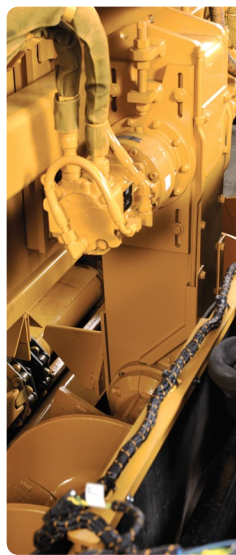
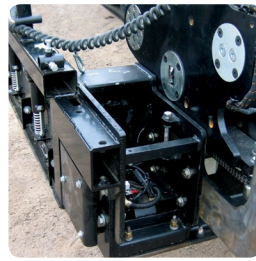


# Training Solutions Guide

## CAT® PAVING PRODUCTS







# CAT<sup>®</sup>

Over the years, Caterpillar has provided you with the equipment to build and maintain the world's infrastructure. And, as technology changed, so did our equipment, increasing your ability to perform more efficiently.

Just as there have been developments in equipment technology, so have there been changes to job specifications and requirements. For these changes, Caterpillar brings you experts with industry

experience to help your technicians and operators meet the ever increasing challenges. Whether it is maintaining your equipment, improving your operator's skills, or updating your crew's techniques, Caterpillar and your Cat<sup>®</sup> Dealer are there to support your efforts and improve your bottom line.

Caterpillar Paving Products  
Training and Solutions





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Bonuses, penalties, tight specifications and tight deadlines. Today, more than ever, you're taking on more project responsibility--and more risk. At Caterpillar we understand the challenges you face, and we have the solutions to help you minimize the risk and maximize your profitability and success.

Caterpillar provides the machines you can count on. And, whether it is maintaining your equipment or building a knowledgeable work crew, Caterpillar delivers the solutions to support your needs:

- Technical training to improve your technician's troubleshooting skills and minimize machine down time.
- Operations training to improve your operator's skills and increase project quality.
- On-demand customized training where you need it, when you need it, to minimize the amount of time your crew is away from the job.
- Project Consulting to help your crew achieve consistent paving quality and maximize the bottom line.

**Contact your Cat® Dealer or visit [www.cat.com/paving](http://www.cat.com/paving) today to learn about how Caterpillar can help you keep Paving All Day, Every Day.**

**Paving All Day. Every Day.**



# TECHNICAL TRAINING



## WHO SHOULD ATTEND?

**Anyone with support responsibility on your Cat paving equipment, including:**

- Technicians
- Shop supervisors
- Service Training supervisors
- Crew members

Classes are kept small in size to offer more hands-on opportunities and time for direct instructor interaction.



## PREREQUISITES

**Experience reading electrical and hydraulic schematics.**



## COURSE DESCRIPTION

**Service training courses provide theory and hands-on training for current paving equipment including:**

- Cat Pavers
- Cat Cold Planers
- Cat Reclaimers
- Cat Asphalt and Soil Compactors

Classes vary in length and include time in the classroom and mechanical lab.

While in the classroom, attendees become familiar with machine systems using a number of tools including detailed colored hydraulic schematics and electrical wiring diagrams. Each system is covered using a basic troubleshooting methodology that emphasizes a step-by-step approach and builds upon a solid understanding of hydraulic and electrical principals.

In the lab, attendees complete hands-on assignments testing and adjusting hydraulic pressures for various systems and practicing calibration steps for electronic control modules (ECMs). Instructors challenge attendees to apply classroom lessons through diagnosis and repair of increasingly complex problems.

Attendee progress is monitored carefully with quizzes assessing critical concepts and functions to ensure course objectives are met throughout the session.





## SPECIFICS

**LENGTH:** 4 days

**CLASS SIZE:** Max: 10 | Min: 6

**LOCATION:** Caterpillar Training Facilities

**FEE:** Ask your local Cat Dealer or go to [www.cat.com/paving](http://www.cat.com/paving) for fee specifics



### COURSE OBJECTIVES

Upon completion of this course, attendees should be able to:

- Trace the flow of oil through the hydraulic system
- Test and adjust all hydraulic pressures
- Troubleshoot hydraulic and electrical systems
- Explain ECM functions and calibration steps
- Set up and adjust grade and slope control (pavers and cold planers)



### TRAINING MATERIAL

Attendees receive training material that follows the course content and includes color-coded hydraulic and electrical wiring diagrams.

Materials are used during the mechanical lab, and eventually can be used as an on-the-job troubleshooting reference.

See your local Cat Dealer, or go to [www.cat.com/paving](http://www.cat.com/paving) for upcoming dates and registration information.

“***Absolutely the best paver mechanic training we’ve ever had.***”

- Paving Contractor, Portland



# PAVING OPERATIONS TRAINING



## WHO SHOULD ATTEND?

- Paving Supervisors
- Training Supervisors
- Training Instructor
- Paver Crew Members



## PREREQUISITES

**Attendees should have a minimum of one years experience with the lay down of hot mix asphalt.**



## COURSE DESCRIPTION

**Paving Operations Training is a structured four-and-a-half day course that emphasizes the fundamentals of asphalt paving and then builds upon these fundamentals to move into more advanced paving techniques.**

Students work in teams of four and practice with a variety of current Cat pavers and screeds. Your student's progress is developed and monitored throughout the session by experienced Caterpillar trainers, concluding with a written and hands-on final examination.

The daily curriculum includes two hours of classroom training and six hours of hands-on training at a paving demo site.

### **Classroom Interactive Sessions include:**

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

### **Hands-on Training includes:**

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



## SPECIFICS

**LENGTH:** 4.5 days

**CLASS SIZE:** Max: 12 | Min: 6

**LOCATION:** Caterpillar training facilities

**FEE:** Ask your local Cat Dealer or go to [www.cat.com/paving](http://www.cat.com/paving) for fee specifics



### COURSE OBJECTIVES

**The primary objective of Paving Operations Training is to develop professional paving operations personnel who can use the course content and material to train other members of their organization.**

As well, this course will polish the skills of your paver and screed operators who are responsible for project quality, performance and efficiency.



### CONTROLLED TRAINING ENVIRONMENT

**Our Paving Operations Training takes place at Caterpillar training facilities under controlled conditions that maximize the experience.**

Our facilities allow for steady learning with generous time for experimentation, student/instructor interaction and questions. Unlike on-the-job training that is fast-paced and time-dependent, Paving Operations Training allows each student to progress at their own pace with the professional guidance from our team of expert trainers.



### TRAINING MATERIAL

**Attendees receive training material and handouts that follow the course content and are used during the hands-on portion of the training.**

Each company present receives one training kit, which contains all the training material, outlines, tests and evaluation forms used in the course. All course materials can be used for internal training within the sponsoring organization.

See your local Cat Dealer, or go to [www.cat.com/paving](http://www.cat.com/paving) for upcoming dates and registration information.





# PAVING OPERATIONS SEMINAR



## WHO SHOULD ATTEND?

**Anyone with support responsibility on your Cat paving equipment, including:**

- Paving/Compaction Operation crew members and supervisors
- Product Support personnel
- Quality Control staff
- Project superintendents



## REGIONAL SEMINAR

**To help your crews achieve top performance, Caterpillar now brings experienced instructors and expertise directly to you through our Regional Paving Operations Seminar.** This gives you the ability to include even more crew members in the training and results in less time away from the job. Additionally, costs for travel and lodging are reduced.



## SEMINAR DESCRIPTION

**This seminar provides theory and real-world applications to improve Paving Operations.** The two-day course schedule is flexible and modular, but is typically divided into two sessions:

### **Day One focuses on Asphalt Paving and covers:**

- Fundamentals of Paving
- Mat Defects
- "Paving by the Numbers"
- Balancing Production
- Grade Control and Instrumentation
- Smoothness Research

### **Day Two focuses on Asphalt Compaction and covers:**

- Fundamentals of Compaction
- Frequency/Amplitude/Speed
- Balancing Production
- SuperPave and SMA Compaction
- How Compaction Affects Smoothness
- Transverse and Longitudinal Joint Compaction

Topics are being developed continuously based on changes in the industry and challenges being forced on actual job sites.





## PROVEN CURRICULUM

**Participants will demonstrate comprehension of the information presented through daily testing.** Answers will be discussed as a group to ensure meaningful retention and understanding of the concepts taught. Upon request, companies can receive copies of their participant's test results.

### Participants head back to the job site with:

- State-of-the-art techniques that can be implemented immediately to improve the quality of their work.
- Improved skills to achieve smoothness and density specifications and earn state incentives.
- Better paving and compaction skills to help maintain your company's leadership edge in this increasingly competitive environment.



## SEMINAR MATERIALS

**Each participant receives training materials used in the course.** They leave with a complete package they can bring back to their organization for internal training, if desired.

Call your local Cat Dealer to arrange a Regional Paving Operations Seminar close to home today!

## DID YOU KNOW?

**Thickness of an asphalt layer affects heat loss more than any other factor. A layer that is 50 mm (2") thick loses heat twice as quickly as a layer that is 75 mm (3") thick when the ambient temperature is 10<sup>0</sup> C (50<sup>0</sup> F).**



# ON-DEMAND CUSTOMIZED TRAINING CLASSES

## WHAT YOU NEED, WHEN YOU NEED IT

Caterpillar offers training tailored to meet your organization's unique needs and logistical requirements. Caterpillar Service and Operations training can be scheduled on demand and can include:

- Service training for Cat Pavers, Compactors, Cold Planers and Reclaimers
- Operations Training for Cat Pavers, Compactors, Cold Planers and Reclaimers
- Paving/Compaction Operation Seminars



## TECHNICAL TRAINING

**On-demand Service Training can be conveniently scheduled and customized for all Cat paving products.** Training length is determined by your organization's needs. You provide the classroom space, required audio/visual equipment, Cat equipment, shop space and basic hand tools and gauges for lab exercises. Caterpillar provides the expert Service trainer and training materials. For optimum learning conditions, Caterpillar recommends a maximum class size of 10 students.



## OPERATIONS TRAINING

**Caterpillar offers hands-on operation training in the field.** Your local Cat Dealer can provide the classroom and demonstration space, or it can be conducted at your site. Class size is determined by the number of Cat machines available for the training and the size of the demo area provided. Typically, training includes two hours of classroom and 6 hours of hands-on training at the demo site.

You provide the meeting space and, audio/visual equipment, adequate demonstration space, Cat equipment, and additional equipment or supplies to perform operations--such as granular material for paving operations and/or loaders to charge haul units and clean the demo area. Caterpillar provides the expert training instructor and training materials.





## PAVING/COMPACTION OPERATIONS SEMINARS

**Classroom seminars are often held at Cat Dealer facilities, but can be held at any locations where adequate classroom space is available.** Class size is limited by meeting room space and the length of each seminar is determined by specific content requirements. Typically each module is 90 minutes in length, allowing for up to four modules per day. Caterpillar provides the training instructor, training materials and related tests.

**A wide range of seminar topics are available; each can be easily customized:**

- Asphalt Paving Fundamentals
- "Paving by the Numbers"
- Understanding Mat Defects
- Paving Smoothness
- Automation Basics
- Asphalt Compaction Fundamentals
- Understanding Amplitude/Frequency/Speed
- Project Planning
- *Other Topics Available*



## FEES

**Fees do apply for on-demand training. Contact your local Cat Dealer for fee specifics.**

“ *The hands-on challenges that the instructors presented during training were very similar to situations I have experienced in the field.* ”

- Contractor, Ontario, Canada

## DID YOU KNOW?

**In the middle 1980s the World Bank determined how to convert roughness data from various testing methods to a single measurement scale. The roughness scale that was defined and tested was eventually named the International Roughness Index (IRI), which is today the most commonly used method for evaluating and managing road systems around the world.**



# ON-THE-JOB CREW TRAINING



## REAL-WORLD TRAINING CONCEPT

**On-the-Job Crew Training occurs under your real-world project conditions. Caterpillar instructors use the same training techniques developed for our smoothness and density studies to achieve improvements in individual and team operational skills and overall paving quality.**

On-the-job training applies the concepts of effective pre-project planning and the adherence to Best Practices for your project. With the help of Caterpillar trainers, crews have a hands-on opportunity to learn to calculate trucking requirements, paving or milling speed and compaction speed to produce a balanced operation. Compactor controls and paver functions are reviewed using your Cat paving equipment.



## TRAINING OBJECTIVES

**The primary objective of On-the-Job Crew Training is to develop the skills of the crew through instruction and hands-on practice.**

**Skills covered on site include:**

- Basic machine and operation safety
- Fundamental machine operation
- Basic machine maintenance
- Grade and slope control set up
- Construction of a flat, smooth transverse joint (“Paving by the Numbers”) with limited hand work or rework required to meet your project’s specifications
- Elimination of screed separation marks, if any, within the first 15 m (50’) of paving off the transverse joint; initial adjustment of the feeder system; and, ways to avoid texture or segregation stripes
- Truck exchange process (if end dumping directly into the hopper)
- Compaction of a smooth transverse joint
- Breakdown roller rolling pattern, including working speed to achieve density targets and match paver production





## DID YOU KNOW?

Many public works departments consider cold planing an opportunity to improve both longitudinal and transverse profile. When properly set up and operated, a cold planer can reduce roughness by as much as 33% and can create slopes accurate to within 0.2%.



### CLASSROOM REINFORCEMENT

If desired, classroom training can be scheduled to run concurrently, reinforcing the concepts and operation fundamentals presented on site.

Training material will mirror segments of the day's on-site training and participants can be tested to confirm the techniques and skills presented on-site were fully mastered.



### FEES

A fee does apply for On-the-Job Crew Training. Contact your local Cat Dealer for fee specifics.

*“It takes exceptional crews to deliver all the requirements the industry now demands.”*

- Contractor



# PROJECT CONSULTING

## ACHIEVING CONSISTENT RESULTS

Today's competitive paving contracts require rigorous adherence to ever-increasing smoothness and density specifications, and regularly include bonuses for meeting or exceeding those specifications in the allotted time frame. This puts extreme pressure on paving crews to perform quickly, while maintaining the required quality specifications. Paving contractors have found that taking crews and quality to that "next level of performance" — consistently — can be difficult.

Caterpillar Project Consulting was created with the goal of helping contractors and crews to achieve consistent paving quality with their Cat equipment on every job, every time.



## THE PROJECT CONSULTING CONCEPT

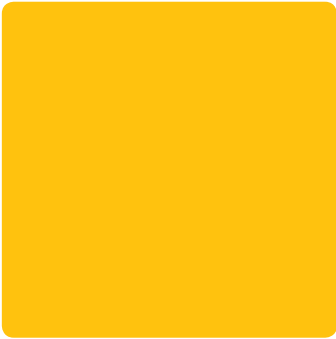
**Using proven 6 Sigma methodologies, that rely upon gathering and analyzing hard data, Caterpillar Project Consulting teams focus on fine-tuning processes and techniques and finding the root causes that adversely affect smoothness and density.**

Project Consulting team members provide immediate feedback and guidance on-site that will maximize bonus pay for meeting or exceeding required project specifications. Projects vary in length but can usually be accomplished by two team members in one to five days. Results are immediate for the project-at-hand and the study results and report recommendations will positively impact every job that follows.

### Data acquisition methods could include many of the following:

- Base condition studies
- Paver speed calculation
- Transverse joint construction
- Feeder system operation
- Grade & Slope functions
- Longitudinal joint construction
- Compaction patterns
- Density studies
- Mix design
- Truck loading at the plant
- Mix transfer to the paver
- Screed operation
- Grade sensor placement
- Infrared mat temperature
- Profilographs





## DID YOU KNOW?

Smooth roads save money by improving fuel economy and by increasing pavement service life. Research has proven that fuel economy improves by 4.5% following a 10% reduction in roughness and asphalt pavement service life increases by 5%.



### REPORTING

**Caterpillar works closely with the sponsoring organization to develop unique reporting requirements.**

Report formats can vary, but typically result in a detailed, four-color document that lays out each process element or technique that contributed to the lower quality results or failure to attain desired smoothness or densities. Recommended methods to improve quality are included as a part of the report.



### FEES

**Our Project Consulting fees are flexible and are negotiated.**

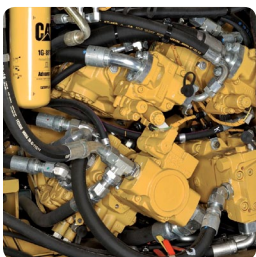
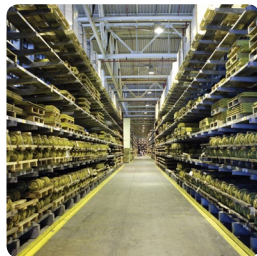
Straight project fees are agreed upon in advance and are based on the scope and complexity of the project.



### SCHEDULING

**Scheduling Project Consulting services can be arranged through your local Cat Dealer who normally participates in the project.**

Paving All Day. Every Day.



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