

INDEX

A

- Absolute units of force, 10
- Acme thread, 380,625,692
- Actual deviation, 64
 - size, 63
- Addendum, 1025
 - angle, 1083
 - circle, 1025
 - cone diameter, 1083
- Adjustable screwed joints, 378
- Advantages of chain drives, 760
 - cycloidal gears, 1032
 - fibre rope drives, 740
 - gear drives, 1022
 - involute gears, 1031
 - rolling contact bearings, 996
 - screwed joints, 377
 - V-belt drive, 730
 - welded joints, 341
 - wire ropes, 744
- Alloy steel, 31
 - cast iron, 24
- Allowance, 63
- Alternating stresses, 182
- Aluminium, 44
 - alloys, 45
 - bronze, 47
- American national standard thread, 379
- Angle of articulation, 761
 - obliquity, 1022
 - thread, 379
- Angular bevel gear, 1081
 - momentum, 13
- Annealing, 42
- Application of levers in engineering practice, 559
 - Soderberg's equation, 216

- Arc of approach, 1027
 - contact, 1027
 - recess, 1027
- Assumptions in designing boiler joints, 296
 - Euler's column theory, 602
 - hydrodynamic lubricated bearings, 965
- Axial brakes, 924
 - pitch, 1067, 1103
- Axially loaded un-symmetrical welded section, 359
- Automobile suspension springs, standard sizes of, 873



B

- Babbitt metals, 48
- Backing, 1083
- Back cone, 1083
 - distance, 1083
 - pitch, 288
 - lash, 1026
- Ball bearings, standard dimensions and designation of, 999
- Barlow's equation, 237

- Band brake
 - simple, 935
 - differential, 942
 - and block brake, 952
- Basic dynamic load rating of rolling contact bearings, 1006
 - static load rating of rolling contact bearings, 1003
- Basic weld symbols, 345
 - size, 63
- Basis of limit system, 66
- Beam strength of gear teeth, 1037
- Bearings, 962
 - classification of, 962
 - characteristic number, 974
 - metals, 48
 - modulus for journal bearings, 974
 - stress, 96
- Bell crank lever, 576
- Belleville springs, 822
- Belt joints, 681
 - speed, 680
 - types of, 678
- Belt drive with idler pulleys, 684
 - velocity ratio of, 686
- Bending stress in curved beams, 137
 - straight beams, 128
- Beryllium bronze, 47
- Bevel gears, 1080
 - classification of, 1081
 - design of a shaft for, 1088
 - determination of pitch angle for, 1084
 - factor, 1087
 - forces acting on, 1087
 - formative or equivalent number of teeth for, 1085
 - proportions for, 1084
 - strength of, 1086
 - terms used in, 1082
- Bilateral system of tolerance, 64
- Birnie's equation, 237
- Blackheart malleable cast iron, 23
- Block brake,
 - chain,



- Boiler joints, design of, 295
 - stays, 402
- Bolted joints under eccentric loading, 405
- Bolts of uniform strength, 404
- Brakes, 917
 - energy absorbed by, 918
 - heat to be dissipated during, 920
 - types of, 923
- Brass, 46
- Breaking stress, 99
- British association thread, 379
 - standard whitworth thread, 379
- Bronze, 47
- Buckling of compression springs, 831
 - load, 601
- Bulk modulus, 112
- Butt joint, 286, 353
- Bush roller chain, 690
- Bushed bearing, 984
 - pin flexible coupling, 499
- Buttress thread, 381, 625

C

- Calculation of fundamental deviation for shafts, 73
 - for holes, 74
- Cap screws, 384
- Carriage spring, 822

- Case hardening, 44
- Cast iron, types of, 21
 - effect of impurities on, 25
 - pulleys, design of, 716, 720
- Casting, 54
 - design of, 56
- Castle nut, 385
- Caulking, 289
- Causes of gear tooth failure, 1044
- Centre crank shaft, design of, 1162
- Centrifugal casting, 56
 - clutches, 910
 - tension, 695
- Chain drives, 759
 - advantages and disadvantages, 760
 - design procedure of, 772
 - factor of safety for, 767
 - terms used in, 761
 - velocity ratio of, 762
- Change in dimensions of thin cylindrical shell, 231
 - spherical shell, 233
- Chilled cast iron, 21
- Characteristics of roller chains, 766
- Circular flanged pipe joint, design of, 294
 - pitch, 1025
- Circumferential lap joint for a boiler, 299
 - stress, 226
- Clamp or compression coupling, 482
- Classification of bearings, 862
 - bevel gears, 1081
 - chains, 763
 - engineering materials, 16
 - gears, 1023
 - Machine Design, 1
 - pressure vessels, 224
 - wire ropes, 745
- Clavarino's equation, 237
- Claw clutch, 886
- Clearance, 1026
 - bearing, 964
 - fit, 65
- Closely coiled helical spring, 821
- Clutches, types of, 885
 - friction, 886
 - plate, 888
 - positive, 886
- Coefficient of friction, 642
 - between belt and pulley, 680
 - fluctuation of speed, 777
 - for journal bearing, 975
 - of energy, 981
- Cold working, 60
 - processes, 60
- Collar bearings, 990
- Column, failure of, 600
 - Johnson's formulae for, 607
 - Rankine's formula for, 606
- Combined steady and variable stresses, 196
 - variable normal stress and variable shear stress, 209
- Common types of screw fastening, 383
- Comparison between involute and cycloidal gears, 1031
- Completely reversed stresses, 1181
- Compression springs, terms used in, 825
 - buckling of, 831
- Compressive stress and strain, 89
- Compound belt drive, 684
 - screws, 671
 - cylindrical shells, 241
 - stresses in, 241
- Concave face worm gear, 1103
- Concentric or composite springs, 857
- Condition of constant velocity ratio of gears, 1027



1218 ■ A Textbook of Machine Design

- for the transmission of maximum power, 697
- Cone centre, 1083
 - clutches, 902
 - distance, 1083
 - pulley drive, 685
 - worm, 1102
- Conical springs, 821
- Connecting rod, design of, 612, 1144, 1150
 - forces acting on, 614, 1146
- Considerations in designing a friction clutch, 887
- Construction of flywheels, 812
 - leaf springs, 869
 - wire ropes, 744
- Contact ratio, 1027
- Conveyor chains, 763
- Copper, 45
 - alloys, 46
- Core diameter, 378
- Cotter joint, types of, 432
 - foundation bolt, design of, 453
 - to connect piston rod and cross-head, 450
- Couple, 11
- Coupler joint, 266
- Cover plates, 252
- Crank shaft, 1161
 - bearing pressures and stresses in, 1161
 - design procedure for, 1162
- Cranked lever, 568
- Creep, 19
 - of belt, 687



- Crest, 379
- Critical pressure of journal bearings, 977
 - load, 601
- Crossed belt drive, 683
 - length of, 690
- Crown bevel gear, 1082
 - height, 1083
- Cyclic stresses, 181
- Cycloidal teeth, 1029
- Cylinder, 1031
 - design of, 1032
- Cylinder heads, 252
 - covers, design of, 395
 - liners, 1031
- Cylindrical worm, 1102

D

- Dedendum, 1025
 - angle, 1083
 - circle, 1025
 - cone diameter, 1083
- Deflection of helical springs of circular wire, 830
 - of non-circular wire, 852
- Density, 11
 - of belt materials, 680
- Depth of thread, 379
- Derived units, 5
- Design of bearing caps and bolts, 986
 - boiler joints, 295
 - cast iron pulleys, 719
 - centrifugal clutch, 910
 - chain drives, 772
 - circular flanged pipe joint, 271
 - circumferential lap joint for a boiler, 299
 - cone clutch, 903
 - connecting rod, 612
 - cylinder, 1127
 - cylinder covers, 397
 - disc or plate clutch, 889
 - flange coupling, 487
 - flywheel arms, 803

- journal bearings, 978
 - levers, 558
 - longitudinal butt joint for a boiler, 296
 - nut, 405
 - oval flanged pipe joint, 274
 - pipes, 265
 - piston rod, 609
 - push rod, 611
 - screw jack, 658
 - shaft, 511
 - shaft for bevel gears, 1088
 - sleeve and cotter joint, 440
 - socket and spigot cotter joint, 432
 - spur gears, 1044
 - square flanged pipe joint, 276
 - worm gearing, 1112
- Detachable fastening, 282
- Designation of screw threads, 386
- wire ropes, 745
- Determination of pitch angle for bevel gears, 1084
- Diagonal pitch, 288
- Diametral pitch, 1026
- Die casting, 55
- Differential band brake, 942
- screw, 669
- Direct and bending stresses combined, 160
- Disadvantages of chain drives, 760
- gear drives, 1022
 - rolling contact bearings, 996
 - screwed joints, 377
 - V-belt drive, 730
 - welded joints, 341
- Disc clutches,
- springs, 822
- Double block or shoe brake, 930
- enveloping worm, 1102
- Duralumin, 45
- Dynamic equivalent load for rolling contact bearings, 1007
- load rating for rolling contact bearings under variable loads, 1009
 - tooth load, 1040

E

- Eccentric loading, 160
- loaded bolted joint, 405,409,419,424
 - long column subjected to, 608
 - riveted joint, 322
 - springs, 831
 - welded joint, 361
- Eccentricity, 160
- Effect of impurities on cast iron, 25
- on steel, 30
 - keyways, 487
 - loading on endurance limit, 184
 - miscellaneous factors, 185
 - size, 184
 - surface finish, 184



- Effective diameter, 398
- Efficiency of riveted joint, 292
- self locking screws, 641
 - square threaded screws, 635
 - worm gearing, 1107
- Elastic limit, 98
- Electric arc welding, 343
- Elements of a welding symbol, 347
- standard location of, 347
- End connections for compression helical springs, 826
- tension helical springs, 827
- Endurance limit, 182
- Energy, 14
- absorbed by a brake, 918
 - in helical springs of circular wire, 847

1220 ■ A Textbook of Machine Design

- stored in a flywheel, 781
- Equalised stress in spring leaves, 870
- Equivalent length of a column, 604
 - number of teeth for bevel gears, 1085
 - for helical gears, 1068
- Essential qualities of rivet, 283
- Euler's column theory, 601
 - assumptions in, 602
 - formula, 602
 - limitations of, 603
- Eutectoid steel, 42
- Expansion joints, 267
- Externally pressurized lubricated bearings, 965

F

- Face angle, 1083
 - of tooth, 1027
 - width, 1027
 - of helical gears, 1067
- Factor of safety, 101
 - for chain drives, 767
 - for fatigue loading, 186
 - for wire ropes, 747
 - selection of, 101
- Factors to be considered to avoid fatigue failure, 190
- Failures of column or strut, 600
 - riveted joint, 290
- Fast and loose pulley, 718
 - drive, 685
- Fatigue limit, 182
 - stress concentration factor, 195
- Feather key, 472
- Ferrous metals, 17, 20
- Fibre ropes, 739
 - sheave for, 740
- Fillet radius, 1027
 - welded joints, special cases of, 351
- Fits, 65
 - types of, 65
- Fitted bearing, 965
- Flange coupling, 484
 - design of, 487
- Flanged pipe joint, 268
 - circular, design of, 271
 - oval, design of, 274
 - square, design of, 276
- Flank of tooth, 1027
 - of thread, 379
- Flat belt drives, 677
 - types of, 682
 - pulleys, 716
 - saddle key, 473
 - spiral spring, 864
- Flexible coupling, 479, 498
 - bushed pin, 499
- Fluctuating stress, 182
- Fluctuation of energy, 778
 - maximum, 779, 780
 - coefficient of, 781
- Flywheel, 776
 - construction of, 812
 - energy stored in, 781
 - stresses in, 788
- Foot lever, 566
 - step bearing, 988
- Force, 9
 - acting in bevel gears, 1087
 - on connecting rod, 614
 - on sunk keys, 474
 - on worm gears, 1111
- Forge welding, 343
- Forging, 57
 - design of, 58
- Form stress concentration factor, 187
- Formative number of teeth for bevel gears, 1085
 - for helical gears, 1068
- Forms of teeth, 1029



Free cutting steel, 31
 — length, 837
 Friction clutches, 886
 — types of, 887
 — wheels, 1021
 Full annealing, 42
 Fullering, 289
 Fundamental deviation, 64
 — units, 5
 Fusion welding, 342

G

Gas welding, 343
 Gears
 — classification of, 1023
 — materials, 1034
 — terms used in, 1024
 — tooth failure, causes of, 1044
 General considerations in Machine Design, 2
 — procedure in, 4
 Gerber method for combination of stresses, 197
 Gib and cotter joint, 443
 — design of, 444,447
 — head key, 471
 Goodman method for combination of stresses, 197
 Gravitational units of force, 10
 Grey cast iron, 21
 Grooved nut, 385
 Guest's theory, 193
 Gun metal, 48

H

Haigh's theory, 154
 Hand levers, 565
 Hardening, 43
 Hauling chains, 763
 Heat resisting steel, 37
 — generated in a journal bearing, 977
 — to be dissipated during braking, 920
 — treatment of steel, 42

Helical gears, 1066
 — face width of, 1067
 — formative or equivalent number of teeth for, 1068
 — proportions of, 1068
 — strength of, 1069
 — springs, 821
 — material for, 823
 — subjected to fatigue loading, 853
 — terms used in, 1067
 — torsion spring, 863

Helix angle, 1105
 Hencky and Von Mises theory, 154
 High speed tool steel, 39
 Hindalium, 45
 Hobed straight face worm gear, 1102
 Hoisting chains, 763
 Hole basis system, 66
 Hollow saddle key, 473
 Hooke's coupling, 504
 Hoop stress, 226
 Hot working, 58
 — processes, 59
 Hydraulic pipe joint, 269
 — for high pressures, 270
 Hydrodynamic lubricated bearings, 965
 — assumptions in, 965
 — terms used in, 973
 Hyper-eutectoid steel, 42
 Hypo-eutectoid steel, 42



I

- Iconel, 50
- Important factors for the formation of thick oil film in hydrodynamic lubricated bearing, 965
 - terms used in riveted joints, 288
 - screw threads, 378
- Indian standard designation of low and medium alloy steels, 33
 - high alloy steels, 39
 - high speed tool steels, 40
 - system of limits and fits, 67
- Inertia, 9
 - bending forces, 616
- Initial stresses due to screwing up forces, 389
 - tension in a belt, 705
- Inside cone diameter, 1083
- Interchangeability, 62
- Interference fit, 66
 - in involute gears, 1033
- Internal bevel gear, 1082
 - expanding brake, 955
- International system of units, 5
- Involute teeth, 1030
- Inverted tooth chain, 765

J

- Jam nut, 385
- Jaw clutch, 886
- Johnson's formulae for columns, 607
- Joints of uniform strength, 313



- Journal bearing
 - coefficient of friction for, 975
 - critical pressure of, 977
 - design procedure of, 978
 - heat generated in, 977
 - solid, 984
 - squeeze film, 967
 - wedge film, 966

K

- Keys, types of, 470
- Keyways, effect of, 477
- Kilogram, 6
- Kinetic energy, 15
- Knuckle joint, 455
 - design procedure of, 459
 - dimensions of various parts of, 456
 - method of failure of, 457
 - thread, 381

L

- Lame's equation, 234
- Laminated spring, 822
- Lap joint, 286, 344
 - circumferential, 299
- Lateral strain, 111
- Law of conservation of energy, 15
 - of motion, 9
- Lead, 48, 379, 1104
 - angle, 1104
- Leaf spring, 822, 866
 - construction of, 869
 - equalised stress in, 870
 - material for, 874
- Length of crossed belt, 690
 - chain and centre distance, 762
 - path of contact, 1027
 - open belt, 688
 - leaf spring leaves, 872
- Levers, 559
 - application of, 559
 - bell crank, 576

- cranked, 568
- design of, 559
- foot, 556
- hand, 565
- for lever safety valve, 572
- miscellaneous, 589

Lewis equation, 1037

Life of a bearing, 1005

Liquid lubricants, 970

Limit system, 63

- basis of, 66
- terms used in, 63

Limits of sizes, 63

Limitations of Euler's formula, 603

Linear strain, 111

Load, 87

- factor, 184

Location of screwed joints, 382

Lock nut, 385

Locking devices, 385

- with pin, 386
- with plate, 386

Long columns subjected to eccentric loading, 608

Longitudinal stress, 227

- butt joint for boiler, 296

Lonzenge joint, 313

Lower deviation, 64

Lubricants, 970

- properties of, 970

Lubrication of ball and roller bearings, 1018

M

Machine Design, classifications of, 2

- general considerations in, 2
- general procedure in, 4
- screws, 384
- shafts, 510

Magnalium, 45

Major diameter, 378

Malleable cast iron, 22

Manufacturing processes, 53

Manufacture of ball and roller bearings, 1018

- rivets, 283
- shafts, 510

Margin or marginal pitch, 288

Marine type flange coupling, 484

Mass, 8

- density, 11
- moment of inertia, 12

Material for belts, 679

- ball and roller bearings, 1018
- brake lining, 922
- friction surfaces, 886
- helical springs, 823
- leaf springs, 874
- rivets, 283
- shafts, 510
- sliding contact bearing, 968

Maximum fluctuation of energy, 780

- distortion energy method, 154
- efficiency of square threaded screws, 635
- permissible working stresses for transmission shafts, 511
- principal stress theory, 152
- principal strain theory, 153
- shear stress theory, 153
- speed for chains, 770
- strain energy theory, 154
- tension in belt, 697





Mean deviation, 64
 Mechanical properties of metals, 18
 — working of metals, 58
 Metre, 6
 Metric thread, 381
 Methods of riveting, 282
 — reducing stress concentration, 188
 Minimum number of teeth on the pinion to avoid interference, 1034
 Minor diameter, 378
 Mitre gears, 1081
 Module, 1026
 Modular ratio, 103
 Modulus of elasticity, 89
 — resilience, 115
 — rigidity, 94
 Moment of a force, 10
 Monel metal, 49
 Mottled cast iron, 22
 Mounting height, 1083
 Muff coupling, 480
 Multiple disc clutch, 891
 — threads, 632

N

Nickel base alloys, 49
 Nichrome, 50
 Nimonic, 50

Nipple joint, 266
 Nipping, 870
 Nodular cast iron, 23
 Nominal size, 63
 Non-ferrous metals, 17, 44
 — metallic materials, 50
 Normal cone, 1083
 — pitch, 1105
 Normalising, 42
 Notch sensitivity, 195
 Normal pitch, 1105
 Number of teeth on the smaller or driving sprocket or pinion, 769
 Nut, design of, 405

O

Oil grooves, 987
 Oldham coupling, 503
 Open belt drive, 683
 — length of, 688
 — coiled helical spring, 821
 Outside cone diameter, 1083
 Oval flanged pipe joint, design of, 274
 Overhauling screw, 640
 Overhung crankshaft, 1170

P

Parallel sunk key, 471
 Paper pulleys, 718
 Path of contact, 1027
 — length of, 1027
 Pearlitic malleable cast iron, 23
 Penn nut, 385
 Percentage elongation, 99
 — reduction in area, 99
 Permanent fastening, 282
 — mould casting, 54
 Permissible working stress for gear teeth in
 — Lewis equation, 1038
 — speed of smaller sprocket, 767
 Phosphor bronze, 47
 Physical properties of metals, 17

- Pipes, 261
- design of, 265
 - flanges for steam, 269
 - hydraulic, 270
 - joints, 266
 - stress in, 262
- Piston, 1132
- barrel, 1136
 - design considerations for a, 1133
 - head, 1134
 - material for, 1133
 - pin, 1138
 - rings, 1135
 - skirt, 1137
- Piston rod, design of, 609
- Pitch, 288, 379, 761
- angle, 1083
 - circle, 1024
 - cone, 1083
 - diameter, 378, 1083
 - point, 1025
 - surface, 1025
 - circle diameter, 1025
- Pivot bearings, 988
- Pivoted block or shoe brake, 926
- Plain carbon steel, 26
- Plastics, 50
- Plate clutches, 888
- Plummer block, 985
- Poisson's ratio, 111
- Polar moment of inertia of welds, 364
- Positive clutches, 886
- Potential energy, 14
- Power, 13
- screws, 624
 - transmitted by a belt, 692
 - by chains, 768
 - transmitting chains, 764
- Preferred numbers, 83
- Presentation of units, 6
- Pressure angle, 1025
- vessels, 224
 - classifications of, 224
 - recommended joints for, 301
- Principal parts of an I.C. engine, 1126
- planes, 145
 - stresses, 145
 - dimensions of tooth profile, 771
 - for a member subjected to bi-axial stress, 146
 - application of, 148
 - determination of, 146
- Procedure for designing a wire rope, 752
- Process annealing, 43
- Profile, 1027
- Proof resilience, 115
- Properties of sliding contact bearing materials, 967
- of wire ropes, 746
- Proportional limit, 98
- Proportions of bevel gears
- helical gears, 1068
 - for worms, 1106
 - for worm gear, 1107
- Protective type flange coupling, 486
- Pulleys, flat belt, 716
- Push rods, design of, 611

Q

Quarter turn belt drive, 684

R

Radial ball bearing, selection of, 1012

- types of, 997

Radial brakes, 924

Rankine's theory, 152

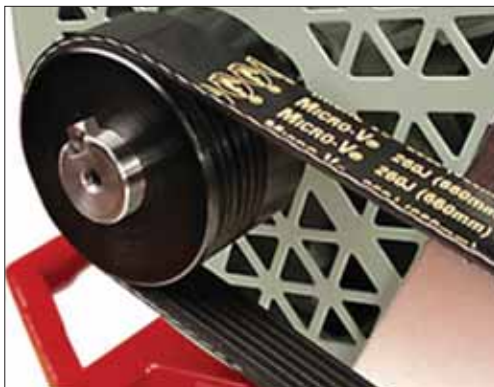




- formula for columns, 606
- Ratio of driving tensions for flat belts, 693
 - fibre ropes, 740
 - V-belts, 730
- Recommended joints for pressure vessels, 301
- Rectangular sunk key, 471
- Relation between endurance limit and ultimate tensile strength, 186
 - pitch and pitch circle diameter, 761
- Reliability of a bearing, 1010
- Repeated stress, 182
- Requirements of a good shaft coupling, 479
- Resilience, 115
- Reversed stresses, 181
- Rigid coupling, 479
- Ring nut, 385
- Rivet, 282
 - essential qualities of, 283
 - heads for, 283
 - materials of, 283
 - manufacture of, 283
- Riveted joints, 280
 - eccentric loaded, 322
 - efficiency of, 292
 - failures of, 290
 - for structural use, 313
 - important terms used in, 288
 - strength of, 292
 - types of, 285
- Rocker arm for exhaust valve, 584

- Roller bearings, 997
 - types of, 1001
 - Rolling contact bearing, 996
 - basic dynamic load of, 1006
 - dynamic equivalent load of, 1007
 - basic static load rating of, 1003
 - static equivalent load of, 1004
 - types of, 997
 - Root angle, 1083
 - circle, 1025
 - diameter, 378
 - Rope drives, 739
 - Round keys, 470
 - Rubber, 50
 - Rules for S.I. units, 7
- ## S
- Saddle keys, 473
 - Saint Venant theory, 153
 - Sand mould casting, 54
 - Sawn nut, 385
 - Screw thread, 378
 - designation of, 386
 - forms of, 379
 - fastenings, 383
 - important terms used in, 378
 - standard dimensions of, 387
 - jack, design of, 658
 - Screwed joints, 378
 - advantages and disadvantages of, 378
 - location of, 382
 - Second, 6
 - Section modulus of welds, 364
 - Selection of a belt drive, 678
 - factor of safety, 101
 - materials for engineering purposes, 17
 - radial ball bearings, 1012
 - Self energizing brake, 926
 - Self locking brake, 926
 - screws, 640
 - Semi-liquid lubricant, 970
 - Set screws, 384
 - Shafts, 509

- types of, 510
 - material used for, 510
 - design of, 511
 - manufacturing of, 510
 - stresses in, 511
 - subjected to twisting moment only, 511
 - axial load in addition to combined torsion and bending loads, 544
 - bending moment only, 514
 - combined twisting moment and bending moment, 516
 - fluctuating loads, 530
- Shaft basis system, 66
- Shaft coupling, 478
- types of, 479
- Shafts in series and parallel, 125
- Shear modulus, 94
- Shear stress and strain, 93
- stresses in beams, 172
- Sheave for fibre ropes, 740
- S.I. units, 5
- rules for, 7
- Side crankshaft, 1170
- Silent chains, 765
- Silicon bronze, 47
- Simple band brake, 935
- Single block or shoe brake, 924
- Single disc or plate clutch, 888
- design of, 889
- Size factor, 185
- Sleeve coupling, 480
- Sleeve and cotter joint, design of, 439, 440



- Slenderness ratio, 603
- Sliding contact bearings, 962
- types of, 964
 - material used for, 968
 - properties of, 967
- Slip of belt, 686
- Slush casting, 55
- Socket joint, 266
- and spigot cotter joint, 432
 - design of, 432
- Soderberg's method for combination of stresses, 199
- application of, 216
- Solid length,
- journal bearing, 984
 - lubricants, 970
- Sommerfeld number, 977
- Special cases of fillet welded joint, 351
- purpose springs, 822
- Spheroidal graphite cast iron, 23
- Spheroidising, 43
- Spigot and socket joint, 267
- Splines, 474
- Split bearing, 985
- Spring lock washer,
- index, 825
 - rate, 836
 - steels, 40
 - types of, 821
- Springs in parallel, 856
- series, 856
- Spur gears, 1021
- construction of, 1056
 - design procedure of, 1044
 - design of shaft for, 1058
 - design of arms for, 1058
- Square flanged pipe joint, design of, 276
- thread, 380, 625
 - sunk key, 471
- Squeeze film journal bearing, 967
- lubrication, 965
- Stainless steel, 36
- Standard belt thicknesses and widths, 681
- pipe flanges for steam, 269

- pitch lengths of V-belts, 729
 - proportions of gear systems, 1032
 - size of spring wire, 824
 - sizes of transmission shafts, 510
 - automobile suspension spring, 873
 - dimensions of screw threads, 387
 - location of elements of a welding symbol, 347
- Static equivalent load for rolling contact bearings, 1004
- Static tooth load, 1042
- Steel, 26
- alloy, 31
 - composition, 28
 - effect of impurities on, 30
 - designation on the basis of chemical
 - mechanical properties of, 26
 - free cutting, 31
 - heat resisting, 37
 - stainless, 36
 - pulleys, 717
- Stepped pulley drive, 685
- Straight worm, 1102
- Straight face worm gear, 1102
- Strain, 88
- energy, 14, 115
 - volumetric, 112
- Strength of a riveted joint, 292
- parallel fillet welded joint, 349
 - transverse fillet welded joint, 349
 - butt joints, 353
 - bevel gears, 1086
 - helical gears, 1079
 - sunk key, 471
 - worm gear teeth, 1109
- Stress, 88
- strain diagram, 97
- Stress concentration, 187
- factor, 187
 - due to holes and notches, 187
 - for various machine members, 190
 - for welded joints, 353
 - method of reducing, 188
- Stresses in composite bars, 102
- compound cylindrical shells, 241
 - due to external forces, 391
 - due to change in temperature, 105



- due to combined forces, 394
 - in thin cylindrical shell due to internal pressure, 225
 - in helical springs of circular wire, 828
 - in non-circular wire, 852
 - in pipes, 262
 - in power screws, 644
 - in a flywheel rim, 788
 - in flywheel arms, 801
 - in screwed fastenings due to static loading, 389
 - in shafts, 511
 - for welded joint, 353
 - in wire ropes, 749
- Studs, 383
- Sunk keys, 471
- forces acting on, 474
 - strength of, 475
- Supplementary weld symbols, 347
- Surface finish factor, 184
- roughness, 82
 - hardening, 44
- Surge in springs, 833
- System of gear teeth, 1032
- units, 5

T

- Tangent keys, 473
- Tap bolt, 383
- Tempering, 44
- Temporary fastening, 282

Tensile stress and strain, 88
 Tension helical spring, 821
 — end connections for, 827
 Thermit welding, 343
 Terms used in bevel gears,
 — chain drives, 761
 — compression springs, 825
 — gears, 1024
 — helical gears, 1067
 — hydrodynamic journal bearing, 973
 — limit system, 63
 Theories of failure under static load, 152
 Thermal rating of worm gears, 1110
 — stresses, 105
 Thick cylindrical shells, 233
 — film bearings, 965
 Thin films bearings, 965
 — spherical shells, 232
 Through bolt, 383
 Thrust bearing, 988
 — ball bearing, 1001
 Tin, 48
 Tolerance, 63
 — zone, 64
 Tooth pressure angle, 1105
 — space, 968
 — thickness, 1001
 Torque, 13
 — required to raise load on square threaded screws, 632
 — to lower load, 634
 Torsion springs, 822
 Torsional shear stress, 120
 Total depth, 1026



Transition fit, 66
 Transmission shafts, 510
 — maximum permissible stresses for, 511
 — standard sizes of, 510
 Trapezoidal threads, 625, 642
 Tredgolds' approximation, 1085
 Tresca's theory, 153
 Turn buckle, 462
 — design of, 463
 Types of belts, 678
 — belt drives, 678
 — clutches, 885
 — cotter joints, 432
 — end conditions of columns, 601
 — flat belt drive, 682
 — friction clutches, 887
 — keys, 471
 — pulleys for flat belts, 716
 — rivet heads, 283
 — riveted joints, 283
 — rolling contact bearings, 997
 — screw threads for power screws, 625
 — shafts, 510
 — shaft coupling, 479
 — sliding contact bearings, 964
 — springs, 820
 — V-belts and pulleys, 728
 — welded joints, 344
 — worms, 1102
 Twist belt drive, 683

U

Ultimate stress, 98
 Unified standard thread, 380
 Unilateral system of tolerance, 63
 Union joint, 266
 Universal coupling, 504
 Unprotective type flange coupling, 485
 Upper deviation, 64

V

Valve gear mechanisms, 1189
 Valves, 1190

1230 ■ A Textbook of Machine Design

- V-belt drives, 730
 - flat drives, 731
- Velocity ratio of belt drive, 686
 - of chain drives, 762
 - of worm gears, 1105
- Virtual coefficient of friction, 642
- Volumetric strain, 112
- Volute springs, 821

W

- Wahl's stress factor, 830
- Wear tooth load, 1042
 - for worm gear, 1109
- Wedge film journal bearing, 966
 - lubrication, 965
- Weight, 8
- Weld symbols
 - basic, 345
 - supplementary, 347
 - standard location of, 347
- Welded joints, 341
 - advantages and disadvantages of, 342
 - eccentrically loaded, 361
 - stresses for, 353
 - stress concentration factor for, 354
 - types of, 344
- Welding processes, 342
- White cast iron, 21
- Whiteheart malleable cast iron, 22
- Wire ropes, 744
 - advantages of, 744
 - construction of, 744
 - classification of, 745
 - designation of, 745
 - properties of, 746
 - diameter of wire and area of, 747
 - factor of safety for, 747
 - fasteners, 749
 - procedure for designing, 752
 - sheaves and drums for, 747
 - stresses in, 749



- Work, 13
- Working depth,
 - stress, 101
 - in belts, 680
- Woodruff key, 472
- Wooden pulleys, 717
- Worms, proportions of, 1107
 - types of, 1102
- Worm gears, design of, 1112
 - efficiency of, 1107
 - forces acting on, 1111
 - proportions of, 1107
 - strength of, 1109
 - terms used in, 1103
 - thermal rating for, 1110
 - types of, 1102
 - wear tooth load for, 1109
- Wrought iron, 25

Y

- Y-alloy, 45
- Yield point, 98
- Young's modulus, 89

Z

- Zero film bearing, 965
 - line, 64
- Zinc base alloys, 49