press release

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Mechatronic components for Euro-6 commercial vehicle engines

So that the worldwide ever stricter emission legislation for commercial vehicle engines can be complied with, Pierburg GmbH is developing solutions for exhaust systems. Included among its mechatronic components for Euro-6 engines are EGR valves, exhaust-gas flaps and check valves all of which are continuously being fine-tuned. These robust components are engineered for extended durability and, the latest generations especially, lowest-possible costs. So far this year, EGR cooler modules for a major industrial engine OEM have been launched into series production. Pierburg is also contributing to “thermal management” solutions, and starting from 2014, will be offering bypass systems for EGR cooler units on commercial vehicle engines.

Between 2012 and 2014, Pierburg's sales of products destined for the commercial and industrial engine segments were doubled. One important element in this growth is Pierburg's global presence. Plants around the world are in a position to address the requirements for local production as frequently expressed by customers. The possibility of individual cooperation is particularly appreciated by OEMs that have already set up base in Asia or are intending to do so with new generations of engines.

Smart system of modules saves costs
Right now, either EGR coolers or EGR mixers form the basis for Pierburg's complete exhaust-gas modules for the commercial diesel market. The advantage of such an approach is that individual components from the corresponding set of modules—EGR valve, EGR cooler, check valve, flap gate, throttle valve—can be combined into a compact, coordinated system. In this way, engines of 50 up to 560 kW can be fitted out at low cost, robustly, and as required. A selection of proven components from a single source enables customized exhaust systems without the OEM having to worry about system integration or quality assurance procedures.

EGR valves for commercial vehicles
Ever since 2011, Pierburg's EGR poppet valves for light and medium trucks have been successfully in series production. With very low internal leakage, they are based on a DC motor specifically developed for the medium-duty market. They are engineered for up to 10,000 operating hours.

The toughest challenge facing the developers of the DC motor (part of the EGR system) was to ensure increased vibration resistance and minimum brush wear. The system of Pierburg's proprietary motor has an advantage in terms of price over the brushless variety used so far—especially relevant in light- and medium-duty environments. Single- and double-flow valves can be used depending on the required flow rate and so these valves permit EGR rates of up to 180 kg/h. The EGR poppet valves are actuated by a PWM signal; they allow full on-board diagnosis.
(OBD) and are available for either 12- or 24-V applications.

Whenever life-cycles of over 20,000 h and a more powerful actuating system or a CAN-bus interface are called for, Pierburg reverts to its HD actuator kit and so supplies from a single source the actuator and the EGR flaps, thus making sure that the individual components match to perfection. The actuators and valve housings are stand-alone subassemblies yet combinable within the modular system. They can take the form of either single- or double-flow EGR valves whose flap diameter can vary between 30 and 50 mm. This allows them to cover engine displacements of 4 to 16 liters and 100 to 600 kW engine outputs.

The EGR valve consists of a temperature-resistant, cooled actuator and a valve housing connected by a rod to the actuator. This arrangement prevents combined heat buildup, essential due to the high exhaust-gas temperatures. The parallel arrangement of the valve and the actuator shafts is a favorable solution in terms of compact package requirements for the engine and the vehicle.

In this, the second-generation product, the actuator electronics are based on a 16-bit controller whose software, if necessary, can be updated via the engine controller. The CAN-bus interface allows for full OBD and servicing functions and adapts automatically to onboard supply systems of either 12 or 24 V.

**Back pressure valves from a single source**

Within the chain of mechatronic components for emission control and hence for addressing Euro-6 requirements, an important role is played by the back pressure valves. These do a variety of jobs when the engine is running, including increasing the operating pressure differential and thus upgrading the EGR rate, assisting engine-braking and gearshift functions, thermal management of the SCR system and regenerating the diesel-particle filter (DPF). As in the case of the EGR valves, when it comes to back pressure valves Pierburg has a variety of solutions specifically for light-, medium- and heavy-duty engines.

2011 saw the startup of series production of the DC-motor operated exhaust-gas flaps whose diameters reach up to 80 mm. Their actuators, engineered for 8,000 to 10,000 operating hours, are triggered by PWM and feature a Pierburg DC motor designed for these higher requirements. Optionally available is water cooling for the actuator in the event that the ambient temperature is too high and air cooling is not provided.

With these exhaust-gas valves, the I.C. engine’s vibrations are highly stressful for the actuator and so this is isolated both thermally and mechanically from the flap housing, an arrangement that impacts favorably on durability. The flap mount is likewise specially developed for electric actuators and is remarkable for its extended longevity, low friction, and minimum leakage.

For wider flaps of up to 120 mm diameter, Pierburg recommends its brushless
second-generation HD actuator which shares the same electric and software specifications as the EGR valves. It is likewise based on a 16-bit controller whose software can, if needed, be updated via the engine controller. The CAN-bus interface allows for full OBD and servicing functions and adapts automatically to onboard supply systems of 12 or 24 V.

New on the heavy-duty exhaust flaps is the mounting; it is basically the one as used on the medium-duty versions and accordingly adapted. As the components are therefore additionally separated robustness is enhanced. As a consequence, Pierburg can offer from a single source a complete package of flap and actuator which are thus closely matched to customer requirements.

**Two versions of check valves**

The check valves are products that have long made a name for themselves among the commercial diesel community. On big engines and on the EGR assembly line, they are installed downstream of the cooler and serve to increase the EGR rate in the case of a partial drop in the flushing pressure. The high-temperature check valves are available for up to 230 °C and, for regular operation, up to 180 °C.

A newcomer to the lineup is a composite check valve recommended for engines of up to 8 liters and priced as an attractive alternative to the choices on the market to date.