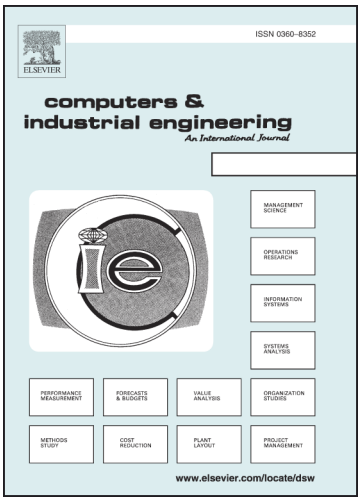

Transient analysis of quality performance in two-stage manufacturing systems with remote quality information feedback

Shihong Liu, Shichang Du, Lifeng Xi

PII: S0360-8352(18)30045-7
DOI: https://doi.org/10.1016/j.cie.2018.02.009
Reference: CAIE 5071

To appear in: *Computers & Industrial Engineering*

Received Date: 23 August 2016
Revised Date: 27 January 2018
Accepted Date: 7 February 2018

Please cite this article as: Liu, S., Du, S., Xi, L., Transient analysis of quality performance in two-stage manufacturing systems with remote quality information feedback, *Computers & Industrial Engineering* (2018), doi: https://doi.org/10.1016/j.cie.2018.02.009

Transient analysis of quality performance in two-stage manufacturing systems with remote quality information feedback

Shihong Liu [a, b], Shichang Du [a, b, *], and Lifeng Xi [a, b]

[a] Department of Industrial Engineering and Management, School of Mechanical Engineering, Shanghai Jiaotong University, Shanghai, 200240, PR China

[b] State Key Lab of Mechanical System and Vibration, Shanghai, 200240, China

* Corresponding author

Abstract: Recently modeling and analysis of product quality propagation in multi-stage manufacturing systems has received lots of attention. However, most existing results are focused on steady state performance, while transient analysis of system quality remains largely unexplored. When product changeover or scheduled maintenance happens, the system quality may undergo transients, which describe the system quality behavior before approaching the steady state at targeted levels of quality and cost. It is of practical importance to comprehensively investigate the quality performance especially during transients in order to reduce quality loss and improve product quality. In this paper, a Markov model is developed to address quality propagation in a two-stage manufacturing system with remote quality information feedback during transients. Based on the proposed mathematical model, analytical formulas for evaluating transient quality performance including the real-time product quality, settling time, and quality loss due to transients, are derived. In addition, the monotonicity properties of critical transient system characteristics and quality performance metrics are explored. The proposed method is validated with numerical data and real-world data, and the results demonstrate the effectiveness for transient quality analysis in two-stage manufacturing systems.

Keywords: quality, transient analysis, Markov model, manufacturing system