

Process Improvement using DMAIC Methodology and SMED System

Background

This project was based of the Laminating Production Improvement for Manufacturing Furniture Company in Massachusetts. Basically, the process consists of the laminates production of wood materials. The lead time and ship dates of the product play an important paper to satisfy the customer's needs. Also, every order must be inspected at the end of packing process, but the focus of this project is based to improve the production of laminating production.

The focus of this project it was reduce the waste time to improve the efficiency, lead time and increase the capacity of orders according the customer's needs using the DMAIC methodology and SMED system. The company seeks to comply with the demand expected yearly.

Define | Project Charter

Problem Statement

The company receive around 6%-8% average of orders per week are delayed. This mean that every 100 of orders processed 6-8 have a customer complains due delays. The production demand have increasing radidly through the year.

Business Case & Benefits

Cycle time improvement of laminates production would result of economic impact and would allow increase the laminates production and would decrease the number of employee. Also, this would eliminate the unnecessary waste in this manner would improve the flow of production. This would maximize the laminate production and would meet with the goals of the company and customer satisfaction.

Goal Statement

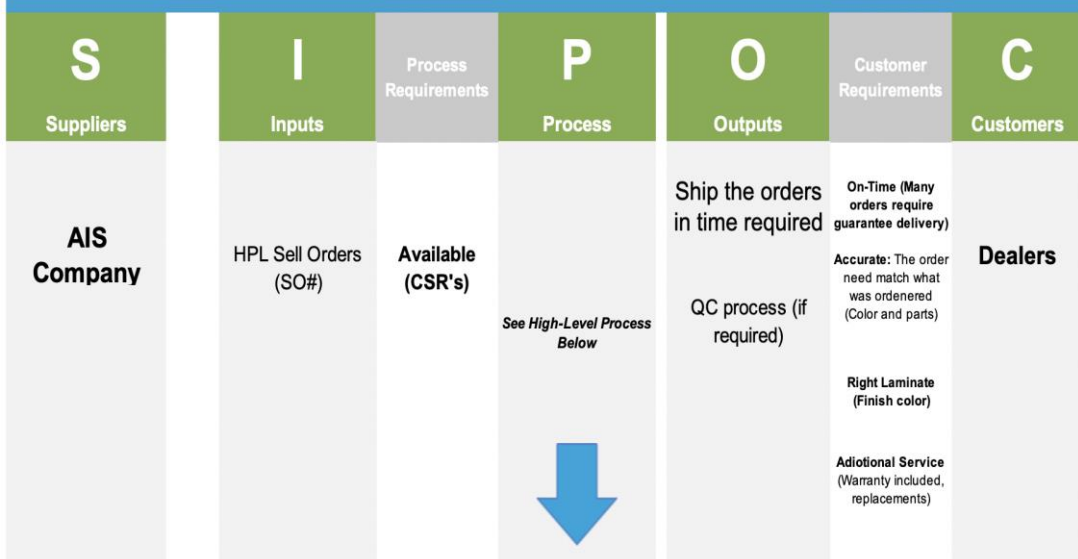
This project seeks to reduce the delayed product from 8% to 2% per week at least. Decreasing the waste time this project seeks increase the productivity 10% to 15% per month. In this manner the company will be capable to increase the production and accomplish the demand annually.

Scope - First/Last and In/Out

1st Process Step: The operator prepare the order and material to process.
Last Process Step: Materials laminated pending to be cut.
In Scope: Material localization, Material preparation, Documentation, Process step, Confirm ID number.
Out of Scope: Cut HPL order, Edgeband process, Ship the order on time, QC if required.

Measure | SIPOC Diagram

SIPOC: Laminates Production

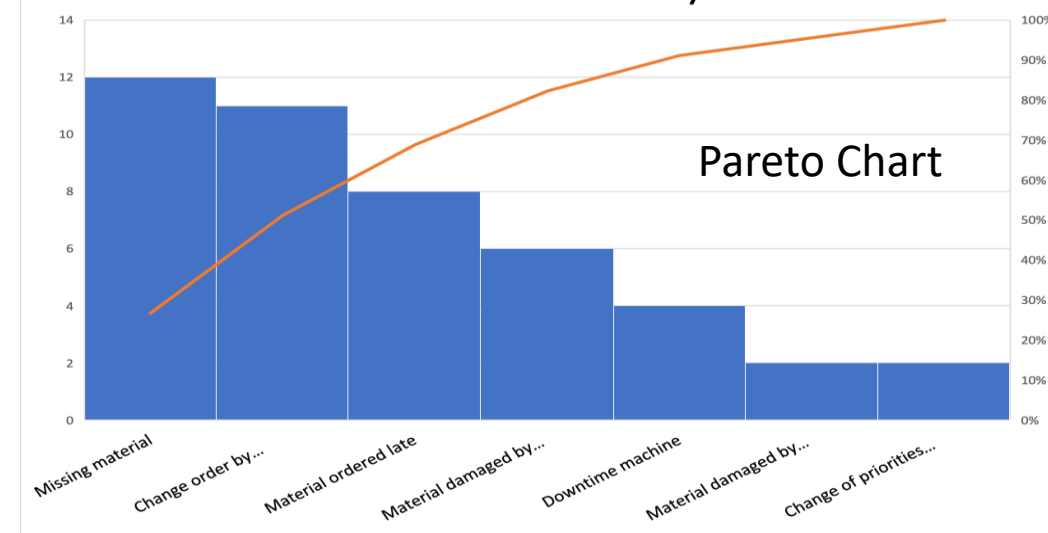


Data Collection Plan

Measure	Data Type	Operational Definition	Stratification Factors	Sampling Notes	Who and How
Preparation Time	Minutes-Discretes	Time (in minutes) from the operator take the paperwork and verify what material and how many needs to the order.	none	Every table jobs the operator take 2-3 minutes to check what material and how many need to do it.	Analysis by study time video recorded
Changeover time	Minutes-Continuous	The time (in minutes) of the operator take to change the set up of the laminate machine.	none	Every changeover of the material take between 8-25 minutes according of the material.	Analysis by study time video recorded
Transportation time	Minutes - Discrete	The time (in minutes) of the operator take to pull in/out the material.	none	At the beginning and end of the process the operator takes about 3-8 minutes to remove and set up the material.	Analysis by study time video recorded

Analyze

Downtime and Waste time by Activities



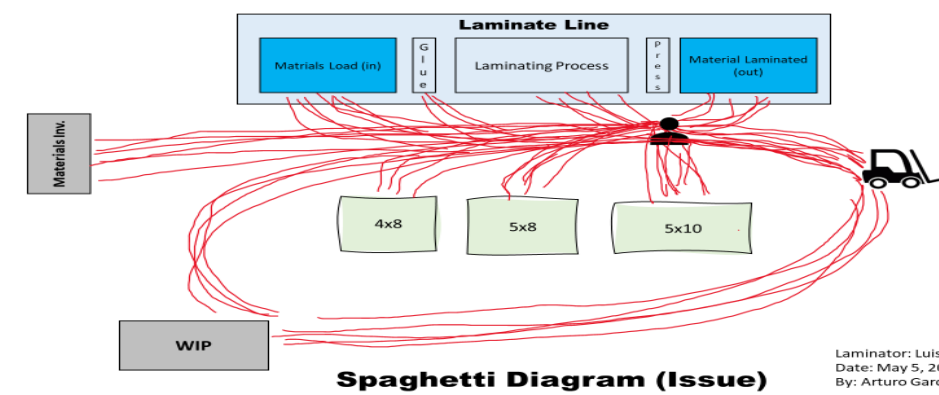
Time Study

Time Study Analysis

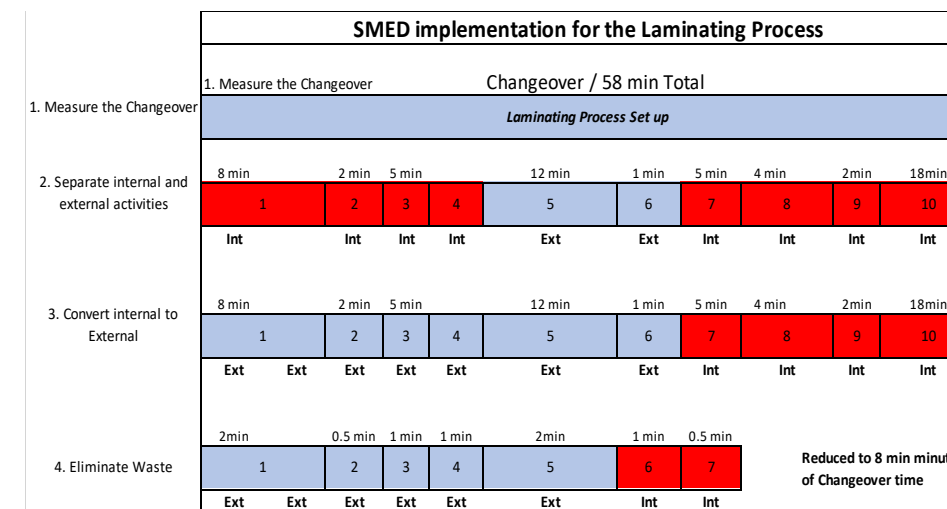
#Task	Aveg (Min)	Value	Cycle #	Total Time	Percent
1	1.44	Non-Value- Added	18	25.92	5.40%
2	2.12	Non-Value- Added	9	19.08	3.90%
3	1.9	Non-Value- Added	7	13.3	2.70%
4	3.62	Non-Value- Added	12	43.44	9.00%
5	2.7	Non-Value- Added	12	32.4	6.70%
6	5.08	Non-Value- Added	6	30.48	6.30%
7	5.24	Non-Value- Added	7	36.68	7.60%
8	2.22	Value-Enabled	13	28.86	6.00%
9	29.96	Value-Enabled	2	59.92	12.20%
10	1.3	*Value-Added*	132	173.712	36.00%
		NVA		46.10%	
		VA		18.20%	
		NVA-r		36.40%	

We can see in this analysis around 46% of the process step is Non-Value-Added steps (NVA). The average of total Value Added was only 18% in total. This is one of reasons where is causing dissatisfaction of the customers and where our focus was reduce the lead time and the waste time to increase the efficiency of the product as well.

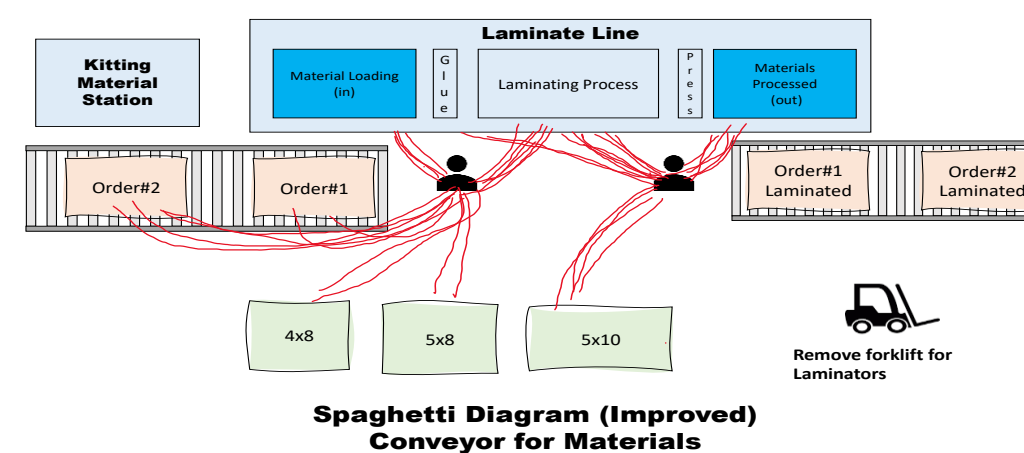
Spaghetti Diagram



Improve | SMED System



Spaghetti Diagram Updated



It was modified the Spaghetti Diagram to visualize the process improvement. The following figure show the result of the SMED system implemented into the laminating process. This figure show how it was possible reduce 58min to 8-10 minutes of set up. We can see how the internals tasks it was changed implementing two conveyors to keep the process while the machine is running.

Control

In this case it was created a document to tracking and audit the process every month. A standard work it was created as part of the process. The quality control agents are responsible to run a report monthly to make sure that the process comply with the parameters and the operator keep doing the process per standard work.

The following template was created as standard document for quality control. The quality agent must fill up every month to audit the process and make sure that the operators are following the process by standards works correctly.

Conclusion

Through this project it was increase 20% of productivity. The goals at the beginning was 10% - 15% to accomplish with the demand. The change of the process was amazing, and we can see how the discipline and the lean system methodology work on it. In addition, it was reduced one operator in the process an equivalent of \$30,000 additionally of saving for the company.

The capacity increase around 5M to 10M more of capacity to fulfilling more than the demand expected. The project it was a great successful and example for others company to use this discipline and methodology for your company.

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