AMERICAN GEAR MANUFACTURERS ASSOCIATION

Load Distribution Factors - Analytical Methods for Cylindrical Gears

AGMA 927-A01

AGMA INFORMATION SHEET

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American Gear Manufacturers Association

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Approved October 22, 2000

ABSTRACT

This information sheet describes an analytical procedure for the calculation of the face load distribution. The iterative solution that is described is compatible with the definitions of the term face load distribution (K_{H}) of AGMA standards and longitudinal load distribution ($K_{H\beta}$ and $K_{F\beta}$) of the ISO standards. The procedure is easily programmable and flow charts of the calculation scheme as well as examples from typical software are presented.

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Foreword

[The foreword, footnotes and annexes, if any, in this document are provided for informational purposes only and are not to be construed as a part of AGMA Information Sheet 927-A01, *Load Distribution Factors - Analytical Methods for Cylindrical Gears.*]

This information sheet provides an analytical method to calculate a numeric value for the face load distribution factor for cylindrical gearing.

This is a new document, which provides a description of the analytical procedures that are used in several software programs that have been developed by various gear manufacturing companies. The method provides a significant improvement from the procedures used to define numeric values of face load distribution factor in current AGMA standards. Current AGMA standards utilize either an empirical procedure or a simplified closed form analytical calculation. The empirical procedure which is used in ANSI/AGMA 2101-C95 only allows for a nominal assessment of the influence of many parameters which effect the numeric value of the face load distribution factor. The closed form analytic formulations which have been found in AGMA standards suffer from the limitation that the shape of the load distribution across the face width is limited to a linear form.

The limitations of the previous AGMA procedures are overcome by the method defined in this information sheet. This method allows for including a sufficiently accurate representation of many of the parameters that influence the distribution of load along the face width of cylindrical gears. These parameters include the elastic effects due to deformations under load, and the inelastic effects of geometric errors as well as the tooth modifications which are typically utilized to offset the deleterious effects of the deformations and errors.

The analytical method described in this information sheet is based on a "thin slice" model of a gear mesh. This model treats the distribution of load across the face width of the gear mesh as being independent of the any transverse effects. The method also represents all of the elastic effects of a set of meshing teeth (tooth bending, tooth shear, tooth rotation, Hertzian deflections, etc.) by one constant, i.e., mesh stiffness ($C_{\gamma m}$). Despite these simplifying assumptions, this method provides numeric values of the face load distribution factor that are sufficiently accurate for industrial applications of gearing which fall within the limitations specified.

The first draft of this information sheet was made in February, 1996. This version was approved by the AGMA membership on October 22, 2000.

Special mention must be made of the devotion of Louis Lloyd of Lufkin for his untiring efforts from the submittal of the original software code through the prodding for progress during the long process of writing this information sheet. Without his foresight and contributions this information sheet may not have been possible.

Suggestions for improvement of this document will be welcome. They should be sent to the American Gear Manufacturers Association, 1500 King Street, Suite 201, Alexandria, Virginia 22314.

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