Performance Measures for Carousel Storage/Retrieval Systems

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Abstract

The objective of this research is to develop closed form expressions of performance measures to use in designing and operating certain carousel storage/retrieval(S/R) systems. Our main performance measure is the system throughput which is defined as the long run average number of requests processed per unit time.

We begin by analyzing a model for double carousel S/R system. The operating policy we apply through this study is cyclic operating policy which alternates requests processing between two carousels. We examine some basic properties such that the picker waiting time is a Harris chain and has a unique stationary distribution. We derive the stationary distributions of the picker waiting time and performance measures for several pick time distributions. Also we develop a sequence of approximations that give lower and upper bounds on the picker waiting time and compare the results with that of the stationary distribution.