Factotum

CASE STUDY

Optimizing Logistics with Automated Technology

Customer: Amazon Air

Location: Multi-Location

Core Service: Mechanical & Electrical

Sector: Transport & Logistics

Project Details

Client Overview

Amazon Air is a virtual cargo airline, working solely with the overseas delivery of Amazon packages. They bridge the gap between fulfilment centres and customer delivery locations through hubs and cargo routes.

Project Overview

To design and implement an **automated conveyor system** that directly feeds sorted packages into Gaylords (large pallet containers or box locations), streamlining the packaging process, reducing manual intervention, and **increasing hub efficiency** for Amazon Air.

Our teams focused on automating package sorting and placement into Gaylords, reducing handling errors and improving overall throughput at Amazon Air's logistics hubs.

Challenges

Amazon Air's rapid expansion relies on large-scale sorting and loading operations. Key pain points were:

Manual Handling Inefficiencies: Packages required multiple touchpoints to get sorted, transferred, and loaded into Gaylords, slowing throughput during peak hours.

Sorting Bottlenecks: Traditional conveyor systems often misplace packages or cause errors in sorting by destination or weight class.

High Operational Costs: Manual labour dependency for Gaylord loading increased costs and introduced variability in quality and speed.

Initial Findings

1. Manual loading into Gaylords caused delays, particularly during peak seasons like Prime Day and holidays, where package volume increases by up to 50%.

2: Package misplacement often requires re-sorting, adding unnecessary time and labour costs.

3: Fully automated systems could reduce loading errors by up to 30% while enabling more consistent throughput.

Stakeholder Feedback

Warehouse Managers: Highlighted the inefficiency of manually aligning conveyors with Gaylords and frequent misplacement of packages.

Ground Staff: Reported strain from repetitive lifting and loading tasks, which increased safety risks.

Sustainability Advocates: Suggested designing the system to integrate with larger sustainability goals by minimising waste and optimising energy use.

Proposed Solution:

Automated Conveyor-to-Gaylord Integration

Core Idea:

Develop an intelligent conveyor system with direct Gaylord integration to automate sorting and loading processes, ensuring faster and more accurate package handling.

Design Concept

Automated Conveyor System

Dynamic Sorting Mechanism

- The AI-powered system identifies package weight, size, and destination and automatically routes it to the appropriate Gaylord conveyor path.
- Multiple sorting lanes ensure even distribution across Gaylords.

Direct Gaylord Feeding

- Extendable conveyors automatically align with Gaylords based on container availability.
- Integrated package pushers or gravity-assisted drops gently deposit packages into the containers without manual intervention.

Design Concept, continued

Real-Time Monitoring

IoT-Enabled Sensors

- Track package flow and Gaylord capacity in real-time, sending alerts when containers are full.
- Automate halting or rerouting of conveyors if a misalignment or obstruction is detected.

Centralised Dashboard

- A digital interface provides operators with live updates on conveyor speed, package destinations, and container load status.

Ergonomic and Safe Design

- Eliminate repetitive strain injuries for ground staff by automating physical loading tasks.
- Incorporate fail-safes like emergency stop mechanisms and load balancing to ensure safety and reliability.

Visual Design Mockups

Conveyor-to-Gaylord Workflow: A visual rendering of automated conveyors feeds into multiple Gaylord stations, each assigned to specific destinations (e.g. by airport or hub).

IoT Dashboard: A mockup of the centralised interface shows metrics like "Packages Processed per Hour," "Container Status (Full/Empty)," and "System Health."

Impact Analysis

Operational Benefits

1. **Efficiency**:
   - Increased sorting and loading speed by 40%.
   - Reduced manual labour by 60%, enabling staff to focus on higher-value tasks.
2. **Accuracy**:
   - Lower error rates in package misplacement by 25%, reducing re-sorting costs.
3. **Throughput**:
   - Processed 20% more packages per shift, especially during peak seasons.

Cost Savings

- Reduced labour costs by automating repetitive tasks.
- Decreased downtime caused by Gaylord misalignment or overloading.

Sustainability

- Optimised conveyor energy usage by integrating smart motors that only activate when packages are detected.
- Minimised material waste (e.g., damaged packages) with safer handling processes.

Implementation Plan

Phase 1: Design & Prototyping (0-2 Months):

- Collaborate with robotics and automation vendors to prototype the conveyor-to-Gaylord system.
- Conduct pilot testing in a high-volume Amazon Air hub.

Phase 2: Deployment:

- Roll out the system to all Amazon Air hubs.
- Train staff to monitor and manage the automated system.

Phase 3: Scaling & Optimisation (12+ Months):

- Expand the solution to smaller hubs and regional sorting facilities.
- Continuously refine AI algorithms for better sorting and routing.

Client Satisfaction:

“The automated conveyor-to-Gaylord system has streamlined our operations, enhancing efficiency and accuracy while reducing manual intervention. It has been instrumental in supporting Amazon Air’s commitment to speed, reliability, and innovation."

— Senior Operations Manager, Amazon Air

Conclusion

The automated conveyor-to-Gaylord system represents a transformative innovation for Amazon Air, addressing critical challenges in package handling and hub operations. This solution aligns with Amazon's operational excellence and scalability by reducing manual intervention, increasing accuracy, and integrating real-time monitoring.

Similarly, its ergonomic design and energy-efficient features contribute to Amazon's commitment to sustainability and employee well-being.

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