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Kolbenschmidt Pierburg AG

New compact range extender developed

Low battery capacity limits the range of modern electric automobiles. And once the battery is empty, these vehicles require extended recharging periods before they are again ready for reuse – unlike conventional vehicles which can be quickly refueled. Range extenders are used in periods between recharging cycles and extend the range of electrically powered vehicles. They alleviate ‘range anxiety’, a phenomenon not to be underestimated when introducing electromobility. From a technical standpoint, a range extender amounts to an additional power unit, in most cases a combustion engine which drives a generator, which in turn powers the battery and electric motor. Kolbenschmidt Pierburg (KSPG) and FEV Motorentechnik GmbH have now jointly developed a concept for a compact, 30-kilowatt range extender. A relevant demonstration model will be presented at the IAA.

Experts and legislators generally see range extenders as paving the way for widespread acceptance of electric vehicles and assume that an entirely new category of very small gasoline engines will arise to make them a reality. This presents attractive possibilities for suppliers, given that these devices are largely unsuited for production in currently available automobile manufacturer production lines and initial unit quantities will possibly not be very high. Kolbenschmidt Pierburg has both a diversified product portfolio and the necessary development competencies. The largely universally mountable module furthermore allows for a positive scaling effect and limits development and application costs.

The new power unit consists of a two-cylinder, V-type gasoline engine with a vertically positioned crankshaft and two generators with gear wheel drive. Except for the fuel tank and the radiator, all components are mounted on a support frame. The vertical crank shaft requires only a short construction height, such that the module can be integrated beneath the floor of a small passenger vehicle and, for example, be placed comfortably within a spare wheel recess. This installation option offers the easiest and least expensive modification procedure relative to conventional vehicle construction and leaves room for interesting compact vehicle packaging and styling options.

The range extender weighs a little more than 60 kg, together with the generators and all related parts. Due to its special construction with active vibration compensation and an advantageous power set mounting, this technology solution achieves optimal NVH (Noise Vibration Harshness)

scores. This means that the low-noise environment of an electric vehicle is largely maintained when the range extender is on.

The power unit is conceived in such a way that the vehicle interfaces are reduced to a minimum. Vehicle integration thus proves comparatively unproblematic and installation or disassembly can be performed easily and efficiently. This enables the range extender to be reduced to an additional accessory equipment option. The automobile can thus be delivered with or without a range extender and allows for a modular design concept.

Bridge technology reduces costs

The current market situation for electric vehicles looks as if many consumers are afraid that battery range will be insufficient ('range anxiety'). They also appear to shy away from high added costs. A bridge technology like that employed in range extenders could expedite market entry for a new generation of battery-powered vehicles and support legislators in their efforts to reduce CO₂ emissions. The advantages of such power units lie in the fact that they reduce battery size and costs and lower additional related weight. With range extenders, normal ranges can be achieved even without long en route recharging periods.