ABSTRACT

CHARACTERISTICS OF A PRODUCTION SYSTEM CONSISTING OF m MACHINES AND s SETUP MEN

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A queueing problem of jobs in one type of production system which con-
sists of *m* machines and *s* setup men are discussed. In this system, the each
job requires to be automatically machined after completion of setup. It is
assumed that the jobs arrive at the system with a Poisson process and that
setup time and machining time are exponentially distributed. This paper ob-
tains the following results.

(1) When R is the minimal non-negative solution of the matrix-geometric form
by Neuts, the eigenvalues of R can be calculated by the following equation:

$$\mid A_0 + yA_1 + y^2A_2 \mid = 0$$

Then, it is shown that excepting the eigenvalues of R the every root of the
equation does not lie inside the unit disk.

(2) Some numerical experiments concerning with the trade off on the men and
machines utilization are carried out. From the results, increase of *m/s* is
effective to increase both the men and machines utilization. Also two ways to
increase *m/s* are proposed.

(3) Some numerical data which are concerned with the average number of jobs
in the system and the average time spent in the system (i.e. the average pro-
duction lead-time) are offered for *s*=1, 2, and 3. From these data, when a net
utilization of machines is given, there is an utilization of man to minimize
the production lead-time.