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*Original*

Technical Drawing for Product Design Mastering ISO GPS and ASME GD&T / Tornincasa, Stefano. - STAMPA. - (2020), pp. 1-306.

*Availability:*

This version is available at: 11583/2854927 since: 2020-12-06T21:10:23Z

*Publisher:*

Springer

*Published*

DOI:10.1007/978-3-030-60854-5

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Stefano Tornincasa

# Technical Drawing for Product Design

Mastering ISO GPS and ASME GD&T

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ISSN 2195-9862                      ISSN 2195-9870 (electronic)  
Springer Tracts in Mechanical Engineering  
ISBN 978-3-030-60853-8              ISBN 978-3-030-60854-5 (eBook)  
<https://doi.org/10.1007/978-3-030-60854-5>

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The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

# Preface

Designers create perfect and ideal geometries through drawings or by means of Computer Aided Design systems, but unfortunately the real geometrical features of manufactured components are imperfect, in terms of form, size, orientation and location.

Therefore, technicians, designers and engineers need a symbolic language that allows them to define, in a complete, clear and unambiguous way, the admissible variations, with respect to the ideal geometries, in order to guarantee functionality and assemblability, and to turn inspection into a scientifically controllable process.

The *Geometric Product Specification (GPS)* and *Geometrical Dimensioning and Tolerancing (GD&T)* languages are the most powerful tools available to link the perfect geometrical world of models and drawings to the imperfect world of manufactured parts and assemblies.

This is a new, more complicated approach than the previous methodologies, but it offers the designer more opportunities and more powerful tools to define the expected functional requirements with the maximum allowed tolerance.

Torino, Italy

Stefano Tornincasa

# About This Book

This book is intended for students, academics, designers, process engineers and CMM operators, and it has the main purpose of presenting the ISO GPS and the ASME GD&T rules and concepts. The GPS and GD&T languages are in fact the most powerful tools available to link the perfect geometrical world of models and drawings to the imperfect world of manufactured parts and assemblies. The topics that have been covered include a complete description of all the ISO GPS terminologies, datum systems, MMR and LMR requirements, inspection, and gauging principles.

Moreover, the differences between ISO GPS and the American ASME Y14.5 standards are shown as a guide and reference to help in the interpretation of drawings of the most common dimensioning and tolerancing specifications. The book may be used for engineering courses and for professional-grade programmes, and it has been designed to cover the fundamental geometric tolerancing applications as well as the more advanced ones. Academics and professionals alike will find it to be an excellent teaching and research aid, as well as an easy-to-use guide.

- Rules and concepts are explained with more than 400 original illustrations.
- The book is the result of a complex work of synthesis and elaboration of about 150 ISO standards and of the more recent ASME standards with the aim of clarifying technical rules and principles in order to document an industrial product in a univocal and rigorous manner.
- The latest changes and improvements of the ISO GPS and ASME Y14.5-2018 standards are presented.
- All the symbols that are used to interpret modern industrial technical drawings are described.
- This book represents an easy and indispensable guide for designers and professionals to clarify the concepts, rules and symbols pertaining to the complex world of technical product documentation.

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# About the Author

**Prof. Stefano Tornincasa** is full professor of Technical Drawing and Design Tools for Industrial Engineering at Politecnico di Torino. He has carried out research activities for over 30 years in the field of functional design and geometric tolerances and has published more than 200 national and international scientific papers. He was President of the ADM Improve Association (Innovative Methods in PROduct design and deVELOPMENT) from 2011 to 2015.

He is co-author of the best-selling book on Industrial Technical Drawing, which is currently adopted in the design courses of most Italian universities.

Professor Tornincasa has conducted training courses on GD&T in many of the main manufacturing companies in Italy, and it is from this activity that he has derived his skill and experience in functional design.

His other research topics have been focused on product development, cycle innovation through digital models and virtual prototyping methodologies (PLM).