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PREFACE

Textile processes have experienced radical change due to new inventions and the stringent demands of high-quality products. The past three decades have seen the development of new fibers, new spinning methods and new weaving techniques as well as the value addition of existing products and increased productivity of current processes. Modern looms are operating at very high speeds, thus imposing stringent requirements on the warp that can be woven efficiently. In the sequence of textile processes, sizing has continued to retain its importance in the value chain and has proved necessary even with today's demanding requirements. Using innovative techniques, the sizing machine and chemical manufacturers have tried to keep pace with the increased speed of looms. Despite the rapidly changing scenario in textile processing and attendant research in sizing, little of this progress has been documented in a single volume. The motivation to write this book arose from this gap, and the material developed from continued research at Clemson University provided the foundation.

The subject of sizing is complicated because of the important roles played by interactions among fiber type, yarn type, sizing chemicals, preparatory weaving processes, characterization of the performance of sized yarns that can help in predicting the behavior of warp during weaving, easy size removability after weaving, and environmental pollution. Prediction of the efficiency of sizing—type of size, amount of size, penetration of size in different yarn structures, and the mode of different deformations of the sized yarns—in terms of weaving efficiency has confounded textile scientists and

technologists for a long time. The subject matter in this volume is arranged with this in mind. The introductory chapter summarizes the importance of fiber properties, yarn quality, sizing process, sizing materials and their evaluation, performance evaluation of sized yarn and the sizing process, and modern instrumentation and control of the sizing machines. Chapter 2 is devoted to different fibers and yarns and their properties. Most recently developed fibers are covered, and then principles of different spinning systems are described to enable the reader to understand the structural differences in various yarns. Recently developed yarn spinning systems are described to acquaint the reader with modern developments and their effects on sizing. Chapter 3 is devoted to the chemistry of sizing ingredients and their properties that determine suitability for applications. The importance of desizing and its effect on size recovery and environment pollution are also discussed.

Good preparatory processes, such as winding and warping, and their effect on the sizing operation are discussed in Chapter 4. Besides the basic principles of winding, warping and sizing operations, this chapter also covers the principles of process controls and modern instrumentation techniques. Effect of sizing machine parameters and practical aspects are briefly described. Single-end sizing systems for filament sizing have become popular in the past two decades, along with developments in draw-warping and sizing to improve the economics of processes. Chapter 4 also deals with the principles of sizing of different types of yarns such as ring, rotor, and filament. The efficiency of sizes on yarns in terms of the types of loom used for weaving is also examined. Prewetting of spun yarns, with its impact on the economy of sizing, is presented. Chapter 5 deals with performance evaluation of sized yarns. The major portion of this chapter is drawn from the research material developed through exhaustive studies conducted at Clemson University over the past fifteen years. A comprehensive bibliography on sizing is appended for the benefit of researchers and interested readers who would like to delve into the subject matter in more detail. References in the bibliography include material that is scattered in various publications in several languages besides English.

This text has been developed with a view to providing systematic information for textile students, engaged in both undergraduate and research studies. The information presented will help textile practitioners comprehend the prevailing practices in the industry and understand the changing processes and practices.

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