

How the engine dynamic characteristics affect the blow-by gasses

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Abstract

The combustion chamber is ought to be perfectly sealed, however, part of the air and fuel mixture can escape from it. Among the several losses there is the gas flow from the inter-ring crevices, which is always present. This leakage is known as blow-by, and affects efficiency, correct lubrication and emissions. The amount of leakage is dependent on many factors, and among the most important are the engine speed and load, which are able to affect the system through the forces applied on it. The aim of this paper was to understand in a more detailed way how the engine speed and load could affect the sealing efficiency of a ring-pack. For this purpose, a complete range of speeds and loads were used in the simulations. The equations of the ring motions and gas dynamics has been implemented and solved in ©Ricardo RINGPAK solver. The results showed that inertia and inter-ring gas pressures drives the sealing behavior of the rings. The blow-by trend showed to decrease with the speed and increase with the load, exception made for the idle condition where the values were different to the other cases, especially at higher speeds. Among the two parameters, the engine speed resulted to affect more significantly the blow-by trend.

Keywords: Blow-by, internal combustion engines, speed, load, ring dynamics.

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