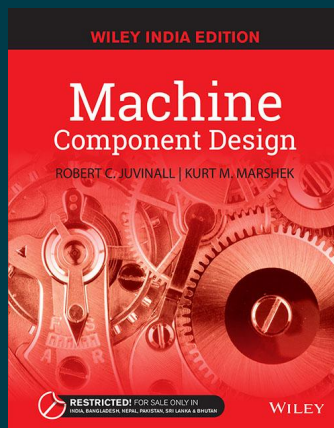


WILEY

Machine Component Design

By Robert C. Juvinall, Kurt M. Marshek

Paperback

ISBN: 9788126559732

Publication: [NOT PROVIDED] *publication_date*

Page Count: 912 pages

₹1,289.00

• Description

Considered a standard in the course, Juvinall and Marshek's Machine Component Design continues to focus on the fundamentals of component design -- free body diagrams, force flow concepts, failure theories and fatigue design, with applications to fasteners, springs, bearings, gears, clutches and brakes. Problem-solving skills are developed by the implementation of a proven methodology which provides a structure for accurately formulating problems and clearly presenting solutions. The fifth edition includes additional coverage of composites, the material selection process and wear / wear theory, along with new and updated examples and homework problems.

• About the Author

Robert C. Juvinall, Kurt M. Marshek

[NOT PROVIDED] *author_details*

• Table of Contents

Part 1 Fundamentals

Chapter 1: Mechanical Engineering design in Broad Perspective

1.1 An Overview of the Subject

1.2 Safety Considerations

1.3 Ecological Considerations

1.4 Societal Considerations,

1.5 Overall Design Considerations

1.6 Systems of Units

1.7 Methodology for Solving Machine Component Problems

1.8 Work and Energy

1.9 Power

1.10 Conservation of Energy

Chapter 2: Load Analysis

2.1 Introduction

2.2 Equilibrium Equations and Free-Body Diagrams

2.3 Beam Loading

2.4 Locating Critical Sections-Force Flow Concept

2.5 Load Division Between Redundant Supports

2.6 Force Flow Concept Applied to Redundant Ductile Structures

Chapter 3: Materials

3.1 Introduction

3.2 The Static Tensile Test-"Engineering" Stress-Strain Relationships

3.3 Implications of the "Engineering" Stress-Strain Curve

3.4 The Static Tensile Test-"True" Stress-Strain Relationships

3.5 Energy-Absorbing Capacity

3.6 Estimating Strength Properties from Penetration Hardness Tests

3.7 Use of "Handbook" Data for Material Strength Properties

3.8 Machinability

3.9 Cast Iron

3.10 Steel

3.11 Nonferrous Alloys

3.12 Plastics, and Composites

3.13 Material Selection Charts

3.14 Engineering Material Selection Process

Chapter 4: Static Body Stresses

4.1 Introduction

4.2 Axial Loading

4.3 Direct Shear Loading

4.4 Torsional Loading

4.5 Pure Bending Loading, Straight Beams

4.6 Pure Bending Loading, Curved Beams

4.7 Transverse Shear Loading in Beams

4.8 Induced Stresses, Mohr Circle Representation

4.9 Combined Stresses-Mohr Circle Representation

4.10 Stress Equations Related to Mohr's Circle

4.11 Three-Dimensional Stresses

4.12 Stress Concentration Factor, K_t

4.13 Importance of Stress Concentration

4.14 Residual Stresses Caused by Yielding-Axial Loading

4.15 Residual Stresses Caused by Yielding-Bending and Torsional Loading

4.16 Thermal Stresses

4.17 Importance of Residual Stresses

Chapter 5: Elastic Strain, Deflection and Stability

5.1 Introduction

- 5.2 Strain Definition, Measurement and Mohr Circle Representation
- 5.3 Analysis of Strain-Equiangular Rosettes
- 5.4 Analysis of Strain-Rectangular Rosettes
- 5.5 Elastic Stress-Strain Relationships and Three-Dimensional Mohr Circles
- 5.6 Deflection and Spring Rate-Simple Cases
- 5.7 Beam Deflection
- 5.8 Determining Elastic Deflections by Castigliano's Method
- 5.9 Redundant Reactions by Castigliano's Method
- 5.10 Euler Column Buckling-Elastic Instability
- 5.11 Effective Column Length for Various End Conditions
- 5.12 Column Design Equations-J. B. Johnson Parabola
- 5.13 Eccentric Column Loading-the Secant Formula
- 5.14 Equivalent Column Stresses
- 5.15 Other Types of Buckling
- 5.16 Finite Element Analysis

Chapter 6: Failure Theories, Safety Factors and Reliability

- 6.1 Introduction
- 6.2 Types of Failure
- 6.3 Fracture Mechanics-Basic Concepts
- 6.4 Fracture Mechanics-Applications
- 6.5 The "Theory" of Static Failure Theories
- 6.6 Maximum-Normal-Stress Theory
- 6.7 Maximum-Shear-Stress Theory
- 6.8 Maximum-Distortion-Energy Theory (Maximum- Octahedral-Shear-Stress Theory
- 6.9 Modified Mohr Theory
- 6.10 Selection and Use of Failure Theories
- 6.11 Safety Factors-Concept and Definition
- 6.12 Safety Factors-Selection of a Numerical Value
- 6.13 Reliability
- 6.14 Normal Distributions
- 6.15 Interference Theory of Reliability Prediction

Chapter 7: Impact

- 7.1 Introduction
- 7.2 Stress and Deflection Caused by Linear and Bending Impact
- 7.3 Stress and Deflection Caused by Torsional Impact
- 7.4 Effect of Stress Raisers on Impact Strength

Chapter 8: Fatigue

- 8.1 Introduction

8.2 Basic Concepts

8.3 Standard Fatigue Strengths () for Rotating Bending

8.4 Fatigue Strengths for Reversed Bending and Reversed Axial Loading

8.5 Fatigue Strength for Reversed Torsional Loading

8.6 Fatigue Strength for Reversed Biaxial Loading

8.7 Influence of Surface and Size on Fatigue Strength

8.8 Summary of Estimated Fatigue Strengths for Completely Reversed Loading

8.9 Effect of Mean Stress on Fatigue Strength

8.10 Effect of Stress Concentration with Completely Reversed Fatigue Loading

8.11 Effect of Stress Concentration with Mean Plus Alternating Loads

8.12 Fatigue Life Prediction with Randomly Varying Loads

8.13 Effect of Surface Treatments on the Fatigue Strength of a Part

8.14 Mechanical Surface Treatments-Shot Peening and Others

8.15 Thermal and Chemical Surface-Hardening Treatments (Induction Hardening, Carburizing and Others)

8.16 Fatigue Crack Growth

8.17 General Approach for Fatigue Design

Chapter 9: Surface Damage

9.1 Introduction

9.2 Corrosion: Fundamentals

9.3 Corrosion: Electrode and Electrolyte Heterogeneity

9.4 Design for Corrosion Control

9.5 Corrosion Plus Static Stress

9.6 Corrosion Plus Cyclic Stress

9.7 Cavitation Damage

9.8 Types of Wear

9.9 Adhesive Wear

9.10 Abrasive Wear

9.11 Fretting

9.12 Analytical Approach to Wear

9.13 Curved-Surface Contact Stresses

9.14 Surface Fatigue Failures

9.15 Closure

Part 2 Applications

Chapter 10: Threaded Fasteners and Power Screws

10.1 Introduction

10.2 Thread Forms, Terminology and Standards

10.3 Power Screws

10.4 Static Screw Stresses

10.5 Threaded Fastener Types

10.6 Fastener Materials and Methods of Manufacture

10.7 Bolt Tightening and Initial Tension

10.8 Thread Loosening and Thread Locking

10.9 Bolt Tension with External Joint-Separating Force

10.10 Bolt (or Screw) Selection for Static Loading

10.11 Bolt (or Screw) Selection for Fatigue Loading: Fundamentals

10.12 Bolt (or Screw) Selection for Fatigue Loading: Using Special Test Data

10.13 Increasing Bolted-Joint Fatigue Strength

Chapter 11: Rivets, Welding and Bonding

11.1 Introduction

11.2 Rivets

11.3 Welding Processes

11.4 Welded Joints Subjected to Static Axial and Direct Shear Loading

11.5 Welded Joints Subjected to Static Torsional and Bending Loading

11.6 Fatigue Considerations in Welded Joints

11.7 Brazing and Soldering

11.8 Adhesives

Chapter 12: Springs

12.1 Introduction

12.2 Torsion Bar Springs

12.3 Coil Spring Stress and Deflection Equations

12.4 Stress and Strength Analysis for Helical Compression Springs-Static Loading

12.5 End Designs of Helical Compression Springs

12.6 Buckling Analysis of Helical Compression Springs

12.7 Design Procedure for Helical Compression Springs-Static Loading

12.8 Design of Helical Compression Springs for Fatigue Loading

12.9 Helical Extension Springs

12.10 Beam Springs (Including Leaf Springs)

12.11 Torsion Springs

12.12 Miscellaneous Springs

Chapter 13: Lubrication and Sliding Bearings

13.1 Types of Lubricants

13.2 Types of Sliding Bearings

13.3 Types of Lubrication

13.4 Basic Concepts of Hydrodynamic Lubrication

13.5 Viscosity

13.6 Temperature and Pressure Effects on Viscosity

- 13.7 Petroff's Equation for Bearing Friction
- 13.8 Hydrodynamic Lubrication Theory
- 13.9 Design Charts for Hydrodynamic Bearings
- 13.10 Lubricant Supply
- 13.11 Heat Dissipation and Equilibrium Oil Film Temperature

13.12 Bearing Materials

13.13 Hydrodynamic Bearing Design

13.14 Boundary and Mixed-Film Lubrication

13.15 Thrust Bearings

13.16 Elastohydrodynamic Lubrication

Chapter 14: Rolling-Element Bearings

14.1 Comparison of Alternative Means for Supporting Rotating Shafts

14.2 History of Rolling-Element Bearings

14.3 Rolling-Element Bearing Types

14.4 Design of Rolling-Element Bearings

14.5 Fitting of Rolling-Element Bearings

14.6 "Catalogue Information" for Rolling-Element Bearings

14.7 Bearing Selection

14.8 Mounting Bearings to Provide Properly for Thrust Load

Chapter 15: Spur Gears

15.1 Introduction and History

15.2 Geometry and Nomenclature

15.3 Interference and Contact Ratio

15.4 Gear Force Analysis

15.5 Gear-Tooth Strength

15.6 Basic Analysis of Gear-Tooth-Bending Stress (Lewis Equation)

15.7 Refined Analysis of Gear-Tooth-Bending Strength: Basic Concepts

15.8 Refined Analysis of Gear-Tooth-Bending Strength: Recommended Procedure

15.9 Gear-Tooth Surface Durability-Basic Concepts

15.10 Gear-Tooth Surface Fatigue Analysis-Recommended Procedure

15.11 Spur Gear Design Procedures

15.12 Gear Materials

15.13 Gear Trains

Chapter 16: Helical, Bevel and Worm Gears

16.1 Introduction

16.2 Helical-Gear Geometry and Nomenclature

16.3 Helical-Gear Force Analysis

16.4 Helical-Gear-Tooth-Bending and Surface Fatigue Strengths

- 16.5 Crossed Helical Gears
- 16.6 Bevel Gear Geometry and Nomenclature
- 16.7 Bevel Gear Force Analysis
- 16.8 Bevel-Gear-Tooth-Bending and Surface Fatigue Strengths
- 16.9 Bevel Gear Trains; Differential Gears
- 16.10 Worm Gear Geometry and Nomenclature
- 16.11 Worm Gear Force and Efficiency Analysis
- 16.12 Worm-Gear-Bending and Surface Fatigue Strengths
- 16.13 Worm Gear Thermal Capacity

Chapter 17: Shafts and Associated Parts

- 17.1 Introduction
- 17.2 Provision for Shaft Bearings
- 17.3 Mounting Parts onto Rotating Shafts
- 17.4 Rotating-Shaft Dynamics
- 17.5 Overall Shaft Design
- 17.6 Keys, Pins and Splines
- 17.7 Couplings and Universal Joints

Chapter 18: Clutches and Brakes

- 18.1 Introduction
- 18.2 Disk Clutches
- 18.3 Disk Brakes
- 18.4 Energy Absorption and Cooling
- 18.5 Cone Clutches and Brakes
- 18.6 Short-Shoe Drum Brakes
- 18.7 External Long-Shoe Drum Brakes
- 18.8 Internal Long-Shoe Drum Brakes
- 18.9 Band Brakes

Chapter 19: Miscellaneous Machine Components

- 19.1 Introduction
- 19.2 Flat Belts
- 19.3 V-Belts
- 19.4 Toothed Belts
- 19.5 Roller Chains
- 19.6 Inverted-Tooth Chains
- 19.7 History of Hydrodynamic Drives
- 19.8 Fluid Couplings
- 19.9 Hydrodynamic Torque Converters

Appendix A: Units

A-1a Conversion Factors for British Gravitational, English and SI Units

A-1b Conversion Factor Equalities Listed by Physical Quantity

A-2a Standard SI Prefixes

A-2b SI Units and Symbols

A-3 Suggested SI Prefixes for Stress Calculations

A-4 Suggested SI Prefixes for Linear-Deflection Calculations

A-5 Suggested SI Prefixes for Angular-Deflection Calculations

Appendix B: Properties of Sections and Solids

B-1a Properties of Sections

B-1b Dimensions and Properties of Steel Pipe and Tubing Sections

B-2 Mass and Mass Moments of Inertia of Homogeneous Solids

Appendix C: Material Properties and Uses

C-1 Physical Properties of Common Metals

C-2 Tensile Properties of Some Metals

C-3a Typical Mechanical Properties and Uses of Gray Cast Iron

C-3b Mechanical Properties and Typical Uses of Malleable Cast Iron

C-3c Average Mechanical Properties and Typical Uses of Ductile (Nodular) Iron

C-4a Mechanical Properties of Selected Carbon and Alloy Steels

C-4b Typical Uses of Plain Carbon Steels

C-5a Properties of Some Water-Quenched and Tempered Steels

C-5b Properties of Some Oil-Quenched and Tempered Carbon Steels

C-5c Properties of Some Oil-Quenched and Tempered Alloy Steels

C-6 Effect of Mass on Strength Properties of Steel

C-7 Mechanical Properties of Some Carburizing Steels

C-8 Mechanical Properties of Some Wrought Stainless Steels

C-9 Mechanical Properties of Some Iron-Based Superalloys

C-10 Mechanical Properties, Characteristics, and Typical Uses of Some Wrought Aluminum Alloys

C-11 Tensile Properties, Characteristics, and Typical Uses of Some Cast-Aluminum Alloys

C-12 Temper Designations for Aluminum and Magnesium Alloys

C-13 Mechanical Properties of Some Copper Alloys

C-14 Mechanical Properties of Some Magnesium Alloys

C-15 Mechanical Properties of Some Nickel Alloys

C-16 Mechanical Properties of Some Wrought-Titanium Alloys

C-17 Mechanical Properties of Some Zinc Casting Alloys

C-18a Representative Mechanical Properties of Some Common Plastics

C-18b Properties of Some Common Glass-Reinforced and Unreinforced Thermoplastic Resins

C-18c Typical Applications of Common Plastics

C-19 Material Classes and Selected Members of Each Class

C-20 Designer's Subset of Engineering Materials

C-21 Processing Methods Used Most Frequently with Different Materials

C-22 Joinability of Materials

C-23 Materials for Machine Components

C-24 Relations Between Failure Modes and Material Properties

Appendix D: Shear, Moment and Deflection Equations for Beams

D-1 Cantilever Beams

D-2 Simply Supported Beams

D-3 Beams with Fixed Ends

Appendix E: Fits and Tolerances

E-1 Fits and Tolerances for Holes and Shafts

E-2 Standard Tolerance for Holes and Shafts

E-1 Tolerance Grades Produced from Machining Processes

Appendix F: MIL-HDBK-5J, Department of Defense Handbook: Metallic Materials and Elements for Aerospace Vehicle Structures,

Appendix G: Force Equilibrium: A Vectorial Approach

Appendix H: Normal Distributions

Appendix I: SN-Formula

Appendix J: Gear Terminology and Contact-Ratio Analysis

To purchase this product, please visit:

<https://wiley.indiafin.com/machine-component-design.html>



Scan to buy