the haul lengths and the traffic flow at different times of the day. The only real difference was the impact on trucking."

The mix was 160˚ C (320º F) at the plant and about 138˚ C (280º F) in the hopper. It was typically 132˚ C (270º F) behind the screed.

A Cat® AP1055D placed the mix at a depth of 76 mm (3 in.). Only one lift was required.



The projects required working close to curbs and gutters.

"There was no profilographing," Hernandez said. "We basically mirrored what's there. The challenges on this job weren't the placement of the mix as much as some other things."

Compaction

Handling breakdown compaction was a Cat CB54. It typically made eight passes, with each movement in forward or reverse counting as a pass. Four of the passes were vibratory.

Next a pneumatic compactor made four passes, working at a temperature of about 93˚ C (200º F). Handling finish work was a CD54B, with four passes at about 77˚ C (170º F). "That machine hardly uses any water," Hernandez said. "It was quiet, with good visibility. But the operator really noticed the water usage. He said he could go all night on seven gallons of water."

Challenges

Hernandez earlier stated the actual placement of the paving was not the main challenge. Still, plenty of other obstacles emerged.

One involved night paving. The specifications mentioned little or no night paving. Those requests didn't come until after the bidding, when a city division reviewed each traffic plan. "That's when they would make a determination of day or night," Hernandez said. "When they came back to us and said it had to be night, we had to make some adjustments.

"It is a changed condition. Our material supplier had to open the asphalt plant at night, which costs more. We had to bring out light towers."

Hernandez credited the city for partnering with TC whenever it could. For example, the city was extremely flexible and often allowed TC to occasionally work an hour longer if a street had been changed from day to night paving.

"At night we didn't have to deal with traffic, so sometimes we actually preferred that time," Hernandez said.

When traffic would be a significant issue, TC requested a change to a night shift. That, too, created logistical challenges.

"We had to get a noise permit," Hernandez said. "We had to knock on doors and ask permission. On one street there were 500 people we had to talk to."

Reaching them required more than a knock and then moving to the next door; followups were required if the door wasn't answered.

Not every resident granted permission, but enough said yes that TC was able to get the permit and work at night. (Such efforts were not required if the city directed TC to pave at night.)

Another challenge resulted when a governmental agency (in addition to the City of San Diego) became involved. Securing permission just to post a sign created a whole other series of permits and, frequently, delays. "We had to get an encroachment permit from Caltrans," Hernandez said. "That process took six months."

Yet another challenge was working around the hustle and bustle of San Diego. "There was a 10k race, and numerous city moratoriums, such as working near the beach at certain times, or for paving downtown," Hernandez said. "Events would come up, and we had our plans that were made to flow. Now where do we go?"

Yet TC understood the need for adjustments. "You're working in a busy area, with lots of people, and many events," Hernandez said. "There are many considerations. We understand that. The people we worked with at the city were more than reasonable. They handled every request we made and were extremely cooperative. We have nothing but good things to say about them."

Perception vs. Reality

As the estimator, Hernandez finds it interesting to reflect on what the thoughts are when the bid is made, compared with the realities that result on the jobsite.

"When you work on a bid, you're in an isolated office environment," Hernandez said. For example, he anticipated traffic on certain streets, but was still surprised by some volumes.

"It's not just the number of vehicles on a street, it's where they're going," he said. "There were a few businesses that were really busy, and we didn't anticipate that much traffic trying to get into that particular entrance."

Yet he and the crews made the jobs work, no matter what challenges emerged. "As we all know, successful paving is about adjusting to changing conditions and learning from each and every project completed," he said. "You can't look at worst-case scenarios every time you prepare a bid. You would never get a bid. You have to do the best you can, and consider all known factors, obviously. But at some point you just have to get out there and get the job done.

"That's paving." ■

Paving Operations Training

Help Your Crew Succeed

Paving Operations Training (P.O.T.) helps your crew succeed on the jobsite in terms of both quality and productivity. Key to the program is its combination of classroom lessons and hands-on training.

Specifically, the daily curriculum includes two hours of classroom training and six hours of hands-on training at the paving demo site. The lessons include:

Classroom Interactive Sessions

- Fundamentals of paving
- Control of segregation
- Understanding grade and slope controls
- Introduction to electronic control modules
- Understanding mat defects
- Compaction basics

Hands-on Training

- Transverse and longitudinal joint construction
- Feeder system set-up and adjustments
- Variable width paving
- Grade/slope set-up and troubleshooting
- ECM calibration
- Critical screed adjustments

Students work in teams of four and practice with various Cat® pavers and screeds. The paving course concludes with a written and a hands-on final examination.

The program also prepares attendees to conduct similar training within his of her organization. Each participating company receives a training kit that contains all the training material, outlines, tests and evaluation forms used in the paving course. Each P.O.T. graduate is awarded a certificate of completion. The sponsoring organization will receive a student progress report.

Who Should Attend?

- Paving Supervisors
- Training Instructors
- Training Supervisors
- Paver Operators and Other Crew Members

Additional Information

- Attendees must have a minimum of one year experience with the placement of hot mix asphalt.
- Course Length: 4.5 days
- Student/Instructor Ratio: 4:1

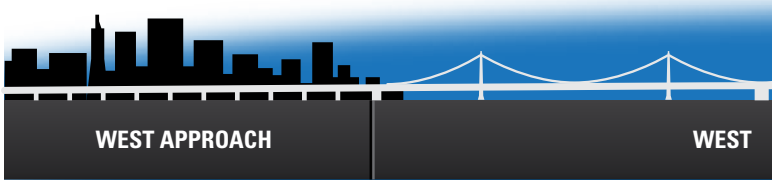
Contact your local Cat dealer for more information.■

A Seismic Change

Bay Bridge Project a Paving Marvel, Too

The Golden Gate Bridge might be on the postcards, but the Oakland Bay Bridge is a visual and engineering marvel in its own right. That was the case when it opened as the world's longest bridge in 1936, and the marvels continue with the recent "seismic retrofit" and construction of a Self-Anchored Suspension span (SAS).

While the engineering received much of the attention, there also were significant changes to the asphalt on the bridge.



Challenging Project

O.C. Jones & Sons Inc., of Berkeley, Calif., paved large portions of the bridge. Jones has a long history of successfully completing difficult projects—on time and on budget. Past projects include paving a portion of the bridge in 1976, and toll plaza demolition, reconstruction and paving work during the last Bay Bridge shutdown in 2011.

O.C. Jones essentially took on two different projects as part of the bridge work. First was placement of the specialized epoxy on the SAS portion of the new bridge.

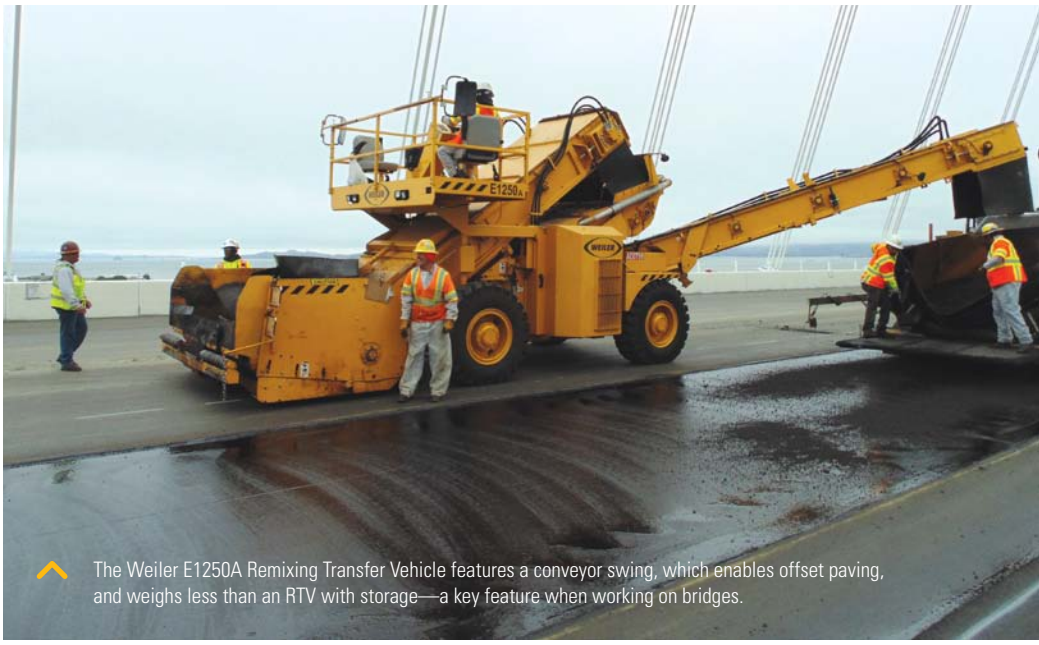
The second project was the new transitional paving on the Oakland touchdown side of the new bridge. That area stretched 1,289 m (4,229 ft.) from beyond the toll plaza to the new bridge approach. The California Department of Transportation (Caltrans) wanted a new surface on the approach, and also corrections to grade and slope.

Placing Epoxy

Two 25 mm (1 in.) lifts of Epoxy Asphalt Concrete (EAC) were placed on the eastbound and westbound lanes of the Bay Bridge's new SAS span.

The epoxy offered significant benefits, including durability and traction, but was very difficult to work with.

Compaction and rolling patterns were closely monitored given the challenging material.



The Weiler E1250A Remixing Transfer Vehicle features a conveyor swing, which enables offset paving, and weighs less than an RTV with storage—a key feature when working on bridges.

The epoxy was chosen because of its extreme durability, tractive benefits and lighter weight.

"The material used was quite unique, and presented some interesting challenges not normally seen with conventional asphalt concrete," said Kelly Kolander, president and CEO of O.C. Jones. "This is the only time this material will be placed in the U.S. this year."

The EAC is essentially a 9 mm (3/8 in.) mix that uses a two-part epoxy. One part is blended with AR 4000 paving oil. It is combined with a specialized dry aggregate and a separate epoxy resin, and mixed in a pug mill.

The resultant EAC is then placed atop a two-part epoxy bond coat. That bond coat was applied to both the steel bridge deck and the first lift of EAC.

The bond coat needed to be applied at a high application rate, using both a robotic device and spray wands. The epoxy products, as well as the technical support, were provided by Chemco Systems of Redwood City, Calif.

"The EAC is significantly different from conventional AC in that once the material is produced from the batch plant, a chemical reaction begins as it is hauled to the project site," Project Manager Bill Jensen stated. "Due to this chemical reaction and extremely tight time and temperature requirements, consistency in travel time for the haul trucks and in the production of the material at the plant were crucial."

So crucial was timing that O.C. Jones was able to secure a haul route to the site with the help of the Californian Highway Patrol and Caltrans. Those organizations worked to minimize traffic disruptions.

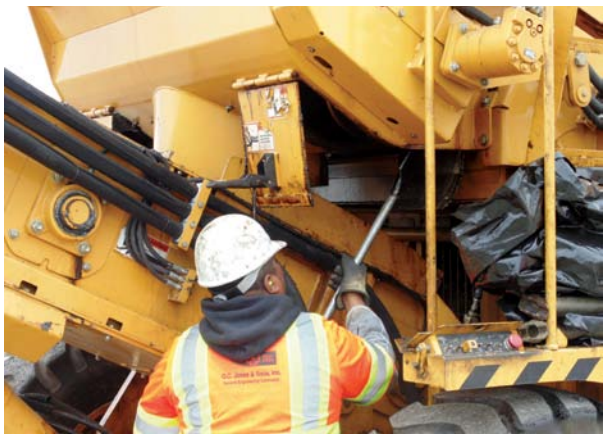
Once the material arrived, it was again tested before it could be placed through the paver. The window for mix placement was extremely tight and closely monitored by testing personnel to ensure project specifications were met. The material then was approved for placement on the bridge deck.

RTV a Perfect Fit

The process had another complication: Trucks and other machines were not allowed to travel on the paving lane after the bond coat had been applied. That meant the material had to be loaded from the side.

This was one of the reasons that O.C. Jones utilized a Weiler E1250A Remixing Transfer Vehicle on the job. The E1250A's conveyor accommodates offset paving, enabling trucks and the RTV to stay off the paving base and the bond coat.

In addition, the E1250A does not have storage capacity, helping the machine weigh 23,000 kg (51,000 lbs.) less than an RTV with storage—an



important factor when working on a bridge, where every pound counts.

"Since storage or surge capacity was not required, the Weiler E1250A proved to be the right choice and performed well," Kolander said.

The material was discharged into a Cat® AP1055E Asphalt Paver, which utilized non-contact averaging skis for enhanced ride quality.

Compaction and rolling patterns were again closely monitored and achieved with Cat CB54 Vibratory Asphalt Compactors and Cat PS150C rubber-tired rollers. The compactors typically made three complete passes, with movement up and back counting as a single pass.

Another unique aspect of the project was the need to thoroughly clean out the RTV and paver after every pass, typically 670 m (2,200 ft.) in length. Unlike conventional AC, EAC is not thermoplastic, and therefore cannot be re-heated.

Once the chemical reaction occurs, the mix remains hard. "This required removing any built-up material in the paver's auger chamber as well as inside the RTV to avoid cured EAC from falling onto the finished mat," said O. C. Jones Area Manager Kevin Goddard.

The Second Project

The bridge was shut down over Labor Day weekend as O.C. Jones crews reconstructed the approach area on the Oakland touchdown side.

That portion of the project did not require the placement of EAC. Instead, crews worked with traditional AC mix, as well as an open-graded asphalt cement. About 17,200 metric tons (19,000 U.S. tons) were placed over an area of 93 million m^2 (1.1 million ft^2.).

Yet that project had its own challenges. Cold planers had to remove mix over much of the area before repaving could begin. So large was the required mill-

The Weiler E1250A RTV helped the paving train move continuously and consistently.

ing volume that up to seven machines worked continuously for 36 hours.

The leveling was particularly extensive in some areas. The eastbound direction required a large profile correction and required removing asphalt at depths up to 0.9 m (3 ft.).

"Complicated cross-slope corrections, leveling and new construction to tie into the new bridge structure from the existing toll plaza area proved challenging, given the tight time constraints," said Area Manager Jim Gallagher.

Paving work began at 10 p.m. Wednesday night and continued nonstop until Sunday morning, utilizing one night crew and two daytime crews.

"There was an incredible amount of coordination between the AC plants, grinders, trucking, traffic control and access points," Jensen said. "Over half of the material placed was required to correct cross slope to aid drainage, establish a new roadway profile, and level uneven pavement, which is all very time-consuming."

Additionally, the westbound portion goes from five lanes to 20 lanes at the toll plaza, then back down to five lanes.

"It made the joints and lane lines an increased challenge," Kolander said. "The Cat pavers handle the variable widths very well; our crews really appreciate their versatility."

Equipment used included Cat AP1055E and 655D asphalt pavers, Cat CB64, CB54 and PS 150C rollers, as well as the Weiler E1250A RTV.

A Success

Kolander said the demands on the job left no margin for error, yet O.C. Jones was able to deliver. He credited the Caterpillar and Weiler products for their roles in helping reach a successful conclusion.

"Being such a complicated and specialized paving project, not to mention such a high-profile one, we required high-production, quality equipment and 100 percent uptime," Kolander said. "Our Cat dealer supports us on a daily basis with our paving needs. We were pleased with the Weiler product as well. It is a well-built machine that performed as advertised."

All factors had to perform together on this project. "The epoxy is certainly not used very often, but has some great benefits," Kolander said. "While not as high profile as some of the other portions of the bridge, the paving process represented a significant change as well." ■

BAY BRIDGE FACTS

Connects San Francisco with the East Bay

Opened November 12, 1936

Comprised of two separate bridges, a tunnel, and a mile-long elevated roadway

Project length 13.5 km (8.4 miles)

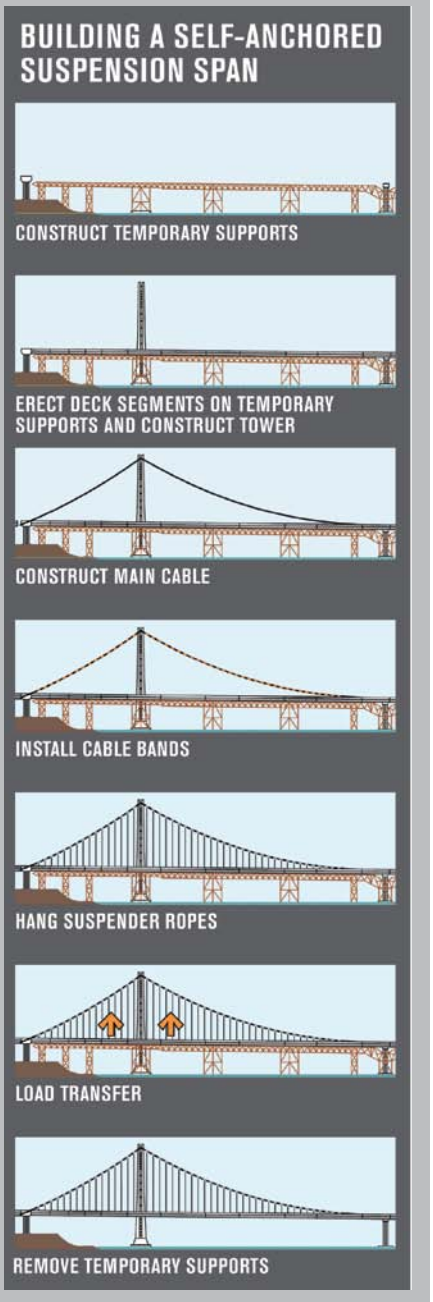
Includes state-of-the-art seismic innovations not previously used

Daily average number of vehicles that use the Bay Bridge: 280,000

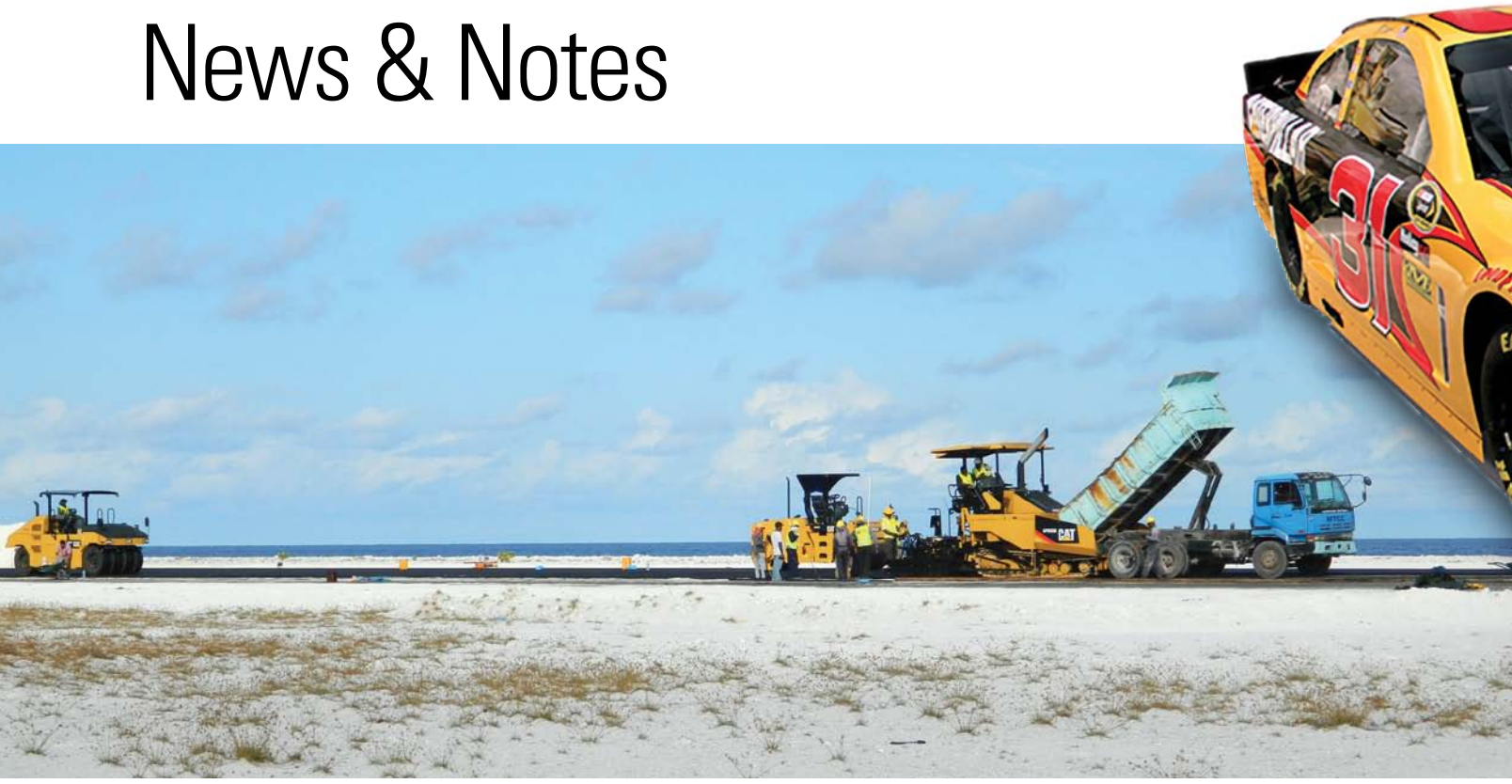
Daily average number of vehicles that use the Golden Gate Bridge: 100,000

East Span damaged in 1989 Loma Prieta earthquake

For more information: *baybridgeinfo.org*



News & Notes



The island of Thimarafushi is now ready for visitors.

PAVING IN PARADISE

Caterpillar Paving products helped build a runway at the remote island of Thimarafushi, which is part of the country of Maldives and the Thaa Atoll.

Reaching the island, in the Indian Ocean, had been no small challenge. It required flying to one of the country's two international airports, then a flight to a domestic airport, and then travel by boat.

Thimarafushi became the seventh domestic airport, which will make it a hub for some nearby islands (there are 1,192 islands in Maldives, with only 200 inhabited). The government of Maldives believes tourism will grow at Thimarafushi and other nearby islands if they are more accessible.

Equipment had to be delivered by landing craft and barge. That included the hot mix plant, which was transported component-by-component.

The Cat® AP655D Asphalt Paver with an AS4251 Screed placed the 1200 m (1,312 yd.) by 30 m (33 yd.) runway and taxiway, which is on land that is surrounded by sea and was reclaimed two years before paving began.

A 200 mm (8 in.) aggregate sub-base was placed first, and a Cat CS533E Soil Compactor compacted it to 150 mm (6 in.). The same process was followed for the second layer. The third layer consisted of binding material that was placed at 130 mm (5 in.) and compacted to 100 mm (4 in.). The fourth layer was asphalt with aggregates of 12.5 mm (1/2 in.), 9 mm (1/3 in.) and 6 mm (1/4 in.). It was placed at 60 mm (2.4 in.) and compacted to 50 mm (2 in.).

Operators, too, were hard to find, though the local Cat dealer helped provide training. And while all involved found the island hard to reach, the scenery that awaited them certainly seemed worth the effort.

Now, with the new airport, the trip is much easier.

NEWMAN BEHIND THE WHEEL

Ryan Newman will drive the No. 31 Caterpillar Chevrolet SS in the NASCAR Sprint Cup Series starting in 2014. Newman, 35, is a 17-time NSCS race winner with 50 pole awards to his credit. He is the 2008 Daytona 500 and 2013 Brickyard 400 champion.

"This is a great opportunity for our team," said Richard Childress, president and CEO of Richard Childress Racing. "I am very proud to have Ryan in the No. 31 Caterpillar Chevrolet starting next year. We have high expectations for this No. 31 team. Ryan has proven himself to be a great driver, and I'm looking forward to winning races with him."

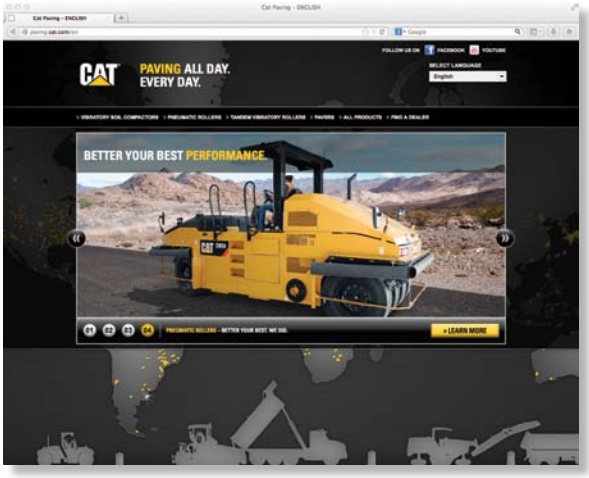
SOIL COMPACTION BOOK PUBLISHED

The Cat Paving Products *Guide to Soil Compaction* has been printed and is available for purchase through local Cat dealers and on **amazon.com**.

The *Guide to Soil Compaction* features more than 100 illustrations and as many photos. The written material addresses everything from the basics to the latest Intelligent Compaction technology, and its role on the jobsite.

The book is the second in a series of publications that offers technical expertise and advice on how to tackle specific applications. The first book, the *Guide to Asphalt Compaction*, was published in 2012. That book, which earned the prestigious American Graphic Design Award, has been printed in English and many other languages.

For more information, contact your local Cat dealer or visit **amazon.com**.



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