

Increasing Production Rate of Laminate Through Process Efficiency

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Abstract

The goal of the project is to investigate and address any inefficiencies and/or bottlenecks in Nobelus' current production process. The production process is observed to identify areas for improvement, and to develop a current state of production. The team will then formulate data-driven recommendations and develop an initial plan for how these strategies should be implemented. Through implementing recommended strategies, they can make significant progress in reaching their throughput goal.

Introduction

Nobelus is a value-add processor of laminate film located in Schaumburg, Illinois. They sell custom and specialty laminate products to several companies and industries, with short turn around rates. MSI is used to measure output, where 1 MSI is 1000 square inches of laminate material. Demand is expected to increase in 2020, and the company hopes to improve production capacity enough to handle this demand without affecting turnaround rates or involving significant increases in labor or capital costs. Currently, the facility handles an average throughput of ~3,500 MSI/hour. The goal of the project is to provide recommendations to increase the facility's capability to at least 10,000 MSI/hr. The objectives are:

- Reduce Non-Value Added time and tasks
- Minimize downtime between runs
- Improve raw material quality

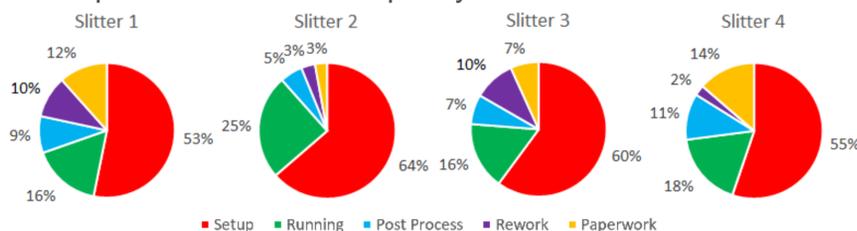


Figure 1: Time Study Average Work Distribution

Methods

Time studies were collected to develop a current state of production capacity and processing rates. A large opportunity in decreasing cycle times is in improving setup times between machine runs.

5S Audits were conducted to assess the current states of each station and identify areas for improvement.

Table 1: 5S Audit Average Scores

Audit 1	Slitter 1	Slitter 2	Slitter 3	Slitter 4
Sort	62.5%	62.5%	56.3%	93.8%
Set-in-order	45.0%	47.5%	42.5%	72.5%
Shine	57.5%	55.0%	50.0%	60.0%
Standardize	55.0%	55.0%	55.0%	55.0%

Spaghetti Diagrams were created to identify operator movements that can be reduced or eliminated.

Capacity Planning: To determine a better estimation of the resources and production improvements needed to meet periods of peak demand, a capacity plan was created. In order to estimate the difference between current and potential capacity, the number of setups needed to be determined.

A **bin-packing algorithm** was used to estimate the total number of setups given expected demand.

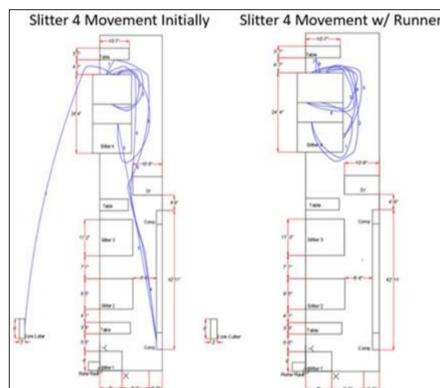


Figure 2: Operator 4 Spaghetti Maps

Combined with **historical demand analysis** and the time studies, the capacity planning model shows the potential capacity under various scenarios. The scenarios tested include: additional workers, changes to production's second shift, and varying quantities of overtime hours.

Recommendations

A **runner position** was suggested to help with setup and decrease cycle times. Installing **Andon lights** at each station can improve visual communication on the production floor.

Defect forms were created to collect information about poor quality master rolls. The information can be used to make decisions about vendor material quality. **Facility layout changes** were also considered using algorithms that minimize movement of workers and materials. Initial runs show that inventory can be moved closer to improve material flow. This can be used to consider how additional resources could be placed in the future.

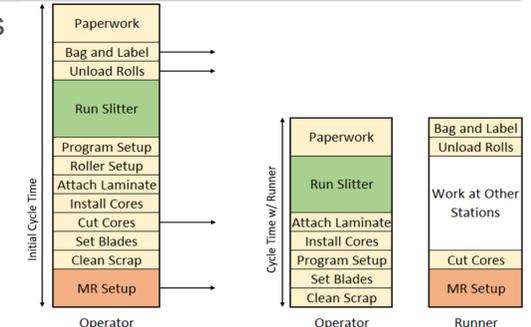


Figure 3: Work Redistribution Visualization

Results and Conclusions

The recommendations will result in improved cycle times and increased average throughput. The runner position was implemented and, Nobelus has seen improvements to slitter cycle times. They also began using defect forms to address vendor quality and have received material credit. The capacity analysis and planning tool can provide information about staffing and overtime plans to meet the demand for the coming months.

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