

Press Release

Aug 16, 2013 | ID: 124738

Volvo Cars' new Drive-E powertrains - efficient driving pleasure with world-first technologies

Volvo Car Group's (Volvo Cars) new Drive-E range of powertrains takes efficient driving pleasure to a new dimension in which the number of cylinders is no longer important to describe power and drivability. The first three engines from the two-litre, four-cylinder Drive-E powertrain family will be launched in autumn 2013. The diesel version features world-first i-Art technology, and the most powerful petrol version comes with a combination of a compressor and a turbocharger.



"We have created smaller, more intelligent engines with power curves that give exciting driveability compared with engines with more cylinders yet deliver the fuel economy of only four cylinders. In addition, by adding electrification such as plug-in hybrid technology, we will reach power figures in the V8 territory," says Derek Crabb, Vice President Powertrain Engineering at Volvo Cars.

The whole Drive-E engine range, which during the development phase was called Volvo Engine Architecture (VEA), basically consists of two four-cylinder engines, one common rail diesel and one direct-injected petrol version. They replace eight engine architectures on three platforms. Drive-E diesels will range from 120 to 230 hp. Petrol versions will start at 140 hp and go all the way up to 300-plus hp.

Several levels of turbo charging open up the flexibility to cover the whole range, from fuel-efficient derivatives through to high power and torque variants. In order to cover all customer requirements, some engines will also gain added performance via electrification or other spearhead technology.

Two Drive-E engines heading to the UK

Initially, the new S60, V60, XC60 FWD, V70, XC70 FWD and S80, will be available with the first diesel engine from the Drive-E family, the new D4, with 181hp. The S60 and V60 will also be joined by a new T6 engine, with 306hp powering the front wheels. Both engines will be available with a new eight-speed automatic gearbox, contributing to a refined drive and excellent fuel economy.

Volvo Cars' powertrain experts have developed the engines in-house. They are being built at Volvo Cars' high-tech engine plant in Skövde, Sweden.



New eight-speed automatic gearbox

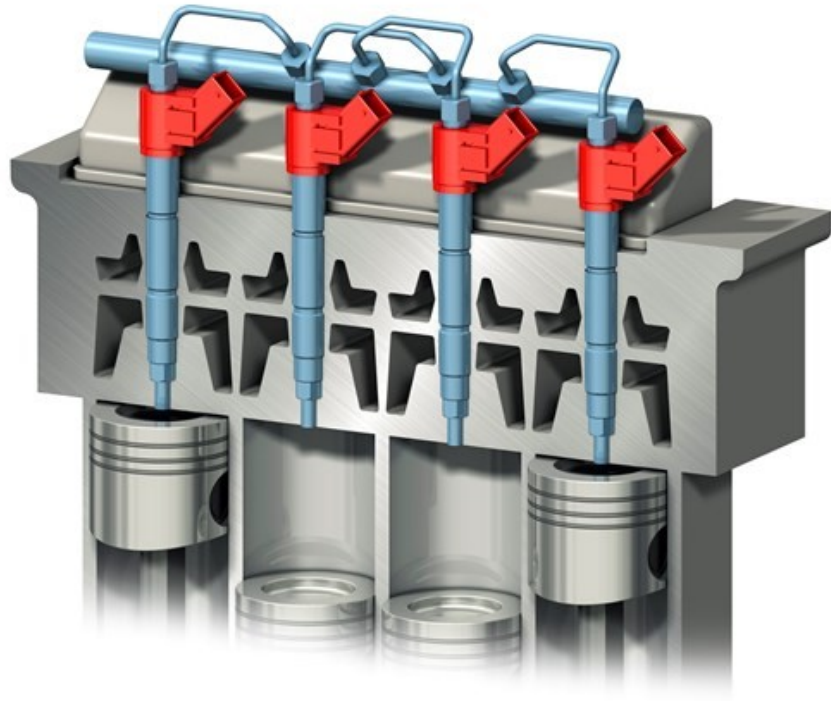
To deliver the desired responsive, smooth and fuel-efficient drivability, the engines are teamed either with a new eight-speed automatic gearbox or an enhanced six-speed manual, tuned for improved fuel economy.

"The sophisticated Drive-E technologies give the customer high performance, improved fuel economy, considerably lower emissions and a powerful sound character. Our four-cylinder engines will offer higher performance than today's six-cylinder units and lower fuel consumption than the current four-cylinder generation," says Derek Crabb. He adds: "If you take a four-cylinder Drive-E engine versus any six-cylinder engine, there's a massive weight and size reduction for the same power. Fuel economy savings are anything from 10 to 30 per cent, depending on which engine you're comparing it to."

Diesels with world-first i-Art technology

The diesels feature world-first i-Art technology. By featuring pressure feedback from each fuel injector instead of using a traditional single pressure sensor in the common rail, i-Art makes it possible to continuously monitor and adapt fuel injection per combustion in each of the four cylinders.

"Increasing the rail pressure to an exceptionally high 2,500 bar, while adding the i-Art technology, can be described as the second step in the diesel revolution. It is a breakthrough comparable to our invention of the lambda sensor for the catalytic converter in 1976. It's another world first in passenger cars for Volvo Cars," says Derek Crabb.



Each injector has a small computer on top of it that monitors injection pressure. Using this information, the self-adapting i-Art system makes sure that the ideal amount of fuel is injected during each combustion cycle. The combination of higher injection pressure and i-Art technology gives the customer an engine with improved fuel economy, considerably lower emissions and high performance output as well as a powerful sound character.

The diesels also feature refinements such as state-of-the-art twin-turbo, reduced friction and a smart valve solution on the cooling system for a more rapid heat-up phase after a cold start.

Petrol engine with compressor and turbo

Using the supercharger to fill in the bottom end torque gives the petrol engine a big, naturally aspirated feel. The mechanically linked compressor starts to function immediately at low revs, while the turbocharger kicks in when the airflow builds up.

Other improvements to the Drive-E petrol engines include friction-reduction measures such as ball bearings on the camshaft, high-speed continuous variable valve timing and intelligent heat management with a fully variable electric water pump.

Prepared for electrification

The Drive-E engines are prepared for future electrification from the start. Key components, such as the Integrated Starter Generator, can be connected easily - and the compact size of the four-cylinder engines means that the electric motor can be fitted in the front or rear of the vehicle. The battery pack will be located in the centre of the car.

Downsizing without compromises

Volvo Car Group is highly confident that the focus on four-cylinder Drive-E powertrains is the right way to create the desirable blend of power, drivability and fuel efficiency.

"The power you get from an engine has nothing to do with its size; it is about the amount of air that you can get to flow through it. You can also make an engine more efficient if you make it smaller. So, if you can get more air through a smaller engine, you can still get the same power but at better efficiency," says Derek Crabb, concluding: "When I was involved in Formula One engines, they were producing 1.5-litre turbo charged engines capable of over 900 hp. And these new Volvo Drive-E engines have in fact been tested on the racetrack already. The engine we used in Volvo's WTCC car in 2011 was a Drive-E prototype and by the last race we set a new track record."

Keywords:

Old S60, Old V60, Volvo XC60, Press Releases, 2014, XC70 (2008-2016), V70 (2008-2016), S80 (2008-2016), Product News

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