ASSIGNING IDENTICAL OPERATORS TO DIFFERENT MACHINES

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Consider a system with M different machines and s identical operators. No machine can work without the constant attention of an operator and all operators can serve all machines. At machine m jobs arrive according to a Poisson arrival process with rate λ_m and service time distribution F_m . A job arriving at machine m can be served at machine m only. Whenever an operator finishes a job a decision has to be taken about the machine where he should go to next.

There are various ways in which this could be done. The operator could choose at random one of the machines that are waiting. He could also choose at random but using weights depending on queue length. Or he could use a criterion such as FCFS.

The performance of the system, as in the shortest queue problem, is not as good as in the s -server system because it may happen that an operator is idle while there is still a job waiting for a machine which is already busy.

For the simplest case with all jobs exponentially distributed with a mean which is independent of the machine, Durlinger and Geurts [1] give a good approximation by describing the system as a two-dimensional Markov process. One of the dimensions is the number of jobs in the system, the other dimension counts the number of empty queues.

Another good approximation is obtained by looking at the asymptotic behaviour for large m and s . As we will show this approach leads to very good approximations for the case of non exponential jobs as well (cf. [2]).

- [1] Durlinger, P.P.J. and J.H.J. Geurts, Determining work order throughput times in dual constrained production departments, Eindhoven University of Technology, Department of Industrial Engineering, Working paper BDK/KBS/89-13, December 1989.
- [2] Kok, A.G. de, and J. van der Wal, Assigning identical operators to different machines, Eindhoven University of Technology, Department of Mathematics and Computing Science, -Memorandum COSOR 93-31, November 1993.