

Introduction of Products

Crawler Dumper Truck CD110R-3

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We have developed the Crawler Dumper Truck CD110R-3, which has been significantly improved in terms of environmental performance, safety, maintainability, and comfort. This paper introduces this product, which was launched to the market as a fully redesigned model after 20 years.

Key Words: CD110R-3, Crawler dump truck, Transporting vehicle on rough terrain, Environmental performance, Safety, Reliability, Maintainability

1. Introduction

The conventional model, CD110R-2, launched into market in 2003, was discontinued after the termination of the special exemption for Japan's 2013 emission gas regulations. Meanwhile, in Japan, the demand for crawler dump trucks had been increasing due to recent disaster recovery projects. However, as the conventional model aged and the remaining units decreased, a great many customers strongly requested the development of a successor model. We have developed the developed model CD110R-3 for the first time in 20 years to meet market expectations, complying with the latest exhaust gas regulations while significantly enhancing safety, maintainability, and comfort. This report provides an overview of this model, which has been reintroduced to the market as a revived model.



Fig. 1 CD110R-3

2. Aims of development

Based on Komatsu's *quality and reliability*, the conventional model's high traveling performance has been inherited, while environmental performance, such as exhaust gas and fuel consumption, has been improved. Additionally, safety and maintainability, which were particularly in high demand in the market, have been significantly improved through the use of ICT, etc. Reliability has been improved by refining the body shape, and versatility has been enhanced by adding body variations to accommodate various applications.

(1) Environmental considerations

- Compact, higher-output engine that meets Japan's 2014 exhaust gas standards
- Auto-deceleration and auto-idle stop functions
- Fuel consumption reduced by 10%

(2) Enhanced safety

- Significantly improved direct visibility to the right of the operator's seat
- Rear/right-side surrounding monitoring system
- LED light
- ROPS-integrated operator's cab
- Digital display of inclination angle
- Body lowering reminder indicator lamp
- Automatic locking of lock lever
- Machine tie off anchor points
- Significantly improved ability to go up and down

- (3) Improved reliability
 - Overload warning lamp
 - A body structure resistant to deformation from falling boulders and easy to fill with soil
- (4) Improved maintainability
 - Large maintenance space
 - Improved cleaning performance of the cooling unit
 - Equipped with a maintenance-free battery
 - Improved battery accessibility
 - Battery disconnect switch
 - Centralized greasing ports for body/cylinder pins
 - Equipped with oil/cooling water sampling ports
- (5) Achieving comfortable workability
 - Three-stage travel speed
 - On-hand gear shift switch
 - Body & swing combined control lever
 - Spacious and deluxe interior space
 - Reduced noise inside the cab
 - Large-screen color multi-monitor
- (6) Enhanced versatility (optional)
 - Reinforced body specification
 - Body specification with tailgate
 - External overload warning lamp

3. Selling points

3.1 Environmental considerations

3.1.1 Compact, higher-output engine that meets Japan's 2014 exhaust gas standards

The developed model has a newly developed engine that is smaller in piston displacement and has a higher output than the engine of the conventional model. While achieving low fuel consumption, it minimizes the increase in machine weight, ensuring both maximum loading mass and high travel performance.

Table 1 Comparison of main engine specifications

	Developed model	Conventional model
Engine type	SAA6D107E-5	SAA6D114E-2
Piston displacement (cc)	6,690	8,270
Gross rated output (kW)	203	190

3.1.2 Auto-deceleration and auto-idle stop functions

The developed model has two functions as standard: an auto-deceleration function, which automatically reduces the engine speed after a certain period when the body/swing lever and travel lever are in the neutral position; and an auto-idle stop function, which automatically stops the engine when a set idling time elapses. These help reduce unnecessary fuel consumption, such as during loading standby.

3.2 Enhanced safety

3.2.1 Significantly improved direct visibility to the right of the operator's seat

By optimizing the position of the newly developed engine, right-side visibility from the operator's seat has been significantly improved.



Fig. 2 Right-side visibility from the operator's seat - developed model (left) vs. conventional model (right)

3.2.2 Rear/right-side surrounding monitoring system

Standard-equipped rear/right side surroundings camera. It is now possible to view clear images on a high-definition liquid crystal display monitor.



Fig. 3 Rear/right-side surrounding monitoring camera images

3.2.3 LED light

The developed model has five LED lights at the front and one at the rear as standard, all featuring low power consumption and long lifespan. This expands the visibility range, enabling the operator to work safely and comfortably in low-light environments.



Fig. 4 Night visibility - front (left) / rear monitor camera (right)

3.2.4 Digital display of inclination angle

The developed model has an IMU and displays the inclination angle digitally on the monitor screen. When a steep incline or tilt is detected, the display color changes and a buzzer sound can also be heard to alert the operator.



Fig. 5 Digital display of inclination angle

3.2.5 Body lowering reminder indicator lamp

While the body is being raised, an icon is displayed on the right side of the screen using a potentiometer that detects the body angle and the travel pilot oil pressure sensor. If travel starts in this state, a buzzer can sound to notify the operator that the body has been forgotten to be lowered.

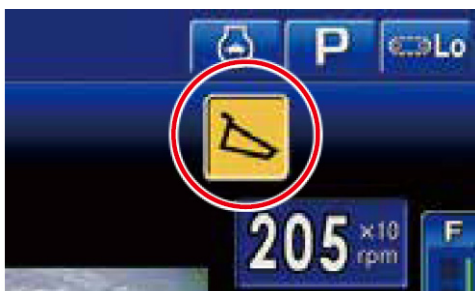


Fig. 6 Body lowering reminder indicator lamp

3.2.6 Machine tie off anchor points

Anchor points for connecting a safety belt are installed to prevent falls during maintenance or cleaning work.

3.2.7 Significantly improved ability to go up and down

Ensuring the ability to go up and down that meet Komatsu's latest standards. Thorough implementation of three-point support, step width, step height, handrail placement, and anti-slip method have all been significantly revised.

Additionally, the steps and handrails are intentionally colored differently from their surroundings to make them easier to distinguish and to understand how to go and down safely.



Fig. 7 Machine tie off anchor points and improved ability to go up and down

3.3 Improved reliability

3.3.1 Overload warning lamp

After body joystick control, the controller calculates the approximate loading mass from the oil pressure sensor in the body cylinder circuit and the potentiometer that detects the body angle. Then, the monitor displays whether there is a risk of overloading, making it possible to check from the operator's seat of the crawler dump truck.

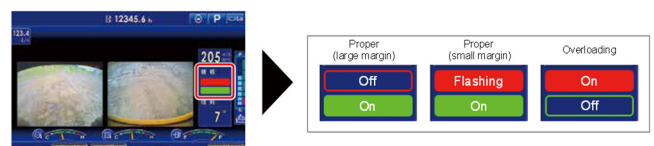


Fig. 8 Overload warning lamp (monitor at control seat)

Also, by installing an optional external overload warning lamp, it can be easily viewed by the operator of a loading machine such as a hydraulic excavator.



Fig. 9 External overload warning lamp (optional)

3.3.2 A body structure resistant to deformation from falling boulders and easy to fill with soil

The cross section of the body side panels has been changed from the conventional box-shaped design to an inclined shape with a round bar added on the top face. This helps to deflect impact from falling loads during loading, reducing deformation while also widening the opening for easier soil loading.

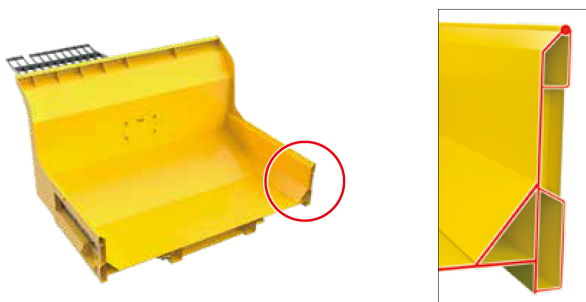


Fig. 10 Shape of body side panel cross section

3.4 Improved maintainability

3.4.1 Large maintenance space

Securing a wide-opening cover that allows access to the engine room and plenty of space in front of and behind the engine room to work safely. Maintainability has been significantly improved compared to the conventional model.



Fig. 11 Engine room front and rear maintenance space

3.4.2 Improved cleaning performance of the cooling unit

The cooling units have been revised from the conventional in-line arrangement to a side-by-side arrangement, making it easier to clean each cooling core.

Additionally, the front cover has been redesigned from the conventional bolt-fixed type to the wide-opening hinged type, and a dust-proof net is installed on the inner side of the door cover for easy removal, significantly enhancing cleaning performance.



Fig. 12 Cooling front opening cover and cooling core arrangement

3.4.3 Equipped with a maintenance-free battery

The developed model has a maintenance-free battery that does not require electrolyte replenishment. Unlike the conventional battery, there is no need to check the electrolyte level, and the battery status (normal / needs charging / needs replacement) can be checked via an indicator on the top.

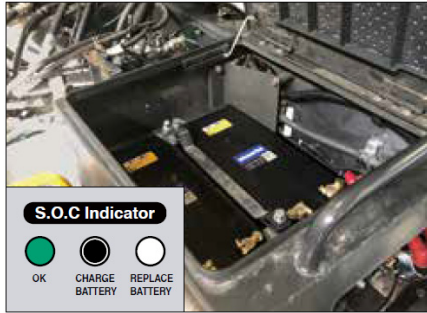


Fig. 13 Maintenance-free battery

3.4.4 Improved Battery Access

In the conventional model, connecting booster cables required raising the body. In the developed model, the layout has been revised, allowing safe access from the ground with the body on the ground.

3.4.5 Battery disconnect switch

In the conventional model, it was necessary to disconnect the battery ground cable when servicing the electrical circuit. With the developed model, maintenance can be performed safely by turning off the battery disconnect switch while checking the system operating lamp.



Fig. 14 Battery access and battery disconnect switch

3.4.6 Centralized greasing ports for body/cylinder pins

A remote hose has been added to the body/cylinder pin greasing ports to allow access from the ground in one place. Safe and quick greasing is now possible.

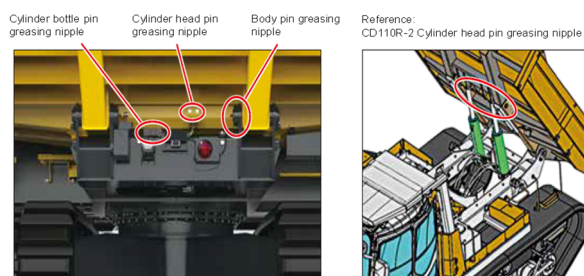


Fig. 15 Centralized greasing ports for body and cylinder pins

3.4.7 Oil/coolant sampling port

Ports that allow sampling via quick coupler connection are provided for engine oil, hydraulic oil, and coolant. These allow for tool-free and quick sampling.

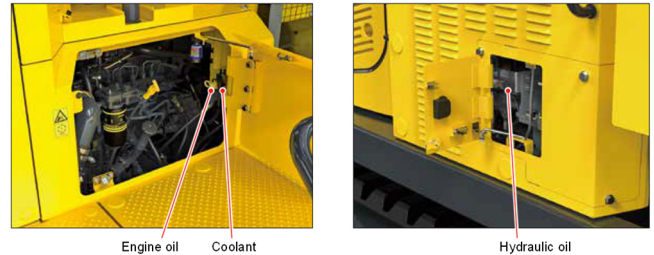


Fig.16 Oil/coolant sampling port

3.5 Achieving comfortable workability

3.5.1 Three-stage travel speed and on-hand gear shift switch

The number of travel speed stages has been increased to three from the conventional two, enabling finer travel speed adjustments according to the worksite environment and the work.

Additionally, a gear speed shift switch has been added near the operator's seat, reducing the burden of posture changes during gear shift operations.



Fig. 17 On-hand gear shift switch

3.5.2 Body & swing combined control lever

Integrating body controls into the swing control lever. combined operations can now be performed using only the left hand, reducing the burden on the operator.



Fig. 18 Body and swing combined operation control lever

3.5.3 Spacious and deluxe interior space

The developed model has a large, spacious operator's cab, ensuring wide forward and side visibility and ample leg room. Furthermore, it has an automatic air conditioner and a front window sun roller blind as standard, improving the comfort of long-period work.



Fig. 19 Visibility from inside the operator's cab



Fig. 20 Sun roller blind

3.5.4 Reduction of noise inside the operator's cab

Shielding between the engine room and the operator's cab has been improved, reducing noise levels at the operator's ears by approximately 3 dB compared to conventional models. This reduces operator fatigue and improves focus on safe operation.

3.6 Improved versatility

3.6.1 Reinforced body specification (optional)

To accommodate the transport of crushed stone and rocky soil, a new, reinforced body has been prepared that is more durable by using even higher-tensile steel for the bottom and back plates of the body and by increasing the thickness of the panels.



Fig. 21 Reinforced body specification

3.6.2 Body specification with tailgate (optional)

To accommodate the transportation of easily spillable loads such as dredged soil, a new body specification with a tailgate has been introduced. It features a higher dump body compared to the standard specification and a tailgate that opens and closes via a linkage mechanism depending on the dumping angle.



Fig. 22 Body specification with tailgate

4. Conclusion

After many years of customers requesting that we revive the CD110R, we were able to do so and successfully achieve its market introduction.

We firmly believe that the crawler dump truck CD110R-3 is an indispensable asset for recovery work that demands speed, especially in the aftermath of unexpected and sudden natural disasters. Even in harsh environments such as slopes, undulating ground, and soft ground, it can be immediately deployed for construction and operated safely.

We are proud to have played a small part in contributing to society, and we would like to express our gratitude to all those involved in the development.

Introduction of the authors



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[A comment from the authors]

At Komatsu, the crawler dump truck development project was the first in about 20 years. As a result, the project started under rather uncertain circumstances, as not only the authors, who had been involved in the development of hydraulic excavators and bulldozers, but also most employees lacked knowledge and expertise in crawler dump trucks.

However, we were able to realize the concept required for the developed model thanks to the valuable feedback we received from customers and sales departments who kindly agreed to visit and investigate the operation sites of the conventional model.

During the design and development stage, we brought together personnel with diverse skills, including those with experience in hydraulic excavator, bulldozer, and wheel loader design. With significant support from the component development, testing & quality verification, and production/procurement/administration departments—covering engines, hydraulics, and software—we were able to achieve early development and market introduction.

We extend our heartfelt gratitude once again to everyone involved in the development and mass production.