Preface

It is imperative for a manufacturing company to run an efficient operation now-a-days to stay competitive in the world market. The advent of new technologies, a continuous improvement in product quality and changing customer requirements have all lead to shorter production runs, which demand effective methodologies for their execution on the shop floor – the ones that minimize work-in-process and cycle time while meeting customer demands. Due to the batch production nature of such an environment, the use of an appropriate production lot size (or sizes) on the shop floor is central to achieving these objectives. One technique that can effectively influence the flow of a batch (or a lot) of jobs over the machines by appropriately determining the size of production lots (also called *sublots* or *transfer lots*) is lot streaming. By splitting a lot of jobs into smaller-size sublots and processing them in an overlapping fashion over the machines, it tends to achieve the above objective. In this book, we present this technique for the flow shop machine configuration, which constitutes the brunt of its development that, thus, also comprises of the core of the related theoretical contributions made in this field of study.

The material presented in the book has been divided into five chapters, while the last chapter, Chap. 6, contains concluding remarks. Chapter 1 introduces the relevant concepts and definitions that are essential for a clear understanding of the material presented in subsequent chapters. To give the reader an appreciation of the potential benefits of lot streaming, analytical expressions to that end are derived. A historical perspective of this technique is given to put the subject matter on lot streaming in proper perspective and to provide the motivation behind the development of this technique. Some application areas that lend themselves to the use of lot streaming are then presented. A glimpse of the material contained in subsequent chapters is also provided to give the reader an idea of what to expect in these chapters. Chapter 2 presents new and generic mathematical models for the lot streaming problems that contain a variety of relevant features. A mathematical model of a problem, in general, can aid in its analysis, and also, in the development of an appropriate mathematical programming-based methodology for its solution. Chapter 2 is written with this intent in mind. Chapters 3–5 present material in the increasing order of difficulty of the lot streaming problems, namely, for two-machine, three-machine, and m-machine problems. Each of these chapters addresses a variety of problems while presenting for each the requisite analytical

development leading up to the algorithm for its solution. These algorithms are illustrated through numerical examples to further aid in their understanding.

The material in this book can be used as a supplement to a course in sequencing and scheduling, production planning and control, production management, supply chain management, or to courses in related areas at graduate or advanced undergraduate levels. As background, it requires mathematical maturity and introductory knowledge of optimization concepts and methodologies. The book provides useful ideas and algorithms for practitioners, and it can serve as a useful research reference.

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