PURDUE UNIVERSITY | School of Industrial Engineering

TEAM 09

PALLET PUT AWAY STRUCTURE PROJECT - GNC

IE 43100 Fall 2022

By Katie Adams, Carolina Solis Blanco, Juan Carlos Javier, Laura Molina, and Rohan Patell

INTRODUCTION

Overview:

- GNC is a multinational company that specializes in health and nutrition related products.
- GNC has two distribution centers in the US with the largest being in Whitestown, Indiana.
- Most of GNC's products go to retail/GNC stores but wholesale products are growing in importance.
- GNC is currently having difficulties with an inefficient pallet put away and pick structure.
- There is no current system in place for the organization of products according to predetermined product classes.
- The result of this issue is increased time spent traveling by workers to and from locations and increased congestion between multiple workers and equipment.

Scope:

- Review Distribution Center's put away process and pick volumes to optimize travel time both vertically and horizontally for equipment drivers and congestion prevention, with an emphasis on the wholesale area.
- Redesign DC **Zones** for wholesale picking and optimal locations for product put away.
- Rearrange product within the DC for **Pick-to-Belt** Line replenishment optimization.
- Redesign **pick path** of the DC to decrease congestion and reduce travel time within the DC.
- Update SKU's put away classes and put away rules per put away class.

Factors Considered:

- Wholesale vs Retail importance
- Item velocities
- Item volumes
- Risk of congestion

Limitations:

- Low technology available for solutions.
- Preset layout for distribution center shelving and other physical assets.
- Constraints on travel directions and areas based on distribution center layout.
- Less freedom due to height and weight constraints on levels one and three.
- Locations may have priorities, but items will not always be placed there if capacity is full.
- Data analysis is done using data from the past few months and while future growth is considered with sustainability suggestions, it may require further future modifications.

SOLUTIONS

Rezoning:

- Using material flow analysis, the team calculated the percentage breakdown of picks going to wholesale versus retail and the volume of pallets picked for each product in the warehouse.
- Original zones RA and RB2 were designated to wholesale products based on proximity and any remaining products that could be picked for wholesale are stored in RB1 for optimal picking.

The team proposed two constraints for pallet allocation into each zone (excluding levels 1 and 3) as listed in Table 1.

Table 1: Pallet Allocation Constraints by Zone

Zone	Items (% and # of wholesale picks)	Estimated # of wholesale pallets
RB1	<75% ***AND*** <30,000	6,700
RA	75%+ ***OR*** 55,000+	4,000
RB2	<75% ***AND*** 30,000<x<55,000	800

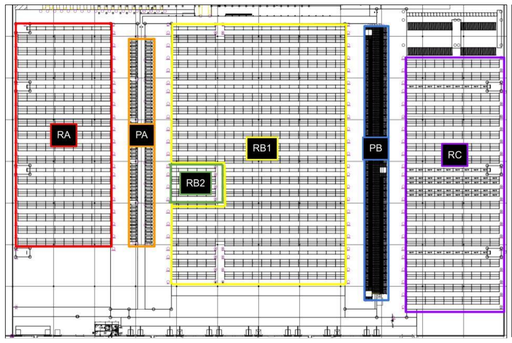

Figure 1: Original DC Zoning

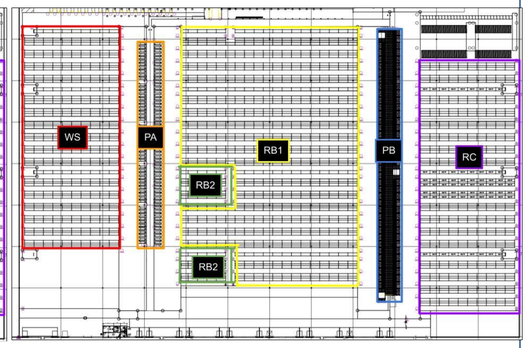

Figure 2: New DC Zoning

Pick to Belt:

- Using one month of data on Pick to Belt (PTB) replenishments, the team concluded that the distribution of items being brought to PA and PB (as shown in Figure 3) have no current efficient system.
- PTB items' put away zones were rearranged to minimize the replenishment travel distances (as shown in Figure 4).
- Putting items in the zones closest to the assigned position in the PTB saves travel time.

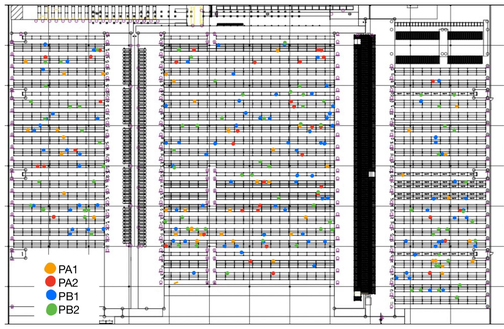

Figure 3: Original Example Pick to Belt Distribution

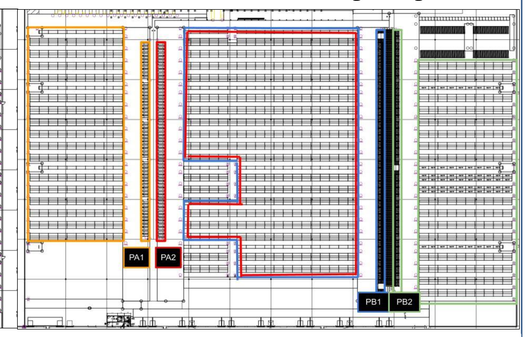

Figure 4: New Pick to Belt Priority Zoning

Pick Path:

- Analysis was done on the warehouse management system's approach to how employees navigated the warehouse to fill orders.
- The pick path includes all locations in the warehouse and was originally chosen based on retail picking protocol.
- Modifications to the path made according to wholesale protocol are listed below.
  - ➢ Changed the direction through certain zones to help with the flow and reflect the new changes in the RB2 zone.
  - ➢ Changed the order of the zones from RA -> PB -> PA-> RB-> RZ-> RC (shown in Figure 5) to RZ -> RC-> PB-> RB1-> PA2-> RB2-> PA01-> RA (shown in Figure 6) to flow better through the warehouse and work from farthest to closest to the wholesale drop zone ("End" at bottom left).

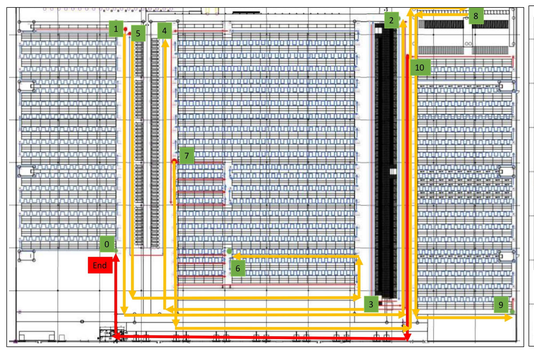

Figure 5: Original DC Pick Path

Figure 6: New DC Pick Path

CONCLUSION

Rezoning Savings:

- For Zone WS, high percentage wholesale products or products picked in great volumes for wholesale and retail will be stored here. This covers about 35% of possible wholesale products within 270 ft of the Wholesale Area.
- For Zone RB2, products picked in pallet volumes greater than 30,000 and have a percentage of <75% for Wholesale will be stored here,. This covers about 7% of possible wholesale products within 222 ft from Wholesale Area.
- All other products with potential to be picked for wholesale will be directed to RB1.

Pick to Belt Savings:

- The total average distance traveled for the replenishment was calculated to be 430 ft.
- Table 2 lists the original average distance to put away items by PTB zone and the new maximum and minimum distances traveled for each zone (assuming items fall into their priority zones).

Table 2: Pick to Belt Replenishment Distances Before and After

Zone	PA01 (RA)	PA02 (RB1)	PB01 (RB1)	PB02 (RC)
Old Avg	440.2	427.4	374.7	492.3
Minimum (ft)	30.3	29.7	31.8	30.1
Maximum (ft)	390.6	869.8	938.0	479.0

Pick Path Savings:

- The measurements of the pick path itemized by zones for both old and new are shown in Table 3, along with the percent improvement.

Table 3: Pick Path Distances Before and After

Zone	RA	RB	RC	PA	PB	Transitions	Total
Old (ft)	2530.2	5265.8	2708.8	549.0	2521.8	4680.3	18255.8
New (ft)	2530.2	5359.4	2708.8	509.3	1412.7	1512.9	14033.3
% Change	0%	-2%	0%	7%	44%	68%	23%

Conclusion:

<u>Overall savings:</u>

- Pick paths were improved by 23% and have more efficient transitions.
- Top wholesale items will be located closer to wholesale area to fulfill orders with minimal travel distance, covering the top 42% of wholesale products.
- Pick to belt items will be located near their PTB location to speed up replenishment and greatly reduce average travel distance.

<u>Sustainability Suggestions:</u>

- Talking to GNC experts who know which products are more wholesale heavy and allocate accordingly.
- Allocating new products to RB1 and with time, updating locations based on algorithms designed on volume/picking data.

<u>Next steps:</u>

- Put systems in to periodically run algorithms to update the system on inventory and order changes.
- Consider investing in warehouse management systems that allow to pick and put away at the same time.
- Make WS into hot zone based on congestion levels observed.
- For new products, gather information and locate them in the optimal location.