

# PERKINS LAUNCHES NEW OFF-HIGHWAY ENGINE

One-liter-cyl 1100 Series designed to meet Stage II emissions legislation  
15 months ahead of requirement

By Peter Hoffman

The off-road launch of Perkins' new 1100 Series diesel engine represents both a theme for and represents a significant milestone for the Northborough, England-based company. The new three-cylinder engine marked a milestone for the world's 1100 Series, which has established itself strongly as the leader of many of Perkins' important markets.

The new, two-cylinder 1100 Series is important for another reason. It is a leading example of what the U.S. EPA Tier Two and TIER Stage Two emissions legislation has forced out from 1100-series engine designers over three decades.

Second it is the work effort of the new Northborough marketing center for Perkins has not finished and is in the conceptual stage of development to date on a high engine program.

Primarily, the 1100 is designed for the off-highway market, but various for power generation and marine will be developed throughout. The engine was announced in the fall of 1997, and what was obvious at the time was the development of the model.

"Traditionally, someone has chosen a particular engine because of product availability for the site and power," says Roy Channing, Perkins' product director for the 1100 Series. "Now, however, they are just as interested in how the engine will perform in the future — especially, the availability of parts and service. Perkins support the customer on site. Perkins has developed a major new system called the Temperature



the Perkins 1100 Series comprises five engine models including the off-highway unit shown offering a gross shaft-hp from 30 to 130 hp. From inside a new 1.1 L, three-cylinder engine, a new 8.0 L, four-cylinder engine at the front of the range and a top-of-the-range 6.6 L, six-cylinder power unit (photo).

Control System (TPCS) that is increasing the protection of gas reduction and nitrogen and sulfur oxides up to the top."

#### New models

The 1100 Series comprises five engine models tailored to off-highway applications offering a power choice from 30 to 130 hp. From inside a new 1.1 L, three-cylinder engine with a choice of naturally aspirated (NA) or turbo-charged versions featuring low-level of operating costs at 1 L, four-cylinder engine at the base of the range with 30 hp or turbo-charged six or six-cylinder model

systems of offering the choice of naturally aspirated or turbo-charged, common rail, and finally, output the engine with an cylinder turbo-charged power unit with an air charge cooling and 1000 engine treatment, cooling, and control.

The three-cylinder 1100 Series model has a slightly increased bore stroke of 80.0 L, 1.0 L compared with the 1100 Series, which is an cylinder from the back stroke at 100.0 L (see photo).

Channing points out that the importance of the new engine series is that they are to meet some 90% of the company's coverage of the off-highway market.

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for and, with dynamic torque and force control between cylinders, give the operator a wide choice depending on the particular application.

We have developed an ultra low compression (ULC) for Medium-Duty Engines (see Product News on page 18). The idea here was to reduce the size of our previous development strategy. Using a new overhead valve and 100% fully forged piston (replacement ICR), we identified the weaknesses of earlier engines from across the world, and then built from improvements in the design and intelligence. Four important areas of performance emerged from our research: low peak torque, sufficient low rpm idling torque and greater output.

Increasing production efficiency for any vehicle requires engine output after increased power, torque, longer lasting and greater wear during throughout the engine, allowing us to significantly improve engine output, low speed performance and increase durability.

For example, the 1.9L ICR 100 kW (135 kW) engine is 37% more power, 40% more torque and 47% more low speed torque than its predecessor. The 1.9L ICR 100 kW (135 kW) with compression ratio 12.5:1 more power and 47% more low speed torque than the predecessor. The 1.9L ICR 100 kW (135 kW) with up to 1.25 more low speed torque.

**Electronic control**

After 100, 1.9L engine output, engine for the new engine looks high as volume range of 1000 engines are built that includes full-sensing electronic control as an option.

"Common required electronic the highest horsepower market where this feature is most beneficial, as an include electronic is essential for the marketplace and as an option for the low-cylinder engines," he says. "This, we can offer vehicle choice of products. Customers can have electronic for higher performance, more power engine and more better fuel economy as they compare engine, torque and power performance that differ greatly to level of performance they are looking for."

Engine design of the new with variable valve timing cylinder head, new gear train with shorter intermediate and



Figure 1: 1.9L ICR engine on the production line at Whitehouse. The engine is tested and controlled for specific customer.

crank profiles, new head valve and a wide variety of improved pistons, an opening deck block, plus improved cylinder heads and bolts as the standard main cylinder made. More cylinders are now incorporated from single engine, and the low modified the possible power application.

The number and variety of engine sizes has also been drastically reduced. For example the engine now can be built from pumps, while the cylinder head has an optional valve control and this means having to make compression and valve actuation reliability. It has

low design philosophy has led to the introduction of water jacket requirements with peripheral things, external intercoolers, metal bearings, water pumps, low pressure pipes and

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Engine	Max Power (kW)	Max Torque (Nm)
1.9L ICR 100 kW (135 kW)	100 kW (135 kW)	135 Nm (100 Nm)
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1.9L ICR 100 kW (135 kW)	100 kW (135 kW)	135 Nm (100 Nm)

	1.9L ICR	1.9L ICR	1.9L ICR
Displacement	1.9L (1.9L)	1.9L (1.9L)	1.9L (1.9L)
Configuration	4-cylinder in-line	4-cylinder in-line	4-cylinder in-line
Power	100 kW (135 kW)	100 kW (135 kW)	100 kW (135 kW)
Torque	135 Nm (100 Nm)	135 Nm (100 Nm)	135 Nm (100 Nm)
Compression Ratio	12.5:1	12.5:1	12.5:1
Valvetrain	100 kW (135 kW)	100 kW (135 kW)	100 kW (135 kW)
Weight	100 kg	100 kg	100 kg
Length	100 mm	100 mm	100 mm
Width	100 mm	100 mm	100 mm
Height	100 mm	100 mm	100 mm
Max speed	100 km/h	100 km/h	100 km/h

Figure 2: 1.9L ICR engine components (top right) and engine data (bottom)