



1 Hybrid wheel loader ZW220HYB-5B

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In order to respond to the market demand for “environmentally-conscious construction machinery,” Hitachi developed the world’s first*¹ mass-produced medium-size ZW220HYB-5B hybrid wheel loader, employing the power electronics technology that it cultivated.

This product employs a series-hybrid configuration that combines a diesel engine and an electric motor for the running system. In addition, since the product uses electrical energy instead of the conventional torque converter and transmission for its drive-train, energy efficiency is higher.

The main features are as follows.

- (1) Reduces fuel consumption by 26%*² compared with the ZW220-5B (which uses a torque converter) of the same class.
- (2) Significantly reduces ambient noise through a smaller engine with a lower-rotation per minute (RPM) motor made possible through hybridization.
- (3) Variable speed enables stress-free driving operability.
- (4) Driving and loading operations can be independently controlled, enabling higher operability for driving and machine work.

(Hitachi Construction Machinery Co., Ltd.)

(Scheduled production start date: Spring of 2015)

*1 According to a study by Hitachi Construction Machinery Co., Ltd.

*2 Comparison based on company evaluation standards.

2 Wheel Loader that Complies with Japan, Europe, and USA Emission Standards ZW140/150-5B

The ZW140/150-5B wheel loader, which is now being sold, reduces environmental load while achieving a high level of workability, and complies with the latest emission standards in Japan, Europe, and the USA.

The product is equipped with an engine control system that determines the operating condition by using various sensors installed on the vehicle, and achieves low fuel consumption. It achieves a 10% reduction in fuel consumption compared to conventional loaders. In addition, the built-in cab has the same basic design as the European model, which emphasizes comfort, increasing the marketability of this product. For example, the quality of the panels inside the cab has been improved, and the noise level has been significantly reduced.

Other features are as follows.

- (1) Two modes are available: standard mode, which reduces wasteful energy loss, and P mode, which emphasizes acceleration and heavy-duty excavation.
- (2) Comes equipped with a first-gear speed limit switch that simplifies operation at narrow sites.
- (3) Comes equipped with a muffler filter that collects and burns particulate matter (PM) in an exhaust gas after-treatment device.
- (4) Is equipped with an eco-mark indicator that promotes fuel-efficient operation.

(Hitachi Construction Machinery Co., Ltd.)



2 Wheel loader ZW140-5B (left), ZW150-5B (right)

3 Operational Test of Hybrid Hydraulic Excavator Using only Next-generation Algae Biofuel

The significant issue with biofuel, which contributes to the reduction of carbon dioxide (CO₂) emissions, is how it competes with food. In recent years, microalgae that produces oil has been gaining attention as a material that can be used to solve this issue. The oil production efficiency of microalgae is some dozen to several hundred times higher compared to other oil-producing crops. Therefore, it is looked upon favorably as a method to reduce the dependency on fossil fuels without impacting the food supply.

As part of research conducted regarding fuel diversity, attention was given to next-generation biofuels produced from algae, and verification tests were performed accordingly. Among a dozen companies in the world, Solazyme, Inc.'s SoladieselRD*1,2 was chosen as the fuel for this test, and information required to perform the test was collected through analysis of fuel properties and basic examination of related parts.

In the verification test, Koriyama Plieed Timber Factory of Maeda Road Construction Co., Ltd. helped operate the hybrid excavator ZH200. By using Global e-Service, a satellite communication system, the operating status was continuously monitored

and the goal of 500 operation hours (specified in November 2013) was achieved.

(Hitachi Construction Machinery Co., Ltd.)

*1 SoladieselRD is microalgae fuel that is supplied by Solazyme, Inc.

*2 See "Trademarks" on page 146.

4 Tire Roller ZC220P-5

Tire rollers are used for rolling compaction work at various sites, for instance, road construction sites, and ZC220P-5 is the latest tire roller model by Hitachi Construction Machinery Co., Ltd. This tire roller is environmentally conscious, and complies with the emission regulations for Non-road Special Motor Vehicle Act of 2011. It also satisfies noise regulations for construction machinery specified by the Ministry of Land, Infrastructure, Transport and Tourism of Japan. The main features of the ZC220P-5 are as follows.

(1) Safety

Its large three-tiered steps make getting on and off easy. In addition to satisfying the "1×1 m" European vision standard, it is equipped with a backward guard sensor as an additional safety



3 Exterior of the testing vehicle (ZH200) (left) and microalgae sample (right)



4 Front (left) and back (right) of tire roller ZC220P-5

device that detects people and obstacles.

(2) Workability

It is equipped with a hydrostatic transmission (HST) enabling the vehicle to start and stop smoothly. A new water sprinkling control function is employed that allows the appropriate amount of water to be sprinkled depending on to the vehicle speed. In addition, it also employs a solution spraying function that allows solution (equivalent to one tire revolution) to be sprayed by pressing a single switch.

(3) Maintainability

The water sprinkler and solution spray nozzles can be attached and detached by pushing a single switch. Filtering functions are grouped next to the three-tiered steps for convenience, reducing the maintenance load.

(Hitachi Construction Machinery Co., Ltd.)

5 Hydraulic Excavator that Complies with Japan, Europe, and USA Emission Standards ZX120-5B, ZX135US-5B

The ZX120-5B and ZX135US-5B are 12-t weight class excavators that comply with the regulations for reducing CO₂ to control

global warming and the emission regulations in Japan, Europe, and the USA (Non-road Special Motor Vehicle Act of 2011, Stage III B, iT4). For the hydraulic system, these excavators employ excavation speed acceleration and boom regeneration systems to achieve both workability and fuel efficiency. As a result, they achieve a 5% to 7% reduction in fuel consumption while maintaining the same operability as conventional excavators. Also, the PM discharged from the engine is collected inside the muffler filter and effectively processed using a unique emission temperature control. This results in about 90% PM reduction. In addition, with a variable type turbocharger and high-capacity cooled exhaust gas recirculation (EGR) system, nitrogen oxide (NO_x) is also reduced.

For safety, the excavators comply with the roll-over protective structures (ROPS) specified by the International Organization for Standardization (ISO), adding an extra layer of safety for operators. They are also equipped with a rear monitor that allows the operator to check the safety of the surroundings.

(Hitachi Construction Machinery Co., Ltd.)

[(Release date: April 2014 (Japan), January 2013 (Europe), June 2012 (USA)]



5 Hydraulic excavator ZX120-5B (left), ZX135US-5B (right)