



International Journal of Systems Science >

Volume 44, 2013 - [Issue 9](#)

299 | 24 | 0  
Views | CrossRef citations to date | Altmetric

Original Articles

# Optimal economic production quantity policy for randomly failing process with minimal repair, backorder and preventive maintenance

Gwo-Liang Liao

Pages 1602-1612 | Received 03 Jan 2011, Accepted 04 Dec 2011, Published online: 21 Feb 2012

Cite this article <https://doi.org/10.1080/00207721.2012.659702>

Sample our  
Engineering & Technology  
Journals  
>> **Sign in here** to start your access  
to the latest two volumes for 14 days

Full Article

Figures & data

References

Citations

Metrics

Reprints & Permissions

Read this article

Share

## Abstract

This study examines the feasibility of using an economic production quantity (EPQ) model incorporating maintenance and production programs to model an imperfect process involving a deteriorating production system. In response to failure, defective parts were produced and minimal repairs performed to create an in-control state. The conditions are studied in the case of the EPQ model undergoing a backorder owing to rejection of defective parts after a failure. Following production run period, two types of periodic preventive maintenance (PM) exist: imperfect and perfect. The probability of perfect PM being performed depends on the number of imperfect PM performed since the last renewal cycle. For the EPQ model, the optimal run time for minimising the total cost is discussed. Various special cases are considered, including the PM learning effect.

Finally, this investigation presents a numerical example to illustrate the effects of PM ability, repair cost and defect number on total costs and production period. This study finds that enhancing maintenance ability reduces production related costs. The product system can be produced more efficiently using a PM program.

Keywords:

- production
- imperfect maintenance
- learning effect
- optimum
- backorder

## Acknowledgements

The author is pleased to thank the anonymous referees, and the editors, for their valuable comments and suggestions, which significantly improved the clarity of this paper. This research was supported by the National Science Council of Republic of China, under Grant No. NSC 99-2410-H-143-009-MY2.

## Related research

People also read	Recommended articles	Cited by 24
------------------	----------------------	----------------

## Information for

[Authors](#)

[R&D professionals](#)

[Editors](#)

[Librarians](#)

[Societies](#)

## Opportunities

[Reprints and e-prints](#)

[Advertising solutions](#)

[Accelerated publication](#)

[Corporate access solutions](#)

## Open access

[Overview](#)

[Open journals](#)

[Open Select](#)

[Dove Medical Press](#)

[F1000Research](#)

## Help and information

[Help and contact](#)

[Newsroom](#)

[All journals](#)

[Books](#)

## Keep up to date

Register to receive personalised research and resources by email



Sign me up



[Copyright © 2025](#) [Informa UK Limited](#) [Privacy policy](#) [Cookies](#) [Terms & conditions](#)

[Accessibility](#)

 **Taylor and Francis Group**

Registered in England & Wales No. 01072954  
5 Howick Place | London | SW1P 1WG