

Unreliable Production Lines with Simultaneously Unbalanced Operation Time Means, Breakdown, and Repair Rates

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Abstract : This paper investigates the benefits of deliberately unbalancing both operation time means (MTs) and unreliability (failure and repair rates) for non-automated production lines. The lines were simulated with various line lengths, buffer capacities, degrees of imbalance and patterns of MT and unreliability imbalance. Data on two performance measures, namely throughput (TR) and average buffer level (ABL) were gathered, analyzed and compared to a balanced line counterpart. A number of conclusions were made with respect to the ranking of configurations, as well as to the relationships among the independent design parameters and the dependent variables. It was found that the best configurations are a balanced line arrangement and a monotone decreasing MT order, coupled with either a decreasing or a bowl unreliability configuration, with the first generally resulting in a reduced TR and the second leading to a lower ABL than those of a balanced line.

Keywords : unreliable production lines, unequal mean operation times, unbalanced failure and repair rates, throughput, average buffer level

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