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SPC

Statistical Process Control in Injection Molding and Extrusion

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Preface

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Preface

The basic principles of statistical process control, or SPC, were developed by Dr. Walter A. Shewhart in the 1920s. The use of SPC in American industry declined after the Second World War, while Japanese companies readily accepted and implemented SPC under the tutelage of Dr. W. Edward Deming, a former colleague of Shewhart. The success of Japanese companies in the 1970s and 1980s is at least partially a result of the widespread use of SPC. Statistical process control experienced a renaissance in American industry in the 1990s, which has contributed to a significant improvement in the country's competitive position. There is no question today that the use of SPC is an indispensable tool in world-class manufacturing operations.

This book is an updated and expanded version of the book *SPC in Extrusion* first published in 1993. The original intent was to publish a separate book on SPC in injection molding. However, with the need to update *SPC in Extrusion*, it was decided to expand the scope of the book to cover both injection molding and extrusion. One important SPC topic that was added to this book is the concept method of precontrol. This method is an alternative to the classical SPC method developed by Shewhart. Another important addition is a discussion on the Shainin methodology to design of experiments and statistical analysis.

The basic idea behind this book is to teach SPC and its application to specific processes in an integrated fashion. Many SPC training programs are taught by people who are very familiar with statistics but who know little about process technology. However, successful implementation of SPC requires an understanding of SPC as well as process know-how. This book, therefore, aims to teach not only the principles of SPC but also basic injection molding and extrusion process technology.

The first chapter deals with injection molding technology and the second chapter with extrusion technology. The third chapter discusses plastic properties that are important in molding and extrusion. In order to fully understand the process, one has to know both the machine and material characteristics. Chapter 4 is an introduction to statistical process control and Chapter 5 covers data collection, analysis, and problem solving. Chapter 6 covers measurement and Chapter 7 control charts. Chapter 8 discusses process capability and special SPC tools for injection molding and extrusion. Finally, Chapter 9 discusses design of experiments, the Shainin methodology, and precontrol.

The original book serves as the text of a companion video training program "Statistical Process Control in Extrusion," available through the Society of Plastics Engineers. The current book will form the basis of an interactive training program, "Statistical Process Control in Injection Molding," which is currently in preparation. This program will be followed by an interactive training program, "Statistical Process Control in Extrusion." These training programs will be available from Rauwendaal Extrusion Engineering as well as from the Society of Plastics Engineers.

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