Influence of the distortion of the conrod big-end bore due to mounting on the tribological behaviour of the conrod/pin coupling

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The present contribution aims at evaluating the influence of the elastic deformation due to mounting of a conrod big-end bore on the tribological behaviour of the coupling between the conrod big-end and the crank pin. In particular, several Finite Element models are prepared in order to determine the deformation of the components involved, namely the conrod, the cap, the bolts and the bearings. Two different connecting rods are investigated manufactured with two different materials (steel and titanium). The following governing parameters are investigated:
1. Influence of the bolt pre-load adopted during the big-end machining; 2. Influence of the bolt pre-load adopted during bearings mounting; 3. Influence of the bearing geometry (crush).

The deformed shapes evaluated via the Finite Element method, are then adopted to describe the geometry of the bearing inner profile in an elastohydrodynamic model of the coupling. The mass-conserving algorithm proposed by some of the authors [1, 2] and based on the complementarity formulation of the cavitation problem is employed. Results are discussed in terms of hydrodynamic pressure distribution, direct contact pressure distribution, minimum oil film thickness distribution and void ratio distribution. The cavitation damage model proposed in [3] is also adopted in order to identify possible critical behaviours.

References