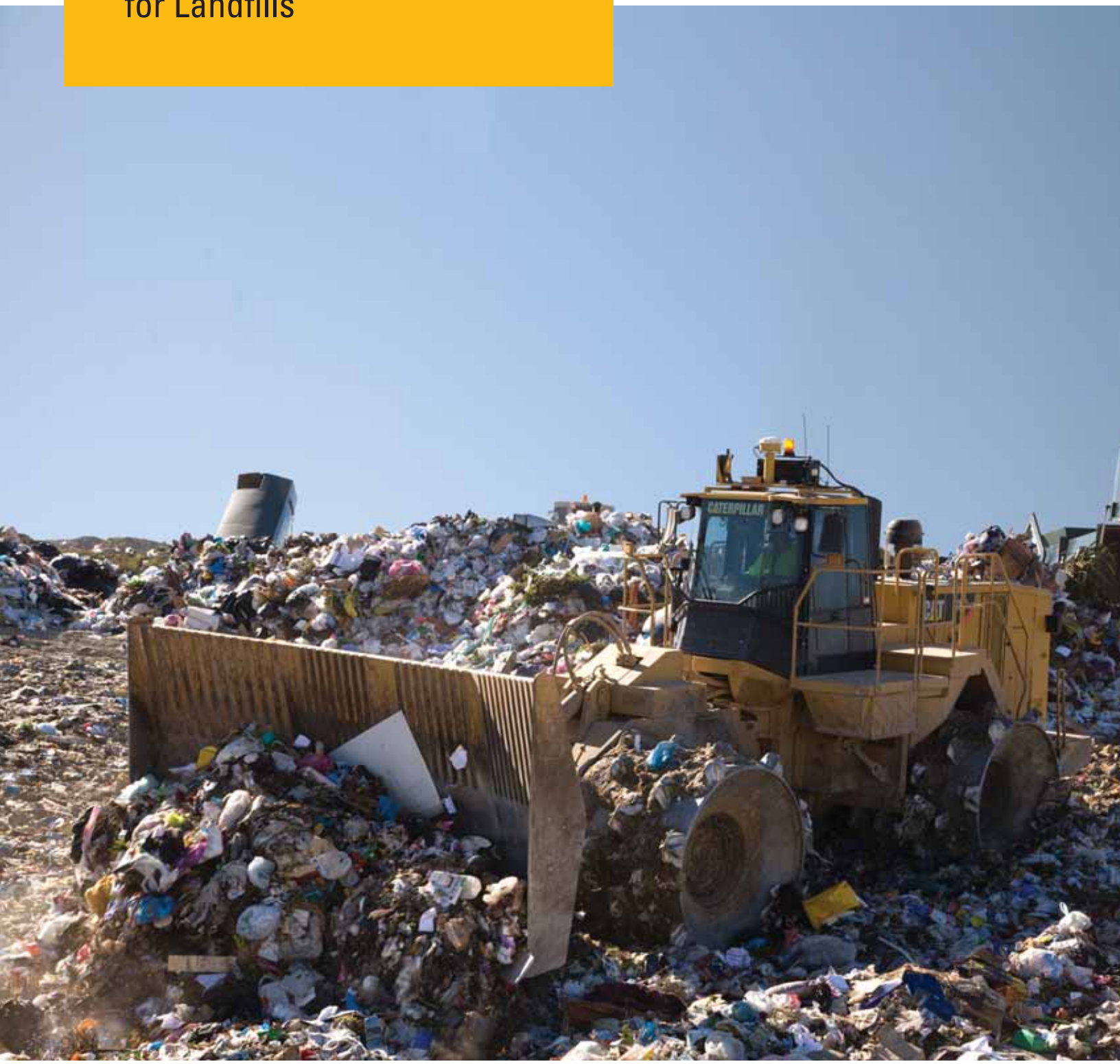
CAES
for Landfills

CATERPILLAR®



Machine Compatibility

Compactors, Track-Type Tractors, Track-Type Loaders, Motor Graders, Excavators and Wheel Tractor Scrapers

CAES for Landfills Features

CAES for Landfills
Allows machine operators to achieve maximum landfill compaction, desired grade/slope, and to conserve valuable cover soil by increased placement and tracking accuracy without the use of traditional grade control methods.

On-Board Components
The CAES display empowers operators with real-time compaction and grade/slope information, enabling better decisions and optimizing performance.

Off-Board Components
Continuous real-time data radio communications with office computer provide accurate, up-to-the-minute site progress and status -ensuring timely and correct operational decisions.

Features and Benefits
CAES for Landfills allows operators to maximize airspace, avoid over/under-building and ensure proper drainage. It also enables precise placement and tracking of critical materials.

CAES for Landfills is a versatile technology solution that maximizes landfill operations. Maximize your landfill operation by using CAES for Landfills to improve compaction, decrease costs and increase productivity.

CAES now allows for critical machine information to be shared between machines through the communications radio. Specific information is shared between machines that allow machine operators to see the position of other CAES equipped machines on their screen. This feature also helps keep multiple CAES machine sites better updated increasing the productivity of the operator, reducing fuel usage, minimizing thick lifts and reducing machine hours.

Contents

CAES for Landfills

A versatile technology solution that maximizes your landfill operation.

The Computer Aided Earthmoving System (CAES) is a high-technology landfill tool that allows machine operators to achieve maximum compaction, hold tighter grades/slopes, and conserve valuable cover soil without stakes and crews.

Using Global Navigation Satellite System (GNSS) technology, machine mounted components, a radio network and office management software, this system delivers real-time information on an in-cab display.

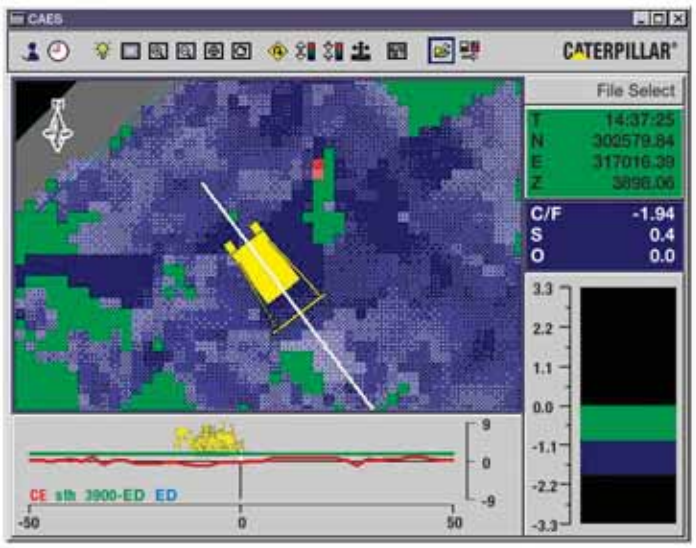
By monitoring compaction progress and grade control, operators have the information they need to maximize the efficiency of the machine, resulting in proper drainage and optimum air space use. This advanced technology tool also aids in the identification of site-specific storage areas for materials requiring special handling and placement records, such as hazardous, medical, sludge and industrial materials.

Applications

CAES is specifically designed for use on landfill compactors, track-type tractors, wheel tractor scrapers, motor graders, hydraulic excavators, and track-type loaders.

Overview

CAES uses GPS technology, a wireless data radio communication network, and office software/data capture to provide real-time design, plan, and sequencing information to machine operators and cell status/operations information to management. Digital elevation designs containing a wealth of additional information, such as hinge points, contours, boundaries and avoidance zones and surfaces, such as gas wells and liners, are sent wirelessly to each CAES-equipped machine. The designs are displayed for operators on a color touchscreen. By tracking the machine's position with high precision GNSS technology, compaction progress and material placement are closely monitored and recorded. As the CAES-enabled machines are driven over the site, elevation is closely monitored and recorded in a digital terrain file. Various color-coded elevation displays ensure operators know when proper elevations have been reached, regardless of machine type. For compactors, in addition to elevation, the number of machine passes is closely monitored and recorded. This allows compactor operators to precisely determine where the appropriate number of passes and high levels of compaction have been achieved via a color coded map. Using the radio network and office software, landfill terrain data is transmitted from the machines to the landfill office for use in volume/density calculations, monitoring of compaction levels, lift heights, pass coverage, elevations and in planning the next fill sequence.



On-Board Components

Keep the operator informed with real-time information.

GPS Receiver

The all-new MS990C is he next generation GNSS receiver from Caterpillar. The antenna and receiver hardware have been combined into one durable component built to withstand working in the harsh landfill environment. This base station GNSS receiver is used to send corrections across the radio network. The system computes positions with centimeter-level accuracies to ensure precise machine location. GPS and GLONASS constellations provide increased position availability for the system.

The new design of the MS990C also includes faster RTK initialization times, better tracking and accuracy characteristics over a broader range of operating environments, and features to use the new modernized U.S.-based GPS satellite constellation.

Communications Radio

The rugged radio is used for transmitting and receiving real-time data. The radio is used to send design data to machines, and receive terrain files, diagnostics, and productivity information from machines. It also sends GNSS corrections from the base station to the machine receiver on a dedicated channel. Under normal conditions, the 900 MHz radio broadcasts data up to 10 km (6.2 miles) line-of-sight. Coverage can be enhanced with a network of repeaters, which allows coverage over a broader area. Optimized for landfill applications, the radio features error correction and high-speed data transfer, ensuring optimum performance. Landfill sites may also use an internet protocol radio network to connect CAES-equipped machines. An Ethernet port on the CAES touch screen display is available for easy connection to third party radios.

CAES Touch Screen Display

The in-cab graphical display provides real-time operating information to the operator. Designed for simple operation, the 264 mm (10.4 in) custom configurable, integrated touch screen display allows operators to easily interface with the CAES system. The display uses the latest infrared touch screen and transflective backlight technology for superior viewing in bright light conditions and a broad range, dimmable backlight for viewing in low light conditions.

Harnesses and Cables

Integrated harnesses and cables connect components to the machine's main electrical systems and are designed for easy installation.

Off-Board Components

Operators have all the information needed to complete the tasks at hand.

CAESoffice Software Suite

The Caterpillar designed CAESoffice software suite enables near real-time monitoring of CAES-equipped machines, work progress, and cell/site status throughout the site. CAESoffice software continuously updates and displays as-built surface information, including compaction state, thick lifts and current elevation.

Productivity Tools

Productivity tools allows management personnel to track volume of material compacted, areas covered, thick lift areas and percentages, under and over-passed areas, and percentages.

CAES Productivity Report Generator

As events happen, they are recorded in various CAES reports and logs so that both the machine operator and office personnel can view them. Reports can be created and archived at any time.

GNSS Reference Station

A GNSS reference station is used to achieve the centimeter-level accuracy needed in a landfill application. The reference station sends GNSS information over a radio link. Depending on which base station is used, satellites in both the GPS and GLONASS constellations can enhance signal strength.

Radio Network

The off-board radios connect the office network to the on-board systems. The network contains one channel used for timely delivery of GNSS corrections to the on-board GNSS receiver.

Landfill Planning Software

CAES landfill planning software is compatible with most third party CAD planning software packages.

Features and Benefits

Maximize efficiency, ensure proper drainage and optimize airspace.

Customer Support

For more than 25 years, Caterpillar has been providing electronic and electrical components and systems for the earthmoving 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 matching machine guidance systems to the application and obtaining responsible, knowledgeable support.

Increased Efficiency

CAES monitors grade and compaction progress and displays the information in the cab, which allows operators to maximize machine efficiency, leading to proper drainage and optimum air space use.

Ease of Communication

Landfill managers can send a work plan to an in-cab display, so the operator can see the work that needs to be done. Data can also be transmitted via the radio network.

Immediate Feedback

CAES provides immediate feedback and real-time information as work is done, so the operator can see the accuracy of each pass and have the information and confidence needed to work more efficiently, productively and profitably.

Machine Compatibility

Compactors, Track-Type Tractors, Track-Type Loaders, Motor Graders, Excavators and Wheel Tractor Scrapers

Communications Radio

Operating range	Up to 10 km (6 miles)	
Technology	Spread spectrum	
Data rate	High speed	
Operating temperature	–40° C to 70° C –40° F to 158° F	
Storage temperature	–55° C to 70° C –67° F to 158° F	
Humidity	100 %	
Height	216 mm	8.5 in
Width	86 mm	3.4 in
Length	260 mm	10.3 in
Weight	0.9 kg	2 lb

GPS Receiver

Horizontal accuracy	10 mm	0.39 in
Vertical accuracy	20 mm	0.79 in
Operating range	Up to 10 km (6.2 miles)	
Network connector	16-pin	
Electrical input	9 to 32 V DC	
Operating temperature	–40° C to 70° C –40° F to 158°F	
Storage temperature	–50° C to 85° C –67° F to 185° F	
Height	147 mm	5.8 in
Width	232 mm	9.1 in
Depth	251 mm	9.9 in
Weight	3.8 kg	8.3 lb

For more complete information on Cat products, dealer services, and industry solutions, visit us on the web at **www.cat.com**

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