Finite element analysis on effects of rim and web thicknesses on root stress of thin-rimmed spur gear with asymmetric web arrangement

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ABSTRACT

Having a lightweight and efficient gear system could improve the efficiency of an engine. The increase of load to over certain limits could end up with the failure to the gear. Special caution needs to be put in consideration for thin-rimmed gears due to the thickness of rim and web. This paper mainly focuses on investigating the effects on root stress of thin-rimmed spur gear with different rim and web thicknesses. There were two different methods used, the analytical method using AGMA standards and the finite element method (FEM). In this study, several sets of thin-rimmed spur gear with different rim and web thicknesses have been simulated in Abaqus software as FE model for further analysis. Von Misses stress value has been obtained with different values of tangential force that have been applied to the gear. Based on the results, a constant increase of root stress values was recorded when the thickness of rim being reduced. The asymmetric web arrangement of thin-rimmed spur gear cause the root stress values to become uneven at the line of Hofer's critical section, that contributes some irregular trend on Von Misses stress values recorded when the thickness of web being reduced.

KEYWORDS:
Finite element; Root stress; Thin- rimmed; Asymmetric