

A finite element approach to dynamic stresses of helical gear pairs
considering tip relief and crowning modifications

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Abstract

An investigation on helical gear pair stresses incorporating
misalignment and detail modification

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Abstract:

A finite element approach to investigating the dynamic behavior of helical gear pairs (HGPs) by incorporating misalignment error and detail modifications of tip relief and face-width crowning is presented. Basing on the C code and derived tooth profile formulas, fine finite element models of helical gear pair (HGP) can be constructed parametrically. Also, all elements on the driven teeth surfaces are numbered to identify individual dynamic stresses. After analysis settings, the dynamic contact and fillet bending stresses of a theoretic HGP are first calculated. Then, the maximum stresses with misalignment error are also obtained. Finally, the effect of tooth modification on the dynamic stresses of HGPs with the misalignment errors is discussed. The result shows modification with tip relief and face-width crowning can reduce the dynamic responses caused by the impact contact of HGPs

Keyword : Helical gear, Dynamics, Tip relief, Crowning, Misalignment,
Finite element