

# Cat<sup>®</sup> Fleet



## Fleet Features

- *Real-time monitoring of mobile equipment and material movement*
- *Advanced truck assignment capabilities to optimize fleet productivity*
- *Material tracking supports precise blending for optimum quality*
- *Production monitoring enables mines to track site-specific key performance indicators*
- *Promotes safe operating practices through machine checklists and position awareness*



## Contents

Features and Benefits .....	4
Fleet Overview .....	6
Production .....	8
Position & Material .....	10
Data Share .....	11
On-Board Components.....	11
Assignment & Optimization .....	12
Support .....	14
Specifications.....	15



**Cat® MineStar™ System is the industry's broadest suite of integrated mine operations and mobile equipment management technologies configurable to suit your operation's needs.**

**Fleet, a capability set of Cat MineStar System, provides comprehensive, real-time machine tracking, assignment and productivity management, giving you a comprehensive overview of all operations from anywhere in the world.**

**Fleet works with data from many types of assets and equipment in order to help reduce costs per ton, enhance productivity and boost overall site profitability. The system is scalable and upgradable to accommodate a growing fleet of machines or an increased desire for more information and capability.**

Fleet is a comprehensive fleet management system using the latest advancements in GNSS technology, on-board touch screen displays and integrated office software for optimum mine planning and control. The system is highly configurable, meeting the needs of fleets sized from small to the large.

### **Increased Productivity**

- Real-time dashboards and custom web-based reports provide mine management with reliable production information.
- Utilization tracking provides valuable information to monitor production and continuously improve mining operations.
- Consumable tracking enables scheduled machine repairs and maintenance, minimizing downtime.

### **Improved Efficiency**

- Advanced assignment engine manages entire fleet including support equipment, minimizes misroutes and manages shift change and fueling schedules.
- Detailed cycle information is recorded without operator interaction and aids with site planning and training while determining proper routing distances to maximize tire life.
- Decision support modeling tool helps evaluate impact of changes to the production plan prior to implementing and helps respond to current over and under-trucking situations.
- Precise management of grade blocks enable optimum blending recipes and downstream processing.

### **Enhanced Safety**

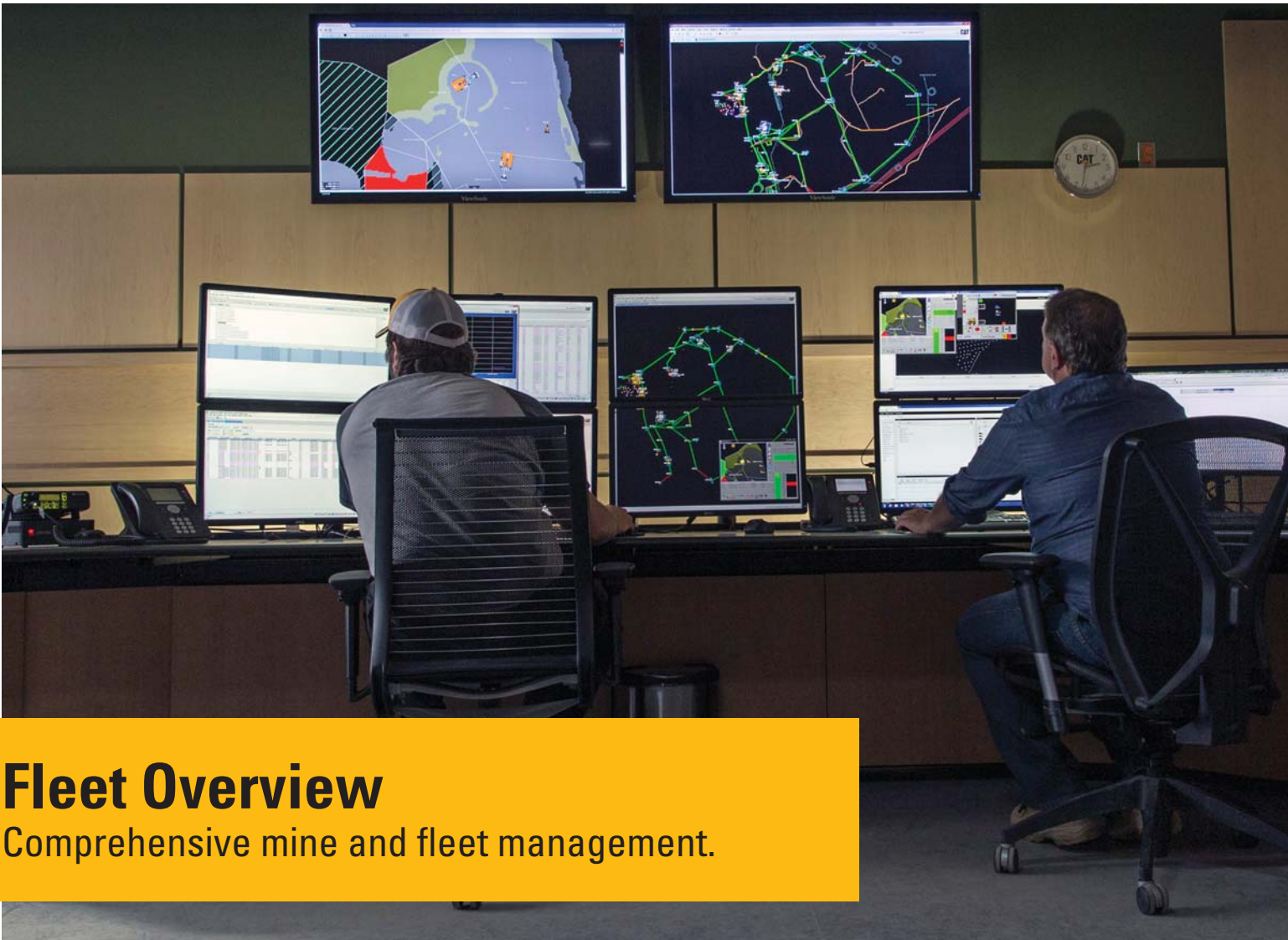
- Licensing tracks which machines an operator is authorized to operate and provides notification of impending expiration dates.
- Machines are tracked with precise positioning to effectively monitor equipment location and allow operators to view vehicles in close proximity on the on-board display.
- Pre-operational checklists support required safety walkarounds and provide service personnel with proactive monitoring of planned maintenance activities.



# Features and Benefits

Identifies, quantifies and sustains productivity on the mine site.





## Fleet Overview

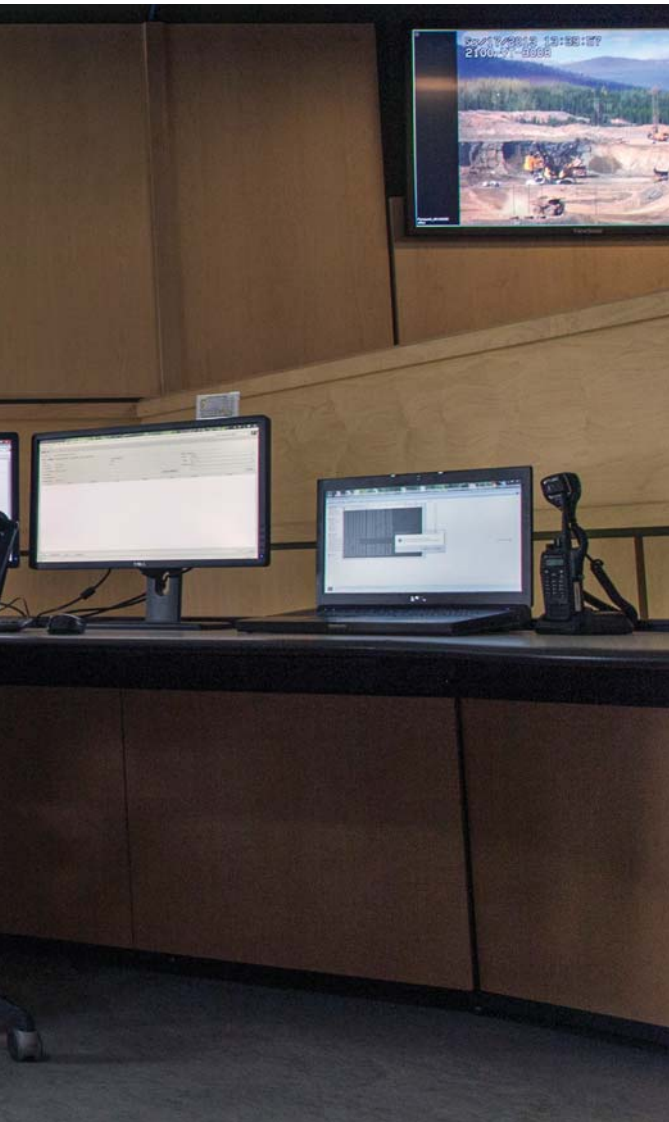
Comprehensive mine and fleet management.

Fleet uses real-time information captured from equipment at the site to remotely manage mining operations. Fully integrated with other Cat MineStar System capability sets, Fleet maximizes operational efficiency through effective and timely flow of information, allowing management to adjust for changing mine and market conditions. The system works with all types of mobile equipment, including trucks, loading tools and auxiliary equipment as well as machines from other manufacturers.

Fleet consists of several capability packages that allow the system to be scalable and configurable to your operation's needs. Production, Assignment & Optimization and Position & Material provide vital monitoring, assignment and tracking tools to help you work more safely, productively and efficiently.

Fleet typically improves productivity by 10-15% through the utilization of features such as dynamic truck assignment, shift change management and fueling. Additionally, reports can be generated on the utilization of groups of assets, equipment on a particular site or even individual machines.

Safety is a top priority at Caterpillar. Every machine and technology product that we create has safety in mind from initial concept through production. The system contributes to mine safety by monitoring equipment location, operator license tracking, warning alarms in the cab and mine office, and logging pre-operational checklists. For more information about how Cat products promote safety at your mine site, visit [safety.cat.com](http://safety.cat.com).



## Cat MineStar System Core Software

*Functionality to manage personnel in the daily mining environment.*

Cat MineStar System includes a core set of features in the office software to assist mine operations with enhancing safety, administering personnel, monitoring equipment, increasing production and managing the mine model.

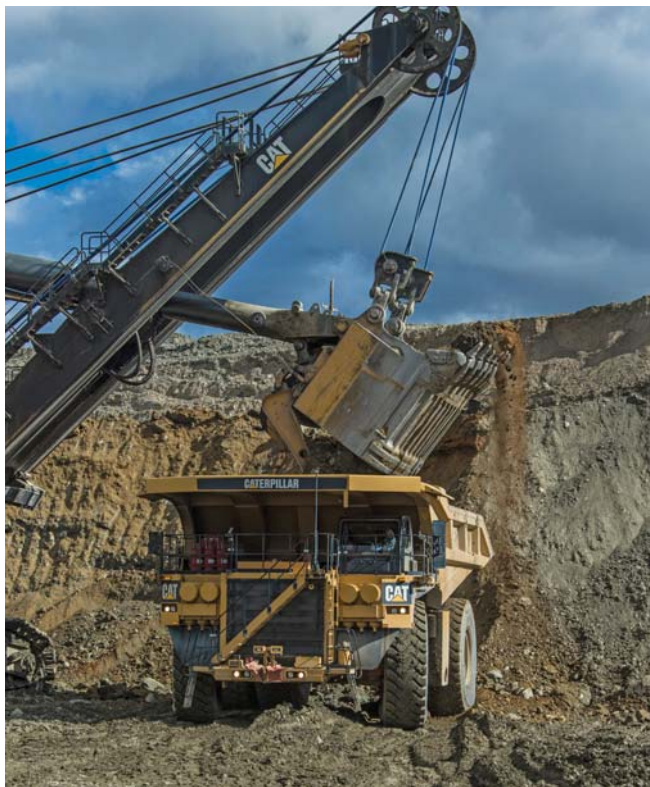
Safety is the number one priority on a mine site. Checklist functionality enforces safety walk-around inspections. Alarms and automatic delays can be created in the event that a pre-operational checklist item fails and data is stored for reporting.

Mine personnel are organized into groups, for example, by crew. Each person has a personnel record where contact details, roles, supervisors, leaves, absences, overtime and machine license information is stored.

Fleet records and manages machine type licenses for each operator to ensure machines are only assigned to individuals authorized to operate.

Positional awareness broadcasts vehicle location to others in the immediate area, providing operators with the ability to view equipment in near vicinity on their in-cab display. A site map can be accessed in the office showing the location of every piece of equipment – with an on-board system installed – in near real-time.

Site editor provides computer aided design capabilities for graphical creation and maintenance of the mine model. With streamlined workflow, site editor enhances the ability to quickly enter and maintain an accurate mine representation within Fleet.





# Production

Monitor and manage production operations.

Utilizing a wireless network and on-board monitoring devices, production enables real-time recording, management, analysis and reporting of mining operations. Cycle management, a key feature of production, monitors the amount of time spent performing production activities. Data is collected with minimal operator interaction, providing increased data accuracy and consistency allowing an operator to focus on the task at hand.

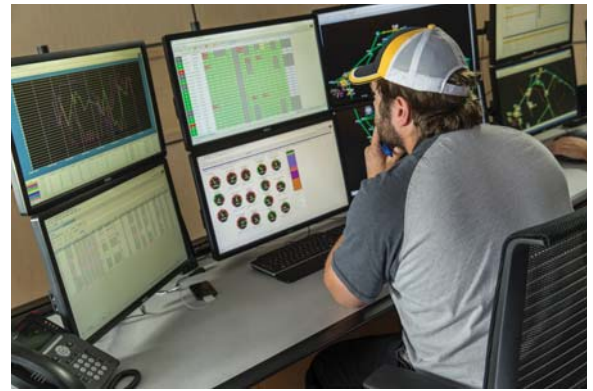
Production provides real-time fleet productivity information enabling increased management control and efficiency of mining operations.

To help identify inefficient operations, the system provides data specifying productive versus non-productive activities. The system logs when a truck is performing production activities and enables operators to identify reasons for delays such as when a truck is down for repair. Delays can be scheduled or unscheduled. Fleet has simplified the process by allowing grouping of multiple delay activities which reduces manual effort when assigning delays and positively impacts mean time between failure calculations.

Detailed equipment utilization reports and real-time key performance indicator (KPI) dashboards take the guesswork out of mine management by providing reliable data on the status of operations.

The system delivers reports that can be viewed from anywhere in the world. Data is accessible through various internal and external tools which include native dashboards, tabular data views and external Open Database Connection compliant applications. Tools for customized reporting are available through SAP BusinessObjects.





## Fleet for Mobile Applications

Fleet data and reports can now be viewed on select tablet devices, through a web browser or on a laptop. This new mobile application provides a view of the office software to a foreman working in the field and allows them to monitor decisions made by the office software and mine controllers. Information available through Cat MineStar System mobile includes the site map, KPI dashboards and the travel progress monitor.

## Site Map

Site map allows a foreman to search and follow individual machines, and in the case of loading tools and processors, see which machines are en-route and queuing.

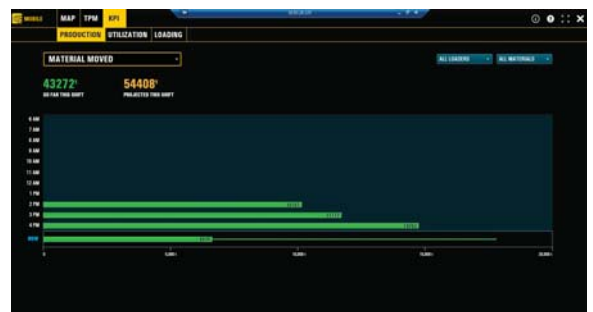
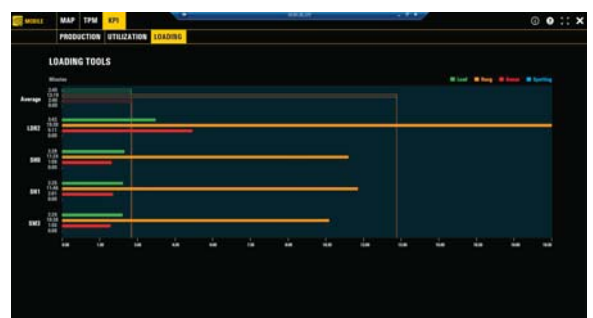
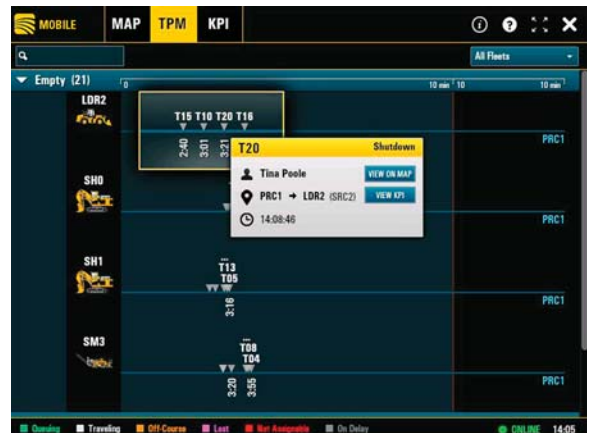
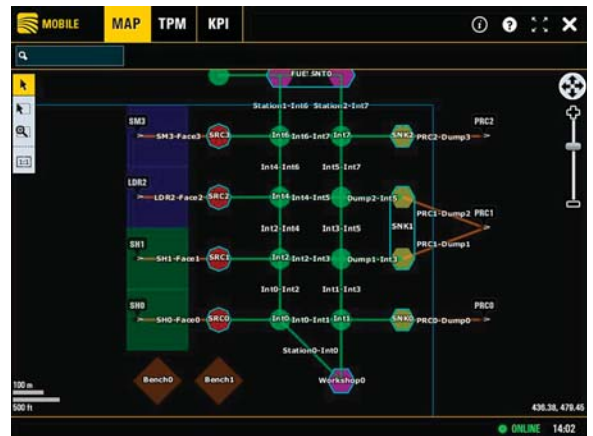
## Travel Progress Monitor

Travel progress monitor shows the relative position, and allocation, of trucks to loading tools and processors.

## KPI Dashboards

The KPI desktop displays dashboards showing different KPI's including production, utilization and loading.

- The production screen allows the user to view material moved or cumulative material moved information. Filters can be set by loading tool and material.
- The material moved view displays material moved within the current shift.
- The cumulative material moved view shows an accumulation of material mined each hour, plus material mined in the current hour. It also differentiates between prime and re-handle.
- The utilization screen displays the KPIs relating to the loading tool availability and utilization as a percentage within the current shift.
- The loading screen displays loading tool specific KPIs with the ability to select shift average, rolling average or cumulative duration. Shift average displays the average load, hang, queue and spotting times for the loading tools across the entire shift. Rolling average displays the average times for the loading tools across the last five cycles only. Cumulative duration displays the total time the loading tool spent in each state for the shift.



# Position & Material

Efficiently track materials, define grade blocks and analyze road segments.



Position & Material gives the mine controller the capability to define materials, grade blocks and recipes. Using actual truck travel times, specific areas of the site travel network can be analyzed to identify problematic road segments.

The system interprets on-board data to plot where machine events occur. Mine controllers can identify events associated with poor operating practices or road conditions, such as engine overspeed, strut pressure spikes and high brake temperature and use that information to improve training practices.

Grade block definition and volume calculations aid tracking of material from an un-mined state through stockpiling and processing. Material identification flow is monitored through integration with Terrain for loading. Materials are locked to destinations (single or multiple) to ensure misdirected loads do not occur.

Stockpile management provides the ability to name and define volumes, grades and materials. These variables are dynamically updated throughout the shift, providing a continuous view of inventories.

Recipes allow the mine controller to direct type, quality and grades of material required at the dump, stockpile and processing plant. Recipes can be defined for individual loaders/locations and can be grouped into material mixes for ease of description of downstream quality in stockpiles, feeds or dumps.



# Data Share

Seamlessly integrate with other mining systems.

Data Share provides customers with an open interface for integration with other mining information systems. Closely integrated systems remove the need for duplicate data entry and allow business processes to span systems and provide greater value to your operations. The interface is built on open industry standard protocols and integration can be achieved by using off-the-shelf components. As such there are no proprietary libraries or program files to integrate, reducing development costs and time to deploy.

Data Share allows you to transfer information between Fleet and other mining systems to:

- Integrate existing HR systems with operator management feature
- Integrate third party fuel management systems
- Allow third party systems to see the position of Fleet equipped machines
- Manage operators, machines, delays, and job codes seamlessly



## On-Board Components

Providing information to operators in real-time.

### Touch Screen Display

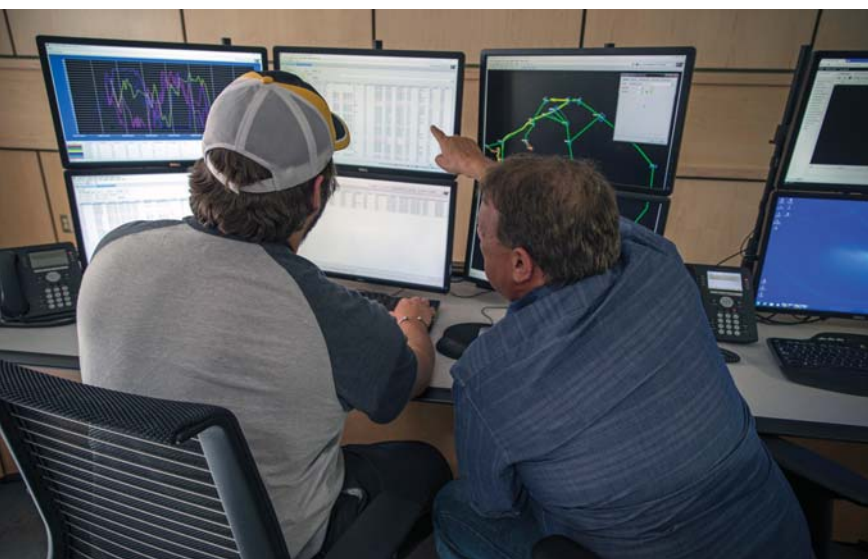
The touch screen display provides equipment operators with an on-board computer that serves as a navigation system. The operator has a map displayed on the screen showing the destination path that is updated in real-time as the machine travels, what material to load, real-time crusher bin level data and scheduled blast times. All of this aids in maximizing the productivity of the machines while increasing mine efficiency and safety. A graphical interface provides easy to read information for the operator, reducing eye fatigue. The touch screen enables operator interaction without having to memorize keypad functionality.

### Mid-Precision GNSS

The mid-precision GNSS receiver provides sub-meter accuracy while continuing to meet Caterpillar's standards for rugged applications. The mid precision receiver supports the newest GPS and GLONASS signals which means increased satellite availability for mines with deep pits or locations in the far northern and southern hemispheres.

### Communications Radio

A rugged ethernet port on the touch screen display allows convenient connection to third party radios.



# Assignment & Optimization

Scheduling trucks to maximize production and shovel utilization.



Assignment & Optimization provides a variety of features to enable the most efficient utilization of a mine's assets, including truck assignment, shift change, fueling, decision support and scheduled breaks.

Optimum routing of trucks increase production, minimize queue times and reduce travel time. Fleet utilizes site specific information, such as equipment capabilities, road network data, production goals and priorities and blending requirements to provide the best possible assignment for each machine. Additionally, the system continuously monitors the actual productivity of mine equipment – which is impacted by variation in materials mined, operator and equipment performance, road conditions and weather – to make dynamic adjustments to assignments.

A configurable TKPH/TMPH threshold can be set for any given truck class or specific truck. A rolling average value of TKPH/TMPH is maintained per active truck and displayed in the office, including customer selected alarms if values are exceeded. It is integrated with the assignment engine to send trucks on shorter haul runs if their TKPH/TMPH is approaching the limit. This feature integrates with the production capability package, allowing performance review of tire management.

Decision support helps mine controllers evaluate the impact that operational changes will have on the production plan. Changes to production goals; material, loading tool and processor priorities; equipment delays, and assignment locks and bars can be simulated, quickly displaying results. By evaluating the “what if” impact of potential changes in advance, Fleet enables the best decision to optimize mine productivity.

The scheduled break feature allows mine controllers to predefine periods of time where equipment will not be available for production activities. Examples include operator breaks, preventive maintenance and planned site events, such as blasting. The system's logic takes scheduled breaks into account to optimize truck assignments.

By implementing the system's shift change functionality, productivity during the first and last hour of a shift can be optimized. An automated lineup process allocates operators to equipment by taking into consideration licensing seniority, preference and license expirations. The system assigns machines to specified tie down destinations, keeping them running as long as possible and reducing congestion at loading tools and processors.

Improved functionality for shift change includes the ability to set a tie-down location load state, create shift change tie-downs with penalty durations and eliminate further assignments until the tie-down has ended. Additionally, operators are assigned to transportation vehicles and drivers are provided with the most efficient route.

The fueling feature increases productivity by sending trucks to get fuel when needed, eliminating unnecessary fueling due to fixed fuel schedules. Also, the system manages queues at fueling stations in order to prevent excessive wait times.





# Support

Unmatched global support.

For more than 25 years, Caterpillar has been providing electronic components and systems for the mining industry – real-world technology solutions that enhance the value of Cat products, making customers more productive and profitable. Your Cat dealer is ready to assist you with mining technology systems and knowledgeable support.

From sales and implementation to support and service, count on your Cat dealer to provide all your technology product needs. Repair options for select technology components are available from factory-trained technicians at the Cat Machine Control & Guidance Repair Center.

## Touch Screen Display

Display screen	165 mm (6.5 in) LCD display, 640 × 480 transfective color VGA	
Electrical input	9 to 32V DC 8A @ 24V DC	
Operator switches	Four illuminated push buttons with tactile feedback one 4-way rocker switch	
Video input	Four video inputs, support both NTSC and PAL video inputs	
Audible alarm	Integral audible alarm located on the front face. Two outputs for external alarm	
Operating temperature	-20° to 70° C	-4° to 158° F
Storage temperature	-40° to 85° C	-40° to 185° F
Humidity	100%	
Height	157 mm	6.18 in
Width	229 mm	9.02 in
Depth	80 mm	3.15 in
Weight	1.81 kg	3.99 lb

## GNSS Receiver

Accuracy	< 1 m*	
Connector	One 12-pin Deutsch, one antenna TNC	
Electrical input	9 to 32V DC 120mA @ 24V DC	
Operating temperature	-40° to 70° C	-40° to 158° F
Storage temperature	-50° to 85° C	-58° to 185° F
Humidity	100%	
Height	187 mm	7.36 in
Width	86 mm	3.38 in
Depth	57 mm	2.24 in
Weight	0.8 kg	1.76 lb

\*With base station corrections.

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

AEHQ6017-02 (10-2013)  
Replaces AEHQ6017-01

© 2013 Caterpillar Inc.  
All rights reserved

Materials and specifications are subject to change without notice.  
Featured machines in photos may include additional equipment.  
See your Cat dealer for available options.

CAT, CATERPILLAR, SAFETY.CAT.COM, their respective logos, "Caterpillar Yellow" and the "Power Edge" trade dress, as well as corporate and product identity used herein, are trademarks of Caterpillar and may not be used without permission.

