STEEL PISTONS – THE PRESSURE RISES

OUR HEART BEATS FOR YOUR ENGINE.
RISING PRESSURES, INCREASING TEMPERATURES – HIGH REQUIREMENTS

Service life is always longest in the truck and transport sector. Alongside the reliability necessary to meet this requirement, additional objectives include low emissions, efficiency and low fuel consumption.

The requirements of the emission legislation are met with a combination of measures inside and outside the engine. These measures include increasing cylinder pressures and temperatures, which place significant demands on the heart of the combustion engine – the piston. The required combustion chamber peak pressures have now risen to significantly over 200 bar.
STAGES OF DEVELOPMENT

ARTICULATED PISTONS
On the articulated piston, the upper section, which has to withstand the combustion pressures and temperatures, is made from steel. The skirt for guiding into the cylinder is made from aluminium. This offered a good compromise to the aluminium piston, but can only be regarded as an intermediate step in the development process.

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MONOBLOCK STEEL PISTONS WITH INNER COOLING CHAMBER
Design combustion pressures over 230 bar have led to the further development of the monoblock steel piston with double friction welding. This results in an even better structural rigidity, i.e. reduced deformation of the piston, particularly in the ring zone. The piston temperatures were lowered by over 20 °C thanks to the improved shape of the cooling chamber on the edge of bowl. Introducing an intermediate base creates a second cooling cavity, which significantly reduces the surface temperature of the combustion bowl.

COMPARISON BETWEEN ALUMINIUM – STEEL

ALUMINIUM
• Good thermal conductivity
• Lower specific weight
• Easy to cast and machine

STEEL
• High strength
• High temperature resistance
• Low thermal expansion

With complex detailed technical solutions, such as the ring carrier, cooling channel, piston pin bush and anodised piston crown, aluminium pistons achieve the required performance characteristics of many modern diesel engines.

Combustion pressures of over 200 bar require a different material to be used, however. Switching the material to steel achieves better operational safety and mileage thanks to its better integrity and temperature resistance.