

Case Study

Nutriline Production Plant
Ada, Michigan

Intra Plant Delivery System Creates Operational Efficiencies



A pallet of raw materials is delivered to production.

The Challenges

Many production operations experience inefficient movement of materials; for example, slow response to requests for material movement, product damaged during movement, and inventory inaccuracies are too common. Furthermore, manually-operated fork trucks may cause safety issues and require staffing over multiple shifts.

Our Solution

The Intra Plant Delivery solution consists of process improvements, software and an automated guided vehicle (AGV) system. It creates operational efficiencies for intra-plant delivery of raw materials, work in process, and finished goods.

The Warehouse Execution System (WES) software manages and directs the material flow processes. In the receiving department, manually-operated hi-lo drivers unload pallets from truck trailers and deliver to a four-level pallet rack structure. Mechanical pallet guides in the rack position the pallets consistently.

Manually operated hi-lo drivers operate only on the receiving side of the rack structure, and do not operate in the plant (only in receiving and shipping).

On the other side of the rack structure, AGVs pick up pallets for delivery to storage or production. By separating the AGV system from the manually operated hi-lo fork trucks, a dedicated operating environment is achieved.

AGVs deliver pallets of raw materials to storage or production rooms, when requested. The WES system software considers the potential allergens on each pallet to ensure certain products are not stored adjacent to each other.

Health and safety regulations specify specific requirements for ingredient storage, including requirements for separation of certain ingredients.

Upon completion of a task, the WES system software directs each AGV to the next appropriate task in the queue. A "look for work" algorithm dispatches the AGVs to a task based on location, status and availability.



AGVs pick up pallets of inbound materials on one side of the pallet staging rack. Manual fork trucks drop off inbound pallets on the opposite side of the rack.

The AGV fleet operates in and out of a clean room environment, traveling through auto-open roll up doors initiated by the system.

The AGV fleet efficiently manages material flow to and from production cells, picking up and dropping off pallet loads onto the floor or load stand as required. Manufacturing technicians request raw material delivery, material return, or empty pallet pickup using a fixed mounted call button at the production cell.

AGVs return unused materials to the designated storage location, or remove empty pallet stacks and deliver to a pallet washer.

For outbound flow, AGVs move pallets of finished goods to the warehouse. AGVs deliver the pallets at floor level in rows, staging a full-truck trailer per row. Hi-lo drivers pick up and transfer the pallets into the appropriate truck trailer at each shipping door.



Product ingredients are stored in a four-level rack structure.



Pallet of finished product is transported to shipping.

Description of Operation

Receiving

- Manually-operated fork trucks (hi-lo's) unload trailers
- Inbound pallets loaded into staging rack structure
- Pallet guides assure accurate positioning in rack
- Operator scans bar code on pallet rack and inbound pallet

Pallet Pick-up

- System software schedules pallet for pick up
- Appropriate AGV selected for task
- AGV picks up pallet in staging rack
- AGV moves pallet to storage or to point of use

Production

- AGV delivers pallet to production cell
- As required, AGV removes finished goods pallet from cell
- AGV transports pallet to storage or shipping

Shipping

- Pallets of finished product are transported to shipping
- Pallets originate from storage or production
- Pallets staged in rows on the floor at shipping
- Hi-lo drivers move finished goods pallets to trailers

The Results

Manually-operated hi-lo trucks are dedicated to receiving and shipping functions only. This allows the production operation to be free of manually-operated industrial truck traffic, thereby minimizing people traffic in the clean room environment, increasing safety and reducing labor costs. The rack structure in receiving supports a “hand-off” between manual and automatic systems, thus omitting potential congestion or flow conflicts.

AGVs support a safe operating environment. AGVs travel at appropriate programmable speeds in designated pathways and are equipped with object-detection devices. Software-directed task management by the WES software optimizes material flow, maintains separation of raw material ingredients and reduces response time. The entire system features real-time monitoring and control to support efficiency and productivity. In addition, the AGV system supports high-density storage since the automated vehicles can operate in tight and confined environments such as the multi-level rack aisles. Pallet staging at shipping is sequenced and grouped for simple and accurate truck loading.

Top 10 Results

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| → Process improvement | → Optimized transport request response |
| → Controlled access to inventory | → Strategic storage separation of raw material ingredients |
| → Automated intra-plant delivery | → Sorted and staged pallets according to truck shipment |
| → Limited hi-lo operation to shipping & receiving | → Real-time monitoring & control |
| → Less staff in clean room environment | |
| → Improved plant safety: AGV object detection, speed control | |



Empty pallets are removed from the storage rack.



Production materials and finished products are stored in pallet racking by the AGV System.



Pallet guides in the rack assure precise pallet placement for AGV pick-up at receiving.