

## A Comparison between Journal Bearings and Rolling Element Bearings in a Camshaft Application

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### ABSTRACT

Concerns over greenhouse gas emissions are driving governments and the automotive industry to seek out ways of reducing vehicle CO<sub>2</sub> emissions. Engine friction reduction is one means of reducing CO<sub>2</sub> emissions, through fuel consumption improvements. One area where it is felt that friction reduction is possible is in connection with the camshaft bearings.

The use of rolling element bearings is generally considered to provide friction reductions by two means:

1. As a direct substitution of the journal bearings by rolling element bearings
2. As an enabling opportunity to reduce the oil flow requirement of the engine

MAHLE has undertaken a motored friction-testing program on a 2.5 litre gasoline engine, comparing the drive torques associated with the standard camshaft bearings and also with camshafts supported by rolling element bearings.

The test engine incorporated a direct-acting valve train design. For manufacturing reasons, the camshaft supported in rolling element bearings incorporated sintered camshaft lobes whilst the standard engine employed a chill cast camshaft supported in conventional journal bearings.

Contrary to previously reported results, the direct substitution tests (1) demonstrated that the camshaft supported on journal bearings had a lower level of friction than the camshaft supported by rolling element bearings. The test engine configuration fitted with rolling element bearings showed a lack of sensitivity to variations in oil flowrates applied both to the rolling element bearings and also to the tappet/cam lobe interface

This paper considers the approach to the testing, the test results obtained and some further discussion, including a possible basis for the results obtained.