

Optimal Periodic Maintenance Policy under Imperfect Repair

Maria Luiza G. de Toledo¹, Marta A. Freitas², Enrico A. Colosimo³ and Gustavo L. Gilardoni⁴

¹ *Escola Nacional de Ciências Estatísticas (IBGE), Brazil, malutoledo83@gmail.com*

² *Universidade Federal de Minas Gerais (UFMG), Brazil, marta.afreitas@gmail.com*

³ *Universidade Federal de Minas Gerais (UFMG), Brazil, enricoc57@gmail.com*

⁴ *Universidade de Brasília (Unb), Brazil, gilardon@unb.br*

In the repairable systems literature one can find a great number of papers that propose maintenance policies under the assumption of minimal repair after each failure (such repair leaves the system in the same condition as it was just before the failure - *as bad as old*). This paper derives a statistical procedure to estimate the optimal Preventive Maintenance (PM) periodic policy, under the following two assumptions: (1) perfect repair at each PM action (i.e., the system returns to the *as good as new* state) and (2) imperfect system repair after each failure (the system returns to an intermediate state between *as bad as old* and *as good as new*). In the present paper, statistical methods, including the likelihood function, Monte Carlo simulation, and bootstrap resample methods, are used in order to: (1) estimate the degree of efficiency of repair and (2) obtain the optimal preventive maintenance check points that minimize the expected total cost. This study was motivated by a real situation involving off-road engines maintenance.

Keywords: maintenance; imperfect repair; virtual age model; greatest convex minorant; optimal periodicity
