Demand Forecasting and Inventory Management for Spare Parts

Business Background

- Gerber Technology is a design-print-cut manufacturing company that provides integrated solution to more than 78,000 customers in 134 countries.
- The Aftermarket Division of the company supports its products through their lifecycle.
- The company has two manufacturing sites: Connecticut (US) and Shanghai (CN)
- Distribution and service centers in different regions process customers orders

Problem | Key Objectives

Customers Service level and forecast accuracy affected by irregular demand from slow moving items. This project is aimed at:

- Exploring the demand behavior of every product
- Proposing new forecasting methods upon demand behavior
- Identifying new ways of classifying products for inventory levels
- Developing unified framework for spare parts management

Methodology

Methodology

Demand Planning

Current

- Multiple forecasting models (Regression, Winter’s, Croston’s, Seasonal, etc.) based on minimum MAPE

Proposed

- Croston’s + Syntellos & Boylan’s methods based on SKU classification

Comparison

- Impact on forecast accuracy measured by RMSE, GMRAE and MAE

Supply Planning

SKU classification (A(8)(C)(D)(S) based on revenue and marketing inputs

Multi-criteria inventory classification using mixed-integer linear programming (MILP)

Comparison

Impact on inventory measured by service levels, inventory levels and inventory holding costs

Expected Contribution

- Improving forecast accuracy and streamline forecasting process
- Product categorization for inventory purpose better aligned with the business needs
- Savings in inventory holding costs
- Development of simple and robust framework for future spare parts management

Initial Results (product demand classification example)

Average Inter-Demand Interval (Months) - P

Squared Coefficient of Variation - CV2

Relevant Literature