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Abstract
SMT Printed circuit boards (PCBs) are extensively used in diverse electronic products today. The placement process is generally the bottleneck in a PCB assembly line. Many researchers indicated that an optimal component placement sequence reduces the cycle time of an assembly line with single placement machine. However, in current practical assembly lines, more than one placement machines are concurrently used. Therefore, in this type of PCB assembly lines, the improvement of the single machine is no longer the issue in increasing throughput rate. The line balancing tasks within machines has a greater impact on the throughput rate.
A time and movement analysis is firstly conducted to develop the operation model for placement machines. Based on and GA are used to solve the balancing task of an assembly line.This research extends the application of Genetic Algorithm (GA) to the problem of feeder rack allocation (FRA) for balancing the workloads within machines. The GA implementation is capable to produce a new feeder rack allocation for machines so as to reduce the cycle time of the assembly line.
This research developed a prototype system for solving the balancing problems faced in a PCB assembly line with multiple machines. The system incorporated with the developed algorithms which is capable of dealing with large quantity of components. A system validation process is conducted to verify the system. It shows a promising result in improving the throughput rate of the assembly line.
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