

Foreword

Management concepts often repeat. Currently, another “wave of lean management” seems to roll, preaching that inventories are waste. Inventories would blur a clear view on mistakes which are made in production planning. Thus, inventories should be reduced. All drivers that necessitate inventories should be eliminated by means of investments. This makes sense in many industries, but not in all. Some industries utilize expensive, automated machines. These cannot easily be replaced by newer ones allowing automated changeovers and thus generating almost no setup times or setup costs. They apply a machinery, which has grown over time. It consists of many machines which show a similar functionality, but have been purchased successively over one or several decades. Hence, there are some older machines, which are less efficient, and a few newer ones, which are more efficient.

An example is the consumer packaged goods industry. There are often only a few production stages (like Make and Pack) with several heterogeneous, parallel production lines per stage. Parallel means that these lines show a similar functionality, i.e., they can be used alternatively to produce—more or less—the same products. Heterogeneous means that they, nevertheless, do not need to be identical. This concerns production speeds, production coefficients, production costs, setup costs and setup times. Both setup costs and times may even be sequence-dependent. The individual work stations of a production line are usually connected by an automated transport system with a fixed cycle time. Thus, each production line can be considered as a single planning unit. Sometimes only one of these stages constitutes a stationary bottleneck. However, sometimes the bottleneck may shift dynamically, dependent on the mix of demand the customers ask for. This book focuses on this kind of industries, more concretely on short- to medium-term production planning and scheduling in this kind of industries when both lot-sizing and scheduling decisions have to be taken simultaneously in order to consider the crucial interdependencies between the various predecessor and successor products on the different production stages.

The author proposes and compares different mixed-integer programming formulations, which base on the so-called General Lot-sizing and Scheduling Problem (GLSP), to accurately model this planning situation. Furthermore, he develops and tests an innovative solution heuristic, combining the principles of Variable Neighborhood Decomposition Search with the Exchange heuristic, which not only behaves well for small “theoretical” problem instances, but also proves to be applicable for a large industrial problem of plastic foil pro-

duction. Despite of the high practical relevance of this type of planning problem, decision support being offered by science and by commercial software (e.g. as part of so-called “Advanced Planning Systems”) seemed to be rather poor and disappointing until now. The author manages to make a first—and already very impressive—step to improve this situation.

Thus, I invite the interested production planner, operations researcher and software developer to carefully read this book. Even though it deals with consumer packaged goods, this book is no fast food. You will have to take your time to eat it. It will often taste sweet and sometimes be hard to digest. But I promise—it is worth every bite of it.

Prof. Dr. Herbert Meyr

Multi-Stage Simultaneous Lot-Sizing and Scheduling
Planning of Flow Lines with Shifting Bottlenecks

Seeanner, F.

2013, XXVI, 182 p. 68 illus., Softcover

ISBN: 978-3-658-02088-0