

Data, Analytics, and Optimization for Production Planning

The Northrop Grumman logo, consisting of the company name in a bold, sans-serif font next to a stylized graphic of two parallel lines forming a square.

BUSINESS PROBLEM

Northrop Grumman's Mission Systems business sector wanted to improve kitting throughput for its Surface Mount Technology (SMT) factory. The key challenge was that high volume SMT reels could not be shared across multiple orders that needed the same component. While total inventory of a component could satisfy forecasted demand, it might not have enough reels to adequately distribute that inventory. A framework for identifying these components and their impact to the business did not exist.

DATA SOURCES

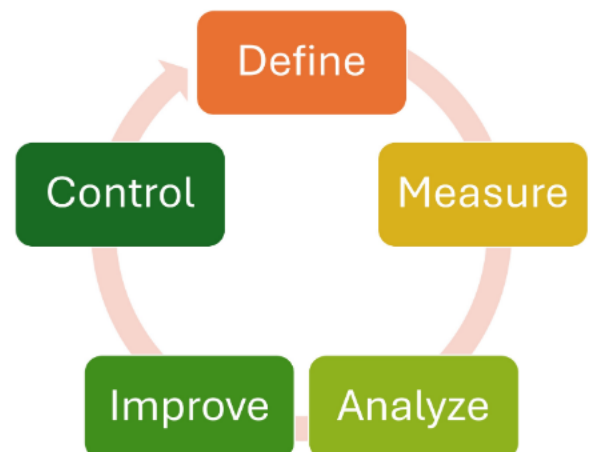
Data sources were predominantly outputs from the MRP system which described current inventory state, upcoming demand, and BOMs for that demand.

Data Types and Format

Data was in .csv format and composed of strings and integers.

APPROACH

The approach to this project was to compare inventory data to forecasted demand data for tape and reel components. Through data manipulation, the number of reels in inventory could be compared to the number of reels needed to support production. Components with insufficient reel quantities were identified and characterized based on cost and accounting structure.



IMPACT

This project identified that Mission Systems procured plant stock based on historical data rather than demand forecasts, and confirmed that these components with insufficient reels had substantial impact on kitting throughput for the SMT factory. Additionally, a framework and automated software tool were developed to identify these components based on existing company data sources. Ultimately, Mission Systems better understood a root cause of its kitting throughput challenges for SMT and was given tools to help alleviate this issue. Eliminating the reel shortages identified by this project will necessarily help Mission Systems improve SMT production throughput.

DRIVERS

The high mix low volume nature of the SMT factory was a key contributor to the constraints that gave rise to the shared reel problem.

BARRIERS

The value stream for the SMT process, beginning with procurement and ending with a Circuit Card Assembly, was incredibly long and spanned multiple organizations. Coming up to speed on a complex process was quite challenging.

ENABLERS

The accessibility and availability of clean data relevant to the problem was tremendously helpful for producing data-driven insights.

ACTIONS



An optimization model to better allocate inventory was piloted, and an automated software tool to screen for components with insufficient reels was rolled out to the planning team.

INNOVATION

Engineering data features that better illustrated key characteristics of the system was a key innovation that enabled the success of this project.

IMPROVEMENT

By alleviating the shared reel issue, factory throughput is expected to increase by ~20%.

BEST PRACTICES

Document assumptions and vet them early during data analysis. Keep modeling simple to keep stakeholders informed.

OTHER APPLICATIONS

Optimization and exploratory data analysis are known to be widely generalizable to just about any problem.