

A556 Innovations - Hybrid Excavators

Summary

Normal excavators usually run on diesel engines which produce a vast amount of CO2 which is harmful to the environment.

Also the excavators need to run their diesel engine at all times when in use all which incurs running costs in fuel.

How does initiative work?

New excavators are utilizing hybrid technology taken from the automotive industry to decrease CO2 emissions and running costs.

Costain has decided to utilise this new technology and trial this particular generator on the A556, it is hoped that by using the hybrid generator it will reduce CO2 emissions by 30% and reduce fuel consumption by 30%.

Benefits

By utilising this Hybrid Generator on site it should be highly beneficial with regards to cutting the CO2 emissions from plant on site. The manufacturer has stated that the excavator will produce 30% less emissions than a normal diesel powered generator. This has the potential to reduce a substantial amount of CO2 on the project as it has duration of 2 years and will require a number of excavators on site. (An example of the hybrid engine can be viewed in page 4)

By promoting the use of this new hybrid technology it is hoped that it will enhance the scheme's reputation as an early adopter of utilizing new technology and keeping the schemes carbon footprint to a minimum.

The manufacturer has also stated that the excavator will use 30% less fuel which will provide a financial saving of 30% fuel costs on the project.

The use of the Hybrid Excavator could be utilised on all schemes where excavators are required and save money on fuel and decrease fuel emissions.

How does it work?

The first of a new generation of Hitachi excavators, the ZH210-5 hybrid has been designed to deliver reliable performance with fewer emissions and less fuel than conventional models*. More economical for owners, easier for operators and better for the environment, the ZH210-5 hybrid incorporates advanced technologies adopted from hydraulic, electric and battery-powered excavators. The result is the TRIAS HX system, which reduces fuel consumption and CO₂ by 31 per cent*.

Hybrid system

The swing motor converts energy recovered from swing braking into electrical energy. This electrical energy is transmitted via the power control unit to the capacitor unit. The stored electrical energy is used to drive the engine and help swing the upper structure. Using swing momentum is the basis for hybrid technology which reuses energy and saves fuel.



1. Swing motor

The swing motor can be used with electric and hydraulic motors. The electric swing motor generates and captures electricity during swing braking, and assists the hydraulic motor during acceleration. This combined motor system keeps the same swing controllability as the current excavator.

2. Electric assist motor

Generates electric power and controls the amount of stored electricity in the capacitor unit by driving the engine.

3. Power control unit (PCU)

Controls electricity between electric assist motor, electric swing motor and capacitor unit.

4. Capacitor unit

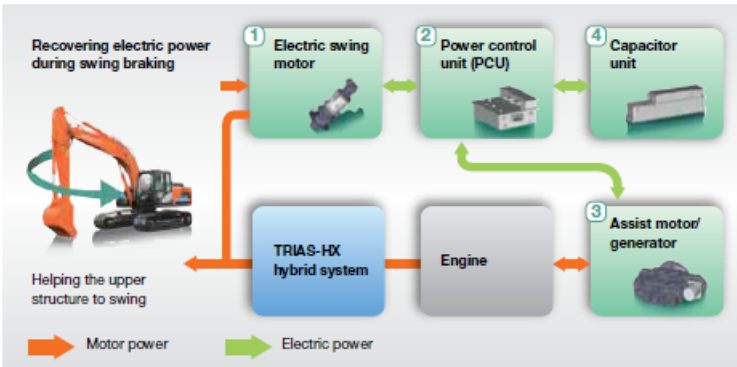
Captures the electrical energy generated during swing braking and discharges it to the electric swing motor.



HYBRID

*Fuel consumption is compared with the ZX210-3 in P-mode.

Equally powerful and versatile, exceptionally fuel efficient



New TRIAS HX system

The TRIAS HX system of the ZH210-5 model combines a hybrid system with an energy-efficient TRIAS hydraulic system to achieve extremely low levels of fuel consumption.

The hybrid system incorporates a swing motor that converts energy generated during swing braking into electrical energy. This energy is transferred via the Power Control Unit and stored in the capacitor unit. The stored energy is used to drive the engine and move the upper structure. Using the swing momentum to regenerate energy results in reduced fuel consumption.

The energy-efficient TRIAS hydraulic system enhances the performance of the Hitachi ZH210-5 hybrid excavator. This employs a three-pump/three-control valve system, which results in greater accuracy and reduces pressure loss that consequently saves energy.

To increase productivity, Hitachi has designed the ZH210-5 with improvement on the pump flow capacity which leads to more efficient cylinders output compared to the ZX210-3.

Practical hybrid

On a typical construction site, the ZH210-5 hybrid performs with the same power, precision and speed of any ZAXIS-5 excavator. Used with a variety of attachments, it also provides the same level of versatility.

The ZH210-5 has an electric power assist system that comes into force for small swing operations. It uses energy from electric swing motors to carry out such movements, reducing the machine's fuel consumption.

The TRIAS-HX system is teamed with a hydraulic boosting system on the front attachment, with a boom recirculating system and an arm recirculation cancel system working at high hydraulic pressure. This enables the ZH210-5 hybrid to maintain the digging force, travel speed, swing torque and front speed that are equivalent to the ZX210-5.

Like all ZAXIS-5 excavators, the ZH210-5 can be used with a variety of attachments and installation is simple thanks to the attachment support system. It has 11 modes that can be registered on the monitor for ease of use.

* Based upon typical work pattern collected via Global e-Service

Key features

- 31% reduction in fuel consumption (PWR mode vs ZX-3 P-mode)*
- 36% reduction in fuel consumption (ECO mode vs ZX-3 P-mode)*
- New TRIAS HX system energy efficient and low levels of fuel consumption

- Reduced hydraulic loss
- Attachment support system