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The Impact of Installed Base and Machine Failure Prediction on Spare Parts Forecasting  
and Inventory Planning

by

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and

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**Abstract**

Recent advances in technological capability and economics have opened up a new world of capability known as the Internet of Things (IoT). The Internet of Things is the concept that all machines can be connected to the internet, and be remotely monitored through an infrastructure of interconnected software and hardware. Many companies are just beginning to explore the economic value that the Internet of Things can unlock, with much of the initial focus on remote diagnostics and predictive maintenance, particularly in application to industrial machines.

This research tests various scenarios of predictive failure accuracy, creating spare parts forecasts based off of varying predictive forecast parameters. We compare these scenarios and their respective outputs to a regular time-series forecasting scenario, inserting each type of forecast into a periodic review (R, S) inventory system. We measure the output of each forecast put into the system in terms of spare parts inventory levels and in-stock service performance. We find that as long as the true positive rate (TPR) and false positive rate (FPR) have different values, our model is able to hold a lower average inventory while providing a higher level of service. Additionally, as the difference between the two values increases, the average amount of inventory held decreases, while the level of service provided increases. A more detailed summary of the results found and the implications on service supply chain were developed, and further areas of research are discussed.

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