Chapter 6
A Study of Flexible Manufacturing System With Multiple Failures

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ABSTRACT

Flexibility refers to the capability of a manufacturing system to respond cost effectively and arbitrarily to adapting production needs and necessities. This ability is becoming increasingly important for the design and operation of manufacturing systems, as these systems do function in highly variable and unpredictable environments. In this chapter, the reliability of the flexible manufacturing system has been calculated based on the mathematical framework. The model of the system consists of the system structure and the distribution of its components. The components are assumed to be repairable after various types of failures. In this work, the reliability and availability have been analyzed by using Markov process, Laplace transformations and supplementary variable techniques. Furthermore, the impacts of various failures on reliability, and availability of the system have also been analyzed.

INTRODUCTION

Reliability analysis is an essential viewpoint of the business as far as higher profitability and lower running cost which can be accomplished by making the system free from failures by appropriate support, arranging and control. This can likewise help the administration to comprehend the impact of expanding or diminishing the repair rates of a specific part or subsystem in a general framework. While Managing unwavering quality based outline of machinery and structures, we may concentrate the relative mechanical and auxiliary failures from the perspective of loss of human lives. Reliability analysis of such sorts of systems helps us to get the required data about the control of different parameters. In the present section authors have examined the unwavering quality investigation of the paper, assembling plant by considering the failures of its primary segments. A few specialists for the last numerous years have examined the different certainties of dependability innovation of the subsystems or frameworks in process ventures at different level and various research papers have been distributed toward this path including Gupta et al. (2005) derived a numerical analysis of reliability and availability of the serial processes in butter-oil processing plant. Shakuntla et al. (2011) analyzed the reliability of palliative industry using the supplementary variable technique. Zadeh (1965) proved a separation theorem for convex fuzzy sets without requiring that the fuzzy sets be disjoint. Wong and Chen (2000) proposed a design and implementation methodology of a GA-based fuzzy system on a Field Programmable Gate Array (FPGA) chip.

LITERATURE REVIEW

Different authors talked about the system having Markovian properties. The system has non-Markovian property can be changed over into a system having the Markovian nature by presenting another supplementary variable.

Initially, (Cox, 1955) utilized supplementary variable method for the examinations of non-Markovian systems. He displayed a methodological arrangement of reliability and availability of that system with the assistance of Supplementary variable technique. Dhillon and Yang (1995) displayed a numerical model for reliability and availability investigation of a general standby system with expanding human error rates and irregular fizzled framework and repair rates. The authors utilized joint density function approach and supplementary variable method. Elsayed and Turley (1980) introduced a two-stage manufacturing system with buffer storing. Ram and Viswanadham (1994) introduced a structure for execution assessment of assembling
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