

**INTELLIGENT MAINTENANCE MANAGEMENT  
MODEL FOR CRITICAL MACHINES IN A SOLID TIRE  
MANUFACTURING FACTORY**

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## **DECLARATION**

I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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## **ABSTRACT**

High machine reliability is an essential feature for a solid tire manufacturing plant. Most of the machines in those plants should be capable of 24 hour continuous running. Engineering department of a solid tire manufacturing company has a great responsibility to maintain the machine reliability level and to assist a trouble free operation. They conduct preventive maintenance and conditional monitoring regularly to minimize the breakdowns in the machines.

However, the current preventive maintenance practice of many engineering teams in solid tire manufacturing plants is a fixed schedule and it does not update with the condition monitoring data. Due to this, sometimes machines are serviced when maintenance is not needed and sometimes they are not serviced, when maintenance is needed. If there is a breakdown due to lack of maintenance and the maintenance team cannot rectify the problem, they have to get assistance from superior levels which may lead to high down times. This work aims to develop an intelligent system to dynamically change preventive maintenance schedule based on machine condition data and breakdown history for critical machines in the Camso Loadstar ETD2 solid tire manufacturing plant. In addition, this work applies artificial intelligence for troubleshooting.

The intelligent maintenance management system designed using artificial neural networks and expert system provides a dynamically updating maintenance schedules and troubleshooting assistance.

The performance of the designed system is evaluated separately for maintenance scheduling and the trouble shooting assistance. The performance of maintenance scheduling is analyzed using 10 critical machines by comparing predicted results with real achievements. The performance of trouble shooting assistance is evaluated by calculating the maturity level of the established expert system. The results show that the proposed intelligent system is a good solution for the existing issues related to maintenance of the critical machines in solid tire manufacturing plants.

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## **LIST OF ABBREVIATIONS**

PM : Preventive Maintenance

ANN: Artificial Neural Network

NN: Neural Network

AI: Artificial Intelligence

PC: Personal Computer

KPI: Key Performance Indicator