RELIABILITY BASED DESIGN OF SPUR, HELICAL AND BEVEL GEARS

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Abstract

The concept of reliability is greater importance in the design of various machine members. As reliability is now an exceedingly important aspect of competitiveness, there is need to design reliability into products. Conventional engineering design uses a deterministic approach. it disregard the fact that the material properties, dimensions of components and the externally applied loads are statistical in nature. In conventional design these uncertainties are covered with factor of safety, which is not always successful. Probabilistic design is a concept where by engineering variables are treated statistically. Each variable is modeled to reflect a spectrum of possible values. The growing trend towards uncertainty is to use the probabilistic approach. In the present work three types of gears namely spur, helical and bevel gears are designed using the reliability principles and their results are compared with those obtained by the deterministic procedure. Design is considered to be safe and adequate if the probability of failure is less than or equal to specified quantity. Two failure modes namely bending and surface wear failure modes are considered. A larger value of face width obtained in either of these two failure modes is considered .A computer program is developed in 'C' to calculate the face width of gears. By changing various design parameters, changes in face width are studied.

Keywords :