The Economic－statistical Design of Control Charts under Preventive Maintenance

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ABSTRACT

As technology advances, human power had gradually replaced by automated production equipment. Therefore, during the production process, maintaining the automated production equipment in order to reduce any production variations can effectively increase product quality and lower production costs. A traditional control chart is designed on the basis of statistics. The chart consists of central line and control limit. The production process will be changed from in-control to out-of-control state if there is an assignable cause occurs and this assignable cause can be detected by the control chart. Since traditional control chart does not take into consideration of the cost, economic design of control chart is developed. Although it may achieve a lower cost, it does not perform well in some statistic features such as Type I error and test power, so the two are combined in order to compensate each other. Even so, the design of a general control chart does not consider the preventive maintenance of machine equipment. Therefore, the economic-statisticaldesign of <img src= ” /theabs/image?id=001&account=097DYU00030019 ” > control chart is developed under a consideration of the preventive maintenance of machine equipment in this study. Numerical example is also used to demonstrate the model ’ s working.

Keywords : control chart、statistical-economic design、preventive maintenance

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REFERENCES

中文部份:1. 蔡炫君，1998，考慮多重非機遇原因在預防保養策略下之管制圖經濟設計之研究，華梵大學工業管理研究所碩士論文。2. 鍾佳樺，2003，考慮預防保養之變動樣本數與抽樣間隔管制圖經濟性設計，雲林科技大學工業工程與管理研究所碩士論文。英文部分:3. Barlow, R. E. and Hunter, L. C.,“ Optimum preventive maintenance policies ”, Operations Research, 8, 90-100. (1960).4. Ben-Daya, M. and Rahim, M. A.,“ Effect of maintenance on the economic design of control chart ”, European Journal of Operational Research, 120, 131-143. (2000)5. Chiu, W. k. and Cheung, K. C.,“ An economic study of -charts with warning limits ”, Journal of Quality Technology, 9, 166-171. (1977)6. Duncan, A. J.,“ The economic design of charts used to maintain current control of a process ”, Journal of the American Statistical Association, 51, 228-242. (1956)7. Duncan, A. J.,“ The economic design of -charts when there is a multiplicity of assignable causes ”, Journal of the American Statistical Association, 66, 107-121. (1971)8. Lorenzen, T. J. and Vance, L. C.,“ The economic design of control charts:a unified approach ”, Technometrics,28, 3-10. (1986)9. Lotka, A. J.,“ A contribution to the theory of self-renewing aggregates with special reference to industrial replacement ”, Annals of Mathematical Statistics, 10, 1-25. (1939)10. McWilliams, T. P.,“ Economic control chart design and the in-control time distribution : a sensitivity analysis ”, Journal of Quality Technology, 21, 103-110. (1989)11. McWilliams, T. P.,“ Economic, Statistical, and Economic-Statistical Chart Designs ”. Journal of Quality Technology, 26, 227-238. (1994)12. Montgomery, D. C.,“ The economic design of control charts:a review and literature survey ”, Journal of Qualit Technology, 12, 75-87. (1980)13. Montgomery, D. C., Torng, J.C.C., Cochran, J.K. and Lawrence, F.P.,“ Statistically constrained economic design of the EWMA control chart ”, Journal of Quality Technology, 27,250-256. (1995)14. Nagendra, Y. and Rai, G.,“ Optimum sample size and sampling interval for controlling the mean of non-normal variable ”, Journal of American Statistical Association, 66, 637-640. (1971)15. Weiss, G.,“ On the theory of replacement of machinery with a random failure time ”, Naval Research Logistics, 3, 279-293. (1956)16. Woodall, W. H.,“ Weaknesses of the economic design of control charts ”, Technometrics, 28, 408-409. (1986)17. Rahim, M. A.,“ An investigation of economic design of charts to control non-normal process means ”, Engineering Optimization, 3, 193-208. (1985)18. Saniga, E. M.,“ Joint economically optimal design of and R control charts ”, Managements Science, 24, 420-431.(1977)19. Saniga, E. M.,“ Economic statistical of control-chart designs with an application to and R charts. Technometrics, 31, 313-320. (1989)20. Savage, I. R.,“ Cycling ”, Naval Research Logistics, 3, 163-175 (1956).21. Zhang, G. and Berardi, V.,“ Economic statistical design of control charts for systems with Weibull in-control times ”, Computers and Industrial Engineering, 32, 575-586.(1997)