Chapter 11
Bottleneck Analysis

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Abstract Within Lean Manufacturing, line balancing is crucial for distributing and assigning work evenly across assembly flow lines to eliminate bottlenecks and increase capacity. As such, bottleneck analysis is a complementary tool to achieve line balancing. While these are widely known tools, the upcoming changes in the global industry brought by digitalization, Internet-of-Things, automatization, and artificial intelligence in decision processes involve the need to understand their origins to make an adaptation, or evolution, of these tools to the new scenarios and challenges. Hence, the present chapter discusses the origins, relationships, impacts, limitations, opportunities, and applications of bottleneck analysis as a fundamental tool for line balancing in Lean Manufacturing. Finally, a case study is presented where the takt time is the basis for analyzing if the required production can be achieved even with the bottleneck, seeking that the current bottleneck governs the adjacent processes to obtain the required production. This work can provide important insights regarding the evolution and application of these tools while identifying future opportunities.

Keywords Bottleneck · Lean manufacturing · Line balancing

11.1 Concept of Bottleneck

In the context of manufacturing, a bottleneck is a stage or process within the production system that limits the overall capacity of the operation. It acts as a constraint, slowing down the system's overall output and impacting the efficiency of the entire production process. The term 'bottleneck' is used because, much like how a narrow

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