



Operation and Maintenance Manual

Cat® MineStar Edge Production Recording

MN2 1-UP (Machine Control
& Guidance Products)

Language : Original Instructions



Scan to access the latest service information, purchase additional media, and buy genuine Cat® parts.



Important Safety Information

Most accidents that involve product operation, maintenance and repair are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. A person must be alert to potential hazards, including human factors that can affect safety. This person should also have the necessary training, skills and tools to perform these functions properly.

Improper operation, lubrication, maintenance or repair of this product can be dangerous and could result in injury or death.

Do not operate or perform any lubrication, maintenance or repair on this product, until you verify that you are authorized to perform this work, and have read and understood the operation, lubrication, maintenance and repair information.

Safety precautions and warnings are provided in this manual and on the product. If these hazard warnings are not heeded, bodily injury or death could occur to you or to other persons.

The hazards are identified by the "Safety Alert Symbol" and followed by a "Signal Word" such as "DANGER", "WARNING" or "CAUTION". The Safety Alert "WARNING" label is shown below.



The meaning of this safety alert symbol is as follows:

Attention! Become Alert! Your Safety is Involved.

The message that appears under the warning explains the hazard and can be either written or pictorially presented.

A non-exhaustive list of operations that may cause product damage are identified by "NOTICE" labels on the product and in this publication.

Caterpillar cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this publication and on the product are, therefore, not all inclusive. You must not use this product in any manner different from that considered by this manual without first satisfying yourself that you have considered all safety rules and precautions applicable to the operation of the product in the location of use, including site-specific rules and precautions applicable to the worksite. If a tool, procedure, work method or operating technique that is not specifically recommended by Caterpillar is used, you must satisfy yourself that it is safe for you and for others. You should also ensure that you are authorized to perform this work, and that the product will not be damaged or become unsafe by the operation, lubrication, maintenance or repair procedures that you intend to use.

The information, specifications, and illustrations in this publication are on the basis of information that was available at the time that the publication was written. The specifications, torques, pressures, measurements, adjustments, illustrations, and other items can change at any time. These changes can affect the service that is given to the product. Obtain the complete and most current information before you start any job. Cat dealers have the most current information available.

NOTICE

When replacement parts are required for this product Caterpillar recommends using original Caterpillar® replacement parts.

Other parts may not meet certain original equipment specifications.

When replacement parts are installed, the machine owner/user should ensure that the machine remains in compliance with all applicable requirements.

In the United States, the maintenance, replacement, or repair of the emission control devices and systems may be performed by any repair establishment or individual of the owner's choosing.

Table of Contents

Foreword 4

Safety Section

Safety 5

Regulatory Compliance Information

Product Information Section

General Information 8

Operation Section

Before Operation 12

Operation 13

Maintenance Section

Maintenance Interval Schedule 39

Index Section

Index 42

Foreword

Literature Information

This manual should be read carefully before using this product for the first time and before performing maintenance. This manual should be stored in the product literature holder or in the product literature storage area. Immediately replace this manual if lost, damaged, or unreadable. This manual may contain safety information, operation instructions, transportation information, lubrication information, and maintenance information. Some photographs or illustrations in this publication show details or attachments that can be different from your product. Guards and covers might have been removed for illustrative purposes. Continuing improvement and advancement of product design might have caused changes to your product, which are not included in this publication. Whenever a question arises regarding your product, or this publication, consult your dealer for the latest available information.

Safety

The safety section, if present, lists basic safety precautions. In addition, this section identifies the text and locations of safety messages used on the product. Read and understand the basic precautions listed in the safety section before operating or performing lubrication, maintenance, and repair on this product.

Operation

The operation section, if present, is a reference for the new operator and a refresher for the experienced operator. This section includes a discussion of gauges, switches, controls, attachment controls, transportation, and towing information (if applicable). Photographs and illustrations guide the operator through correct procedures of checking, starting, operating, and stopping the product. Operating techniques outlined in this publication are basic. Skill and techniques develop as the operator gains knowledge of the product and its capabilities.

Product Information

The product information section, if present, may provide specification data, product intended use, product identification plate locations, and certification information.

Maintenance

The maintenance section, if present, is a guide to equipment care. Proper maintenance and repair are essential to keep the equipment and systems operating correctly. As the owner, you are responsible for the performance of the required maintenance listed in the Owner Manual, Operation and Maintenance Manual, and Service Manual. The Maintenance Interval Schedule lists the items to be maintained at a specific service interval. Items without specific intervals are listed under the "When Required" service interval. The Maintenance Interval Schedule lists the page number for the step-by-step instructions required to accomplish the scheduled maintenance. Use the Maintenance Interval Schedule as an index or "one safe source" for all maintenance procedures.

Maintenance Intervals

Use the service hour meter to determine servicing intervals. Calendar intervals shown (daily, weekly, monthly, etc.) can be used instead of service hour meter intervals if they provide more convenient servicing schedules and approximate the indicated service hour meter reading. Recommended service should always be performed at the interval that occurs first. Under extremely severe, dusty, or wet operating conditions, more frequent lubrication than is specified in the maintenance intervals chart might be necessary. Perform service on items at multiples of the original requirement. For example, at every 500 service hours or 3 months, also service those items listed under every 250 service hours or monthly and every 10 service hours or daily.

Product Capacity

Additional attachments or modifications may exceed product design capacity, which can adversely affect product performance characteristics, safety, reliability, and applicable certifications. Contact your dealer for further information.

Safety Section

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Safety

SMCS Code: 1400

Safety Messages

 **WARNING**

Do not operate or work on this machine unless you have read and understand the instructions and warnings in the Operation and Maintenance manuals. Failure to follow the instructions or heed the warnings could result in injury or death. Contact your authorized dealer for replacement manuals. Proper care is your responsibility.

Operation

- Ensure that you have read and understood the machine Operation and Maintenance Manual.

Regulatory Compliance Information

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Product Link (PL671 - If Equipped)

SMCS Code: 7490; 7606

Table 1

Model	Cat Part Number
PL671	483-3663 520-4349

WARNING

This equipment is equipped with a Cat® Product Link communication device. When electric detonators are being used for blasting operations, radio frequency devices can cause interference with electric detonators for blasting operations which can result in serious injury or death. The Product Link communication device should be deactivated within the distance mandated under all applicable national or local regulatory requirements. In the absence of any regulatory requirements Caterpillar recommends the end user perform their own risk assessment to determine safe operating distance.

NOTICE

The transmission of information using a Cat Product Link communication device is subject to legal requirements. The legal requirements may vary from location to location, including, but not limited to, radio frequency use authorization. The use of a Cat Product Link communication device must be limited to those locations where all legal requirements for the use of the Cat Product Link communication device and communication network have been satisfied.

If equipment outfitted with the Cat Product Link communication device is located in or relocated to a location where (i) legal requirements are not satisfied or (ii) transmitting or processing of such information across multiple locations would not be legal, Caterpillar disclaims any liability related to such failure to comply, and Caterpillar may discontinue the transmission of information from that equipment.

Consult your Cat dealer with any questions that concern the operation of the Product Link system in a specific country.

Reference: Refer to the Operation and Maintenance Manual of your product for additional information.

sDoC

(Simplified Declaration of Conformity)

European Union



Caterpillar Inc. 100 NE Adams Peoria, IL
61529 USA

Hereby, Caterpillar Inc. declares this radio equipment is in compliance with directive “2014/53/EU”. The full text of the European Declaration of Conformity is available at the following web address:

<https://www.cat.com/radio-compliance>

Great Britain



Caterpillar Inc. 100 NE Adams Peoria, IL
61529 USA

Hereby, Caterpillar Inc. declares this radio equipment is in compliance with the relevant statutory requirements. The full text of the Great Britain Declaration of Conformity is available at the following web address:

<https://www.cat.com/radio-compliance>

Caterpillar suggests that the Declaration of Conformity is obtained shortly after purchase.

Specifications

The following Cat Product Link communication device specifications are provided to aid in conducting any related hazard assessment and to ensure compliance with all local regulations:

Table 2

Voltage and Current Draw		
Model	Voltage Range	Current Draw
PL671	9VDC - 32VDC	1000mA - 300mA

Table 3

WiFi Transmitter		
Model	Frequency	Power
PL671	2.402GHz - 2.480GHz	41mW Average 85mW Max
	5.170GHz - 5.835GHz ⁽¹⁾	85mW Average ⁽¹⁾ 308mW Max ⁽¹⁾

⁽¹⁾ May be restricted depending on country regulations

Table 4

Machine to Machine Transmitter			
Model	Frequency	Power	Range
PL671	5.795GHz - 5.835GHz ⁽¹⁾	103mW Average ⁽¹⁾ 308mW Max ⁽¹⁾	300m ⁽²⁾
	5.850GHz - 5.925GHz ⁽¹⁾		

⁽¹⁾ May be restricted depending on country regulations

(continued)

(Table 4, contd)
(2) Line of Sight

Certification Notices

Brazil

This equipment is not entitled to harmful interference protection and may not cause interference to duly authorized systems.

Canada Notice to Users

This device complies with Industry Canadas license exempt RSSs. Operation is subject to the following two conditions:

- This device may not cause interference
- This device must accept any interference, including interference that may cause undesired operation of the device.

Mexico

Operation of this equipment is subject to the following two conditions:

- It is possible that this equipment or device may not cause harmful interference
- This equipment or device must accept any interference, including interference that may cause undesired operation.

FCC Notice

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with limits for a class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna

- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/tv technician for help

Changes or modifications to this device without the express approval of Caterpillar may void the users authority to use this device.

Product Information Section

General Information

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General Information

SMCS Code: 7348; 7490

Intended Use

Cat® MineStar System Edge Production Recording is a cloud based, highly intuitive, easy to use mining operational ecosystem. The system is purpose built too automatically, with no operator input and with a high degree of accuracy, collect, and monitor load and haul production data. An optional display is available for loading tool operators to monitor KPI's and input material selections as needed during the shift. The system uses onboard machine components to connect your equipment with the Cat MineStar System application using a sites in pit wireless network. Users often times pit supervisors or production managers in the office, access production data in real time by simply entering a web address.

Production data is captured utilizing the following:

- Machine components
- Sophisticated software algorithms
- Machine learning and data fusion models
- Loader operator input using a display

Utilizing these four components produces a highly accurate record of load and haul activities while the activities are occurring. With this highly accurate tracking of activities, miners are able to monitor key production data during the shift and make production adjustments immediately.

The Cat MineStar System Edge Production Recording system is cloud-based, which eliminates the need for servers, database licenses, and other infrastructure that is required with traditional fleet management systems. To access the systems, users simply log in to the site application via a web address. The application has an intuitive, easy to use graphical interface.

Cat MineStar System Production Recording Basics

Definitions

GPS – Global Positioning System (United States Department of Defense (DoD) NAVSTAR)

GLONASS – GLObal Navigation Satellite System (Russia)

GNSS – Global Navigation Satellite Systems (generic naming used to describe the use of more than one positioning system)

Global Positioning System/GLObal Navigation Satellite System (GPS/GNSS) Availability

WARNING

Due to the nature of wireless communications and government controlled navigation systems, satellite timing signals may be lost, inaccurate, or of poor signal strength. The availability of satellite-based positioning signals is beyond the control of both, the user and Caterpillar. Diagnostics to detect low accuracy or the loss of signal provide warnings to the operator. Failure to follow the instructions or heed the warnings could result in injury or death.

Cat MineStar System Edge Production Recording consists of several key elements that make up the complete system. At the heart of the Production Recording system are the GNSS satellite constellations. Both GPS (United States) and GLONASS (Russia) are owned and operated by the defense departments of the countries that placed the satellites in orbit. Government agencies recognize the great dependence the private sector has for these satellite systems. For security reasons, at any time, these governments can shut off, move/reallocate to a different slot, or alter the timing signals provided by these satellites. These government activities are out of the user and Caterpillar control and would have an adverse effect on the system to report accurate locations of the equipment. The onboard system incorporates diagnostics to detect and correct low accuracy and/or no GPS signal conditions.

Elements of the Cat MineStar System Production Recording

The following list defines elements of the Cat MineStar System Production Recording system:

- GPS/GNSS (Space element)
- Onboard Product Link “Elite” ECM (machine interface)
- Wireless network, onboard, and infrastructure (Two-way data communications)

- Office application (receives equipment facts and generates production data for all users)

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System Components

SMCS Code: 7348; 7490

The Cat MineStar System Edge onboard system consists of the following components:

Required:

- Cat MineStar System Edge module (PL671)

Optional:

- GPS Antenna
- Interface Module (Product Link "Elite")
- Dump Switch
- Loader operator display

Reference: Refer to Special Instruction, M0088029, "MineStar Production Recording System" for the installation requirements.

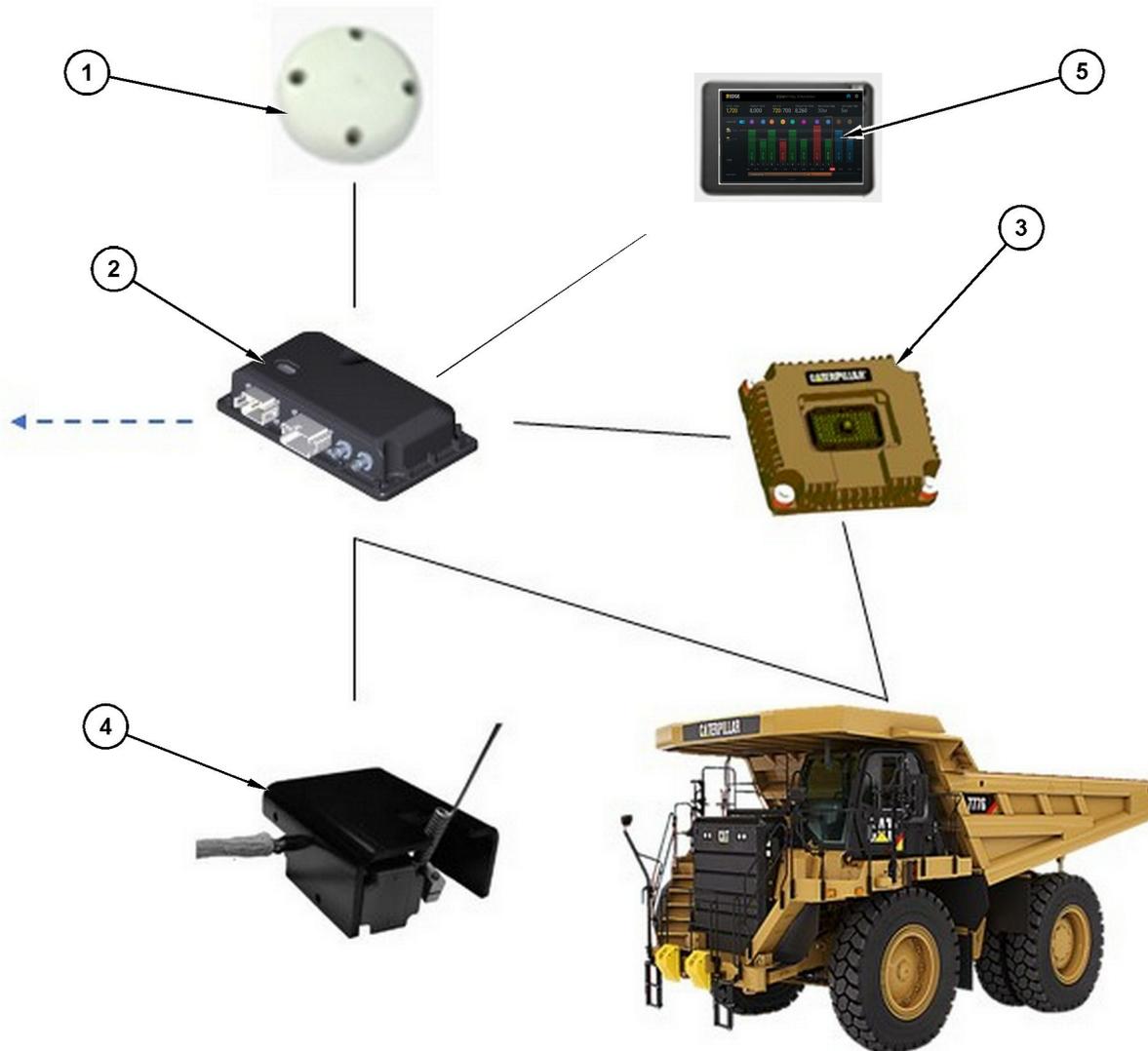


Illustration 1

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Stand-alone Production Recording system

- | | |
|---|---|
| (1) GPS antenna | (3) Interface Module (Product Link "Elite") |
| (2) Cat MineStar system Edge module (PL671) | (4) Dump Switch |
| | (5) Loader operator display |

Cat MineStar System Edge Module (PL671)

The Cat MineStar System Edge module (PL671) is the system main communication module. The Cat MineStar System Edge module (PL671) performs the following functions:

- Processes GPS positions
- Receives machine information
- Sends data via built-in wireless radio

- Sends data to operator display

Optional Items

The following list depicts items that may or not be required to install the Cat MineStar System Edge Production Recording system:

GPS Antenna

The optional external GPS (1) antenna receives signals from the GPS satellites and provides the signals to the Cat MineStar System module (PL671). The external GPS antenna is not required if the Cat MineStar System module (PL671) has adequate sky visibility.

Product Link “Elite” Interface Module (Optional)

The Product Link “Elite” interface module (8) performs the following function:

- Connects to existing machine ECMs to collect data parameters required for accurate production recording.

Dump Switch (Optional)

A physical dump switch which mounts on the frame of the truck and connects to the Cat MineStar System Edge module (PL671).

Loader Operator Display (Optional)

A 254.00 mm (10 inch) D6 display that mounts in the cab and allows a loader operator to monitor Key Performance Indicators (KPI) for the current shift, select materials, and edit materials for recent cycles. The display connects to the PL671 using 2 wire Ethernet.

Operation Section

Before Operation

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Before Operation

SMCS Code: 7348; 7490

⚠ WARNING

Improper operation of an access platform could result in injury or death. Operators must carry out their duties properly and follow all instructions and guidelines given for the machine and access platform.

Power ON/OFF

Power is supplied to the system when the operator turns the machine keyswitch to the ON position. During the power-up process, the MineStar module will perform a self-test. The MineStar module will illuminate LEDs to indicate what processes are functioning.

MineStar Module PL671 Indicator Lights

The module contains 4 LED indicator lights that indicate the following scenarios:

Green LED

The purpose of the green LED is to indicate when the radio is powered ON or OFF.

Green LED OFF – Indicates that the radio is not powered.

Green LED ON – Indicates that the radio is powered properly and is ON.

Green LED Blinking – The green LED will blink when a fault has been detected that will prevent the application firmware from running. If the green LED is blinking, contact your Caterpillar dealer.

Orange LED - GPS

The purpose of the orange LED is to indicate whether a GPS fix has been made.

Orange LED OFF – The orange LED will be OFF when a GPS antenna is not found by the radio.

Orange LED ON – The GPS antenna is working properly, and can see enough GPS satellites to determine a good location fix.

Orange LED Blinking – The orange LED will have a constant blinking status when the GPS antenna is working properly, however not enough GPS satellites are viewable to get a good GPS location fix. If a blinking orange LED persists, contact your Caterpillar dealer.

Yellow LED

The yellow LED is not used for the MineStar Production Recording system.

Blue LED - Ethernet

The purpose of the blue LED is to determine when Ethernet connections are present.



Illustration 2

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Blue LED OFF – Indicates no Ethernet link established.

Blue LED Blinking – The blue LED will blink to indicate Ethernet activity.

Blue LED ON – The blue LED will turn ON when the module has established an Ethernet link. Refer to Illustration 2 .

Operation

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Main Screen

SMCS Code: 7348; 7490

Operator ID/Login

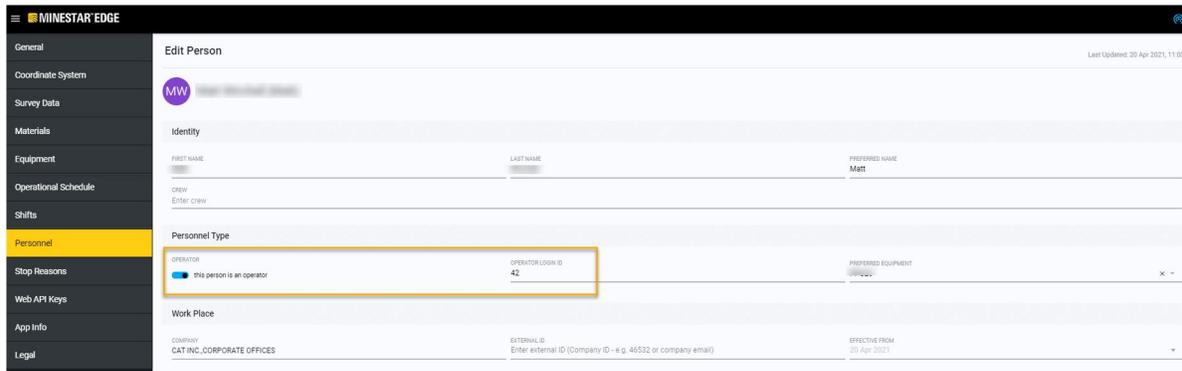


Illustration 3

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1. Press the power up button to display the login screen. Operators who have registered in pit supervisor, can login using the assigned login ID as shown in illustration 3 .

Note: Operator login ID can be set in the personal tab of setup.

Operation Section
Main Screen

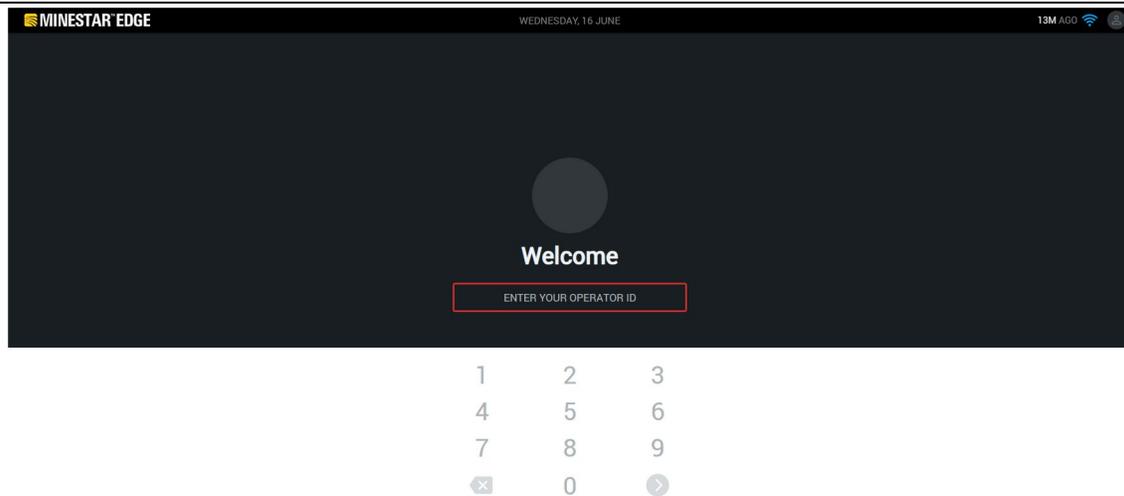


Illustration 4

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- Click and enter the operator ID using the pop up keyboard as shown in illustration 4 .

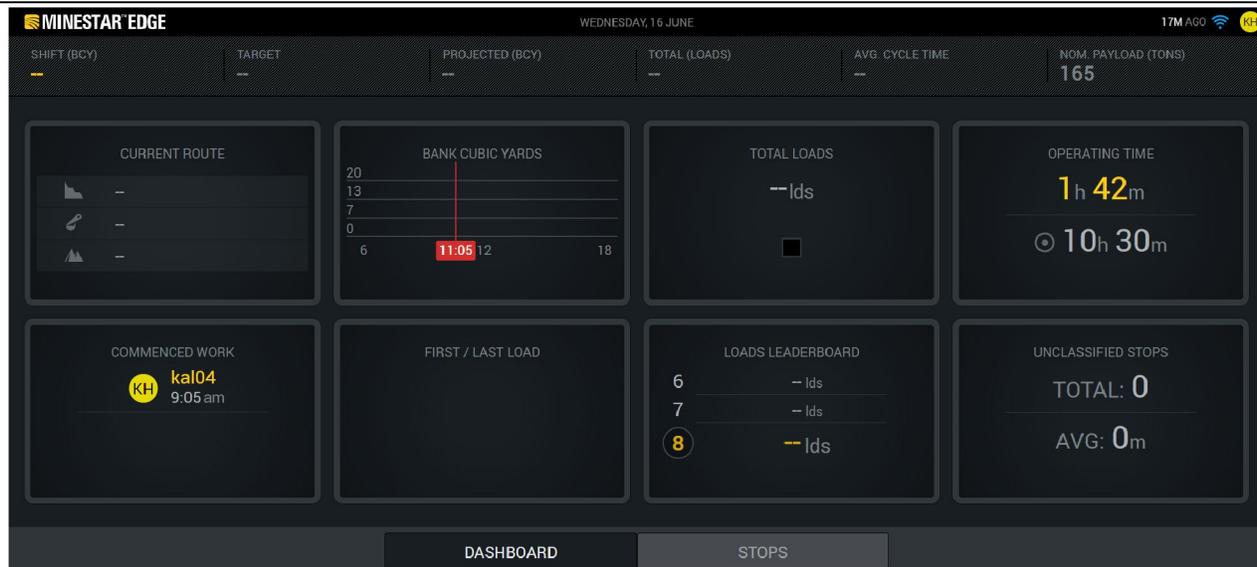


Illustration 5

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- Select Enter after entering the operator ID to view the Home page as shown in illustration 5 .

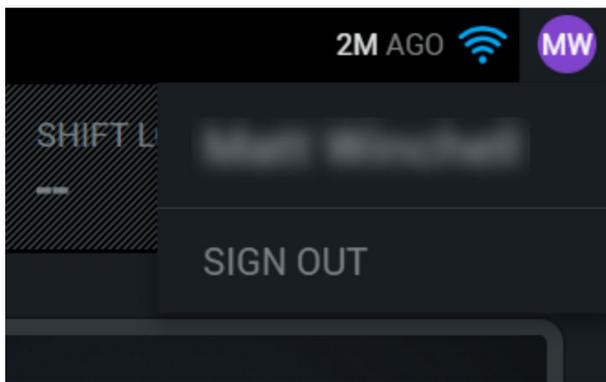


Illustration 6

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4. If the operator wants to sign out, press the operator initials on the top right corner of the screen as shown in illustration 6 .

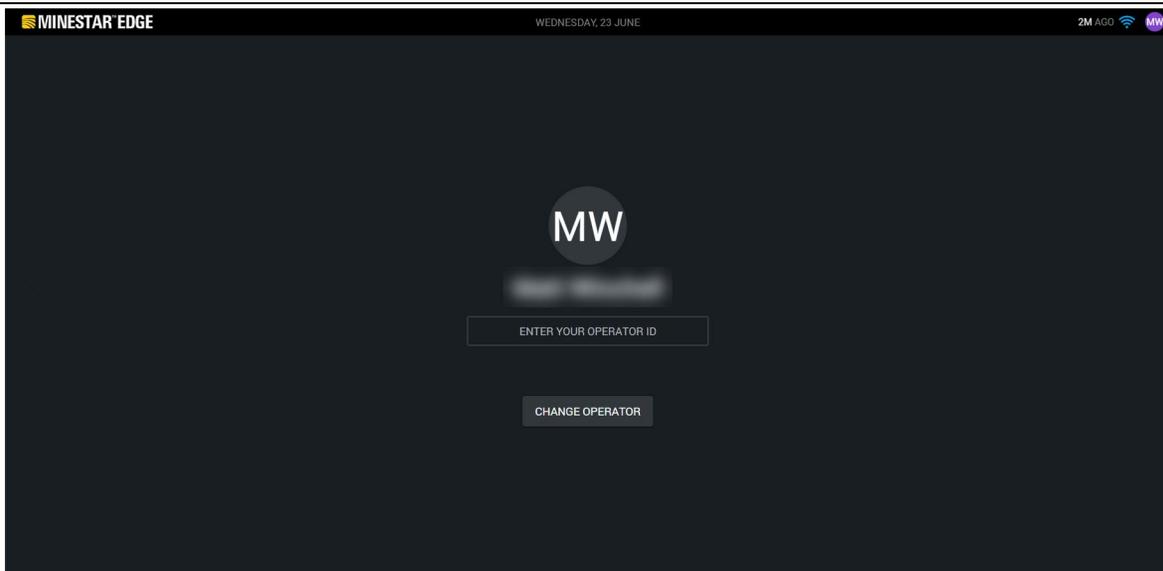


Illustration 7

g06694846

5. On the display, the details of the last logged in operator can be viewed. Press on change operator to login as another operator.

Note: After logging into the display, the operator observations are recorded in the pit supervisor.

Operator Display (Loader)



Illustration 8

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Cat[®] MineStar System Edge production recording operator display main screen

- (1) Title bar
(2) Header bar
(3) Main screen area
(4) Footer bar

The Cat[®] MineStar System Edge production recording operator display main screen contains four main sections listed below:

- Program Title Bar (1)
- Machine Performance Metrics (2)
- Operator Display Icons(3)
- Tool Button Display(4)

Program Title Bar (Loader)



Illustration 9

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Edge production recording main screen title bar

(5) Cat MineStar system Edge logo
(6) Current date

(7) Time since last message received
(8) Current wireless link status icon

(9) Exit software icon

The program title bar contains the following information:

Cat MineStar System Edge Logo(5) – This shows the program that is currently running on the display.

Current Date(6) – This shows the current date, as determined by the Global Positioning System (GPS) data from the PL671.

Time Since Last Message Received (7) – This shows the last time the display received an update from the Cat MineStar System Edge cloud application.

Current Wireless Link Status Icon (8) – This shows the status of the wireless link of the machine to a radio network.

Exit Software Icon (9) – Not used at this time.

Machine Performance Metrics (Loader)

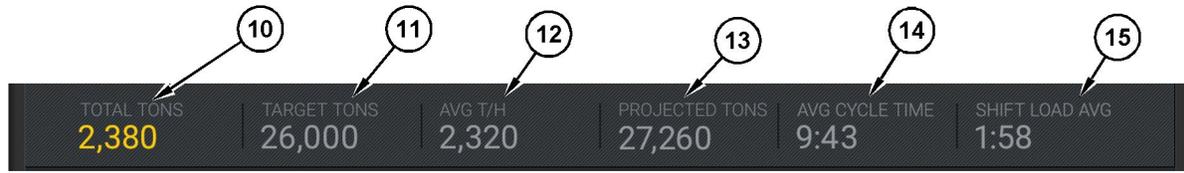


Illustration 10

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Cat MineStar System Edge production recording machine performance metrics bar

(10) Current shift total indicator
(11) Shift production target indicator

(12) Average hourly production indicator
(13) Projected shift total indicator

(14) "AVG CYCLE TIME" indicator
(15) "SHIFT LOAD AVG" indicator

The machine performance metrics section of the main screen contains the following information about loader production for the current shift:

Current Shift Total Indicator (10) – This indicates the total production achieved by the operator in the current shift. Unit may be displayed as total loads, total mass or total volume as determined by target and material settings in the office. Results including payload are determined by completed haul truck cycles.

Shift Production Target Indicator (11) – This indicates the production target for the current shift as defined in the office application. Unit should align with the "Current Shift Total" indicator and may be displayed as target loads, total mass or total volume or an hourly rate.

Average Hourly Production Indicator (12) – This indicates the average rate of hourly production as determined by completed haul truck cycles. Unit should align to the "Current Shift Total" .

Projected Shift Total Indicator (13) – This indicates the total operator production as expected by the end of shift based on current results. Unit should align to the "Current Shift Total" .

"AVG CYCLE TIME" Indicator (14) – This indicates the average haul truck cycle time for trucks loaded by this loading tool for the current shift. "AVG CYCLE TIME" is the average of the last 5 cycles.

"SHIFT LOAD AVG" Indicator (15) – This indicates the average load time for this loading tool for the current shift. "SHIFT LOAD AVG" is the average of the last 5 cycles.

Operator Display Icons (Loader)

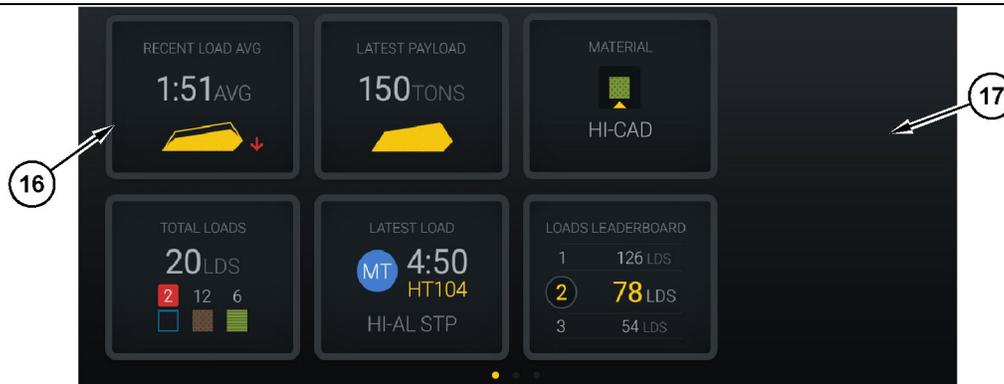


Illustration 11

g06502270

Edge production recording main screen

(16) Operator display tiles

(17) Operator display main screen area

The following operator display icons are displayed on the main screen.

- “RECENT LOAD AVG”
- “LATEST PAYLOAD”
- “MATERIAL”
- “TOTAL LOADS”
- “LATEST LOAD”
- “LOADS LEADERBOARD”

Reference: For more information on the operator display tiles, refer to the Operator Display Icons section of this manual.

Tool Button Display (Loader)



Illustration 12

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Edge production recording main screen footer bar

(19) "DASHBOARD" tool button

(20) "MATERIAL" tool button

The tool button display is the area of the screen that allows the operator to navigate within the software. The tool button display shows buttons that are predetermined by the version of the machine software.

Operator Display (Truck)

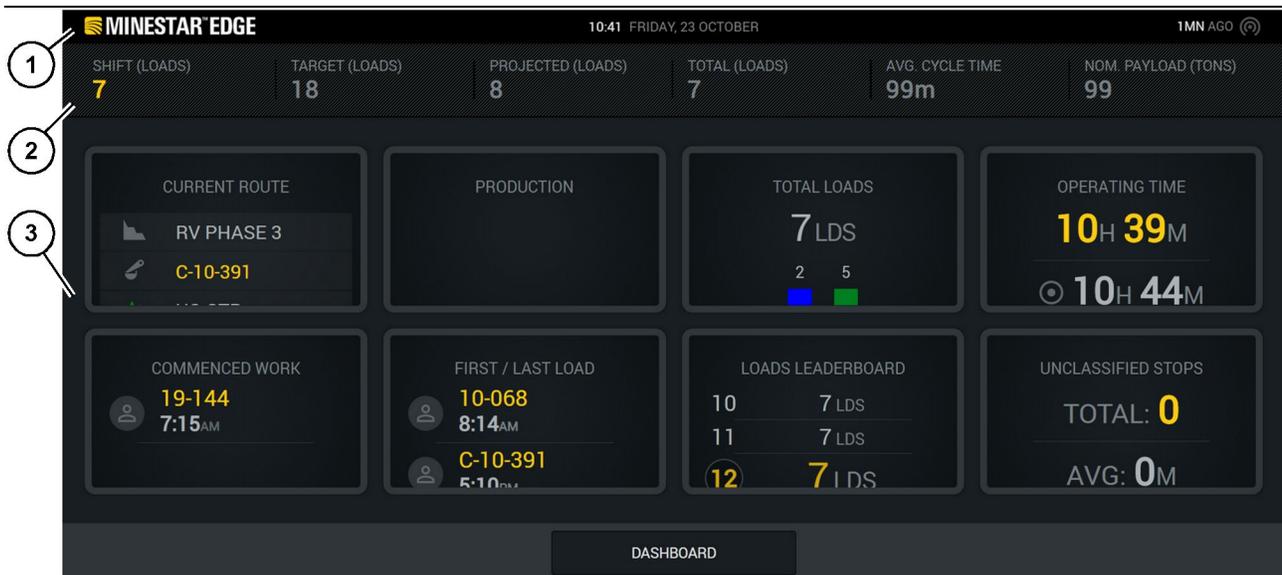


Illustration 13

g06655630

Edge production recording operator display main screen

(1) Title bar

(2) Header bar

(3) Main screen area

The Cat[®] MineStar System Edge production recording main screen contains the following four main sections.

- Program Title Bar (1)
- Machine Performance Metrics (2)
- Operator Display (3)

Program Title Bar (Truck)



Illustration 14

g06655631

Edge production recording main screen title bar

- (4) Cat MineStar system Edge logo
- (5) Current date
- (6) Time since last message received
- (7) Current wireless link status icon

The program title bar for the haul truck contains the following information:

Cat MineStar Edge Logo(4) – This shows the current application running on the display.

Current Date (5) – This shows the date and time, as determined by the Global Positioning System (GPS) data from the PL671 radio.

Time Since Last Message Received (6) – This shows the last time the display received an update from the Cat MineStar cloud application.

Current Wireless Link Status Icon (7) – This indicates whether the display is currently connected or not connected to the internet network. BLUE color indicates that the network is currently connected and GRAY color indicates that the network is not currently connected.

Machine Performance Metrics (Truck)

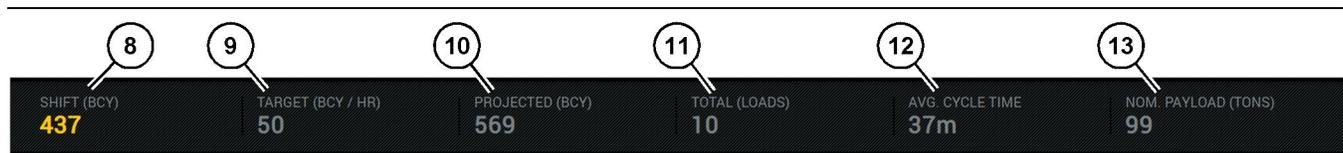


Illustration 15

g06655632

Edge production recording machine performance metrics bar

(8) Shift production indicator
(9) Production target indicator

(10) Projected production indicator
(11) Total (loads) indicator

(12) Average cycle time indicator
(13) Nominal payload

The machine performance metrics section of the main screen contains the following information about loader production for the current shift:

Shift Production Indicator (8) – This indicates the count of the production completed in the current shift. This number will be reset at the end of the shift, but this does not reflect the total for the overall day. This value will be set by what is being tracked in the office, which can be set to loads or the bank cubic yards (BCY).

Production Target Indicator (9) – This indicates the production target for the current shift as defined in the office application. Unit should align with the “Current Shift Total” indicator and may be displayed as target loads, total mass or total volume or an hourly rate.

Projected Production Indicator (10) – This indicates the total operator production as expected by the end of shift is based on current results. Unit should align to the “Current Shift Total” .

Total (Loads) Indicator(11) – This indicates the total load counts for the shift, based on the Edge office determining the loading activity for the truck. This will not change based on configured targets. However, it reflects the loads for reference.

Average Cycle Time Indicator (12) – This indicates the average haul truck cycle time for trucks loaded by this loading tool for the current shift. “AVG CYCLE TIME” is an average of the last 5 cycles.

Nominal Payload Indicator (13) – This indicates the nominal payload value set for the truck when configured for Edge. The value is measured in Imperial or Metric tonnage based on the Edge Office site settings. The measurement is specified in parenthesis.

Operator Display (Truck)



Illustration 16

g06655634

Edge production recording main screen

(14) Operator display tiles

(15) Operator display main screen area

The operator display icons area of the main screen contains the following information:

- “CURRENT ROUTE”
- “SHIFT PRODUCTION”
- “TOTAL LOADS”
- “OPERATING TIME”
- “COMMENCED WORK TIMESTAMP”
- “FIRST/LAST LOAD TIMESTAMPS”
- “LOADS LEADERBOARD”
- “UNCLASSIFIED STOPS”

Reference: For more information and detail on each tile, refer to the operator display tiles section of this manual.

Tool Button Display (Truck)

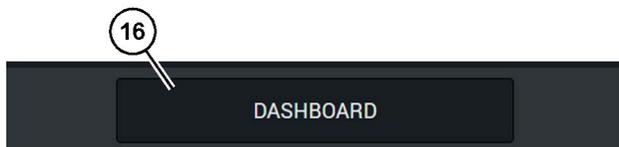


Illustration 17

g06655644

Edge production recording main screen footer bar

(16) “DASHBOARD” tool button

The tool button display is the area of the screen that lets the operator navigate within the software. The tool button display shows buttons that are predetermined to be present based on the version of the machine software.

Stop Reasons

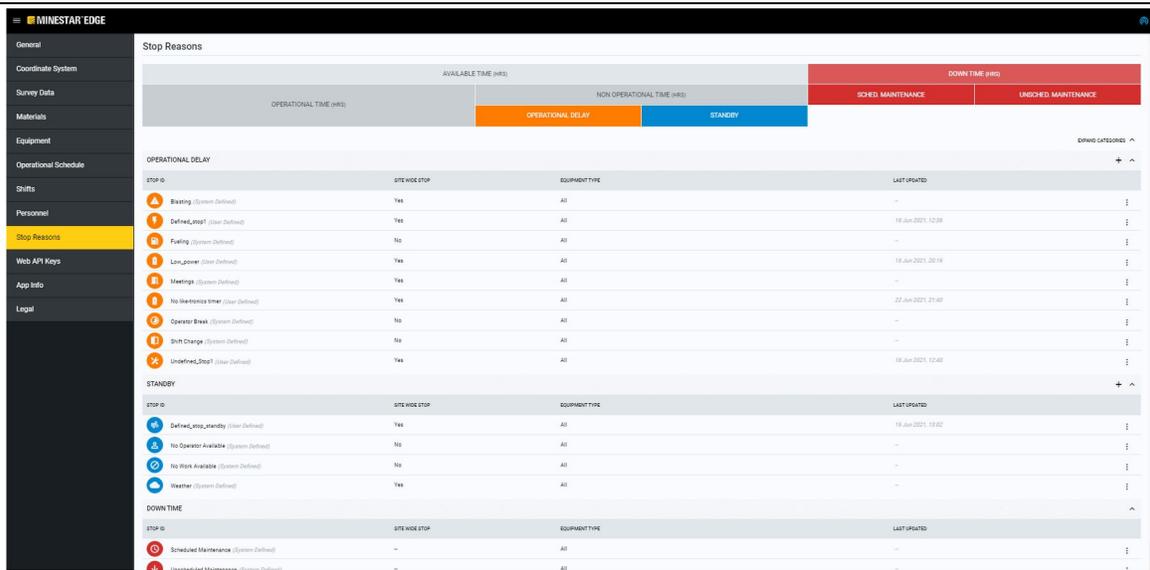


Illustration 18

g06694847

1. The pit supervisor includes a list of operational delay, standby, and down time delay as shown in illustration 18 .

Note: Additional stop reasons can be added to the system from the above screen.

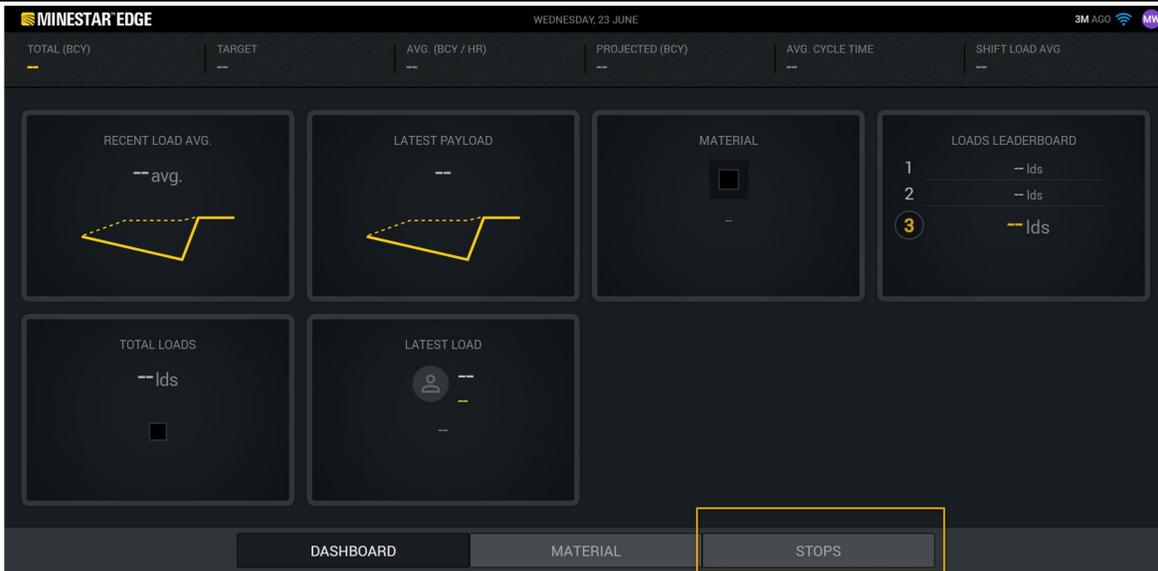


Illustration 19

g06694848

2. Operators can assign the stop reasons via the operator display. After successful login, Press the stops button at the bottom of the screen as shown in illustration 19 .

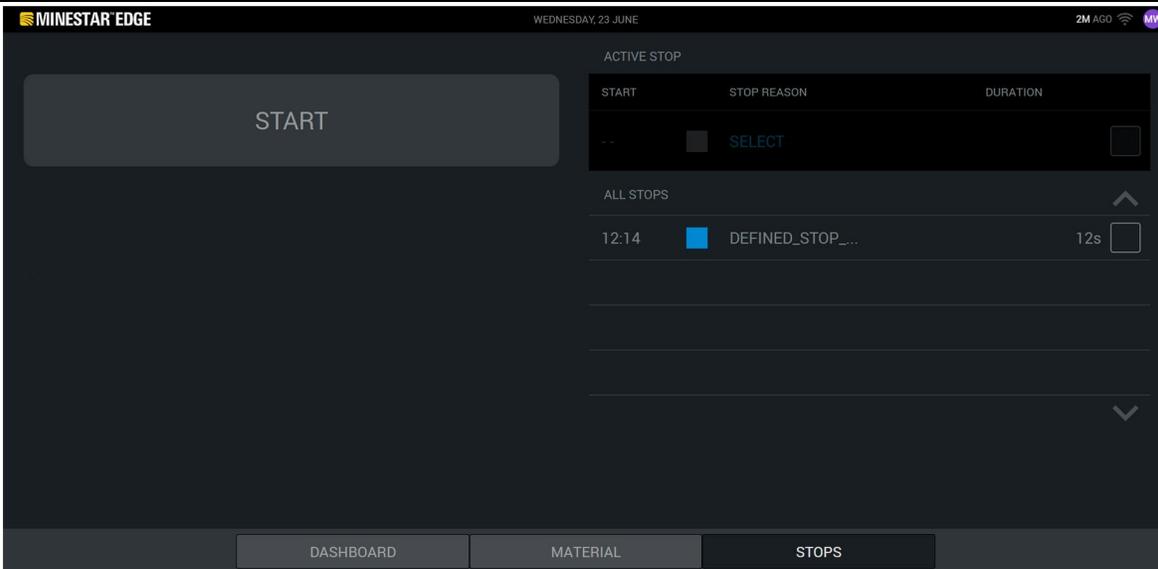


Illustration 20

g06694849

3. Stops screen displays with a start button, an active stop section, and a list of previous stops. To start a new stop event, press the start button.

Operation Section
Main Screen

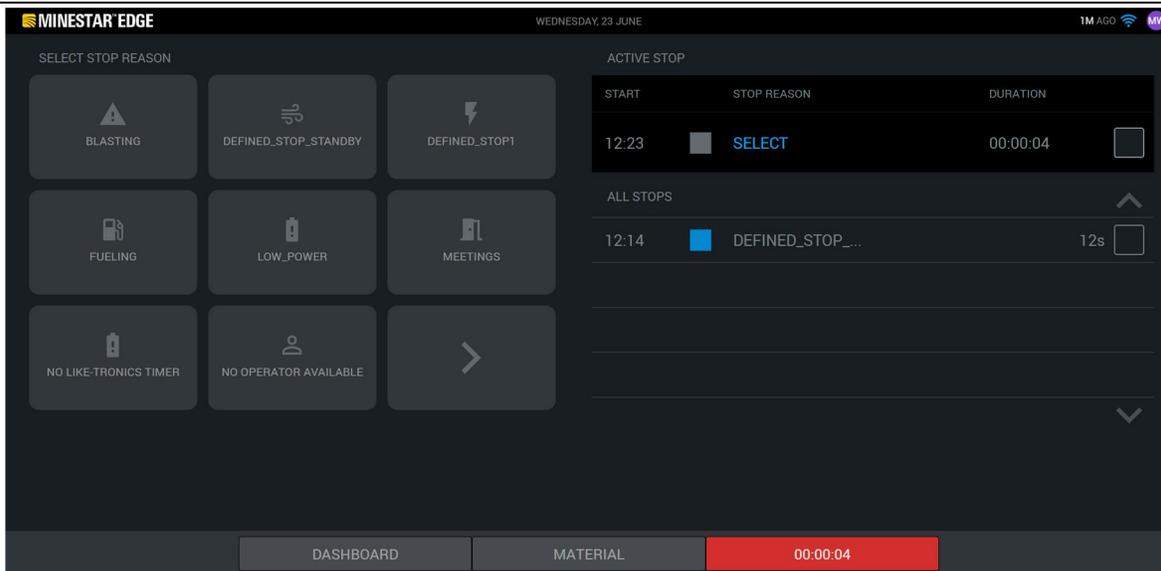


Illustration 21

g06694850

4. On clicking the start button, the STOPS at the bottom turns red with a timer indicating the duration. The active stop section displays a start time, a stop duration and a stop reason if selected. The list of stop reasons will show up on the left side of the screen. The arrow buttons can be used to scroll through the different stop reasons created in pit supervisor. Select a reason by clicking on the icon.

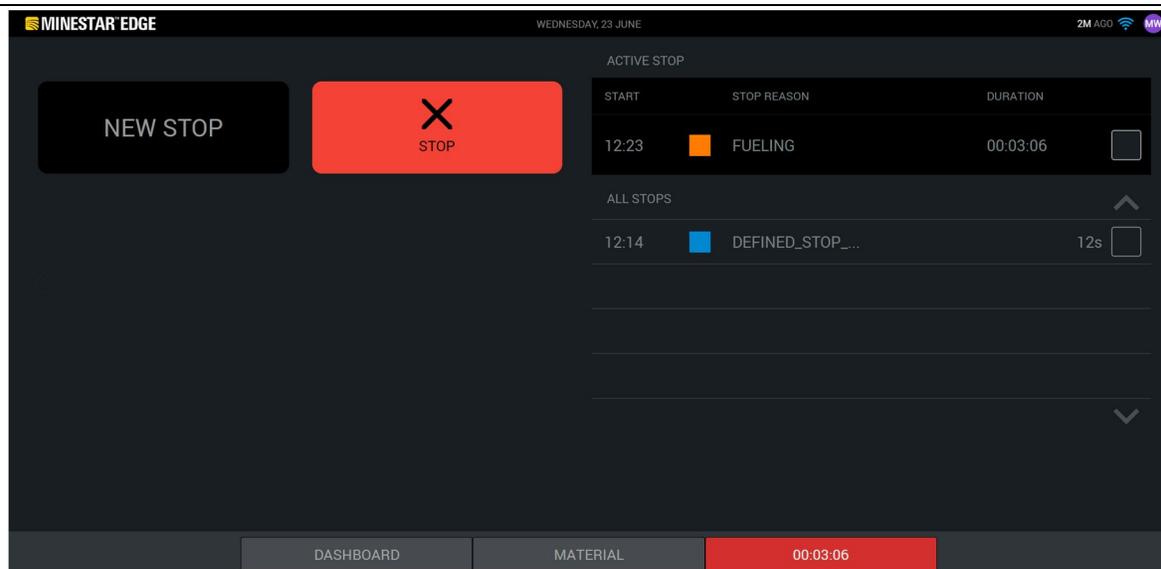


Illustration 22

g06694851

5. By selecting a stop reason, the buttons appear to start a new stop or end the current stop.

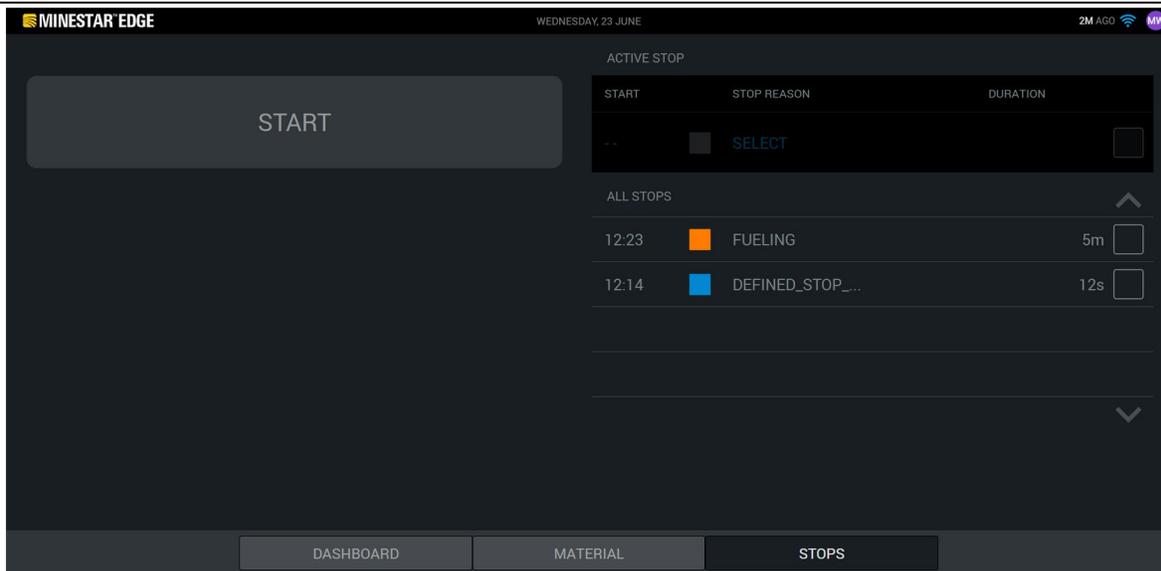


Illustration 23

g06694853

- By clicking the stop button, the active stop comes to an end and gets listed in the list of historical stops. The button to stop a new one also appears as a back up.

To change the stop reason, enable the check mark and select a different stop reason. The stops and the reasons are updated as observations in the pit supervisor.

i08400006

Operator Display Icons

SMCS Code: 7490

Display Icons (Loader)

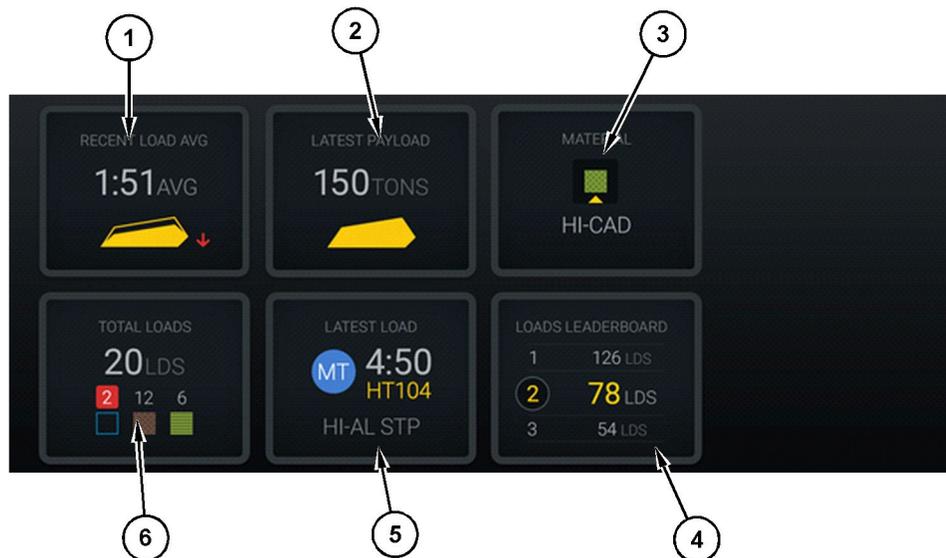


Illustration 24

g06502967

Edge production recording main screen

(1) Recent load average
(2) Latest payload

(3) Current material
(4) Loader leaderboard

(5) Latest load
(6) Total loads

Recent Load Average (1) – Average load time for the last five loads.

Latest Payload (2) – Payload of the last load recorded by the system based on the resolved haul truck payload.

Note: The truck must dump and then offload the data for the Latest Payload to update.

Current Material (3) – Top row shows current material as defined by the load area. Bottom row shows current selected material by the loader operator.

Loader Leaderboard (4) – Rank of loading tools. Yellow highlighted one is this machine.

Latest Load (5) – Load time, truck, material, and operator (if assigned) of the latest load.

Total Loads (6) – Total number of loads by this loading tool in the current shift. Material counts will show how many loads for each material.

The Operator Display Buttons area of the main screen contains such information as:

- “RECENT LOAD AVG”
- “LATEST PAYLOAD”
- “MATERIAL”
- “TOTAL LOADS”
- “LATEST LOAD”
- “LOADS LEADERBOARD”

Recent Load Average

The Recent Load Average or "RECENT LOAD AVG" Button shows the operator the last 5 loads.

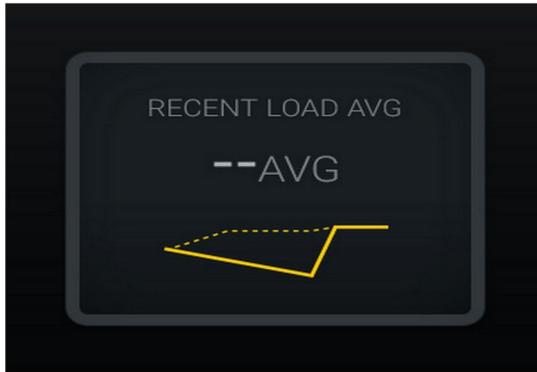


Illustration 25 g06489835
Recent load average. No data for the shift



Illustration 26 g06488997
Recent load average. Under loading trending down (getting worse)



Illustration 27 g06488998
Recent load average. Under loading trending up (improving)



Illustration 28 g06489367
Recent load average. Overloading trending down (improving)



Illustration 29 g06489383
Recent load average. Overloading trending up (getting worse)

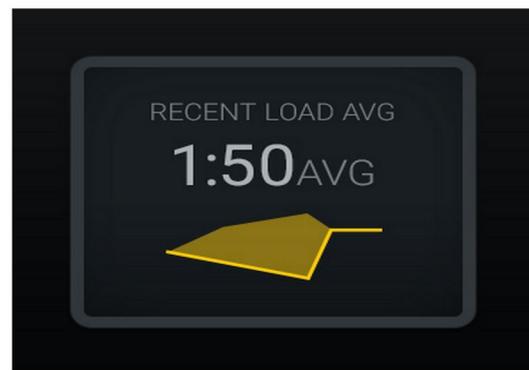


Illustration 30 g06489638
Recent load average. Optimal

Current Material

Material Determination Widget



Illustration 31 g06503289

Material is set

Operator has set material at the display. (Indicating the material is different than the load area)

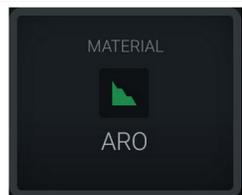


Illustration 32 g06503290

Material is not set

Operator has not set override. (Determined by the load area.)

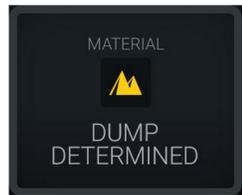


Illustration 33 g06503295

Material is not set.

Operator has not set override. (Determined by the dump area)

Total Loads/Material History Summary

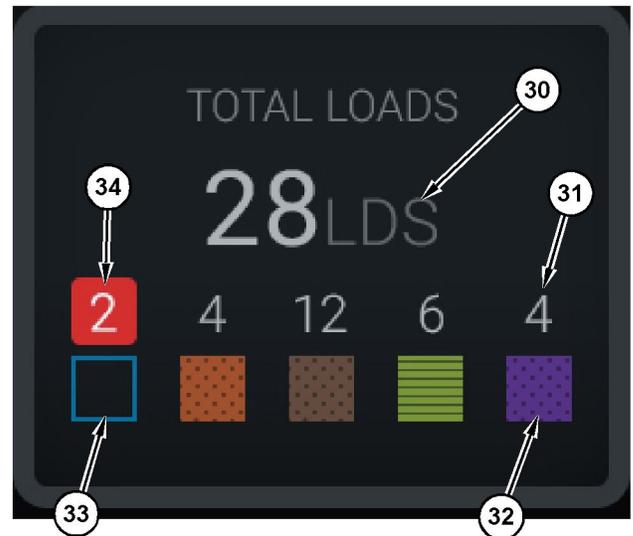


Illustration 34 g06503060

Total Loads/Material History Summary

- (30) Total loads including unknown material
- (31) Known material load count
- (32) Known material
- (33) Unknown material (default blue)
- (34) Unknown material load count

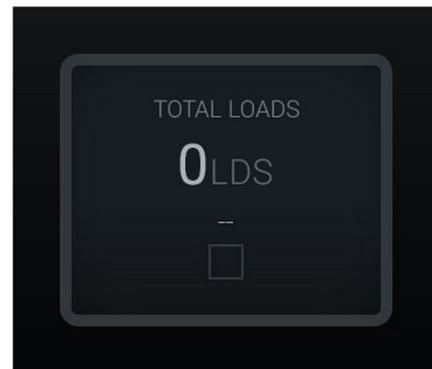


Illustration 35 g06489794

No Data for the Shift

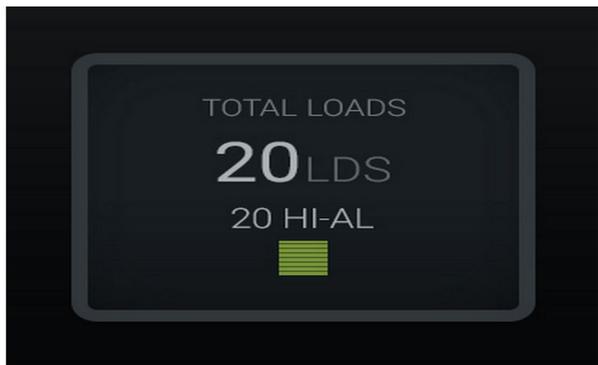


Illustration 36 g06489779
 One Active Material

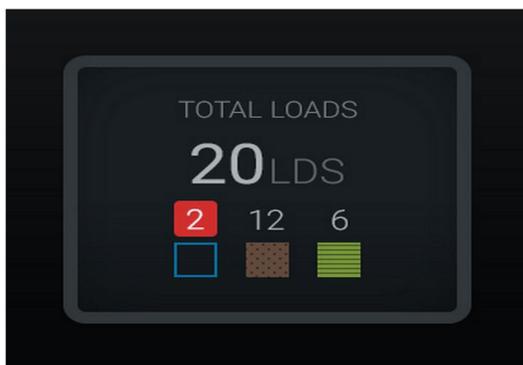


Illustration 37 g06489801
 Unknown/Known Materials



Illustration 38 g06489698
 Unknown/Known Materials

Loading Tool Leaderboard

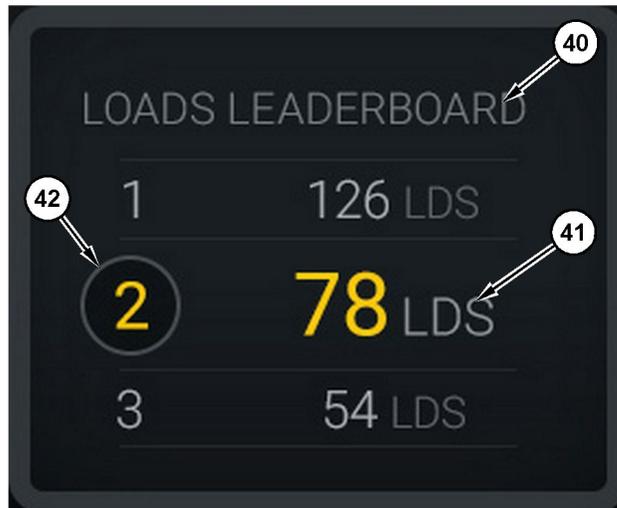


Illustration 39 g06503075

Loading tool leaderboard

- (40) Label added
- (41) Measurement unit (loads)
- (42) Operator shift rank

Material Selection and Historical Loads Screen



Illustration 40 g06490054

Material selection and historical loads screen

- (45) Default material based on assignment rules in the software application
- (46) Currently selected material if chosen by operator
- (47) Historical loads list
- (48) Next page of materials button

Default Material (45) – Material assigned to the load area (if any).

Currently Selected Material (46) – Material selected by the operator.

Operation Section
Operator Display Icons

Historical Loads (47) – Historical loads shown here. To change the material for a load, select the check boxes and confirm the change.

Next Page button (48) – Allows the operator to navigate to the next page of material for sites with multiple types of materials on site.

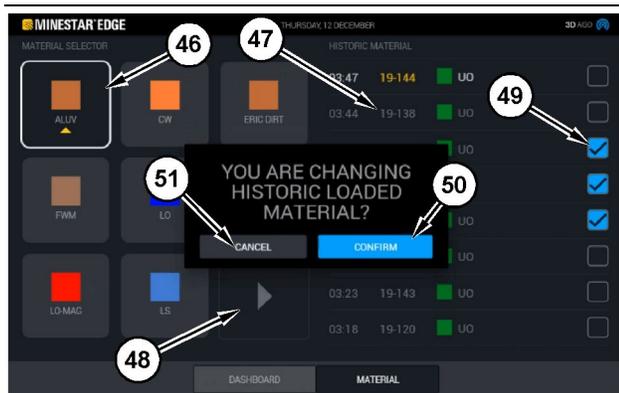


Illustration 41

g06490064

Material selection and historical loads screen with the “YOU ARE CHANGING HISTORIC LOADED MATERIAL?” popup box

- (45) Default material based on assignments rules in the software application
- (46) Currently selected material if chosen by operator
- (47) Historical loads list
- (48) Next page button
- (49) Historical loads list check box with selected check mark
- (50) “CONFIRM” button
- (51) “CANCEL” button

1. Select a historical load cycle to change by selecting the check box next to the historical load cycle.
2. Select the material to change the historical load cycle to.

3. After making a selection, a “YOU ARE CHANGING HISTORIC LOADED MATERIAL?” popup box will appear to confirm the users changes. Select the “CONFIRM” button (50) from the “YOU ARE CHANGING HISTORIC LOADED MATERIAL?” popup box.

Display Icons (Truck)



Illustration 42

g06656524

Edge production recording main screen

- | | | |
|----------------------|----------------------|------------------------|
| (1) Current Route | (4) Operating Time | (7) Loads Leaderboard |
| (2) Shift Production | (5) Commenced Work | (8) Unclassified Stops |
| (3) Total Loads | (6) First/Last Loads | |

Current Route (1) – Displays the route being traveled for the current cycle, showing respectively the loading area, the loader (if outfitted), and the dump area.

Shift Production (2) – Gives a line graph of the selected measurement over the time of the shift. It will also outline targets and projections with red or green lines indicating if the target is projected to be reached and, if a stationary target is set, a white line with a range to show the target and accepted range. Can be set to display loads, tons/tonnes, or bank cubic yards/meters, or any of those per hour.

Note: The truck must dump and then offload the data for the Latest Payload to update.

Total Loads (3) – Shows the total loads that the truck has handled currently within the shift, and also gives a breakdown of materials associated with the loads.

Operating Time (4) – Displays the total amount of time the current operator has been operating the machine.

Commenced Work (5) – Gives a timestamp of when work began for the shift along with the specific machine name that the operator is assigned to. This can reflect multiple entries if a machine switch occurs and that is input into the Edge Office.

First/Last Loads (6) – This will show timestamps for the first load to occur during the shift and the last load that it takes, along with the associated load equipment (if outfitted with Edge).

Loads Leaderboard (7) – The leaderboard of all active trucks to show which place you are currently in for who has more cycles overall. It will display your current placing and the total amount of loads currently completed, and it will display the two other places closest to your current place for comparison.

Unclassified Stops (8) – Gives the total number of times that the operator stopped the machine that was determined to be Unclassified, meaning it wasn't attributed with a shift change or break, or another production event such as fueling or loading.

Current Route

The route being traveled for the current haul cycle displayed as 3 points, the load area, the loader assigned, and the dump area.

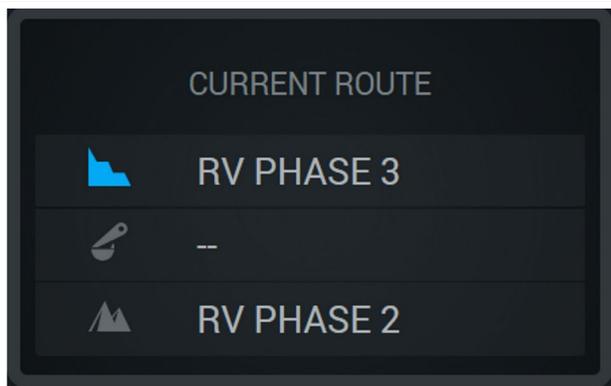


Illustration 43 g06656523
Route without an assigned loader

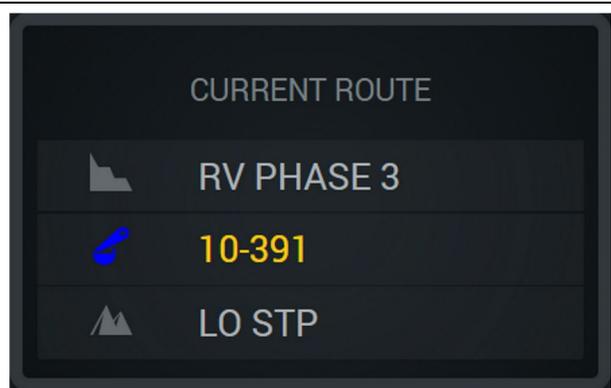


Illustration 44 g06656522
Route with an assigned loader

Shift Production

Displays the Production Target over the time of the current shift and also tracks if the projected finishing point will be above or below the target. The target set for the machine in the office will determine the values being tracked.

Overall Loads

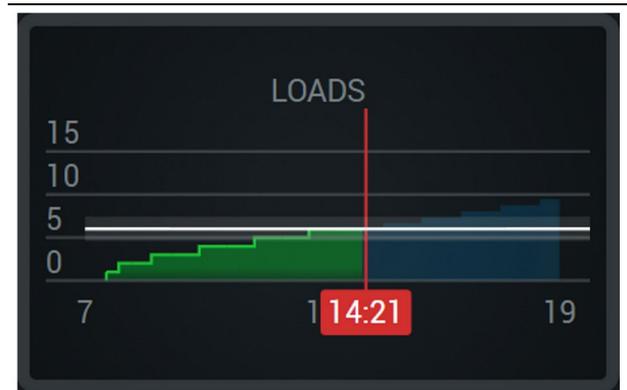


Illustration 45 g06656521

Overall Loads, with a target that is reached or going to be reached during the shift with current projections. The white line indicates the target that was set and the zone around it indicates the accepted range close to the target that was set.

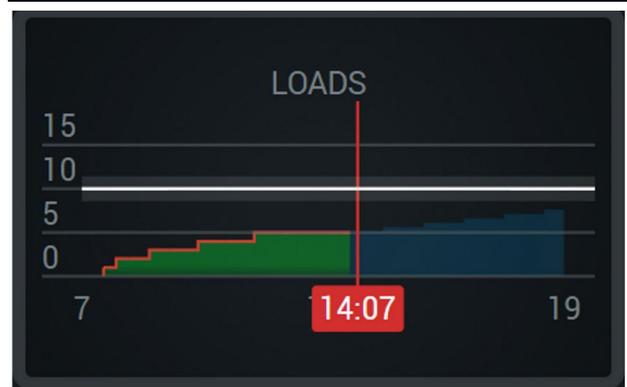


Illustration 46 g06656520

Overall Loads, with a target that is not going to be reached during the shift with current projections. The white line indicates the target that was set and the zone around it indicates the accepted range close to the target that was set.



Illustration 47 g06656519

Loads per hour, with the target being reflected as reached with a green line or not reached with a red line.

Overall Tonnage

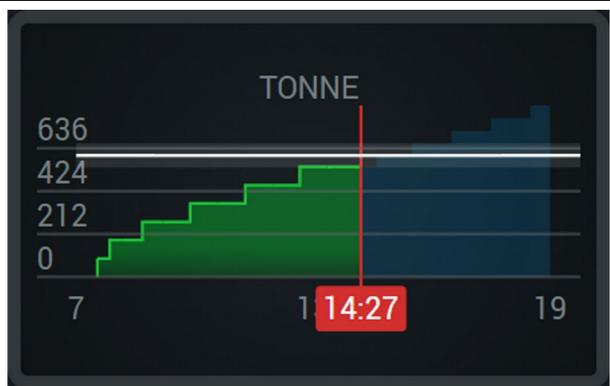


Illustration 48 g06656517

Overall Tonnage with a target that is reached or going to be reached during the shift with current projections. The white line indicates the target that was set and the zone around it indicates the accepted range close to the target that was set. The measurement system set in the site will determine if displayed in Tons (Imperial) or Tonnes (Metric).

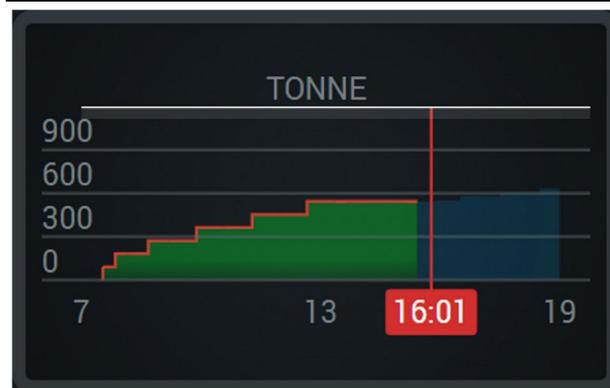


Illustration 49 g06656516

Overall Tonnage with a target that not going to be reached during the shift with current projections. The white line indicates the target that was set and the zone around it indicates the accepted range close to the target that was set. The measurement system set in the site will determine if displayed in Tons (Imperial) or Tonnes (Metric).



Illustration 50 g06656496

Tonnage per hour, with the target being reflected as reached with a green line or not reached with a red line.

Bank Cubic Metres

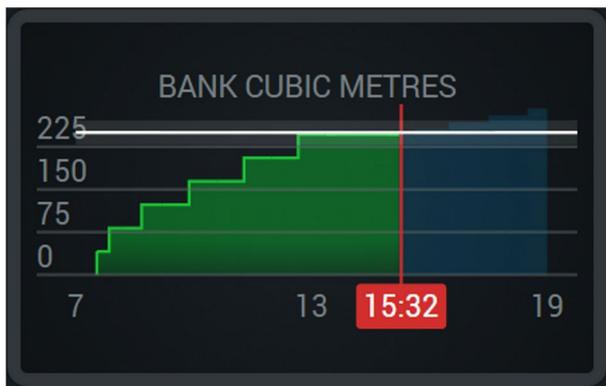


Illustration 51 g06656486

Overall BCUs with a target that is reached or going to be reached during the shift with current projections. The white line indicates the target that was set and the zone around it indicates the accepted range close to the target that was set. The measurement system set in the site will determine if displayed in Cubic Yards (Imperial) or Cubic Meters(Metric)

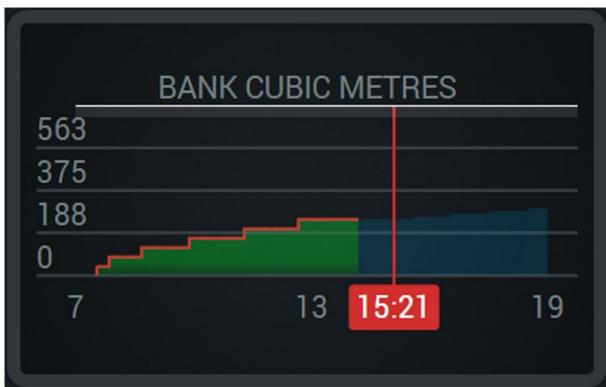


Illustration 52 g06656485

Overall BCUs with a target that not going to be reached during the shift with current projections. The white line indicates the target that was set and the zone around it indicates the accepted range close to the target that was set. The measurement system set in the site will determine if displayed in Cubic Yards (Imperial) or Cubic Meters (Metric)

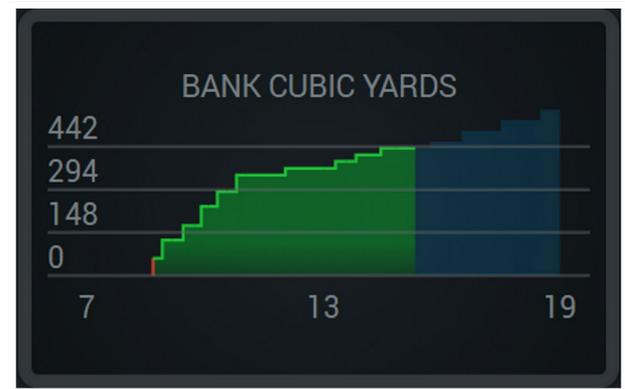


Illustration 53 g06656484

BCUs per hour, with the target being reflected as reached with a green line or not reached with a red line.

Total Loads/Material History Summary

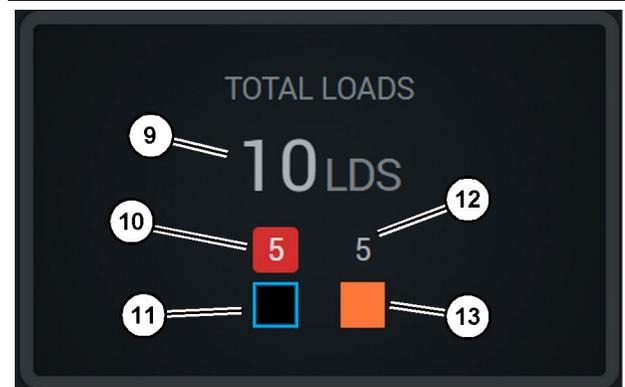


Illustration 54 g06656436

- (9) Total Loads
- (10) Unknown material load count
- (11) Unknown material (default Black)
- (12) Known material load count
- (13) Known material

The Total Loads tile will display the total number of loads as you complete cycles during the shift. It will also give a breakdown of the loads by material type.

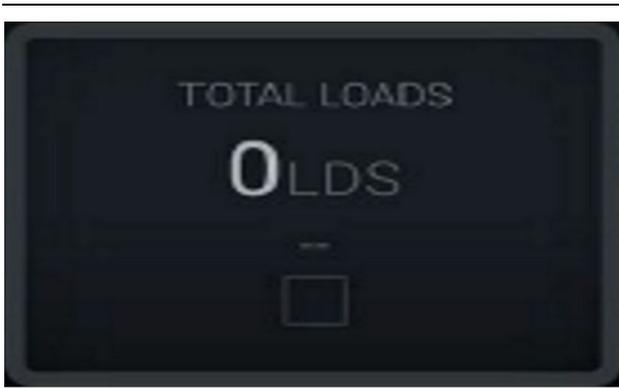


Illustration 55 g06656445
No data for the shift

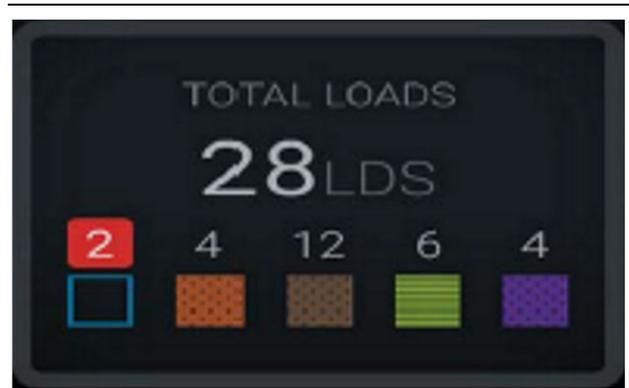


Illustration 58 g06656458
Unknown and Known materials with higher variance



Illustration 56 g06656444
One Active material

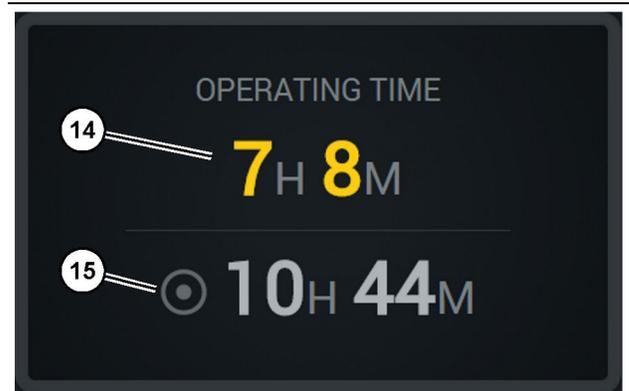


Illustration 59 g06656327
(14) Current shift total operating time
(15) Target operating time for the shift

Commenced Work

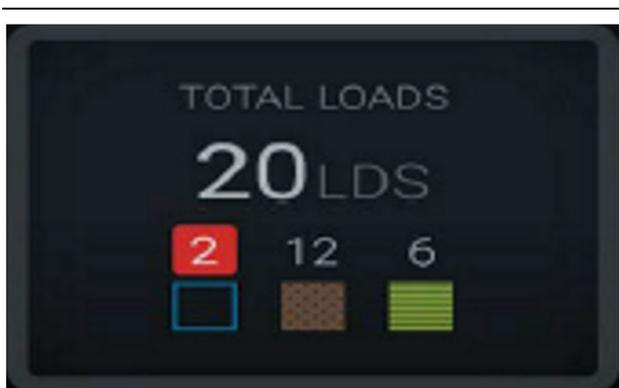


Illustration 57 g06656450
Unknown and Known materials

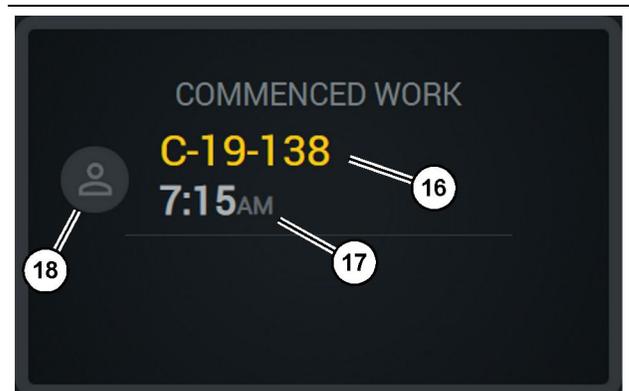


Illustration 60 g06656324
(16) ID of machine currently being operated
(17) Time that the truck began working
(18) Portrait for the currently assigned operator

First/Last Load

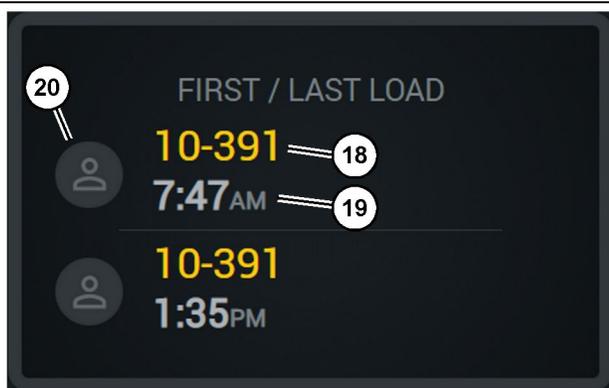


Illustration 61

g06656317

- (18) Portrait of the assigned operator
- (19) ID of machine currently being operated
- (20) Timestamps for first load time and last load time

Unclassified Stops

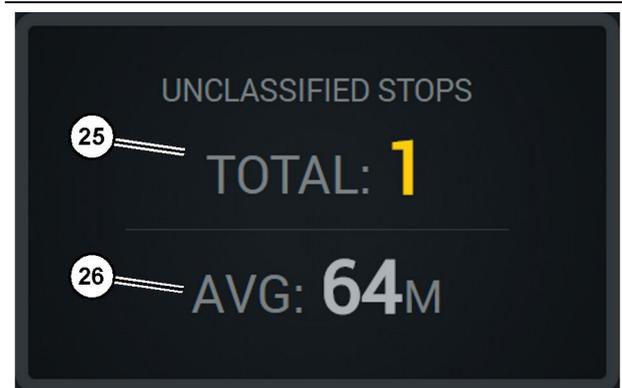


Illustration 63

g06656314

- (25) Total Unclassified stops
- (26) Average amount of total unclassified stop time

Loads Leaderboard

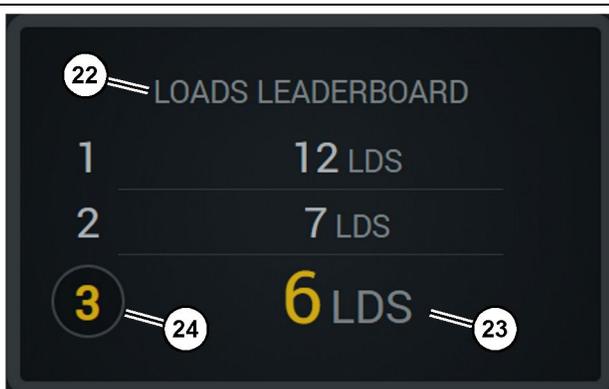


Illustration 62

g06656315

- (22) Label added
- (23) Measurement unit (Loads)
- (24) Shift rank

Maintenance Section

i08579953

Maintenance Interval Schedule

SMCS Code: 1400

Ensure that all safety information, warnings, and instructions are read and understood before any operation or any maintenance procedures are performed.

The user is responsible for the performance of maintenance, including all adjustments, the use of proper lubricants, fluids, filters, and the replacement of components due to normal wear and aging. Failure to adhere to proper maintenance intervals and procedures may result in diminished performance of the product and/or accelerated wear of components.

Use mileage, fuel consumption, service hours, or calendar time, **WHICH EVER OCCURS FIRST**, to determine the maintenance intervals. Products that operate in severe operating conditions may require more frequent maintenance.

Note: Before each consecutive interval is performed, all maintenance from the previous interval must be performed.

Every 8 Service Hours or Daily

“ Display - Clean”	40
“GPS Antenna Bracket - Align”	40
“Harness and Cable - Inspect”	41
“MineStar Module (PL671) - Check”	41

i08003572

Display - Clean

SMCS Code: 7347-070

Make sure that the Display screen is clean.

Clean the Status Display screen

Sometimes a spot of dirt on the display can cause a pixelation. Follow the instructions below to clean the Liquid Crystal Display (LCD):

NOTICE

Isopropyl alcohol is a flammable liquid. Never spray or pour any liquid directly on the Status Display screen. Do not clean the screen while the Operator Console is on.

1. Shut down the Display.
2. Wipe the screen gently with a soft, dry cloth. If any marks remain, moisten the cloth with an LCD cleaner, and then gently stroke the cloth across the display in one direction, moving from the top of the display to the bottom.

NOTICE

Do not use any of the following chemicals or any solutions that contain the following:

- Acetone
- Ethyl alcohol
- Toluene
- Ethyl acid
- Ammonia
- methyl chloride

If you have a different chemical or solution and are not sure whether the chemical or solution is suitable, do not use the chemical or solution. Using any of the chemicals in the previous list may cause permanent damage to the Status Display screen. Some commercial window cleaners contain ammonia and are, therefore, unacceptable.

3. Be sure that the screen is dry before using the Display.

Note: Many cleaning solutions are sold specifically as LCD cleaners. These cleaners can be used to clean the screen on the Operator Console. Alternately, you may use a 50/50 isopropyl alcohol and water mixture. Microfiber cloths such as those used to clean eyeglasses are excellent for use with LCDs.

4. Check the display operation and functionality before using in the field.

Note: Be sure to have a damaged display repaired or replaced before operating the machine.

i07493507

GPS Antenna Bracket - Align

SMCS Code: 7348-535; 7490-535

WARNING

Improper operation of an access platform could result in injury or death. Operators must carry out their duties properly and follow all instructions and guidelines given for the machine and access platform.

Note: When accessing the GPS antenna bracket for cleaning or inspection, be sure to observe safe procedures for access. Maintain a three-point contact and or use a body harness.

Always inspect the condition of the GPS antenna bracket and the condition of the GPS antenna bracket mounting hardware before you operate the machine. Replace any parts that are damaged or worn before you operate the machine. Make sure that the mounting bolts are tight.

i07493441

Harness and Cable - Inspect

SMCS Code: 1408-040; 4459-040



Illustration 64

g06214673

PL671 inspection

Inspect for damaged wires or cables routed to the MineStar modules. Refer to Illustration 64 .

i07493508

MineStar Module (PL671) - Check

SMCS Code: 7605-535

Check that the power and communication lights illuminate when powered ON. Check for physical damage to the module.

Index

B

Before Operation	12
Power ON/OFF	12

D

Display - Clean	40
Clean the Status Display screen	40

F

Foreword	4
Literature Information	4
Maintenance	4
Maintenance Intervals	4
Operation	4
Product Capacity	4
Product Information	4
Safety	4

G

General Information	8
Cat MineStar System Production Recording	
Basics	8
Intended Use	8
GPS Antenna Bracket - Align	40

H

Harness and Cable - Inspect	41
-----------------------------------	----

I

Important Safety Information	2
------------------------------------	---

M

Main Screen	13
Operator Display (Loader)	16
Operator Display (Truck)	20
Operator ID/Login	13
Stop Reasons	24
Maintenance Interval Schedule	39
Every 8 Service Hours or Daily	39
Maintenance Section	39
MineStar Module (PL671) - Check	41

O

Operation	13
Operation Section	12
Operator Display Icons	28
Display Icons (Loader)	28
Display Icons (Truck)	33

P

Product Information Section	8
Product Link (PL671 - If Equipped)	6
Certification Notices	7
sDoC	6
Specifications	6

R

Regulatory Compliance Information	6
---	---

S

Safety	5
Operation	5
Safety Messages	5
Safety Section	5
System Components	9
Cat MineStar System Edge Module	
(PL671)	10
Optional Items	10

T

Table of Contents	3
-------------------------	---

Product and Dealer Information

Note: For product identification plate locations, see the section "Product Identification Information" in the Operation and Maintenance Manual.

Delivery Date: _____

Product Information

Model: _____

Product Identification Number: _____

Engine Serial Number: _____

Transmission Serial Number: _____

Generator Serial Number: _____

Attachment Serial Numbers: _____

Attachment Information: _____

Customer Equipment Number: _____

Dealer Equipment Number: _____

Dealer Information

Name: _____ Branch: _____

Address: _____

Dealer Contact

Phone Number

Hours

Sales: _____

Parts: _____

Service: _____

M0097305
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