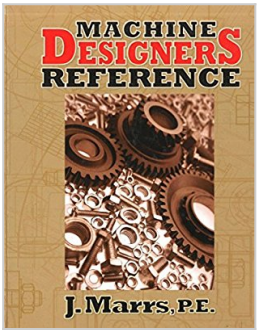

Machine Designers Reference

By J. Marrs

Machine Designers Reference By J. Marrs

This comprehensive reference was written with a single goal-to assist design professionals in their job quickly and efficiently. Designed with the working mechanical designer in mind, users will save time in selection, sizing, and tolerancing of mechanical parts and assemblies. This book is packed with essential charts and tables such as fastener data, locating feature data, material selection guides, and component selection charts. Most books containing similar data are targeted at shop personnel or students. Focusing on the most common needs of the design professional, it pares down the information to just what is most frequently needed while providing the quickest possible access to necessary data. Because the job of the design professional has changed significantly this handbook aims to complement available software and assist in its efficient use.
Features:
* Presents design data in groups corresponding to these design activities to minimize time spent flipping pages.
* Speeds up the selection process through contained formulas and guides that are designed to assist the working engineer while selecting machine components from catalogs rather than designing these common components from scratch.
* The full-size format is ideal for reading charts easily.
* Intended to be a quick guidebook but contains lists of recommended resources for in-depth information.
Contents:
* Design and Analysis (Design of Machinery, Units, Equations)
* Ergonomics and Machine Safety (Ergonomics, Machine Safety, Safeguarding)
* Dimensions and Tolerances (Limits, Fits, and Tolerance Grades, Tolerances on Drawings, Tolerance Stack-Ups)
* Precision Locating Techniques
* Pins, Keys, and Retaining Rings
* Pipe Threads, Threaded Fasteners, and Washers
* Welds and Weldments
* Materials, Surfaces, and Treatments (Materials, Surface Finish, Heat Treatment, Surface Treatment)
* Force Generators (Springs, Pneumatics, Motors)
* Bearings (Plain Bearings, Rolling Element Bearings, Linear Bearings)
* Power Transmission Devices (Shafts, Couplings, Gears, Gearboxes, Belts and Chains, Power Screws)
* Machine Reliability and Performance (FMECA, Safety Category, Reliability, Performance, OEE)

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Editorial Review

From the Back Cover
Would you like to see hole sizes and tolerances included in tables of common fastener sizes and related dimensional information rather than have to take extra time finding the data in separate tables?

Could you make fast use of step-by-step procedures for common machine component selection and sizing activities, coupled with all the equations you need right there rather than sprinkled throughout a textbook?

These are just two examples of how the task-specific grouping of reference material in Machine Designers Reference can help you and other busy designers do your jobs more quickly and efficiently.

About the Author

Jennifer Marrs, P.E., is a mechanical design engineer. For two decades, her focus has been the design and analysis of high-speed assembly machines and related systems. She has also worked as a product designer, manufacturing engineer and forensic engineer. She is pictured here with the off-road vehicle she built by hand, a genuine labor of mechanical love.

When Jennifer initially approached Industrial Press with her extraordinary idea for*Machine Designers Reference*, she said

"I have an idea for a companion to Machinery's Handbook.... a ***Toolbox*** *that contains items I've... squirreled away over my years of machine design. These are items that the working machine designer uses just about every day."*

Jennifer holds a BSME from Worcester Polytechnic Institute, an MSME from Northeastern University, and volunteers with the mechanical engineering programs at both WPI and Dartmouth College. She enjoys her successful consulting practice and is a licensed Professional Engineer throughout New England (click here to visit her website). She is also a registered U.S. patent agent. Her employers and clients include Gillette, Millipore, FujiFilm Dimatix, and Green Mountain Coffee Roasters. Mrs. Marrs is currently on the Executive Committee of her local ASME subsection and holds an international patent.

EXCERPT from CHAPTER 10 BEARINGS
10.1 Plain Bearings
Plain bearings provide sliding contact between two surfaces. The most common type of plain bearing is the sleeve bearing or bushing. Plain bearings are often chosen over rolling element bearings due to cost or space limitations. They are also more rigid and quieter in operation than rolling element bearings. The main disadvantages of plain bearings are their higher potential to wear (as compared to rolling element bearings) as well as their relative vulnerability to contaminants. This section serves as a general introduction to plain bearings, with a focus on sleeve bearings used in rotary motion applications with boundary lubrication conditions. Please consult the recommended resources for more information and calculation methods for other types of lubrication. Plain bearings used in linear motion applications are discussed in Section 10.3.

Lubrication of Plain Bearings

Plain bearings must be lubricated in order to have long life and low friction. There are four types of lubrication conditions under which plain bearings are run: hydrostatic lubrication (full film), hydrodynamic lubrication (full film), mixed film lubrication, and boundary lubrication (thin film). Full film lubrication occurs when the lubricant layer between surfaces is thick enough to prevent any surface contact. Boundary lubrication occurs when the lubricant layer is present but not thick enough to prevent contact between surfaces. A graph showing relative coefficients of friction for the different types of lubrication are shown in Figure 10-1. The horizontal axis is a function of lubricant viscosity (Z), journal speed (N), and bearing pressure (P).

Recommended Resources

• R. Mott, Machine Elements in Mechanical Design, 5th Ed., Pearson/Prentice Hall, Inc., Upper Saddle River, NJ, 2012
• R. L. Norton, Machine Design: An Integrated Approach, 4th Ed., Prentice Hall, Upper Saddle River, NJ, 2011
• Oberg, Jones, Horton, Ryffel, Machinery's Handbook, 28th Ed., Industrial Press, New York, NY, 2008

Hydrostatic lubrication is full film lubrication, and occurs when high pressure lubricant is used to force the sliding surfaces apart. Plain bearings with hydrostatic lubrication can accommodate heavy loads at low speeds. Hydrostatic lubrication is normally used in planar or linear bearings rather than in sleeves.

Design of an assembly using hydrostatic lubrication is extremely complex and must focus on lubricant feeding and containment.

Hydrodynamic lubrication is full film lubrication, and is most commonly employed with high-speed rotating shafts in plain sleeve bearings. Bearings with hydrodynamic lubrication are often called journal bearings. A wedge of lubricant is caught between the rotating shaft and bearing surface, providing sufficient pressure to carry the applied load. The shaft rides on a film of oil and does not contact the bearing except during periods of low speed or stasis. Typical coefficients of friction range from 0.002 to 0.010. Oil is typically used as the lubricant, and it must be supplied from a reservoir to maintain hydrodynamic lubrication. The lubricant also cools the bearing, and lubricant leakage and circulation enhances the cooling effect. Lubricant viscosity and temperature are important parameters in hydrodynamic lubrication performance, and temperature control is recommended. Hydrodynamically lubricated bearings go through periods of boundary lubrication during startup and shutdown periods. In light industrial machinery, relatively low speeds and/or intermittent movements mean that boundary lubrication of plain bearings is more common than hydrodynamic lubrication. Hydrodynamically lubricated journal bearings are beyond the scope of this text, but are detailed in the recommended resources.

Figure 10-1: Plain Bearing Lubrication vs. Coefficient of Friction

Users Review

From reader reviews:

Lillian Tobias:

Now a day individuals who Living in the era wherever everything reachable by match the internet and the

resources inside can be true or not involve people to be aware of each data they get. How individuals to be smart in getting any information nowadays? Of course the solution is reading a book. Looking at a book can help people out of this uncertainty Information mainly this Machine Designers Reference book because book offers you rich information and knowledge. Of course the details in this book hundred % guarantees there is no doubt in it you know.

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