To Mary
and our family Robert, Joyce, Thomas,
William, Richard, and Janice
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Note to Readers

Becoming a published author was a longtime dream of our father, Charles Robert “Bob” Simcoe. As a metallurgical researcher by profession and a voracious reader of history and biographies, he wanted to pass his knowledge on to others. On February 25, 2017, however, he died quietly in the intensive care unit of Iroquois Memorial Hospital. He was just one month shy of turning 94.

During his final month, while in a rehabilitation center, he continued to revise and edit chapters of this book and began to write the preface. But the three paragraphs of the preface following this note are all he managed before his death. Those three paragraphs, though, can only hint at the story behind the scenes.

As a research metallurgist, our father worked to support a family of eight, with little time for extra activities. But he loved to tell stories about metals and would readily explain the structure of a building down to the tiniest screw or the composition of the soda can from which we might be drinking. After he retired, he began to put the stories in this book together, at first as a hobby and for his own amusement. He researched not only in libraries but also among his own files, along with interviewing friends in and retired from the industry and creating a blog for a wider audience.

Writing for long periods was interrupted by the need to care for our mother, Mary, who was diagnosed with memory loss and eventually Alzheimer’s disease. As our mother’s health deteriorated and she was placed in a nursing home, Dad again took time to write. Even though he spent countless hours with our mother, it was then that he began to contact editors at Advanced Materials & Processes, ASM International’s flagship publication, about turning his blog into a series of articles. He did not let rejection stand in his way. On March 14, 2013, our mother passed away quietly in her sleep. By then, they had been married over 71 years.

In the following months, Frances Richards became the new editor of Advanced Materials & Processes, and Dad immediately pitched his writing ideas to her. She readily accepted them, and the “Metallurgy Lane” article series was born. Writing for the magazine and later this book became our father’s purpose in life, his legacy. He came alive as he received emails from Karen Marken and
Frances Richards, his patient and understanding editors, and his readers, who hailed from all around the world. He raced life’s clock to finish this book. We are sad that he will not be able to hold it in his hands, but grateful that he won that race.

Robert Simcoe
Joyce Simcoe Simutis
Thomas Simcoe

April 2017

William Simcoe
Richard Simcoe
Janice Simcoe
Preface

It was my intention, for many years, to write on the history of the development of modern technology from the viewpoint of the structural metals used to build our 21st century world. I started this work more than 30 years ago. Many times I have picked it up for a while and then laid it down to do more pressing things connected with earning a living. In addition, I have felt along the way that the subject matter is so vast and that other workers in the field were so much more qualified to perform the task that I was willing to defer to them. However, no one came forward to do the work. In the meantime, a whole generation of metals workers who might have written a more comprehensive history, a more knowledgeable history, indeed a more elegant history have passed from the scene.

So, I take up the challenge of presenting the history of the development of metals as both an industrial activity and a science, which made possible the present world of land, air, and space travel; of chemical production in rust-resistant plants; of buildings reaching over 100 stories high; of welded ships that can cruise for months at a time on nuclear power; and many other engineering accomplishments that the average reader takes for granted.

The past 100 years have been ones which indeed could be called a second industrial revolution, or more accurately a technological revolution. The industrial revolution was based on steam power. This technological revolution involves electricity, oil, and nuclear power combined with developments in transportation, communications, manufacturing advances, and general consumer needs. Nearly every major technical advance, however, has been accompanied or preceded by the development of a new metal or alloy or a breakthrough in the use of an existing one.
About the Author

Charles Robert “Bob” Simcoe became a member of ASM International, formerly the American Society for Metals, in 1950. He attended The Ohio State University and graduated from Purdue University with a degree in metallurgical engineering in 1950. Simcoe became interested in the field while serving in the U.S. Navy during World War II and taking a course in welding and metallurgy during his service.

After graduation, his first job was with Westinghouse Atomic Power Division in Pittsburgh, where he studied zirconium, the structural metal for the atomic reactor in the USS Nautilus submarine. After two years, he began work at Battelle Memorial Institute in Columbus, Ohio. He focused on alloy steels and hydrogen in steel and titanium. In 1958, he began work for the Armour Research Foundation in Chicago, Illinois. He directed a team working on titanium, aluminum, alloy steels, columbium, and other alloys. In 1964, he moved to Lockport, New York, to work for Simonds Saw and Steel. It was here that he worked as an assistant laboratory director, materials manager, and vice president of sales and marketing until he retired in 1985.

During his retirement, he consulted with various businesses and worked for Curtiss-Wright in Buffalo, New York. He also taught the metallurgy lab at the State University of New York at Buffalo for six years.

During his career, Simcoe wrote articles for Transactions of the ASM, The National Metalworking Weekly, a publication of Centre D’Information Du Cobalt (Brussels), Mechanical Engineering, and the Journal of Metals. He also wrote more than 40 articles for ASM International’s Advanced Materials & Processes magazine, which became the basis for this book.