

A Simulation Study of an MRP Planned Job Shop

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Thesis Summary

A simulation study is done of an MRP controlled job shop producing the derivable products to order. The products can belong to one of the six product structure types and may have one of the three types of monthly demand.

Analysis of variance was used to study the main effects of and the interaction effects between three planning decisions of an MRP planned job shop, namely, lot-sizing, offsetting and dispatching, on three different criteria, viz. mean tardiness, value of average inventory, and total system cost. The main effects of the three planning decisions were found to be significant (at 0.1 level or less) for all performance criteria for all the product structure types. Second order interactions between the lot-sizing and dispatching decisions were significant (at 0.1 level or less) for most of the performance criteria for most of the product structure types. Second order interaction between offsetting and lot-sizing decisions and between the offsetting and dispatching decisions were not significant (at 0.1 level or less) for most of the performance criteria for most of the product structure types. Among the three planning decisions, the dispatching decision was found to have the maximum effect on most of the performance criteria for most of the product structure types.

Among the seven lot sizing rules studied, the Least Cost per Period (LCP) rule and the Lot for Lot (L4L) rule result in much better values of the performance criteria. Among the eight dispatching rules studied, the Shortest Processing Time (SPT) rule, the First-In-First-Out (FIFO) rule, the maximum number of remaining operation (MRO) rule, the Earliest Due Date (EDD) rule give much better values of the performance criteria. The L4L-MRO combination of the lot-sizing and dispatching rules gave the best values of the performance criteria. Other combinations of good lot sizing rules and good dispatching rules were almost as good as the L4L-MRO combination and resulted in only slightly higher values of the performance criteria.