PRESSRELEASE

Driven by performance

MAHLE takes anticipatory steps concerning European Directive on lead-free materials

Stuttgart, Germany, September 2007 — The European Commission is considerably limiting the use of hazardous substances in vehicles (European Directive 2000/53/EC). According to this Directive, the proportion of lead in every component, for instance, should be less than 0.1 percent of the component's weight.
Annex II of the Directive outlines exemption deadlines to allow for technical difficulties. Beginning July 1, 2008, the amended version from September 2005 will also be mandatory for engine bearings and bushings.
Long before these environmental aspects became a central topic, MAHLE was dedicated in its search for lead-free materials for bearings and bushings. For more than ten years, many lead-free bimetallic bearings based on aluminum have been part of MAHLE's product portfolio. The manufacturing processes were extensively optimized in order to achieve ideal product properties for the increasingly demanding conditions in the engine. The lead-free running surfaces of the bimetallic bearings are made of aluminum, tin, and supplemental elements such as silicon and copper. The MAHLE product portfolio includes a large selection of alloys: for example, ML157, ML176, ML215, ML18, and ML230.

To comply with the new legislation, new solutions were also required for the highly stressed bearings of modern diesel engines for passenger cars and heavy commercial vehicles. In consequence, MAHLE intensified its materials development efforts for trimetallic bearings and bushings. These developments have produced two new products.

The first product was recently introduced on the market and consists of a lead-free bronze substrate (CuSnNi) with aluminum-tin coating, which is applied by means of PVD sputtering (ML335). This product is an alternative to sputtered bronze bearings

containing lead, which in the past were successfully used in high-speed diesel engines and heavy commercial vehicles.

The second variant is also based on a lead-free substrate alloy (CuSnBiNi), however, with an electroplated tin-silver coating (ML130). This concept is an alternative to the leaded bronze bearings with electroplated lead-tin coatings, which are frequently used as counterparts for PVD-sputtered bearings for high-speed diesel engines and heavy commercial vehicle diesel engines as the lower bearing halves in the crankshaft. In less demanding engines, the electroplated tin-silver coating can be used for both the upper and lower bushings. For connecting rod bushings, MAHLE recently introduced on the market the new lead-free ML15 bronze alloy (CuSnNi) with steel backing and excellent load-bearing capacity.

The MAHLE Group is one of the 30 largest automotive suppliers worldwide. As the leading manufacturer of components and systems for the internal combustion engine and its peripherals, MAHLE is among the top 3 systems suppliers for piston systems, cylinder components, valve train systems, air management systems, and liquid management systems. With more than 40,000 employees in 110 production plants and seven research and development centers, MAHLE generated sales in excess of EUR 4.3 billion (USD 5.8 billion) in 2006.

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