

## Friction Calculation and Simulation of Column Electric Power Steering System

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**Abstract :** This study presents a procedure for friction calculation of column electric power steering (C-EPS) system which affects handling and comfort in driving. The friction losses estimation is obtained from experimental tests and mathematical calculation. Parts in C-EPS mainly involved in friction losses are bearings and worm gear. In the theoretical approach, the gear geometry and Hertz law were employed to measure the normal load and the sliding velocity and contact areas from the worm gears driving conditions. The viscous friction generated in the worm gear was obtained with a theoretical approach and the result was applied to model the friction in the steering system. Finally, by viscous friction coefficient and Coulomb friction coefficient, values of friction in worm gear were calculated. According to the Bearing Company and the characteristics of each bearing, the friction torques due to load and due to speed were calculated. A MATLAB Simulink model for calculating the friction in bearings and worm gear in C-EPS were done and the total friction value was estimated.

**Keywords :** friction, worm gear, column electric power steering system, simulink, bearing, EPS

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