

## **Application of Environmental Impact Assessment to Engine Bearings**

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Life cycle assessment (LCA) is conducted for four types of plain bearings used for automotive engines.

LCA is a procedure to study the environmental aspects and potential impacts throughout a product's life from raw material acquisition through production, use and disposal. Four major features of LCA can be cited: (1) it presents quantitative indices of environmental impact of a product, (2) it has standardized processes of inventory analysis and impact assessment and the use of standard data makes comparison possible between independently obtained results, (3) any scope of study can be defined, though assessment is possible over the whole life of a product, and (4) results can be given for various categories, e.g. global warming, depletion of ozone layer, or pollutions of air and a river.

In the present study, equivalent CO<sub>2</sub> emission (ECE) is used as the index of the environmental impact for global warming, and is compared among different chemical compositions and different manufacturing processes of the bearings. Three types of aluminum alloy bearings, all of which are in the market, show little difference in ECE, irrespective of different lining constituents or the addition of an interlayer. Copper-lead alloy bearings with overlay, on the other hand, show an ECE value approximately 2.7 times as high as that for the aluminum alloy bearings, the increment originating from the overplating process. If higher fatigue resistance of the aluminum alloy bearings is taken into consideration and their size could be reduced maintaining the same level of performance, further advantage would be found for their use.