

# CAT<sup>®</sup> DETECT DRIVER SAFETY SYSTEM

SEE, MITIGATE AND MANAGE FATIGUE AND DISTRACTION



# CAT<sup>®</sup> DETECT DRIVER SAFETY SYSTEM

FATIGUE AND DISTRACTION RISK MANAGEMENT

Fatigued and distracted equipment operators can pose a severe risk to themselves and others. The consequences can be costly, even fatal. The Cat<sup>®</sup> Detect Driver Safety System (DSS) is an in-cab detection technology that can help identify and address fatigue and distraction events, enhancing operator safety.



## FULL VISIBILITY OF OPERATOR FATIGUE AND DISTRACTION

The Cat Detect Driver Safety System (DSS) enhances operator safety and manages risk by:



**SUPPLEMENTING DRIVER ATTENTION:** DETECTS CHANGES IN FACIAL FEATURES AND HEAD ORIENTATION.

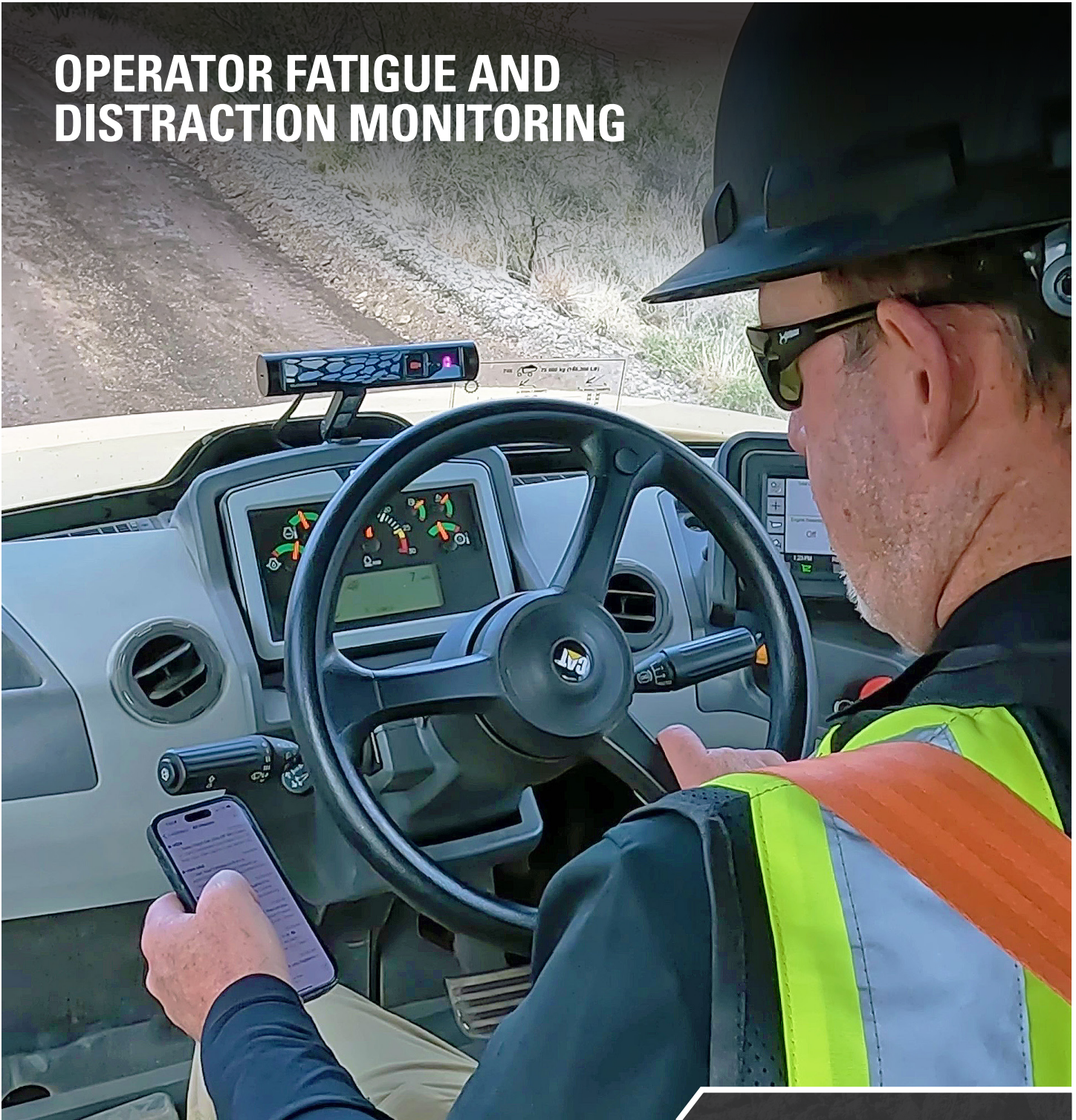


**HELPING MITIGATE RISK:** ALERTS OPERATORS WITH IN-CAB AUDIO AND SEAT VIBRATION TO HELP REGAIN FOCUS.



**GENERATES DATA:** DATA ANALYTICS AND REPORTING TO INFORM CONTINUOUS IMPROVEMENT.

# OPERATOR FATIGUE AND DISTRACTION MONITORING



## THE HIDDEN SAFETY RISK

Paying attention is closely tied to the cognitive workload. If the workload is too high or low, focus can falter, leading to inattentive blindness and increased susceptibility to attention lapses.

Many of us have experienced a momentary lapse of attention while driving, whether due to fatigue or distraction. It is a natural phenomenon and a result of being human. While distraction and fatigue may go unnoticed, the consequences can be life-changing.

## WHAT CATERPILLAR FATIGUE EXPERTS SEE PER YEAR

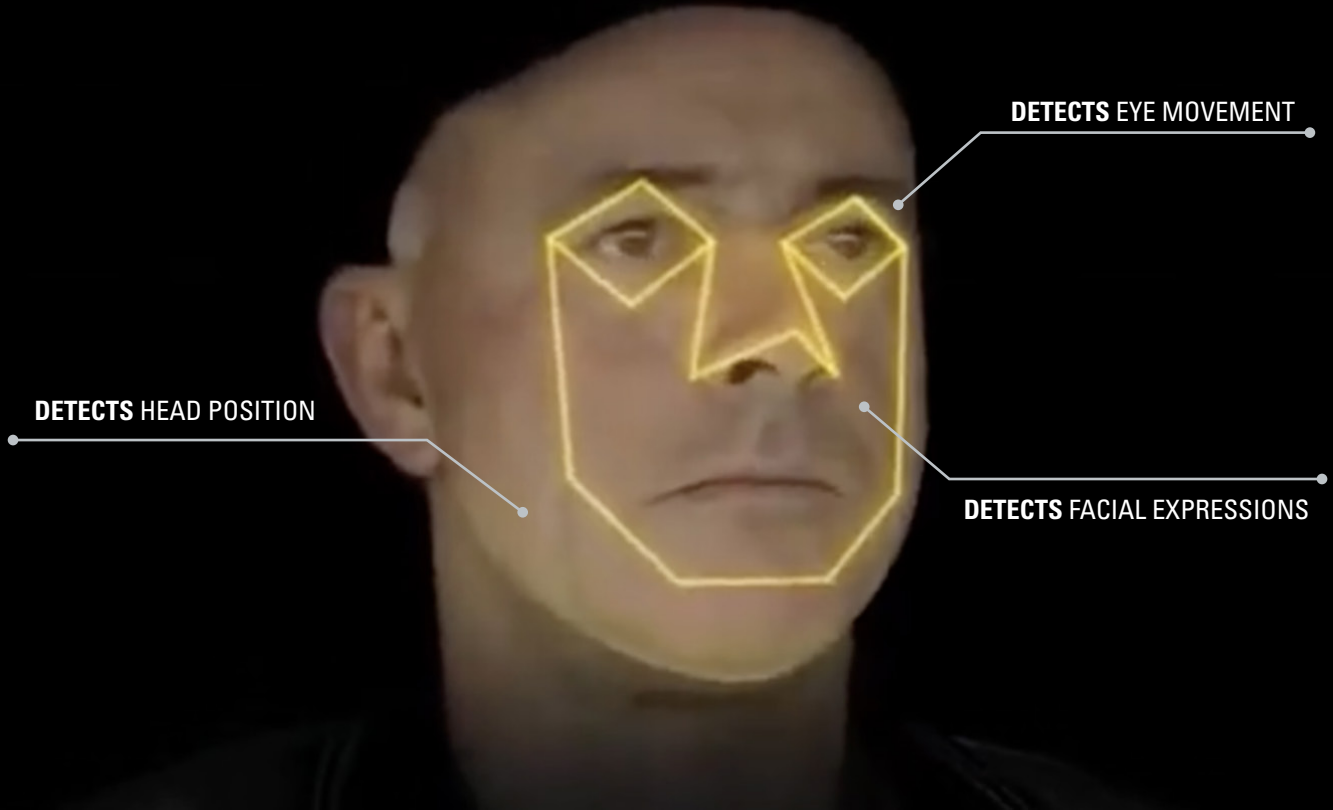
**250,000\***  
CONFIRMED FATIGUE EVENTS

**160\***  
VERIFIED FATIGUE HOURS

\* Caterpillar Monitoring Center Data (2023)

# HOW THE DRIVER SAFETY SYSTEM WORKS

## TECHNOLOGY THAT CAN SAVE LIVES



## THE INTERVENTION PROCESS

### FROM DISTRACTION TO ACTION

The Cat Detect DSS detects operator inattention due to fatigue, distraction, or some other cause. When inattention is detected, the system nudges the operator back to attention, captures event data, and transmits a secure, encrypted event data file to Caterpillar's 24/7 monitoring center. Cat's trained safety advisors confirm, categorize, and classify each event and initiate your company's risk intervention plan.

### SAVED FOR THE FUTURE

The DSS system archives the event video clip and other event data from the onboard system and sends them to the DSS back office and monitoring center for confirmation. Confirmed event data can be viewed in the system and used to support safety management reviews.



#### EVENT DETECTED

DSS algorithms track the driver's face and eyes for fatigue or distraction and activate alarms when parameters are exceeded, alerting the driver back to attention.



#### ALERT ACTIVATED

Once an event is detected, an event file is created, stored, and sent to Caterpillar's monitoring center for review and verification.



#### ACTION INITIATED

When an event has been verified, the Caterpillar monitoring center implements a personalized intervention plan tailored to each organization's specific policies and procedures.

# SEE:

## A FRIEND IN THE CAB

The Cat Detect DSS system uses artificial intelligence to detect physiological signs of fatigue and alerts the operator if a microsleep or distraction occurs. If an operator gets distracted, an alarm will sound. If an operator closes their eyes for more than 1.5 seconds, an alarm will sound, and their seat will shake, waking them up.



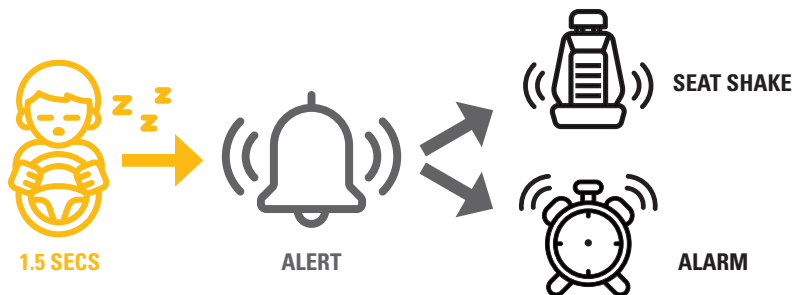
### FACE MAP:

Lapse of attention detected.



### RECOVERING:

Operator is brought back to attention by sound and seat vibration.



## WHAT IS A LAPSE OF ATTENTION?

The Cat Detect DSS monitors operators for signs of inattention, including distraction events and microsleep events.

### DISTRACTION EVENT

Distraction is diverting attention from the operating task to a competing secondary activity. Cat Detect DSS can detect distraction by eye movement away from the task at hand.

### MICROSLEEP EVENT

A microsleep is a short sleep due to extreme fatigue or a monotonous task. They usually last between 2 and 20 seconds, which is dangerous when operating machinery. Cat Detect DSS can detect when a microsleep event is occurring based on eye closure, closure rates, and facial changes.

# MITIGATE:

## KEEPING OPERATORS ALERT ON SHIFT

One of the most dangerous aspects of fatigue is that it's very difficult to self-diagnose. By the time an operator realizes fatigue is bearing down, multiple microsleeps have likely already occurred. That's what makes the DSS alert system so fundamental. Designed to alert operators back into attention, it can save lives.



### DRIVER SAFETY SYSTEM USER EXPERIENCE

**72% REDUCTION\***  
IN FATIGUE EVENTS

**37% REDUCTION\***  
IN DISTRACTION EVENTS

\* Caterpillar Monitoring Center Data (2023)

# WHAT MAKES THE CAT DETECT DSS TECHNOLOGY SO EFFECTIVE?



**+** **IT DOESN'T JUST KEEP A RECORD**  
DSS is like an early warning system that provides actionable insights and intervenes with audible and seat vibration alerts.

**+** **IT PRIORITIZES DRIVER FOCUS**  
DSS has dashboard mounting, which offers unparalleled monitoring accuracy while being unobtrusive to the operator.

**+** **GAIN INVALUABLE INSIGHTS**  
DSS provides invaluable data insights through remote monitoring, analysis and assistance.

**+** **INDUSTRY-LEADING ALGORITHMS**  
Its algorithms have been refined over 20+ years using 9 billion miles of naturalistic driving data.

**+** **SCIENTIFICALLY PROVEN RESULTS**  
The Cat Detect DSS has been rigorously tested and scientifically proven to reduce fatigue events by more than 72%\*, significantly enhancing driver safety and reducing the risk of accidents.

**+** **MAINTAINING OPERATOR PRIVACY**  
DSS is not a video surveillance or CCTV system. All video data remains onboard the unit unless a safety threshold is breached. Only then does the system transmit data offboard, helping maintain operator privacy. Supervisors cannot use it to survey operators remotely; they will only be alerted when necessary.

\* Caterpillar Monitoring Center Data (2023)

# MANAGE:

## SYSTEM IMPLEMENTATION AND DEPLOYMENT

Getting the Cat Detect DSS system up and running is guided by a detailed implementation process. Customers are supported throughout this process to ensure all requirements are met and training is completed.



### KICK-OFF

During the kick-off of the deployment process, roles and responsibilities and customer requirements documentation are discussed.

### PHASE 1

This phase will take 1-2 days. It includes creating customer requirements documents, installing DSS systems, providing fatigue and distraction training, and setting up and registering a database.

### PHASE 2

Fatigue and distraction data is reviewed during this phase, and a fatigue intervention plan is developed. In addition, in-cab alerts are activated, and a rapid improvements workshop is held.

### PHASE 3

During this phase, the intervention plan is tested over a two-week period, with DSS monitoring and reporting. A final meeting will conclude the implementation and deployment process, and ongoing support will be provided as necessary.



# LEADING THE WAY FOR SUSTAINED CHANGE

By installing the Cat Detect DSS fleet-wide, managers can collect data on fatigue and distraction events that would have previously been unattainable. With this information, companies can begin to support real change.

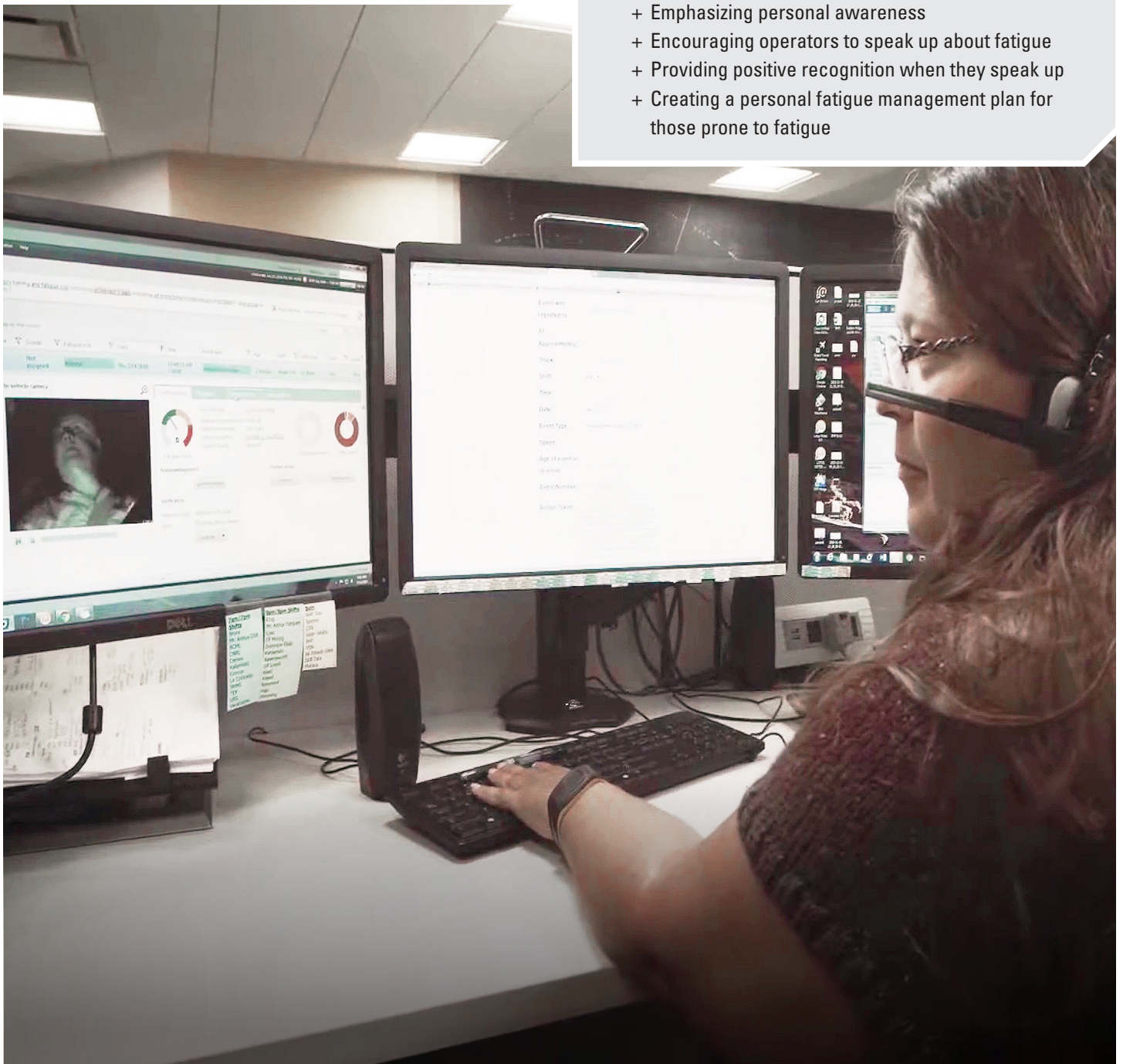
## WHAT DSS DATA CAN PROVIDE YOUR BUSINESS

The Cat Detect DSS helps you access operation data and identify the scope of any fatigue or distraction issues. Managers are provided measurable data over time that can help them take action to improve driver safety.

## SUSTAINING A SAFETY CULTURE

The construction industry prides itself on grit and fortitude. The 'best' operators often get the most done and are unwilling to say, 'I'm too tired to do this safely.' The culture of denial among workers where microsleeps occur frequently is a genuine concern. However, it's possible to change behavior by:

- + Emphasizing personal awareness
- + Encouraging operators to speak up about fatigue
- + Providing positive recognition when they speak up
- + Creating a personal fatigue management plan for those prone to fatigue



# CAT DETECT DSS HARDWARE



The Cat Detect DSS in-cab hardware is a comprehensive system comprising an operator-facing sensor that detects facial and eye changes, an electronic control module (ECM), a vibration motor, and a forward-facing camera\* that provides video of events that occur in front of the vehicle.

*\* Forward-facing cameras are not currently available for use in the EU.*



## WHAT APPLICATIONS DOES THE CAT DETECT DSS SUIT?

Any company, no matter the size of its fleet, can utilize the Cat Detect Driver Safety System. The system is compatible with any enclosed cab vehicle, including:

- + Articulated Trucks
- + Earthmoving Equipment
- + Heavy-Duty Service Trucks
- + Light Duty Commercial Trucks
- + Quarry Trucks
- + Construction Trucks
- + On-Highway Trucks
- + Over-The-Road Haulers
- + Ready-Mix Trucks
- + Snow Removal & Sanding Trucks
- + And More...

Industry	Light & Medium Duty Commercial / Industrial
Vehicle Type	< 100 mt
Over-The-Air-Updates	Yes
Connectivity	Cellular
IP Rating	IP50

# SYSTEM SPECIFICATIONS

CONTROLLER	
Processor	ATOM® x5- E3940 1.80GHz Quad Core 2GB of DRAM 8GB eMMC Storage 32GB Internal SD Card
Interfaces	In-Cab Sensor, Forward-Facing Camera, Vibration Motor, Serial GPS, Global 4G*, Nano SIM, RS232, USB 3.0, USB 2.0 OTG, Relay Output, 1 x General Purpose Input, Micro HDMI  <i>* Guardian 2 ECMs with a Product ID Beginning P1001229 have 3G Connectivity.</i>
Peripherals	In-Cab Sensor, Cellular Antenna, GPS Antenna, Forward-Facing Camera (Optional), Vibration Motor
Environmental	Temperature -40 to 65 °C
Driver Alerts	Audio Alert (Dual Piezo Buzzer), Haptic Alert (Vibration Motor)
Electrical	Supply Voltage: 10-30 VDC Power: 36W
Dimensions	Controller: 182mm x 124mm x 43mm Controller with Mounting Pan: 218mm x 146mm x 54mm
Weight	Controller: 620 g Controller with Mounting Pan: 830 g

VIBRATION MOTOR	
Dimensions	137mm x 55mm x 66mm
Weight	685g (with 4m cable)
Features	Rugged Design 3900 RPM Screw Mount - Installs on Round, Square, Flat Bars / Surfaces.

IN-CAB SENSOR	
Dimensions	200mm x 120mm x 145mm (With Mounting Arm and Adhesive Mount)
Weight	630g (Including 5m Cable)
Environmental	Temperature -40 to 85 °C
Features	H47° x V36° Field of View 54 Frames per Second +135° ~ 45° Camera Angle Rotation (8° Increments with Standard Bracket), 940nm IR Illumination Ambient Light Sensor Monochrome Sensor 1280 x 960p Resolution Inbuilt Inertial Measurement Unit (IMU) Adhesive or Screw Mount Options

FORWARD FACING CAMERA*	
Dimensions	72mm x 41mm x 40mm
Weight	160g (Including 7m Cable)
Environmental	Temperature -40 to 85 °C
Features	Color Sensor, H114° x V61° Field of View 71° Camera Angle Rotation 1280 x 800p* Resolution Up to 30 Frames Per Second Status Light  <i>* Recorded Resolution is Lower to Conserve Storage Space and Increase Duration of Video Data Stored.</i>

COMPLIANCE	
FCC, ICES-003, CE, RCM, RoHS	

\* Not Currently Available in the EU

Cat Detect Driver Safety System Availability May Vary by Region and Model.  
Consult Your Cat Dealer for Details.

For more complete information on Cat products, dealer services and industry solutions, visit us on the web at [www.cat.com](http://www.cat.com).

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PEDJ1407 (04-2024)  
(N Am, Eur, Aus-NZ)

