

LIFT CASE STUDY



Mobile Robots and Logistics Automation for Avery Dennison

More and more organizations are introducing automation into their logistics operations using automated guided vehicles (AGVs) and autonomous mobile robots (AMRs). Over the past several years, Flexware Innovation has assisted customers with this effort by leveraging Ignition to integrate these vehicles into their existing ecosystems. This integration typically includes interfacing with automation/control infrastructure, inventory management systems, and other line-of-business applications. The result of this continuous development is a highly configurable, Ignition-based middleware framework named LIFT (Logistics Integration Framework Technology).

Project Overview

Avery Dennison recently expanded the production and warehousing capacity of its plant in Greenfield, Indiana. The project included the implementation of a new JBT AGV system that would transfer materials autonomously throughout the facility. Avery Dennison wanted to create a comprehensive material handling solution that would seamlessly integrate the new JBT AGV system with existing facility systems and processes. Flexware utilized its Ignition-based LIFT framework to create a fully integrated logistics solution and help make Avery's expansion a success.

The Challenge

Avery Dennison wanted its final material handling process to be as seamless and cohesive as possible. The new JBT AGV system would transfer large rolls of paper label stock autonomously around the facility, feeding production equipment, stocking WIP areas, removing scrap material, and delivering finished goods to specific shipping areas. This process would require a complex mixture of material movement events triggered both by automation systems and human operators. Avery also wanted to sophisticated business logic to ensure that materials were routed automatically to the correct destination.

It also wanted the system to coordinate with operators on human-operated vehicles used to move material into areas not reachable by the JBT fleet, as well as with operators who were calling for materials to be brought to their respective areas. Finally, the system had to report every material move back to the inventory tracking system.

Example use cases included:

- Non-compliant rolls must be delivered to proper location based on disposition (scrap, hold, rework, etc.).
- Good rolls must be delivered either to the warehouse for WIP storage or, in the case of pick requests from downstream processes, directly to the requested plant location.
- Appropriate warehouse locations should be selected by multiple criteria, including mission routing, availability, and configured business rules for storage needs.
- Rolls requiring rotation should be routed correctly through the rotating machine before delivery to their final destinations.
- Operators must have access to the production schedule, and the ability to stage requested rolls on a pick list, which would be processed automatically by the material handling system.



The Solution

Flexware leveraged its existing LIFT framework, built on the Ignition platform, as a solution accelerator and added additional capabilities to meet the challenges posed by the Avery Dennison implementation. The Web Dev Module and custom scripting were used to develop a new vehicle adapter interface for the JBT REST API. The concept of an AGV “mission” was used to define the source and destination locations and other configurable properties for a given move request. The existing mission dashboard was enhanced with pick list logic for the various lines, and a mission triggering system was added to provide workflow-like mission selection based on PLC tag values. Numerous configuration screens were added to expand the configurability and flexibility of the solution, and all settings were persisted to a custom MSSQL database. A data interface was developed to communicate with Avery’s custom MES/Oracle ERP layer to manage schedule coordination and inventory tracking.

Powered by Ignition, the final product was a unified, cohesive, end-to-end logistics solution that allowed the customer to manage complex material movement within the plant. Most importantly, the system was designed to be completely configurable, putting the power into the customer’s hands to maintain and expand the solution moving forward.

Result

Flexware developed the solution over a six-month period, and then partnered with both the Avery Dennison and JBT teams to implement the integrated solution into the production environment successfully. With limited training, the Avery Dennison team has achieved complete customer ownership of the solution. The full-featured configuration client allows Avery Dennison to reconfigure existing missions as desired, as well as add new equipment, vehicles, and missions to the system as needed. The system manages Avery Dennison's autonomous vehicles, human-driven vehicles, production lines, a shipping area, and an expanded warehouse area. This integrated material handling solution has allowed Avery Dennison to increase logistics capacity significantly in this plant with minimal additional manpower.

Project Scope

- Tags: 25-1,000+, depending on customer
- Screens: 175-225, depending on customer
- Clients: 20-50, depending on customer
- Alarms: 0-50+, depending on customer
- Devices used: 10+ PLCs, robots, fleet managers, depending on customer
- Architecture used: Standard
- Databases used: one core, typically MSSQL; multiple databases integrated depending on customer

