Chapter 1

OVERVIEW OF PROCESSING OPERATIONS

INTRODUCTION

The various processes reviewed in this book are used to fabricate all types and shapes of plastic products, ranging from household convenience packages to electronic devices and many others—including the strongest products in the world, used in space vehicles, aircraft, building structures, and so on. Proper process selection depends upon the nature and requirements of the plastic, the properties desired in the final product, the cost of the process, its speed, and product volume. (Note that a plastic also may be called a polymer or a resin.) Some materials can be used with many kinds of processes; others require a specific or specialized machine. Numerous fabrication process variables play an important role and can markedly influence a product’s aesthetics, performance, and cost.

This book will provide information on the effects on performance and cost of changing individual variables during processing, including upstream and downstream auxiliary equipment. Many of these variables and their behaviors are the same in the different processes, as they all relate to temperature, time, and pressure. This chapter contains information applicable to all processes characterized by certain common variables or behaviors, such as plastic melt flow, heat controls, and so forth. It is essential to recognize that for any change in a processing operation, there can be advantages and/or disadvantages. The old rule still holds: for every action there is a reaction. A gain in one area must not be allowed to cause a loss in another; changes must be made that will not be damaging in any respect.

All processes fit into an overall scheme that requires interaction and proper control of different operations. An example is shown in Fig. 1–1, where a complete block diagram pertains to a process. This FALLO (Follow ALL Opportunities) approach can be used in any process by including those “blocks” that pertain to the fabricated product’s requirements.
The FALLO concept has been used by many manufacturers to produce acceptable products at the lowest cost. Computer programs featuring this type of layout are available. The FALLO approach makes one aware that many steps are involved in processing, and all must be coordinated. The specific process (injection, etc.) is an important part of the overall scheme and should not be problematic. The process depends on several interrelated factors, such as: (1) designing a part to meet performance and manufacturing requirements at the lowest cost; (2) specifying the plastic; (3) specifying the manufacturing process, which basically requires (a) designing a tool "around" the part, (b) putting the "proper performance" fabricating process around the tool, (c) setting up necessary auxiliary equipment to interface with the main processing machine, and (d) setting up "completely