

Design Improvement of Worm Gearing for Better Energy Utilization

Authors : Ahmed Elkholy

Abstract : Most power transmission cases use gearing in general, and worm gearing, in particular for energy utilization. Therefore, designing gears for minimum weight and maximum power transmission is the main target of this study. In this regard, a new approach has been developed to estimate the load share and stress distribution of worm gear sets. The approach is based upon considering the instantaneous tooth meshing stiffness where the worm gear drive was modelled as a series of spur gear slices, and each slice was analyzed separately using a well-established criteria. By combining the results obtained for all slices, the entire worm gear set loading and stressing was determined. The geometric modelling method presented, allows tooth elastic deformation and tooth root stresses of worm gear drives under different load conditions to be investigated. On the basis of the method introduced in this study, the instantaneous meshing stiffness and load share were obtained. In comparison with existing methods, this approach has both good analytical accuracy and less computing time.

Keywords : gear, load/stress distribution, worm, wheel, tooth stiffness, contact line

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