Preface

The field of manufacturing control has had an eventful past. It began in the mid-1960s, when the planning and control of continually larger plants and factories with thousands of orders and tens of thousands of operations overwhelmed the experience and imagination of supervisors and managers. Famous rules were seen as last resorts for getting through the eternal target conflict between a higher utilization and punctual delivery. Examples of such rules included “a workshop just has to be provided with a large number of jobs in order to be productive”, or “setup times should be avoided as much as possible so combine orders that are the same” and “processing orders according to the shortest processing time (SPT) rule will create short throughput times for orders”. What is common about all of these rules and others is that they resolutely support one target, but do nothing to resolve the actual conflict between targets.

Within this context, queuing theory, which had already been successfully implemented in systems for distributing goods and telephone systems, gave rise to hope. Nevertheless, despite great efforts being made both in research and on the shop floor, it never managed to establish itself in discrete manufacturing organized according to the job shop principle. Comprehensive research showed that the mathematical conditions for this model just did not exist in the industry.

Growing computer capacities and the availability of visual displays rang in a new era of production control in the early 1980s. The so-called ‘electronic control board’ finally promised reliable planning and processing of orders by meticulously planning and pursuing every single operation on every machine. But these hopes too were dashed because the underlying deterministic model was wrong and the effort for planning and maintaining the system was too great.

Parallel to these developments new approaches became known. Kanban, developed in Japan, radically called into question traditional ways of thinking in that orders were drawn from the production based on the supermarket principle (i.e. the pull principle) instead of loading them into the production long before the desired delivery date (push principle). The Load Oriented Order Release (LOOR) – developed for job shop productions and later extended to Load Oriented Production Control and Monitoring – was the first to combine a backlog oriented capacity control with a WIP oriented order release. Other authors emphasized the bottleneck theory, thus the Theory of Constraints (TOC) and Optimized Production Technology (OPT), which was derived from it. Further milestones included CONWIP (Constant Work in Process) and Cumulative Production Figures which was developed in the automobile industry.

In the mid-1980s the lean production wave set-in resulting in the partitioning of factories into autonomous market and product oriented islands, segments and fractals. Each of these was to in turn be controlled as much as possible by the workers. This was accompanied by the increased shifting of parts, components and entire subsystems to suppliers, while production enterprises concentrated on procurement, assembly and distribution. The interest in production control thus greatly diminished and numerous production control systems subsequently disappeared from the market.

In the mid-1990s, the focus became centered on the entire supply sequence from the supplier's supplier up to the customer's customer: The supply chain was born and with that the transparency of the processes stood in the foreground.

Irrespective of these and other developments such as agent control, fuzzy logic and genetic algorithms, for example, the target conflicts and production control tasks naturally continued to exist. Nevertheless, the demands especially with regards to delivery reliability, the increasing forms of production and their connection to production systems as well as the methods available for fulfilling PPC tasks have changed. If one were to ask companies today what the largest problem in logistics is, the main complaint would still be the unreliability of production logistics.

Given this situation, this book is long overdue. With a new systematical approach the author forges the logical correlations between the objectives and tasks of production control. The latter being: order generation, order release, capacity control and sequencing. Each of these tasks is then characterized based on the properties with which they are classified.

The subsequent description of all the methods known in professional literature as well as on the shop floor based on their logic forms the core of this book. With the aid of clear and comprehensive diagrams these methods are made transparent and assessed in regards to their suitability for specific application cases. Nine guiding principles, which continually remind the reader about the correlation between the objectives and actuating/controlled variables, form the foundation for this evaluation.

In conclusion, the author demonstrates how the individual components of manufacturing control are selected and configured together. Seeing some methods are able to fulfill a number of tasks, this is a critical aspect.

This work distinguishes itself not only with its convincing systematic and thorough international research, but also in the way it clearly presents the material and can be directly applied. I hope this book will be well received both in scientific circles as well as on the shop floor and am convinced it will become a standard work in publications on PPC.

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