ENGINEERING BASICS

he following information helps you solve technical problems frequently encountered in designing and selecting motion control components and systems.

Torque

$$T = FR$$
 (1)

Wherest

T - Torque, lb-ft.

F = Force, Ib

R = Radius, or distance that the force is from the pivotal point, ft

Linear to rotary motion

$$N = \frac{V}{0.262D}$$
 (2)

Where

N = Speed of shaft rotation, rpm

V = Velocity of material, fipm

 D = Diameter of pulley or sprocket, in.

Horsepower

Rotating objects:

$$P = \frac{TN}{5,250}$$
 (3)

Where:

P - Power, ho

T - Torque, lb-ft.

N = Shaft speed, rpm.

Objects in linear motion:

$$P = \frac{FV}{23.000}$$
(4)

Wherest

P = Power, hip.

F = Force, lb.

V = Velocity, fpm

Pointpec

$$P = \frac{QHS}{3.960m}$$
(5)

Where:

P = Power, hp

Q = Flow rate, gpm

H = Head, ft

S = Specific gravity of fluid

μ = Pump efficiency

Fans and blowers:

$$P = \frac{Qp}{229\mu}$$
(6)

Where:

P = Power, hp

Q -Flow rate, cfm

p - Pressure, psi

ps - Efficiency

(2) Accelerating torque and force

Of rotating objects

$$T = \frac{\left(HK^2\right)\Delta N}{308t}$$
(7)

Witnesse:

T - Torque required, lb-ft.

WK^q = Total inertia of load to be accelerated, lb-ft². (See Formulas 9, 10, 11, and 12.)

ΔN = Change in speed, rpm t = Time to accelerate load, sec

Objects in linear motion:

$$P = \frac{W\Delta V}{1.933t}$$
(8)

Wheres

F - Force required, Ib-

W - Weight, lib

 ΔV = Change in velocity, fpm

t - Time to accelerate load, sec

Moment of inertia

Solid cylinder rotating about its own axis:

$$WK^a = (1/a)WK^a$$
 (9)

Witheren:

WK" — Moment of inertia, lb-ft³

W = Weight of object, lb

R = Radius of cylinder, ft

Hollow cylinder rotating about its own axis:

$$WX^{2} = \frac{W(R_{1}^{2} + R_{2}^{2})}{2}$$
(10)

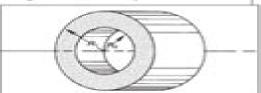
Whenever

WK" - Moment of inertia, lb-ft"

W = Weight of object, lb

 $R_1 = Outside radius, ft.$

 $R_s = Inside radius, ft$



Material in linear motion with a continuous fixed relation to a rotational speed, such as a conveyor system:

$$WK_L^2 = W\left(\frac{V}{2\pi N}\right)^2$$
(11)

Where

WKa " - Linear inertia, lb-ft"

W - Weight of material. Ib

V = Linear velocity, fpm

N = Rotational speed of shaft, rpm

Reflected inertia of a load through a speed reduction means — gear, chain, or belt system:

$$WK_E^2 = \frac{WK_L^2}{R_c^2}$$
 (12)

Wherec

 WK_{θ}^{s} = Reflected inertia, lb-ft^s WK_{θ}^{s} = Load inertia, lb-ft^s

R. - Reduction ratio

Duty cycle calculation

The RMS (root mean square) value of a load is one of the quantities often used to size PT components.

$$L_{ESCS} = \sqrt{\frac{L_{2}^{2}t_{1} + L_{2}^{2}t_{2} + ... + L_{n}^{2}t_{n}}{t_{1} + t_{2} + ... + t_{n}}}$$
(13)

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Basic Engineering Principles:

Basic engineering principles J. A. Merkel, 1981 **BASIC Basic Engineering Principles** James A. Merkel, 1974 PRINCIPLES OF ENGINEERING PHYSICS Dr. R. S. Chandok, Dr. K. Sailesh Kumar, Dr. Bhavani Naga Prasanna H, Dr. B. Radhakrishna, 2025-07-22 Physics forms the fundamental backbone of all engineering sciences providing the essential principles and laws that underpin technological advances and innovations The study of engineering physics equips students with the crucial analytical tools and conceptual understanding necessary to solve practical engineering problems and to design efficient reliable systems across various disciplines This book Basic Principles of Engineering Physics has been meticulously crafted to serve as an introductory textbook for undergraduate engineering students It covers core topics ranging from classical mechanics and thermodynamics to modern physics concepts such as quantum mechanics and nanotechnology The emphasis throughout is on building a solid foundation by elucidating fundamental concepts with clarity and rigor while highlighting relevant engineering applications Each chapter introduces essential theoretical frameworks followed by practical examples illustrative problems and exercises to reinforce learning and promote critical thinking The content aligns with the current syllabi adopted by premier engineering universities and is designed to balance academic learning with real world relevance Our objective is to make this book a comprehensive and accessible resource that inspires students to appreciate the role of physics in engineering innovation Constructive feedback from readers is welcome to enhance the content further We express our sincere gratitude to all colleagues students and reviewers who have contributed their valuable insights during the development of this book Basic Lumber Engineering for Builders Max Schwartz, 1997 The beam and lumber requirements for your jobs aren t always clear especially with changing building codes and lumber products If you need to figure any type of on the job lumber engineering this book will help fill the gap between what you can find in building code span tables and the complex calculations that you need to hire a certified engineer to do The book covers most building types and framing systems including door window and roof framing And there s a chapter on connections retrofitting with anchor bolts framing anchors and tie downs plus the latest requirements for cross bridging and anchoring Also included is an important chapter on designing concrete formwork figuring the pressures tolerances and thickness for plywood Plyform composition and fiber reinforced plastic In the back of the book you ll find a computer disk with an easy to use version of Northbridge Software's Wood Beam Sizing TM Just follow the step by step instructions in the program to find out what size member you need for the spans and loads that you require based on the wood species that you re using Requires Windows 3 1 or higher **Basic Engineering Principles** Wayne Knoth, National Forest Products Basic Engineering Mechanics Explained, Volume 3 Gregory Pastoll, 2019-04-09 This series of three Association, 1974 volumes aims to explain in a reader friendly way the essential principles of basic mechanics as used in engineering It attempts to provide clarity motivation and relevance for any reader who wants to understand the principles of mechanics and

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