

Index

A		
Absolute tolerances	19.13	
gap	19.13	
(examples)	19.14	
worksheet	19.16	
Absolute viscosity	25.6	
Absorbtion coefficient	45.27	
Acceleration:		
geometric	40.4	
modified trapezoidal	40.11	
Acceptable conditions (checklist)	10.12	
Accelerometer, piezoelectric	3.29	
Acceptability	1.16	
Acceptance ratio	3.9	
Accumulator	43.20	
Accuracy	3.43	
Acme thread in power screws	20.3	20.4
standard thread sizes (table)	20.5	
Acoustic center	45.11	
Acoustically calibrator	45.8	
Action:		
actual	1.12	
must	1.12	
should	1.12	
want	1.12	
Active transducer	3.5	

1.2

<u>Index terms</u>	<u>Links</u>		
Actual action	1.12		
Actuating torque in power screws	20.6		
Actuation and power transmission system of robots:			
electric systems	47.13		
hydraulic systems	47.15		
pneumatic systems	47.16		
requirements	47.12		
Actuator profile (figure)	43.4		
Actuators, linear	39.3		
ADAMS	41.22		
Adendum	33.1	34.2	35.6
Addition method of Crafts and Lament	8.9		
Additional criteria in design evaluation	1.3		
Additives, extreme pressure (EP)	25.11		
Addresses:			
AGMA	35.1		
ANSI	9.29		
ASHRAE	9.29		
ASSE	9.29		
NASA	9.29		
OSHA	9.29		
SAE	9.29		
U.S. Military Standards, National Technical Service	9.29		
Adequacy assessment:			
definition	5.6		
in skill #1 (flowchart)	5.7		
in skill #2 (flowchart)	5.8		
use	1.15	12.2	
Adjustable-stroke mechanism	39.5		
Adjustment, fine (illustrations)	39.4	39.5	
Adsorption	25.9		

<u>Index terms</u>	<u>Links</u>	
AGMA (American Gear Manufacturer's Association)	33.4	34.25
address of	34.25	
standards of	35.1	
AGMA rating equations for wear for spur gears:		
for allowable contact stress	33.6	
for pitting resistance	33.6	
for pitting resistance power rating	33.8	
AGMA rating equations for bending strength for spur gears:		
for allowable bending stress	33.9	
for bending strength power rating	33.9	
AISC (American Institute of Steel Construction):		
fatigue allowables	14.42	
Algebra of random variables:		
formulas for	2.14	
Algorithm for design	5.4	
Allowable stress by design factor	2.4	
Allowable stress levels	2.3	14.40
Allowable stresses in bolts (table)	23.6	
Alloy designations for steels	7.51	
Alloy increments	8.10	
boron	8.13	8.16
chromium	8.25	
manganese	8.14	
molybdenum	8.16	
nickel	8.25	
silicon	8.14	
Amorphous solids	7.4	
Ampere, definition of	3.5	
Amplifiers:		
charge	3.27	
operational	3.26	

<u>Index terms</u>	<u>Links</u>			
Amplifiers: <i>(Continued)</i>				
voltage	3.27			
Amplitude response	3.12			
Analysis, ladle	8.9			
Analysis of frames:				
Castigliano's theorem in analysis of frames	50.15			
(example)	50.15	50.18		
Castigliano's theorem with redundant members	50.20			
(example)	50.21			
Analysis tasks of the computer	5.9			
AND element	43.40			
Angle of twist	49.6			
Angular deflection of sections (table)	49.7			
Angular fluctuation in flywheels	18.7			
(example)	18.8			
Annealing	7.20			
Anode in welding	14.4			
Anodic protection	44.5			
ANSI (American National Standards Institute)	32.2	45.7		
Anthropometric information	9.2			
(tables)	9.4	9.18	9.20	
Approximation:				
arc sag	4.8			
finite difference	4.16			
Fourier series	4.12			
reciprocal	4.9			
Taylor series	4.11			
trigonometric	4.11			
Application factor in rolling contact bearings	27.13			
A priori decisions	5.6			
Arc sag approximation	4.8			

<u>Index terms</u>	<u>Links</u>	
Arc shielding	14.2	
Arc welding:	14.1	
codes and specifications	14.39	
commercial processing	14.6	
consumables	14.18	
welded joint design	14.23	
Area, reduction of	7.35	
second moment of	48.11	
As-quenched hardness	8.10	
ASHRAE (American Society of Heating, Refrigeration and Air Conditioning Engineers)	45.18	
ASME (American Society of Mechanical Engineers)	41.10	
Assessment, adequacy	1.15	
ASTM (American Society for Testing and Materials)	14.39	45.11
rivet specifications	22.3	22.5
Atkinson mechanism	39.13	
Atomic hydrogen process	14.16	
Atomic number	7.2	
Atomic structure	7.4	
Atomic weight	7.2	
Attitude angle	28.17	
Average person	9.3	
AWS (American Welding Society) specifications	14.19	
Axes:		
possible, in crystal	7.9	
principal	48.14	
Axial clutch (figure)	30.6	
B		
Backlash	33.1	34.2
Backup strips	14.35	

I.6

<u>Index terms</u>	<u>Links</u>	
Baking	24.2	
Balancing	3.41	
(figure)	41.21	
Ball bearings (<i>see</i> Rolling Contact Bearings)		
Ball screws	20.3	
sizes and capacities (table)	20.11	
Ballast type of circuit	3.32	
Ballistic effects	11.3	
Band brake	30.9	30.34
Band mechanisms	47.14	
Base:		
circle	33.2	
coordinates	47.26	
pitch	33.3	35.6
units	3.4	
Basic:		
load rating	27.7	
pneumatic power circuit	43.32	
product decisions (table)	1.4	
size	19.2	
size ranges, IT grades	19.4	
Basic pneumatic power circuit	43.32	
analyzing a system	43.33	
the basics	43.33	
determining conductor flow capacity	43.35	
fluid logic system	43.38	
circuit design	43.39	
circuit evaluation	43.46	
design example	43.42	
logic elements	43.40	
Basic static load rating in rolling contact bearings	27.6	
Basic arc welding circuit	14.2	

<u>Index terms</u>	<u>Links</u>
Beam column analysis	15.12
Beam springs	24.55
Beams:	
computer analysis	50.3
tables of properties	50.4
Bearing:	
alloys (table)	28.10
area (figure)	23.9
journal	28.3
lengths	28.20
load(s)	28.17
range of (table)	28.17
materials	28.8
reliability goal	27.9
selection	27.8
stress	23.9
in joints	23.5
types (figure)	28.5
whirl	28.45
Bearings:	
ball	27.2
design charts	28.23
flow relations	28.27
friction relations	28.27
load relations	28.16
long and short	28.20
notation	28.3
roller	27.2
stability chart	28.46
stepwise loading	27.13
thermal conditions	28.19
types	28.4

<u>Index terms</u>	<u>Links</u>	
Bell crank	41.1	
Belleville washers	22.26	24.38
Belt:		
couplings	39.16	
materials	31.15	31.17
rivet	22.3	
Belt drives:		
comparison	31.37	
flat belt	31.14	
flexible connectors	31.2	
other	31.25	
V-belt	31.19	
Bending deflection of shafts by tabular method	37.5	
(tables)	47.5	37.7
Bending formula	49.13	
Bending of curved bars in the plane of curvature	16.2	
Bending stress in threads	20.6	
Bent washers	22.26	
Bessel correction	3.45	
Bevel and hypoid gears:		
computer-aided design	34.55	
design considerations	34.9	
design of mounting	34.50	
manufacturing	34.7	
tooth dimensions	34.19	
tooth strength	34.25	
Biaxial stress	49.1	
Biezeno theorem	16.12	
Bifurcated rivet	22.3	
Bilateral tolerance	11.9	
Binary code	47.18	

<u>Index terms</u>	<u>Links</u>	
Binomial series expansion	4.8	
Bleedoff	43.9	
Bleedoff circuit	43.22	
Blind rivet	22.3	
Body-centered cubic lattice (BCC)	7.10	
Body dimensions	9.2	
females/males (table)	9.4	
Boiler rivet	22.3	
Bolt:		
grades	23.6	23.22
heater	23.27	
preload	23.27	
specifications	23.32	
Bolted connection, statistical data	23.23	
Bolt stresses	23.13	
due to combined forces	23.15	
due to primary shear force	23.13	
due to secondary shear force	23.14	
Bolt torque requirement	23.39	
selecting correct torque	23.29	
Bolts	21.5	
carriage:		
dimensions	21.12	
(table)	21.13	
finished hex bolt:		
basic dimensions (table)	21.14	
grade markings:		
ASTM (table)	21.9	
SAE (table)	21.8	
metric (table)	21.10	
heavy structural hex bolt:		
(table)	21.7	

Bolts (*Continued*)

metric hex:

head dimensions (table) 21.7

thread length 21.6

round head:

dimensions 21.12

(table) 21.13

Bonded fluxes 14.12

Bonds:

covalent 7.3

metallic 7.3

secondary 7.4

van der Waal 7.4

Bouncing of springs 24.21

Boundary 11.3

conditions in bearings 28.15

lubrication 28.5

Bounds, confidence 2.26

Brake types:

classification 30.11

band 30.34

caliper 30.42

cone 30.37

disk 30.40

electromagnetic 30.45

long shoe 30.25

(*See also* Clutches and brakes)

Brake factor 30.13

Brake selection (table) 30.15

Brake shoes, self-energizing 30.31

Brake-in procedure in wear 6.10

Brakes (*see* Clutches and brakes)

<u>Index terms</u>	<u>Links</u>	
Breaking strength	7.34	
Bridge circuit	3.34	
Brinell hardness	7.22	
quantitatively relating gear and pinion hardness	13.42	
Brittle materials	12.5	
Buckingham:		
load-stress factor	13.42	
pi theorem	11.4	
Buckling:		
of columns	15.2	
of power screws	20.8	
of springs	24.18	
Burmester theory	41.12	
Butt joint	23.4	
Buttress threads in power screws	20.3	20.4

C

CAA (computer-aided analysis)	5.3
CAD (computer-aided design)	5.3
CAD (computer-aided drafting)	5.3
CAD/CAM (computer-aided design and/or computer-aided manufacturing)	5.3
CADET (computer-augmented design engineering technique):	
programming structure (figure)	5.24
CAE (computer-aided engineering)	5.3
CAM (computer-aided manufacturing)	5.3
Cam characteristics:	
acceleration diagrams	40.5
dynamic factor	40.4
motion equation	40.4
planer cam motion	40.1

<u>Index terms</u>	<u>Links</u>
Cam characteristics: <i>(Continued)</i>	
plate cams	40.2
spatial cam motion	40.1
stiffness	40.3
Cam layout and design:	
cam profile	40.17
circular arc cams	40.16
constant breadth cams	40.16
eccentric cams	40.15
finite difference method	40.22
measurement	40.19
undercutting	40.17
Cam mechanisms:	
basic cam motions	40.5
contact stress and wear	40.25
force and torque analysis	40.22
layout and design	40.17
manufacturing considerations	40.17
programming	40.22
types, characteristics, motions	40.1
Cam motions:	
miscellaneous	40.15
polynomial family	40.14
trigonometric family	40.6
Candela, definition	3.5
Cap screw:	
flat, countersunk head	21.13
socket button-head	21.13
socket head	21.13
Capabilities:	
of computers (list)	5.4
of humans (list)	5.4

<u>Index terms</u>	<u>Links</u>	
Carbon ideal diameter	8.12	
Carriage bolts:		
dimensions	21.13	
(tables)	21.13	
Carrier systems	3.6	
Castigliano's theorem	16.2	
Cathode in welding	14.4	
Cause-effect-extent	11.3	
Centering mechanisms	39.7	
Central limit theorem	2.14	2.16
Centroid, of a bolt group	23.11	
Centroids and center of gravity	48.1	48.11
Chain drives:		
engineering steel chain drives	32.18	
lubrication and wear	32.14	
roller chain drives	32.4	
roller chain selection	32.7	
selection of silent chain drives	32.27	
selection offset-sidebar chain drives	32.20	
silent chain drives	32.25	
types, uses, characteristics	32.2	
Charge effects	11.3	
Charts, stress concentration	12.8	
Check:		
adequacy assessment	11.19	
alternative method	11.17	
asking the right questions	11.18	
cause-effect-extent equations	11.19	
colleague	11.17	
dimensional	11.15	
experience	11.15	
experimental	11.16	

<u>Index terms</u>	<u>Links</u>
Check: <i>(Continued)</i>	
insufficiency of the methods of check	11.17
limiting case	11.15
personal competence	11.19
problem-solving strategy	11.17
robustness of assumptions	11.16
Chemical effects	11.3
Chebychev spacing	41.4
Checklist, design	1.7
Chinese windlass	39.4
Chi-squared goodness-of-fit test	2.13
Circle diagram, Mohr	49.2
Circuit:	
bridge	3.34
design	43.4
welding	14.2
Clamping mechanisms	39.6
Clamshell loader	39.21
Classical approach to design	2.3
Classical statistical distributions	2.9
(table)	2.10
Clock mechanisms	39.8
Clearance, radial, in a journal bearing	28.3
Closure theorems	2.15
Clutches and brakes:	
actuational problems	30.48
band and cone	30.24
electromagnetic	30.45
friction materials	30.23
general	30.4
multidisk	30.40
rim type, analysis	30.25

Index terms**Links**Clutches and brakes: *(Continued)*temperature considerations **30.21**torque and energy considerations **30.14**

Clutch types:

band **30.34**centrifugal **30.33**cone **30.37**disk **30.40**electromagnetic **30.45**list of types **30.4**magnetic **30.46**Code **1.36** **1.42**for welds **14.39**Coefficient, strength **7.31**Coefficient of energy variation in flywheels **18.7**(example) **18.7**Coefficient of linear expansion **49.15**Coefficient of speed fluctuation **18.3**(table) **18.4**Coefficient of variation **2.6**

Coefficients of variation of strength amplitude:

for ASME-elliptic fatigue failure locus **13.26**for Gerber fatigue failure locus **13.25**for Smith-Dolan fatigue failure locus **13.26**Coldwork **7.18** **7.30** **8.3**Combined deflection of shafts **37.11**(table) **37.12**Companion normal to lognormal distribution **2.6**

Comparison of belt drives:

cost and economy **31.38**optimal speeds **31.40**performance **31.37**

<u>Index terms</u>	<u>Links</u>	
Comparison of belt drives: <i>(Continued)</i>		
power-cost curves	31.39	
properties (table)	31.38	
specific power transmission capacity	31.38	
Complete set of dimensionless variables	11.4	
Complex numbers	4.3	
Components, standard	1.20	
Compression packing	17.6	
Compressive stress, definition	49.4	
Computer-aided analysis (CAA)	5.3	
Computer-aided design (CAD)	5.3	
Computer-aided design in bevel and hypoid gears:		
available computer programs	34.56	
computer time-sharing	34.55	
design calculating services	34.56	
Computer-aided drafting (CAD)	5.3	
Computer-aided engineering (CAE)	5.3	
Computer-aided manufacturing (CAM)	5.3	
Computer analysis for slope and deflection in bending:		
BASIC computer code	50.17	
equation basis	50.3	50.14
numerical method	50.14	
shaft analysis example	37.5	
Computer-augmented design engineering technique (CADET)	5.24	
Computer-generated pseudo random numbers:		
lognormal	5.28	
normal	5.27	
uniform	5.27	
Weibull	5.28	
Computer hardware and software organization for robots:		
computer structure options	47.24	

<u>Index terms</u>	<u>Links</u>	
Computer hardware and software organization for robots: <i>(Continued)</i>		
microcomputers	47.22	
software organization	47.21	
supporting hardware and software	47.23	
Computer program documentation:		
sample page from CADET	11.12	
Computer programming suggestions for tension loaded		
joints	23.36	
logic flowcharts	23.27	23.28
Computer simulation	2.15	5.25
in statistical tolerancing	19.17	
Computer workstations	9.25	
Computer capabilities (list)	5.4	
Computing mechanisms	39.25	
Concepts of design (table)	1.10	
Confidence bounds	2.26	
Connecting mechanisms	39.15	
Constant flow vs. demand flow circuits:		
pump discharge pressure	43.12	
relation of pump discharge to actuator speed	43.12	
Constraints:		
equality	5.23	
functional	5.23	
inequality	5.23	
regional	5.23	
Consumer-expectation test	1.35	
Contact stresses	49.17	
in cams	40.25	
in wear	6.8	
minimum permissible curvature	40.26	
Contact zone half-width:		
of cylinders	49.20	49.22

Contact zone half-width: (<i>Continued</i>)	
of spheres (radius)	49.19
Control operation by humans	9.17
Control region	11.3
Control selection for humans	9.18
Control surface	11.3
Controller design for robots:	
coordination	47.26
generation of specified hand trajectories	47.27
servo design	47.28
subdivision	47.26
Correction:	
Bessel	3.45
Richardson	5.19
Correlation coefficient r	2.11
Correlation method	2.16
Corrosion:	
corrosion data for material selection	44.28
(table)	44.8
corrosion rates	44.2
introduction	44.1
metal attack systems	44.2
Corrosion rates	44.2
Cost	1.2
Cost in design evaluation	1.3
Cost, relative, of common spring wires (table)	24.10
Coulomb force	7.2
Coupling mechanisms	39.15
Couplings:	
attachment of	29.32
flexible estomeric	29.19

Index terms**Links****Couplings: (*Continued*)**

flexible metallic	29.9
general	29.2
rigid	29.7
rotating link	29.25
universal joint	29.25

Coupling types:

beam	29.12	
bellows	29.17	
Cardan	29.25	
Centaloc	29.33	
chain	29.11	
diaphragm	29.12	
double-Cardan	29.30	
flexible disk	29.9	
flexible elastomer	29.19	
flexible shaft	29.16	
gear	29.13	
grid	29.11	
Hooke	29.25	
hydraulic	29.13	
link	29.10	
needle bearing	29.28	
pin-and-block	29.8	
precompressed	29.24	
rigid	29.7	
roller-trunion	29.31	
rotating link	29.25	29.32
Rzeppa	29.31	
shear	29.22	
spring	29.15	
tension	29.23	

<u>Index terms</u>	<u>Links</u>	
Coupling types: <i>(Continued)</i>		
tire	29.23	
torus	29.23	
Tracta	29.30	
Uniflex	29.17	
Universal	29.25	
Covalent bonds	7.3	
Crafts and Lamont, addition method	8.9	
role in general strength estimation	13.4	13.33
Creep limit	7.43	
Creep rate	7.43	
Creep strength	7.43	
Critical diameter, ideal	8.12	
Critical hardness	8.10	
Critical speeds in shafts	37.17	
Rayleigh equation	37.17	
(example)	37.17	
(table)	37.20	
Critical stress-intensity factor	12.16	
Crystal, piezoelectric	3.28	
Cumulative distribution function of normal distribution		
(table)	2.7	
Cup packings	17.13	
Curve, Jominy	8.20	
Curved beam equations (table)	16.4	
Curve-fits:		
by least squares	4.22	
linear	4.23	
polynomial	4.21	
several variables	4.25	
simple exponential	4.20	4.24
Cycle profile	43.4	

<u>Index terms</u>	<u>Links</u>	
Cycles-to-failure estimates, complicated variation	13.29	
Cylinders:		
contacting, approach	13.42	
stress	13.41	
D		
Danger	10.2	
Damping	3.17	38.2
Damping ratio	38.5	
Data:		
amount to take	3.47	
analysis of	3.43	
combining	3.51	
histographic display of	2.12	
pooling	3.51	
valid	3.2	
Datsko:		
Fortran code for Datsko's rules	8.32	
method, use of	13.4	
notation	8.3	
rules	8.4	
Dead-weight tester	3.7	
Decision:		
a priori	5.6	
basic product (table)	1.11	
design	5.6	
second level (table)	1.11	
under risk, uncertainty, conflict	1.13	
Decision-maker	1.12	
Decision-making	1.12	
Decision-making model (table)	1.13	
Decision-making ingredients (table)	1.12	

I.22

<u>Index terms</u>	<u>Links</u>	
Decision-making steps	1.13	
Decision matrices	1.14	
Decisions, product (table)	1.11	
Decisions, second level (table)	1.11	
Decision theory	1.13	
Decision tree	1.14	
Decrement, tempering	8.10	
Defect:		
crystal	7.11	
design	1.35	10.3
manufacturing	1.34	10.3
product	1.34	
warning	1.34	
Definitions and notation for stress	49.1	
Deflection:		
analysis of frames	50.14	
angular twist	49.6	
bending	50.3	
computer analysis	50.3	
due to bending	50.3	
stiffness or spring rate	50.2	
Deflection of power screws	20.8	
Degree of precision	4.2	
Degrees of freedom	41.2	47.1
Delay time	3.14	
Demand-flow circuits:		
fixed-displacement pump circuits	43.20	
flow-compensated pumps	43.27	
pressure-compensated pumps	43.24	
Derived quantities	11.4	
Descriptive statistics	5.21	

<u>Index terms</u>	<u>Links</u>	
Design:		
algorithm	5.4	
checklist	1.7	
criteria	1.2	
critiques	1.2	
decision	5.6	
defect	1.35	10.3
definition of	1.1	3.1
deterministic approach to	2.3	
factor	1.18	
distribution of (figure)	2.8	
lognormal equation for	2.8	
normal equation for	2.9	
machine, definition	5.3	
probabilistic approach	2.15	
reviews	1.4	10.8
stochastic approach	2.15	
variables	5.6	
Design considerations in worm gearing:		
bored worm blanks	36.18	
gear-blank dimensions	36.17	
gear pitch diameter	36.14	
gear ratio	36.13	
number of teeth and threads	36.13	
pitch	36.14	
thread and tooth proportions	36.15	
tooth depth	36.16	
worm face	36.18	
Design and function of robots	47.6	
Design engineering technique, computer-augmented (CADET)	5.24	
Design factor, probability density function	13.25	

<u>Index terms</u>	<u>Links</u>	
Design factor vis a vis factor of safety	1.19	
Design imperative	1.1	
Design of mounting in bevel and hypoid gearing:		
axial thrust and radial separating force	34.53	
bearing loads	34.54	
hand of spiral	34.50	
loaded contact check	34.55	
lubrication	34.54	
tangential force	34.51	
types of mountings	34.54	
Design procedure	1.4	
Design process flowchart	1.7	
Design to a reliability goal	2.6	
Design specification form (table)	1.8	
Designer's fatigue diagram	13.24	37.15
Designer's obligation	10.4	
Designing:		
for human body postures	9.5	
for human force and power	9.13	
for human materials-handling	9.25	
for reach and mobility	9.9	
for sitting operator	9.7	
for standing operator	9.6	
for vision	9.24	
labels and warnings	9.23	
Designs, fail-safe	10.11	
Detail drawing	1.22	
Detector-transducer	3.5	
Deterministic deductive mathematical models	11.3	
steps in developing	11.3	
Deviation letter	1.34	

<u>Index terms</u>	<u>Links</u>
Deviation:	
fundamental	19.2
lower	19.2
upper	19.2
Deviations in fits	19.4
fundamental	19.4
tolerance position letters	19.4
in holes	19.5
in shafts	19.5
Deviations, on drawings	1.34
Diagram, designer's fatigue, for shafts	37.15
Diameter:	
critical ideal	8.12
carbon ideal	8.12
Diameter-pitch combination for metric (M) screw threads:	
(table)	21.3
Diamond-pyramid hardness	7.24
Dimensioning:	
dual	1.28
Dimensionless term	11.5
forming	11.5
pi term	11.5
Dimensions:	
derived	11.4
fundamental	11.4
human body	9.2
matrix of	11.4
on drawings	1.25
Dipoles	7.4
Distant hardness	8.16
Distortion energy—ASME-elliptic fatigue locus:	
for shafts	13.25 37.15

<u>Index terms</u>	<u>Links</u>	
Distortion energy—ASME-elliptic fatigue locus: <i>(Continued)</i>		
(example)	13.26	
Distortion energy—Gerber equation for shafts	13.25	37.17
Distortion energy theory	12.3	
Distribution, uniform, in tolerances	19.17	
Distributions, statistical (table)	2.10	
Documentation in design evaluation	1.3	
Domestic standards:		
mandatory	1.40	
voluntary	1.40	1.41
Double-enveloping worm gear sets:		
base circle	36.20	
gear blank dimensions	36.21	
gear ratio	36.19	
materials	36.22	
number of teeth and threads	38.18	
pitch	36.19	
tooth and thread forms	36.20	
tooth depth proportions	36.20	
worm length	36.21	
worm pitch and root diameter	36.19	
<i>(See also Worm gearing)</i>		
Drawing:		
assembly	1.22	
(example)	1.24	
detail	1.22	
(example)	1.23	
group	1.22	
(example)	1.25	
installation (example)	1.26	
machine outline	1.22	
(example)	1.25	

<u>Index terms</u>	<u>Links</u>
Drawing: <i>(Continued)</i>	
schematic	1.22
(example)	1.27
Drawings	1.20
mechanical	1.24
standard sizes of	1.22
Ductility, measure of	7.35
Dynamic:	
hardness	7.25
factor in cams	40.4
viscosity	25.6
Dynamic work, of humans	9.13
E	
Eccentrically-loaded shear joint	23.12
Eccentricity, in a journal bearing	28.4
Eccentricity ratio	28.15
Effect of fluid characteristics:	
on actuator performance	43.28
on control valve performance	43.31
Effective column length	15.4
Effects:	
ballistic	11.3
charge	11.3
chemical	11.3
heat	11.3
tractive	11.3
work	11.3
Efficiency of power screws	20.7
(graph)	20.7
Elastic constant equation	49.5
Elastic limit	7.34

<u>Index terms</u>	<u>Links</u>
Elasticity, modulus of	7.33
Elastically restrained column ends:	
critical buckling load	15.6
differential equation	15.6
equation for kL	15.7
Electrons	7.2
Elongation, percent	7.35
Emission ratio	3.9
Endloops of extention springs (table)	24.31
Endurance limit by correlation method:	
fatigue ratio for axial loading	13.19
fatigue ratio for rotating bending	13.19
fatigue ratio for torsional loading	13.19
Energy transmission systems:	
introduction	42.1
functional segments	42.2
Energy variation, coefficient of:	
in flywheels	18.7
(example)	18.7
Engineering, definition of	1.1
Engineering, human	9.1
Engineering (nominal) strain	49.5
Engineering steel chains:	
dimensions	32.19
nomenclature	32.18
nonstandard	32.3
sprockets for	32.3
selection	32.20
Engineering stress-strain	7.28
Equation, exponential	11.5
Equation, strain-strengthening	7.31

<u>Index terms</u>	<u>Links</u>
Equivalent load rating for power screws	20.10
Ergonomics	9.1
Ergonomics/human factors	10.20
Error:	
illegitimate	3.40
loading	3.42
random	3.41
systematic	3.40
Error analysis	4.13
statistical approach	4.14
Error, relative	4.8
Escapement mechanisms	39.8
Estimate:	
of yield strength after plastic strains	8.8
of ultimate strength after heat treatment	8.9
of ultimate strength after plastic strains	8.8
Estimator, unbiased	3.44
Euler column buckling equation	15.2
pinned-end buckling load	15.4
Expected value	2.14
Expected usage	1.9
Exponent, strain-strengthening	7.36
Exponential equation	11.5
Express warranty	1.34
Extended position in power screws	20.3
Eyelets	22.10
Eytelwein equation	31.14
F	
Face-centered cubic structure	7.10
Face seals	17.6

Index terms

Links

Factor:

application, in rolling contact bearings	27.13	
Buckingham load-stress	13.43	
critical stress-intensity	12.16	
design	1.18	
dynamic, in cams	40.14	
fatigue strength modification	13.9	
loading	13.13	
Marin fatigue modification	13.9	
miscellaneous	13.17	13.19
multiplying, for materials	8.21	
of safety	1.18	
of safety vis a vis design factor	1.19	
shape, in flywheels (table)	18.21	
size	13.12	
stress-concentration	12.7	
stress intensity	12.15	
surface finish	13.12	
temperature	13.14	
tempering	8.10	

Fail-safe designs

10.11

Failure analysis in design evaluations

1.3

Fasteners:

threaded	21.1
unthreaded	22.1

Fatigue:

strength component, amplitude:	
for ASME-elliptical failure locus	13.25
for Gerber failure locus	13.25
for Smith-Dolan failure locus	13.26
strength component, steady	13.25
stress component, amplitude	13.24

<u>Index terms</u>	<u>Links</u>	
Fatigue: <i>(Continued)</i>		
stress component, steady	13.24	
Fatigue diagram, designer's, for shafts	37.15	
Fatigue loading of bolted and riveted joints	23.29	
Fatigue locus for shafts:		
distortion energy—ASME-elliptic	13.25	37.15
distortion energy—Gerber	13.25	37.15
Smith-Dolan	13.16	
Fatigue, of humans	9.13	
Fatigue equations summary:		
(table), customary engineering units	13.21	
(table), SI units	13.22	
Fatigue ratio:		
average	2.18	
probability density function	2.17	
scalar	2.17	
stochastic	2.17	
parameters (tables)	2.17	
Fatigue ratios of Gough	13.11	
Fatigue strength modification factors (Marin)	13.3	
Fatigue testing:		
coaxing method	13.5	
constant stress level testing	13.5	
probit method	13.5	
Prot method	13.5	
sparse survey method	13.4	
up-down method	13.6	
Feasibility	1.16	
Figure of merit	1.17	5.6
in skill #2 (flowchart)	5.8	
Film bearing (<i>see</i> Journal bearings)		
Fine adjustment mechanisms	39.4	

<u>Index terms</u>	<u>Links</u>
Finished hex bolt, basic dimensions (table)	21.14
Finite difference approximations	4.16
Finite element method	15.13
Finite resolution	3.46
First-angle projection	1.21
Fit:	
standard fits (table)	19.10
U.S. standard	19.9
Fits:	
hole basis	19.2
shaft basis	19.2
preferred	19.7
Flat-belt drive	31.14
Flaws, of a surface	1.29
Flexible connector drives	31.2
classification	31.3
forces	31.5
geometry	31.3
tensioning devices	31.9
<i>(See also Belt drives)</i>	
Flexural formula	49.13
Flexure	49.10
Flow plots	43.2
Flowchart of the design process	1.7
Fluctuation, angular, in flywheels	18.7
example	18.8
Fluid power systems and circuit design:	
basic pneumatic power circuit	43.32
circuit design	43.4
constant flow vs. demand flow circuits	43.12
cycle profile	43.4
demand flow circuits	43.20

Index terms

Links

Fluid power systems and circuit design: <i>(Continued)</i>		
effect of fluid characteristics:		
on actuator performance	43.28	
on control valve performance	43.31	43.32
flow plots	43.2	
fluid logic systems	43.38	
hydraulic vs. pneumatic systems	43.28	
open and closed loop circuits	43.5	
pneumatic circuits	43.28	
pressure plots	43.2	
Flywheels	18.3	
Flywheels for energy storage:		
isotropic and anisotropic designs	18.20	
special considerations	18.21	
Fluxes:		
bonded	14.12	
fused	14.12	
FOM (<i>see</i> Figure of merit)		
Foot strength of humans	9.14	
Force:		
Coulomb	7.2	
human	9.13	
Force and torque analysis of cams	40.22	
cam force	40.24	
cam torque	40.25	
critical angle	40.23	
jump speed	40.25	
springs	40.25	
Foreign standards	1.40	1.42
Form, design specification	1.8	
Fortran subroutine GOLD:		
code	11.10	

<u>Index terms</u>	<u>Links</u>
Fortran subroutine GOLD: <i>(Continued)</i>	
documentation	11.12
Four-bar planer linkage:	
basic parameters	41.4
kinematic inversion	41.6
torque ratio	41.6
transmission angle	41.7
velocity ratio	41.6
Four-bar planer linkage, dimensional synthesis:	
analytical synthesis	41.19
geometric synthesis	41.18
Four-bar planer linkage, kinematics:	
dynamic behavior	41.10
position geometry	41.8
velocity and acceleration	41.9
Four-bar planer linkage, motion generation:	
available computer programs	41.17
five positions in a plane	41.17
four positions in a plane	41.12
three positions in a plane	41.10
two positions in a plane	41.10
Fourier series	4.7
approximation to	4.12
Fracture mechanics	12.11
Fracture strain	7.35
Fracture strength	7.34
Fracture toughness	12.16
for some engineering materials	12.19
Frequency response	3.13
Function, of a design	1.2
Function evaluations:	
in exhaustive search	11.9

Index terms**Links**Function evaluations: (*Continued*)

in Fibonacci search	11.10
in golden section search	11.10
in interval halving search	11.9
Function-generator mechanisms	39.24
Functions	4.3
Functions of random variables:	
means	2.14
standard deviation	2.14
Fundamental dimensions	11.4

G

Gaskets:

classification	26.1
(table)	26.4
compression and stress testing	26.22
design and selection	26.13
environmental conditions	26.12
installation specifications	26.23
load-bearing properties	26.7
permeability properties	26.3
test method	26.2

Gasket base materials:

binders and fillers	26.3
metallic	26.7
nonmetallic	26.3
reinforcements	26.6

Gasket design and selection:

ASME code procedure	26.13
Whalen simplified procedure	26.14

Gasket environmental conditions	26.12
---------------------------------	-------

Gasket installation checklist	26.23
-------------------------------	-------

Index terms**Links**

Gasket properties:

conformability and pressure	26.7	26.9
creep and relaxation	26.10	
effect of geometry	26.11	

Gasket testing:

lead pellet test	26.22
NCR paper test	26.23

Gas-lubricated journal bearings

	28.43
axially grooved	28.50
limiting solutions	28.44
noncircular	28.51
ungrooved	28.45

Gauge, strain

3.35

Gearing:

bevel	34.1
helical	35.1
hypoid	34.1
spur	33.1
worm	36.1

Gear strength in bevel and hypoid gearing

34.25

allowable stresses	34.33
formulas for contact and bending strength	34.31
scoring resistance	34.42

Gear-tooth dimensions in bevel and hypoid gearing:

AGMA references	34.25
bevel-gear tooth dimensions	34.19
hypoid dimensions	34.24
tooth taper	34.19

Gear trains:

differential gear trains	46.14
gear type selection	46.3
ordinary gear trains	46.1

<u>Index terms</u>	<u>Links</u>
Gear trains: <i>(Continued)</i>	
planetary gear trains	46.14
Geometric:	
acceleration	40.4
jerk	40.6
velocity	40.4
Geometric design of robots:	
accuracy and repeatability	47.38
singular positions	47.37
structural subdivision	47.29
workspace optimization	47.30
Gerber parabolic fatigue locus	37.15
Golden section search	15.12
Goodness-of-fit test:	
chi-squared	2.13
Kolomogorov-Smirnov	2.11
Gough, stochastic nature of the fatigue ratio	13.11
Governmental regulations	1.36
Grade markings:	
ASME (table)	21.9
metric	21.10
SAE (table)	21.8
Grommets	22.16
Grossmann and Fields multiplication method	8.12
role in estimating local strengths	13.4
block diagram	13.33
example	13.33
Grubler criterion	41.4
Guarding	10.12
Gumbel conditions	28.16

<u>Index terms</u>	<u>Links</u>	
H		
Hand strength of humans	9.15	
Hardness	7.1	7.21
as-quenched	8.10	
Brinell	7.22	
critical	8.10	
diamond pyramid	7.24	
distant	8.16	
dynamic	7.25	
initial	8.16	
Knoop	7.25	
Meyer	7.23	
Rockwell	7.21	
scleroscope	7.25	
Hazard	10.2	
classification	1.8	
recognition	10.5	
Hazards:		
analysis (checklist)	10.6	
electrical	10.5	
energy	10.5	
environmental	10.6	
human factors/ergonomic	10.5	
kinematic/mechanical	10.5	
of human origin (table)	1.9	
of nonhuman origin (table)	1.9	
Heat effect	11.3	
Heavy structural hex bolt	21.5	
dimensions (table)	21.7	
Height of the work station	9.6	
Helical gear geometry	35.5	
Helical gear load rating	35.9	

<u>Index terms</u>	<u>Links</u>
Helical gear types:	
continuous (herringbone)	35.2
double conventional	35.2
double staggered	35.2
single	35.2
Helical gearing advantages:	
load capacity	35.4
manufacturing	35.4
noise	35.2
Helical gears:	
advantages	35.2
geometry	35.5
load rating	35.8
Hesitation mechanisms	39.19
High-cycle fatigue strength equation	13.34
High-cycle fatigue strength approximation	13.28
High-cycle fatigue strength cycles-to-failure:	
estimate, example	13.30
Histogram	2.3
(example)	2.4
Histogrammic data	2.12
Hoisting mechanisms	39.4
Hole-basis for fits	19.2
Hollow shaft correction	37.19
Hooke's law	49.5
Human:	
capabilities	5.4
engineering	9.1
force	9.13
power	9.13
Human Factors and Ergonomics Society	9.1
Human factors/ergonomics	10.20

<u>Index terms</u>	<u>Links</u>
Human strengths	9.16
Hybrid journal bearings (<i>see</i> Journal bearings)	
Hydraulic vs. pneumatic systems	43.28
Hydrodynamic bearing (<i>see</i> Journal bearings)	
Hydrostatic journal bearings (<i>see</i> Journal bearings)	
Hydrostatic journal bearing design	28.52
classification	28.52
design parameters	28.54
design procedures	28.54
Hypoid gears (<i>see</i> Bevel and hypoid gears)	
I	
Ideal critical diameter	8.12
IEC (International Electrotechnical Commission)	45.7
Illegitimate error	3.4
IMP (Integrated Mechanisms Program)	41.23
Impact strength	7.42
Implied warranty	1.34
Inadvertent operation	9.20
Increments, alloy	8.10
(<i>See also</i> Alloy increments)	
Index, viscosity	25.7
improvers	25.8
Indexing mechanisms	39.9
Industrial psychology	9.1
Industrial:	
engineering	9.27
psychology	9.1
Inferential statistics	5.21
Influences on the designer:	
external	1.4

<u>Index terms</u>	<u>Links</u>	
Influences on the designer: (<i>Continued</i>)		
figure	1.5	
internal	1.4	
figure	1.6	
Ingredients in decision-making (table)	1.12	
Initial hardness	8.16	
ISO (International Standards Organization)	43.33	45.8
Intended use	1.9	
Integration:		
BASIC program for beam deflection	50.17	
numerical	4.18	5.19
Simpson rule	4.18	5.19
torque-angle in flywheel	18.5	
Instability in beams	15.14	
example	15.16	
Instructions, for safe use	9.24	
Interference of distributions:	2.5	
general distributions	2.20	
lognormal-lognormal distributions	2.19	
normal-normal distributions	2.19	
Interference-fit stresses	19.9	
example	19.11	
Interlocking	9.22	
International Ergonomics Association	9.1	
International tolerance grade	19.2	
Interpolation	4.26	
linear	4.27	
exponential	4.28	
Interpolation formula for L/D	28.28	
Interval-halving search	11.9	
Interval of uncertainty	11.9	

Index terms**Links**

Introduction to robots:

elements of a robot system	47.1
externally constrained mechanisms	47.3
use of the word "robot,"	47.3
IT (international tolerance grade)	19.2

J

J. B. Johnson buckling equation in power screws	20.8
Jerk, geometric	40.6

Joints:

bolted	23.1
friction type	23.10
riveted	23.1
shear	23.4
welded	14.23

Joints, tension loaded (*see* Tension-loaded joints)

Jominy:

curve	8.20
distance	8.9
specimen	8.9
test	8.9
	12.2

Journal bearings:

bearing and journal configurations	28.4
clearance	28.5
elliptical	28.5
fitted	28.6
foil	28.7
full bearings	28.4
lobed	28.6
offset	28.6
partial	28.4
pivoted shoe	28.6

<u>Index terms</u>	<u>Links</u>	
Journal bearings: <i>(Continued)</i>		
rocking	28.6	
shapes	28.7	
step	28.6	
tilting pad	28.6	
Journal bearing material and selection criteria:		
material selection	28.2	
materials	28.7	
pressure equation	28.13	
Journal bearing performance:		
friction relations	28.18	
load relation	28.16	
lubricant flow	28.18	
thermal relations	28.19	
K		
Kilogram, definition	3.4	
Kinematic viscosity	25.6	
Kinematics of power screws	20.3	
Knoop hardness	7.25	
Kolomogorov-Smirnov goodness-of-fit test	2.11	
Keys	22.23	22.24
L		
Label, example	10.19	
Labels	9.23	
example	10.19	
guidelines (checklist)	9.23	
Ladle analysis	8.9	
Langer first-cycle-yield line	37.16	
Latch mechanisms	39.12	
Lattice points	7.8	

<u>Index terms</u>	<u>Links</u>
Lattice, space	7.8
Lay, of a surface	1.29
Legal considerations in design	1.34
Levai representation of a planetary gear train	46.9
Life, in rolling contact bearings:	
mean	27.7
median	27.7
Life, wear	6.1
Limit, creep	7.43
Limit, elastic	7.34
Limiting stress criterion in columns	15.8
deflection curve	15.9
differential equation for crooked column	15.9
maximum bending moment	15.9
stress equation	15.10
LINCAGES (program)	41.23
Line, ear-eye	9.24
Line of sight	9.24
Linear actuators	39.3
Linear wear equation	6.13
Line-call-out in gaskets	26.2
Linkage concepts:	
degrees-of-freedom	41.1
kinematic elements	41.1
number synthesis	41.3
Linkages:	
crank-angle coordination	41.18
four-bar planer linkage	41.4
kinematic analysis of fourbar linkage	41.8
linkage concepts	41.1
mobility criterion	41.4

Index terms**Links**Linkages: *(Continued)*

pole-force method 41.20

precision positions 41.4

spatial linkages 41.21

Lip seals, radial 17.4

Liquid-lubricated journal bearing:

design charts 28.23

L/D effects 28.20

optimization 28.40

Load-cycle analysis:

introduction 42.1

load-dominated energy transmission systems 42.4

load plots 42.7

machine-cycle analysis 42.5

load-dominated energy transmission system 42.4

Load-induced von Mises stresses in shafts:

stress amplitude component 37.14

steady stress component 37.14

components due to press-fit 32.15

Load line in a shaft 13.40 37.16

critical slope 37.16

slope 37.16

Load-life-reliability equation for rolling contact:

bearings 27.10

Load-plots 42.7

Loading:

combined 13.36

simple 13.36

Loading mechanisms 39.21

Loading in rolling contact bearings 27.13

continuously varying 27.13

stepwise varying 27.13

<u>Index terms</u>	<u>Links</u>	
Loading error	3.41	
Loads on shear joints	23.11	
Locating mechanisms	39.7	
Logarithmic strain	7.29	
Lognormal probability density function	2.10	2.13
Lognormal variates:		
distribution in high-cycle fatigue	13.4	
fatigue ratio	13.11	
Marin factors	13.11	
products, quotients, real powers	2.14	
Logic elements	43.40	
Logic flowchart for estimating local strength	13.33	
Lubricants:		
deterioration	25.12	
feed	25.16	
function	25.1	
gas	25.26	
grease	25.17	
liquid	25.3	
selection of	25.14	
selection of type of	25.2	
solid	25.22	
storage	25.29	
unconventional	25.1	
Lubrication:		
boundary	25.4	25.9
elastohydrodynamic	25.5	
hydrodynamic	25.4	
mixed	25.4	
thick film	25.4	
Lubrication of, and wear in chain	32.14	
application of lubricants	32.14	

Index terms

Links

Lubrication of, and wear in chain (*Continued*)

chain-casing reservoirs	32.16
flow rates	32.15
purposes	32.14
recommendation	32.17
types of lubrication	32.16

M

Machine-cycle analysis	42.5	
case study	42.6	
Machine design, definition	5.3	
Machine outline drawing	1.22	
Machine screws	21.22	
Maintenance	10.10	
Manipulation area	9.27	
Manufacturability	1.2	
Manufacturing defect	1.34	10.3
Manufacturing of bevel and hypoid gears:		
localization of contact	34.7	
methods of generation	34.7	
testing	34.7	
Margin, stress	2.4	
Marketability	1.2	
Marin fatigue modification factors:		
loading factor	13.13	13.19
miscellaneous effects factor	13.17	
scalar	13.9	
size factor	13.12	
stochastic	13.11	
surface factor	13.12	
temperature factor	13.14	
Material, brittle	12.5	

<u>Index terms</u>	<u>Links</u>
Material handling, by humans	9.25
Mathematical model	11.2
Matrices:	
decision	1.14
loss table	1.14
payoff	1.14
Matrix of dimensions	11.4
rank of	11.5
Matrix of solutions	11.6
Material specification on drawings	1.32
Maximum pressure in zone of contact:	
of cylinders	49.20
of spheres	49.18
Mean, sample	3.44
Mean design factor	2.8
Mean life in rolling contact bearings	27.7
Mean rank CDF	2.12
Measurement	3.1
valid	3.2
Measurement task flowchart	3.3
Measurement system, design of	3.8
Mechanical drawings	1.21
Mechanism types:	
clamping	39.6
computing	39.25
connecting	39.15
coupling	39.15
escapement	39.8
fine adjustment	39.4
function generator	39.24
hesitation	39.19
indexing	39.9

Index terms

Links

Mechanism types: *(Continued)*

latching	39.12
linear actuators	39.3
loading	39.21
locating	39.7
oscillating	39.10
path generators	39.23
pause	39.19
ratchet	39.12
reciprocating	39.13
reversing	39.14
robot	39.27
slider-connector	39.8
snap-action	39.2
speed-changing	39.26
stop	39.19
transport	39.21
unloading	39.21
Mechanisms, a thesaurus of	39.1
Mechanisms of wear	6.2
Median life in rolling contact bearings	27.7
Median-rank CDF	2.12
Merit	1.14
Merit, figure of	1.17
Metal attack systems	44.2
crevice corrosion and pitting	44.5
galvanic corrosion and protection	44.3
general attack	44.2
hydrogen embrittlement	44.7
intergranular corrosion	44.7
mechanical contributions	44.28
passivation	44.4

<u>Index terms</u>	<u>Links</u>	
Metal attack systems (<i>Continued</i>)		
sacrificial anodes	44.6	
selective leaching	44.6	
stress-corrosion cracking	44.6	
Metallic bond	7.3	
Metallic sealing rings	17.6	
Meter, definition of	3.4	
Method for bending deflection of shafts:		
basis for tabular method	37.5	
table	37.5	37.7
Method for combined deflection of shafts	37.11	
table	37.12	
Method for shear deflection of shafts	37.8	
table	37.8	37.10
Method, weighting function	1.17	
Metric hex bolts:		
head dimensions (table)	21.7	
thread length	21.6	
Metric standard of limits and fits	19.2	
Meyer hardness	7.23	
Minimum fillet weld size	14.42	
"Minimum" strength design	2.3	
Misalignment penalty	27.16	
Mobility, at a workstation	9.9	9.13
Mobility criterion	41.4	
Grubler criterion	41.4	
Model, for decision-making	1.13	
Modeling, one system with another	11.8	
Modes of product usage (table)	1.9	
Modes of wear failure	6.11	
Modulus of elasticity (Young)	7.33	

<u>Index terms</u>	<u>Links</u>
Modified buckling equations	15.7
Modified Mohr theory of failure	12.6
Modulus:	
of elasticity	49.5
of rigidity	49.5
shear modulus of rigidity	49.5
tangent	15.8
Youngs	7.33
Mohr circle	49.2
programming of	49.3
Molecular solids	7.5
Mole, definition	3.5
Moore, R. R., fatigue test	2.16
Most-representative value	3.1
Multiplicative method of Grossmann and Fields	8.12
Must action	1.12
N	
Naming fatigue loci	13.41
Natural strain	7.29
Nature of the welding arc	14.4
Navier-Stokes equation	28.13
NCR (National Cash Register Company) paper test	26.23
Negligence	1.34
NEMA (National Electrical Manufacturers Association):	
color identification	14.20
Neutral axis (surface)	49.13
Neutrons	7.2
Newton, definition	3.4
Newton-Raphson method	5.17

<u>Index terms</u>	<u>Links</u>
NFPA (National Fluid Power Association)	43.33
Nil-ductility temperature	7.43
Noise	45.1
Noise and its control:	
introduction	45.1
noise control	45.18
noise effects and standards	45.15
noise measurement and analysis	45.2
Noise control:	
path control	
control of airborne noise	45.26
control of structure borne noise	45.21
source control	45.18
electric motors	45.18
fans and blowers	45.16
hydraulic pumps	45.20
other mechanical components	45.21
Noise effects and standards:	
hearing damage	45.15
sleep interruption	45.18
speech interference	45.17
Noise measurement and analysis:	
data evaluation	45.10
measurement instrumentation	
acoustical calibrations	45.8
microphones	45.7
sound-level meters	45.6
spectrum analyzers	45.8
measurement procedures	45.8
noise measures	45.2
sound fields	45.5
Nominal (engineering) strain	7.27

<u>Index terms</u>	<u>Links</u>		
Noncontacting seals	17.9		
Nonferrous metals	12.17		
Normal distribution	2.7	2.10	2.12
CDF (table)	2.7		
interference theory	2.5		
Normal distribution in statistical tolerancing	19.18		
Normal variates, sums of	2.14		
Notation of Datsko	8.3		
Notch sensitivity	12.8		
factor	12.8		
mean notch sensitivities	13.19		
scatterbands	13.18		
Nucleus	7.2		
Number, Sommefeld	25.3	28.7	
Number:			
atomic	7.2		
quantum	7.2		
(<i>See also</i> Numbers)			
Numbering systems for metals:			
AISI	7.51		
SAE	7.51		
for aluminum alloys	7.52		
for copper alloys	7.53		
for magnesium alloys	7.54		
Numbers:			
approximate	2.21		
approximation-error	2.26		
incomplete	2.26		
integer	2.26		
irrational	2.26		
range	2.26		
rational	2.26		

Index terms

Links

Numbers: *(Continued)*

rounded	2.27
significant	2.26
Nuts	21.28

O

Occupational Safety and Health

Administration (OSHA)	9.2	10.9
Octahedral shear stress	12.3	
limiting value	12.4	
Octahedral shear theory	12.3	
Open- and closed-loop circuits	43.5	
control methods	43.7	
directional control	43.7	
flow control	43.8	
pressure control	43.9	
functions performed	43.6	
Optimality	11.9	
Offset	7.34	
Offset slider-crank planer linkage	41.8	
Oldham coupling	39.16	
Operation, inadvertant	9.20	
Operation of pedals by humans	9.6	
Operational amplifiers	3.26	
Optimization	4.37	
of journal bearings	28.40	
Optimization tasks of the computer	5.22	
logic flowchart	5.8	
OR logic element	43.42	
Ordered principal stresses	12.4	
O-ring materials	17.3	

<u>Index terms</u>	<u>Links</u>
O-ring seals	17.1
circular sections	
standard sizes (table)	17.2
standard sizes, rectangular sections (table)	17.3
Orthographic projection	1.21
Oscillating mechanisms	39.10
OSHA (Occupational Safety and Health Administration)	45.17
Overhauling screws	20.3
Overrunning clutches	30.5
Overshoot	3.18
 P	
Packing, compression	17.6
Parabolic bucking formula (Johnson)	20.8
Parameter, stimulus	1.19
Parameters in wear equation	6.6
Parts, standard	1.20
Partial derivative estimation method	2.14
Path generator mechanisms	39.23
Pawl	39.12
Pause mechanisms	39.19
Peak time	3.18
Peaucellier linkage	39.23
Pedals, human operation of	9.6
Percent elongation	7.35
Percentiles	9.3
Permissible speeds in rolling contact bearings	27.6
Permissible stresses and strains	12.2
role of design factor	12.2
role of factor of safety	12.2

<u>Index terms</u>	<u>Links</u>	
Permissible stress levels	2.3	
Person, average	9.3	
Phase response	3.14	
Philosophy of design (table)	1.10	
Physiology, work	9.1	
Pi terms	11.5	
formation of	11.5	
Piezoelectric:		
accelerometer	3.29	
crystal	3.28	
Pinion	33.1	
Pins	22.8	
types of	22.8	
Pipe	48.22	
(tables)	48.22	48.23
Pipe threads	21.5	
inside dimensional (table)	21.5	
Piston rings	17.15	
Pitch:		
angle	33.4	
base	33.3	
circle	33.1	
circular	33.1	
diameter	33.1	
diametral	33.1	
Plane stress	49.1	
Plastic true strain	49.10	
conversion equation	49.10	
Pneumatic circuits	43.28	
Points, lattice	7.8	
Poisson ratio	49.5	

<u>Index terms</u>	<u>Links</u>
Pole-force method in linkages	41.20
Posture, human:	
kneeling	9.5
lying	9.5
squatting	9.5
stooping	9.5
Power plots	43.3
Polydyne cams	40.14
Polynomial cam motions	40.14
Power:	
screws	20.2
springs	24.61
Precipitation hardening	7.20
Precision	3.1
index	3.43
positions	41.4
Chebychev spacing	41.4
Preferred fits	19.7
Preferred numbers and sizes:	
preferred numbers	48.14
(table)	48.15
preferred sizes	48.15
metric sizes in millimeters (table)	48.16
sizes in fractions of an inch (table)	48.17
Pressure gauge, Bourdon tube	3.6
Pressure plots	43.2
Pressurized bearing (<i>see</i> Journal bearings)	
Pretension in springs	24.29
Pretensioning of belts:	
by adjusting center distance	31.11
by belt strain	31.11
by slackside tensioner	31.11

<u>Index terms</u>	<u>Links</u>	
Pretensioning of belts: <i>(Continued)</i>		
by torque	31.14	
illustrations	31.14	
Primary shear	23.13	
Principal directions	49.2	
Principal stress cubic equation	49.4	
Principal stresses	49.2	
ordered	12.4	
Prismatic pair	39.1	
Probabilistic design:		
approach	2.16	13.19
factor (figure)	13.25	
methods	2.15	
Problem-solving	1.11	
Problem-solving constraints	1.1	
Product:		
decisions (table)	1.11	
defect	1.34	
Product usage, modes of	1.9	
Programming a cam system	40.26	
logic flowchart	40.27	
program steps	40.26	
Programming suggestions for tension-loaded joints	23.36	
logic flowcharts	23.37	
Projection:		
first angle	1.21	
orthographic	1.21	
third angle	1.21	
Proof strength	7.34	
Propagation of error	2.15	

<u>Index terms</u>	<u>Links</u>
Properties, tensile	7.32
table	7.47
Properties of beams in bending (table)	50.5
Properties of common spring materials (table)	24.7
Properties of sections (table)	48.3
Protons	7.2
Pseudo-random number generator	2.16
Psychology, industrial	9.1
Pure tension, definition	48.4
 Q	
Q factor	38.16
Quadrature	11.13
Qualifying tests	1.33
Quantum number	7.2
Quick-return mechanism	39.10
 R	
R (Renard) series of preferred numbers	48.14
Radial and thrust loading in rolling contact bearings	27.12
Radial clearance in journal bearings	28.3
Radial lip seals	17.4
Radius of gyration	48.13
Raimondi and Boyd charts	28.23
Rainflow counting technique	13.30
Random:	
error	3.41
number generation	2.16
numbers	5.25
variable algebra	2.13
Range of motion in power screws	20.3

<u>Index terms</u>	<u>Links</u>	
Range numbers	2.26	
Rachel mechanisms	39.12	
Rate:		
creep	7.43	
spring	50.2	
Rated life of ball screws	20.10	
Rating life of rolling-contact bearings	27.7	
Ratio:		
acceptance	3.9	
emission	3.9	
transfer	3.9	
RCCC linkage	39.11	
RCCR coupling	39.17	
RCCR linkage	41.3	
Real number	4.1	
<i>(See also Numbers)</i>		
Reach, human	9.9	
envelopes	9.9	
Reciprocating mechanisms	39.13	
Reciprocating motion seals	17.9	
lip packings	17.13	
O-rings	17.9	
piston rings	17.15	
Reduction of area	7.35	
Regulations, governmental	1.36	
Relations, natural and nominal strain	7.36	
true and nominal stress	7.36	
Relative error	4.8	
Release, of drawings and specifications	1.33	
Reliability	1.2	2.5

<u>Index terms</u>	<u>Links</u>	
Reliability estimate:		
shaft examples	13.26	
Renard geometric series	19.2	
Residuals, in Newton-Raphson method	5.16	
Resolution	3.10	
finite	3.46	
Response:		
amplitude	3.12	
frequency	3.13	
phase	3.14	
potential	2.19	
time	3.14	
Response potential	2.19	
Retaining rings	22.16	22.18
stamped	22.18	
Retracted position in power screws	20.3	
Reversing mechanisms	39.14	
Reynolds equation	28.14	
RGGR coupling	39.18	
RGGR linkage	39.11	41.21
Richardson error estimate	5.19	
Ring with distributed loading	16.13	
example	16.14	
Rings, retaining	22.16	22.18
stamped	22.18	
Ring-segment:		
deflection due to concentrated load	16.19	
with distributed load	16.20	
with fixed ends	16.15	
with one support	16.3	
with one support (table)	16.9	
with simple supports	16.11	

<u>Index terms</u>	<u>Links</u>	
Ring-segment: <i>(Continued)</i>		
with symmetrical loads	16.12	
Rise time	3.14	
Risk	10.2	
Rivets:		
head shapes	22.1	
types	22.2	
sizes and material	22.3	
Robot mechanisms	39.27	
Robots and smart machines:		
actuation and power transmission system	47.12	
computer hardware and software organization	47.21	
controller design	47.26	
design and function	47.6	
geometric design	47.29	
introduction	47.1	
sensing system	47.17	
structural design	47.8	
tool design	47.39	
Rockwell hardness	7.21	
Rod scrapers	17.14	
Roller bearings (<i>see</i> Rolling contact bearings)		
Roller chains:		
dimensioning	32.4	
double-pitch	32.2	
multistrand	32.2	
nomenclature	32.4	
nonstandard	32.3	
numbering	32.5	
selection	32.7	
sprockets	32.3	32.6
standard	32.2	

Index terms**Links**Roller chains: (*Continued*)

strength	32.5
----------	------

Rolling-contact bearings:

application factor	27.13
basic load rating	27.7
coefficients of friction (table)	27.6
combined loading	27.12
illustrations	27.2
load-life-reliability relation	27.9
load-life relation at constant reliability	27.7
misalignment	27.16
survival relations at steady load	27.8
variable loading	27.13

Roman method of engineering design	2.3
------------------------------------	-----

Root-finding 5.15

exploratory phase	4.29
interval-halving in	4.30
linear interpolation in	4.30
Newton-Raphson	4.31
of simultaneous equations	4.34
quadratic equation	4.34

Rotary motion seals:

cast iron sealing rings	17.6
compression packing	17.6
face seals	17.6
metal sealing rings	17.6
noncontacting seals	17.9
O-rings	17.4
radial lip seals	17.4

Roughness of a surface	1.29
------------------------	------

Round-head bolts:

dimensions	21.12
------------	-------

<u>Index terms</u>	<u>Links</u>	
Round-head bolts: <i>(Continued)</i>		
(table)	21.13	
RRGC linkage	39.11	
RRGRR linkage	39.11	
Rounding	2.27	4.1
R. R. Moore test	2.16	13.4
r-test	2.11	
Rubber	26.6	
Rules of Datsko	8.4	
Run test for randomness	5.21	
Running torque of power screws	20.7	
Rupture	12.5	
Rzeppa universal joint	29.31	

S		
Safe	10.5	
Safety	1.1	10.1
checklists	10.11	
factor of	1.18	
in design evaluation	1.3	
Sample, random	3.44	
Sampling	3.44	
Sample mean	3.44	
Scales, standard	1.22	
Schematic drawing	1.27	
Scleroscope hardness	7.25	
Scooping mechanisms	39.22	
Scotch yoke mechanism	39.13	
Screw clamp	39.6	
Screw threads:		
metric series	21.1	

<u>Index terms</u>	<u>Links</u>	
Screw threads: <i>(Continued)</i>		
unified inch series	21.1	
Screws:		
cap screw	21.11	
(table)	21.13	
flat counter-sunk head, cap	21.13	
formed	21.11	
(table)	21.14	
heavy	21.11	
(table)	21.14	
machine	21.22	
power	20.2	
shoulder	21.15	
slotted-head set screw	21.19	21.22
socket button-head cap	21.13	
socket-head cap	21.13	
tapping	21.35	
Seal rings	17.1	
Sealing rings, metallic	17.6	
Seals for rotary motion	17.4	
Search:		
exhaustive	11.9	
golden-section	11.9	
interval-halving	11.9	
Secant column equation	5.14	
Second, definition	3.5	
Second-level decisions (table)	1.11	
Secondary bonds	7.4	
Second moments of area	48.11	48.13
radius of gyration	48.13	
transfer formula	48.13	
Secondary quantities	11.4	

<u>Index terms</u>	<u>Links</u>
Section modulus	49.14
Sections and shapes, tabular data:	
centroids and center of gravity	48.1
preferred numbers and sizes	48.14
second moment of areas	48.11
sizes and tolerances of sheet steels and bars	48.17
structural shapes	48.37
wire and sheet metal	48.37
Selecting materials for wear resistance	6.7
Selection guidelines in rolling-contact bearings	27.6
Self-lowering screws	20.3
Sensing systems of robots:	
encoders	47.18
force sensors	47.19
proximity sensors	47.20
requirements	47.17
resolvers	47.19
robot vision systems	47.20
Sensitivity	3.10
Series:	
binomial expansion	4.6
Fourier	4.8
Taylor	4.7
trigonometric	4.6
Set, complete, of pi terms	11.4
Set screws	21.19
Set, in springs	24.19
Settings:	
discrete	9.17
quantitative	9.17
Settling time	3.18

Index terms

Links

Several degree-of-freedom systems:

multi-degree-of-freedom systems continuous	38.26	
Rayleigh method	38.26	
geared	38.25	
Holzer numerical method for	38.23	
two degree-of-freedom systems	38.19	
forced vibration	38.20	
free vibration	38.19	
SFA (suitability-feasibility-acceptability) method	1.16	
Shaft basis for fits	19.2	
Shaft diameter in general shaft loading	13.41	
Shaft terminology	37.2	
Shafts:		
critical speeds	37.17	
distortion due to:		
bending	37.3	
torsion	37.13	
transverse shear	37.8	
hollow	37.19	
introduction	37.2	
load-induced stresses	37.14	
materials	37.13	
strength	37.15	
Shape factor for isotropic flywheels (table)	18.21	
Shear deflection of shafts, tabular method	37.8	
(table)	37.5	37.10
Shear flow	49.14	
Shear strain	49.5	
Shear stress, definition	49.4	
Should action	1.12	
Shoulder screws	21.15	
SI (Système International d'Unités)	3.4	

<u>Index terms</u>	<u>Links</u>	
Silent chain:		
Dimensions	32.25	
nomenclature	32.25	
nonstandard	32.4	
numbering	32.26	
selection	32.28	
sprockets for	32.4	32.27
standard	32.4	
tooth form	32.27	
Similitude	11.7	
first known equation	11.7	
Simple eccentric cam motions	40.15	
Simpson rule	4.18	5.19
equation	11.13	
error term	11.13	
Richardson error term	11.13	
Simpson rule integration in ring deformation	16.19	
Single degree-of-freedom systems:		
critically damped	38.5	
force transmissibility	38.10	
forced vibration	38.8	
foundation-excited	38.11	
free vibration	38.1	
overdamped	38.5	
resonance, bandwidth, and Q-factor	38.16	
rotating balance	38.11	
Runga-Kutta numerical method in	38.17	
torsional systems	38.7	
forced	38.17	
undamped	38.2	
underdamped	38.3	
(See also Vibration)		

<u>Index terms</u>	<u>Links</u>		
Six rules of Datsko	8.4		
6R robot mechanism	39.27		
Size factors	13.12		
Sizes and tolerances of steel sheet and bars:			
bar steel	48.17		
(tables)	48.20		
pipe and tubing	48.22	48.27	
(tables)	48.22	48.23	48.27
	48.28		
sheet steel	48.17		
(tables)	48.18		
Sizes:			
of drawings	1.22		
of fillet welds	14.32		
of metal grains	7.18		
preferred	48.14		
Simulation:			
convergence (figure)	5.26		
confidence interval of	5.25		
error	5.28		
minimizing number of trials	5.29		
number of correct digits in result	5.29		
simulation plan in Fortran	5.30		
Simulation in statistical tolerancing:			
confidence interval on probability of interference	19.18		
error in simulation	19.18		
Skill #1 of a designer:			
defined	5.6		
flowchart	5.7		
Skill #2 of a designer:			
defined	5.7		
flowchart	5.8		

<u>Index terms</u>	<u>Links</u>	
Slenderness ratio	15.11	
Slider-:		
connector mechanisms	39.19	
crank mechanisms	39.13	
Sliding pair	39.1	
Sliding speed in wear	6.9	
Slotted-head cap screws	21.19	21.22
SN diagram:		
random loading	13.7	
sinusoidal loading	13.7	
Snap-action mechanisms	39.2	
Smith-Dolan fatigue locus	13.26	
Socket-head cap screws	21.13	
Sockets and keys	21.11	
Solids, structure of	7.1	
amorphous	7.4	
molecular	7.5	
Solution constraints	1.1	
Solving problems	1.11	
Sommerfeld conditions	28.16	
Sommerfeld number	25.3	28.17
Sound:		
absorption coefficient (table)	45.12	
level, A-weighted	45.4	45.7
level meter	45.7	
power	45.4	
power level	45.5	
pressure	45.2	
propagation	45.1	
speed of	45.3	
Sources of standards	1.39	

<u>Index terms</u>	<u>Links</u>	
Space lattice	7.8	
Specification set	2.1	5.5
definition	5.5	
Speed-changing mechanisms	39.26	
Speed-dependent torque in flywheels	18.9	
example	18.12	
Speed fluctuation, coefficient of	18.3	
(table)	18.4	
Speeds, permissible, in rolling contact bearings	27.6	
Springs:		
Belleville spring washer	24.38	
constant-force	24.56	
flat	24.53	
glossary	24.2	
helical compression	24.10	
helical extension	24.27	
helical torsion	24.34	
hot-wound	24.64	
materials	24.4	
power	24.61	
special spring washers	24.49	
torsion bar	24.60	
Spur gear:		
modules (table)	33.4	
pitches (table)	33.4	
tooth systems (table)	33.4	
Spur gears:		
definitions	33.1	
force analysis	33.5	
fundamental AGMA rating formulas	33.5	
tooth dimensions and standards	33.4	
Square threads in power screws	20.3	20.4

<u>Index terms</u>	<u>Links</u>		
Stacking of tolerances	19.14		
Standard:			
company	1.37		
consensus	1.31		
consumer-expectation	1.36	1.38	
good engineering practice	1.36	1.37	1.42
government regulation	1.36		
government standards	1.37		
industry	1.36		
mandatory	1.36		
technical society	1.36	1.37	
trade association	1.36	1.37	
Standard components	1.20		
Standard diameter-pitch combinations for metric (M)			
screw threads:			
(table)	21.3		
Standard fits	19.10		
Standard parts	1.20		
Standard scales	1.22		
Standard series of screw threads, constant-pitch	21.1		
Standard sizes of drawings	1.22		
Standard thread-pitch combinations for UN and UNR			
screw threads (table)			
Standards	1.34		
Static effort of humans	9.13		
Static failure theory	12.3		
Statistical tasks of a computer	5.21		
Statistical tolerances	19.16		
Statute of limitations	1.35		
Statute of repose	1.35		
Steps in decision-making	1.13		

<u>Index terms</u>	<u>Links</u>		
Stiffness:			
scale	50.2		
spring rate, tensile or torsional	50.2		
stiffness	50.2		
Stimulus	2.19		
Stimulus parameter	1.19		
Stochastic considerations	12.20		
mean design factor for reliability goal	12.20		
Stochastic fatigue example	13.22		
Strain(s):			
engineering	7.27	49.6	
fracture	7.35		
logarithmic	7.29		
natural	7.29		
nominal	7.27		
plastic	49.10		
principal	49.6		
relations between	7.36	49.10	
shear	49.5		
true	7.29	49.10	
Strain energy (table)	16.8		
Strain gauge	3.35		
Strain-strengthening exponent	7.31		
for materials of interest (tables)	7.47	7.48	7.50
Stop mechanisms	39.19		
Strength and safety in flywheels:			
materials	18.21		
safety	18.24		
Strength at critical locations:			
cold-formed eyebolt example	13.31		
cold-formed flat spring example	13.32		
Strength coefficient	7.31		

<u>Index terms</u>	<u>Links</u>		
Strength in shafts	37.15		
Strength	7.1	7.18	7.26
breaking	7.34		
creep	7.43		
estimation	8.2		
fracture	7.31		
impact	7.42		
proof	7.34		
tensile	7.34		
ultimate	7.34		
yield	7.34		
Strength of humans:			
foot	9.15		
hand	9.15		
whole-body	9.15		
Stress	7.26		
Stress:			
allowable level	2.3		
contact	49.17		
definition and notation	49.1		
flexure	49.10		
permissible level	2.3		
stresses due to temperature	49.14		
stress-strain relation	49.4		
Stress-concentration	12.3		
charts	12.8		
factor	12.7		
Stress-concentration and notch-sensitivity	13.15		
Heywood equation	13.15		
Heywood parameters	13.17		
low-cycle notch sensitivity	13.17		
modified Neuber equation	13.15		

<u>Index terms</u>	<u>Links</u>	
Stress-concentration factor of Wahl	12.17	
Stress-intensity charts	12.17	
Stress-intensity factor	12.15	
Stress-raisers	12.7	
Stress, in flywheels:		
disk of constant thickness	18.18	
example	18.19	
rim type, no bending	18.13	
example	18.6	
rim type, with bending	18.15	
example	18.16	
thin disk	18.17	
Stress margin	2.4	
Stress, octahedral shear	12.3	
Stresses:		
in fasteners	23.5	23.8
in plates	23.8	
Stress-strain:		
engineering	7.28	
true	7.29	
Stress-strain relations	49.4	
principal strains	49.6	
plastic strains	49.10	
Stress variation patterns, complicated:		
characterization	13.29	
Stresses in power screws:		
bearing	20.9	
normal	20.9	
shear	20.9	
von Mises	20.9	
Stresses, interference fits	19.9	
example	19.11	

<u>Index terms</u>	<u>Links</u>
Stribeck curve	25.3
Strict liability	1.34
Structure:	
atomic	7.4
body-centered cubic (BCC)	7.10
face-centered cubic (FCC)	7.10
of solids	7.1
Structural design of robots:	
impact mode of sensing and control	47.8
material selection	47.11
selection of structural sections	47.9
structural characteristics	47.8
Structural shapes (tables)	48.28
Stub Acme thread in power screws	20.4
Subprogram capability for spring rate	5.10
Subroutine for spring rate	5.10
Suitability	1.16
Suitability-feasibility-acceptability method	1.16
Surface endurance strength of Buckingham:	
load-stress factor	13.42
load-stress factor used in gear studies	13.42
Surface stress, line contact:	
approach of roller centers	13.42
half-width of contact zone	13.41
orthogonal normal stresses	13.41
Surface texture	1.29
example	1.32
Surroundings	11.3
Symbols, standard	1.29
(table)	1.30
Swift-Stieber conditions	28.16

<u>Index terms</u>	<u>Links</u>	
Synchronous-belt drive	31.25	
System	11.3	
general measurement, block diagram	3.6	
Systematic error	3.40	
Système International d'unités (SI system)	3.4	
T		
Tabular method of bending deflection in shafts	37.5	
(table)	37.5	37.7
Tabular method for combined deflection of shafts	37.11	
(table)	37.12	
Tabular method for shear deflection in shafts	37.8	
(table)	37.8	37.10
Tangent modulus	15.8	
Taper pins	22.8	
dimensions of	22.10	
Tapping screws	21.35	
Taylor series	4.7	
approximation to	4.11	
Teaching pendant	47.2	
Tearout stress	23.9	
Temperature:		
transition	7.43	
nil-ductility	7.43	
Temperature scale:		
practical international	3.5	
thermodynamic	3.5	
Temperature stresses	49.15	
Tempered hardness	8.10	
Tempering decrement	8.10	
Tempering factor	8.10	

<u>Index terms</u>	<u>Links</u>	
Tempering temperature-time tradeoff equation	8.29	
Tensile properties	7.32	
(table)	7.47	
Tensile strength:		
relation to Brinell hardness	7.40	
relation to coldwork	7.38	
Tensile test	7.25	12.2
Tensile stress, definition	49.4	
Tension-loaded joints:		
achieving desired preload	23.27	
fastener stiffness	23.16	
gasketed-joint stiffness	23.18	
lower limit of clamping force	23.21	23.26
preloading	23.16	
target preload	23.18	
upper limit in tension	23.10	23.22
Terminology of bevel and hypoid gears	34.2	
Tester, dead-weight	3.7	
Test, consumer-expectation	1.35	
Test, tensile	7.25	
Testing, fatigue:		
constant-stress level method	13.5	
probit method	13.5	
Prot method	13.5	
sparse survey method	13.4	
up-down method	13.6	
Testing wear	6.12	
Theory:		
distortion energy	12.3	
Henky-von Mises	12.3	
von Mises	12.3	

<u>Index terms</u>	<u>Links</u>	
Theories of failure:		
Coulomb-Mohr	12.6	
distortion-energy	12.3	
interference	2.19	
internal friction	12.6	
maximum normal stress	12.6	
modified Mohr	12.6	
octahedral shear	12.3	
von Mises	12.4	
Thermal stress	49.14	49.16
Theory of decision-making	1.13	
Thread profile, unified (UN), and metric (M) series	21.2	
Threads, pipe	21.5	
basic dimensions (table)	21.5	
Thermo-plastic	7.6	
Thermo-setting plastic	7.7	
Thick-film lubrication	28.4	
Third-angle projection	1.21	
Thin-film lubrication	28.4	
Three-parameter Weibull distribution	2.24	
Thrust and radial loadings in rolling-contact bearings	27.12	
Time:		
constant	3.14	
delay	3.14	
peak	3.18	
response	3.14	
rise	3.14	
settling	3.18	
Time constant	3.14	
Toggle mechanism	39.4	39.13
Toggle press	39.6	

<u>Index terms</u>	<u>Links</u>
Tolerance	19.2
Tolerances, absolute	19.13
Tolerances, the stacking of	19.14
Tolerances, on drawings	1.29
Tolerances, statistical	19.16
on gap	19.17
Tool design for robots:	
remote center compliance devices	47.39
similarities to fixed automation	47.39
Torque, actuating, in power screws	20.6
Torque analysis of cams	40.22
Torque, running, of power screws	20.7
Torque, starting, of power screws	20.7
Torque-angle curve, flywheels	18.4
engine example	18.6
integration of	18.5
punch-press example	18.4
Torsion-bar springs	24.60
Torsion springs	24.34
Torsional stresses and angular deflection of sections:	
(table)	49.7
Torsional shear modulus	49.6
Tractive effects	11.3
Tradeoff equation, tempering temperature-time	8.29
Train value	46.8
Transducer:	
active	3.5
detector	3.5
passive	3.5
readout	3.5
Transfer function	3.9

<u>Index terms</u>	<u>Links</u>
Transfer ratio	3.9
Transformation which rectify CDF data strings (table)	2.11
Transition temperature	7.43
Transport mechanisms	39.20
Transverse shear	49.14
Trapezoidal rule integration	18.11
Travel of a power screw	20.3
Triaxial principal strains	49.6
Triaxial principal stresses	49.6
Triaxial stress	49.3
principal stress cubic equation	49.4
Trigonometric approximations	4.10
True stress	49.10
conversion equations	49.10
Truncation of significant digits	3.46
Tubing	48.22
properties	48.27
Two-parameter Weibull	27.11
U	
U-seals	17.13
Ultimate tensile strength	7.34
UN (Unified-series) profile thread	21.1
Unbiased estimator:	
of mean	3.44
of variance	3.44
Uncertainty	3.1
Uncertainty, interval of	11.9
Uncertainty in machine design	12.3
Uniform distribution	2.12
Uniform distribution in tolerances	19.17

<u>Index terms</u>	<u>Links</u>
Unilateral hole-basis fits	19.9
Unimodal function	11.9
Units:	
base	3.4
derived	3.4
fundamental	3.4
independently defined	3.4
supplemental	3.4
of amount of substance	3.5
of current	3.5
of force	3.4
of length	3.4
of luminous intensity	3.5
of mass	3.4
of temperature	3.5
of time	3.5
Unloading mechanisms	39.21
UNR profile thread	21.1
Unreasonably dangerous	10.2
Unthreaded fasteners	22.1
Up-down testing method	13.6
Usage considerations (table)	1.10
U.S. Customary System (USCS)	24.22
U.S. Standards of fit, inch units	19.19
(table), standard fits	19.10
Usage:	
expected	1.9
intended	1.9
Utility, definition	1.13

<u>Index terms</u>	<u>Links</u>	
V		
Valid:		
data	3.2	
measurement	3.2	
Valve controls	43.7	43.8
van der Waal bonds	7.4	
Variable loading in rolling contact bearings	27.13	
continuously varying	27.13	
stepwise varying	27.13	
Variability:		
in strength of a 1020 steel	2.12	
in loading (figure)	2.4	
in fatigue ratio (figure)	2.17	
Variable-pitch spring (figure)	24.24	
Variables, design	5.6	
Variance	2.9	3.44
V-belt drive	31.19	
V-belt shapes (figure)	34.21	
Vibration:		
isolation	38.28	
single degree-of-freedom systems	38.1	
systems with several degrees-of-freedom	38.19	
Vibration isolation:		
active isolation	38.28	
passive isolation	38.29	
transmissibility	38.28	
Vickers hardness	7.24	
Viscosity:		
absolute	25.6	
dynamic	25.6	
Engler	25.9	
index	25.7	

<u>Index terms</u>	<u>Links</u>	
index improvers	25.8	
kinematic	25.6	
Redwood	25.9	
Saybolt	25.9	
Vision of humans	9.24	
von Mises stress	13.34	
in power screws	20.9	
V-ring packings	17.13	
W		
Wahl stress-concentration factor	24.17	
Want action	1.12	
Warning defect	1.34	
Warnings	9.24	10.15
Washers:		
types	22.26	
Watt linkage	39.23	
Waviness of a surface	1.29	
Wear equation	6.6	
linear	6.13	
Wear failure, modes of	6.11	
Wear life	6.1	
Weibull parameters in rolling-contact bearing life	27.8	
Weight, atomic	7.2	
Weighting function method	1.17	
Weld metal, allowables for	14.42	
Welding (<i>see</i> Arc welding)		
Welding codes	14.39	
Welding current limitations	14.5	
Whitworth quick-return mechanism	39.14	
Whole-body strength of humans	9.15	

<u>Index terms</u>	<u>Links</u>	
Wire and sheet metal (table)	48.24	48.25
Wire, spring:		
rectangular	24.22	
round	24.5	
strength of	24.9	
Woodruff key, dimensions	22.25	
Work areas	9.9	
Work, cold (<i>see</i> Cold work)		
Work effect	11.3	
Work hardening (<i>see</i> Strain strengthening)		
Work physiology	9.1	
Worksheet, heat-treated steels	8.30	
computer-generated	8.31	
Worksheet:		
absolute tolerance	19.16	
for heat treated steels	8.30	8.31
Work station areas	9.9	
Work station height	9.6	
sitting	9.7	
standing	9.6	
Worm gearing:		
design standards	36.13	
double-enveloping gear sets	36.18	
force analysis	36.5	
heat dissipation	36.12	
kinematics	36.3	
velocity and friction	36.5	

Y

Yield strength	7.34	7.37
relations to coldwork	7.37	8.3
tabulations (<i>see</i> Tensile properties)		

<u>Index terms</u>	<u>Links</u>
Young's modulus	7.33
Z	
Zero shift	3.42
Zerol gears	34.1
Zoller mechanism	39.12
z-variable of N(1,0)	2.5
table	2.11