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Dynamics of piston in an internal combustion engine using a mathematical model and computational analysis.

To develop a new engine for a vehicle, the work performed by the engine as well as the power requirements of the vehicle in various driving environments must be estimated. In this paper, parameters such as compression ratio, expansion coefficient, and maximum pressure are set to calculate the powers of the presented vehicles. To maintain a proper engine power with the ability to overcome aerodynamic resistance and rolling resistance, accelerations and maximum powers were estimated. In addition, to determine the static and dynamic characteristics of the engine as well as the common configuration of the slider crank mechanism, the angle and the length of the connecting rod, the angle of the crankshaft, and the radius of the crankshaft were considered. To analyze the applied forces acting on the engine for the study of the kinematics of the engine system, constant angular frequency, specific angular frequency, and a steady-state operation of the engine were assumed. Computational experiments applied to different vehicle engines for the crank angle of rotations, varying from 0 degree to 720 degree, prove that an angle about 350 degree 400 degree is ideal for the crank angle to produce high power. (Received August 03, 2020)