

**Abstract** — With the intent of decreasing the cycle time of the merchandise process receiving, the unloading and scanning step and the sorting step were identified as a labor cost opportunity. Through 3 kaizen events done across site, it was determined a requirement of 15% total cycle time reduction for receiving merchandise process. DMAIC methodology and Lean manufacturing principles was used to develop this project and successfully decreased the receiving process cycle time. With the reassignment of employee's positions in the different steps and with the identification of the work areas, the improvement on the process was significantly noted. This project achieved an improvement of 75.27 minutes per pallet down to 52.46 minutes per pallet, which represents a 30.30% decrease of cycle time on this process, which at the same time, represent a reduction of approximately \$10,927.42 on payroll cost for the company.



## Define

### Research Description

Burlington is a company that has more than 670 stores in 48 states and Puerto Rico. Burlington Stores has remained successful by making value a top priority. Through strategic purchasing, they can offer the latest in branded clothing, shoes, accessories, baby products and home furnishings with great savings.

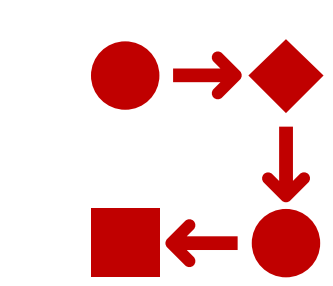
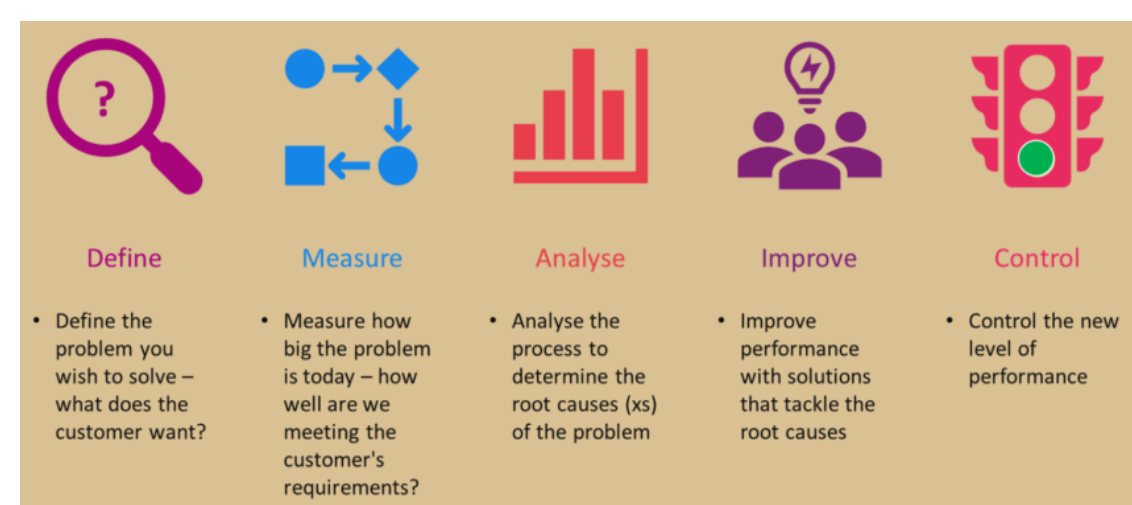
The Burlington store located in Elizabeth, New Jersey has been presenting problems on the merchandise receiving process. Is important to perform this process in the shorter time possible to be able to maximize the representation of merchandise on the sales floor. This store receives merchandise every night, which must be processed and represented the same night to maximize the sales for each product. Currently, on this store the merchandise is not being processed and fully represented on each shift. The store's goal is to process and represent all merchandise the same day it is received.

### Research Objectives

- Identify factors that are increasing the receiving processing time.
- Increase 15% the speed of the merchandise receiving process to achieve the daily work goal.
- Reduce in 10% the overtime work.

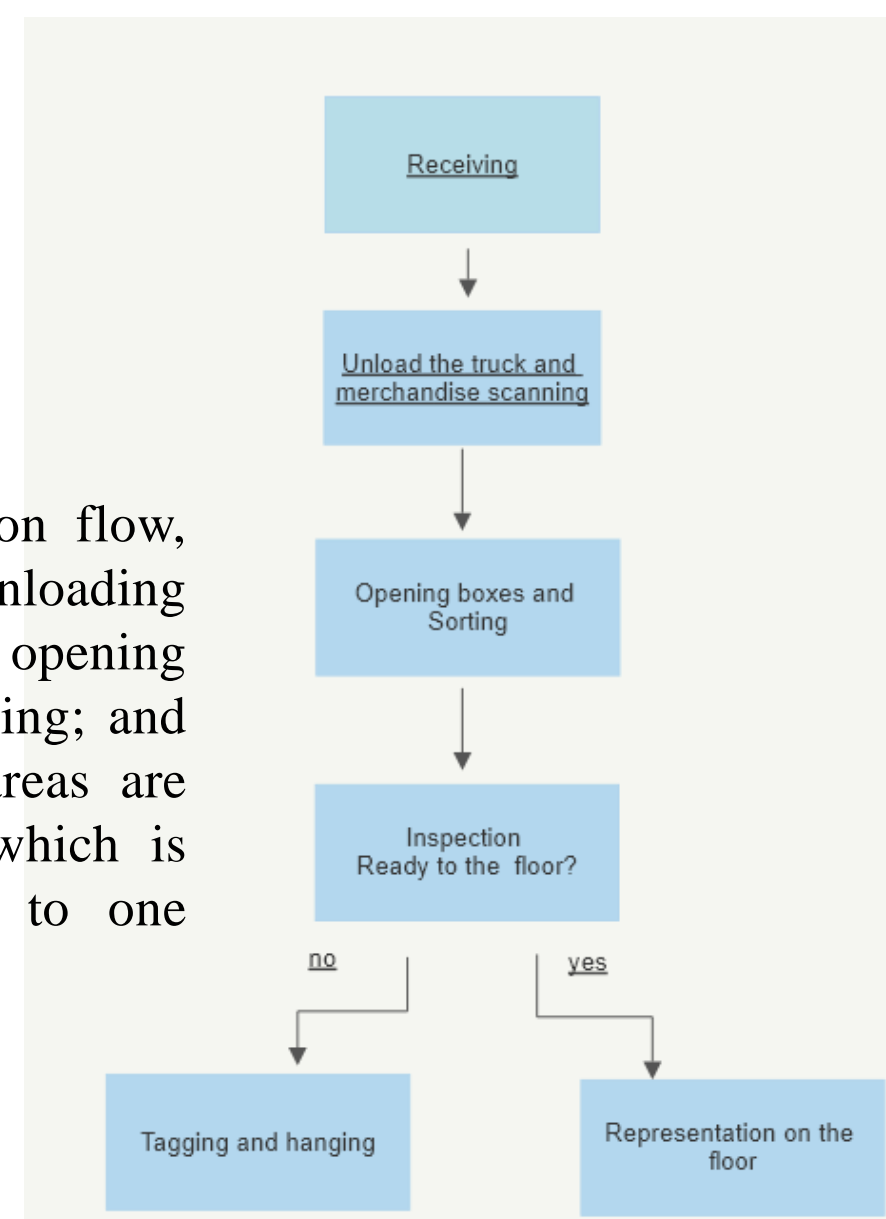


### Methodology



### Flow chart

The receiving process operation flow, consists of 4 workstations: Unloading and scanning area, sorting and opening area, inspection area and hanging; and tagging area. The first two areas are connected by one conveyor which is used to transport the boxes to one station to another.

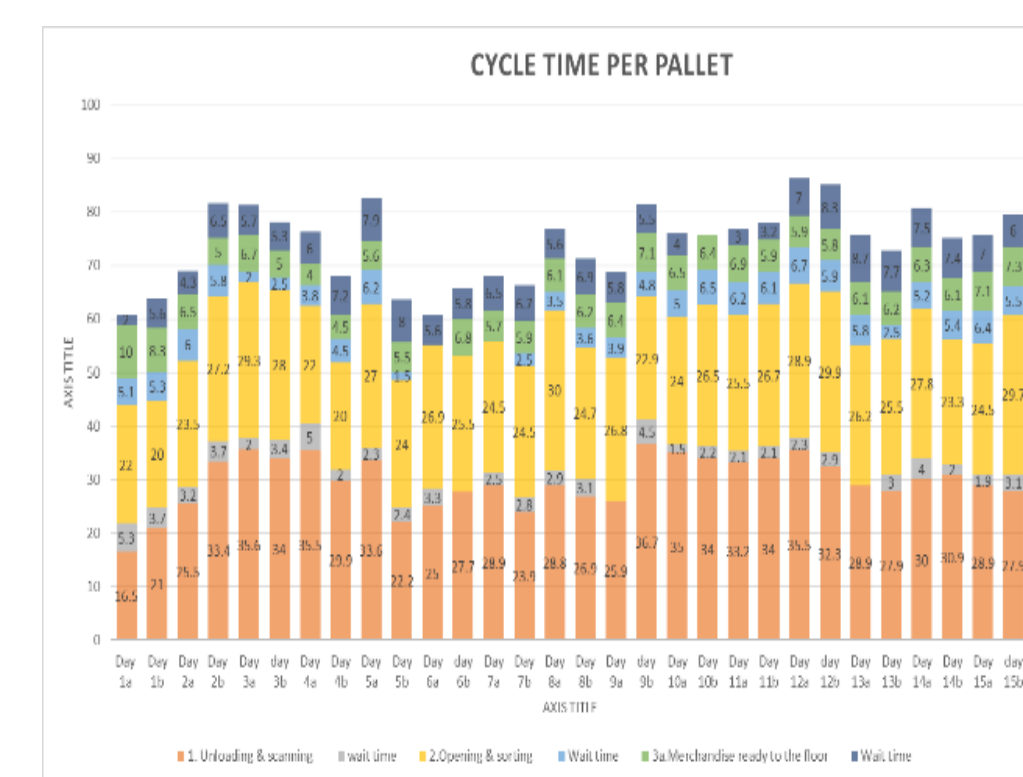


## Measure

As part of the Measure phase of the project, the current times were measured for the receiving process operations. This process was evaluated using the time that a pallet is processed.



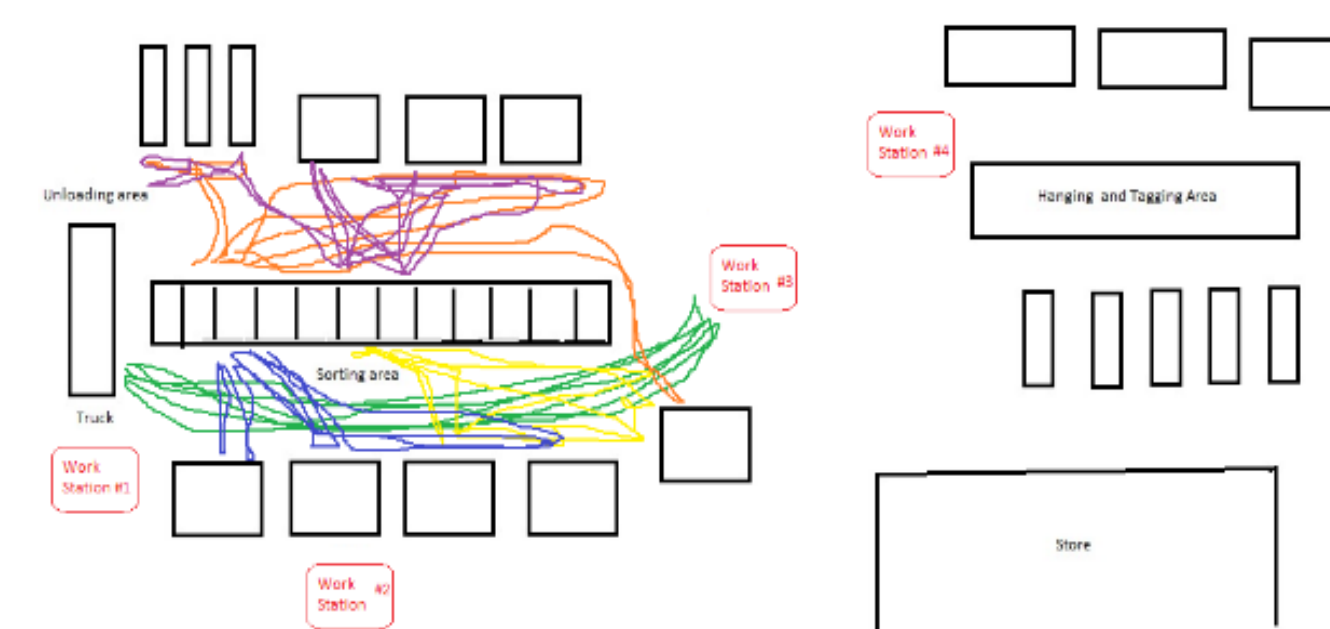
For this project, was measured the time since a pallet is unloaded from the truck until this merchandise is on the inspection area. A sample of 30 pallets was taken, the process of two pallets per 15 days were observed.



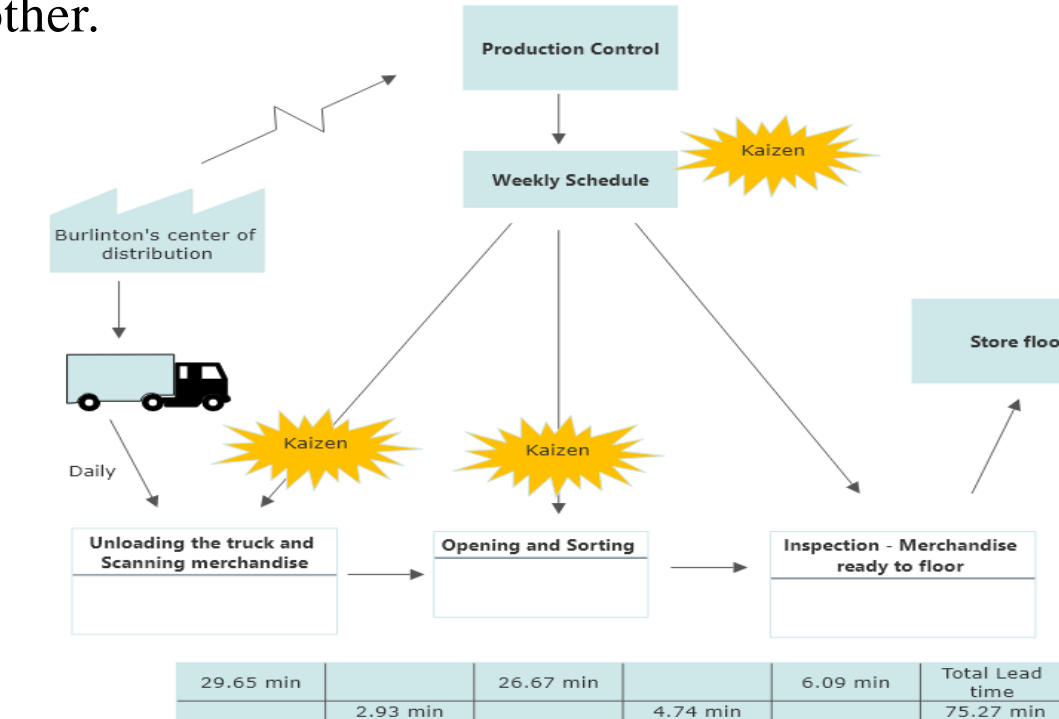
The receiving operation has a total average time of 75.27 minutes/pallet, out of which 7.68 minutes are on waiting time at the between every workstation.

The wait time presents a standard deviation of 0.94 and 1.49, and coefficient of variation of 32.19% and 31.47%, which means that process during the wait time is variable and present a non-consistent process. Also, the steps with the most consuming time during the process were the unloading and scanning step (29.65 min) and the sorting step (25.58 min).

	Average	Std.Dev	Coefficient of variation
Unloading & Scanning	29.65	4.83	16.28%
Wait time	2.93	0.94	32.19%
Opening and sorting	25.58	2.68	10.47%
Wait time	4.75	1.49	31.47%
Inspection - Merchandise ready to the floor	6.09	1.59	26.11%

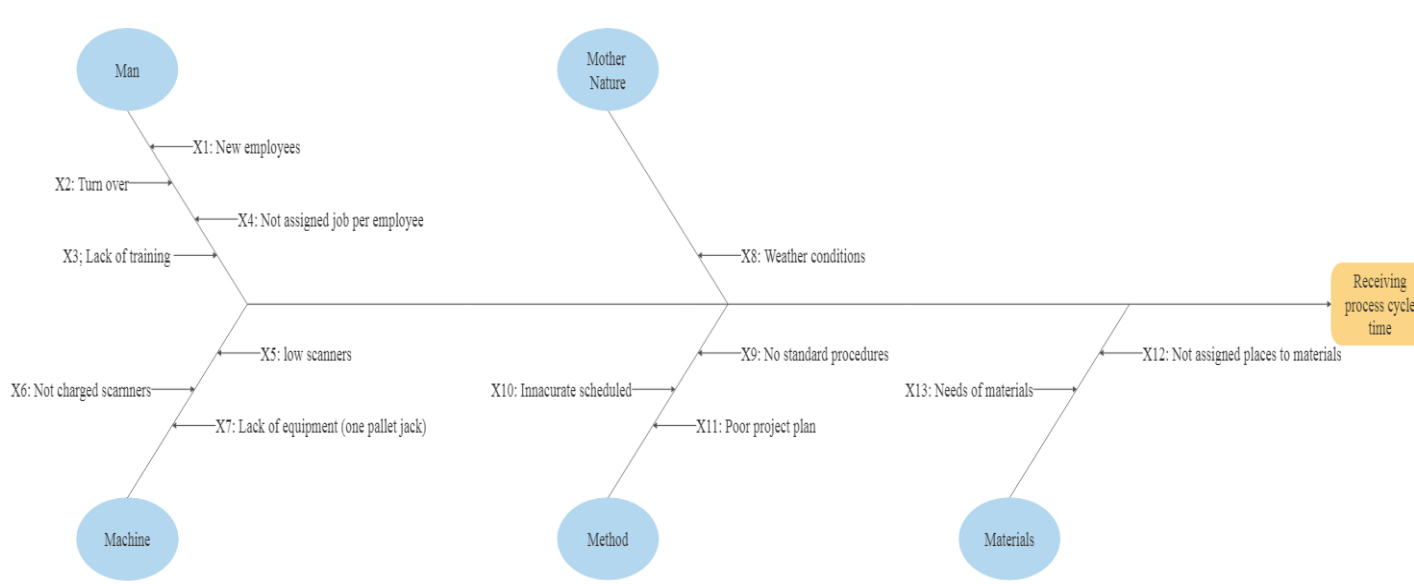


To be able to observe and follow the walk of the employees during the sorting process, a spaghetti diagram was developed. One of the most notable issues was when the employees walk around the workstation placing merchandise in different bins crossing their ways one to another.



## Analyze

With the purpose of identifying potential root causes of receiving process cycle time, a cause-and-effect diagram was completed and documented using a fishbone diagram



As part of the Analyze project phase, the potential causes identified in the diagram were prioritized with the Priority matrix analyzing the cost and importance of every cause.

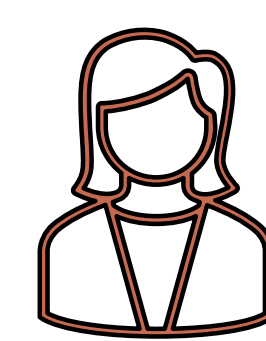
High Importance	X4: Not assigned job per employee X6: Not charged scanners X10: Inaccurate scheduled X12: Not assigned places to materials X13: Needs of materials	X2: Turn over X5: low scanners X9: No standard procedures X11: Poor project plan
Low Importance	X1: New employees X3: Lack of training X7: Lack of equipment (one pallet jack) X8: Weather conditions	
	Low Cost	High Cost

These assessments evaluate each high-ranked cause from the fishbone analysis and provides the evidence on the evaluation of the effect each of these has on the project. Out of the 13 causes brought to the Analyze phase, 5 causes will be taken to the next project phase, Improve, due to the proven effect these have on the project.



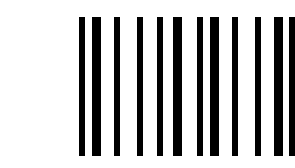
## Improve

Through the Improve project phase, each cause was evaluated to understand the value-added of each. Each element of the Receiving process is described and additional identified causes with the proposed improvement:

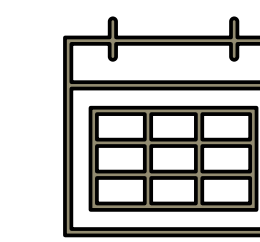


- Not assigned job per employee: At the beginning of every shift, it was observed that the employees took a long time to organize themselves at the workstations.

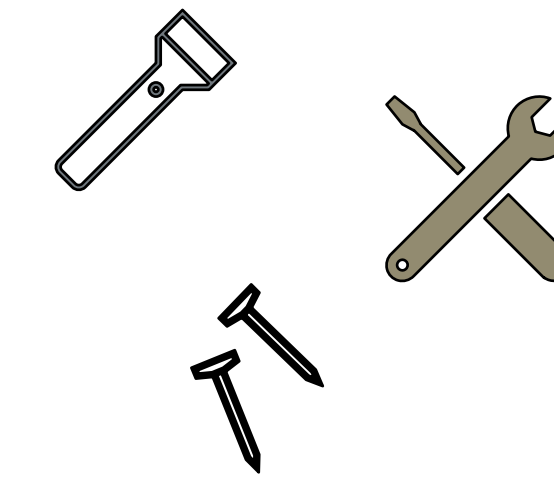
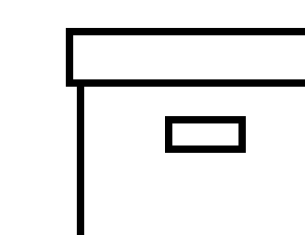
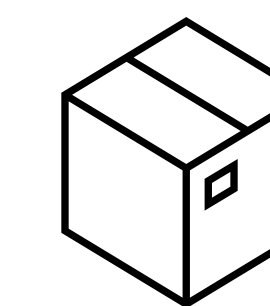
- X6: Not charged scanner: During the walk-in place (GEMBA walk), it was observed that at the beginning of the shifts, the scanners were not charged. This cause delays on the receiving process by having to wait for the equipment to get charge.



- Inaccurate Schedule: During an interview with the night shift supervisors, it was identified that the hours and number of employees were not always effective for the workload.



- Not assigned places to materials: It was observed that at the beginning of every shift, employees spent time just trying to find work materials. Additionally, it was identified that in the sorting area the employees found difficult to identify the correct place of the merchandise because the areas were not identified.



- Needs of materials: It was observed that the employees shared their work tools, which caused delays in their tasks and increased the processing time of the merchandise.



## Control

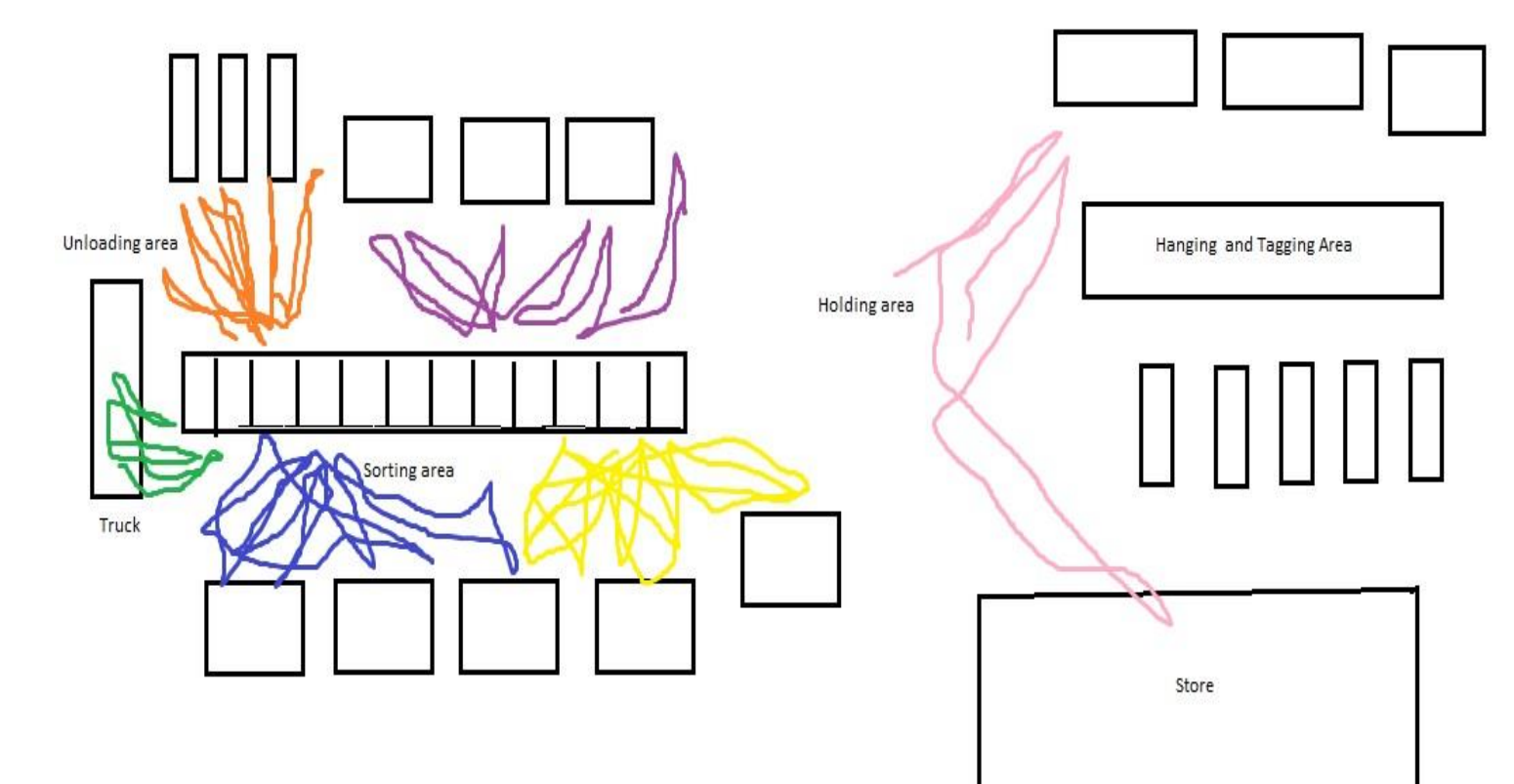
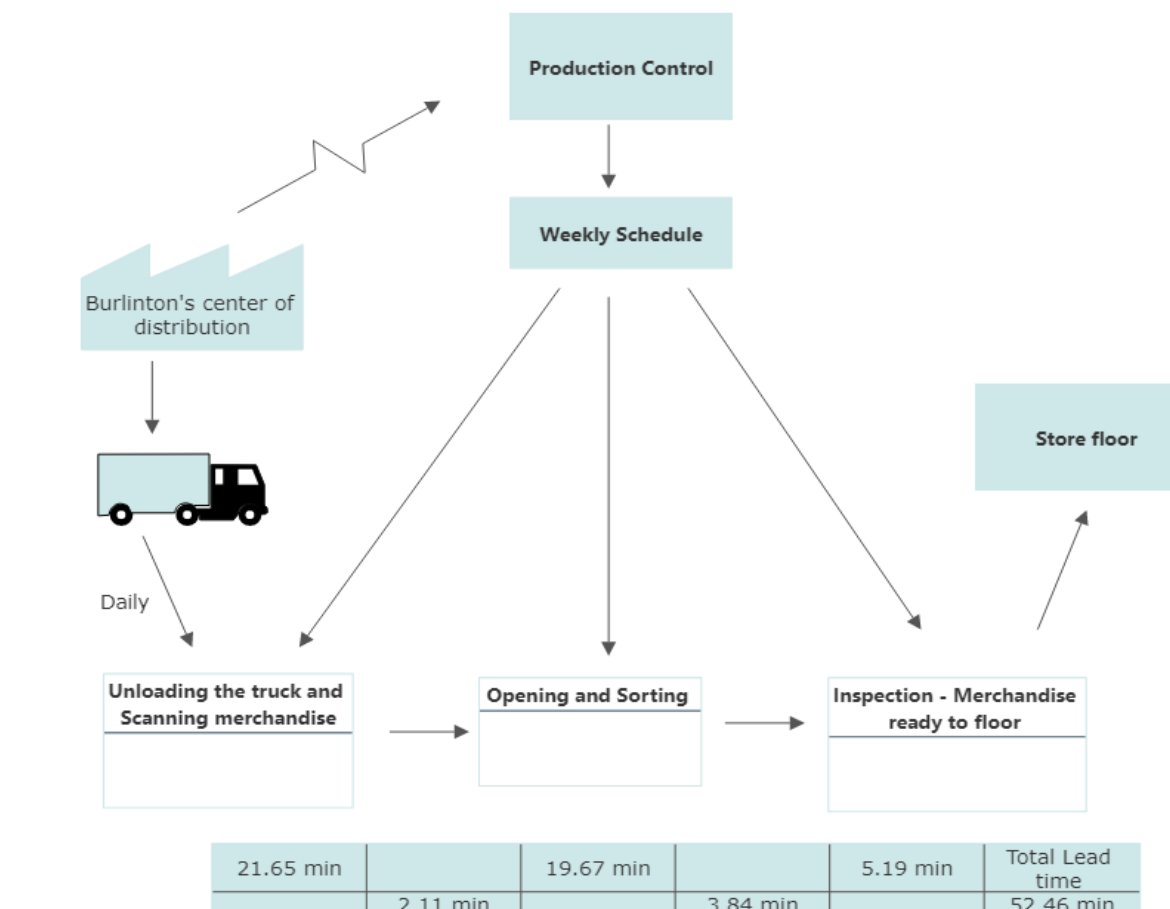
To maintain control of the new implementations in the project several measures were developed. To monitor the success of the implementations, a daily monitoring sheet to documenting how much work was completed per day was created. Likewise, another monitoring sheet was developed to ensure that no scanner is uncharged at the start of the shifts.



As part of the improve phase, a reassignment of positions was progress of the implementation of the changes. established in the workstations, a scoreboard was created where the night shift supervisor would organize the team on different positions. Finally, as a commitment of the management to the project, monthly meetings will be held to monitoring the progress of the new implementations.

### Conclusion

This project achieved an improvement of 75.27 minutes per pallet down to 52.46 minutes per pallet, which represents a 30.30% decrease of cycle time on this process. This exceeds the project objective of improving the time by a 15%. This represents a reduction of 971.33 hours a year on the receiving merchandise operation, which will represent a reduction of approximately \$10,927.42 on payroll cost.



On this diagram is observed the improvement of walk path of every employee; they no longer cross their ways anymore and with the identification of the bins, is easier to know where the item goes and is no longer necessary to walk around the floor to identify the correct bin to place the items.

### Future work

- In the future the same Six Sigma techniques will be used to:
  - Analyze all the steps of the receiving process that were not covered on this project as tagging and hanging step.
  - Develop a Standard operation procedure (SOP) for the receiving merchandise process.
  - Analyze the causes of the high turnover on the night shift.
  - Analyze the effect of the new implementations on overtime.

### REFERENCES

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