Geometric Boundaries SI

Interpretation and Application
of Geometrical Product Specifications (GPS)
(Using SI Units)
Based on ASME Y14.5M-1994

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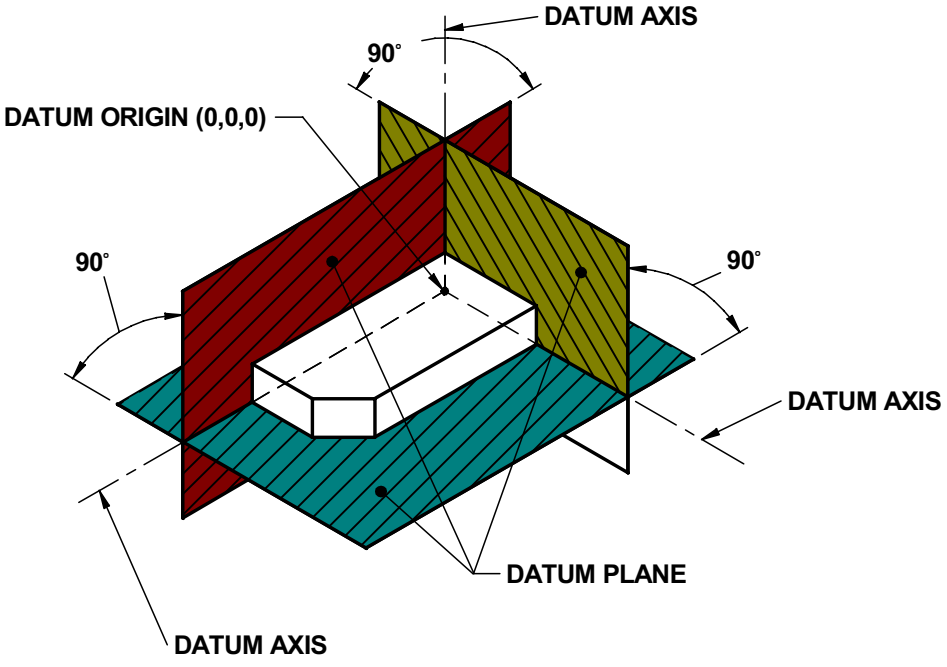

Preface

This book is written for those individuals within the design, drafting, engineering and manufacturing fields that desire a practical guide for the interpretation and application of geometrical tolerancing.

I have deliberately directed my efforts for technical professionals applying geometric dimensioning and tolerancing and attempted to comprehensively cover the concepts and applications that are and will be the most relevant within industry today and the future. The choice of examples are those which represent typical applications and may be combined as applicable to create products.

Much of the text material has been organized so that the topics appear and build the necessary knowledge required to proceed to the next subject matter.

The book is dedicated to my children, Nathan and Heather.

Kelly L. Bramble

Revision L

Acknowledgments

The following documents have been used as reference material (cited and not cited).

ASME Y14.5.M-1994, Dimensioning and Tolerancing.
ANSI Y14.5M-1982, Dimensioning and Tolerancing.
ANSI Y14.5M-1973, Dimensioniing and Tolerancing
ANSI Y14.5M-1966, Dimensioning and Tolerancing
International Standards Institute, ISO/R1101-1969, & Associated Documents
ANSI B4.2-1978, Preferred Metric Limits and Fits
ANSI B5.10-1981, Machine tapers – Self Holding and Steep Taper Series
ANSI/ASME B46.1-1985, Surface Texture (Surface Roughness, Waviness, and Lay)
ANSI B89.3.1-1972, Measurement of Out-of-Roundness
ANSI B92.1-1970, Involute Splines and Inspection, Inch Version
ANSI B92.2M-1980, Metric Module, Involute Splines
ANSI/ASME B94.6-1984, Knurling
ANSI B94.11M-1979, Twist Drills
ANSI Y14.1-1980, Drawing Sheet Size and Format
ASME Y14.2M-1992, Line Conventions and Lettering
ASME Y14.5.1M-1994, Mathematical Definition of Dimensioning and Tolerancing Principles.
ANSI Y14.6.1-1978, Screw Thread Representation
ANSI Y14.6.2-1981, Screw Thread Representation (Metric Supplement)
ANSI Y14.7.1-1971, Gear Drawing Standards – Part 1: For Spur, Helical, Double Helical, and Rack
ANSI Y14.7.2-1978, Gear and Spline Drawing Standard – Part 2: Bevel and Hypoid Gears
ASME Y14.8M-1989, Castings and Forgings
ANSI Y14.36-1978, Surface Texture Symbols
ANSI/IEEE 268-1992, Metric Practice
ANSI/ASME B1.2-1983, Gages and Gaging for Unified Inch Screw Threads
ANSI B4.4M-1981 (R1987), Inspection of Workpieces
ASME Y1.1-1989, Abbreviations
ASME Y14.3M-1994, Multiview and Sectional View Drawings
Engineers Edge 2000 - 2007, Solutions by Design, Kelly Bramble,
Geometric Boundaries, Interpretation and Application (Using Imperial Units) per ASME Y14.5M-1994
Design for Manufacturing 2006 - 2007, Kelly Bramble

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Introduction

Geometric Dimensioning and Tolerancing (GD&T) is an engineering drawing language used to communicate the physical limit requirements of a product object in two or three dimensional space. The GD&T standard defines a collection of symbols and specific rules for defining specific characteristics, relationships, and feature controls.

The latest standard on the subject of GD&T defined and in practice is the American Society of Mechanical Engineers (ASME) Y14.5M – 1994 Dimensioning and Tolerancing. The GD&T standard used internationally is the International Institute Standard (ISO) 1101:2004, Technical Drawings - Geometrical Tolerancing and associated standards.

The following are ISO standards that define GD&T requirements:

ISO/129-	Technical Drawings General Principles
ISO/406-	Technical Drawing Linear and Angular Dimensions
ISO/1101-	Technical Drawings Geometrical Tolerancing
ISO/1660-	Technical Drawings Profiles
ISO/2692-	Technical Drawings Maximum Material Condition
IOS/2692:1998/DAM 1	Technical Drawings Least Material Condition
ISO/3040-	Technical Drawings Cones
ISO/5458-	Technical Drawings Positional Tolerancing
ISO/5959-	Technical Drawings Datums and Datum Systems
ISO/7083-	Technical Drawings Symbols Proportions
ISO/8015-	Technical Drawings Fundamental Tolerance Principle
ISO/10579-	Technical Drawings Non-Rigid Parts
IOS/10587-	Technical Drawings Projected Tolerance Zones

Declarations:

All illustration and drawings are depicted and interpreted per Figure .1

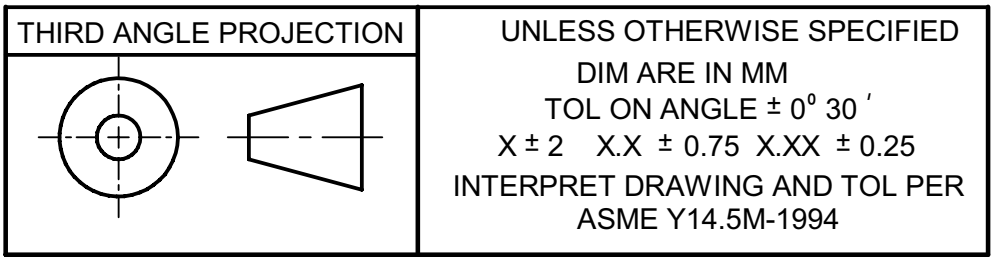

Figure .1