

# **An Optimal Preventive Maintenance Policy for a Solar Photovoltaic System in Order to Promote Sustainability & Profitability**

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## **Abstract**

The aim of this paper is to develop a preventive maintenance strategy for a group of solar panels interconnected in series. The approach was to determine the optimal number of solar panels to replace, as well as the optimal replacement periods in order to minimize the total cost of maintenance, over a finite time horizon. In addition, it has been considered that the replacement of solar panels improves the reliability of the system. In case of failure, a minimal repair is carried out. This intervention has no impact on the reliability of solar panels. A numerical example is presented to illustrate the contribution of the proposed modelling approach and to discuss the different results obtained.

## **Keywords**

Preventive maintenance policy, Solar panel, Reliability, Sustainability, Minimal repairs.

## **Biography**

**Elkouiri Safouane** is a research Engineer holds a degree in Electrical Engineering from the Polytechnic School of Agadir and a research master's in industrial and Logistics Systems from Lorraine University. In his final year project, he worked on the implementation of maintenance strategies of Photovoltaic Panels.

**Mifdal Lahcen** is a Professor, and Responsible of Industrial Engineering Department at Polytechnic School of Agadir. Mr Mifdal holds a Bachelor of Science degree in Industrial Systems Control from National School of Applied Science of Agadir. He earned Masters in Conception, Industrialization and Innovation from University of Lorraine, France and PhD in Industrial Engineering from the same university. Dr Mifdal has taught courses in Operations Management, Maintenance, Logistics and Operational Research. His research interests include manufacturing, optimization, reliability, scheduling, manufacturing, logistics and production.

**Dellagi Sofiene** obtained his Ph.D. from University of Lorraine (France) in industrial engineering. His main expertise and research interests include Systems Reliability and Maintenance, and Production management. He is associate Professor in Industrial Engineering at the University of Lorraine (France). Besides his research contributions through the publication of several articles and a book, Dr Dellagi works on various international research projects in collaboration with industry. He also acts as invited professor in European and North American universities. He has also been the Co-Editor of a special issue of the International Journal of Production Research in 2008.

**Chelbi Anis** is full Professor in Industrial Engineering at the University of Tunis. He graduated from Laval University (Canada) and Kyoto University (Japan). His main expertise and research interests include Operations and Supply Chain Management. Besides his numerous scientific contributions and publications and his extensive teaching experience at the graduate level worldwide, Dr. Chelbi has a rich experience of more than 20 years as a consultant for industrial companies in various fields like Aeronautics with SNECMA Motors and Messier-Dowty in France, Chemical industry with AKZO-Nobel in Belgium, and other industries in Tunisia such as Ceramics, Packaging and Food industries. Dr. Chelbi serves in different scientific committees of renowned international conferences related to Industrial Engineering and Operations Management. He is also member of the Editorial board of the international Journal of Quality in Maintenance Engineering (JQME) and has acted as guest editor of the International Journal of Production Research (IJPR). Finally, he is recipient of the Outstanding Paper Award at the Literati Network Awards for Excellence 2009.