

NEW HOLLAND "EX"-ERCISES HYBRID OPTION

New Holland, Kobelco explore hybrid excavator concept; reduced emissions; lower fuel usage

By Dawn M. Geske



The Hybrid hydraulic excavator developed between New Holland and Kobelco is powered by a 2.2 L four-cylinder Isuzu diesel engine rated 27 kW, coupled to a 20 kW generator. This is a significant reduction from the 40 kW Isuzu engine typically installed on the 6.3 tonne machine.

While still in its prototype stage, New Holland Construction, in cooperation with Kobelco Construction Machinery America Co. Ltd., has developed a hybrid hydraulic excavator. Competing in the 6.3 tonne class, the Hybrid, as the machine is referred to, is designed to reduce fuel consumption and CO₂ emissions by 40% versus conventional excavators of the same class.

"Over the next few years, engine technology will evolve drastically," said Paul Golevicz, New Holland marketing manager. "At New Holland, we are accelerating the development of environmentally friendly construction equipment with a focus on reducing carbon dioxide and greenhouse gas emissions."

By using a smaller 2.2 L four-cylinder Isuzu diesel engine rated 27 kW coupled to a 20 kW generator, the Hybrid excavator is able to produce as much

power as a conventional 7 ton excavator without sacrificing any digging performance, said New Holland. Total power on the unit is 47.5 kW, with a rated dig depth of 4.6 m and breakout force of 5399 kg.

This is a significant reduction in horsepower based on the 70SR excavator produced by Kobelco, which is the base machine used for the Hybrid development. In the standard excavator, a four-cylinder Isuzu A-4JB1 diesel engine rated 40 kW at 2100 r/min powers the machine.

For the Hybrid excavator, New Holland and Kobelco use a 288 V lithium battery to store energy produced by the engine and generator. Unlike typical hybrid machines, which produce additional electrical power through regenerative braking, the Hybrid excavator achieves regenerative charging through an electric

swing motor, which is the most used circuit on the machine.

The independent electric swing motor allows energy produced through the swing circuit to be captured and stored in the battery for later use. This energy can also be used to drive the Kawasaki hydraulic pumps, which power the Nabtesco travel motors in the drive circuit, or to supply the excavator's boom, arm and bucket cylinders. A power inverter is also used to convert power from ac to dc.

The two-way charging system (engine and swing motor) allows the Hybrid excavator to run the diesel engine only as needed, operating mostly off the battery system. Thanks to the smaller diesel engine, exhaust emissions are lower and fuel consumption is reduced in addition to the overall noise level of the machine. According to New Holland, both fuel usage and CO₂ emissions are reduced on the Hybrid by 40% versus a conventional excavator.

While the powertrain of the Hybrid excavator is significantly different than any excavator New Holland or Kobelco produces, the company said, the working range and digging force remains the same on the machine as a standard 6.3 tonne model. The appearance and chassis of the machine also remain unchanged with only a 500 mm longer rear-side radius.

"The Hybrid hydraulic excavator is just one example of New Holland's overall commitment to providing our customers and the industry with technologically advanced products that make a positive contribution to the environment around us, even as we deliver reliable, powerful solutions to everyday challenges," said Golevicz.

New Holland said production on the Hybrid excavator is dependent upon market demand for the machine. Currently, five Hybrid units are in testing in Japan and the U.S.A. ♦

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