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| George Mason University |
| Executive Summary |
| Improving Pallet Routing Operations at the Washington Post |

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| Justine Blaho, Catalina Gomolka, Ryan Graziano, Laura Rodriguez Lopez  12/2/2010 |

## Introduction

George Mason University graduate students in the Systems Engineering and Operations Research Department performed a research study to identify potential production cost savings at the Washington Post plant in Springfield, VA. The Washington Post requested a characterization of the current system and suggestions for improvement in operations that lead to greater efficiency with potentially less resources.

## Problem Statement

The purpose of this study is to determine material handling routes and labor assignments that allow the Washington Post Springfield Mailroom to accomplish its objectives using a minimum number of resources. The major lines of operation that will enable this study to meet its intended goals include the following four sub-tasks:

* Understand the current mailroom operations. Provide a complete characterization of the current system.
* Identify issues within the system that negatively affect operations. Provide a list of issues that need to be addressed.
* Restructure routes to fix the issues identified relating to pallet movement operations. Provide a list of recommendations to improve the overall material handling processes.
* Determine the appropriate number of personnel to hire for pallet movement operations. Provide a methodology to calculate appropriate helper hires based on work performed for every shift during the week. Provide a list of recommended helper hires using said methodology.

## Methodology

The initial step in this project was to understand the system. We met with the Washington Post to get an explanation of the processes and entities involved in the preparation and mailing of the newspapers on a day to day basis.

Upon obtaining a better understanding of the system, we worked with the Washington Post POCs to determine the data that would be necessary to perform the analysis. The Washington Post determined that the week of August 16-22, 2010 was representative of an average week of the work completed in the Springfield Plant.

### Labor Data Analysis

This data was analyzed and using labor markup requirements (the number of helpers assigned to each machine per shift), we created Visio drawings for the following helper zones: SLS machines, Collator machines, Shipping Lanes and Docks, Z-loaders, and the Rack. A drawing was completed for each helper zone per day per shift. Each drawing contained the inputs and output routes to each location and provided a visualization of the moves per location, and allowed us to better gauge the number of pallet moves that each individual helper is performing per shift.

The analysis performed on the completed drawings helped determine how many pallet moves per helper per shift were occurring. These numbers were compared to the number of helpers assigned to each specific helper zone. This comparison was used to determine whether the number of helpers being assigned to that particular helper zone was too high based on the volume of pallets moved within that helper zone.

To determine which parts of the mailroom were busy and which parts were slow a baseline needed to be determined. So, the number of pallets moved at all of the machines and locations was divided by the number of helpers hired for each shift and day by helper zone, to come up with a number of moves per hired helper. Then each different helper zone was more closely analyzed by looking at what the minimum, maximum, mean and median number of moves was per helper to come up with a baseline.

### Route Analysis

We also focused on the reduction of pallet moves and the improvements of routes. Matlab was used to create a list of unique routes along with their frequency of occurrence. The routes with very low frequencies of occurrence highlight data anomalies and lead to several data recommendations.

Next Visio was used to draw the routes that occur frequently along the Springfield mailroom floor every day for all three shifts. The visualization of the routes made it possible for the team to identify some issues including unnecessary stops at some locations and routes unnecessarily going through areas of high traffic.

## Recommendations

There are four types of recommendations being made: shift reduction, route modifications, data, and general recommendations.

### Shift Reduction Recommendations

The following is a summary of the shift reductions being recommended. There are a total of 30 reductions recommended, based on the data analysis performed. Cost savings pertaining to each shift are also depicted in the table, based on a cost savings of $7,000 per helper per shift.

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| Shift | Reduction Recommendations | Recommendations to be Implemented | Total Cost Savings | Possible additional Savings[[1]](#footnote-1) |
| Monday Shift #1 | **4** | **2** | **$14,000** | **$14,000** |
| Monday Shift #2 | **1** | **1** | **$7,000** | **0** |
| Monday Shift #3 | **1** | **1** | **$7,000** | **0** |
| Tuesday Shift #1 | **3** | **1** | **$7,000** | **$14,000** |
| Tuesday Shift #2 | **4** | **1** | **$7,000** | **$21,000** |
| Tuesday Shift #3 | **2** | **2** | **$14,000** | **0** |
| Wednesday Shift #1 | **2** | **1** | **$7,000** | **$7,000** |
| Wednesday Shift #2 | **1** | **1** | **$7,000** | **0** |
| Wednesday Shift #3 | **1** | **1** | **$7,000** | **0** |
| Thursday Shift #1 | **2** | **2** | **$14,000** | **0** |
| Thursday Shift #2 | **2** | **1** | **$7,000** | **$7,000** |
| Thursday Shift #3 | **1** | **0** | **0** | **$7,000** |
| Friday Shift #1 | **4** | **4** | **$28,000** | **0** |
| Friday Shift #2 | **1** | **1** | **$7,000** | **0** |
| Saturday Shift #1 | **1** | **0** | **0** | **$7,000** |
|  |  |  | **$133,000** | **$77,000** |

### Route Recommendations

After analyzing the routes currently utilized within the mailroom a number of inefficiencies were identified. In order to eliminate them, the following are recommended:

* MRIPD should be eliminated for the following:
  + Items coming from anywhere but the racks do not face any height restrictions.
  + It is suggested that MTC be modified so that the placement of pallets on the racks takes into consideration their future location. If items need to be moved from the racks to SLS5, SLS6, or SLS7, and Collator 4 then the pallets should be placed in a rack location that does not require the use of a deep reach truck.
* For pallets coming from SLS1 and SLS2 use ZL1 as long as the final destination is any of the following concourse locations: CN01 through CN31. If the final destination of the pallet is the North Dock then use ZL2 or 3.
* For pallets coming from SLS3 and 4 use ZL2 or 3 as long as the final destination is any of the following concourse locations: CN07 through CN31 or North Dock. If the final destination is CN01 through CN06 then use ZL1.

### Data Recommendations

Data anomalies were identified during our analysis of the data. The following are recommendations for helping reduce these anomalies. This can help increase data integrity and provide a clearer picture of the mailroom processes and activity.

* Examine data anomalies to ensure data integrity:
  + Moves to ZLs are not tracked from SLS1-4 for a large number of data (e.g., 133 times on Thursday August 19). Therefore, ZL numbers are not accurate enough to specify cuts.
  + Inconsistencies of moves between collators (e.g., Move from COL 1 to COL 4 on Thursday).
  + Move from S6HS to S7HS on Thursday.
  + On Tuesday, Wednesday and Thursday blank jackets are moved downstairs and are not scanned. Moves from SLS to Z-loader and then to rack should be scanned to capture labor being fulfilled.
* Scan pickup locations with date and time that a pallet is picked up to be moved instead of at the destination.

### General Recommendations

In addition to the aforementioned recommendations, there is also a set of recommendations that do not cover a specific area (e.g., shift, data, route), but rather are more general in manner. The general recommendations are as follows (in no particular order):

* Move clean-up to 3rd shift, so that clean-up personnel have more space to work and are not in the way of daily operations (need to determine who can share this responsibility).
* All helpers should fall under a single department. This will allow helpers to be used more effectively (e.g., SLS helpers can help out with collators, etc).
* In low ND and CD movement times only a single dock should be operational.
* More frequent busy season markups and low season markups should be considered to ensure that changes of workload throughout the year are taken into consideration.
* Consider further analysis to determine if extra buffering processes and handling steps can be eliminated, such as determining if pallets can be loaded directly to trucks, versus being held in the shipping lanes.

## Conclusion

In conclusion, we feel that there are a number of recommendations that can be implemented by the Washington Post to help reduce their costs. Out of the 30 recommendations for labor cuts, there are 19 that have been approved by the Washington Post. The additional 11 recommendations require additional analysis from the Washington Post to determine if implementing these cuts would be feasible. This additional analysis required is a direct result of incomplete data that was in MTC and to the data anomalies that were mentioned above.

In addition, the implementation of the Data, Route and General Recommendations can further improve the current processes and help reduce inefficiencies currently present.

The study presented in this report constitutes a characterization of the mailroom process currently utilized by the Washington Post. We feel that additional work could be accomplished to continue helping the Washington Post in their pursuit to cut production cuts. The following areas should be considered for future work:

* Consider a holistic analysis of the mailroom: For instance using an approach such as Lean Manufacturing to assess of all improvement opportunities in the warehouse, including people, strategies, processes, technologies, assets, layout, external influences, and internal organization.
* An improvement of the automated software MTC could be performed by adding optimizations modules to it. For example, add options to the system so that it returns routes utilizing either shortest or quickest paths.
* A simulation could be performed to determine the effects of changing various parameters on the mailroom process. The Washington Post would need to collect data on the travel times for each route, the time to create a pallet for each machine when it is operational, the schedule of when machines are running, and the scheduled deadlines for loading pallets onto the trucks.
* Analysis of data to understand the behavior of the mailroom activities every hour of every shift. This analysis could be used to determine the busiest hours of every shift and to allocate helpers through the shift based on results.
* Consider further analysis to determine if extra buffering processes and handling steps can be eliminated. For instance, determining if pallets can be loaded directly into trucks, rather than being held in the shipping lanes.

1. If additional recommendations are implemented, this is based on additional analysis necessary by the Washington Post to verify that positions may be reduced. [↑](#footnote-ref-1)