

A study on a reliability of a mixed-model assembly line based on complexity

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ABSTRACT

Many manufacturers have made extensive efforts to enhance the flexibility of their manufacturing systems, which can produce various products in small volumes with limited resources. For instance, in the automotive industry, maintaining a high diversity of models and options is a key objective in their business to guarantee market competitiveness. However, this diversification of products frequently causes a dramatic increase in manufacturing complexity in the mixed-model assembly system. Nevertheless, quantitative indices for manufacturing complexity are relatively insufficient due to their high dependency on manual tasks and minimal consideration for task difficulty in complex assembly processes. This research, thus, proposes a reliability-based complexity metric for effective assessment of mixed model assembly lines with consideration for task difficulties in manual assembly processes. This research presents a model and analysis of process complexity based on information entropy to estimate the manufacturing complexity of mixed-model production system in manufacturing industries. The proposed model is illustrated with a small-scale assembly line with operators' manual tasks to verify and validate its applicability and usefulness.

Keywords: Information entropy; fatigue; manufacturing complexity; mixed-model assembly line; reliability