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## ABSTRACT

### OPTIMAL NUMBER OF STANDBY UNITS FOR A MULTI-STAGE, MULTI-MACHINE, LOGICALLY SERIAL PRODUCTION SYSTEM

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The scope of reliability encompasses all branches of science and engineering. As technological advances produce more complex devices and systems that are expensive to build, and even more expensive if they fail to operate as designed, performance evaluation using reliability analysis techniques takes on an ever increasing importance.

In this study, a model that will determine the optimum number of standby units that will support a



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multi-stage, multi-machine, and logically serial production system was formulated. The objective of which was to minimize the total present cost of improvement subject to a reliability constraint. A logically serial system is one whose configuration is such that the entire system experiences downtime whenever there is a shortfall in the number of operating units in any of the stages. The system considered consists of different stages with several identical equipment in each stage.

A computer program was developed to solve the formulated model. One just needs to input the number of stages in the production system, the number of operating units per stage with the equipments' failure rates as well as the repair rate of the service facility. The program will also ask for the costs corresponding to each equipment and the reliability requirement of the system. The results are readily available once all the data required are inputted. The program is user friendly and can be used by anyone with access to a 386 or a later model personal computer.



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