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Maintenance Policy for Repairable Systems Using Minimal Repair and Replacement Service under Warranty

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Abstract

The minimal repair replacement policy is investigated with the preventive maintenance services in the warranty period using failure times and warranty servicing times. For such purposes, we develop the renewing free replacement-repair warranty and the renewing pro rata replacement-repair warranty. Then the maintenance model considering the preventive maintenance in the warranty period is discussed from the manufacturer's perspective. As the criterion to determine the optimal maintenance strategy, we formulate the expected cost rate per unit time. Under the warranty, the replacement service is considered as well as the repair service for a failed product when warranty service and the preventive maintenance service are scheduled for system's quality and reliability during the warranty period. Given the maintenance cost structures within the warranty period, the optimal maintenance cycle is determined before the expiration of the warranty policy. The main goal of this paper is to determine the optimal length of warranty period from the manufacturer's perspective when the renewable two dimensional warranty is offered for the system at its sale. The real application is implemented using the proposed approach by field data.

Keywords
Minimal repair, replacement policy, reliability and maintenance, warranty cost analysis

Biography

Minjae Park is currently an Assistant Professor with the College of Business Administration, Hongik University, Seoul, Korea. He received the B.S. degree in Applied Statistics from Yonsei University, Seoul, Korea; the M.A. degree in Statistics from Columbia University, New York, NY; and the M.S. degree in Statistics and Ph.D. degree in Industrial and Systems Engineering from Rutgers University, Piscataway, NJ. Prior to joining Hongik University, he was a researcher participating in a liquefied natural gas project, a co-study between Rutgers University and Qatar University, Doha, Qatar. His research interests include quality management, reliability, optimization, mean shift detection, and applied statistics. He is member of IIE, INFORMS, and IEEE.

Ki Mun Jung is an Associate Professor at Kyungsung University of Korea since 2003. He received his PhD degree in Statistics from Dongguk University of Korea in 1999. During 2002-2003, he had worked as a Research Fellow at University of Southampton in the UK. He has published many articles in the areas of reliability theory, maintenance policy and warranty policy in a wide variety of journals including Reliability Engineering and System safety, Journal of the Operational Research Society and Communications in Statistics-Theory and Method. His research interests are in the areas of maintenance policy and warranty policy for a repairable system.

Dong Ho Park is a full professor at Hallym University, Chuncheon, Korea, since 1993. He received his B.S. degree in Applied Mathematics in 1968 from Seoul National University, Seoul, Korea and M.S. and Ph.D. degrees from Florida State University, Tallahassee, USA, in 1980 and 1982, respectively. He was formerly an associate professor at University of Nebraska-Lincoln, USA, until 1995 and was a director of Statistics Division, Department of Mathematics and Statistics. He has founded the Korean Reliability Society in 1999 and assumed the presidency of that society from 1999 to 2004. Now, he is an honorary president of The Korean Reliability Society. He has written over 70 research papers and 8 books in the areas of reliability theory, life testing, software reliability, and system maintenance policy in a wide variety of international journals. He is an associate editor for Asian-Pacific Journal of Operational Research and is on editorial board in several international journals.