Shigley & Mischke, Mechanical Engineering Design, 6/e (2001)	Shigley, Mischke & Budynas, Mechanical Engineering Design, 7/e (2004)	Comments on 7/e changes
PART I BASICS **Chapter 1, INTRODUCTION** **1-1 Design** **1-2 Mechanical Engineering Design** **1-3 Your Path to Competence** **1-4 Technology Can Be Fragile** **1-5 Interaction between Design Process Elements** **1-6 Codes & Standards** **1-7 Economics** **1-8 Safety & Product Liability** **1-9 The Adequacy Assessment** **1-10 Uncertainty** **1-11 Stress & Strength** **1-12 Design Factors & Factor of Safety** **1-13 Reliability** **1-14 Numbers, Units & Preferred Units**	**PART I BASICS** **Chapter 1, INTRODUCTION** **1-1 Design** **1-2 Mechanical Engineering Design** **1-3 Interaction between Design Process Elements** **1-4 Design Tools & Resources** **1-5 The Design Engineer's Professional Responsibilities** **1-6 Codes & Standards** **1-7 Economics** **1-8 Safety & Product Liability** **1-9 The Adequacy Assessment** **1-10 Uncertainty** **1-11 Stress & Strength** **1-12 Design Factor & Factor of Safety** **1-13 Reliability** **1-14 Units & Preferred Units** **1-15 Calculations & Significant Figures**	**In 7/e Budynas has added information on design tools & resources, and using the Internet. He has added a new section 1-5 on Professional Responsibilities. An old-fashioned-looking case study ("Henhouse Heater") has been taken out, and the chapter has been shortened and written in a more straightforward and concise style.** **Overall, the new Part I in 7/e provides a more logical, unified introduction to machine design—it surveys the design process, statistical methods, materials & materials selection, along with an applied review of strength of materials. The chapters are all rewritten to be shorter and more focused; student readers will see the importance of the concepts covered as they begin their work in the course. The writing style is much more straightforward, which will will increase student comprehension and motivation.**
Chapter 2, ADDRESSING UNCERTAINTY **2-1 Questions Come with the Territory** **2-2 Estimating Statistical Parameters** **2-3 Probability Density Function & Cumulative Distributon Function** **2-4 Linear Regression** **2-5 Propagation of Error** **2-6 Simulation** **2-7 Design Factor & Factor of Safety** **2-8 Limits & Fits** **2-9 Dimensions & Tolerances** **2-10 Summary**	**Chapter 2, STATISTICAL CONSIDERATIONS** **2-1 Random Variables** **2-2 Arithmetic Means, Variance, & Standard Deviation** **2-3 Probability Distributions** **2-4 Propagation of Error** **2-5 Linear Regression** **2-6 Limits & Fits** **2-7 Dimensioning & Tolerancing**	**In the 7/e Budynas has made the Statistics chapter similar to the one in Shigley 5/e. It is a self-contained overview of statistics relevant to Machine Design Information that was included in appendices in 6/e has been integrated in 7/e Chapter 2, to make a clearer overview of basics. Instructors can use information from Chapter 2 in a flexible manner—it is especially useful for dealing with the topic of Bearings in Chapters 11.** **NOTE: BUDYNAS HAS REMOVED RANDOM STATISTICALLY-BASED EXAMPLES & PROBLEMS FROM SUBSEQUENT CHAPTERS.**
Chapter 3, STRESS **3-1 Stress Components**	**Chapter 3, MATERIALS** **3-1 Static Strength & Stiffness**	**In the 7/e Budynas has moved the Materials chapter up into Part I—it was Chapter 5 in the 6/e. The new**

Shigley & Mischke, Mechanical Engineering Design, 6/e (2001)	Shigley, Mischke & Budynas, Mechanical Engineering Design, 7/e (2004)	Comments on 7/e changes
3-2 Mohr Circles 3-3 Triaxial Strain 3-4 Uniformly Distributed Stress 3-5 Elastic Stress 3-6 Stress-Strain Relations 3-7 Equilibrium 3-8 Shear & Moment 3-9 Singularity Functions 3-10 Normal Stress in Flexure 3-11 Beams with Asymmetrical Sections 3-12 Shear Stresses in Beams 3-13 Shear Stresses in Rectangular-Section Beams 3-14 Torsion 3-15 Stress Concentration 3-16 Stresses in Cylinders 3-17 Rotating Rings 3-18 Press & Shrink Fits 3-19 Temperature Effects 3-20 Curved Members in Flexure 3-21 Contact Stress 3-22 Propagation of Error 3-23 Summary	3-2 The Statistical Significance of Material Properties 3-3 Strength of Cold Work 3-4 Hardness 3-5 Impact Properties 3-6 Temperature Effects 3-7 Numbering Systems 3-8 Sand Casting 3-9 Shell Modeling 3-10 Investment Casting 3-11 Powder-Metallurgy Process 3-12 Hot-Working Processes 3-13 Cold-Working Processes 3-14 The Heat Treatment of Steel 3-15 Alloy Steels 3-16 Corrosion-Resistant Steels 3-17 Casting Materials 3-18 Nonferrous Materials 3-19 Plastics 3-20 Composite Materials	placement makes more sense, since it doesn't overlap with the basic mechanics covered in Part II of the text. The chapter has been shortened, with some advanced topics deleted, and several mechanics-oriented sections reorganized into later chapters, for consistency. Coverage of Composites has been added, since these materials are widely used in modern machinery.
Chapter 4, DEFLECTION & STIFFNESS 4-1 Spring Rates 4-2 Tension, Compression & Torsion 4-3 Deflection Due to Bending 4-4 Finding Deflection by Integration 4-5 Finding Deflection by Area-Moment Method 4-6 Finding Deflection by the Use of Singularity Function 4-7 Strain Energy 4-8 Castigliano's Theorem 4-9 Statistically Indeterminate Problems	Chapter 4, LOAD & STRESS analysis 4-1 Equilibrium & Free-Body Diagrams 4-2 Shear Force & Bending Moments in Beams 4-3 Singularity Functions 4-4 Stress 4-5 Cartesian Stress Components 4-6 Mohr's Circle for Plane Stress 4-7 General Three-Dimensional Stress 4-8 Elastic Strain 4-9 Uniformly Distributed Stresses 4-10 Normal Stresses for Beams in Bending	In 7/e Budynas has transformed 6/e chapter 3 into new chapter 4. He provides more coverage of loading in general; more on equilibrium, use of free-body diagrams, shear force, bending moment, singularity methods, and curved beams. This basic coverage of background mechanics now flows much better than in 6/e, provides a clearer link back to Mechanics of Materials course material students have had.

Shigley & Mischke, Mechanical Engineering Design, 6/e (2001)	Shigley, Mischke & Budynas, Mechanical Engineering Design, 7/e (2004)	Comments on 7/e changes
4-10 Deflection of Curved Members 4-11 Compression Members-General 4-12 Long Columns with Central Loading 4-13 Indeterminate-Length Columns with Central Loading 4-14 Columns with Eccentric Loading 4-15 Struts, or Short Comoression Members 4-16 An Application: Round-bar clamps 4-17 Deflection of Energy-Dissipative Assemblies 4-18 Shock and Impact 4-19 Suddenly Applied Loading 4-20 Propagation of Error	4-11 Beams with Asymmetrical Sections 4-12 Shear Stresses for Beams in Bending 4-13 Torsion 4-14 Stress Concentrations 4-15 Stresses in Pressurized Cylinders 4-16 Stresses in Rotating Rings 4-17 Press and Shrink Fits 4-18 Temperature Effects 4-19 Curved Beams in Bending 4-20 Contact Stresses 4-21 Summary	
PART II, FAILURE PREVENTION Chapter 5, MATERIALS 5-1 Static Strength 5-2 Plastiuc Deformation 5-3 Strength & Cold Work 5-4 Hardness 5-5 Impact Properties 5-6 Temperature Effects 5-7 Numbering Systemms 5-8 Sand Casting 5-9 Shell Molding 5-10 Investment Casting 5-11 Powder-Metallurgy Process 5-12 Hot-Working Processes 5-13 Cold-Working Processes 5-14 Heat Treatment of Steel 5-15 Alloy Steels 5-16 Corrosion-Resistant Steels 5-17 Casting Materials 5-18 Nonferrous Metals 5-19 Plastics 5-20 Notch Sensitivity	Chapter 5, DEFLECTION & STIFFNESS 5-1 Spring Rates 5-2 Tension, Compression & Torsion 5-3 Deflection Due to Bending 5-4 Beam Deflection Methods 5-5 Beam Deflections Using Superposition 5-6 Beam Deflections Using Singularity Functions 5-7 Strain Energy 5-8 Castigliano's Theorem 5-9 Statically Indeterminate Problems 5-10 Deflection of Curved Members 5-11 Compression Members-General 5-12 Long Columns with Central Loading 5-13 Intermediate-Length Columns with Central Loading 5-14 Columns with Eccentric Loading 5-15 Struts, or Short Compression Members 5-16 Shock & Impact 5-17 Suddenly-Applied Loading	In 7/e Budynas has made chapter 5 the last in Part I, while the 6/e chapter covered Materials as the beginning of Part II. Budynas has made the content progression more logical by moving materials back to chapter 3, in Part I. His new chapter 5 provides completes his applied review of mechanics of materials concepts; he has simplified the material Mischke covered in 6/e chapter 4 by taking out numerical integration and area of moment methods, and depending more on Singularity Functions and Castigliano's Theorem (with more examples). As in all chapters, the treatment has been made more clear and concise.

Shigley & Mischke, Mechanical Engineering Design, 6/e (2001)	Shigley, Mischke & Budynas, Mechanical Engineering Design, 7/e (2004)	Comments on 7/e changes
5-21 Introduction to Fracture Mechanics **5-22 Stress-Corrosion Cracking** **5-23 Properties of Cold-Worked Metals** **5-24 Properties of Heat-Treated Steels**		
Chapter 6, FAILURES RESULTING FROM STATIC LOADING **6-1 Static Strength** **6-2 Stress Concentration** **6-3 Hypotheses of Failure** **6-4 Ductile Materials: Maximum-Shear-Stress Hypothesis** **6-5 Ductile Materials: Strain-Energy Hypothesis** **6-6 Ductile Materials: Internal-Friction Hypothesis** **6-7 Criticism of Hypotheses by Data in Ductile Materials** **6-8 Brittle Materials: Maximum-Normal-Stress (Rankine) Hypothesis** **6-9 Brittle Materials: Modifications of Mohr Hypothesis** **6-10 Criticism of Hypotheses by Data in Brittle Materials** **6-11 What Our Failure Models Tell Us** **6-12 Interference-General** **6-13 Static or Quasi-Static Loading on a Shaft**	**PART II FAILURE PREVENTION** **Chapter 6, FAILURES RESULTING FROM STATIC LOADING** **6-1 Static Strength** **6-2 Stress Concentration** **6-3 Failure Theories** **6-4 Maximum-Shear-Stress Theory for Ductile Materials** **6-5 Distortion-Energy Theory for Ductile Materials** **6-6 Coulomb-Mohr Theory for Ductile Materials** **6-7 Failure of Ductile Materials Summary** **6-8 Maximum-Normal-Stress Theory for Brittle Materials** **6-9 Modifications of Coulomb-Mohr Theory for Brittle Materials** **6-10 Failure of Brittle Materials Summary** **6-11 Selection of Failure Criteria** **6-12 Static or Quasi-Static Loading on a Shaft** **6-13 Introduction to Fracture Mechanics** **6-14 Stochastic Analysis**	**In 7/e Budynas has begun Part II with Chapter 6. He replaces the lofty-sounding word "hypothesis" with the more conventional expression "theory" throughout, and provides a much more concise, direct treatment of key failure prevention concepts. He organizes the topics so a reader studies ductile materials methods, then gets a summary; and to brittle materials and a summary. Fracture mechanics is brought in at this logical point—in 6/e it was in the Materials chapter.** **The final section on Stochastic Analysis describes factor of safety, and represents one of the few times statistic are (by necessity) brought into the 7/e.** **The revised Part II in the 7/e includes much of the significant change and improvement of the new edition. The key topics of Failure Prevention are presented in a more clear, condensed fashion, so student readers can easily navigate through the concepts needed.**

Shigley & Mischke, Mechanical Engineering Design, 6/e (2001)	Shigley, Mischke & Budynas, Mechanical Engineering Design, 7/e (2004)	Comments on 7/e changes
Chapter 7, FAILURE RESULTING FROM VARIABLE LOADING **7-1 Introduction to Fatigue in Metals** **7-2 Strain-Life Relationships** **7-3 Stress-Life Relationships** **7-4 Endurance Limit** **7-5 Fatigue Strength** **7-6 Endurance-Limit Modifying Factors** **7-7 Stress Concentration & Notch Sensitivity** **7-8 Applying What We Have Learned About Endurance Level & Endurance Strength** **7-9 The Distributions** **7-10 Characterizing Fluctuating Stresses** **7-11 Failure Loci under Variable Stress** **7-12 Torsional Fatigue Strength under Pulsating Stresses** **7-13 Combination of Loading Modes** **7-14 Stochastic Failure Loci under Fluctuating Stress** **7-15 Cumulative Fatigue Damage** **7-16 Fracture-Mechanics Approach** **7-17 Surface Fatigue Strength** **7-18 The Designer's Fatigue Diagram** **7-19 An Important Design Decision: The Design Factor in Fatigue**	**Chapter 7, FATIGUE FAILURE RESULTING FROM VARIABLE LOADING** **7-1 Introduction to Fatigue in Metals** **7-2 Approach to Fatigue Failure in Analysis and Design** **7-3 Fatigue Life Methods** **7-4 The Stress Life Method** **7-5 The Strain Life Method** **7-6 The Linear-Elastic Fracture Mechanics Method** **7-7 The Endurance Limit** **7-8 Fatigue Strength** **7-9 Endurance Limit Modifying Factors** **7-10 Stress Concentration and Notch Sensitivity** **7-11 Characterizing Fluctuating Stresses** **7-12 Fatigue Failure Criteria for Fluctuating Stress** **7-13 Torsion Fatigue Strength under Fluctuating Stresses** **7-14 Combinations of Loading Modes** **7-15 Varying, Fluctuating Stresses. Cumulative Fatigue Damage** **7-16 Surface Fatigue Strength** **7-17 Stochastic Analysis**	**This is a key chapter, and one that has been very significantly improved in the 7/e. Budynas provides a much clearer progression of development, supported by a number of new illustrations. He talks about variable loading failure general concepts, then describes 3 methods—stress-life, strain-life, and fracture mechanics—where the stress-life method is emphasized for design applications. Statistical methods have been removed, and only deterministic methods are used until section 7-17, where at the discetion of the instructor they are considered in context.**
PART III DESIGN OF MECHANICAL ELEMENTS **Chapter 8, SCREWS, FASTENERS, & DESIGN OF NONPERMANENT JOINTS** **8-1 Thread Standards & Definitions** **8-2 Mechanics of Power Screws** **8-3 Threaded Fasteners** **8-4 Joints-Fastener Stiffness** **8-5 Joints-Member Stiffness** **8-6 Bolt Strength**	**PART III DESIGN OF MECHANICAL ELEMENTS** **Chapter 8, SCREWS, FASTENERS, & THE DESIGN OF NONPERMANENT JOINTS** **8-1 Thread Standards & Definitions** **8-2 The Mechanics of Power Screws** **8-3 Threaded Fasteners** **8-4 Joints-Fastener Stiffness** **8-5 Joints-Member Stiffness** **8-6 Bolt Strength**	**Throughout Part III on specific machine elements, Budynas has improved the flow of presentation, and removed most statistically-oriented examples and problems (exceptions noted by chapter in this grid).** **In Chapter 8, the 7/e corrects a number of errors on power screws; has redone notation for clarity and accuracy; and replaces several 6/e examples with new ones that more clearly show the design of screws & fasteners. Stochastic (statistical) methods are used in**

Shigley & Mischke, Mechanical Engineering Design, 6/e (2001)	Shigley, Mischke & Budynas, Mechanical Engineering Design, 7/e (2004)	Comments on 7/e changes
8-7 Tension Joints-External Load 8-8 Relating Bolt Torgue to Bolt Tension 8-9 Statistically Loaded Tension Joint-Preload 8-10 Gasketed Joints 8-11 Tension Joints-Dynamic Loading 8-12 Adequacy Assessment, Specification Set, Decision Set, & Design 8-13 Shear Joints 8-14 Setscrews 8-15 Pins & Keys	8-7 Tension Joints - The External Load 8-8 Relating Bolt Torque to Bolt Tension 8-9 Statically Loaded Tension Joint with Preload 8-10 Gasketed Joints 8-11 Fatigue Loading of Tension Joints 8-12 Shear Joints 8-13 Setscrews 8-14 Keys and Pins 8-15 Stochastic Considerations	section 8-15, where they are required.
Chapter 9, WELDING, BRAZING, BONDING, & DESIGN OF PERMANENT JOINTS 9-1 Welding Symbols 9-2 Butt & Fillet Welds 9-3 Stresses in Welded Joints in Torson 9-4 Stresses in Welded Joints in Bending 9-5 Strength of Welded Joints 9-6 Specification Set, Adequacy Assessment, & Design Set 9-7 Static Loading 9-8 Fatigue Loading 9-9 Resistance Welding 9-10 Bolted & Riveted Joints Loaded in Shear 9-11 Adhesive Bonding & Design Considerations	Chapter 9, WELDING, BRAZING, BONDING, AND THE DESIGN OF PERMANENT JOINTS 9-1 Welding Symbols 9-2 Butt and Fillet Welds 9-3 Stresses in Welded Joints in Torsion 9-4 Stresses in Welded Joints in Bending 9-5 The Strength of Welded Joints 9-6 Static Loading 9-7 Fatigue Loading 9-8 Resistance Welding 9-9 Bolted and Riveted Joints Loaded in Shear 9-10 Adhesive Bonding	In the 7/e revision this chapter has been reduced by about 30%, in order to concentrate on the essentials. “Spec Set & Adequacy Assessment” section has been deleted; notation has been improved; and there’s better explanation of why certain equations are needed in welding situations. Coverage of adhesive bonding has been condensed.

Shigley & Mischke, Mechanical Engineering Design, 6/e (2001)	Shigley, Mischke & Budynas, Mechanical Engineering Design, 7/e (2004)	Comments on 7/e changes
Chapter 10, MECHANICAL SPRINGS **10-1 Stresses in Helical Springs** **10-2 The Curvature Effect** **10-3 Deflection of Helical Springs** **10-4 Extension Springs** **10-5 Compression Springs** **10-6 Stability** **10-7 Spring Materials** **10-8 Helical Compression Springs for Static Service** **10-9 Critical Frequency of Helical Springs** **10-10 Fatigue Loading** **10-11 Helical Compression Springs for Dynamic Service** **10-12 Design of a Helical Compression Spring** **10-13 Design of Extension Springs** **10-14 Designing Helical Coil Torsion Springs** **10-15 Belleville Springs** **10-16 Miscellaneous Springs** **10-17 Summary**	**Chapter 10, MECHANICAL SPRINGS** **10-1 Stresses in Helical Springs** **10-2 The Curvature Effect** **10-3 Deflection of Helical Springs** **10-4 Compression Springs** **10-5 Stability** **10-6 Spring Materials** **10-7 Helical Compression Springs for Static Service** **10-8 Critical Frequency of Helical Springs** **10-9 Fatigue Loading of Helical Compression Springs** **10-10 Helical Compression Spring: Design for Fatigue Loading** **10-11 Extension Springs** **10-12 Helical Coil Torsion Springs** **10-13 Belleville Springs** **10-14 Miscellaneous Springs** **10-15 Summary**	**In the 7/e the springs chapter concentrates mainly on compression springs, with one section on extension springs that is more consistent with the rest of the chapter. The remaining sections are similar to the 6/e.**
Chapter 11, ROLLING-CONTACT BEARINGS **11-1 Bearing Types** **11-2 Bearing Life** **11-3 Bearing Life-Load Trade-off at Constatnt Reliability** **11-4 Bearintg Survival: The Reliability-Life Trade-Off** **11-5 Load-Life-Reliability Trade-Off** **11-6 Combined Radial and Thrust Loading** **11-7 Variable Loading** **11-8 Selection of Ball & Cylindrical Roller Bearings** **11-9 Selection of Tapered Roller Bearings**	**Chapter 11, ROLLING-CONTACT BEARINGS** **11-1 Bearing Types** **11-2 Bearing Life** **11-3 Bearing Load-Life at Rated Reliability** **11-4 Bearing Survival: Reliability vs. Life** **11-5 Relating Load, Life, and Reliability** **11-6 Combined Radial and Thrust Loading** **11-7 Variable Loading** **11-8 Selection of Ball & Cylindrical Roller Bearings** **11-9 Selection of Tapered Roller Bearings** **11-10 Design Assessment for Selected Rolling-Contact Bearings** **11-11 Lubrication**	**Budynas focuses on the selection of appropriate bearings from manufacturers' catalogs; he has also made some corrections in calculations.**

Shigley & Mischke, Mechanical Engineering Design, 6/e (2001)	Shigley, Mischke & Budynas, Mechanical Engineering Design, 7/e (2004)	Comments on 7/e changes
11-10 Adequacy Assessment for Selected Rolling-Contact Bearings 11-11 Lubrication 11-12 Mounting & Enclosure	11-12 Mouting and Enclosure	
Chapter 12, LUBRICATION & JOURNAL BEARINGS 12-1 Types of Lubrication 12-2 Viscosity 12-3 Prtroff's Equation 12-4 Stable Lubrication 12-5 Thick-Film Lubrication 12-6 Hydrodynamic Theory 12-7 Design Consideration 12-8 The Relations of the Variables 12-9 Steady-State Conditions in Self-Contained Bearings 12-10 Clearance 12-11 Pressure-Fed Bearings 12-12 Loads & Materials 12-13 Bearing Types 12-14 Thrust Bearings 12-15 Boundary-Lubricated Bearings	Chapter 12, LUBRICATION & JOURNAL BEARINGS 12-1 Types of Lubrication 12-2 Viscosity 12-3 Petroff's Equation 12-4 Stable Lubrication 12-5 Thick-Film Lubrication 12-6 Hydrodynamic Theory 12-7 Design Consideration 12-8 The Relations of the Variables 12-9 Steady-State Conditions in Self-Contained Bearings 12-10 Clearance 12-11 Pressure-Fed Bearings 12-12 Loads & Materials 12-13 Bearing Types 12-14 Thrust Bearings 12-15 Boundary-Lubricated Bearings	In 7/e the coverage of lubrication has been simplified and shortened, with numerous technical corrections made. Derivations have been revised and improved for easier understanding.

Shigley & Mischke, Mechanical Engineering Design, 6/e (2001)	Shigley, Mischke & Budynas, Mechanical Engineering Design, 7/e (2004)	Comments on 7/e changes
Chapter 13, GEARS-GENERAL **13-1 Types of Gears** **13-2 Nomenclature** **13-3 Tooth Systems** **13-4 Conjugate Action** **13-5 Involute Properties** **13-6 Fundamentals** **13-7 Contact Ratios** **13-8 Interference** **13-9 Forming of Gear Teeth** **13-10 Straight Bevel Gears** **13-11 Parallel Helical Gears** **13-12 Worm Gears** **13-13 Gear Trains** **13-14 Force Analysis-Spur Gearing** **13-15 Foirce Analysis-Bevel Gearing** **13-16 Force Analysis-Helical Gearing** **13-17 Force Analysis-Worm Gearing** **13-18 Gear Ratios & Number of Teeth** **13-19 Gear-Shaft Speeds & Bearings**	**Chapter 13, GEARS-GENERAL** **13-1 Types of Gears** **13-2 Nomenclature** **13-3 Conjugate Action** **13-4 Involute Properties** **13-5 Fundamentals** **13-6 Contact Radio** **13-7 Interference** **13-8 The Forming of Gear Teeth** **13-9 Straight Bevel Gears** **13-10 Parallel Helical Gears** **13-11 Worm Gears** **13-12 Tooth Systems** **13-13 Gear Trains** **13-14 Force Analysis –Spur Gearing** **13-15 Force Analysis –Bevel Gearing** **13-16 Force Analysis –Helical Gearing** **13-17 Force Analysis –Worm Gearing**	**In 7/e the General Gears chapter has been tightened up considerably, with the last two sections included in 6/e deleted. The section onTooth systems has been relocated for clarity.**
Chapter 14, SPUR & HELICAL GEARS **14-1 The Lewis Bending Equations** **14-2 Surface Durability** **14-3 AGMA Stress Equations** **14-4 AGMA Strength Equations** **14-5 Geometry Factors *I* and *J*** **14-6 The Elastic Coefficient *Cp(Ze)*** **14-7 Dynamic Factor *Kv*** **14-8 Overload Factor *Ko*** **14-9 Surface Condition Factors *Cf & Zr*** **14-10 Size Factor *Ks*** **14-11 Load Distribution Factor *Km* or *Kh*** **14-12 Hardness-Ratio Factor *Ch*** **14-13 Load Cycles Factors *Yn* & *Zn*** **14-14 Reliability Factors *Kr* & *Yz***	**Chapter 14, SPUR & HELICAL GEARS** **14-1 The Lewis Bending Equations** **14-2 Surface Durability** **14-3 AGMA Stress Equations** **14-4 AGMA Strength Equations** **14-5 Geometry Factors *I* and *J*** **14-6 The Elastic Coefficient *Cp(Ze)*** **14-7 Dynamic Factor *Kv*** **14-8 Overload Factor *Ko*** **14-9 Surface Condition Factors *Cf & Zr*** **14-10 Size Factor *Ks*** **14-11 Load Distribution Factor *Km* or *Kh*** **14-12 Hardness-Ratio Factor *Ch*** **14-13 Stress Cycle Life Factors *Yn* & *Zn*** **14-14 Reliability Factors *Kr* & *Yz***	**In 7/e, “Adequacy Assessment” section has been dropped, and the chapter has been shortened overall more focus and clarity. “Roadmap” has been improved, and notation has been made more consistent.**

Shigley & Mischke, Mechanical Engineering Design, 6/e (2001)	Shigley, Mischke & Budynas, Mechanical Engineering Design, 7/e (2004)	Comments on 7/e changes
14-15 Temperature Factors *Ky & Yo* 14-16 Rim-Thickness Factor *Kb* 14-17 Safety Factors *Sf & Sh* 14-18 Analysis 14-19 Adequacy Assessment of a Gear Mesh 14-20 Design of a Gear Mesh	14-15 Temperature Factors *Ky & Yo* 14-16 Rim-Thickness Factor *Kb* 14-17 Safety Factors *Sf & Sh* 14-18 Analysis 14-19 Design of a Gear Mesh	
Chapter 15, BEVEL & WORM GEARS 15-1 Bevel Gearing-General 15-2 Bevel Gear Stresses & Strains 15-3 AGMA Equation Factors 15-4 Straight-Bevel Gear Analysis 15-5 Design of a Straight-Bevel Gear Mesh 15-6 Worm Gearing-AGMA Equation 15-7 Worm-Gear Analysis 15-8 Designing a Worm-Gear Mesh 15-9 Buckingham Wear Load	Chapter 15, BEVEL & WORM GEARS 15-1 Bevel Gearing –General 15-2 Bevel Gear Stresses and Strengths 15-3 AGMA Equation Factors 15-4 Straight-Bevel Gear Analysis 15-5 Design of a Straight-Bevel Gear Mesh 15-6 Worm Gearing –AGMA Equation 15-7 Worm-Gear Analysis 15-8 Designing a Worm-Gear Mesh 15-9 Buckingham Wear Load	In 7/e, no major content changes in this chapter; some sections have been streamlined and made more readable.
Chapter 16, CLUTCHES, BRAKES, COUPLINGS & FLYWHEELS 16-1 Rudiments of Brake Analysis 16-2 Internal Expanding Rim Clutches & Brakes 16-3 External Contracting Rim Clutches & Brakes 16-4 Band-Type Clutches & Brakes 16-5 Friction-Contact Axial Clutches 16-6 Disk Brakes 16-7 Cone Clutches & Brakes 16-8 Self-Locking Tapers & Torque Capacity 16-9 Energy Considerations 16-10 Temperature Rise 16-11 Friction Materials 16-12 Miscellaneous Clutches & Couplings 16-13 Flywheels 16-14 Adequacy Assessment	Chapter 16, CLUTCHES, BRAKES, COUPLINGS, and FLYWHEELS 16-1 Rudiments of Brake Analysis 16-2 Internal Expanding Rim Clutches & Brakes 16-3 External Contacting Rim Clutches & Brakes 16-4 Band-Type Clutches & Brakes 16-5 Friction-Contact Axial Clutches 16-6 Disl Brakes 16-7 Cone Clutches & Brakes 16-8 Energy Considerations 16-9 Temperature Rise 16-10 Friction Materials 16-11 Miscellaneous Clutches & Couplings 16-12 Flywheels	In 7/e, the last section on Adequacy Assessment has been deleted, with relevant information blended in other sections.

Shigley & Mischke, Mechanical Engineering Design, 6/e (2001)	Shigley, Mischke & Budynas, Mechanical Engineering Design, 7/e (2004)	Comments on 7/e changes
Chapter 17, FLEXIBLE MECHANICAL ELEMENTS **17-1 Belts** **17-2 Flat- & Round-Belt Drives** **17-3 V Belts** **17-4 Timing Belts** **17-5 Roller Chains** **17-6 Wire Rope** **17-7 Flexible Shafts**	**Chapter 17, FLEXIBLE MECHANICAL ELEMENTS** **17-1 Belts** **17-2 Flat- and Rounded-Belt Drives** **17-3 V Belts** **17-4 Timing Belts** **17-5 Roller Chain** **17-6 Wire Rope** **17-7 Flexible Shafts**	**There's not much change in the 7/e coverage of flexible elements; some updating and revision on belts.**
Chapter 18, SHAFTS & AXLES **18-1 Introduction** **18-2 Sufficing Geometric Constraints** **18-3 Sufficing Strength Constraints** **18-4 Adequacy Assessment** **18-5 Shaft Materials** **18-6 Hollow Shafts** **18-7 Critical Speeds** **18-8 Shaft Design** **18-9 Computer Considerations**	**Chapter 18, SHAFTS & AXLES** **18-1 Introduction** **18-2 Geometric Constraints** **18-3 Strength Constraints** **18-4 Strength Constraints-Additional Methods** **18-5 Shaft Materials** **18-6 Hollow Shafts** **18-7 Critical Speeds** **18-8 Shaft Design**	**Not much change in this 7/e chapter, other than some rewriting for readability and conciseness.**
APPENDICES **A Statistical Relations** **B Linear Regression** **C Propagation of Error Relations** **D Simulation** **E Useful Tables** **F Solutions to Selected Problems**	**APPENDICES** **A Useful Tables** **B Solutions to Selected Problems**	**Four 6/e appendices on statistics have been omitted, since this basic information is now integrated in Chapter 2 to provide a clear overview of probability & statistics for readers with limited background in the field.**