



PepsiCo Labs presents..

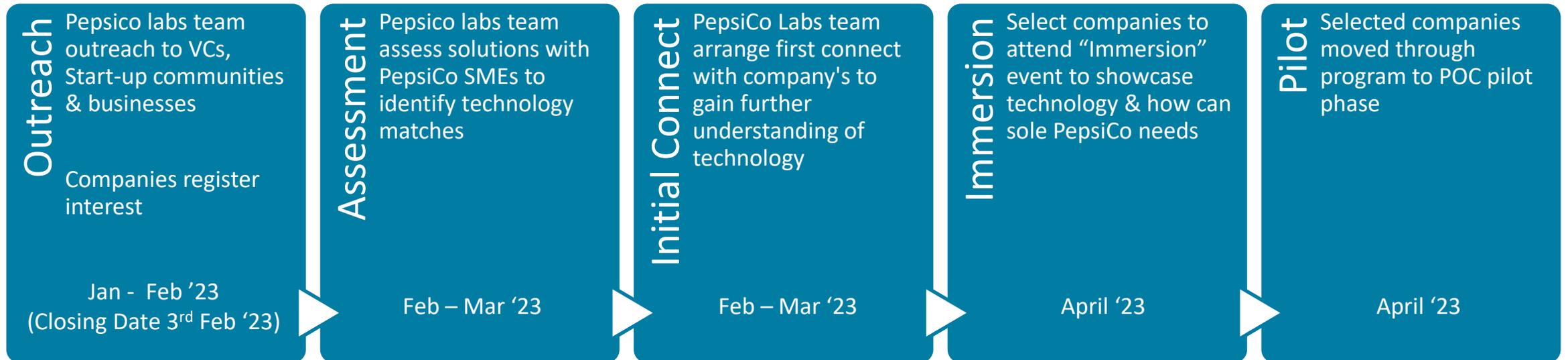


Warehouse Program

Creating the future of warehouse, today

Focus Areas & Briefs

PepsiCo Labs and North America Warehouse Program Process & Timing



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PepsiCo Labs and North America Warehouse Program Focus Areas

1. Automation



- 1.1 Case Picking Automation
- 1.2 Low cost trailer loading/unloading
- 1.3 Automated Stretch Wrap removal
- 1.4 Breakthrough warehouse automation

2. Optimisation



- 2.1 Warehouse mapping optimisation
- 2.2 Optimisation of “Eaches” picking slots
- 2.3 Sequencing & order consolidation

3. People



- 3.1 Accelerated employee onboarding & training
- 3.2 Gamification toolkit
- 3.3 Task Allocation

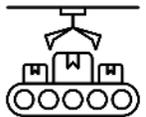
4. Inventory



- 4.1 Automated inventory management
- 4.2 Picking accuracy
- 4.3 Warehouse Orchestration & Planning
- 4.4 Mixed Pallet Scanning

PepsiCo Labs and North America Warehouse Program Focus Areas

Automation	1.1 Case Picking Automation	1.1.1	AMR Solution: Full case picking solution to operate within warehouse case pick aisles/lanes – Ability to pick single case from pallet and place to transfer belt.
		1.1.2	AMR Solution: Full case picking solution to replace manual operation inside traditional warehouse (pallet rack storage). Full order picking includes multiple case picks / locations, with capability to transferring consolidated order to dispatch location.
	1.2 Low cost trailer loading/unloading	1.2.1	AMR Solution: Full pallet trailer loading/unloading. Low cost & high speed AMRs to automate loading and unloading palletized stock from and trailers/warehouse including barcode/inventory scanning capability.
		1.2.2	Automated solution / technology to enable ‘super fill’ (additional case layers) on completed pallets i.e. to maximise all available space on trailers.
		1.2.3	Automated low cost solution for load and unload of cases directly from trailer (dead stacking – no pallet)
1.3 Automated Stretch Wrap removal	1.3.1	Technology solution to autonomously remove and manage stretch wrap/film from palletized goods.	
1.4 Breakthrough warehouse automation	1.4.1	Open Brief : Breakthrough technology to support automation of manual operations within warehouse environments. Low cost, high speed, flexible, dexterous solutions for fan folded, jar/dips trays and perforated cases.	
Optimisation	2.1 Warehouse mapping optimisation	2.1.1	Warehouse Layout Optimization : System to enable dynamic allocation of warehouse stock locations based on product type & velocity to maximize warehouse efficiency. Must include efficiency “trade-off” evaluation for recommended changes (warehouse / ASRS).
	2.2 Optimisation of Eaches picking slots	2.2.1	Eaches Picking : Dynamic slotting of product based on velocity SKU / Volume / weight per shift. Must include efficiency “trade-off” evaluation for changes.
	2.3 Sequencing & order consolidation	2.3.1	Solution to optimize sequencing and loadout of trailers : Automation of manual movement of part-orders to loadout locations, smart loadout orchestration targeting direct to trailer loading to minimise multiple handling of part-orders in DC
People	3.1 Accelerated employee onboarding & training	3.1.1	Guided & assisted training to enable Warehouse operators to get onto floor quicker. Develop/sign off skill sets & drive team efficiency. Provide real time KPI feedback for new starter and supervisor.
	3.2 Gamification toolkit	3.2.1	Gamification toolkit for team/individual performance with ability to roll up to site/location scoreboard live. Compete against neighbouring section in warehouse vs other sites nationally. Improve employee experience by introducing a friendly natured competitiveness solution.
	3.3 Task Allocation	3.3.1	As part of overall warehouse orchestration, enable move to automated task allocation.
Inventory	4.1 Automated inventory management	4.1.1	Case visibility : Breakthrough technology to enable low cost inventory tracking throughout PepsiCo network through to customer store.
	4.2 Picking accuracy	4.2.1	Eaches stock visibility : Low cost solution to provide live stock within an Eaches pick-face unit
		4.2.2	Technology to enable order pick validation for operators across DC/GES facilities i.e. Check to ensure correct item picked for order
	4.3 Warehouse Orchestration & Planning	4.3.1	AI/ML Optimization tool to enable end-to-end orchestration & planning capability - Order pick scheduling, stock visibility, Labour visibly (inc. task allocation*), trailer visibility & order loadout dispatch scheduling.
4.4 Mixed Pallet Scanning	4.4.1	Technology to enable mixed pallet scanning to identify individual components on pallet for returns processing.	



1.1 Case Picking Automation

1.1.1 AMR Solution: Full case pick solution to operate within warehouse case pick aisles/lanes

Solution overview

Problem to solve



In GES locations, pallet of stock is loaded into the 'picking tunnels' via ASRS. Each full pallet has a different SKU (e.g. 1 pallet full of Doritos Chili Heatwave, 1 pallet full of Tostitos).

Currently, the cases are picked manually by an operator walking to the pallet and loading the correct number of cases by SKU onto the belt via a pick to light system.

Whilst this is an accurate process, we're looking to automate to speed up operations.

Potential use cases



PepsiCo are looking for breakthrough technology in the robotics space to be able to:

- Travel up and down the pick aisle (10m long for each zone)
- Pick cases from pallets
- Place cases onto belt

Capabilities & Evaluation criteria

Key tech features requested

Critical Capability needs



- Retrofit to be able to travel up and down pick aisle to pallet location
- Be able to pickup fan folded reusable cardboard boxes
- Be able to pickup products not perfectly on the pallet
- Be able to pickup cases of trays/jars from pallet
- Be able to pick different case orientation

Key Evaluation Criteria

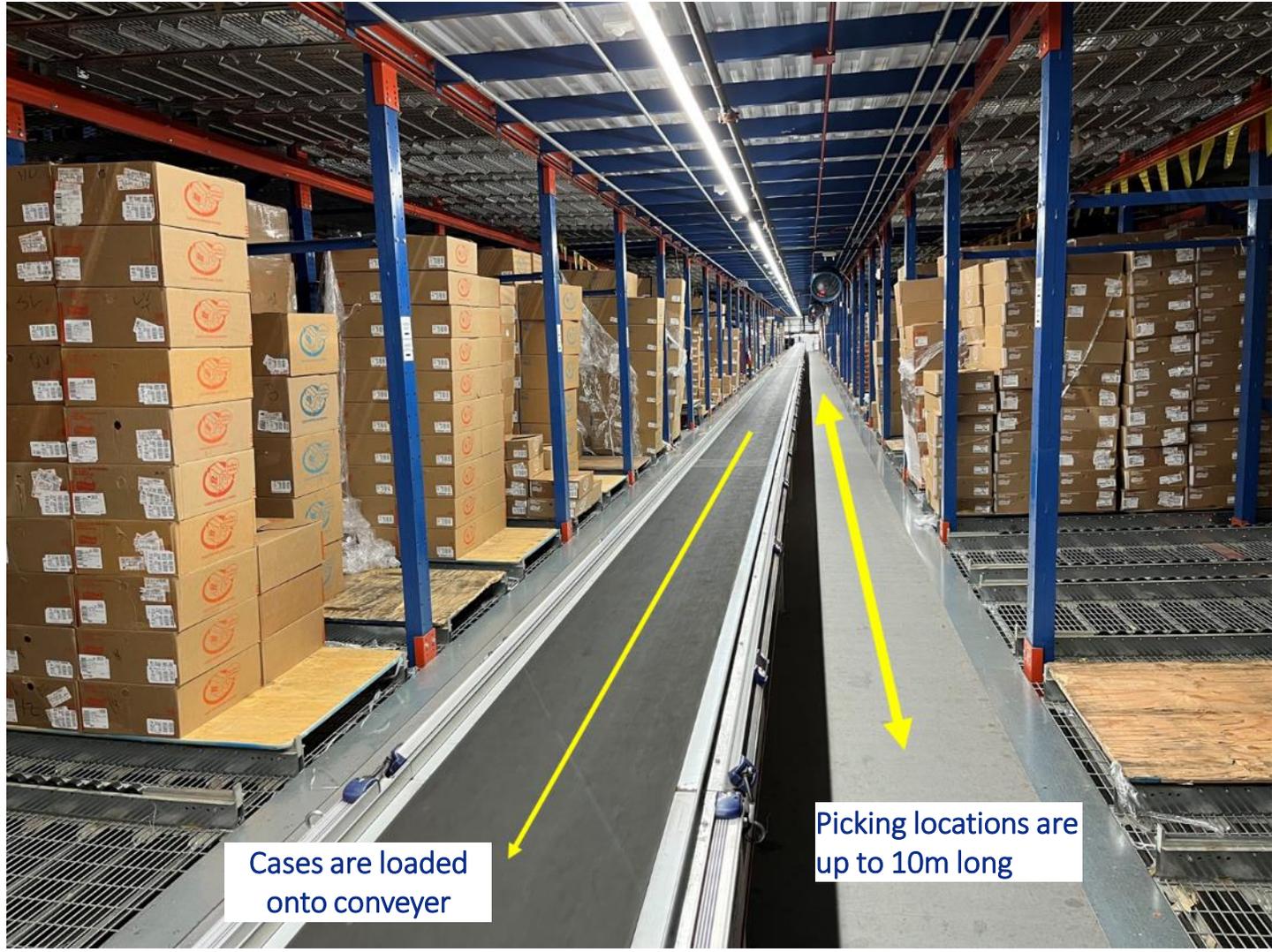


- Cost & TCO
- Simplicity & ease to implement
- Speed & capability
- Flexibility and adaptability for different product types
- Speed of onboarding
- Proof of adoption in similar environments

1.1 Case Picking Automation

1.1.1 AMR Solution: Full case pick solution to operate within warehouse case pick aisles/lanes

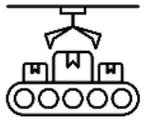
Products are in standard reusable cardboard



Pallets loaded from ASRS to this pick area

Cases are loaded onto conveyer

Picking locations are up to 10m long



1.1 Case Picking Automation

1.1.2 AMR Solution: Full case picking solution to replace manual operation inside traditional warehouse

Solution overview

Problem to solve



In DC locations, we have traditional pallet racking. We have operators that pull aluminium carts around the warehouse loading cases based on order details.

Whilst this is an accurate process, we're looking to automate to speed up operations.

Potential use cases



PepsiCo are looking for breakthrough technology in the robotics space to be able to:

- Travel around the warehouse locations
- Pick cases from pallets on ground level pallet racking
- Place cases onto cart
- Transport cart to dock door

PepsiCo are also open to exploring case picking onto other transportation methods not using our aluminium carts if efficiencies can be proved.

Capabilities & Evaluation criteria

Key tech features requested

Critical Capability needs



- Co-operate with humans
- Be able to pickup fan folded reusable cardboard boxes
- Be able to pickup products not perfectly on the pallet
- Be able to pickup trays/cases of jars from pallet

Key Evaluation Criteria



- Cost & TCO
- Simplicity & ease to implement
- Speed & capability
- Flexibility and adaptability for different product types
- Speed of onboarding
- Proof of adoption in similar environments

1.1 Case Picking Automation

1.1.2 AMR Solution: Full case picking solution to replace manual operation inside traditional warehouse



Cases are picked from bottom rack

Stradivari® Warehouse Management System dictates what's the movement of goods

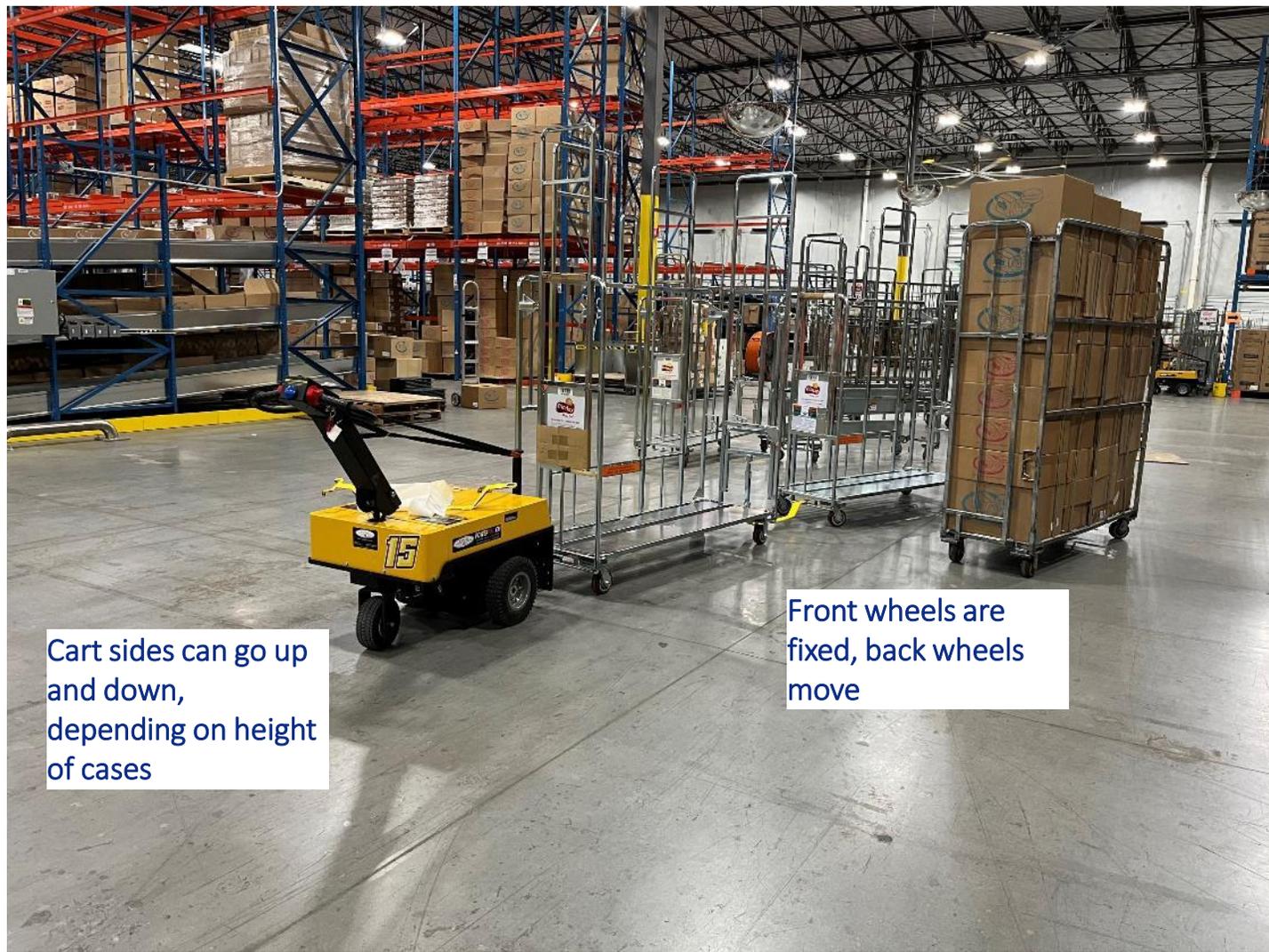
Each lane has full pallet of 1 SKU

Cases picked from pallet and placed onto cart

Picking also from non-rack locations

1.1 Case Picking Automation

1.1.2 AMR Solution: Full case picking solution to replace manual operation inside traditional warehouse



Cart sides can go up and down, depending on height of cases

Front wheels are fixed, back wheels move



1.2 Low cost trailer loading/unloading

1.2.1 AMR Solution: Full pallet trailer loading/unloading.

Solution overview

Problem to solve



Pallet boards are (L = 50", W = 42", H = ¾") reduced height boards for transporting goods within Frito Lay network. The pallet boards are loaded with stock and loaded and unloaded from trailers.

Currently, all the loading and unloading is done manually which is timely and highly labor intensive.

Potential use cases



Low cost & high speed AMRs to automate loading and unloading palletized stock from and trailers/warehouse including barcode/inventory scanning capability.

PepsiCo are looking for breakthrough AMR technology to autonomously load and unload goods on pallet boards on and off trailers.

Capabilities & Evaluation criteria

Critical Capability needs



Key tech features requested

- Ability to pickup pallet boards from trailer floor (scoop under the boards)
- Ability to go over 'hump' between dock door and trailer
- Ability to identify objects in it's way and go around obstacles
- Ability to co-operate with humans
- Ability to learn most efficient way of loading for route (e.g. load last drop first)
- No reliance on mobile network
- Use own Wifi / LAN

Key Evaluation Criteria



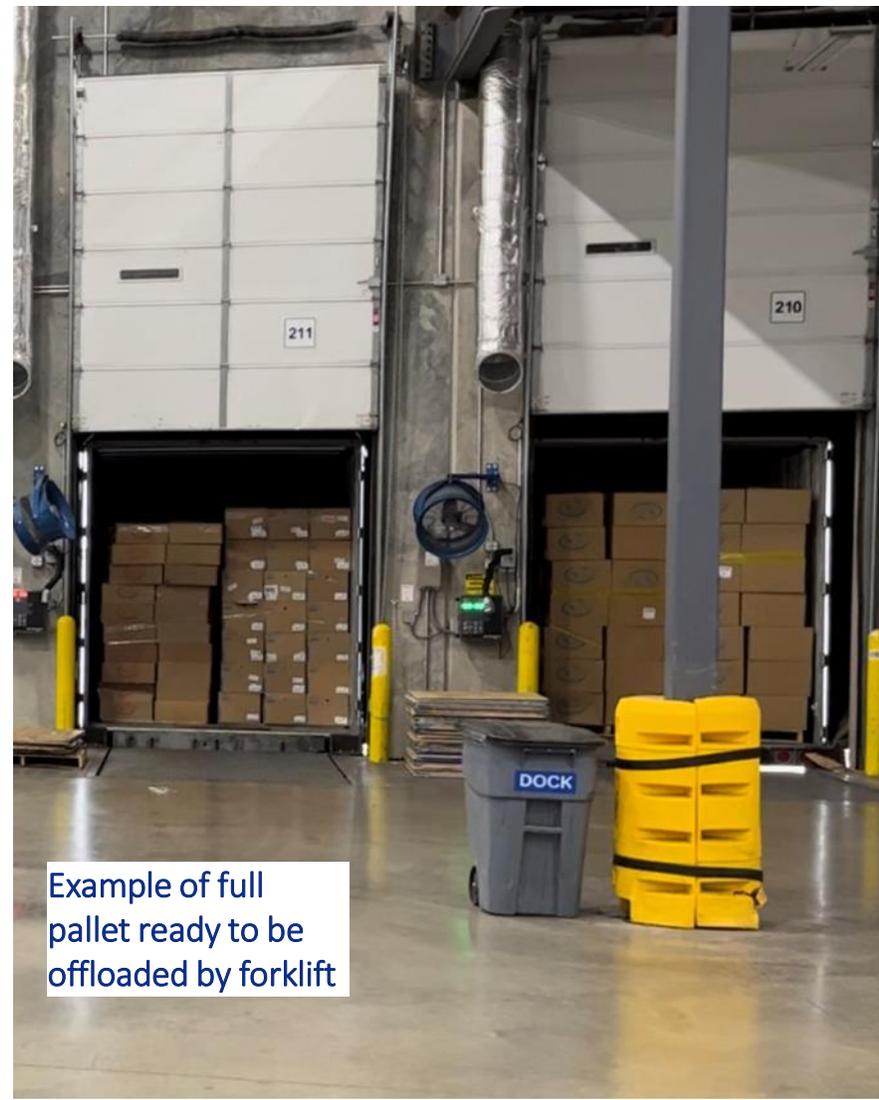
- Cost & TCO
- Simplicity & ease to implement
- Speed & capability
- Flexibility and adaptability to enable changes mid-shift
- Speed of onboarding
- Proof of adoption in similar environments

1.2 Low cost trailer loading/unloading

1.2.1 AMR Solution: Full pallet trailer loading/unloading.



PepsiCo already have some AMRs in operation , these are not deployed for trailer loading/unloading



Example of full pallet ready to be offloaded by forklift



1.2 Low cost trailer loading/unloading

1.2.2 Automated solution / technology to enable 'super fill' (additional case layers) on completed pallet

Solution overview

Problem to solve



Space is a limiting factor in moving stock around the country. When we move carts and pallets around the country, there is extra space in the trailer on top of the palletted goods – this is what we call 'Super Fill'. Frito-Lay products cases are light, so therefore can be placed on top of pallet goods without damaging stock.

Currently, the way of loading and unloading the Super Fill trailer is labour intensive and can be unsafe for manual loading.

Potential use cases



Automated solution / technology to enable 'super fill' (additional case layers) on completed pallets i.e. to maximise all available space on trailers.

Can be either:

- Palletted goods loaded all in first, then automation to place case stock on top of goods afterwards
- Pallet goods loaded and super fill loaded simultaneously

Capabilities & Evaluation criteria

Critical Capability needs



Key tech features requested

- Adaptable to be able to cope with Frito-Lay varying case heights
- Be able to load 18 wheeler trailer
- Be able to load a Class 6 box truck
- No reliance on mobile network
- Use own Wifi / LAN

Key Evaluation Criteria



- Cost & TCO
- Simplicity & ease to implement
- Speed & capability
- Flexibility and adaptability for different product types
- Speed of onboarding
- Proof of adoption in similar environments



1.2 Low cost trailer loading/unloading

1.2.3 Automated low cost solution for load/unload of cases directly from trailer (dead stacking)

Solution overview

Problem to solve



Space is a limiting factor in moving stock around the country. One way to over-come the transfer the goods between PepsiCo Factory to DCs and GES locations are to 'Dead stack' cases in a trailer. This is where cases are loaded and stacked directly into a trailer without being on a pallet. This enables even more stock to be loaded into a trailer.

Currently, it is very manual and takes too long to manually load and unload dead stacked trailers. We have instances of automating this loading, but it's also very expensive.

Potential use cases



PepsiCo are looking at breakthrough technology to autonomously load and unload Dead Stacked trailers at it's Factory, DC and GES locations.

Loading:

- Load cases from dock door to full height of trailer

Unloading:

- Unload cases and palletise stock

Capabilities & Evaluation criteria

Critical Capability needs



Key tech features requested

- Adaptable to be able to cope with Frito-Lay varying case heights
- Be able to load 18 wheeler trailer
- Be able to load a Class 6 box truck
- No reliance on mobile network
- Use own Wifi / LAN

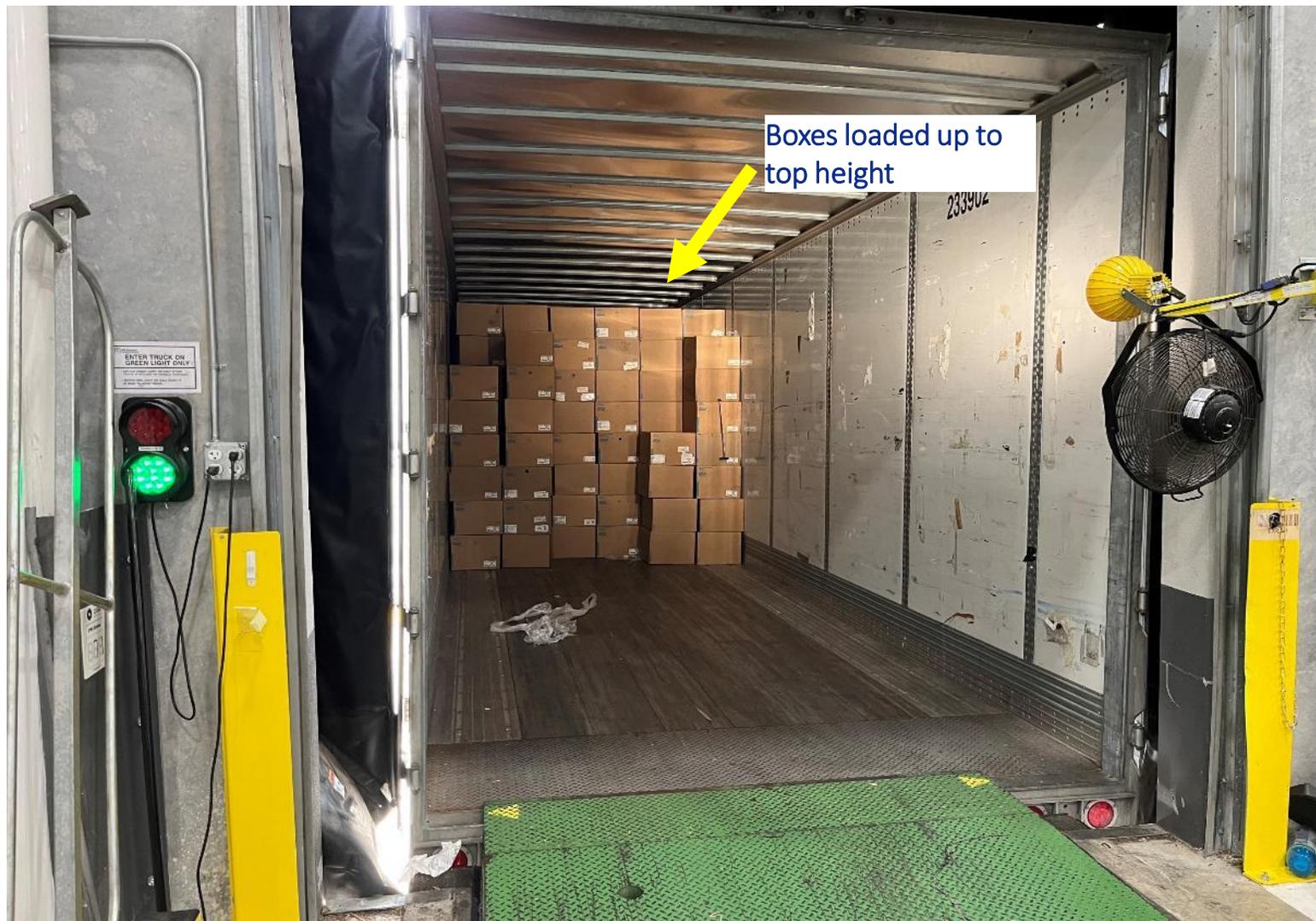
Key Evaluation Criteria

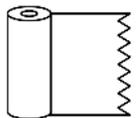


- Cost & TCO
- Simplicity & ease to implement
- Speed & capability
- Flexibility and adaptability for different product types
- Speed of onboarding
- Proof of adoption in similar environments

1.2 Low cost trailer loading/unloading

1.2.3 Automated low cost solution for load/unload of cases directly from trailer (dead stacking)





1.3 Automated Stretch Wrap removal

1.3.1 Technology solution to autonomously remove & manage stretch wrap/films from palletized goods.

Solution overview

Problem to solve



PepsiCo globally uses stretch wrap to secure cases on pallets when transporting both inside a warehouse and when externally to customer.

We are seeking breakthrough technology to autonomously remove and manage this stretch wrap, both on conveyer and/or in fixed position.

Applying stretch wrap is already automated, however, removing is still a manual labour intensive task.

Potential use cases



PepsiCo are looking for breakthrough technologies to autonomously cut and/or remove then manage the used material (collect to transfer to recycling location).

Possible solutions:

- On-belt solution to work on full pallet conveyers
- Freestanding solution for cutting and removing at dock doors when unloading trailers

Capabilities & Evaluation criteria

Key tech features requested

Critical Capability needs



- Ability to remove stretch film on different pallet heights and wrap types (e.g. full case wrap, top wrap, etc)
- Ability to remove and store material ready to transfer to recycling station
- Ability to cut without damaging corrugate boxes

Key Evaluation Criteria



- Speed of removal vs manual effort
- TCO & ROI
- Use in our DCs, GES and Core Warehouse locations
- Ability to co-habit with humans



1.4 Breakthrough warehouse automation

1.4.1 Open Brief : Breakthrough technology to support automation of manual operations within warehouse

Solution overview

Problem to solve



PepsiCo need to optimize overall warehouse operations – Specifically we are looking for breakthrough technologies that will support automation of manual tasks withing warehouse operations.

Potential use cases



Open Brief : Breakthrough technology for warehouse automation

Capabilities & Evaluation criteria

Key tech features requested

Critical Capability needs



- Assessed based on specific tech capabilities (TBC)

Key Evaluation Criteria



- Efficiency vs manual effort
- TCO & ROI
- Use in our DCs, GES and Core Warehouse locations
- Ability to co-habit with humans



2.1 Warehouse mapping optimisation

2.1.1 Warehouse Layout Optimization

Solution overview

Problem to solve



PepsiCo Distribution Centres (DCs) & GES locations have static pallet racking systems.

Currently, the locations of where the pallets are stored in the systems is done manually and periodically (typically twice a year).

Dynamic stock location mapping could unlock efficiencies through reduced pick distances for both DCs and GES.

Potential use cases



PepsiCo are looking for breakthrough technology to efficiently mapping our warehouse locations by:

- Map pallet storage;
- Understand planned orders & history;
- Predict upcoming orders for that location based on orders & historical influences
- Autonomously prescribe where the most efficient locations are both for picking locations and storage locations based off route management tooling
- Understand ROI of moving locations (e.g. Takes 2 hours to move pallets around, but only gains 1 hour of productivity)

Capabilities & Evaluation criteria

Critical Capability needs



Key tech features requested

- Advanced AI/ML capabilities
- Adaptable to work autonomously in different locations across North America with different footprints
- Has route management to understand efficiency of route for pickers
- Work out benefit vs time taken analysis of moving the products

Key Evaluation Criteria

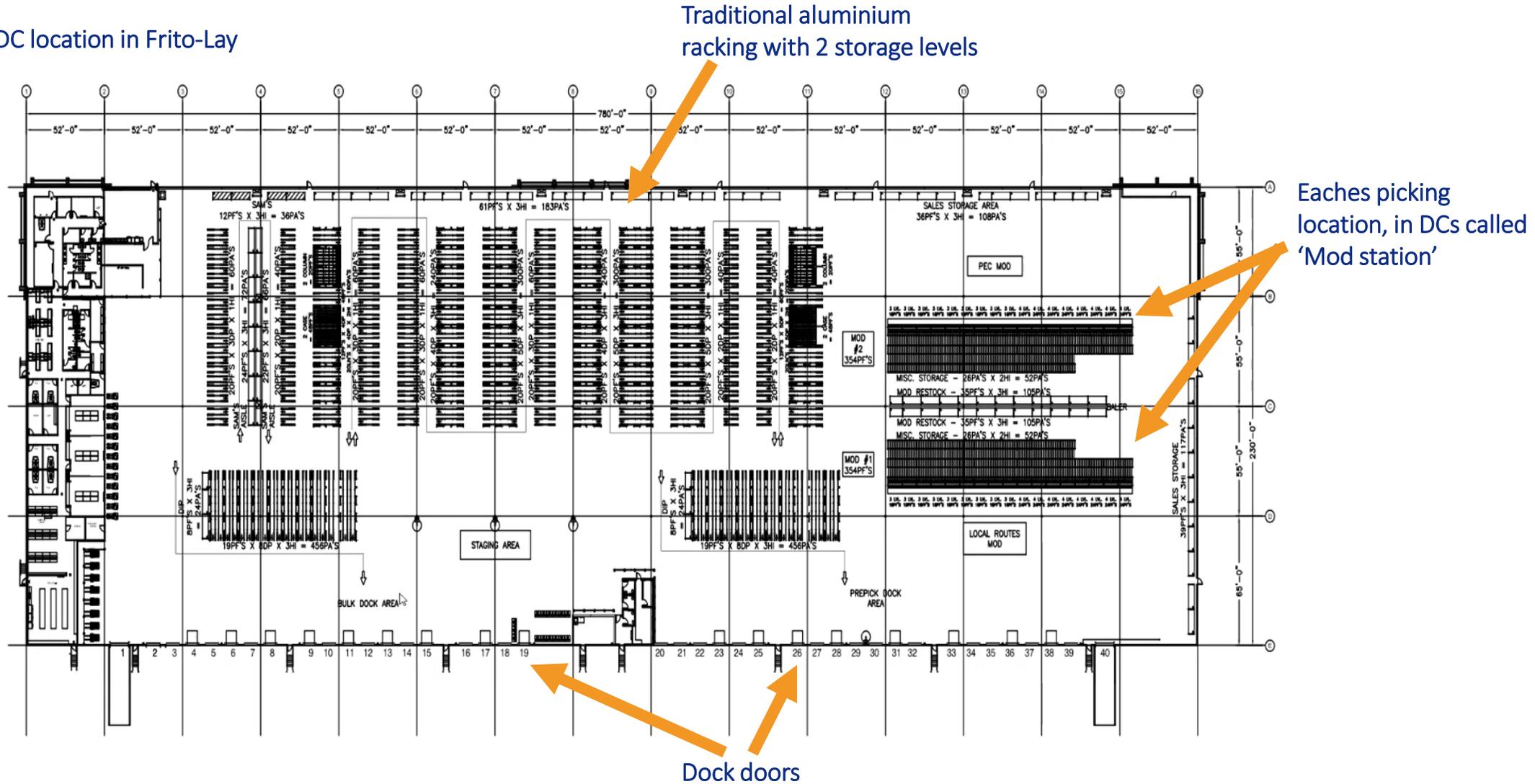


- Cost & TCO
- ROI
- Ease & cost of creating and updating warehouse locations
- Speed of onboarding
- Proof of user adoption in similar environments

2.1 Warehouse mapping optimisation

2.1.1 Warehouse Layout Optimization

Example floorplan of DC location in Frito-Lay





2.2 Optimisation of Eaches picking slots

2.2.1 Eaches Picking : Dynamic slotting of product based on velocity SKU / Volume / weight per shift

Solution overview

Problem to solve

PepsiCo DCs and GES locations have manual picking location for 'Eaches' (individual bags of chips & dips) where bags are picked into a tote via Pick-to-Light system.

There are 'slots' where the cases of products are stored. These slots are worked out manually weekly (sometimes monthly) for each site for each picking location.

Each picking location in every site is different, they all have different number of slots and rows.

Potential use cases

PepsiCo are looking for breakthrough technology for dynamic slotting based on the live orders we already know from SAP; whether this is for the night before, or during the shift.

The system needs to prescribe the new planogram at least daily, and work out the time to change the planogram to ensure it's offering the best ROI. (e.g. changing the slots will take 3 hours, but efficiency gained in picking will only be 2 hours saved)

Prescribes the new 'planogram' for best slots of products dynamically.

Capabilities & Evaluation criteria

Critical Capability needs

Key tech features requested

- Advanced AI/ML capabilities
- Adaptable to be able to create planograms for each individual pick stations automatically based on sizes of picking stations
- Orders locked by 3pm
- Work out benefit vs time taken analysis of moving the products

Key Evaluation Criteria

- Cost & TCO
- Ease & cost of creating content & contests
- Speed of onboarding
- Proof of user adoption in similar environments



2.3 Sequencing & order consolidation

2.3.1 Solution to optimize sequencing and loadout of trailers

Solution overview

Problem to solve



At Frito-Lay DCs, there is both 'Eaches' picking (individual bags of chips picked into totes) and Full Case picking done for an order. These are done by two different teams as they are two completely different tasks.

Both pick types are then transported to the dock door separately, when someone then comes and sequences the route load by customer and mixes the Eaches and Full Case pick together.

This currently, requires the cases to be handled a great deal and is inefficient.

Potential use cases



Solution to optimize sequencing and loadout of trailers :

- Automation of manual movement of part-orders to loadout locations
- Smart loadout orchestration targeting direct to trailer loading to minimise multiple handling of part-orders in DC

PepsiCo are open to explore all technologies, for example:

- Robotics/AMRs to take picked products between operators which will load order and then take to trailer

Capabilities & Evaluation criteria

Critical Capability needs



Key tech features requested

- Adaptable to work autonomously in different locations across North America with different footprints
- Be able to co-habit with humans
- Ability to carry 12+ cases simultaneously
- Be able to carry different shapes & weights of goods (e.g. Jars are 18lb per case)

Key Evaluation Criteria



- Cost & TCO
- ROI
- Speed vs manual order sequencing
- Speed of onboarding
- Proof of user adoption in similar environments

2.3 Sequencing & order consolidation

2.3.1 Solution to optimize sequencing and loadout of trailers



Orders picked onto carts



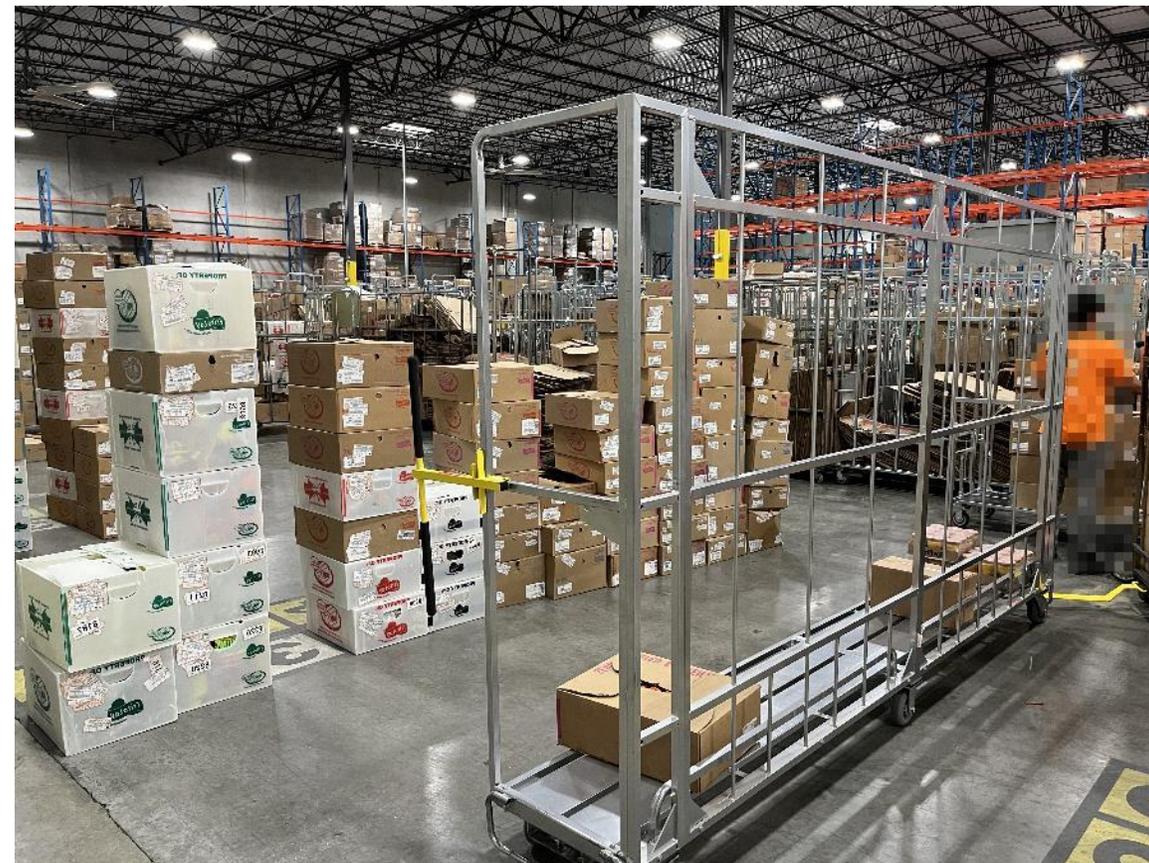
Cart loads delivered to drop down location

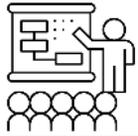


Case reloaded onto loading cart



Loading cart manually transferred to trailer





3.1 Accelerated employee onboarding & training

3.1.1 Guided & assisted training to enable Warehouse operators to get onto floor quicker.

Solution overview

Problem to solve



PepsiCo spends a lot of time and money on training new frontline employees to enable them to operate their roles both safely and efficiently.

In addition, training is also now more technical with new robotics, machinery and AMRs which is specific to a PepsiCo environment.

Potential use cases



PepsiCo are looking for breakthrough technologies to supplement training given by people to enable staff getting onto shop floor and completing tasks quicker without sacrificing safety.

For example, but not limited to:

- Guided & assisted learning whilst operating tasks (e.g. Like a video game tutorial level)
- Tracks work being completed and flags any accuracy issues instantly to supervisor
- Prompts on machinery to help them understand what they need to do when things break (e.g. WalkMe)

Capabilities & Evaluation criteria

Critical Capability needs



Key tech features requested

- Develop/sign off skill sets & drive team efficiency.
- Provide real time KPI feedback for new starter and supervisor.
- No use of mobile phones
- No reliance on mobile network
- Ideally use own Wifi / LAN
- Ruggedness to cope with busy warehouse operations
- Easy & cost effective way of creating ever-changing training scenarios
- Multi-lingual in top 10 languages

Key Evaluation Criteria



- Cost & TCO
- Ease & cost of creating content
- Speed of onboarding
- Proof of user adoption in similar environments



3.2 Gamification toolkit

3.2.1 Gamification toolkit for team/individual performance with ability to roll up to site/location



Solution overview

Problem to solve



PepsiCo are always looking for ways to improve the experience of its frontline workforce. PepsiCo has identified there is a natural & friendly competitive nature in the workforce.

PepsiCo can track performance, utilisation & throughput per employee. There is already some work done to create leaderboards, which these are displayed when coming in and out of the warehouse.

However, PepsiCo want to improve the visibility and raise the profile to create a way for employees to see their work and direct impact.

Potential use cases



PepsiCo are looking for breakthrough technology to provide a gamification platform that directly links into the day-to-day tasks for a warehouse team.

Way to track performance and bias tasks, to enable fair play for different tasks (e.g. some tasks are quicker and easier than others).

Multiple display leaderboards & link to existing employee recognition platforms.

Create competition between sites (e.g. Pickers in California sites vs Texas)

Example: Monsters Inc Scarer's Leaderboard

Capabilities & Evaluation criteria

Critical Capability needs



Key tech features requested

- No use of mobile phones
- No reliance on mobile network
- Use own Wifi / LAN
- Ruggedness to cope with busy warehouse operations
- Easy & cost effective way of creating ever-changing training scenarios
- Multi-lingual in top 10 languages

Key Evaluation Criteria



- Cost & TCO
- Ease & cost of creating content & contests
- Speed of onboarding
- Proof of user adoption in similar environments

3.2.1 Gamification toolkit – example of current dashboards

EP and Utilization			
Employee Name	EP	Util	TP
Z	18.93	69.48	4,212
D	15.25	72.57	3,520
C	9.68	72.85	2,828
F	6.54	87.44	2,586
K	6.02	66.61	2,169
F	3.94	78.02	2,052
J	3.77	75.51	1,923
O	3.08	68.36	1,770
P	-0.87	84.19	1,696
B	-1.30	85.73	1,227
D	-11.67	80.94	1,092

EP and Util by Department		
Dept	EP	Util
MANH	5.48	75.26

Throughput by Department	
Dept	Cases
BULK LOAD STK	23,215
BULK UNLOAD STK	1,860
DEFAULT JOB FUNCTION	0
INDIRECT	0
MOVES	0
KD WORK	0

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Scoreboards that are currently being displayed in our warehouses. The EP% is Employee Performance (0 is minimum expectation, negative is bad, positive is good). UTIL% is what % of time is the team member handling cases (~75% is target). TP is Throughput (cases loaded + cases unloaded). These are displayed on TVs and get refreshed every 5-10 min.



3.3 Task Allocation*

3.3.1 As part of overall warehouse orchestration, enable move to automated task allocation.



Solution overview

Problem to solve



PepsiCo's current method of prescribing tasks to its operators for picking, loading/unloading, etc. is extremely manual. It involves lots of offline spreadsheets which then enable operators to pick what tasks they'd like to do, as apposed to what it's best for them to do.

Potential use cases



PepsiCo are looking for breakthrough technologies to autonomise all task management within the warehouse for each operator type and location. This will be all driven from orders/demand and what workforce we have on for that shift.

We would still want an element of operator engagement within the tooling to enable enjoyment whilst on shift.

The new system will dictate the tasks they have to do, either via handheld Zebra system or in-ear piece.

Capabilities & Evaluation criteria

Critical Capability needs



Key tech features requested

- No use of mobile phones
- No reliance on mobile network
- Use own Wifi / LAN (if requiring new hardware)
- Multi-lingual in top 10 languages
- Feed or pull from SAP

Key Evaluation Criteria



- Cost & TCO
- Accuracy of task allocation
- Speed of onboarding
- Proof of user adoption in similar environments



4.1 Automated inventory management

4.1.1 Breakthrough technology to enable low cost inventory tracking throughout PepsiCo network

Solution overview

Problem to solve



PepsiCo DCs, GES facilities and Factory Warehouses represent the highest number of warehouses in Frito Lay, North America.

PepsiCo are looking for breakthrough technology to enable tracking of inventory (case/pallet) throughout the PepsiCo network.

Potential use cases



Breakthrough technology to enable low cost inventory tracking throughout PepsiCo network through to customer store.

SAP and WMS should already say what is predicted. We need to reconcile the predicted vs actual.

Note: Typically, it is a full case pallet (all same product on one pallet) within reusable cardboard totes (same look of box on the outside for all products).

Examples: scanner to go between pallets & scan SKU barcodes; IoT device on cases to track case inventory; vision sensors on forklift to record inventory whilst on trip

Capabilities & Evaluation criteria

Key tech features requested

Critical Capability needs



- Individual case tracking which can be aggregated to total pallet
- Identify individual cases within mixed pallets
- Passive technology, do not require human interaction
- Can be quickly programmed & recommissioned
- Can be read through stretch wrap
- Track multiple deep pallets (avg 8 pallet deep) with missing cases on pallets
- Track history & audit trail
- +99% accuracy w/ >0.5m location accuracy
- Track from factory, transportation, warehouses to customer store

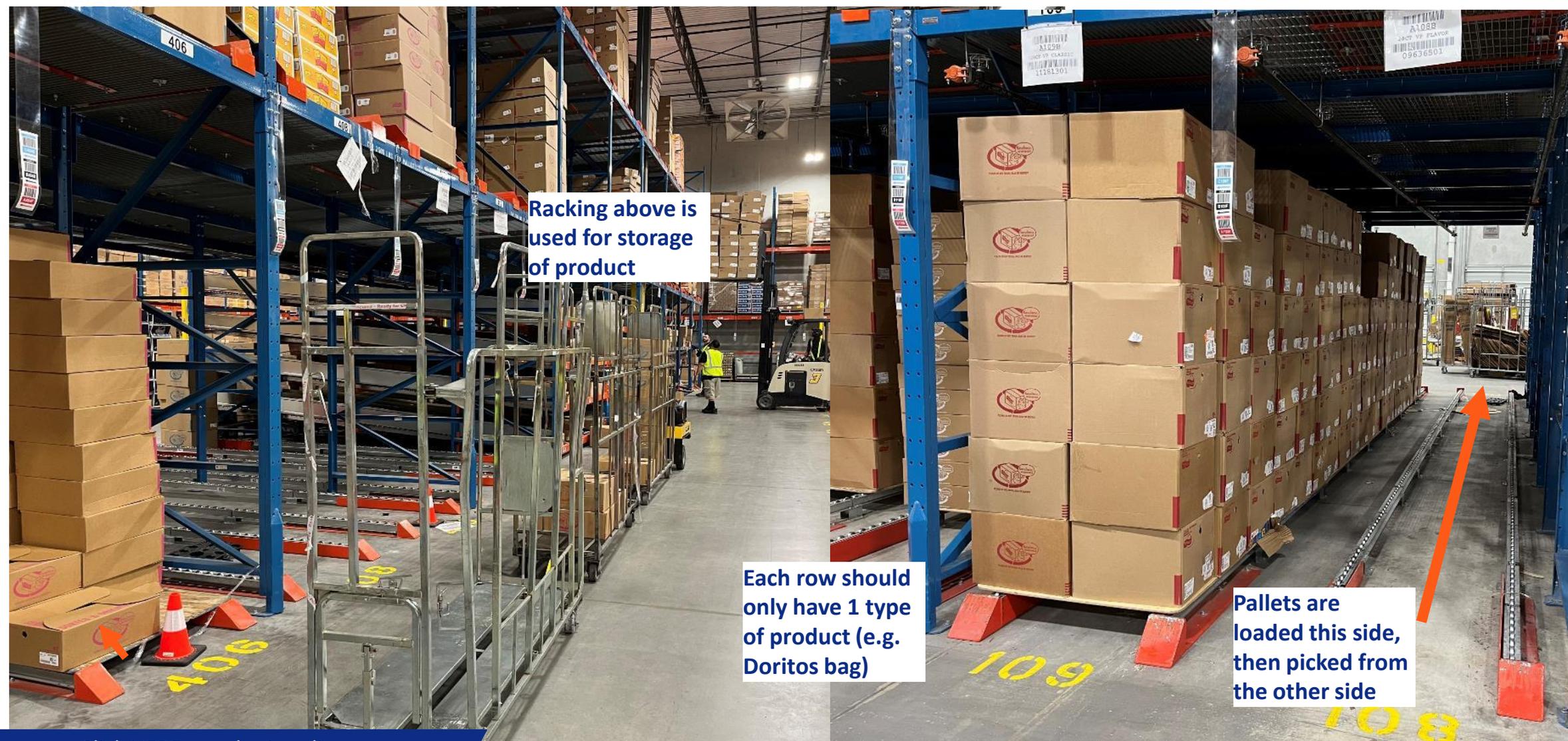
Key Evaluation Criteria



- Accuracy of reading (>99.98%)
- Ability to integrate with Warehouse Management Systems
- Cost \$ & TCO
- Ability to work within busy warehouse environment
- Longevity & ruggedness
- Little to no changes to operational procedure

4.1 Automated inventory management

4.1.1 Breakthrough technology to enable low cost inventory tracking throughout PepsiCo network



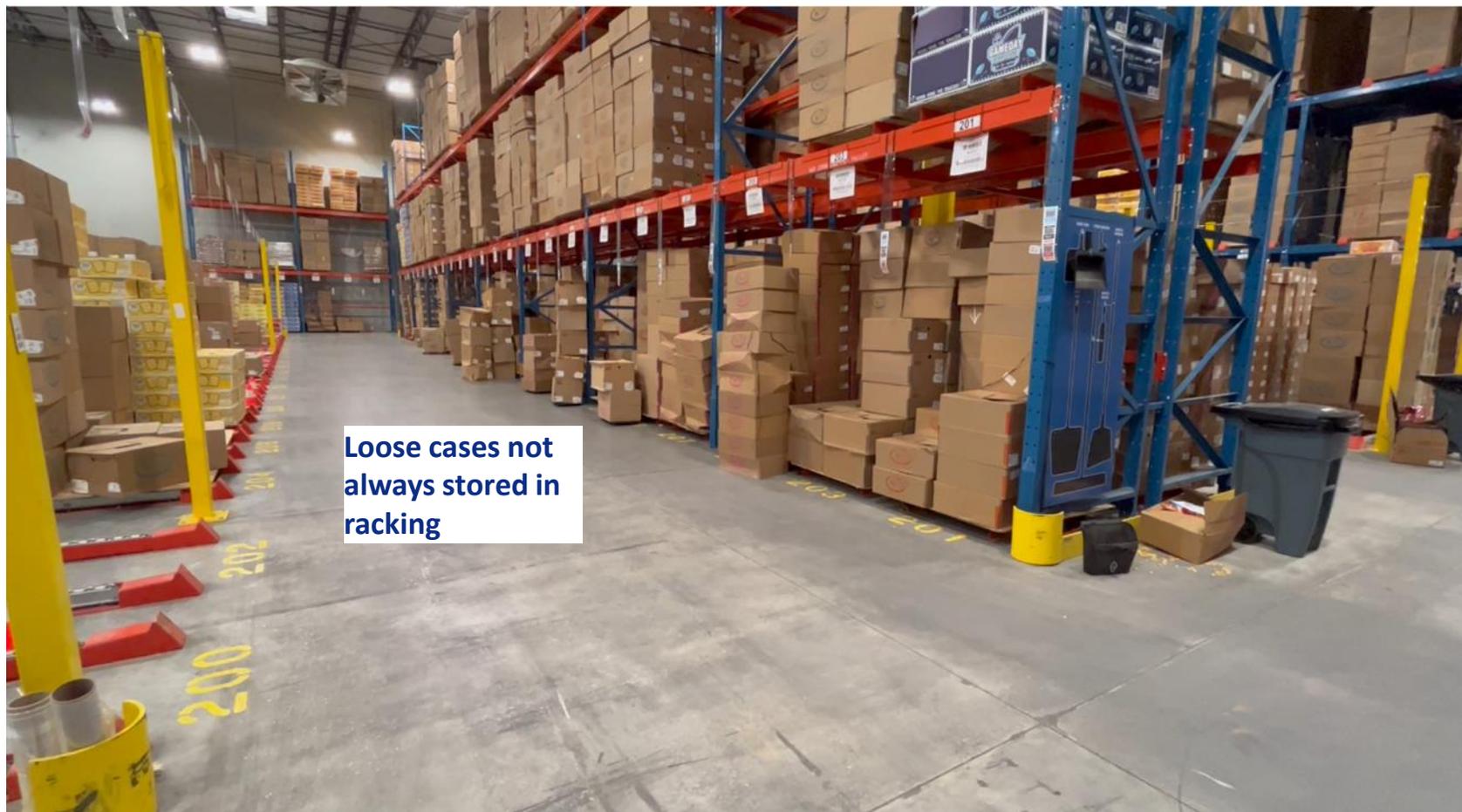
Racking above is used for storage of product

Each row should only have 1 type of product (e.g. Doritos bag)

Pallets are loaded this side, then picked from the other side

4.1 Automated inventory management

4.1.1 Breakthrough technology to enable low cost inventory tracking throughout PepsiCo network





4.2 Picking accuracy

4.2.1 Eaches stock visibility : Low cost solution to provide live stock within an Eaches pick-face unit

Solution overview

Problem to solve



Frito-Lay in North America has a unique operation where they manually will pick 'Eaches' (individual bags of chips) into a tote to create a custom order for all customers (e.g. Walmart, 7-eleven, etc). This is done by a pick to light system. The setup in our GES locations and DCs are slightly different, but similar principles and logic. However, each picking location at each site will be different (e.g. different number of rows, columns, etc)

PepsiCo are looking for breakthrough technology to track what inventory (cases/unit items) is in stock in the warehouse for each SKU. As picking is done manually, there can be human error (e.g. pick 1 too many bags for order) which impacts stock availability.

Potential use cases



Track inventory being stored (Cases/Eaches) for each product in the pick station module.

SAP and WMS should already say what is predicted. We need to reconcile the predicted vs actual.

Note: Typically, it is a full case pallet (all same product on one pallet) within reusable cardboard totes (same look of box on the outside for all products). SKU barcodes are on the long-side of the case.

Examples: Vision system to track inventory when placed in tote; Automated scanning technology to scan when placed in tote.

Capabilities & Evaluation criteria

Critical Capability needs



Key tech features requested

- Track multiple deep pallets (avg 4 pallet deep) with missing cases on pallets

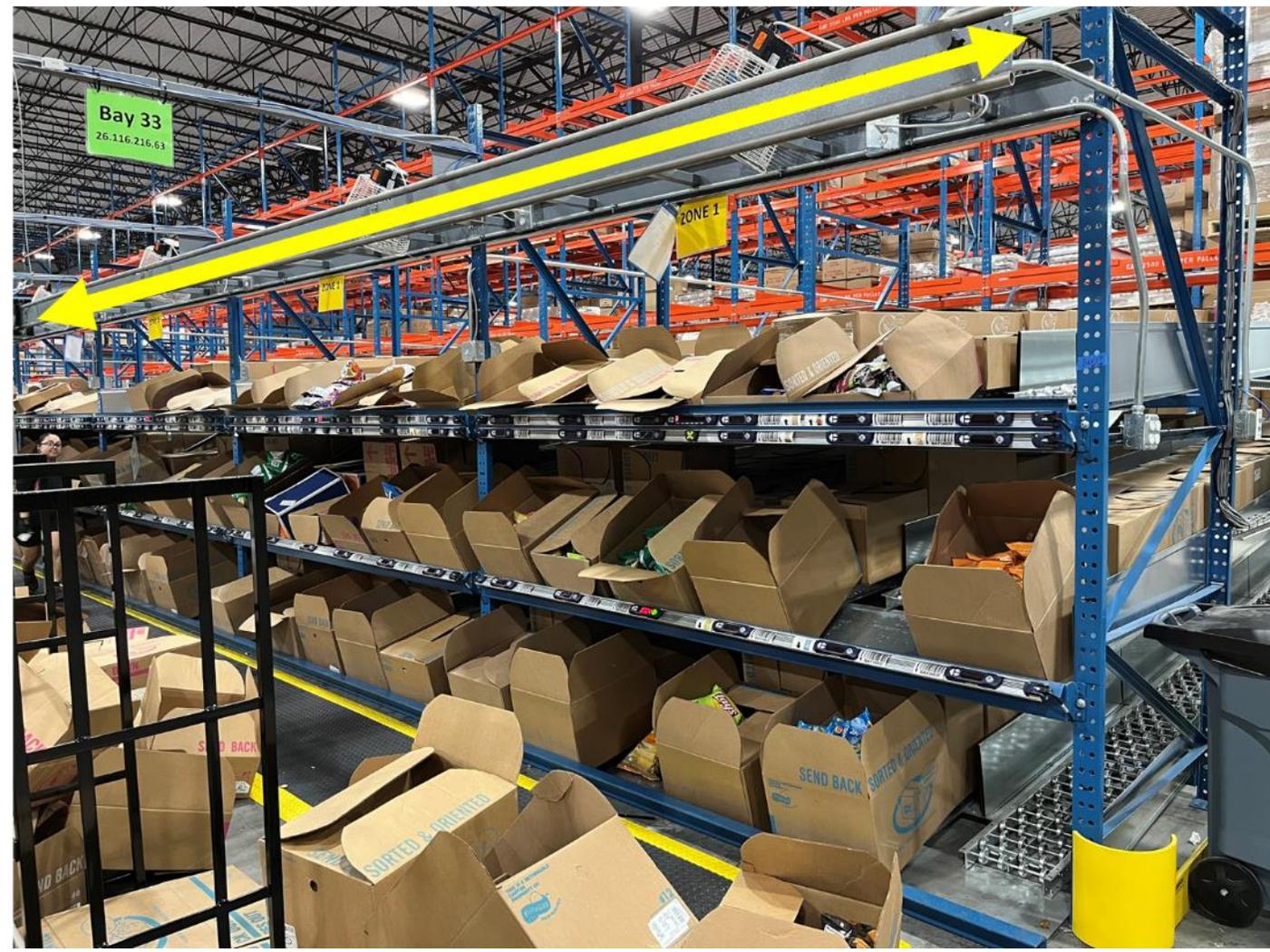
Key Evaluation Criteria



- Accuracy of reading
- Ability to integrate with Warehouse Management Systems
- Ability to prescribe actions ("this SKU is showing less inventory than we believed, send someone to check")
- Cost \$ & TCO
- Ability to work within busy warehouse environment
- Longevity & ruggedness
- Little to no changes to operational procedure

4.2 Picking accuracy

4.2.1 Eaches stock visibility : Low cost solution to provide live stock within an Eaches pick-face unit



An operator will work within this whole zone

Cases of the same product is loaded from the back and gravity feeds the case down.

The products are picked from this locations via Pick to Light system

Typical pick will be "4 bags of Doritos Chili Heatwave; 3 bags of Tostitos; 6 bags of Lays; etc"

4.2 Picking accuracy

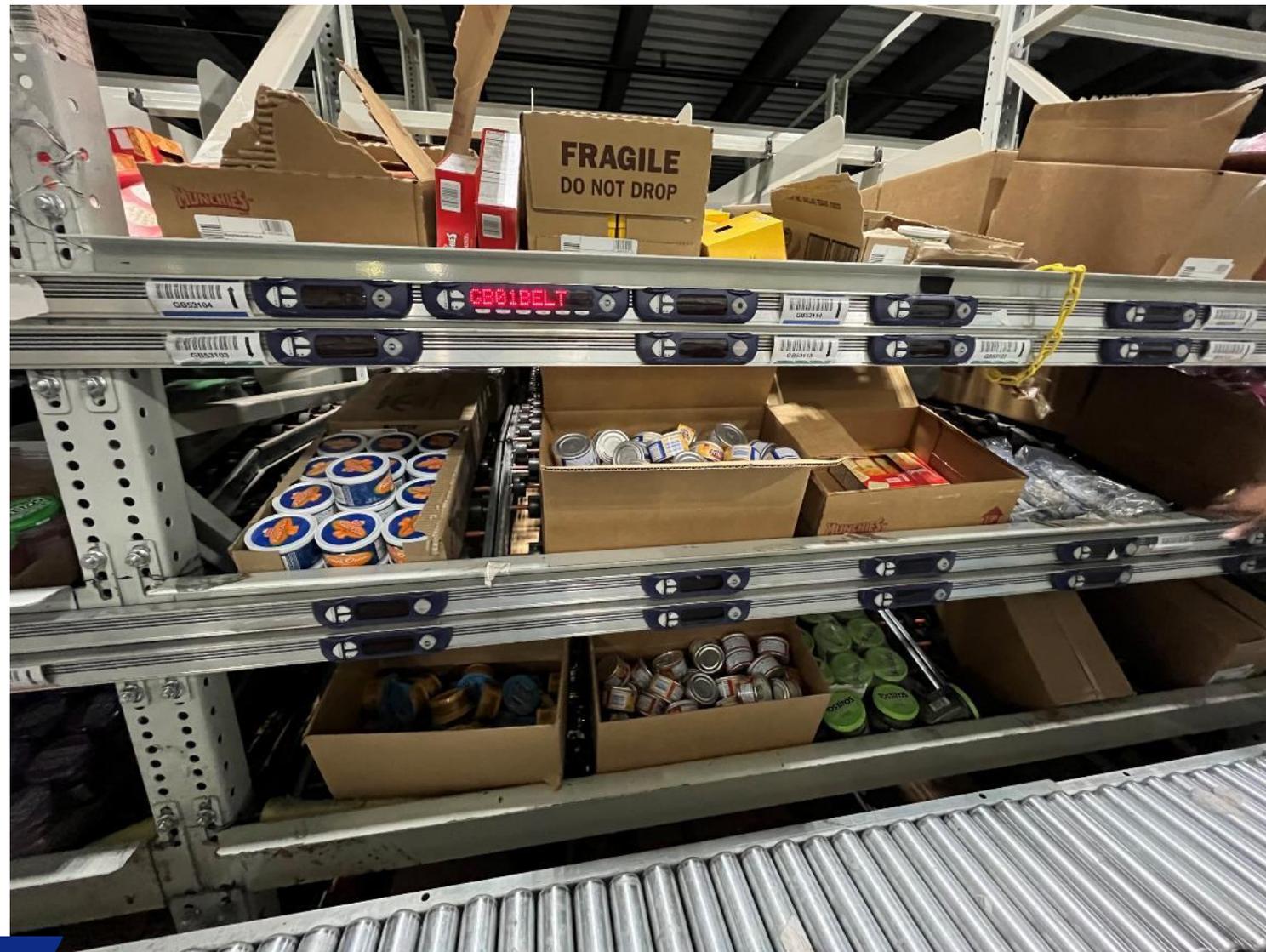
4.2.1 Eaches stock visibility : Low cost solution to provide live stock within an Eaches pick-face unit

In addition to
Chips, we also have
canned goods

Like DC locations, it
is also a pick to
light system

The boxes aren't
always perfectly
neat

Cases are also fed
from the back





4.2 Picking accuracy

4.2.2 Technology to enable order pick validation for operators across DC/GES facilities

Solution overview

Problem to solve



Case & eaches picking is a done manually.

- In warehouses, an operator will pick multiple cases from various locations onto an order cart.
- In GES, and operator will pick “eaches” from a pickface into an order tote/box.

The operation relies on the operator picking the correct product and quantity. Errors in this can lead to mis-picks which either have to be repicked or incorrect customer orders.

Potential use cases



PepsiCo are looking for breakthrough technology to track correct order picking for both case and eaches pick operations.

Note: Products are in reusable fan-folded cardboard boxes. These cases all look identical from the outside.

SKU barcodes are on the end-side of the case.

Examples: Vision system to check case before loading; geolocation to ensure operator is at correct bay when picking; etc

Capabilities & Evaluation criteria

Critical Capability needs



Key tech features requested

- Ability to integrate with Stradivari® Warehouse Management System
- Be able to identify individual bags of chips & dips without slowing operation
- Be able to not physically get in the way of fast passed operators
- Be able to identify 500+ SKUs (product flat imagery can be API via Nielsen Brand Bank)
- No use of mobile phones
- No reliance on mobile network
- Use own Wifi / LAN
- Ruggedness to cope with busy warehouse operations

Key Evaluation Criteria

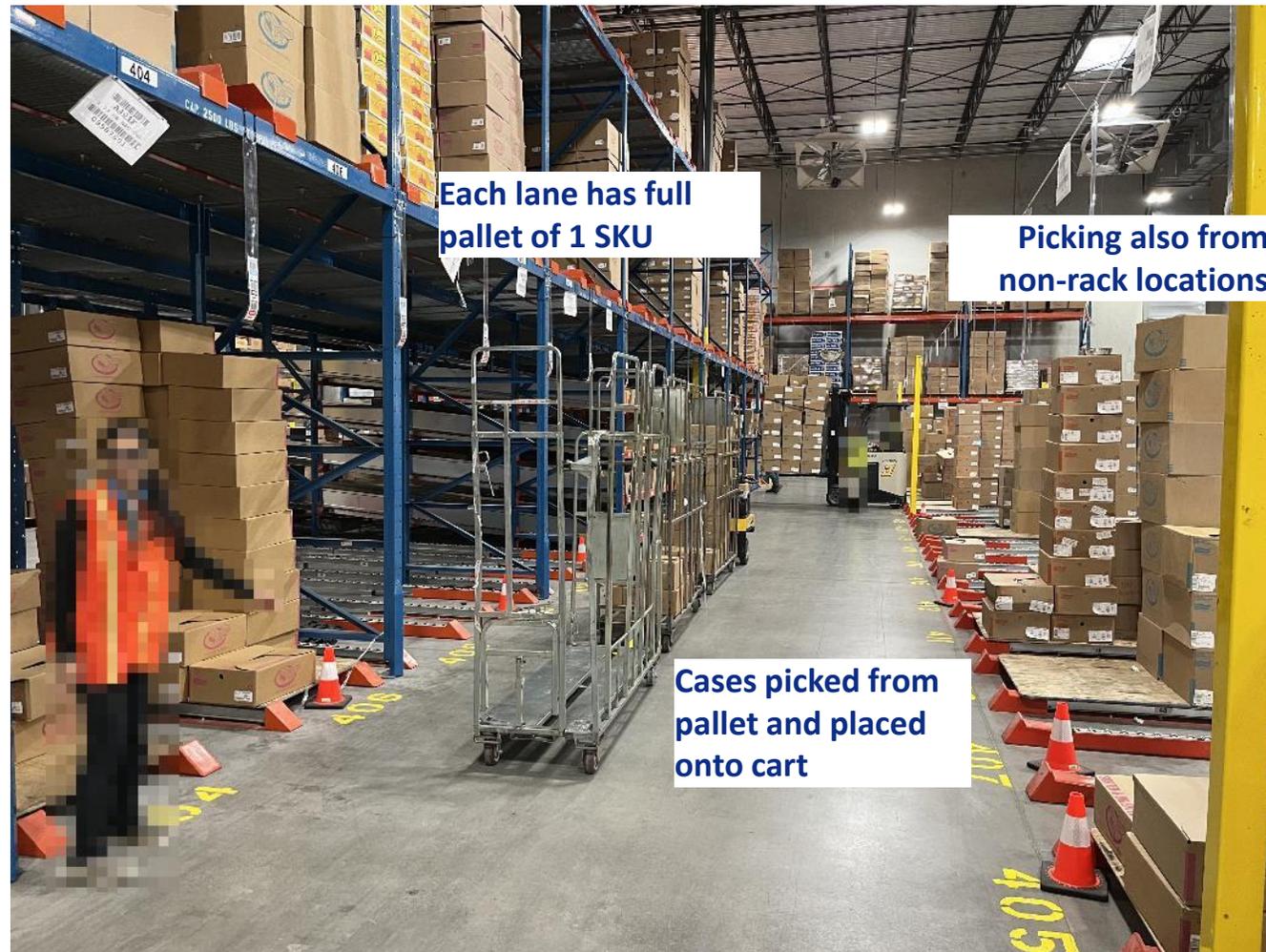


- Accuracy of reading
- Ability to prescribe actions to operator (“this SKU isn’t correct, you need X SKU”)
- Cost \$ & TCO
- Ability to work within busy warehouse environment
- Longevity & ruggedness
- Little to no changes to operational procedure

4.2 Picking accuracy

4.2.2 Technology to enable order pick validation for operators across DC/GES facilities

Manual Case Picking Locations in DCs



Each lane has full pallet of 1 SKU

Picking also from non-rack locations

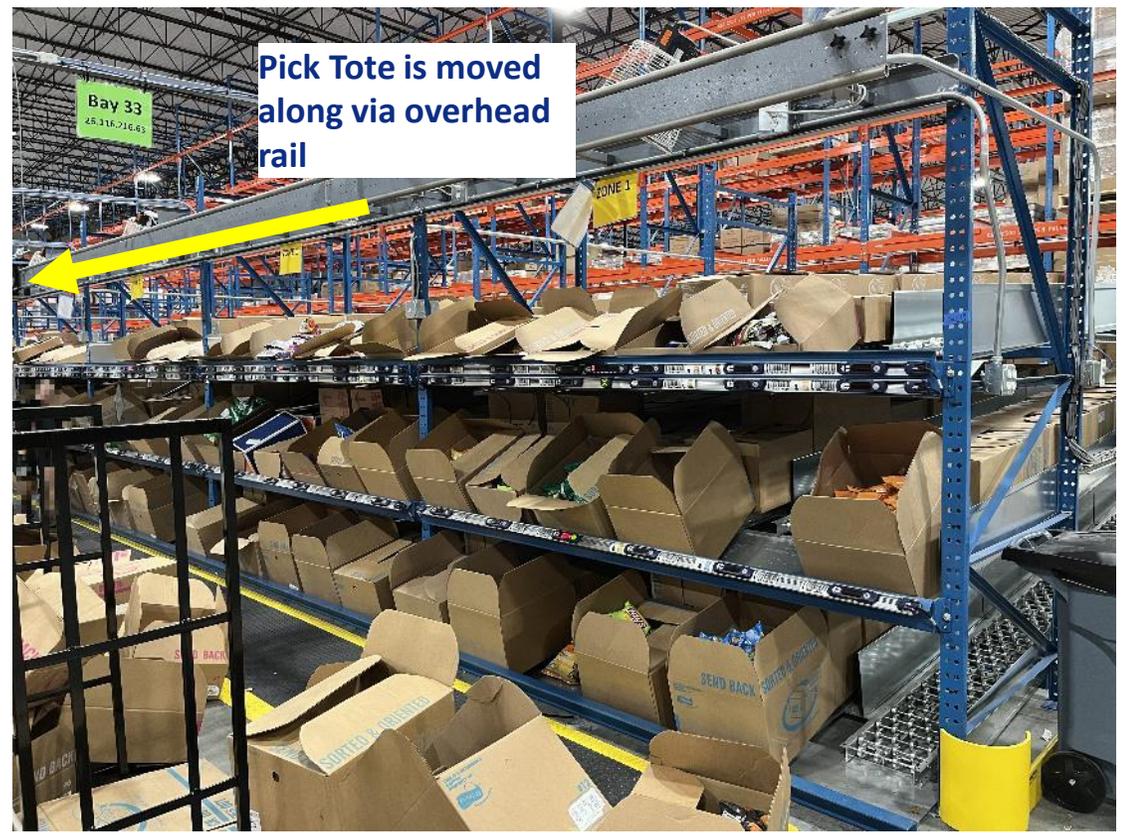
Cases are picked from bottom rack

Cases picked from pallet and placed onto cart

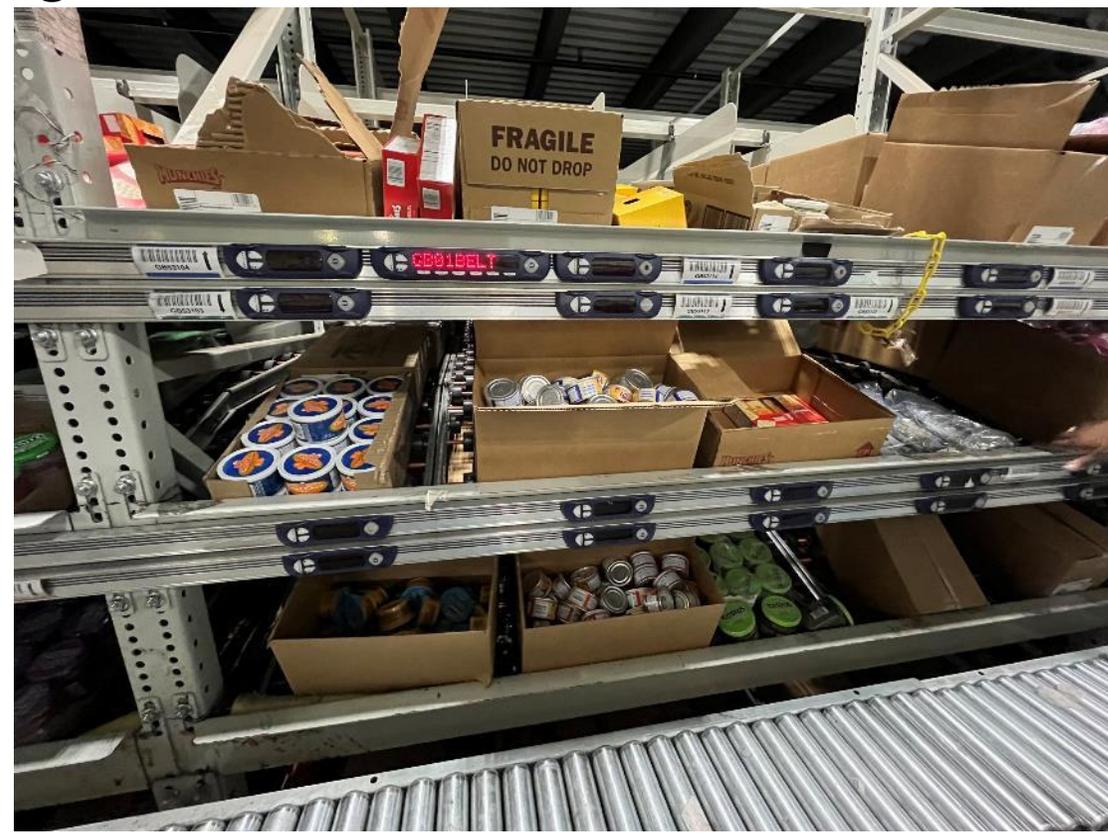
4.2 Picking accuracy

4.2.2 Technology to enable order pick validation for operators across DC/GES facilities

GES "Eaches" Picking Locations



Products are picked via Pick to Light system



Cases are also fed from the back

The boxes aren't always perfectly neat

4.2 Picking accuracy

4.2.2 Technology to enable order pick validation for operators across DC/GES facilities



An old internal shipping label. When in the pallet this doesn't mean anything

Top barcode is the product code

Product labels are placed over each other

Old external shipping label

4.2 Picking accuracy

4.2.2 Technology to enable order pick validation for operators across DC/GES facilities



Doritos ⁰⁰¹⁴ **8** **\$9.37**

DORITOS
NACHO CHEESE
MT
May-02/02/2002/1/81 Use By: 18SEP22

EACH
0 28400 04745 6

CASE
00028400341400

3999999999

PLANT
0756090125

PGT PLANT

- (01)00028400341400
- (92)111123334445555
- (240)399999999
- (10)20450000XX



4.3 Warehouse Orchestration & Planning

4.3.1 AI/ML Optimization tool to enable end-to-end orchestration & planning capability.

Solution overview

Problem to solve



PepsiCo need to optimize overall warehouse operations with end-to-end orchestration & planning capability.

Potential use cases



AI/ML Optimization tool to enable end-to-end orchestration & planning capability. Platform to deliver orchestration tool kit for :

- Order pick scheduling
- Stock visibility
- Labour visibly (inc. task allocation*)
- Trailer visibility
- Order loadout dispatch scheduling.

**Create work plans/orders for operators for them to work through*

AI/ML optimization & planning capability to allow real time optimization & replanning

Capabilities & Evaluation criteria

Key tech features requested

Critical Capability needs

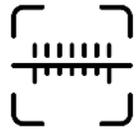


- Integrate with existing WMS systems
- Automatically create work plans for operators
- Holistic schedule of work to enable no downstream downtime (e.g. Forklift driver needs to deliver X stock before it can be picked)

Key Evaluation Criteria



- Integration to PepsiCo WMS
- Cost / TCO
- Advanced scheduling and innovative capabilities
- Flexibility and adaptability to enable changes mid-shift
- Speed of onboarding
- Proof of user adoption in similar environments



4.4 Mixed Pallet/Cart Scanning

4.4.1 Technology to enable mixed pallet scanning

Solution overview

Problem to solve



In PepsiCo GES locations, they have the ability to accept return stock from customers. This is both full case stock as well as 'Eaches' (individual bags of chips).

Currently, all return stock is manually entered back into the systems and then placed back into the network. PepsiCo are looking for way to automate how we can scan products back into the warehouse.

Potential use cases



Breakthrough technology to automate how warehouse operators can scan return stock that's on a PepsiCo specific cart and link into inventory management in WMS / onto backload trailers.

e.g. Data logic wall scanner to capture GES container ID (eaches) and full case labels

Note: PepsiCo reusable fan-folded cases are stored on a cart on the trailer. These have SKU barcodes on the end of the boxes.

Capabilities & Evaluation criteria

Key tech features requested

Critical Capability needs



- Be able to identify SKU from SKU barcodes as reusable boxes all look the same
- Be able to identify individual bags of chips & dips for 'Eaches' return stock
- Link into the WMS systems

Key Evaluation Criteria

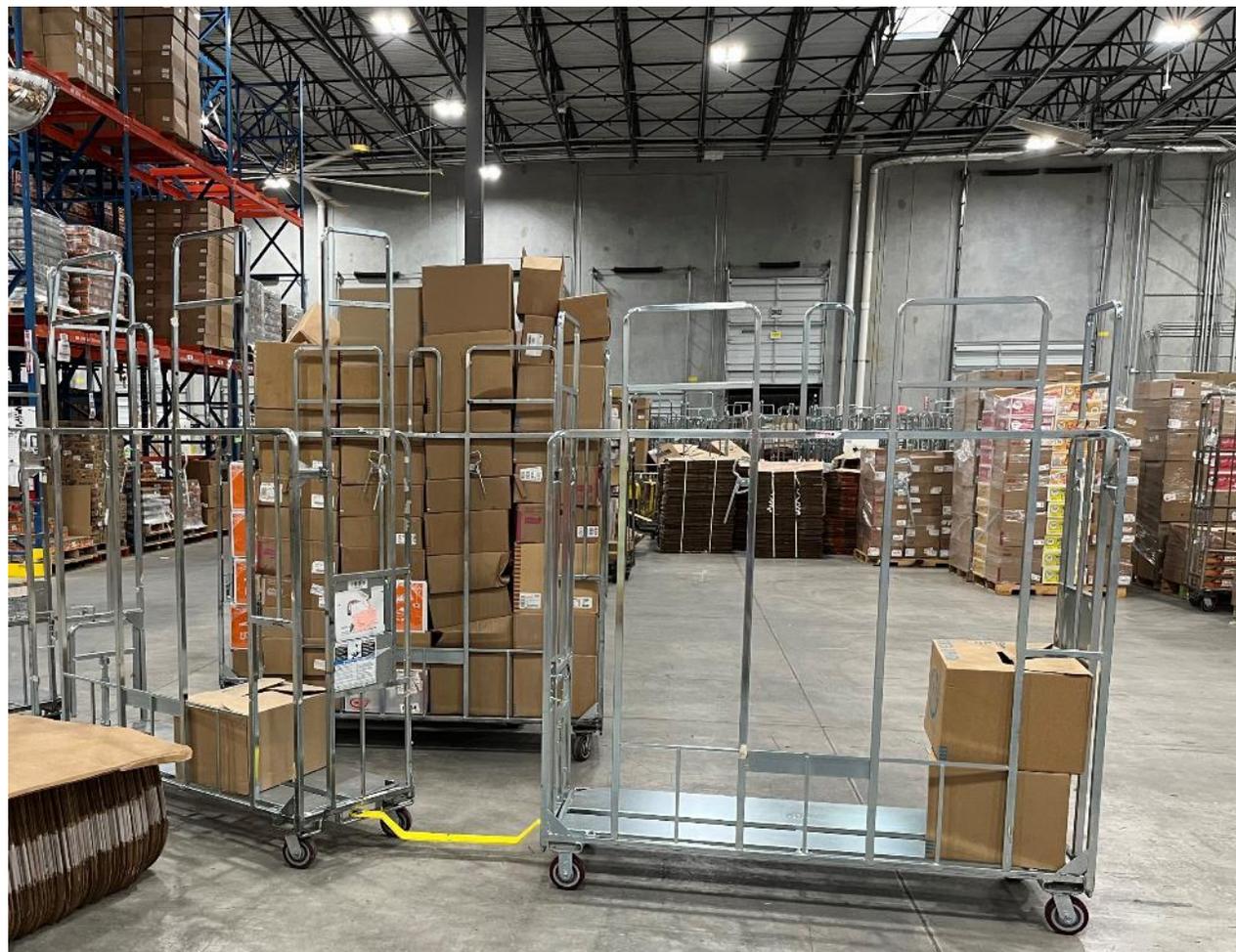


- Accuracy of reading
- Ability to integrate with Warehouse Management Systems
- Cost \$ & TCO
- Ability to work within busy warehouse environment
- Longevity & ruggedness

4.4 Mixed Pallet/Cart Scanning

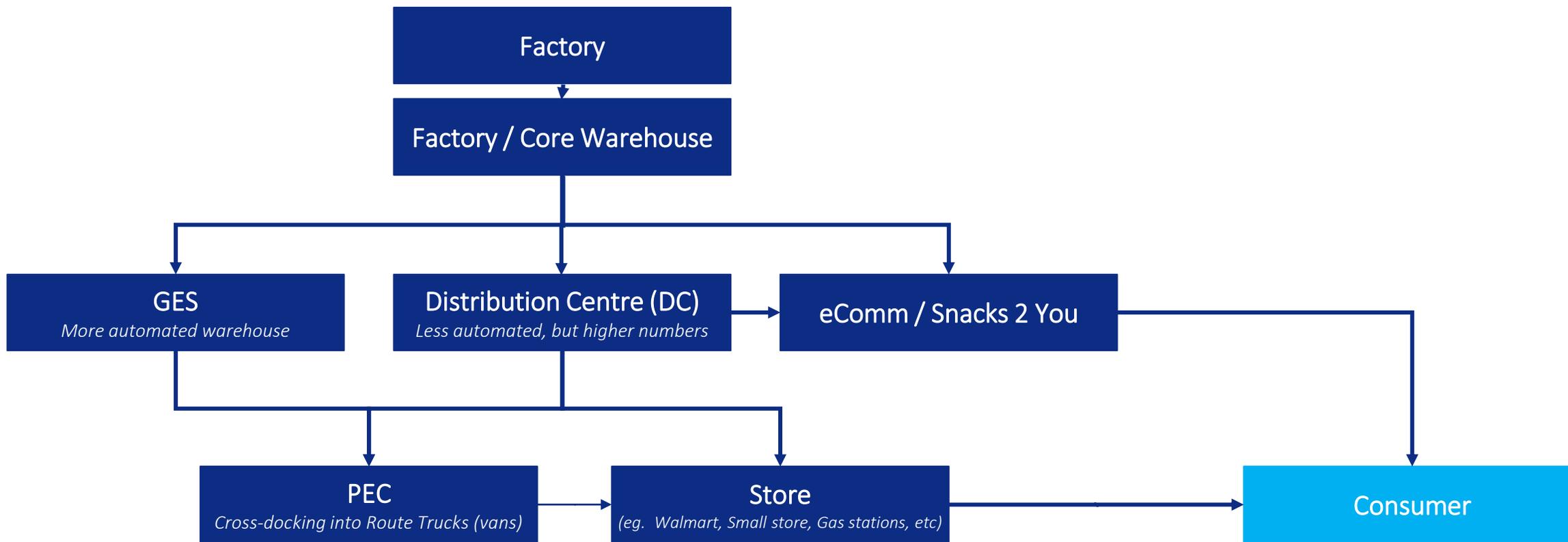
4.4.1 Technology to enable mixed pallet scanning

Example of
loaded/empty cart for
scanning



Appendix

Frito-Lay – Supply Chain Distribution Network



Appendix

Frito Lay – North America – Standard Case Sizing

- Frito-Lay North America uses **standard sized reusable corrugate boxes** for most of their snacks & foods.
- Instead of being taped down to secure contents, the boxes are **‘fan-folded’** on top and bottom
- The outside of the boxes will look similar for all products
- There is a Product/SKU sticker on the case applied at factory to indicate product info held within the box
- Plastic totes are used in ‘Eaches’ picking, where individual bags/packs are picked and loaded for an order

Carton Size (Name)	Length (")	Width (")	Height (")
6	20.87	16.25	6.43
7	20.87	16.25	7.68
8	20.87	16.25	8.31
9.75	20.87	16.25	10.43
12	20.87	16.25	12.56
13	20.87	16.25	13.87
14	20.87	16.25	14.68
GB Eaches Plastic Tote	20.25	16.25	12.5

#7 size



#8 size



Plastic totes



New SKU product labels



Appendix

Frito Lay – North America – Non-Standard Case Sizing

Case/Product Type	Length (")	Width (")	Height (")	Weight (lb)
Nut Mix	16.25	10.43	8.68	6.19
Seeds/Nuts	14.37	11.12	7.18	5.62
Cookie	15.75	9.37	9.43	6.56
Mini Cookies	20.87	16.25	6.43	5.98
Crackers	23.93	12	3.87	8.52
Matador Sticks	15.93	9.68	5.87	5.62
Jerky 3.0	11	7.31	7.37	1.12
Jerky	9	7	6.5	4.5
Dip Jar 15.5	14	10.56	4.43	11.62
Dip Jar 24.0	13.63	10.31	6.63	18
Dip SS	14.12	10.62	4.5	13.5

Dips Jar



Dips Jar



Cookies



Crackers



Jerky



Jerky



Crackers



Seeds

