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Design Manual for Cylindrical Wormgearing

Design Manual for Cylindrical Wormgearing

AGMA 6022-C93 (Revision and Redesignation of AGMA 341.02)

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ABSTRACT:

This Design Manual provides information pertaining to selection of geometric parameters which will constitute good design of fine and coarse pitch cylindrical wormgearing. The power rating for fine and coarse pitch wormgearing is not included in this design manual but can be found in AGMA 6034, *Practice for Enclosed Cylindrical Wormgear Speed Reducers and Gearmotors*.

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FOREWORD

[The foreword, footnotes, and annexes, if any, are provided for informational purposes only and should not be construed as part of AGMA 6022-C93, *Design Manual for Cylindrical Wormgearing* (formerly 341.02, *Design of General Industrial Coarse-Pitch Cylindrical Wormgearing*).]

The standard provides a broad range of design parameters for fine and coarse pitch cylindrical wormgearing which would constitute feasible design, within which the designer may search for a *better* design. The greatest possible latitude for design has been sought.

The earlier standard AGMA 341.01, was approved by the AGMA membership in June 1955, and AGMA 341.02 was approved by the membership in December 1964 and reaffirmed in May 1970.

Standard AGMA 374.01, *Design for Fine-Pitch Wormgearing* is being withdrawn.

Data contained herein represents a consensus from among engineering representatives of member companies of AGMA and other interested parties.

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American National Standard - Design Manual for Cylindrical Wormgearing

1 Scope

This design manual covers the design of fine and coarse pitch cylindrical wormgearing operating at right angles and primarily made as gear sets to be incorporated into other machines and mechanisms. Many of the design procedures are also incorporated in enclosed drives.

1.1 Uses of wormgearing

Wormgearing is used on applications transmitting very small amounts of power up to 1000 HP (746KW) and 10 lb in (1.13 Nm) up to 3 000 000 lb in (339 000 Nm) output torques. Worm speeds can vary from 0 to 10 000 rpm, depending on size. Design of wormgearing varies with its specific uses and application requirements. Wormgearing used in an indexing mechanism of a machining center has different requirements from a conveyer drive in a steel mill.

1.2 Intended use

The equations and values presented provide a general approach to design. Deviations from the methods and values stated in this design manual may be made when justified by experience, testing, or more specific analysis. It is intended for use by experienced gear designers capable of selecting reasonable values based on their knowledge of the performance of similar designs and the effect of such items as lubrication, deflection, manufacturing tolerances, metallurgy, residual stresses, and system dynamics. It is not intended for use by the engineering public at large. Because of the wide variety of applications of wormgearing, this design manual is a practical overview of wormgearing design and is intended as a guideline for users and manufacturers in the general principles of operation, the basic design concepts and formulas, the common thread forms used, the use of modified designs, tooling and manufacturing considerations, and the proper mounting, assembly and run-in of wormgearing.

2 Symbols, terms, and definitions

The symbols, terms, and definitions, when applicable, conform to ANSI/AGMA Standard 1012-F90, *Gear Nomenclature, Definitions of Terms with Symbols*. See table 1.

Table 1 - Symbols used in equations

Symbol	Term	Units	First used	First referenced
A	Distance from wormgear pitch point to bearing B	in (mm)	Equation 37	14.2
a	Worm and wormgear addendum	in (mm)	Equation 8	4.9.1
B	Axial backlash	in (mm)	Equation 13	4.9.4
b	Worm and wormgear dedendum	in (mm)	Equation 9	4.9.2
C	Center distance	in (mm)	Equation 2	4.3
c	Clearance	in (mm)	Equation 21	4.9.10
D	Wormgear pitch diameter	in (mm)	Equation 4	4.4
D_o	Wormgear outside diameter	in (mm)	Equation 20	4.9.9
D_r	Wormgear root diameter	in (mm)	Equation 19	4.9.8

(continued)