

PREFACE TO FOURTH EDITION

It has been 17 years since the Second Edition of the *Lubrication Engineers Manual* was published by the Association of Iron and Steel Engineers (AISE) and three years since the Third Edition was published by the Association for Iron & Steel Technology (AIST). In 2004, as the steel industry saw its way through major changes, including plant closures, bankruptcies and corporate buyouts, AISE and the Iron & Steel Society (ISS) merged to form the AIST. The Lubrication and Hydraulics Division became the Lubrication and Hydraulics Technology Committee in AIST's Technology Division VIII: Plant Services and Reliability. Many of the members of the Lubrication Engineers Manual Committee from the Second and Third Editions have now retired and have become consultants to the industry. Those who were already acting in that capacity have retired from business completely. The years between the Second and Third Editions saw the Society of Tribologists and Lubrication Engineers (STLE) introduce the Certified Lubrication Specialist Exam and Certification. Many of the committee members were instrumental in bringing that program to the industry and continue to support the efforts of the STLE as it expands the role of the CLS Certification. The *Lubrication Engineers Manual* has become a cornerstone for information for those who are preparing for the exam. The term "Lubrication Engineer" or "Lubrication Specialist" that was spoken about in the Preface for the Second Edition still exists, and the requirements for the person who performs those duties are still the same. What has happened is that the person no longer exists in the steel plants as they did in the 1940s through 1970s. The operating conditions and types of machinery utilized in the steel mills to produce steel are still the same. What has changed is that the lubrication and hydraulics engineering functions are being drawn into the job functions of the maintenance mechanical engineer, reliability engineer, mechanical maintenance foreman or mechanic or millwright. In many cases, the services and expertise are provided by outside contractors who are supplying the lubricants and lubrication hardware or hydraulics systems and also the technical services and troubleshooting to the steel plants. It is the intent of the *Lubrication Engineers Manual* to cover the lubrication fundamentals, lubricant requirements, types of machinery designed for the steel mills and the systems involved to get the right amount of the right lubricant for the application to the right location at the right time. This manual can also be used by people working in the nonferrous sector and other manufacturing industries that have similar applications, i.e., mining, pulp and paper, and forestry.

The Fourth Edition of the *Lubrication Engineers Manual* continues to update the information from the First, Second and Third Editions, while retaining the same format and basics as the original text. With the continued decentralization and outsourcing of the lubrication functions, it has become increasingly important to update and enhance the references at the end of each section, so that people entering the profession can learn in more depth the subjects involved in tribology and lubrication.

The Fourth Edition has the addition of Section 14: Contamination Control in Hydraulic and Lubrication Systems, discussing filtration. Also, Section 3, originally titled Statistics, has been changed to Maintenance and Reliability to provide the general information and tools available for troubleshooting the mechanical aspects of industrial machinery.

As stated in the Preface for the Second Edition, and it still holds true into the 21st century, the role of the tribologist or lubrication engineer involves being a multi-faceted person. He or she must understand chemistry, physics, metallurgy, mathematics, mechanical engineering, and biology. This manual is intended to provide the basics to the practitioner of lubrication and act as a bible for many generations in the future.

The Association for Iron & Steel Technology is indebted to the USX Corporation for turning over the copyrights to the text in the late 1980s. This edition is the result of the combined efforts by the members of the Lubrication and Hydraulics Technology Committee and the Maintenance and Reliability Technology Committee of the AIST.

DEDICATION

At one time, all of the major integrated steel mills in North America and perhaps the world, had their own lubrication and hydraulics engineers. With changes in the steel mills and the downsizing or right sizing of the organizations, the internal lubrication engineer has all but disappeared. The AIST Lubrication and Hydraulics Operating Committee would like to dedicate the Fourth Edition of the Lubrication Engineers Manual to all of those Engineers that looked after the plant lubrication and hydraulics programs for their steel plants and are now retired, semi-retired and working as consultants or passed away after many years of service to the industry.

ACKNOWLEDGMENTS

The Lubrication Engineers Manual Fourth Edition is based on the work of the Third Edition of the Manual that was published in 2007. The Third Edition in turn had been based on the original Lubrication Engineers Manual that had been published by the United States Steel Corporation in 1971. This book has been widely accepted as the definitive reference publication on the subject of lubrication in the steel industry. The manual has also found its way into other industries as a standard reference for training and teaching about lubrication.

The Fourth Edition is the result of work by members of the AIST's Lubrication and Hydraulics Technology Committee within the AIST Technology Division VIII: Plant Services and Reliability. Special credit should go to the following people, whose hard work, lubrication knowledge, patience and perseverance make the manual one of the great references in the field of lubrication:

Bill Albaugh	AIST
*Charles Barrett	Consultive Services Company
*Bernard Bast	Retired Bethlehem Steel Corporation
*Craig Biddle	Middough Associates, Inc.
*Barbara Bruce	Formerly with AISE
**Andrew Cichelli	Retired Bethlehem Steel Corporation
*Larry Cote	ArcelorMittal Dofasco
*James Davis	Quaker Chemical Corporation
*Alan Denniston	76 Products Company
Jim Dunn	ArcelorMittal Dofasco
Hocine Faci	Castrol Industrial N.A. Inc.
Khalid Farooq	Pall Corp.
Tim Fawcett	HASTEC Turbolube System Inc.
Frank Fonner	Duferco-Farrell Corporation
Paul Fournier	North Star Bluescope LLC
*Mala Garg	Brooks Technology Company
*Lesley Harschnitz	ArcelorMittal Dofasco
John Haspert	CASTROL Industrial Americas
*Ronald Jeroski	Retired, USX Engineers and Consultants
Walt Kusnier	NSK Corporation
*Thomas Lantz	Lantz Consulting Services
*Dennis Lauer	Kluber Lubrication North America
Kevin Marthaler	SKF-Vogel Lubrication
*Roscoe McDowell	McDowell Consulting

*Daniel McCoy	The ELCO Corporation
David Northrop	USS-POSCO Industries
Jay Ondrovic	Castrip LLC
*Edward Pell	Quaker Chemical Corporation
Colleen Reeves	Dubric Industries, Inc.
*Norman Rodowicz	Consultant
*Richard Rush	Consultant
John Schlobohm	Consultant
Dave Schrader	Fluor Corp.
*Richard Schrama	ArcelorMittal Dofasco
Jim Sidow	Fuchs Lubricants Co.
*William Stofey	American Ultra Specialties Inc.
Dave Stoyanoff	DropsA USA Inc.
Bryan Uncapher	Federal Mogul-DEVA
Rodney Walker	Safety Kleen
*Frank Weiss	Formerly with AISE
Brian Wilson	Total Lubricants Canada, Inc.
*Robert Wingrove	Integrated Lubrication Technologies, Inc.
Tom Wojtkowski	Morgan Construction Company A Siemens VAI Business

* Indicates participants who were involved with the original publication.

** AISE originally retained Andy Cichelli to edit the Second Edition, a task which he performed with diligence and enthusiasm until his death in June, 1995.

This Fourth Edition of the Lubrication Engineers Manual was partially funded by the Seeley W. Mudd Memorial Fund of AIME.