

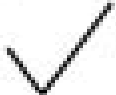
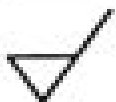



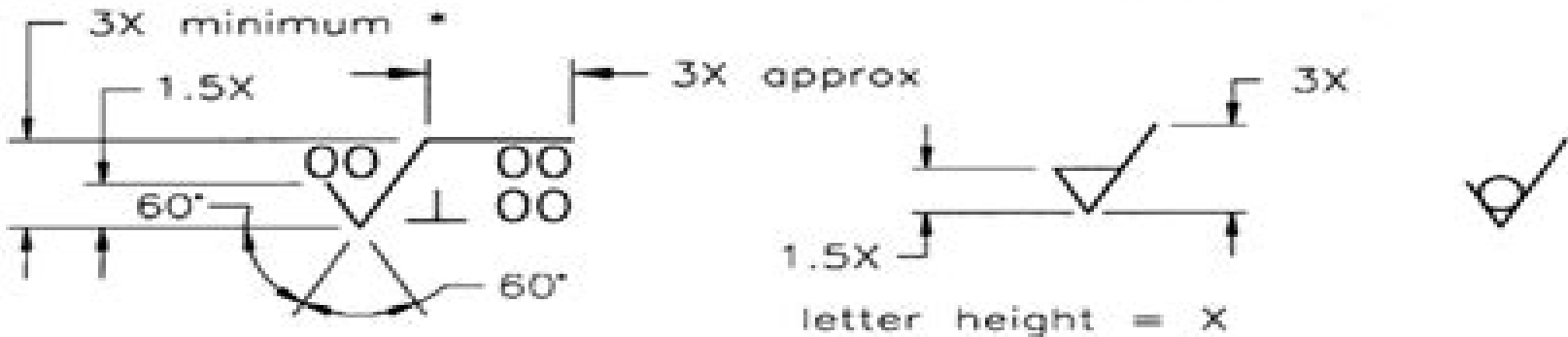
Symbol	Meaning
(a) 	Basic Surface Texture Symbol. Surface may be produced by any method except when the bar or circle (Symbol b or d) is specified.
(b) 	Material Removal By Machining is Required. The horizontal bar indicates material removal by machining is required to produce the surface and material must be provided for that purpose.
(c) 	Material Removal Allowance. Value in millimeters for "X" defines the minimum material removal requirement.
(d) 	Material Removal Prohibited. The circle in the vee indicates the surface must be produced by processes such as casting, forging, hot finishing, cold finishing, die casting, powder metallurgy or injection molding without subsequent removal of material.
(e) 	Surface Texture Symbol. To be used when any surface texture values, production method, treatment, coating or other text are specified above the horizontal line or to the right of the symbol. Surface may be produced by any method except when bar or circle (Symbol b or d) is specified or when the method is specified above the horizontal line.
<p>(f) </p> <p>* THIS DIMENSION IS ADJUSTED BY +1 FOR EACH LINE OF VALUES BEYOND THE TWO LINES SHOWN BELOW THE HORIZONTAL LINE.</p>	

FIG. 1 SURFACE TEXTURE SYMBOLS AND CONSTRUCTION

Mechanical Drawing Standards Surface Finish Symbols

David Planchard



Mechanical Drawing Standards Surface Finish Symbols:

Technical Drawing: Reviewed from ISO Standards Ir. Muttaqin Rahmat Pangaribawa, S.T., M.Eng., This Book offers a clear and structured introduction to technical drawing progressing from basic principles to advanced applications It covers fundamental techniques such as orthographic projection scaling and tolerancing with precision Emphasis is placed on ISO standards highlighting their role in establishing global benchmarks and ensuring quality Practical skills are developed through dimensioning schematic drawing and manufacturing detail exercises The use of traditional drafting tools and modern CAD methods is addressed Islamic perspectives are thoughtfully integrated into discussions on ethics and standardization Readers are guided toward producing accurate legible and compliant engineering drawings Key practices and real world applications are underscored throughout Summaries exercises and a comprehensive glossary reinforce learning This text is ideal for students lecturers and practitioners striving for professional mastery Mechanical Drawing, 1920 Fundamentals of Modern Manufacturing Mikell P. Groover, 2015-11-23 Fundamentals of Modern Manufacturing Materials Processes and Systems 6th Edition is designed for a first course or two course sequence in Manufacturing at the junior level in Mechanical Industrial and Manufacturing Engineering curricula As in preceding editions the author's objective is to provide a treatment of manufacturing that is modern and quantitative The book's modern approach is based on balanced coverage of the basic engineering materials the inclusion of recently developed manufacturing processes and comprehensive coverage of electronics manufacturing technologies The quantitative focus of the text is displayed in its emphasis on manufacturing science and its greater use of mathematical models and quantitative end of chapter problems This text is an unbound three hole punched version Handbook of Optomechanical Engineering Anees Ahmad, 2018-12-07 Good optical design is not in itself adequate for optimum performance of optical systems The mechanical design of the optics and associated support structures is every bit as important as the optics themselves Optomechanical engineering plays an increasingly important role in the success of new laser systems space telescopes and instruments biomedical and optical communication equipment imaging entertainment systems and more This is the first handbook on the subject of optomechanical engineering a subject that has become very important in the area of optics during the last decade Covering all major aspects of optomechanical engineering from conceptual design to fabrication and integration of complex optical systems this handbook is comprehensive The practical information within is ideal for optical and optomechanical engineers and scientists involved in the design development and integration of modern optical systems for commercial space and military applications Charts tables figures and photos augment this already impressive handbook The text consists of ten chapters each authored by a world renowned expert This unique collaboration makes the Handbook a comprehensive source of cutting edge information and research in the important field of optomechanical engineering Some of the current research trends that are covered include Manual of Engineering Drawing Colin H. Simmons, Dennis E. Maguire, 2009-03-24 The

Manual of Engineering Drawing has long been the recognised as a guide for practicing and student engineers to producing engineering drawings and annotated 3D models that comply with the latest British and ISO Standards of Technical Product Specifications and Documentation This new edition has been updated to include the requirements of BS8888 2008 and the relevant ISO Standards and is ideal for International readership it includes a guide to the fundamental differences between the ISO and ASME Standards relating to Technical Product Specification and Documentation Equally applicable to CAD and manual drawing it includes the latest development in 3D annotation and the specification of surface texture The Duality Principle is introduced as this important concept is still very relevant in the new world of 3D Technical Product Specification Written by members of BSI and ISO committees and a former college lecturer the Manual of Engineering Drawing combines up to the minute technical information with clear readable explanations and numerous diagrams and traditional geometrical construction techniques rarely taught in schools and colleges This approach makes this manual an ideal companion for students studying vocational courses in Technical Product Specification undergraduates studying engineering or product design and any budding engineer beginning a career in design The comprehensive scope of this new edition encompasses topics such as orthographic and pictorial projections dimensional geometrical and surface tolerancing 3D annotation and the duality principle along with numerous examples of electrical and hydraulic diagrams with symbols and applications of cams bearings welding and adhesives The definitive guide to draughting to the latest ISO and ASME standards An essential reference for engineers and students involved in design engineering and product design Written by two ISO committee members and practising engineers *A.S.M.E. Mechanical Catalog and Directory* ,1956 Engineering Graphics with SOLIDWORKS 2015 and Video Instruction David Planchard,2015-01-14 Engineering Graphics with SOLIDWORKS 2015 and video instruction is written to assist the technical school two year college four year university instructor student or industry professional that is a beginner or intermediate SOLIDWORKS user The book combines the fundamentals of engineering graphics and dimensioning practices with a step by step project based approach to learning SOLIDWORKS with video instructions Learn by doing not just by reading The book is divided into four sections Chapters 1 3 explore the history of engineering graphics manual sketching techniques orthographic projection Third vs First angle projection multi view drawings dimensioning practices ASME Y14 5 2009 standard line type fit type tolerance fasteners in general general thread notes and the history of CAD leading to the development of SOLIDWORKS Chapters 4 9 explore the SOLIDWORKS User Interface and CommandManager Document and System properties simple machine parts simple and complex assemblies proper design intent design tables configurations multi sheet multi view drawings BOMs and Revision tables using basic and advanced features Follow the step by step instructions in over 80 activities to develop eight parts four sub assemblies three drawings and six document templates Chapter 10 provides a section on the Certified Associate Mechanical Design CSWA program with sample exam questions and initial and final SOLIDWORKS models Chapter 11 provides a section on Additive

Manufacturing 3D printing and its benefits and features Understand the terms and technology used in low cost 3D printers Review individual features commands and tools using the video instruction and SOLIDWORKS Help The chapter exercises analyze and examine usage competencies based on the chapter objectives The book is designed to complement the SOLIDWORKS Tutorials located in the SOLIDWORKS Help menu Desired outcomes and usage competencies are listed for each project Know your objectives up front Follow the step by step procedures to achieve your design goals Work between multiple documents features commands and properties that represent how engineers and designers utilize SOLIDWORKS in industry The author developed the industry scenarios by combining his own industry experience with the knowledge of engineers department managers vendors and manufacturers These professionals are directly involved with SOLIDWORKS every day Their responsibilities go far beyond the creation of just a 3D model DUBBEL - Handbook of Mechanical Engineering B.J. Davies,Wolfgang Beitz,Karl-Heinz Küttner,2013-06-29 DUBBEL s Handbook of Mechanical Engineering has provided generations of German speaking engineers with a comprehensive source of guidance and reference on which they can rely throughout their professional lives The key sections of this standard work are now available for the first time in English Each subject is discussed in detail and supported by numerous figures and tables DIN standards are retained throughout but ISO equivalents are given where possible The text offers a concise but detailed and authoritative treatment of the topics with full references Contents Mechanics Strength of Materials Thermodynamics Engineering Design Hydraulic and Pneumatic Power Transmission Components of Thermal Apparatus Machine Dynamics and Components Manufacturing Process and Systems *Industrial Standardization and Commercial Standards Monthly* ,1936 *Engineering* ,1874

Commands Guide Tutorial for SolidWorks 2013 David C. Planchard,Marie P. Planchard,2012-12-27 The Commands Guide Tutorial for SolidWorks 2013 is a comprehensive reference book written to assist the beginner to intermediate user of SolidWorks 2013 SolidWorks is an immense software package and no one book can cover all topics for all users This book provides a centralized reference location to address many of the tools features and techniques of SolidWorks 2013 This book covers the following System and Document properties FeatureManagers PropertyManagers ConfigurationManagers RenderManagers 2D and 3D Sketch tools Sketch entities 3D Feature tools Motion Study Sheet Metal Motion Study Sustainability Sustainability Xpress FlowXpress PhotoView 360 Pack and Go Intelligent Modeling techniques and more Chapter 1 provides a basic overview of the concepts and terminology used throughout this book using SolidWorks 2013 software If you are completely new to SolidWorks you should read Chapter 1 in detail and complete Lesson 1 Lesson 2 and Lesson 3 in the SolidWorks Tutorials If you are familiar with an earlier release of SolidWorks you still might want to skim Chapter 1 to become acquainted with some of the commands menus and features that you have not used or you can simply jump to any section in any chapter Each chapter 18 total provides detailed PropertyManager information on key topics with individual stand alone short tutorials to reinforce and demonstrate the functionality and ease of the SolidWorks tool or

feature All models for the 240 plus tutorials are located on the enclosed book CD with their solution initial and final Learn by doing not just by reading Formulate the skills to create modify and edit sketches and solid features Learn the techniques to reuse features parts and assemblies through symmetry patterns copied components design tables configurations and more The book is design to compliment the Online Tutorials and Online Help contained in SolidWorks 2013 The goal is to illustrate how multiple design situations and systematic steps combine to produce successful designs The authors developed the tutorials by combining their own industry experience with the knowledge of engineers department managers professors vendors and manufacturers These professionals are directly involved with SolidWorks everyday Their responsibilities go far beyond the creation of just a 3D model **Fundamentals of Mechanical Drawing** United States. War Department,1943

Fundamentals of Manufacturing, Third Edition Philip D. Rufe,2013 Fundamentals of Manufacturing Third Edition provides a structured review of the fundamentals of manufacturing for individuals planning to take SME S Certified Manufacturing Technologist CMfgT or Certified Manufacturing Engineer CMfgE certification exams This book has been updated according to the most recent Body of Knowledge published by the Certification Oversight and Appeals Committee of the Society of Manufacturing Engineers While the objective of this book is to prepare for the certification process it is a primary source of information for individuals interested in learning fundamental manufacturing concepts and practices This book is a valuable resource for anyone with limited manufacturing experience or training Instructor slides and the Fundamentals of Manufacturing Workbook are available to complement course instruction and exam preparation Table of Contents Chapter 1 Mathematics Chapter 2 Units of Measure Chapter 3 Light Chapter 4 Sound Chapter 5 Electricity Electronics Chapter 6 Statics Chapter 7 Dynamics Chapter 8 Strength of Materials Chapter 9 Thermodynamics and Heat Transfer Chapter 10 Fluid Power Chapter 11 Chemistry Chapter 12 Material Properties Chapter 13 Metals Chapter 14 Plastics Chapter 15 Composites Chapter 16 Ceramics Chapter 17 Engineering Drawing Chapter 18 Geometric Dimensioning and Tolerancing Chapter 19 Computer Aided Design Engineering Chapter 20 Product Development and Design Chapter 21 Intellectual Property Chapter 22 Product Liability Chapter 23 Cutting Tool Technology Chapter 24 Machining Chapter 25 Metal Forming Chapter 26 Sheet Metalworking Chapter 27 Powdered Metals Chapter 28 Casting Chapter 29 Joining and Fastening Chapter 30 Finishing Chapter 31 Plastics Processes Chapter 32 Composite Processes Chapter 33 Ceramic Processes Chapter 34 Printed Circuit Board Fabrication and Assembly Chapter 35 Traditional Production Planning and Control Chapter 36 Lean Production Chapter 37 Process Engineering Chapter 38 Fixture and Jig Design Chapter 39 Materials Management Chapter 40 Industrial Safety Health and Environmental Management Chapter 41 Manufacturing Networks Chapter 42 Computer Numerical Control Machining Chapter 43 Programmable Logic Controllers Chapter 44 Robotics Chapter 45 Automated Material Handling and Identification Chapter 46 Statistical Methods for Quality Control Chapter 47 Continuous Improvement Chapter 48 Quality Standards Chapter 49 Dimensional Metrology Chapter 50

Nondestructive Testing Chapter 51 Management Introduction Chapter 52 Leadership and Motivation Chapter 53 Project Management Chapter 54 Labor Relations Chapter 55 Engineering Economics Chapter 56 Sustainable Manufacturing Chapter 57 Personal Effectiveness **SOLIDWORKS 2017 Reference Guide** David Planchard, 2017 The SOLIDWORKS 2017

Reference Guide is a comprehensive reference book written to assist the beginner to intermediate user of SOLIDWORKS 2017 SOLIDWORKS is an immense software package and no one book can cover all topics for all users This book provides a centralized reference location to address many of the tools features and techniques of SOLIDWORKS 2017 This book covers the following System and Document

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Tutorial for SolidWorks 2011 David C. Planchard, Marie P. Planchard, 2010 The Commands Guide Tutorial for SolidWorks 2011 is a comprehensive reference book written to assist the beginner to intermediate user of SolidWorks 2011 SolidWorks is an immense software package and no one book can cover all topics for all users The book provides a centralized reference location to address many of the tools features and techniques of SolidWorks 2011 This book covers the following System and Document properties FeatureManagers PropertyManagers ConfigurationManagers RenderManagers 2D and 3D Sketch tools Sketch entities 3D Feature tools Motion Study Sheet Metal Motion Study Sustainability Sustainability Xpress Flow Xpress PhotoView 360 Pack and Go Intelligent Modeling techniques and more Chapter 1 provides a basic overview of the concepts

and terminology used throughout this book using SolidWorks 2011 software If you are completely new to SolidWorks you should read Chapter 1 in detail and complete Tutorial 1 Tutorial 2 and Tutorial 3 in the SolidWorks Tutorials If you are familiar with an earlier release of SolidWorks you might still want to skim Chapter1 to get acquainted with some of the new commands menus and features that you haven t used or you can simply jump to any section in any chapter Each chapter 18 total provides detailed PropertyManager information on key topics with individual stand alone short tutorials to reinforce and demonstrate the functionality and ease of the SolidWorks tool or feature All models for the 240 plus tutorials are provided on the enclosed book CD with their solution initial and final Learn by doing not just reading Formulate the skills to create modify and edit sketches and solid features You will also learn the techniques to reuse features parts and assemblies through symmetry patterns copied components design tables configurations and more The book is designed to compliment the Online Tutorials and Online Help contained in SolidWorks 2011 The goal is to illustrate how multiple design situations and systematic steps combine to produce successful designs

TEXTBOOK OF MACHINE DRAWING K. C. JOHN,2009-04-13

This book provides a detailed study of technical drawing and machine design to acquaint students with the design drafting manufacture assembly of machines and their components The book explains the principles and methodology of converting three dimensional engineering objects into orthographic views drawn on two dimensional planes It describes various types of sectional views which are adopted in machine drawing as well as simple machine components such as keys cotters threaded fasteners pipe joints welded joints and riveted joints The book also illustrates the principles of limits fits and tolerances and discusses geometrical tolerances and surface textures with the help of worked out examples Besides it describes assembly methods and drafting of power transmission units and various mechanical machine parts of machine tools jigs and fixtures engines valves etc Finally the text introduces computer aided drafting CAD to give students a good start on professional drawing procedure using computer

KEY FEATURES Follows the International Standard Organization ISO code of practice for drawing Includes a large number of dimensioned illustrations and worked out examples to explain the design and drafting process of various machines and their components Contains chapter end exercises to help students develop their design and drawing skills This book is designed for degree and diploma students of mechanical production automobile industrial and chemical engineering It is also useful for mechanical draftsmen and designers

Engineering Design with SolidWorks 2014 and Video Instruction David Planchard,2014 Engineering Design with SolidWorks 2014 and video instruction is written to assist students designers engineers and professionals The book provides a solid foundation in SolidWorks by utilizing projects with step by step instructions for the beginner to intermediate SolidWorks user Explore the user interface CommandManager menus toolbars and modeling techniques to create parts assemblies and drawings in an engineering environment Follow the step by step instructions and develop multiple parts and assemblies that combine machined plastic and sheet metal components Formulate the skills to create modify and edit sketches and solid features Learn the techniques

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and systematic steps combine to produce successful designs The author developed the tutorials by combining his own industry experience with the knowledge of engineers department managers professors vendors and manufacturers He is directly involved with SOLIDWORKS every day and his responsibilities go far beyond the creation of just a 3D model

SolidWorks 2016 Reference Guide David Planchard,2015-12-16 The SOLIDWORKS 2016 Reference Guide is a comprehensive reference book written to assist the beginner to intermediate user of SOLIDWORKS 2016 SOLIDWORKS is an immense software package and no one book can cover all topics for all users This book provides a centralized reference location to address many of the tools features and techniques of SOLIDWORKS 2016 This book covers the following System and Document propertiesFeatureManagersPropertyManagersConfigurationManagersRenderManagers2D and 3D Sketch toolsSketch entities3D Feature toolsMotion StudySheet MetalMotion StudySolidWorks SimulationPhotoView 360Pack and Go3D PDFsIntelligent Modeling techniques3D printing terminology and more Chapter 1 provides a basic overview of the concepts and terminology used throughout this book using SOLIDWORKS 2016 software If you are completely new to SOLIDWORKS you should read Chapter 1 in detail and complete Lesson 1 Lesson 2 and Lesson 3 in the SOLIDWORKS Tutorials If you are familiar with an earlier release of SOLIDWORKS you still might want to skim Chapter 1 to become acquainted with some of the commands menus and features that you have not used or you can simply jump to any section in any chapter Each chapter provides detailed PropertyManager information on key topics with individual stand alone short tutorials to reinforce and demonstrate the functionality and ease of the SOLIDWORKS tool or feature The book provides access to over 240 models their solutions and additional support materials Learn by doing not just by reading Formulate the skills to create modify and edit sketches and solid features Learn the techniques to reuse features parts and assemblies through symmetry patterns copied components design tables configurations and more The book is designed to compliment the Online Tutorials and Online Help contained in SOLIDWORKS 2016 The goal is to illustrate how multiple design situations and systematic steps combine to produce successful designs The author developed the tutorials by combining his own industry experience with the knowledge of engineers department managers professors vendors and manufacturers He is directly involved with SOLIDWORKS every day and his responsibilities go far beyond the creation of just a 3D model

SOLIDWORKS 2018 Reference Guide David Planchard,2018-01-29 The SOLIDWORKS 2018 Reference Guide is a comprehensive reference book written to assist the beginner to intermediate user of SOLIDWORKS 2018 SOLIDWORKS is an immense software package and no one book can cover all topics for all users This book provides a centralized reference location to address many of the tools features and techniques of SOLIDWORKS 2018 This book covers the following System and Document propertiesFeatureManagersPropertyManagersConfigurationManagersRenderManagers2D and 3D Sketch toolsSketch entities3D Feature toolsMotion StudySheet MetalMotion StudySOLIDWORKS SimulationPhotoView 360Pack and Go3D PDFsIntelligent Modeling techniques3D printing terminology and more Chapter 1 provides a basic overview of the

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