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# High-Velocity Order Fulfillment

## Simulating BRP's Next-Gen Warehouse

**AnyLogic Conference 2025**

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# Agenda

- Intro to SimWell & BRP
- Simulation Project - Business Context, Objectives & Scenarios
- Model Demo
- Results Analysis
- Project Benefits & Conclusion

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# SimWell

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## Presenters:


**André Jacques**

CTO

**Mary Klincevicius**

Senior Simulation Consultant


- SimWell is a global decision intelligence firm focused on **simulation**, optimization and digital twins.
- Started up in **2015**
- Team of **80** people worldwide

- AnyLogic partner since **2018**
- More than half of SimWell's workforce are **AnyLogic users**

# SimWell Team

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# BRP (Bombardier Recreational Products)

- Designer and manufacturer of **powersports vehicles** and propulsion systems
- Iconic brands

ski-doo SEA-DOO can-am

- Company operates **worldwide**
- Headquartered in Valcourt, Quebec, Canada
- Acclaimed for its **innovation** in recreational vehicle engineering and design


SEA-DOO


ski-doo
MXZ

# BRP - Business Context

- New state-of-the-art warehouse spanning 1 million square feet.
- Facility is scheduled to begin operations in early 2026
- Centralized hub for distributing all parts, accessories, and apparel to BRP dealers worldwide
- Improving service levels through consolidation and optimized logistics.

# Simulation Project Context

- Modeling and simulation of the new distribution center's operations is an opportunity to
  - optimize BRP's resources: space, equipment, and personnel
  - maximize the center’s efficiency and productivity.

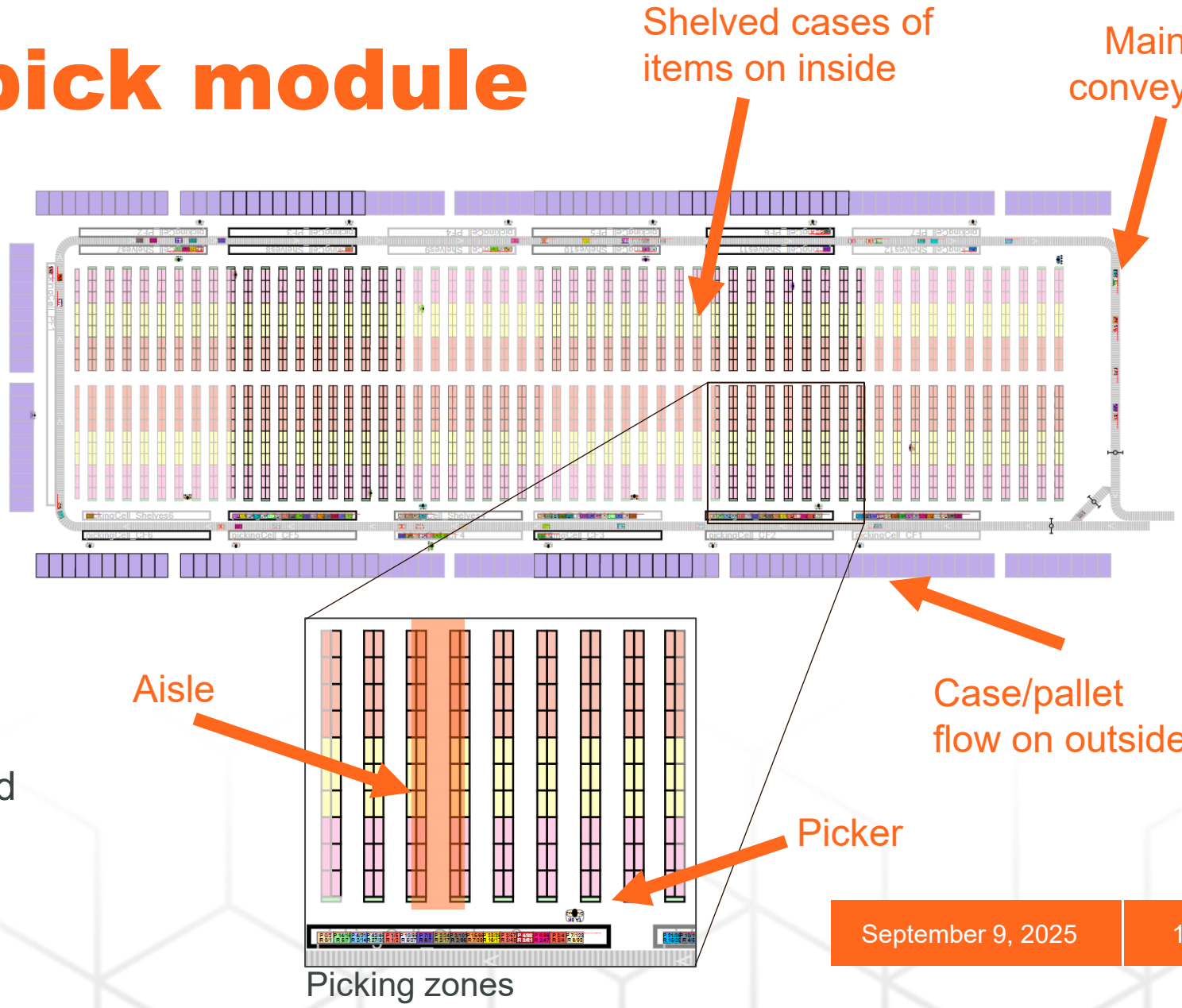
- Project was focused on the high velocity area of the warehouse: « **pick module** »
  - The top priority was to **confirm the physical layout**, to enable BRP to order the equipment
  - the model was further used to test:
    - several human resource configuration scenarios
    - different operational principles: dispatching of resources and task execution
    - product slotting options

# Why use AnyLogic?

- We go straight to AnyLogic as our first choice for most simulation projects
  - It is flexible to personalize logic and incorporate complex decisions
  - it is easy to incorporate changes when shareholders changed their opinion
  - Easy to have visuals to communicate issues/results to clients
- We've used it for hundreds of models in all industries
  - Warehousing, manufacturing, supply chain, mining, healthcare, transportation, pedestrian, etc.
- We've successfully used AnyLogic in the past for several warehouse projects.
- We can smoothly blend the material handling library tools with some custom-built agents/components

# Model Scope: pick module

- Models elements
  - Main conveyor
  - Picking zones
    - Roller conveyor for WIP orders
    - Picker: employee
    - Aisles
      - Shelf units
  - Orders
    - One tote at first, but extra ones can be injected, based on volume
    - List and quantity of items

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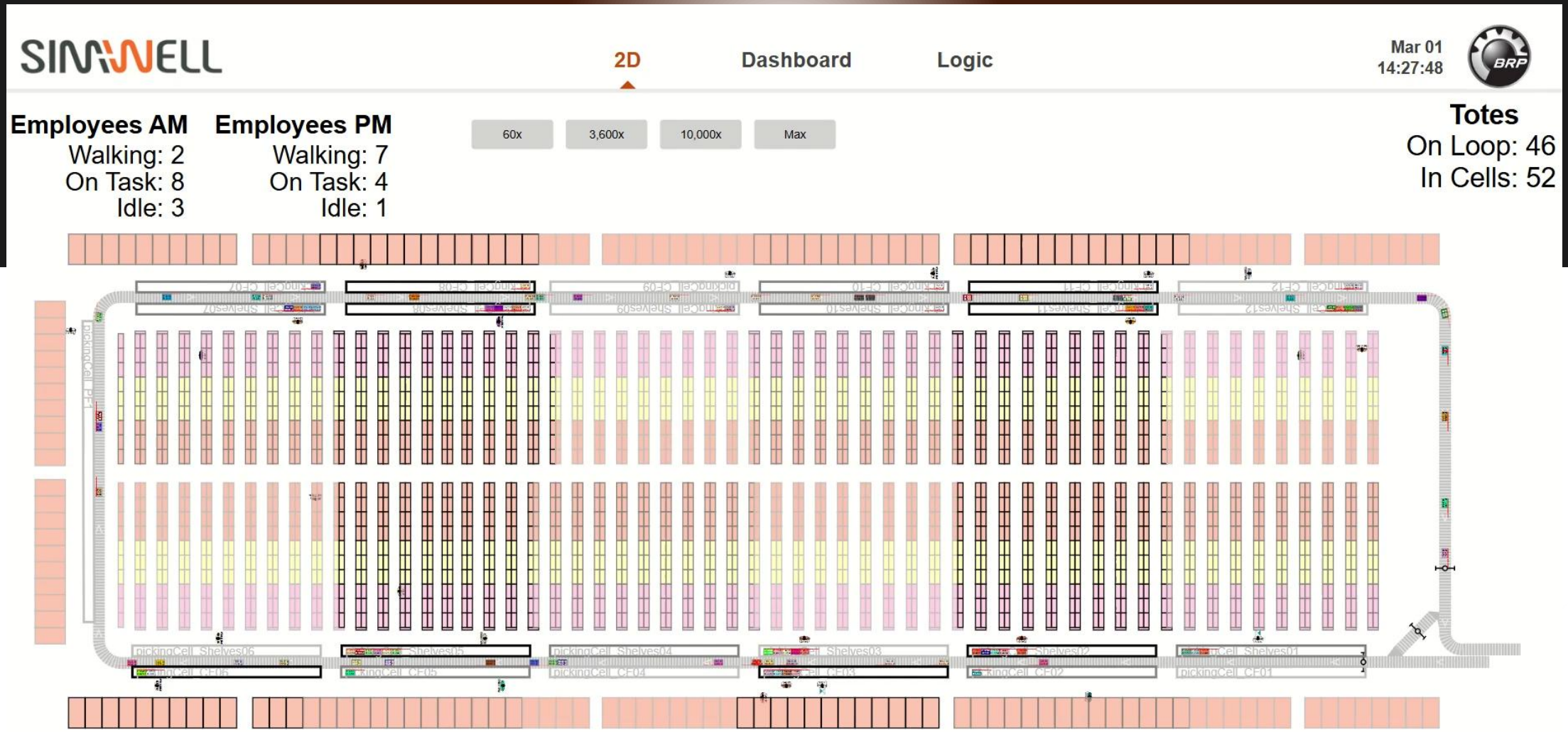


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***Video: Overview of the System Simulation Demo***

# Base Case: Conservative (no optimization)

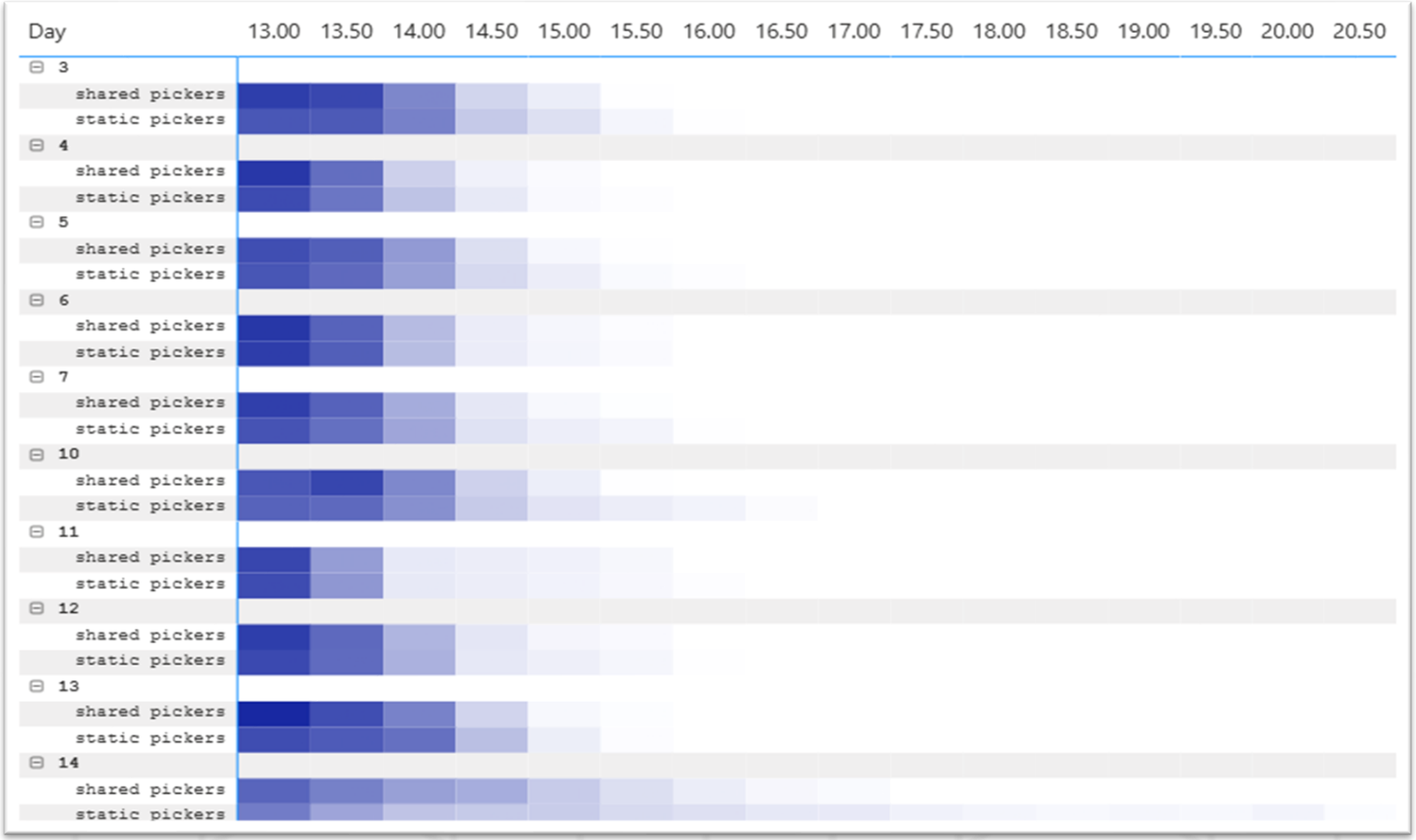
- The peak period:
  - Afternoon (12:30 – 15:00)
  - Fullfillment of **next day** orders
  - A **winter** month
- Data:
  - Historical data from the previous year
  - Separation of “pick module” items from other areas (Future operation)

- Base Case **Objective**:
  - **Make sure** system had the capacity to achieve desired service levels without optimization
- Examples:
  - slotting was randomized
  - routing of orders between stations is sequential
  - task processing times were on the “high estimates”
  - etc.

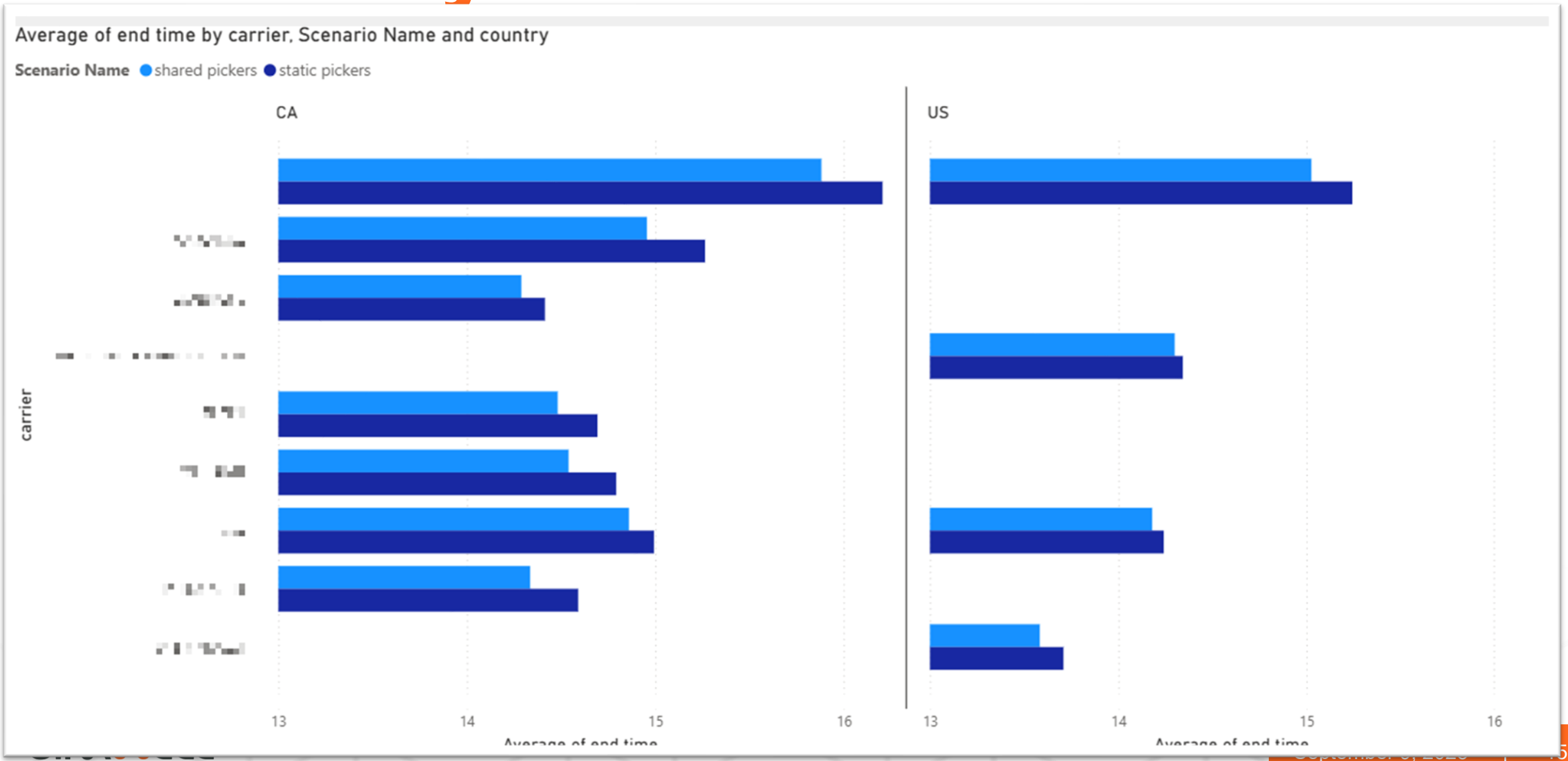
# Outputs

- Total number of picks, rows and orders
  - Broken down per day, picking station and picker
- Time in system for each order
- Picker utilization
  - Possible overtime
- Shift end time
- End time of a given type of order
  - per carrier, destination country, etc
- Number of orders completed per hour
- Number of totes on the station and on the conveyor

# Results Analysis... day by day order finish



# Results Analysis…breakdown orders



# Results Analysis... picker Idle %

| Average of IDLE | Col | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Row Labels | ll_CF1 | ll_CF2 | ll_CF3 | ll_CF4 | ll_CF5 | ll_CF6 | ll_PF1 | ll_PF2 | ll_PF3 | ll_PF4 | ll_PF5 | ll_PF6 | ll_PF7 | elves1 | lves10 | lves11 | lves12 | elves2 | elves3 | elves4 | elves5 | elves6 | elves7 | elves8 | elves9 | Grand |
| 2025-02-03 | 55% | 13% | 21% | 10% | 35% | 37% | 44% | 62% | 82% | 63% | 60% | 68% | 59% | 21% | 9% | 8% | 14% | 14% | 14% | 5% | 2% | 3% | 20% | 26% | 25% | 31% |
| 2025-02-04 | 54% | 56% | 25% | 19% | 30% | 50% | 40% | 60% | 78% | 57% | 58% | 39% | 55% | 33% | 18% | 13% | 20% | 24% | 15% | 13% | 11% | 10% | 18% | 24% | 29% | 34% |
| 2025-02-05 | 61% | 30% | 23% | 28% | 34% | 51% | 40% | 67% | 80% | 65% | 71% | 67% | 65% | 31% | 8% | 7% | 14% | 20% | 19% | 12% | 11% | 2% | 25% | 31% | 19% | 35% |
| 2025-02-06 | 58% | 31% | 43% | 30% | 38% | 49% | 41% | 68% | 81% | 57% | 67% | 51% | 55% | 17% | 14% | 10% | 15% | 6% | 11% | 6% | 5% | 5% | 20% | 23% | 13% | 33% |
| 2025-02-07 | 38% | 31% | 37% | 34% | 49% | 44% | 18% | 59% | 79% | 52% | 71% | 48% | 63% | 22% | 16% | 8% | 15% | 14% | 14% | 2% | 3% | 6% | 18% | 22% | 31% | 32% |
| 2025-02-10 | 32% | 24% | 4% | 6% | 9% | 26% | 33% | 59% | 82% | 61% | 72% | 56% | 65% | 23% | 20% | 16% | 20% | 18% | 15% | 9% | 7% | 2% | 16% | 23% | 30% | 29% |
| 2025-02-11 | 50% | 19% | 18% | 33% | 40% | 38% | 34% | 65% | 84% | 62% | 64% | 64% | 61% | 10% | 9% | 6% | 8% | 4% | 3% | 7% | 4% | 6% | 18% | 16% | 16% | 30% |
| 2025-02-12 | 54% | 25% | 12% | 19% | 33% | 37% | 30% | 67% | 81% | 70% | 73% | 63% | 71% | 21% | 13% | 12% | 16% | 14% | 14% | 13% | 6% | 5% | 27% | 29% | 27% | 33% |
| 2025-02-13 | 56% | 32% | 25% | 12% | 31% | 42% | 21% | 64% | 52% | 63% | 60% | 58% | 54% | 30% | 29% | 14% | 16% | 21% | 16% | 16% | 4% | 8% | 29% | 40% | 34% | 33% |
| 2025-02-14 | 56% | 27% | 34% | 34% | 39% | 50% | 1% | 1% | 80% | 63% | 75% | 69% | 64% | 32% | 41% | 26% | 28% | 29% | 16% | 10% | 12% | 18% | 33% | 36% | 44% | 37% |
| 2025-02-17 | 62% | 27% | 34% | 19% | 34% | 43% | 17% | 53% | 84% | 56% | 74% | 66% | 68% | 25% | 18% | 10% | 18% | 23% | 16% | 12% | 5% | 8% | 27% | 31% | 31% | 35% |
| 2025-02-18 | 59% | 8% | 17% | 19% | 31% | 41% | 36% | 56% | 82% | 67% | 70% | 69% | 71% | 26% | 29% | 18% | 25% | 21% | 14% | 8% | 2% | 6% | 32% | 33% | 31% | 35% |
| 2025-02-19 | 60% | 21% | 25% | 17% | 22% | 37% | 32% | 61% | 84% | 59% | 56% | 62% | 65% | 24% | 20% | 11% | 15% | 17% | 13% | 12% | 3% | 6% | 16% | 24% | 25% | 31% |
| 2025-02-20 | 49% | 22% | 27% | 17% | 32% | 43% | 4% | 18% | 61% | 70% | 69% | 66% | 66% | 26% | 16% | 8% | 12% | 22% | 12% | 4% | 2% | 4% | 23% | 26% | 22% | 29% |
| 2025-02-21 | 39% | 16% | 19% | 26% | 44% | 45% | 44% | 63% | 83% | 56% | 61% | 49% | 67% | 35% | 26% | 19% | 24% | 22% | 16% | 9% | 3% | 2% | 22% | 30% | 26% | 34% |
| 2025-02-24 | 44% | 32% | 35% | 34% | 46% | 54% | 39% | 62% | 76% | 58% | 67% | 54% | 59% | 10% | 20% | 12% | 16% | 8% | 7% | 14% | 10% | 3% | 18% | 20% | 30% | 33% |
| 2025-02-25 | 39% | 44% | 13% | 27% | 23% | 31% | 36% | 65% | 77% | 62% | 70% | 59% | 64% | 5% | 12% | 9% | 11% | 6% | 6% | 7% | 10% | 4% | 16% | 15% | 23% | 29% |
| 2025-02-26 | 55% | 33% | 29% | 24% | 35% | 49% | 28% | 29% | 77% | 49% | 64% | 57% | 65% | 15% | 13% | 4% | 8% | 21% | 13% | 10% | 3% | 3% | 19% | 28% | 26% | 30% |
| 2025-02-27 | 53% | 17% | 13% | 5% | 6% | 11% | 37% | 71% | 82% | 63% | 58% | 66% | 65% | 30% | 22% | 12% | 12% | 3% | 19% | 1% | 10% | 3% | 16% | 27% | 29% | 29% |
| 2025-02-28 | 52% | 28% | 21% | 29% | 36% | 55% | 28% | 71% | 88% | 72% | 56% | 62% | 35% | 26% | 23% | 16% | 24% | 5% | 12% | 7% | 2% | 4% | 13% | 16% | 26% | 32% |
| **Grand Total** | **51%** | **27%** | **24%** | **22%** | **32%** | **42%** | **30%** | **56%** | **79%** | **61%** | **66%** | **60%** | **62%** | **23%** | **19%** | **12%** | **17%** | **16%** | **13%** | **9%** | **6%** | **5%** | **21%** | **26%** | **27%** | **32%** |

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# Project Benefits

- **De-risking** the acquisition of a costly custom conveyor system with automated tote routing
  - Major investments
  - having to modify the system later would be very expensive and complex
- Learning to operate a brand new system in the **virtual world first**
  - Testing lots of scenarios helps **plan HR** needs and labor dispatching
  - **Shorten operations ramp up** by having tested order injection sequence, slotting, etc.
  - Will likely reduce the number of **employees required** for the first few weeks of operations
  - Reduce potential **overtime**
  - Employee training could be facilitated by showing/watching the simulated operations

# Conclusion / Future Potential Benefits

- Down the road: the model can be maintained as **a digital twin** to allow testing more optimized operations, such as:

- **Smart routing** of order totes:
  - for example going first to least busy stations
  - instead of looping around or getting stuck a long time in a closer, but busy station
- Different **product slotting** configurations
  - Fine tuning balance demand between stations during the different seasons
  - Potentially duplicating locations for certain products

- Continuously **improving task dispatching**:
  - clear procedures for help between pickers/stations
  - When/where to move, when to come back
- Simulate **replenishment** operations
  - which were left out of scope, for now

# Thank you

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