Issue 3 **2010**

PAVING NEWS

A Caterpillar publication serving the global paving industry

Firm Ready for Takeoff When Opportunity Arises

Cat® Grade and Slope Leads to Perfection

Intuitive system makes believers out of operators

CATERPILLAR®

Technology Backs up Training

Lieven Van Broekhoven
Worldwide Sales
and Marketing Manager

Over the years when we at Caterpillar Paving have asked customers what kind of technology they'd like to see on our new models, we've heard many ideas about new features. But the most consistent request isn't about the features themselves—it's about offering reliable, easy-to-use technology that doesn't require operators to re-learn their jobs. In other words, technology that provides an easy transition.

So, it was gratifying for me to read in this issue ("Not One Single Bump," page 16) comments from a customer about the newly released Cat Grade and Slope system. When Superintendent Jeff Luce uses phrases like "simple to run," "intuitive," and "easy to understand," I know that we put in time listening to users before we launched this paver option. What good is cutting edge technology if operators don't trust it and won't use it?

I would be remiss, though, if I didn't point out that a lot of forward-looking paving contractors, like Asphalt Paving & Materials Co., are already producing very good work. No one paves a single lift for 21 lane miles without bump grinding unless they've made a commitment to quality and to crew training. That crew knows what they're doing and are able to take in new technology and to make it work for them immediately.

I imagine someone could learn a lot watching Jeff Luce's crew take off from a transverse joint. They must be pretty good at it, because transverse joints are the main targets for bump grinding. I wonder who trained them? Do you suppose they take off in manual depth control or do they use automatic grade and slope?

Their performance tells me one thing: They were trained and ready the first time they used the new Cat Grade and Slope system on that highway project. That's the correct way to use new technology, and the result speaks for itself. ■

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Feature Articles

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The paver moved at a consistent pace.

Peab Asfalt of Sweden primarily handles major road and highway projects in the inland portion of the country. But the company was willing and able to take on a new challenge when an airport runway needed to be paved in their own backyard.

"When you're working on a project like this, anything can happen," said Reijo Seppanen, project supervisor for Peab. "You can have problems with the weather and there are time pressures. We have to get off the runway one hour before the next airplane is arriving."

Firm Ready When Opportunity Arises

Many steps were taken to prevent segregation.

Peab Asfalt crews find success on airport jobsite

The Project

The work was done at an airport in Jonkoping. It's a relatively small airport but still crucial to the inland area of Sweden. "We don't have many airports around here," Seppanen said.

Flights typically were rerouted during the project, with the exception of two per day in the later afternoon or evening. That enabled Peab Asfalt to make progress almost daily, and also kept outbound and inbound passengers and freight connecting to key hubs in Stockholm and Copenhagen.

"Even with the limited flights, we had to adjust paving schedules," Seppanen said. Paving often started in the middle of the night and extended into the late afternoon of the following day.

The paving firm placed 9743 metric tons (10,736 short tons) on the runways and another 4073 metric tons (4,488 short tons) along taxiways and other areas adjacent to the runways. Density requirements consisted of an air void between 1.5-5.5.

Another contractor handled the first phase of the project, which consisted of milling about 50 mm (2") off the existing surface. "Then we put the asphalt down," Seppanen said.

The paving portion of the project took about three weeks.

Paving

Segregation is always on the mind of Seppanen and others at Peab Asfalt. The efforts start at the plant, with proper loading of the trucks. The trucks themselves have rounded, not flat, bed bottoms. This prevents sticking when

"I really like the Cat® paver. It doesn't take a lot of diesel—it's very stingy with the fuel."

the materials are end-dumped into the Cat AP600D later in the process.

The trucks traveled about 70 km (43 miles) from the plant to the airport. Traffic was light given the area and the fact much of the paving was done at night. Shorter truck cycle times, combined with other segregation fighting efforts, paid off.

"Our trucks are insulated, so the asphalt stays hot," Seppanen said. "The asphalt is covered as well. There was no problem keeping the asphalt in the trucks hot because the job took place in the middle of the summer."

The mix left the plant at 170º-180º C (338º-356º F), and was dumped into the hopper at about 160º-165º C (320º-329º F). Plant production, paving speed and trucking distance were all calculated to keep the paver moving consistently. "We move continuously," Seppanen said. "That's one of the key efforts we make to prevent segregation."

Another segregation-fighting technique is allowing mix to collect in the sides of the hopper throughout the shift. "We don't close the (hopper) sides between lifts to loosen material," Seppanen said. "The asphalt on the sides is cold, and we don't want to shake it loose and mix it with the hotter material. When the work is done for the day, we clean the sides."

The AP600D was a newcomer to the site, with the company previously using a different manufacturer's product.

"I really like the Cat paver," Seppanen said. "It's silent compared to others." He also appreciated its fuel efficiency. "It doesn't take a lot of diesel—it's very stingy with the fuel," he said. Crews also found the screed adjustments easy to make.

The paver worked at a pace of about 4-5 m (13-16') per minute, placing a single lift of 40 mm (1."). The Cat paver worked at a width of 4.5 m (14.8'). Ten

Round truck bed bottoms prevented materials from sticking.

passes were required to cover the entire 45 m (148') width of the runway. The runway was 2,200 m (7,216') long.

"The middle of the runway is the highest point because of drainage," Seppanen said. "We started at one side, then made five passes until we reached the middle. Then we started at the opposite side, and worked our way back to the middle."

The width of the project led to many longitudinal joints. Peab Asfalt crews placed the new, hot mat slightly higher than the adjacent cold mat. A breakdown compactor used a small side roller to compact the joint.

Compaction

Three heavy rollers handled compaction. All three were in the 11 metric ton (12 short tons) range.

The first roller made 6-7 passes, with a movement up being one pass, and the movement back counted as a second pass. "The operator was very tight to the paver, and worked as far back as 20-30 m (65-98')," Seppanen said.

The second roller worked about 50 m (164') from the paver. The number of passes varied based on that day's conditions. The compactor was vibrating while making its passes.

The third roller had no set distance between it and the rest of the paving train. "He mostly worked to take the tracks out of the mat and make it smooth," Seppanen said.

Core samples were taken along the way to ensure adequate compaction was being achieved.

The project had production and time demands, but Peab Asfalt was glad to take it on. "We don't have many projects like that come up," Seppanen said. "When there is an opportunity, you have to take advantage of it."

Product support is very important to the company's efforts to hit deadlines and overcome other obstacles, Seppanen said. "If we ever have a problem, I call the dealer and they help right away," he said. "We try on the phone first, and usually can solve problems that way. If that doesn't work quickly, they come to the jobsite right away."

The combination of customer support commitment and parts availability helps keep the equipment up and running. "It's important on time-sensitive jobs like this," Seppanen said.

The airport proved to be a challenge, but in this case, both crew and paver proved more than up to the task. ■

Two machines can accomplish the work of three

Conserve by Minimizing Compaction Train

The compaction process generally consists of three phases: breakdown, intermediate and finish. However, you do not necessarily have to use three compactors to accomplish the three phases. In some cases where requirements and specifications permit, proper planning can allow two compactors to do the work normally assigned to three.

Cat® Dealers and Cat paving industry consultants are expert at matching the compaction train to the laydown equipment and helping reduce your equipment investment and your energy consumption. Here's an actual project example of how Cat consultants go about the compaction planning process.

First, Cat consultants calculate the paving speed based on hourly tonnage, paving width and paving depth. On this project the contractor was laying down 250 tonnes per hour (275 tph) at an uncompacted depth of 70 mm (2.75") and a width of 3.66 m (12') while using a material transfer vehicle. The paving speed was 7 meters per minute (23 fpm).

Available for the project were two CB54 XW double drum vibratory compactors. On the test strip, we determined that after three passes per panel the mat is brought to the breakdown density target of 92.5% to 93.5% of maximum theoretical density. Based on 2 m (79") drum width and frequency of 2520 vibrations per

2 m (79") Cat compactor working in the hottest temperature zone staying ahead of the tender zone.

minute with 75% efficiency factor, the compactor will match the paver speed by working at 70 mpm (229 fpm).

The first CB54 XW did its work in approximately 8 minutes, staying ahead of a tender zone that begins 12 minutes behind the paver when the mat has cooled to about 110º C (230º F). Tenderness stops about 30 minutes later when the mat has cooled to about 90º C (190º F). At that point, the second CB54 XW set in high frequency (3800 vpm) and low amplitude made two passes at 116 mpm (380 fpm), always staying behind the tender zone, and bringing the density up to 94.5% to 95% of maximum theoretical density.

Finally, when the mat had cooled below 60º C (140º F), the second CB54 XW completed two long, slow passes to clean up any marks left by previous rolling.

Higher hourly production or project specifications may dictate the use of another compactor, a pneumatic, for example. But why increase your equipment operating costs and burn more fuel if you don't have to? Look to your Cat Dealer for guidance to help match the laydown and compaction equipment on your projects. ■

The next haul unit must be held up and kept clear of the front of the paver while laborers are cleaning up spills.

Training Supports Safety Programs

Most paving contractors have safety policies and programs. Their employees are expected to follow the established guidelines. Companies pass out safety manuals and conduct annual safety certification classes. There are start-of-shift safety reviews. Rightfully so, workplace safety has the highest priority.

One way to supplement safety training is to continuously conduct operation and application training. Operators and laborers who are confident of their skills are in control and are less likely to make careless mistakes or create potentially hazardous situations.

There are some good examples of how operator training can help to minimize exposure to workplace safety issues.

- **Train paver operators in the proper truck exchange procedures.** During courses conducted by Cat Paving Products, operators are trained to avoid or minimize spills out of the front of the hopper during trucks exchanges. With fewer spills on the grade there is less chance that laborers will be working between the paver and the next truck backing in to the paver push rollers. Thus, a potentially hazardous zone is eliminated.
- **Compactor operators need training for rolling patterns that eliminate entry into the screed operators or laborers work zone.** The rolling pattern boundary should end at least two compactor lengths away from the screed. There is no need for the rolling pattern to be any closer. Remember, screed operators and laborers are almost always looking forward, not back at the compactor. They are usually unaware of the compactor's position.
- **Train the paving crew to set up grade and slope systems correctly at the start of the pull.** This is especially important if there is traffic along one side of the paver. Sensors and skis must be properly positioned so the operators do not have to make adjustments that would expose them to traffic once the paver is moving.

Safety is more than awareness. It's also about the confidence that comes from being welltrained and alert to all aspects of the work zone. Include operation and application training whenever possible with safety training. Your Cat Dealer has a wide range of operation training material available for this purpose. ■

Make Your Crew 'Exceptional'

Training programs of all types available

Paving contractors today face more demands than ever. There are customer demands to meet, and deadlines to hit. Productivity is always on the minds of owners and supervisors as they try to maximize the resources they have.

Crucial to all these efforts are crews. It takes exceptional crews to deliver all the requirements the industry now demands.

How can your crew become "exceptional"? It all starts with training. Crews need to know the proper techniques. They also must learn to leverage the technology and productivity that is built into today's machines.

Caterpillar and your Cat dealer can supply the experts to help transform your crew. Here are some of the ways they can help.

Paving Operations Training

Paving Operations Training (P.O.T.), provided through Caterpillar, is a combination of classroom and hands-on training. It is offered at a Caterpillar facility.

P.O.T. is a "train the trainer" program. That means those who attend the training are able to teach those same lessons to crew members back home. Each participating company receives a training kit that contains all the written materials, outlines, tests and evaluation forms to help the attendees share their newfound knowledge.

The daily routine includes time in a classroom and at a demo site. Topics range from fundamentals, to transverse and longitudinal joint construction, to critical screed adjustments.

Paving Operations Training courses are currently available for North American operations and will soon be available worldwide.

On-demand customized training classes

These sessions take place at a location of your choice, whether it's your dealership, a Caterpillar facility, or a facility of your own.

The program is about more than convenience. It also is tailored to your specific needs. Tell your dealer the targeted areas of improvement for your crews and a curriculum will be designed to meet your needs.

Topics include equipment operation, as well as servicing.

On-the-job crew training

Experts from your dealership and Caterpillar will join your crew on the job to help them implement the proper techniques. They will help troubleshoot mat issues as well as compaction issues. Classroom sessions can be arranged to coincide with and complement the on-site lessons.

Call your Cat dealer today for more information on a training program that can help your crews become "exceptional." ■

CAT.COM/Training

No shortage of challenges at mountaintop

A New Surface for a Tricky Trail

Highway 34 in Rocky Mountain National Park, Colorado, is a tricky trail. The highway, also called Trail Ridge Road, rises to an altitude of 3 713 m (12,183'). It is the highest continuously paved road in the United States.

The road was in need of repair, having been damaged by a combination of heavy vehicle use—at least during the months the road isn't closed by snow—and weather that brings repeated freeze and thaw cycles.

This summer a team of people from A&S Construction, Canon City, Colo., along with their subcontractors, worked on a 30.5 km (19 mile) stretch of the road. They started at "the bottom" of the project, which was actually an altitude of 2 590 m (8,500'). They then worked their way to the top.

"What's caused us the most trouble is the weather," said John P. Ary, owner of the company. Temperatures drop to –1° C (30° F) some mornings in June and July. "Then you have extremely high winds, so strong your crew can't even stand up," Ary said. "Then you have to deal with heavy traffic, and you have to lay polymer mix."

Paving foreman David Tafoya has dealt with the challenges on a daily basis. "It's a tough job," Tafoya said. "I've been paving for 20 years, and it doesn't get much tougher than this. The challenges are part altitude, and part element of surprise."

Everything is more difficult at such altitudes. Simply breathing and staying hydrated proved to be a struggle, as did winds that reached 129 km/h (80 mph) at the mountaintop and occasionally shut down paving.

Cell phone service is non-existent, leading to the use of two-way radios. Yet nowhere is communication more important than on a job with such logistical challenges—including narrow roads, big trucks, and thousands of vehicles.

"Over the July 4 weekend, 70,000 vehicles passed over this road," Tafoya said. "At one point, there were 2,000 vehicles per hour. The pace isn't like that every day, but it's very, very busy all the time. The slower speed of the tourist traffic makes the traffic seem non stop, bumper-to-bumper, at times."

The Project

Specs called for removal of 89 mm (3.5") of the existing mat, pulverizing and reclaiming the road, then placing two lifts of asphalt on top of the reclaimed base. A&S had two years to complete the work, but will likely finish the job in one season despite uncooperative weather. But doing so required nearly all the company's energy.

"We wanted to do this project right, and we wanted to do it now, and we didn't want to have to return here in the spring," Tafoya said. "We were willing to do anything we could to get it done in one season."

Crews were limited in how much they could work. Night work paving was impossible because temperatures often fell to the -1° C (30° F) range. In addition, specs allowed for only 30-minute traffic delays. The traffic increased in the afternoon, so crews typically had to stop paving by 2 p.m. at the latest, with 1 p.m. being a common stop time.

Paving

The road's width is said to be 8 m (26'), but it varies between 6.7 m (22') and 11.6 m (38'), Tafoya said. "It's not like a standard highway job in most ways, and the varying width is one of them," he said. "We have to adjust along the way."

The crew typically paved in widths of about 4 m (13'). Belly dump paving with a pickup machine is nothing new for mountain paving projects completed by A&S, but a material transfer vehicle was spec'ed into the job, so A&S had to adjust.

The paving took place on a road reclaimed by a Cat RM500 Road

Reclaimer.

At the peak, crews typically paved 7.6 m (25') per minute, or 227 metric tons (250 short tons) per hour. That pace resulted in averaging 2.4 m (1.5 miles) per day. "The pace is set at the plant, with truck haul times and traffic being controlling factors," Tafoya said. Given the rapidly changing conditions, adjustments are made based on challenges that crop up anywhere in the chain, Tafoya said.

The cool temperatures were a concern from the beginning of the process, where mix was loaded at a temperature of over 149º C (300º F).

The portable plant was about 4 miles from the start of the 30.5 km (19 mile) long project. Yet covering that short distance between the plant and the paver required 25 belly dumps weighing 22.6 metric tons (25 short tons).

The mix is about 149º C (300º F) when it's dumped, and 143º C (290º F) when it goes into the paver. The mix temperature is about 138º C (280º F) immediately behind the screed.

Delivering the load was only part of the hassle. Trucks often had to pull forward a few miles before finding a spot to turn around. After they did, they often were further delayed in traffic before finally returning to the plant.

"The issue is turning around," Tafoya said. "They have to go a long way to turn around, then get in line with the traffic."

Compaction

The pace of the paver, and eventually the rollers, started at the plant.

"We've had to adjust as the altitudes have climbed," Tafoya said. "There was no wind at the bottom, and the temperatures were warmer. But at 12,000' (3,658 m), it's usually cold and windy."

The thin mat also was a factor. "That top lift cooled very quickly," Ary said. "It was only 1.5" (38 mm), so it didn't take long to cool, especially with the lower temperatures and stronger winds at the higher altitudes."

The compaction process, at all altitudes, typically consisted of a 9-12 metric ton (10-14 short ton) breakdown roller working immediately behind the paver and as far back as 76 m (250').

The breakdown roller worked in vibratory mode when compacting uphill

and static mode downhill. It would make a single pass, with a movement up and then back counting as a pass. The mat temperature was 116º C (240º F) after the breakdown pass.

Handling intermediate compaction was a 22 metric ton (24 short ton) rubber-tired roller. It completed six passes. The mat was about 104º C (220º F) when the passes were completed. Two 3.6-4.5 metric ton (4-5 short ton) finish rollers followed. They made just one or two passes, mostly to remove marks from the rubber-tired roller.

The crew achieved compaction of about 93 percent, exceeding the spec of 91 percent. Smoothness requirements also were met.

"It was a difficult job, mostly in terms of the weather and logistics," Tafoya said. "There were many logistical challenges to work out, and doing that at high altitudes is no small task."

Ary agreed. "It's no doubt one of the most challenging projects we've ever paved," he said. "Those challenges were met in part with the aid of positive attitudes and a great deal of help and cooperation from the FHWA and the Park Service personnel. Completion in one season was only possible due to the teamwork exhibited by all the personnel involved. The owners seem pleased that quality work was completed in a timely manner with a minimal effect on the public users. That's what counts." ■

Quickly changing temperatures were a challenge for David Tafoya and his crew.

POWER AT THE PEAK

The Cat®AP1055D Asphalt Paver is the first tracked paver A&S Construction has operated. Paving in the mountains is a perfect application for the machine due to its stability and tractive power.

"As far as the paver is concerned, you can't even tell you're at altitude," said John P. Ary, owner of A&S. "That's one of the reasons we went with Caterpillar."

The slopes and super-elevations can be as steep as 19 degrees, said David Tafoya, paving foreman with A&S, a division of Ary Corp, Cannon City, Colo. "There are grades and slopes to worry about, and then there is the incredible amount of weight the paver is pulling. This paver has the power, and it also grips. You cannot afford to twist and turn, and this machine doesn't."

Operator Kevin Clement referred to the paver as "a bulldozer."

"That's the best paver," he said. "It has good power, and you need that up here."

You also need a smooth finish. "The paver, the screed (1020B) are good highway rideability screeds," Tafoya said. "Rideability counts every bit as much up here."

Clement also praised the visibility, greatly enhanced by the swing-out seat. "You can see the very edge," he said. "That matters everywhere—and nowhere more so than here."

Tafoya believes the AP1055D is a productive, high-end machine no matter where it's used. "That is an awesome machine," he said. "Caterpillar has pretty much nailed it."

Cat® Grade and Slope leads to perfection

‘Not One Single Bump’

Jeff Luce and others at Asphalt Paving & Materials Co. have a simple goal that is shared by many paving contractors.

“We focus on doing very good work,” said Luce, project superintendent for the Huron, S.D.-based company. “We try to pave a smooth road. It sounds simple, but that’s our focus.”

While the goal is straightforward, it’s still challenging. “It’s easy to say you’re going to do really good work, but it’s tougher to back up,” he said.

Keeping the “good work” promise

The system enables operators to place an exact amount of mix.

just became easier thanks to Cat® Grade and Slope. Asphalt Paving & Materials is one of the first companies in the world to integrate the new system, and it has delivered unprecedented success.

"We just finished a state highway project with Cat Grade and Slope," Luce said. "It's the smoothest one-opportunity job the state has seen. We paved 21 road miles without a bump—not one single bump."

The key to the success, Luce said, is believing in the system. "As an operator, you have to realize the automation is smarter than you are. It's telling you how to do the job the right way, at the proper settings.

"You want success? Set up the Cat Grade and Slope, and let it do its job."

The decision

Why did Asphalt Paving & Materials switch to Cat Grade and Slope?

"We bought a new paver, and our dealer sales representative convinced us to try it," Luce said. "He's always had great input in the past and has helped us make the right choices. So we tried it."

The company also is continually looking toward the future, particularly ways to leverage new technology.

"This industry is changing so fast electronically," Luce said. "We really liked the fact this system will be compatible with other Caterpillar products to be introduced in the future."

It will be easy to update the existing system as new stringless and GPS technologies become available. "We wanted something that would be on the cutting edge of what Caterpillar has coming down the road," Luce

said. "We've seen the positive impact their technologies can make on paving performance, and we want to continue to benefit from those improvements."

The specifics

What has Luce noticed about Cat Grade and Slope in the field? "How user-friendly it is," he said. "It has a lot of features that we really like."

• "With the dual screens, you can see both sides of your paver. You can see what your slope is doing, or you can make corrections to your slope from the opposite side. Let's say you don't want to leave one side because you're passing over a super-elevated curve. You can hit a button on the right side of the paver and make a correction to the left. It's not something that happens a lot—but when it does, it's a great feature."

• The system is intuitive. "This is very, very simple to run. It is quick and easy to learn to operate. The displays are very clear. It's easy to understand, 'If I push this button, this will happen.' The displays walk you through what you're doing."

Asphalt Paving & Materials handles a variety of jobs, including airports, highways and parking lots. They've earned numerous paving awards. "Our company name and reputation speaks for itself," Luce said. He's willing to put that reputation on the line in recommending Cat Grade and Slope.

"I would tell somebody, 'Go buy it today,'" Luce said. "I'm saying it because it's true. With Cat grade and slope, we've not once said, 'I wish we could have stuck with the old (non Caterpillar) system.' Not once." ■

PERFORMANCE-BOOSTING FEATURES

What separates the Cat® Grade and Slope system from others? Like so many Cat products, it comes down to performance, reliability and product support.

Intuitive Displays
The straightforward LCD display enables the operator to easily configure the system and make necessary adjustments.

Highly Reliable
The sealed components provide durability and withstand heat, moisture and vibration. The factory installed system ensures that consistent routing and component locations optimize performance.

Single Source Supplier
Caterpillar offers complete support of the entire system. That includes training, consulting and parts support. There is no need to utilize outside suppliers and risk improper setup.

Precise Control
The Cat Grade and Slope System enables operators to place the exact amount of mix on the surface. Controlling thickness maximizes material usage and optimizes compaction performance while saving money for contractors.

The System

- Is available in multiple languages and stored on the Electronic Control Module (ECM), making the LCDs interchangeable from side to side.
- Can provide elevation to one or both sides of the system; cross-slope; or elevation and cross-slope.
- References existing surfaces, curbs and string lines.
- Provides automatic calibration of tow-point valves.
- Is factory installed to ensure proper setup and routing.
- Features sealed components to prevent contamination.
- Enables the operator to change the "deadband" settings for grade, slope and two-point valves.
- Provides visual and audio warnings in the event of a fault condition.
- Stores fault history on the ECM.

LCD Display

- Can operate both sides from a single display.
- Large displays and familiar icons make interpretation easy.

- Text-based menus require minimal training, making setup quick and easy.
- Fault code diagnostics feature easy-to-read explanations; no need to reference a manual.
- Offer brightness and contrast controls that are effective during day or night paving.
- Adjustment keys function as visual grade indicators for easy reference.
- Is sealed to withstand moisture and prevent contamination.
- A lockout feature prevents unauthorized access.
- The Cat grade sensor provides a wide reference range that makes following a stringline easier.
- A directional arrow advising the operator how to stay centered when using a stringline.
- An audible alarm alerts the operator to off-grade conditions or diagnostic messages.
- Features a swivel that enables the operator to view the screen from the walkway and side of the screed.
- Is protected with an enclosure to prevent theft and vandalism.

Grade and Slope Sensors

- The system can utilize up to three grade sensors on the averaging beam. Each sensor sends out five sonic pulses for a total of 15 readings. Six signals are discarded, while the remaining nine are averaged. The tow point will adjust by 1/3 of the total deviation—true averaging for smoother transitions.
- Each sonic grade sensor features five ceramic transducers. Three signals are averaged, while two are discarded.
- Sonic grade sensors provide a reference range of 200-1000 mm (8" to 39").
- Grade sensors account for rapid air temperature changes.
- Contacting grade sensors are available with a shoe- or wand-type sensor.
- Slope sensors measure the cross-slope of the screed and provide an angle range of +/- 10° or +/-17.6 %.
- A cross-coupling feature enables the side slope to immediately react if the grade side makes an adjustment.
- The slope sensor requires a single calibration, and does not drift due to temperature variation.
- The sonic averaging beam reduces grade deviations in the paved surface.
- When utilizing the averaging beam, the system provides on-the-go selection of one, two or three sensors. Switching between sensors does not require recalibration.

CATERPILLAR OFFERS PAVING OPERATIONS TRAINING.

Contract your Cat® Dealer or visit our website for course schedules, detailed course descriptions and online registration. Classes are starting soon. Register today!

http://www.cat.com/paving-training

CAT®