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KS Kolbenschmidt GmbH

Piston innovations for downsizing truck engines

Compliance with ever stricter emission standards and a reduction in fuel consumption are the fundamental innovation drivers on modern engine generations. Not least of all, these trends are mirrored in new downsizing and downspeeding measures where a major role is played by progress in the engineering of the piston assemblies comprising the pistons themselves, the piston rings, the piston pins, the connecting rods, and the accompanying bearings.

KS Kolbenschmidt GmbH is presently developing special low-friction piston assemblies for truck engines. In the process, the newest design, computational and testing techniques are applied and efficient coatings, production materials and production processes employed. In line with current market trends, the development of complete first-tier piston assemblies is increasingly gaining significance for the OEMs. Involved in this process are the affiliates KS Aluminium-Technologie GmbH (cylinder working surfaces), KS Gleitlager GmbH (bearings) and the alliance partner Nippon Piston Rings (piston rings) and Metaldyne (connecting rods).

For heavy commercial vehicles, engines developing around 2-liter displacement per cylinder unit, specific engine outputs of around 35 kW/liter are required nowadays. As in the case of car engines, these, too, reflect the increasing trend toward downsizing. Given today's peak pressures of over 200 bar and required truck mileages of over 1.2 million, new aluminum materials, a local improvement in material properties and optimized engine cooling are indispensable. Hence, KS Kolbenschmidt is developing new aluminum and steel materials especially designed for commercial vehicle applications and, as a further step toward enhancing the strength of the pistons, is applying a resmelting process to the piston bowl lip.

In the heavy-duty truck market in which high mileages are of the essence, monobloc steel pistons ensure an even higher service life compared with conventional aluminum pistons. Kolbenschmidt's monobloc steel pistons with interior cooling passages are presently state-of-the-art at the top end of the output range.

Among the factors contributing toward lower fuel consumption is, above all, reduced friction. In order to achieve this, the manufacturer has developed a

package comprising Nanofriks shaft coating, weight reduction and asymmetrical shaft design. Computer-aided fine-tuning of shaft and piston pin bore geometry allows a significant reduction in friction. These measures are applied in a low-friction Power Cylinder Unit package for commercial vehicles, comprising pistons, piston rings, pins, and liners.

Photo

Monobloc steel piston KS Spinteks for commercial vehicle compression-ignition engine with extremely low compression height