

Bottleneck identification and alleviation in a blocked serial production line with discrete event simulation: A case study

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ABSTRACT

Aiming at the gap between theoretical research and practical application in the production bottleneck field, we apply five bottleneck identification methods in a serial production line in aerospace industry based on discrete event simulation and Plant Simulation software, meanwhile discuss the influence of the bottleneck machine quantity on the system performance. This paper evaluated the practicability, accuracy and limitation of various bottleneck identification methods at the practical level. The results of the bottleneck alleviation manifest that increasing the number of bottleneck machines can effectively improve the system performance, but the more machine quantity, the smaller performance improvement. More importantly, the paper studies the influence mechanism and function relationship of the bottleneck machine quantity on the maximum completion time from an interesting actual phenomenon for the first time. The function obtains the condition that the maximum completion time achieve the minimum. The research and conclusion of this paper have essential reference significance for production guidance and theoretical research, and can also contribute to narrow the gap between theory and application of the production bottleneck field.

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