

# **An Optimal Integrated Maintenance Strategy for a Multi-Machines System**

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## **Abstract**

In this paper, an optimal integrated maintenance strategy is proposed for a production system composed by multi-machines that are mounted in parallel and based on the Center-of-Gravity approach. The production system produces one type of product in order to satisfy the random demand under a given service level. The different machines are subjected to a random failures and these failure rates are influenced by the variation of production rates. This study proposed an economical production policy and an optimal maintenance strategy. Firstly, the objective is to determine the economical production plan depend to the work times of each machine and by minimizing the costs of machines setup, inventory and work times. Secondly, we establish the optimal maintenance plan for each machine as well as the new improved maintenance strategy by joining the different maintenance actions in a single one basing to Center-of-Gravity approach.

## **Keywords**

Maintenance Strategy, Center of Gravity, Parallel Machines, failure rate.

## **Biography**

**Tarek Askri** is currently a PhD Student in Automatics and Signal Processing at University of Lorraine, Metz France. Mr. Askri holds an Engineer Degree in Chemical Engineering from University Centrale, Tunisia and a Master of Science degree in Industrial Engineering from University de Lorraine, France. He has taught courses in industrial processes for Industrial Engineering Students at Polytech Centrale, Tunisia.

**Hajej Zied** is an Associate professor at the University of Lorraine, Metz platform since September 2012. It operates research in the laboratory LGIPM Metz. After obtaining his doctorate at the University of Paul Verlaine - Metz in 2010, he was employed at the University of Metz as contract research engineer until August 2012. His main areas of research on the optimization of maintenance policies coupled to production and the development of methods and support the design and control tools in the production systems of goods and services. He is the author of numerous articles in international community of industrial engineering. Her teaching areas include modeling and organization of manufacturing and logistics systems, the practice of simulation, automation, and quality system production.

**Nidhal Rezg** is a professor at the University of Lorraine; he is a Doctor of Industrial Automatic from the National Institute of Applied Sciences (INSA) in Lyon in 1996. Accreditation to supervise research at the University of Metz in 2003. He was Professor at the Faculty of Engineering of the University of Moncton, New Brunswick Canada from 1997 to 1999 and Associate professor at the University of Metz until 2004, and currently holds the position of Professor of University. He is director of LGIPM laboratory since October 2006 and scientific responsible of the INRIA CusTom team from 2007 to 2011. His research interest is the optimization of maintenance policies coupled to production, the optimal control SED. He is the author of sixty papers in international journals, directors of 12

theses and 4 Accreditation to supervise research. Keywords researches are modeling, simulation and optimization of stochastic processes, reliability and maintenance and Petri nets.