

Spare Parts Safety Stock Planning in the German Automotive Industry – a Case Study

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February 11, 2011

Abstract

Spare parts management recently attracted the attention of inventory research, due to the increasing pressure on companies to deliver high after-sale service for their products. In particular, the automotive and machine manufacturing industries are confronted with customers demanding a high availability of spare parts to minimize downtime costs. Additionally, companies need to hold an increasing variety of spare parts, as the demand for customized products leads to a higher number SKUs (stock-keeping units) to be held as spares. Many spare part SKUs have an underlying intermittent demand pattern, which makes forecasting and safety stock planning a difficult task. The high service level required by the market, the high number of SKUs and the intermittent nature of demand constitute a great challenge for the inventory management.

In this case-study based research project a wide range of statistical distributions is examined for the safety stock planning of spare parts. Based on a data set including historic demand series of over 24,000 SKUs over 55 months from [censored], a major company of the German automotive industry, Goodness-of-Fit tests are conducted to evaluate the ability of the statistical distributions to approximate the intermittent demand pattern. Further, simulations over the 55 months horizon were run for inventory systems using the statistical distributions for safety stock planning in order to gain insights about which distributions perform best in terms of service level achievement and inventory cost, whether the choice of the statistical distributions has a big impact on the overall performance of the inventory system and whether the Goodness-of-Fit tests correspond to the results from the simulation, which is to say whether the Goodness-of-Fit tests can be used as decision support tool when choosing an appropriate statistical distribution.

Keywords: spare parts, forecasting, safety stock, intermittent demand approximation, statistical distribution, goodness of fit, case study

Please reference this paper as:

David Bucher, Joern Meissner. Spare Parts Safety Stock Planning in the German Automotive Industry – a Case Study. Working Paper (available at <http://www.meiss.com>), Lancaster University Management School, 2011.

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