

ESTIMATION BY CALCULATION OF MECHANICAL POWER LOSSES ON AUTOMOTIVE TURBOCHARGERS

Authors

Y. Konan¹, M. Deligant¹, C. Périlhon¹, P. Podevin¹, A. Clenci²

¹ Conservatoire National des Arts et Métiers, Laboratoire de génie des procédés pour l'environnement l'énergie et la santé - LGP2ES, France

² University of Pitesti, Romania,

Abstract

Nowadays diesel automotive engine is turbocharged. Regulations of CO₂ emission lead also for gasoline engine to be turbocharged (downsizing). Therefore, high performances of the turbocharger are required on an even wider functioning area. That also means that these performances must be known with a satisfactory accuracy.

Unfortunately, this is not the case for turbocharger's operation at low speeds, which is often encountered in automotive applications. Some experiments have been performed in Cnam laboratory on a turbocharger test bench equipped with a torquemeter.

Experimental results permit a coarse evaluation of friction losses based on the difference between power given to the airflow and power measured by the torquemeter. It seems that a better accuracy of these losses can be obtained by a direct mechanical calculation of friction losses but first calculations were not satisfactory.

So, it has been decided to carry out a careful analytical calculation using "classical" methods for journal bearings applied to one turbocharger and study influences of different parameters (load, clearance, eccentricity, lubricating oil viscosity...).

Then these calculations have been compared with 2D CFD results. A 3D analysis is in progress. In this paper, the results of these different computations are presented and discussed.

Keywords

turbocharger, friction losses, journal bearings, CFD