Issue 2 **2011**

# PAVING NEWS

A Caterpillar publication serving the global paving industry


## Smooth Sailing

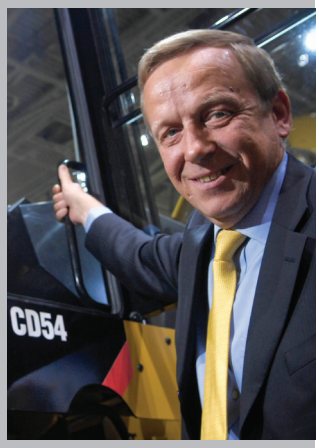
Preparing for the America's Cup

### Small Part, Big Payoff

Extending mill bit life has significant impact on production

CATERPILLAR®

# My Kind of Technology




**Lieven Van Broekhoven**
Worldwide Sales
and Marketing Manager

I love technological advances, especially when the technology is so integrated with the product that I don't have to go to school to learn about it. I want technology that simply helps me do a better job or be more efficient without adding complexity.

This issue of Paving News has several outstanding examples of how Caterpillar uses technology to make products more reliable and more productive. The CAN-bus electrical system now used on most Cat® Screeds is basically invisible to the paver and screed operators. Yet, the CAN-bus cleans up all the electrical routing and simplifies on-board communications. It's unbelievable, but wiring on Cat Screeds has been reduced by more than 50 % because of the new technology. And, the components on the screed and the tractor share information better.

For example, Cat Grade and Slope Control for asphalt pavers is designed to take advantage of the CAN-bus system. Because the electrical interface between the screed electronic control module and the grade controls is better, screed control is more reliable and more responsive. Plus, the new technology provides a better platform for three-dimensional paving if that's the direction you want to go.

I would also like to mention the story about the manufacturing technology being used on Cat cold planer cutter bits. We've always had a great rotor design and a reputation for ease of maintenance. The latest focus on the manufacturing process for the cutter bits incorporates state-of-the-art powdered metal technology. The result is bits that can provide up to 50 % more service life than other bits. From the crew's standpoint, nothing changes. They have nothing new to learn. The equipment operates the same way. Cutter maintenance is still done the same way, just less frequently, so the cold planer gets the tonnes in the trucks in less time.

Caterpillar makes the transition to the new technology effortless. That's the kind of technology that I want to buy. ■

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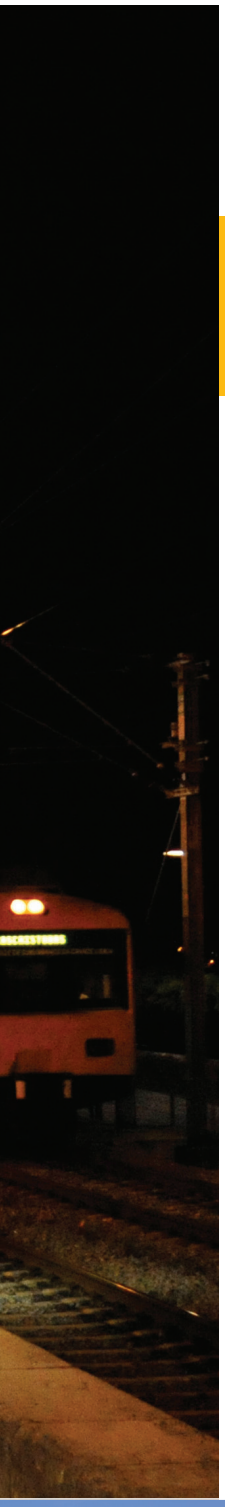
# Feature Articles

Paving News: 2011 - Issue 2


The importance of the Cascais street meant it had to remain open while the work was done.



# Smooth Sailing

## Paving job goes perfectly in preparation for America's Cup

The Portuguese village of Cascais has enough attractions, including magnificent views of the Atlantic Ocean, to make it a tourist destination. The historic hotels and winding roads that nearly touch the ocean also have been the backdrops of films, including a James Bond film. In addition, the city has a rich racing history, having hosted the Formula I Portuguese Grand Prix and numerous motorcycle events.

The attention was even greater this year with the arrival of one of the world's premier sailing races, the America's Cup, in August.

With a busy summer ahead, Cascais municipality realised it had to make improvements to Avenida Marginal, the waterfront thoroughfare that leads to the village and the main attractions.

The main issue with the road was its drainage.

"In times of heavy rainfall, stormwater tributaries accumulate, forming a river and making it dangerous to cars and pedestrian circulation," an engineer for the town of Cascais wrote in a report.

The importance of the street meant that the work had to be completed before the America's Cup crowd arrived. Yet the seasonal tourists also meant the road had to remain open while the work took place.

Sanestradas, a respected paving contractor, was chosen for the job based on the time requirements and the need for high quality.

### The project

Cascais municipality's project involved a 1 km section of Avenida Marginal. Much of the road's surface was in good shape, with the exception of about 65 m. That section of road had been damaged during a building construction project. The 65 m would also be the location for a new drainage system, with rainfall channelled to it via curbs along the remainder of that 1 km section.

Directing the water to those drains created another challenge. About 300 m of the road was so level that water did not flow.

A simple solution would have been placing a new surface lift with a slightly steeper grade. Yet that choice was dismissed because of low curbs: an


### *AT A GLANCE*

**Company:** Sanestradas
**Owner and Managing Director:** Daniel A. Gonçalves
**Headquarters:** São Domingos de Rana, Portugal
**Founded:** 1966
**Services offered:** Engineering; asphalt manufacturing; paving

average of only 100 mm. Applying a new bituminous layer to create the grade would have simply caused rain to run over the curbs. The flooding would have continued.

Cascais municipal officials came up with a strategy. First, they proceeded with the new drainage system. The 65 m of existing curb was removed, and the ditch floor area replaced with two 200 mm layers of crushed, aggregate base of extensive granulometry. That base featured irrigation fluidised MC70 bitumen at an impregnation rate of 1 kg/m2.

A binder layer with a thickness of 11 cm was placed on top, followed by the wear layer with an average thickness of 6 cm.

The remainder of the road did not need new base layers or other improvements. Therefore, milling crews removed 6 cm of material. The paving crew then placed an AC 14 Surf 35/50 (BB) wear layer over both the rebuilt and milled portions of the project.

## Tight schedule

Crews were given just two weeks to complete the work, but the time was actually considerably less because work was only allowed at night. Crews began work at 8 pm or 9 pm and continued until about 7 am the following morning. In addition, Avenida Marginal had to remain open to traffic with no limitations on Fridays, Saturdays and Sundays to allow tourists to come and go unimpeded. That meant the two weeks was in actuality eight days.

Further complicating the project was the requirement to keep traffic circulating, though in a limited manner. This led to a process of milling one lane for two nights, then tandem paving and compacting for the next night. At that point, the lane was completed.

## Milling

A Cat® PM102 Cold Planer removed the 6 cm of asphalt in the required areas. The PM102, smaller than the Cat PM200, was chosen because its size made it a better fit for


Tandem pavers helped crews meet the tight deadlines.


the narrow road. Yet the machine delivered the required productivity, too, as it had to mill a lane in only two nights.

The tight timeframe left no margin for error. Because of this, two service technicians from STET, the Cat dealer in Portugal, remained on the jobsite throughout the night in case they were needed. Fortunately, there were no problems.

## Paving

When an entire lane was milled, tandem pavers went to work. Delivery trucks end-dumped the material into the pavers.

Sanestradas chose the new Cat AP555E with an AS4252C Screed. Working just a few metres ahead of it was the tried-and-tested Cat AP655D.

Pedro Santos, project chief for Sanestradas, was pleased with both pavers. One key reason: their productivity enabled the job to be completed in a short time frame. "With the two pavers working in tandem we succeeded in finishing the job much faster than expected, and with excellent smoothness results," said Sr. Santos.

Caterpillar had a technician specialised in handling pavers on hand to ensure smooth integration of the new AP555E. He closely followed both the performance of the machine and the crew and offered suggestions for improvement.

## Compaction

Three Cat compactors, the CB434D, PS300B and CB34, easily kept pace with the two pavers, and met density specifications.

The PS300B worked in breakdown mode, and was right behind the second paver, the AP555E. The longitudinal joint was done 'hot', and easily compacted, because the first paver worked only a few dozen metres ahead of the second.

The compactors worked at a distance that enabled compaction and kept pace with the paving train. The number of passes depended on the pace of the paver and the delivery trucks. The compactors treated the two freshly placed mats as if they were one and worked across the entire width of the lane.

## Completion

Santos and other Sanestradas representatives were pleased with the performance of the Cat cold planers, pavers and compactors, and the Caterpillar dealer. Many officials from both Caterpillar and STET were on-site to ensure the highly complex project was a success.

No spectators were more important than Cascais Municipality authorities, who also kept a close watch on the jobsite. They saw machines making quick work of the milling, paving and compaction and were pleased the road was completed in time for the America's Cup, while serving all the tourists so crucial to the village's economy. ■


# Cat® Screed Improvements Enhance Profitability

## Technology, convenience built into new models

Many pieces of the paving equation must come together to create smooth mats. While all elements are crucial to the process, none are more important than the screed. In fact, a properly specified, selected and operated screed can be the difference between a satisfied customer and costly rework.

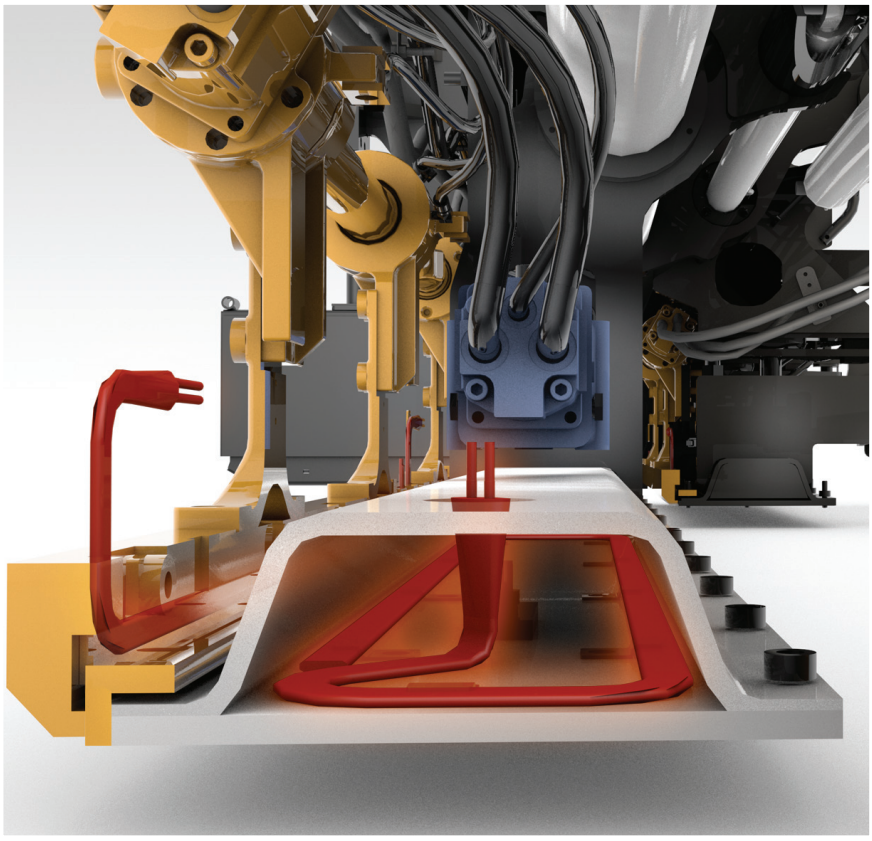
Even though Cat® screeds are already recognised as some of the most advanced in the industry, designers at Caterpillar Paving Products are fully aware of the need for continuous improvement. As improvements are made, rest assured key features and benefits of previous screed models won't be forgotten.

They include:

- Great control for urban and commercial applications, minimising handwork.
- Heavy-duty frames that prevent flexing and enable material to easily flow out to extenders when increasing paving widths.
- Smooth, consistent results on mainline paving.
- Easy-to-operate, low-maintenance screed plates.
- Superior serviceability.

Customers have provided key input on how to further enhance the existing product line. Engineers have taken that input, as well as research gathered by experts in the field, and created four key improvements that are being phased into the entire screed line. They are:

1. Utilisation of a CAN-bus system
2. Integration of an improved grade and slope system
3. Electric heat enhancements
4. A convenient toolbox



The electric screed system has been updated to extend the life of heating elements.

### CAN-bus system

This is a key improvement that already has been implemented in many Cat screeds, and will be added to others soon. The CAN-bus system substantially reduces the amount of wiring running between the operator's controls and the components. In fact, some of the new screeds have seen a wiring reduction of over 50 %.

How could so much wiring be eliminated? Previously, a wire ran from each control switch through the screed harnessing to the tractor control system. The information then was routed from the tractor back to the screed along a separate wire to the proper motor or controller to carry out the function. Now the screed handles these functions internally, and only communicates relevant information to the tractor over dedicated communication wires.

The reduction in wiring has two important customer benefits. First, the reduction lessens the possibility of a problem with wiring. Second, if a problem does occur, it's much easier to isolate. Technicians and even operators will find it much easier to troubleshoot.

The screed continues to respond quickly to commands. The CAN-bus system is simply an improved method for the various components to easily communicate with one another. These communication changes allow for product improvements without costly wiring changes.

### Cat Grade and Slope option

The addition of this system into the new screeds means less reliance on the operator. Paving contractors will see better control of yield, and an associated cost-savings, as the screeds become more automated. The automation provided by grade and slope also helps place smoother mats.

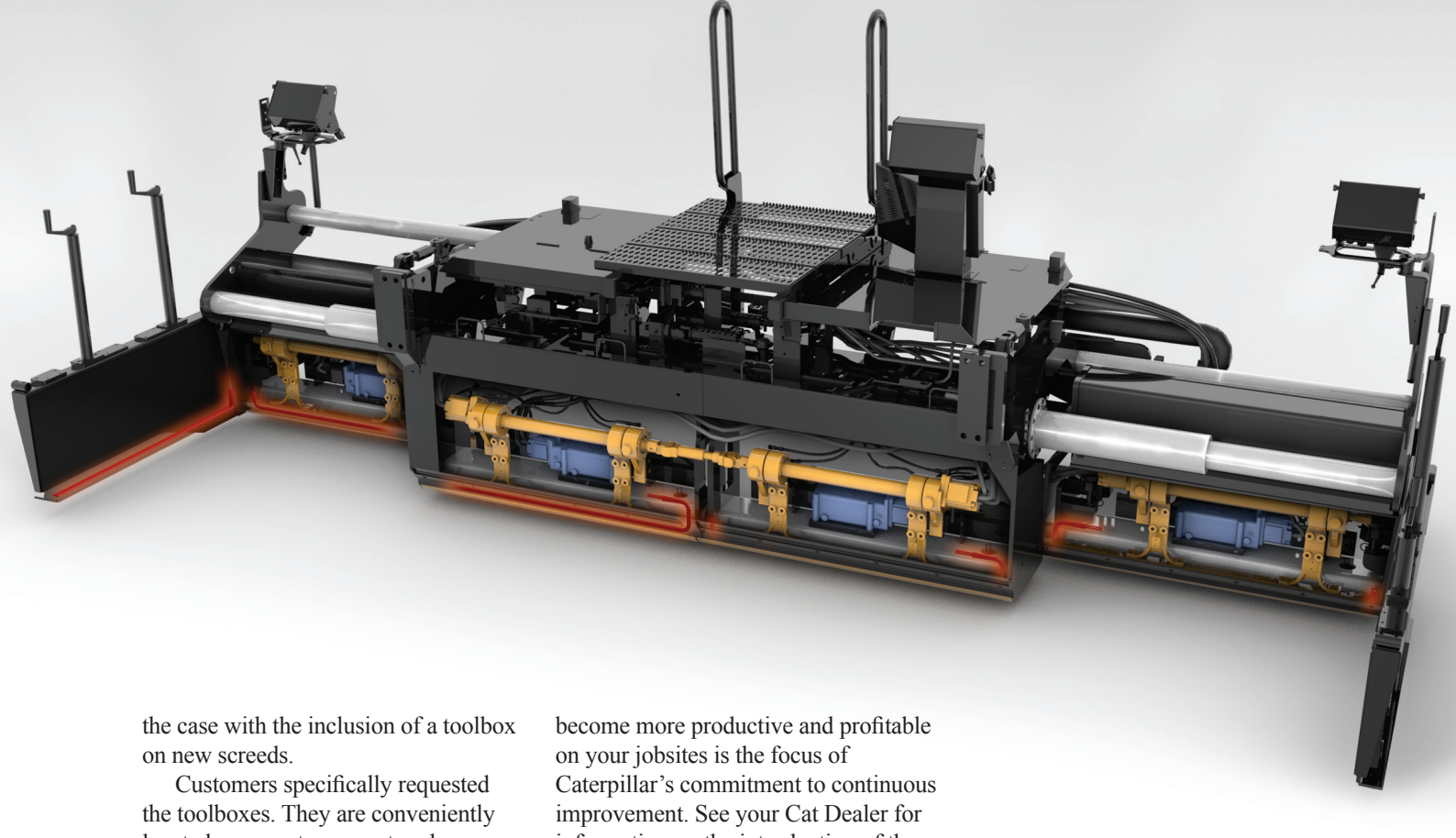
In addition, its implementation enables contractors to benefit from the quality improvements associated with 3-D paving techniques and the comprehensive, multi-layered information they provide.

### Electric screed improvements

Paving contractors over the last few years have embraced the electric screed system and the consistent heat it supplies, from one end of the screed to the other. Caterpillar engineers have updated that electric system to extend the life of the heating elements.

### Toolbox

Sometimes an improvement has more to do with customer convenience and less to do with technology. That's



the case with the inclusion of a toolbox on new screeds.

Customers specifically requested the toolboxes. They are conveniently located so operators can store key jobsite tools right on the screed.

Helping you find new ways to become more productive and profitable on your jobsites is the focus of Caterpillar's commitment to continuous improvement. See your Cat Dealer for information on the introduction of the screed improvements by model. ■

## *THE LATEST IN THE LINE-UP*

The Caterpillar AS3301C Asphalt Screed is the most recent to join the Caterpillar Paving Products line-up. It replaces the Extend-A-Mat 10-20B.

Like other Cat® screeds recently developed, or under development, around the world, the AS3301C will show improvements in four key areas: Wiring improvements thanks to a CAN-bus system, integration of an improved optional grade and slope system, electric heat enhancements, and the addition of a toolbox.

**Other changes to the AS3301C include:**

**A spinner for the depth crank.** The spinner makes the crank easier to turn, conserving operator energy throughout the shift.

**Recessed switches.** Prevent un-intended actuation by the operator.

**An improved ergonomically correct control panel.** The arrangement of the panel was adjusted based on input from screed operators.

**An integrated coily cord.** The cord, located near the sonic feed sensor, previously ran from the sensor to the back corner of the paver. It was exposed to damage during normal paving practices or even during travel. The cord now is integrated into the screed's frame for added protection.

**A cupholder.** The new screed includes a spot to hold a bottle of water or a coffee mug. The holder can be folded when the paver works in a confined area or when encountering obstructions.

# A Year of Trade Shows

Caterpillar paving products have been well-represented at trade shows around the world in the last year. Caterpillar and Cat® Dealers continued to show their global commitment by participating in dozens of the events.

No matter what the location, customers can benefit from trade shows. The events provide:

- **A chance to compare Cat machines, side-by-side, with competitive equipment.**
- **A close-up view of new products.**
- **Experts who can answer questions.**
- **A chance to talk about other needs, such as product support.**

Talk to your Cat Dealer about upcoming trade shows in your area.


Ankara, Turkey


Verona, Italy


Jakarta, Indonesia

Bucharest, Romania


Zaragoza, Spain


Mumbai, India



## *CS533E SPECIFICATIONS*

**CS533E**

**Power:** 97 kW

**Operating weight:** 10 840 kg

**Drum width:** 2134 mm

The soil compactor works on the new terminal at Kuala Lumpur International Airport.


# Solidifying The Base For Future Growth

## Cat® CS533E plays key role in airport expansion

The leaders of Malaysia are determined to see their country grow. To understand that you need look no further than the Low Cost Carrier Terminal (LCCT) at Kuala Lumpur International Airport (KLIA).

The impact of the LCCT is staggering:

- It is expected to bring in 30 million passengers annually in the first years after its construction
- That number could grow to as many as 45 million annually in subsequent years
- The "low-cost" element means tourist numbers, specifically, will increase dramatically, having an enormous impact on the country's economy
- A last-minute terminal adjustment was made to include infrastructure that will expedite business travel, making an impact on both the airport and the overall economy

Given these numbers, it's not surprising that officials are eager to complete the project. Their dream becomes closer to reality with each vibrating pass of the Cat® CS533E Soil Compactor.

**The Project**

The LCCT is an enormous undertaking. It is essentially an expansion—a very large expansion—to the KLIA terminal. In fact, the existing KLIA and the new terminal, called KLIA2, will be 1.5 km apart.

Construction firm WCT was awarded the earthworks and drainage improvements of the project. The firm—no stranger to high-profile projects—began compaction immediately after the majority of the drainage work was completed.


The Cat Dealer provided on-site product support, enabling the machine to be serviced without leaving the jobsite.


The airport project has provided a boost to the local economy, while the completed project is expected to provide long-term economic growth.

The terminal, at 242 $m^2$, will be the largest purpose-built dedicated low-cost carrier terminal in the world. It will include 68 boarding gates when completed in April 2012. The project is expected to cost RM2 billion.

**The Role of the CS533E**

WCT chose the Cat CS533E to handle the soil compaction. The single-drum compactor's reliability, durability and ability to work at high speeds are among the reasons it was chosen. Time demands on the job were tight, so WCT used 20 CS533Es on the jobsite. The construction firm turned to their Cat Dealer - Tractors Malaysia - to rent machines to help meet the deadlines.

The Cat compactors were set at the highest vibratory setting while working on the base materials. Their work included the future home of both the terminal and the 4 km runway. The base material consisted of cut-and-fill soil topped with sand.

Random core tests were frequently taken to ensure compaction targets were being reached. Doing so typically required the CS533Es to make six passes (with a single movement up and back counting as one pass).

> "The construction of a project such as this new terminal brings the country many benefits"

The rollers proved productive, working from dawn until 10 p.m. daily. Each compactor rolled for about 300 hours per month.

The Cat Dealer had on-site product support available to keep the machines productive, and enable WCT to meet their demanding production goals.

Operators described the machines as comfortable and reliable.

**The impact**

The effect the LCCT will have on Kuala Lumpur, and well beyond, is significant. Prime Minister Datuk Seri Najib Razak has stated that the low-cost carrier terminal will provide the country with an economic stimulus.

"The construction of a project such as this new terminal brings the country many benefits," the prime minister was quoted as saying in a regional publication. "Not only will it serve as an economic stimulus by providing job opportunities to the people of Malaysia, it will also boost tourism by attracting more airlines and visitors into the country."

Low-cost carriers, served by the

terminal, are attractive to price-sensitive tourists. The terminal will help bring those tourists to the country.

Malaysian leaders also made adjustments to their original plan that allow the terminal to serve more than just low-cost carriers, helping it attract business clients as well. Serving that group of travellers will provide more economic stimulus.

Of course there will be many jobs created during the construction. "With its vision to be a world-class airport business, I am encouraged to know that besides operating top-notch airport facilities and services, there will also be ample retail and commerce opportunities to allow Malaysian businesses to capitalise and benefit from the influx of tourists and spending power flowing continuously through the arrival and departure gates," Najib said. ■

## WCT Berhad (www.wct.com.my)

**Locations:** Malaysia, China, Qatar, Bahrain, India, Vietnam, UAE

**Established:** 1981

**Specialties include:** Formula One Circuits, Civil engineering and earthworks

**Past projects:**

- **Formula 1 Circuits in Malaysia, Bahrain and Abu Dhabi, UAE**
- **Airports**
- **Hydro-electric dam management**
- **Expressways and highways**
- **High-rises**
- **Township planning and development**

**History:** WCT has completed more than 300 construction projects valued at RM16.5 billion and has delivered in excess of 12,000 units of residential and commercial properties amounting to gross development value of RM3.2 billion.

**Asset investments:** WCT owns shopping malls, grade-A offices, business hotels and has equity ownership in two toll highway concessions in India.

## Not just airports—roads, too

The Cat CS533E Soil Compactor isn't just a favourite at the expansive airport terminal jobsite. It's also the machine of choice for oil palm plantation roads.

The plantations, another of the country's economic drivers, utilise dirt haul roads for the transport of oil palm fruits. The CS533E is a great match for the needs of the road. Its grading and compaction ability enable a single machine to handle tasks that otherwise could require both a grader and compactor.

The roads are in very remote locations, meaning reliability also is an issue. The machines deliver on that front as well.

The remote locations could be challenging when it's time for maintenance. But Tractors Malaysia, like all Cat Dealers, is committed to parts availability by having locations in every major town in Malaysia, as well as plans to quickly deliver those parts to all corners of the country.

Significant Investments Made at Caterpillar Paving Products Plants

# Improved Facilities Benefit Customers

Many of the facility improvements at Caterpillar Paving Products are taking place inside manufacturing facilities. But customers from the outside world will most appreciate the changes.

"While many of our competitors choose to blatantly 'advertise' their investments in facilities, Cat® Paving is quietly, behind the scenes, making the aggressive investment necessary to continue our leadership position in the worldwide paving equipment industry," said Jim McReynolds, Global Paving President.

The improvements to Caterpillar Paving Products plants in Rantigny, France; Minerbio, Italy; Xuzhou, China; and Minneapolis, USA, have been made to provide increased volumes, better quality and timeliness that customers require, McReynolds said.

**Among the changes to the facilities:**

- **Improved materials receiving areas,** including the utilisation of modern technology for scanning, tracking and inventorying all incoming materials. The receiving areas also have a direct line to the distribution warehouse. "It's enabled us to speed up our assembly processes and meet our delivery dates," said Joshua Meyer, Region Manager with Caterpillar Paving Products for Europe, Africa and the Middle East.
- **Only providing what is needed, when it's needed.** "We now deliver only the components for a specific machine to a station," said Giacomo Minchio, Manager of the Minerbio and Rantigny facilities. "It improves space utilisation, and makes the assembly process more efficient. It's an improvement that helps avoid waste. When we avoid waste, we help our customers with cost."
- **A major workflow reorganisation.** "We've reconfigured the lines and the flow," Meyer said. "The increased efficiency means the products are built faster, and also improves quality because there are fewer starts and stops along the way."
- **A reconfiguration of work stations**. The amount of work to be completed at each station is better balanced. Making sure there are quality checks and the right amount of work at each station, and the proper tooling, is part of the improvement plan.
- **The use of 'island' offices.** Process engineers and managers are now located directly on the line. "They're essentially in an all-glass bubble on the assembly line," Minchio said. "They're closely observing the process. If issues arise, they're immediately available to provide solutions and advance production."
- **More comprehensive pre-delivery inspections.** The new process includes more inspections for each machine. They're extremely comprehensive, and done at various points during the process. Machines also are randomly chosen for additional audits. Steps also are being taken to eliminate any trouble spots in the production line.


Reorganised workflow and work stations have improved quality and lessened the manufacturing time at Caterpillar Paving Products facilities, including this plant in Minerbio, Italy.

"To summarise, we are improving our facilities to better meet the demands of the various global markets we serve," said Lieven Van Broekhoven, Worldwide Sales and Marketing Manager. "There has been considerable consolidation in the global paving industry in the past few years, and we are positioning ourselves to remain the best partner for our paving customers in the markets where we are currently the leader, and to become a stronger contender in those geographical areas where we see potential for growth well beyond our current position.

"The improvements in our facilities are the result of our recent phenomenal global growth and the experience we have gained from that. Our production, logistics, purchasing and marketing teams all contributed to the concepts and implementation of the improvements mentioned. We call this Cat@work." ■

# Mill Bit Life a Big Factor in Cost-per-Tonne

Many contractors consider power a key indicator of cold planer productivity, and rightly so. Power certainly is an important contributor to overall performance.

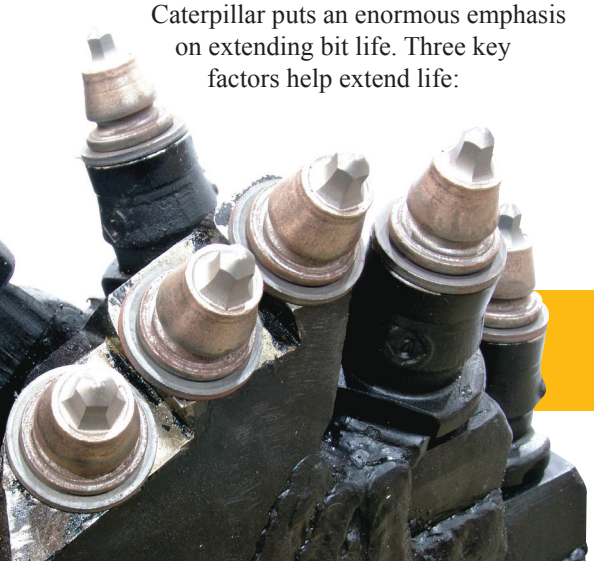
Those same contractors may not be as likely to consider the impact of mill bit life when factoring productivity. Yet the useful life of those bits has an enormous impact, on both production and costs.

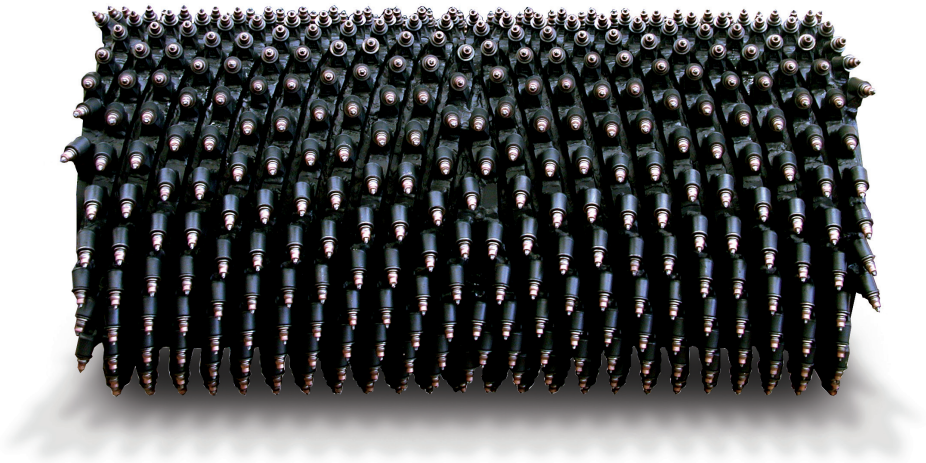
First, long-lasting mill bits maximise machine uptime. During the course of a year, mill bits with extended life can deliver hundreds of hours in increased productivity.

An under-rated yet key benefit is that extended bit life enables replacement at the time of the crew leader's choosing. That means new bits often can be installed between jobs or at the end of the workday when operators, haul truck drivers and labourers are off the clock.

This added efficiency provides significant cost-savings, and should be considered at the time of purchase. Bits with lower initial purchase prices can prove to be surprisingly expensive when cost-per-tonne is measured.

That bottom-line cost is why Caterpillar puts an enormous emphasis on extending bit life. Three key factors help extend life:





1. Bit design.
2. Manufacturing techniques.
3. Exclusive Cat® Conical Tool Holders.

### Bit design

Caterpillar Paving Products offers a variety of mill bits, with varied features, to precisely match the materials at your jobsites. Properly matched bits not only offer productivity on the jobsite, but function efficiently to extend life.

Among the life-saving design features of Cat mill bits:

- Tapered bodies that move abrasive material away from the holder.
- Wear-reducing washers.
- High carbide content for longer wear life.

### Manufacturing techniques

The manufacturing process and materials used also have an impact on mill bit life. Caterpillar Paving Products offer Master Grade carbide bits, which can provide up to 50 % more life than standard bits. The focus of the manufacturing process, from the selection of materials to final heat treatment, is to produce mill bits that last.

1. Preparing powders. A hardening material, such as tungsten carbide, is combined with a cobalt bonding material. These materials are milled, mixed, dried and transformed into a powder for pressing.
2. Shaping. State-of-the-art pressing machines turn the powder into a

Tapered bodies and wear-reducing washers help extend the life of Cat mill bits.

raw form of the bit.

3. Sintering. This high-temperature process fuses the bonding material and solidifies the hard metal product. Sintering is so intense that the size of the bit shrinks by 20% during the complex process, leaving behind a compact, hardened bit.
4. Surfaces/tolerances. The bits are so hard that diamond tools must be used to polish and hone them during the last stage of the process.

**Exclusive Cat Conical tool holders**

The holders themselves are built for extended life, and a tapered fit to maintain tightness. Conical tool holders extend bit life by:

- Improving rotation for even wear.
- Holding bits away from the rotor mandrel. This isolates the bits, keeps material away from the drum, and extends drum life, too.
- Breaking away if they strike an immovable object, such as a manhole. The break-away feature helps prevent damage to more expensive components of the rotor drive system.

If you're evaluating mill bit options solely on initial price, you're missing three important elements of the equation: mill bit life, the productivity increases/savings that result from longer change intervals and the negative impact of more frequent downtime on your production schedule. To learn more, talk with our milling and paving experts. ■

## *TIPS FOR EXTENDING BIT LIFE*

1. Choose the right bit for the right job

2. Make sure your water system is functioning properly to keep bits cool and clean

3. Adjust your conveyor speed to ensure proper material cleanout and reduce abrasion


Long-lasting mill bits maximise machine uptime.

CATERPILLAR®