



Thermal Management Technology Contributing to Efficiency Improvement and Electrification of Construction Machinery

-Hybrid Construction Machinery Contributing to Carbon Neutrality-



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<http://komatsu.first.iir.titech.ac.jp/>

- Realizing energy efficiency improvement by solving the thermal problems of electrification of construction machinery
- Advancement of thermal management technology for battery systems



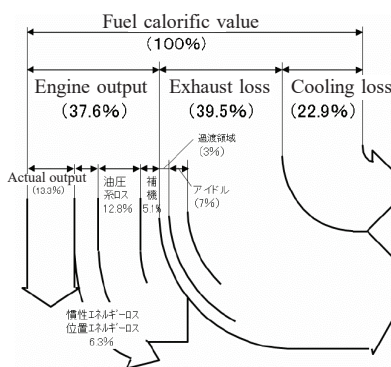
HB335(LC)-3, <https://kcsj.komatsu/>

- Hybridization of construction machinery
 - Toward the realization of a carbon-neutral society, the electrification and hybridization of automobiles and other transportation equipment is progressing.

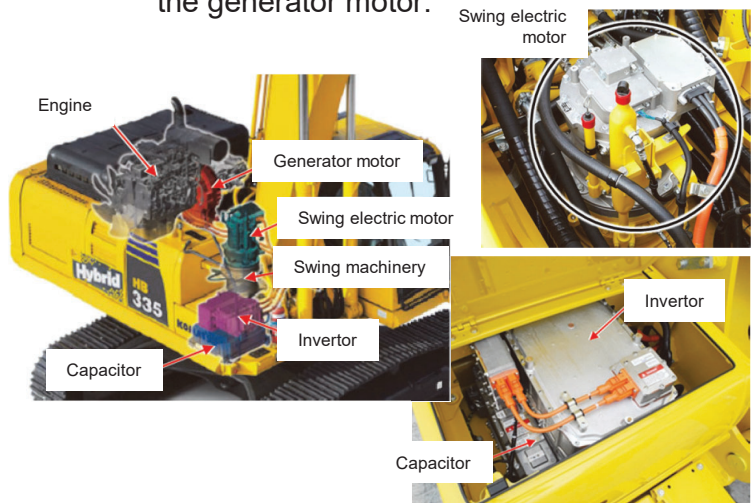
Year	Model / Size	Features
2008	PC200-8E0 / 20 t	The world's first commercially available hybrid hydraulic excavator
2010	HB205-1/HB215LC-1 20 t	Model change
2013	HB205-2/HB215LC-2 20 t	Compliant model to the 2011 exhaust gas regulations
2013	HB335-1/HB365-1 30 t	Models for overseas markets such as Australia
2016	HB335-3/HB365-3 30 t	Developed for Japanese, US and European markets. Compliant model to the 2014 exhaust gas regulations

Worldwide sales exceeded 5,000 units by the end of fiscal 2020.

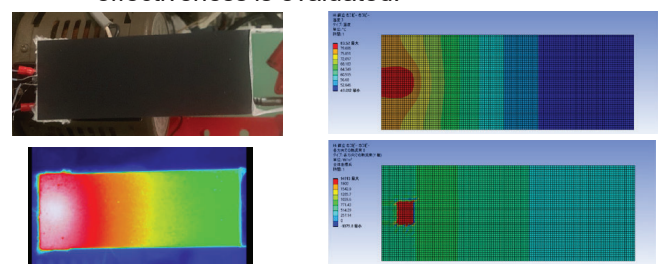
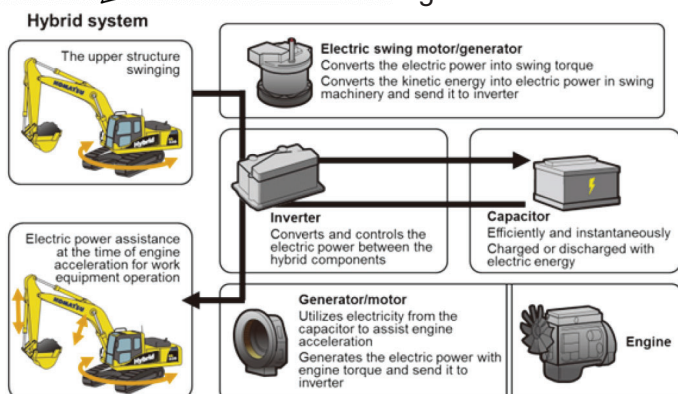
- In general work, hydraulic excavators (non-hybrid type) can extract only 13.3% of the fuel (energy) used as actual output.



- Configuration of hybrid hydraulic excavator
 - The hybrid system consists of a swing electric motor, a generator motor, an inverter, a capacitor, etc.
 - When the rotating body is decelerated, the rotating electric motor regenerates electrical energy and stores it in the capacitor.
 - The stored electrical energy is used not only for the motion of the rotating body, but also for assisting the engine work through the generator motor.



- Improving hybrid system performance
 - By improving the heat dissipation performance of the capacitor, it is possible to reduce the number of cells used, improve vehicle compatibility, and reduce costs. Based on the structural characteristics of the capacitor, measures to promote heat dissipation are examined and their effectiveness is evaluated.



Measurement of temperature distribution by infrared camera and estimation of heat flux distribution
Upper left: Appearance of specimen, Upper right: Temperature distribution (simulation), Lower left: temperature distribution (infrared camera), Lower right: heat flux distribution

