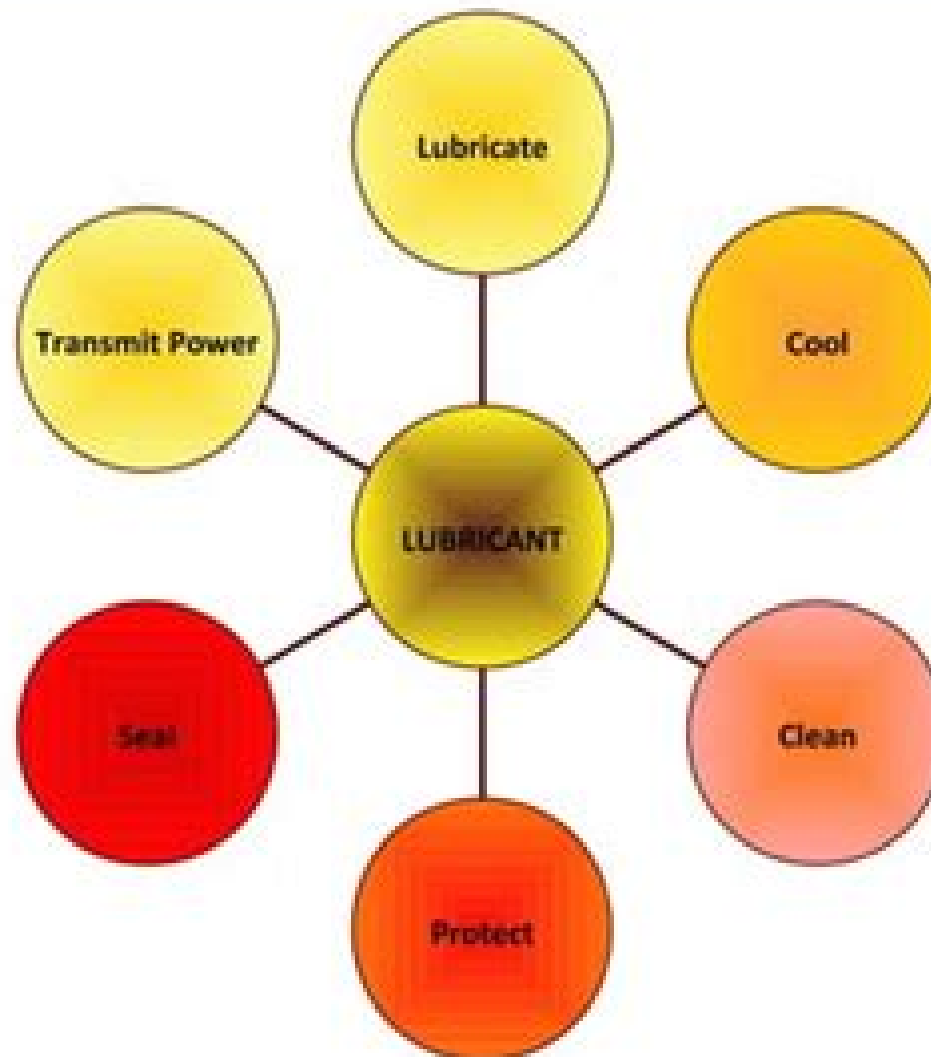


# What is the Function of a Lubricant?



# Lubrication Fundamentals

**Bernard J. Hamrock, Steven R.  
Schmid, Bo O. Jacobson**



## **Lubrication Fundamentals:**

**Lubrication Fundamentals, Revised and Expanded** Don M. Pirro, Martin Webster, Ekkehard Daschner, 2017-07-31  
Careful selection of the right lubricants is required to keep a machine running smoothly. *Lubrication Fundamentals Third Edition Revised and Expanded* describes the need and design for the many specialized oils and greases used to lubricate machine elements and builds on the tribology and lubrication basics discussed in previous editions. Utilizing knowledge from leading experts in the field, the third edition covers new lubrication requirements, crude oil composition and selection, base stock manufacture, lubricant formulation and evaluation, machinery and lubrication fundamentals, and environmental stewardship. The book combines lubrication theory with practical knowledge and provides many useful illustrations to highlight key industrial, commercial, marine, aviation, and automotive lubricant applications and concepts. All previous edition chapters have been updated to include new technologies, applications, and specifications that have been introduced in the past 15 years. What's New in the Third Edition Adds three new chapters on the growing renewable energy application of wind turbines, the impact of lubricants on energy efficiency, and best practice guidelines on establishing an in-service lubricant analysis program. Updates API, SAE, and ACEA engine oil specifications, descriptions of new engine oil tests, impact of engine and fuel technology trends on engine oil. Includes the latest environmental lubricant tests, definitions, and labeling programs. Compiles expert information from ExxonMobil publications and the foremost international equipment builders and industry associations. Covers key influences impacting lubricant formulations and technology. Offers data on global energy demand and interesting statistics such as the worldwide population of nuclear reactors, wind turbines, and output of hydraulic turbines. Presents new sections on the history of synthetic lubricants and hazardous chemical labeling for lubricants. Whether used as a training guide for industry novices, a textbook for students to understand lubrication principles, or a technical reference for experienced lubrication and tribology professionals, *Lubrication Fundamentals Third Edition Revised and Expanded* is a must-read for maintenance professionals, lubricant formulators, and marketers, chemists, and lubrication surface chemical, mechanical, and automotive engineers. *Lubrication Fundamentals* Don M. Pirro, Ekkehard Daschner, 2001-08-28 Building on the cornerstone of the first edition, *Lubrication Fundamentals Second Edition* outlines the emergence of higher performance specialty application oils and greases and emphasizes the need for lubrication and careful lubricant selection. Thoroughly updated and rewritten since the previous edition reached its 10th printing, the book discusses Solid Lubrication Fundamentals and Applications Kazuhisa Miyoshi, 2019-06-05 *Solid Lubrication Fundamentals and Applications* description of the adhesion, friction, abrasion, and wear behavior of solid film lubricants and related tribological materials, including diamond and diamond-like solid films. The book details the properties of solid surfaces, clean surfaces, and contaminated surfaces, as well as discussing the structure. **Lubrication Fundamentals** Don M. Pirro, Martin N. Webster, Ekkehard Daschner, 2016 **Lubrication Fundamentals and Practice** Armstrong Cork Company, 1957 Lubrication Fundamentals and Practices

Session IV, V, Vi and Vii United States. International Cooperation Administration, 1957      Chapter 1 : Lubrication Fundamentals ,2009 THIS CHAPTER DEALS WITH THE FUNDAMENTALS of lubrication It covers the lubricant functions nature and composition of the lubricants market concepts of friction lubrication viscosity and wear lubricant types and lubricant selection performance specifications and composition A brief description of the lubricant classes and additives is also provided The concepts addressed in this chapter are invaluable in understanding the modern lubricant technology and the material covered in the subsequent chapters Almost all modern machines require the use of a lubricant Power generation in such equipment is achieved by the use of engines that mostly comprise metal parts that move against one another In many cases there is metal to metal contact that leads to the generation of friction and heat which results in wear The extent of wear in equipment depends upon the degree of the metal to metal contact either due to the equipment design or the nature of the operation For example the equipment that is designed to experience minimal metal to metal contact as is the case in most parts of an internal combustion engine there is little friction and wear However the parts that are designed to have intimate metal to metal contact such as gears and bearings wear due to friction is extensive With respect to the effect of equipment operation on wear high speed low load operation leads to lower wear than slow speed high load operation This is because in the former case there is minimal metal to metal contact A lubricant can be a solid liquid or gas and lubrication is its primary function The usual objective of the lubrication is to lubricate surfaces to minimize direct metal to metal contact and hence reduce friction and wear The term lubricant is also loosely applied to many other fluids that do not specifically perform this function Examples include power and heat transmission fluids hydraulic fluids dielectric fluids process oils and the others Incidentally in this book the term lubricant pertains to a finished lubricant that is it comprises base fluid and additives A lubricant performs many diverse functions which help protect and prolong the life of the equipment 1 These include the following 1 Lubrication reduce friction and wear Lubricant helps reduce friction and wear by introducing a lubricating film between mechanical moving parts such as gears and bearings Essentially the presence of a lubricating film minimizes the metal to metal contact and reduces the force necessary to move one surface against the other thereby reducing wear and saving energy 2 Cooling heat transfer Lubricant acts as a heat sink and dissipates the heat away from the critical moving parts of the equipment thereby decreasing the possibility of the machine component deformation and wear The heat is either frictional heat that results from the metal surfaces rubbing against one another such as in gears or is conducted and radiated heat which is due to the close proximity of the parts to a combustion source such as the combustion chamber in an automobile engine 3 Cleaning and Suspending Lubricant facilitates smooth operation of the equipment by removing and suspending potentially harmful products such as carbon sludge and varnish and the other materials such as dirt and wear debris This lubricant function is important in operations that involve high operating temperatures as in the case of an internal combustion engine or a transmission This is because in these applications the lubricant gets oxidized to

form deposit precursors that can separate on hot surfaces and get converted into deposits 4 Protection Lubricant prevents metal damage due to oxidation products corrosion and wear It achieves this by forming a physical film on metal surfaces that is impervious to oxygen water and acids or by forming physical and chemical films by additives such as rust and corrosion inhibitors extreme pressure EP additives and anti wear agents that are present in the lubricant 5 Transfer Power Lubricant is used as a power transfer medium in some applications for example in hydraulic systems The lubricant performs this function in addition to its normal function of lubrication Examples of equipment that use hydraulics technology include transmissions circulating systems lifts used in automotive service stations log splitters fork lifts dump trucks and underground continuous mining equipment such as drills loaders and miners **Elasto-hydrodynamic Lubrication** D. Dowson, G. R.

Higginson, 1966 **Fundamentals of Fluid Film Lubrication** Bernard J. Hamrock, Steven R. Schmid, Bo O. Jacobson, 2004-03-15 Specifically focusing on fluid film hydrodynamic and elastohydrodynamic lubrication this edition studies the most important principles of fluid film lubrication for the correct design of bearings gears and rolling operations and for the prevention of friction and wear in engineering designs It explains various theories procedures and equations for improved solutions to machining challenges Providing more than 1120 display equations and an introductory section in each chapter Fundamentals of Fluid Film Lubrication Second Edition facilitates the analysis of any machine element that uses fluid film lubrication and strengthens understanding of critical design concepts **Friction and Wear Devices** American Society of Lubrication Engineers. Lubrication Fundamentals Committee. Subcommittee on Wear, 1976 **Fuels and Lubricants Handbook**,

*Principles and Applications of Tribology* Habeeb Adewale Ajimotokan, 2024-04-01 This book presents a comprehensive exploration of tribology concepts and their real world implications delving into introductory principles as well as advanced topics such as friction lubrication and wear Tailored for engineers across diverse disciplines it serves as a fundamental resource for both undergraduate engineering courses and postgraduate studies focused on tribology Moreover it caters to the needs of mechanical materials and biomechanics researchers engineers academics and industry professionals alike Noteworthy features include unique engineering perspectives practical discussions on lubrication principles for minimizing friction and wear and guidance on selecting optimal lubricants and materials for various tribological applications

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tribology technologies and introduces a comprehensive overview of tribology. General up to date knowledge on how tribology is approached in various related areas of research both experimental and computational is provided. Friction and Wear Devices, a Survey American Society of Lubrication Engineers. Lubrication Fundamentals Committee. Sub-committee on Wear, R. Benzing, 1967. Tool and Manufacturing Engineers Handbook: Machining Thomas J. Drozda, 1983-05-02 Part of the renowned Tool and Manufacturing Engineers Handbook Series the Machining Vol 1 helps you apply cost effective techniques to achieve the best results for over 100 traditional and nontraditional machining processes. Chapters include Principles of Metalcutting and Machinability Tolerance Control Cutting Tool Materials Sawing Broaching Planing Shaping and Slotting Turning and Boring Milling Grinding Threading Gear and Spline Production Nontraditional Machining Machine Loading and Unloading Machine Rebuilding and much more. **Fundamentals of Friction & Lubrication in Engineering** American Society of Lubrication Engineers, Victor Anthony Ryan, 1954. **A Catalog of Friction and Wear Devices** American Society of Lubrication Engineers. Lubrication Fundamentals Committee. Sub-committee on Wear, 1973.

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