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## Abstract

This project was focused on eliminating the MUDA or waste found (non-value added) in the Offset machines printing process, (duplication the tasks, Work in Process, and no traceability of the Finance department). The waste elimination in the printing process is important to identify what is the real-time it takes to run a product order.  
 The largest opportunity area was identified in the drying process, which was done without any measurement if not follow the operators' knowledge. This exercise was done by trial and error, and the result was an improvement of more than 90% of the drying time.

## Introduction

Eliminating waste along entire value streams, instead of at isolated points, creates processes that need less human effort, less space, less capital, and less time to make products and services at far less costs and with much fewer defects, compared with traditional business systems. [1]

## Background

The main objective of this project is to eliminate all activities that do not allow tasks to be done as smoothly as possible. These activities in the printing process identified are low number of orders completed daily (2 orders are completed per day), drying time of the product (it takes more than 4 hours), duplicates of tasks (printing and machine set-up) and high quantity of scrap produced (250 units minimum produced per order).



Figure 1: AB Dick Machine

## Problem

Eliminating the waste from the process would help to:

- Reduce the distance traveled during the run of the order.
- Increase output during production.
- Reduce the total run time of the order (set-up and run).
- Reduce the raw material used during the order.

## Methodology

For this project, the first activity was to evaluate the tasks that the operators execute during the order run, first the Process Diagram (Figure 2), the objective is to focus only on the activities that it identifies that are normally executing.

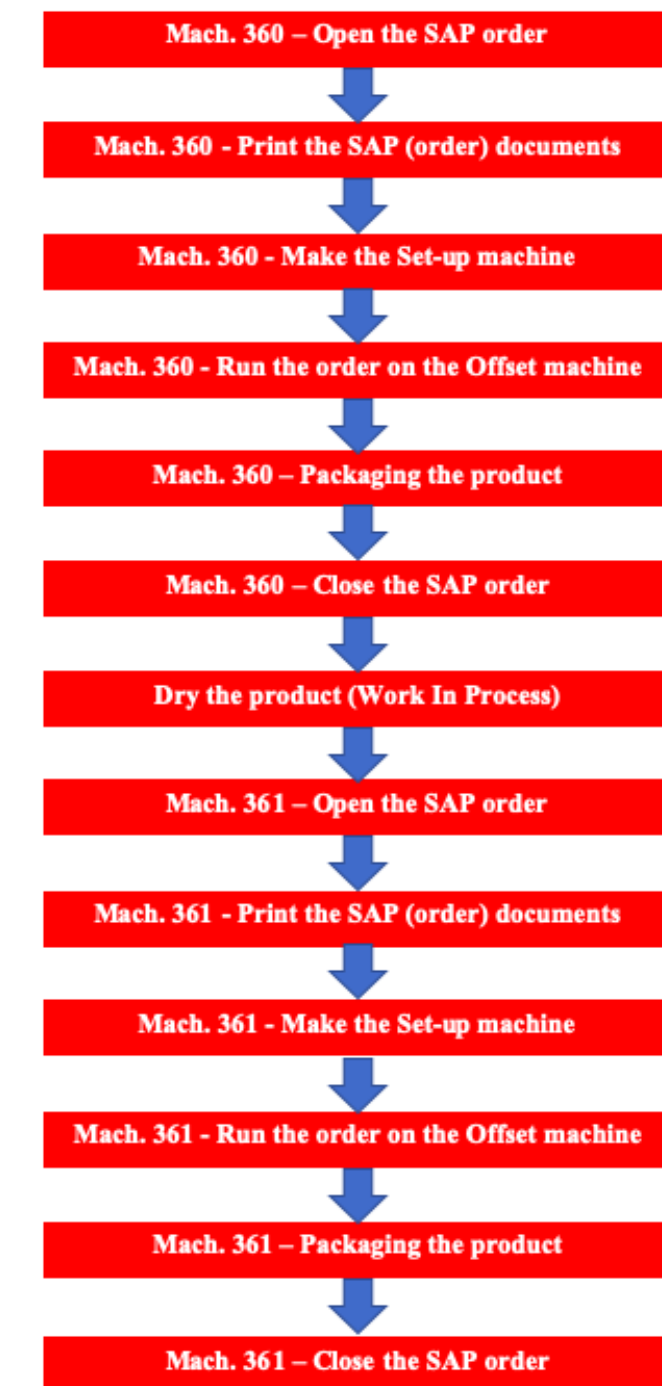


Figure 2: Process Diagram – Before

For these tasks, it traced the route that the operator travels during the execution of the order, and for this, it was used the tool of the Spaghetti diagram (Figure 3) that details it to us.

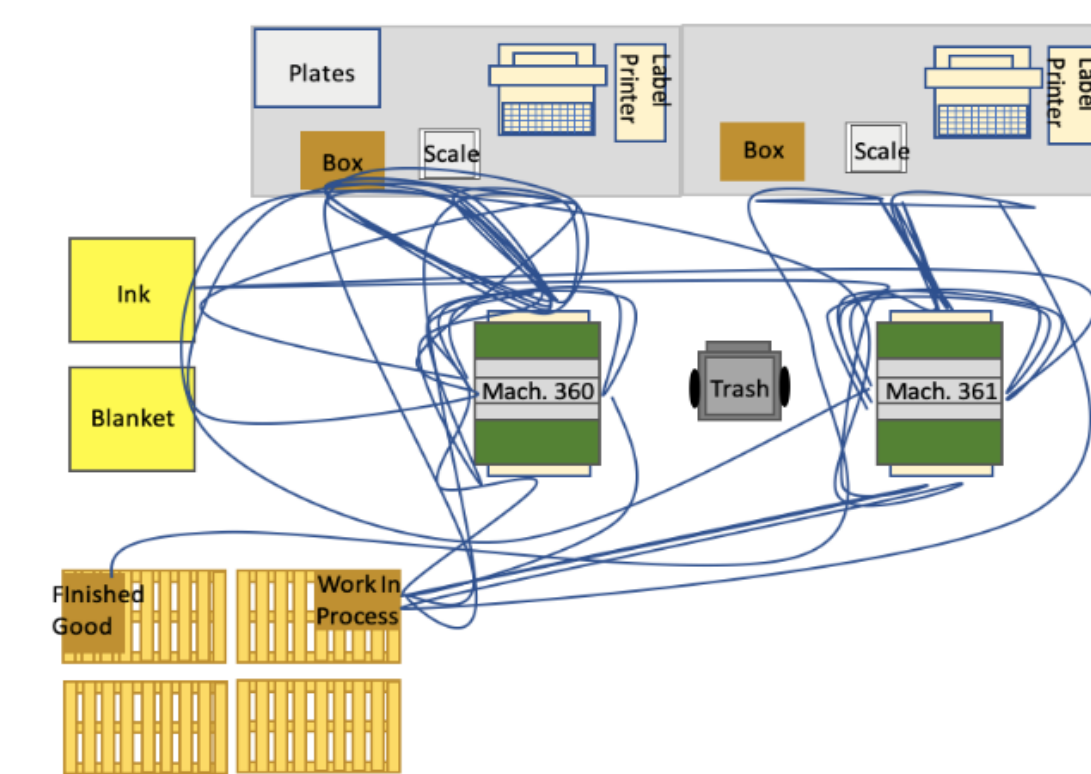


Figure 3: Spaghetti Diagram – Before

The runs of the last 6 months were filtered to create a baseline to be used as a comparison at the end of the project.(Table 1)

Table 1: Baseline

Order Yr	377
Units per Yr	1,306,130
Days per Yr	250
Effective Minutes Available	348
Units per day	5,225
Takt Time	0.07
Unit per minute	15
Min	\$ 140.00
Normal Process	
Avg. Order Qty	2,000
SetUp (Hr)	1.01
Run Time (Hr)	4.83
Dryer Time (Hr)	6
EA/HR	414
Hrs. need work daily (Units per day / (EA/HR))	12.62 Hr
Hrs. need work yearly (Units per Yr. / (EA/HR))	3154.39 Hr
PLATES	
Used Yrly.	300
Price/Plate	\$ 1.80
Price/Box	
Roll/Box	
Plates/Roll	
Colors Used	
Operation Expenses	\$ 540.00

Finally, it was made an Action Item Register of other tasks that it was identified that it had to execute by different company employees to have good results in the project.

Action	Owner	Status
Join the two SAP systems and make only one.	V. Robles / IT	Completed
Make drying test.	K. Gonzalez / A. Ayala	Completed
Compare / Approve the printing of the Finished Good with the customer drawing.	T. Tuñon	Completed

## Results and Discussion

The first task of the Action Item Register was to join the two SAP systems (machine 360 and machine 361) into just one system (Machine 362). Eliminate the Overprocess had, where two machine set-ups were executed on different occasions, and the same documents were printed on both machines to keep them in production record of each order. 50% reduction in tasks performed during the run.

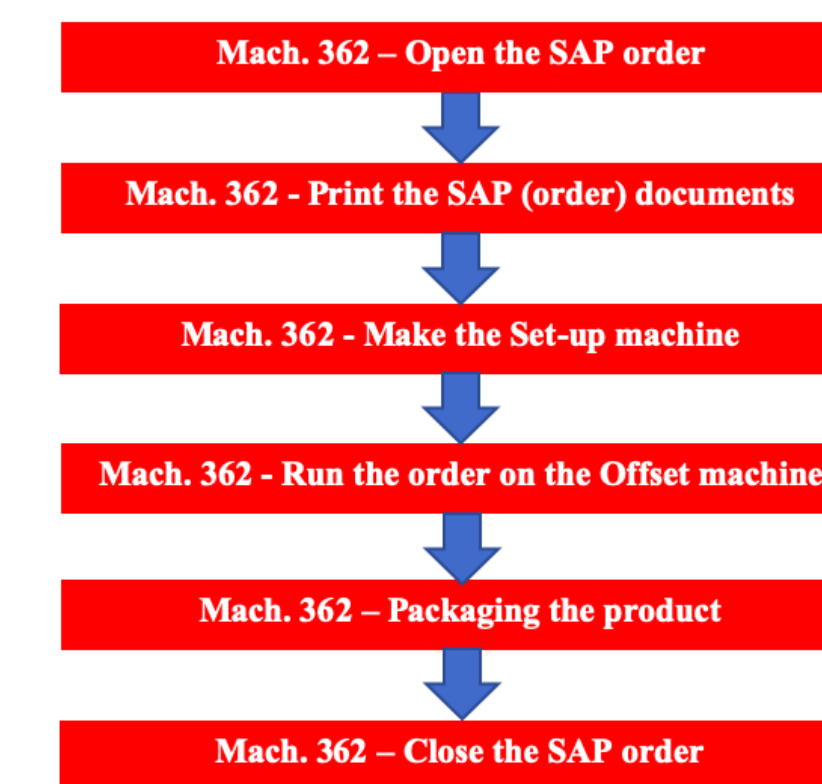


Figure 4: Process Diagram - After

Another waste eliminated was the Overproduction, because before while the product was going to be in the drying phase, at least 250 additional units were left. Now there is no more than just what is going to be used. This change was achieved because now the drying time is measured by a stopwatch (20 minutes) that was added to the operation (measured since the first bundle is placed in the cart), previously the operators left drying no less than 4 hours.

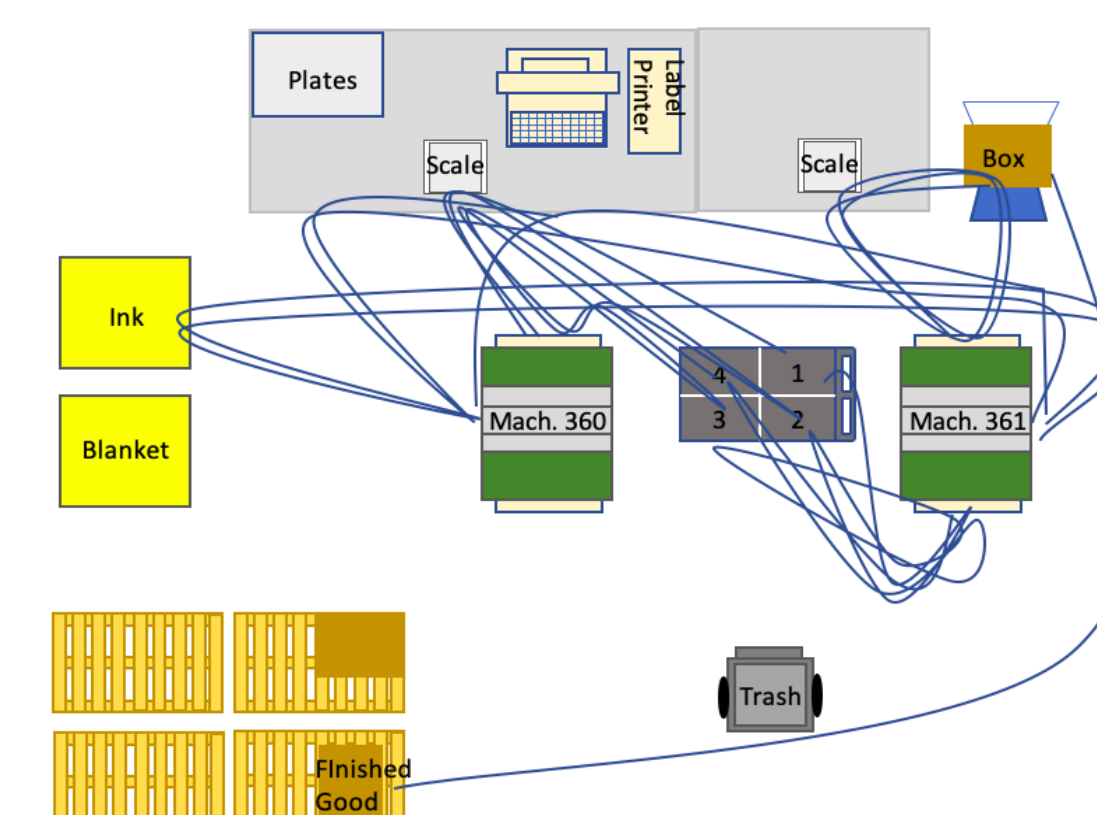


Figure 5: Spaghetti Diagram – After

It was also possible to eliminate the Work In Process (WIP) that was left and gives a more realistic scenario to the Finance Department in the system about the execution in the printing machines. In the end, it was estimated that for the next year more than \$ 300,000 in savings without investing any capital.

Table 3: Saving

	Normal Process	Lean Process
Avg. Order Qty	2,000	2,000
Setup (Hr)	1.01	0.84
Run Time (Hr)	4.83	2.22
Dryer Time (Hr)	6	0.33
EA/HR	414	501
Hrs. need work daily (Units per day / (EA/HR))	12.62 Hr	5.80 Hr
Hrs. need work yearly (Units per Yr. / (EA/HR))	3154.39 Hr	1450.00 Hr
PLATES		
Used Yrly.	300	300
Price/Plate	\$ 1.80	\$ 1.80
Price/Box		
Roll/Box		
Plates/Roll		
Colors Used		
Operation Expenses	\$ 540.00	\$ 540.00
WASTE		
Saving Waste (EA)		79,170
Saving Waste (\$)		\$ 25,730.25
Savings (\$)		
Setup (\$)		\$ 9,100.00
Dryer Time (\$)		\$ 299,262.60
Run Time (\$)		\$ 24,934.55
Monthly (\$)		\$ 334,097.85

## Conclusions

After completing this project, the first thing it should highlight is that this project had no capital invested, the same resources were used but in an optimum manner to benefit the business. Three wastes were eliminated from the process (Transportation, Overproduction, and Overprocessing). This elimination results in an improvement of more than 50% in the process (over \$300,000) to the company.

It was also possible to fulfill another of the objectives obtained from VoB (Voice of the Business), which was to end the Work In Process (WIP) that took visibility away from the Finance Department whether there was production or not. It can also talk about the obsolete of the machine, which often provides downtime that is not caused by the operator but occurs during its shift. That is why the search for a new machine that could improve both the process and the quality of printing that the customer wants in your products.

## Future Work

- It proposed to the company to explore buying a new offset model. For example, this Presstek 34Di model
- Set-up: 0.25 hours (15 minutes) performs a machine set-up because it saves the recipes and the drawing in a memory that runs it when selected.
  - Output: 7,000 EA / Hr. (94% faster than originally run.

The savings will exceed \$780,000.



Figure 6: Presstek 34Di model

## Acknowledgements

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- I thank the company that allowed me to work on this project and to develop new initiatives with them.

## References

[1]Lean Enterprise Institute. "What is Lean?," Lean.org, 2000-2020, [Online]. Available: <https://www.lean.org/whatslean/>.