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Bevel and hypoid gear geometry

锥齿轮和准双曲面齿轮几何学

(English Translation)

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Appendix A (informative) Framework of ISO calculation formulas for geometric parameters of bevel gears and hypoid gears

Appendix B (Informative) Pitch cone parameters

Appendix C (informative) Gear geometric dimensions

Appendix D (Informative) Force Analysis

Appendix E (informative) Machine tool data

Appendix F (informative) Four calculation examples

Reference

Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents" Drafting.

This document is equivalent to ISO 23509:2016 "Bevel and hypoid gear geometry".

Please note that some content in this document may be subject to patents. The publisher of this document assumes no responsibility for identifying patents.

Introduction

For decades, gear machining machine tool manufacturers have developed and disclosed the geometric properties of bevel and hypoid gears. well known it is known that the relevant calculation formulas are based on specific machine tools and auxiliary tools and are deduced using the generation method. Generally, these formulas do not apply for all types of bevel gears. But with the advent of general-purpose, multi-axis, CNC machine tools, the situation has changed. These machine tools can theoretically Machining of almost all types of bevel gears. Therefore, manufacturers of bevel gear processing machines need to consider different cutting methods for their products.

The corresponding geometric principles are matched with CNC programs.

This document integrates the design methods of spur bevel gears and three spiral bevel gears into a complete set of calculation formulas. only in special circumstances Certain formulas are required. Through these formula sets, users can directly program calculations

and compare different bevel gear designs.

The three design methods of spiral bevel gears are based on the general calculation formula of hypoid gears. The calculation of spiral bevel gears only requires the calculation of hypoid gears.

The offset distance can be set to zero. For the bevel gear pair in the geometric sense, the large wheel does not need to consider the offset and is processed by the generation or non-generation method.

to; while the small wheel is added to the total offset of the hypoid gear pair and processed through the generation method.

Another purpose of this document is to establish a standard for ISO hypoid gears in the future based on the comprehensive geometry of bevel gears.

Rating system.

Bevel and hypoid gear geometry

1 Scope

This document gives bevel gear geometry.

The term "bevel gear" is used for the designs of straight bevel gears, spiral bevel gears, zero-degree bevel gears, and hypoid gears. If in this document the content only involves one or more (but not all) of the forms, and there will be special instructions.

The target tooth profile described in this document can be processed by various methods and is universal and does not imply a specific process.

This document also covers the geometric relationships for the calculation of evaluation factors for bevel gears, eg ISO 10300 (all parts).

This document is intended for experienced gear designers who can rely on their knowledge and background to make reasonable choices for the required values.

This document is not intended for general technical personnel.

This document gives the framework of the calculation method, see Appendix A.

2 Normative reference documents

The contents of the following documents constitute essential provisions of this document through normative references in the text. Among them, the dated quotations for undated referenced documents, only the version corresponding to that date applies to this document; for undated referenced documents, the latest version (including all amendments) applies to this document.

Note: GB/T 3374.1-2010 Gear terms and definitions Part 1: Geometric definition (ISO 1122-1:1998, IDT)

3 Terms, definitions and symbols

Note 1: The symbols, terms and definitions used in this document have been consistent with other international standards as far as possible. Due to certain application limitations, some symbols, terms and definitions the meaning is different from the expression of bevel gear in related literature.

Note 2: The geometric terms of bevel gears in this document are illustrated in Figures 1 to 3. Figure 1 is an axis cross-section, Figure 2 is a midpoint cross-section, and Figure 3 shows the quasi-sectional view.

Hyperboloid gear geometry terminology.

The symbols in this document have subscript 1 for small wheels and subscript 2 for large wheels.