

Construction Machinery



1 ZAXIS350LC-7 hydraulic excavator that meets European Stage V Standards

1 ZAXIS-7 Series of Hydraulic Excavators that Meet European Stage V Standards

ZAXIS-7 is a series of 24-to-87-t class hydraulic excavators that comply with the new European emissions regulations (Stage V Standards) that began in 2019. The main features of ZAXIS-7 series are as follows:

(1) Environmentally friendly

The Stage V Standards add a new particle number (PN) standard for exhaust particles. To comply with it, ZAXIS-7 models have exhaust gas after-treatment equipment that uses a ceramic filter combined with a urea-based selective catalytic reduction (SCR) system. The hydraulic system, exhaust gas, and fuel consumption have also been matched to create the optimum combination.

(2) Improved fuel efficiency

Further gains in fuel efficiency have been made by improving the energy-saving TRIAS and HIOS hydraulic systems of the previous lineup. Control has been optimized for each operation, and fuel efficiency has been greatly improved while keeping the hydraulic systems easy to operate with the same amount of effort. The result is a fuel consumption reduction of 6 to 20% relative to the ZAXIS-6 series.

(3) Improved interior

A number of refinements have significantly improved

the interior. For example, large windshield wipers are provided for better visibility. The suspension seat is integrated with the console, and a large monitor is provided along with a new switch layout.

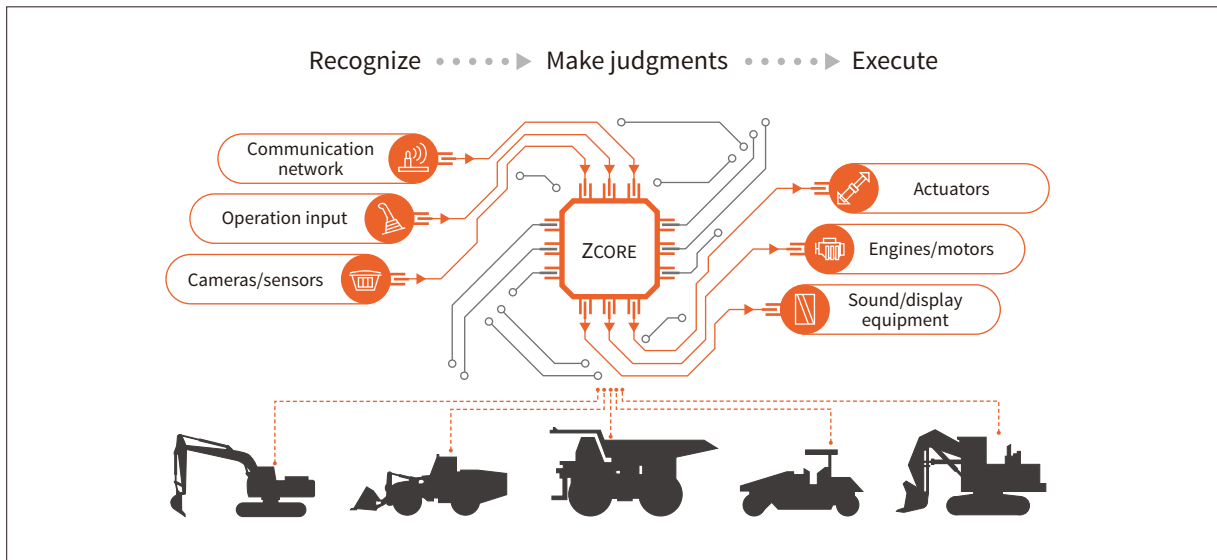
(Hitachi Construction Machinery Co., Ltd.)

2 ZCORE Autonomous Construction Machinery Platform

ZCORE is a system platform developed to provide a cooperative construction machinery hub that combines advanced autonomous operation with cooperative safety (an approach to improving the safety and productivity of a construction site as a whole through collaboration between people and machinery).

Faced with dwindling working-age populations and aging pool of experienced technicians, developed countries' construction industries are looking for ways of saving labor to boost productivity. Developing autonomously operated construction machinery is being seen as one promising solution, but the safety of the human workers around the machinery needs to be ensured.

Operators of standard construction machinery recognize and make judgments on construction site conditions, and then execute the required operations with safety in



2 Concept of ZCORE autonomous construction machinery platform

mind. With ZCORE, the machinery system can recognize, make judgments, and execute. It makes it easy to implement the sensors and information systems needed for these processes, enabling a combination of cooperative safety and advanced autonomous operation. It also provides a standardized interface to support general-purpose sensors, enabling easy function expansion or customization tailored to user needs.

Hitachi is planning to use ZCORE with hydraulic excavators, wheel loaders, rigid dump trucks, and other autonomous construction machinery it has developed. (Hitachi Construction Machinery Co., Ltd.)

A number of different engine types are available to meet the local emissions regulations applicable in each region. The main features are as follows:

(1) Fuel-saving

The main pump's electronic regulator is controlled to reduce the discharge flow rate during hydraulic relief. The oil cooler size has been increased to reduce the fan speed. A flow rate regeneration circuit has been added for lowering the boom.

(2) Improved reliability

The hydraulic hoses connecting the front attachment to the excavator body have been re-routed to reduce the fluctuation angle. The automatic lubricator's capacity has been increased, and the electrical wiring harnesses are protected by a solid conduit with no slits.

(3) Improved safety

Displays that indicate how much the excavator's body has tilted or turned to prevent toppling or operator errors. The emergency evacuation equipment has been improved. Retractable stairs and an engine stop switch operated from the ground have been installed.

3 EX2600-7 and EX5600-7 Mining Excavators

EX2600-7 and EX5600-7 are two mining excavator models recently released. The new models have improved on previous models in the areas of fuel efficiency, reliability, safety, operability, serviceability, and interior features.



3 Mining excavator models EX2600-7 (left) and EX5600-7 (right)

(4) Improved operability

Operator fatigue has been reduced by adding a control feature that reduces the hydraulic cylinder speed at the end of each stroke to absorb shocks.

(5) Improved serviceability

A starter disconnecter switch has been added to prevent the engine from being started by mistake during servicing. The engine oil pan capacity has been increased, eliminating the separate reserve tank of previous models without increasing the engine oil change frequency.

(6) Improved interior

The main monitor's visibility has been improved, roller screen has been provided, and air conditioner performance has been improved.

(7) Compliance with emission regulations in different jurisdictions.

A choice is offered of either an engine that complies with US Environmental Protection Agency (EPA) tier 4 emission standards and European stage V non-road emission standards or a fuel-efficient engine for use in other jurisdictions.

(Hitachi Construction Machinery Co., Ltd.)

Hitachi has responded by developing a measurement technology that measures the work of a technician using equipment such as cameras or motion capture devices, and creates visualizations of the work from quantitative data. The technology has been used to start demonstration testing to enable the development of a training system that can compare the work of trainees to proper welding work conditions derived from correlations between skilled technician data and weld quality. The system will provide visual and quantitative information to show trainees how they are improving, and will give instructors the data they need to provide specific guidance. It will be designed to eliminate individual differences in learning level by letting both instructors and trainees share the same visual model to enable effective training.

Hitachi is planning to enhance its future human resources development by using the system in the skills training programs it provides at its domestic and overseas manufacturing centers.

(Hitachi Construction Machinery Co., Ltd.)

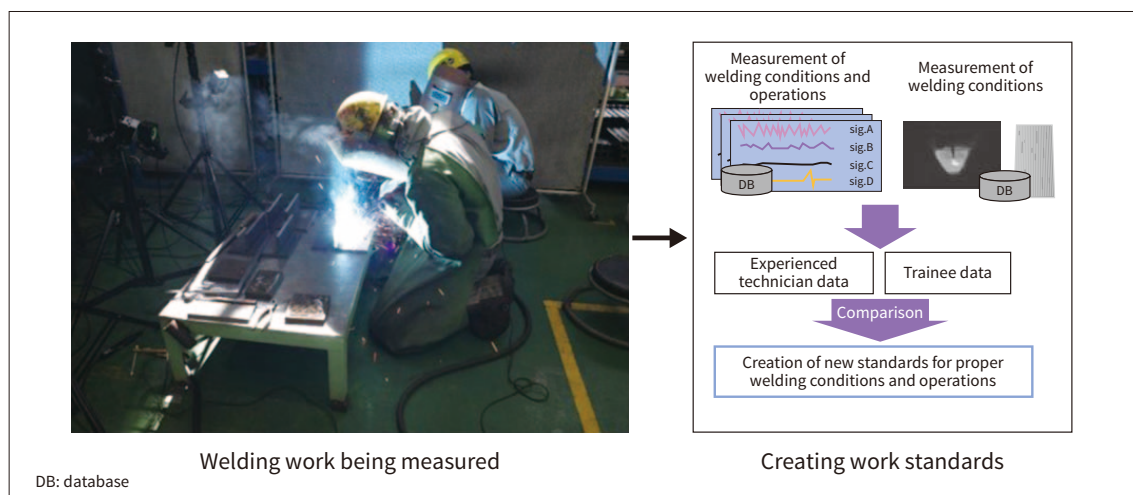
4 Using Quantitative Data to Visualize Welding Work

Ensuring welds of adequate quality requires training to learn how to properly adjust the arc by setting the current and voltage, and to learn the right way to move the torch while examining the state of the weld. Meanwhile, Japan's shrinking pool of skilled technicians is making it increasingly difficult to provide effective training for skills such as specialized construction machinery welding expertise.

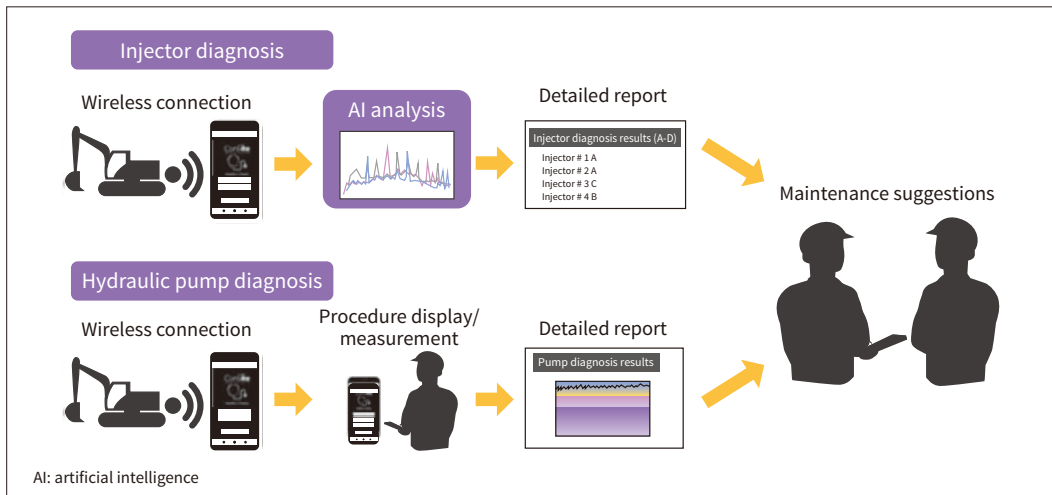
5 ConSite Health Check: An App for Diagnosing Construction Machinery States from Operating Noise and Measurement Data

The construction machinery industry is very concerned with improving productivity and reducing lifecycle costs, so servicing machinery to prevent breakdowns and repairing it at just the right time are key requirements for maintenance services.

Meanwhile, Japan's dramatically shrinking pool of skilled construction workers and shortage of replacements for retiring workers are making it difficult to find service technicians who can provide advanced diagnostics.



4 Welding work being measured, and how work standards are created



5 Overview of ConSite Health Check app

The amount of time needed to train new workers is a serious issue facing the country that industry needs to work on.

Hitachi Construction Machinery's ConSite development unit has addressed this issue by examining the advanced diagnostic methods of service technicians to create a tool that distills their expertise into an app called ConSite Health Check.

(1) Injector diagnosis

Injectors are vital engine components that generate power by spraying the fuel as mist into the engine. ConSite Health Check identifies injection failure by using the smartphone's microphone to pick up the explosive combustion sound of the injectors.

(2) Hydraulic pump diagnosis

Hydraulic pumps are key components used to provide hydraulic energy. ConSite Health Check identifies internal leak defects caused by internal pump wear by using proprietary logic to perform calculations on sensor information obtained from the vehicle body.

(Hitachi Construction Machinery Co., Ltd.)

(1) Lower lifecycle costs

ConSite Mine prevents major accidents, maintains stable operation, and helps reduce downtime by using technologies for applications such as predicting damage in welded structures in the arms and booms of ultra-large hydraulic excavators, detecting problems in hydraulic pumps, and monitoring hydraulic fluid properties. The app also helps reduce lifecycle costs by optimizing maintenance and part replacement schedules.

(2) Improved safety and productivity

The dashboard provides real-time displays of abnormal or inefficient operations that might lead to accidents, helping to maintain safety in the mine site environment and improve productivity by alerting operators.

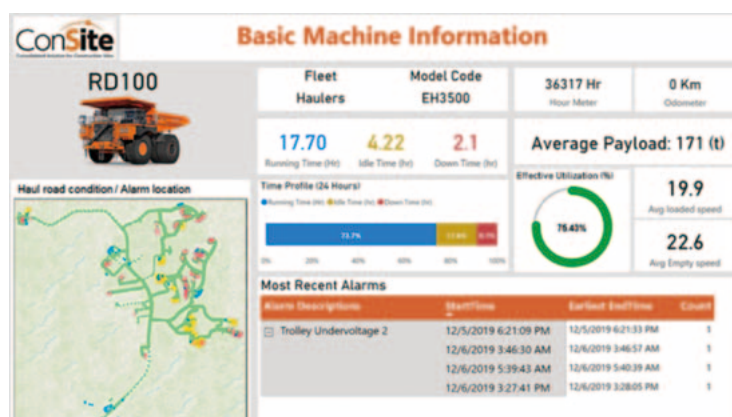
(3) Lower environmental impact

The dashboard displays real-time site-specific operating conditions and mining machinery information. The app also helps in reducing fuel consumption by optimally tuning the engine idle speed and the acceleration performance due to sudden acceleration.

(Hitachi Construction Machinery Co., Ltd.)

6 ConSite Mine: An App for Monitoring Mining Machinery in Real Time

Hitachi Construction Machinery is developing ConSite Mine, an app that helps solve problems at mining sites by providing remote round-the-clock monitoring of mining machinery and displaying operation conditions and analysis results on a dashboard accessible by a web browser or smartphone. The main features are as follows:



6 Example dashboard