

Automated Warehousing System Improves Inventory Management for Electronics Manufacturer



CHALLENGE

With 633,000 square-foot of assembly and warehousing space to produce color TVs, camcorders, VCRs, laserdisc players, audio, and communications products, a major electronics producer's distribution center embarked on a \$30 million modernization program.

The main challenge of the modernization program was to provide an automated conveying and storage operation that could handle a wide range of carton size & types. Because assembly operations take place in one building and storage in an adjacent building, the stream of different product types entering the warehouse building needs to be sorted

and assigned to one of eight storage zones in this massive warehousing facility.

The facility had a package sortation system, three unitizers, and a fleet of manual clamp trucks to deliver the stacks of products to the proper zone.

The goal was to find a system that would convey both light and heavy loads to the sortation system and the three unitizers, as well as provide a completely automated delivery of the sorted loads to the proper zone. From the zones, manual clamp trucks are directed to handle the final delivery of products to the shipping docks as needed.

SOLUTION

After reviewing several sources of automated material handling, Jervis B. Webb Company was chosen to provide a fully automated warehousing operation. The material handling system includes a 2,000 foot roller conveyor system, 9 automatic guided vehicles, and a radio dispatch system to direct clamp/fork truck operators.

The 2,000 foot conveyor system included 2.5 inch diameter chain driven live roller conveyor, incline/decline belt on roller conveyor, merge beds, tapered roller curves, and zero pressure accumulation conveyors.

This conveyor system transports individual cartons from the production area, via incline and ceiling supported conveyors into the warehousing facility. Packages are then diverted to either a unitizing/sortation system or prepared for manual clamp/fork truck pickup.

Loads sent to the unitizer are column stacked and enter onto a Webb pallet conveyor system where the load must be reoriented 90 degrees by a "spider lift" rotator built into the chain driven live roller conveyor. When the rotation is complete the load is transferred to a 90 foot long main conveyor line via a right angle pop-up chain transfer. As the load travels down the main conveyor line it is transferred in succession to one of six AGV pick up spurs via right angle pop-up chain transfers.

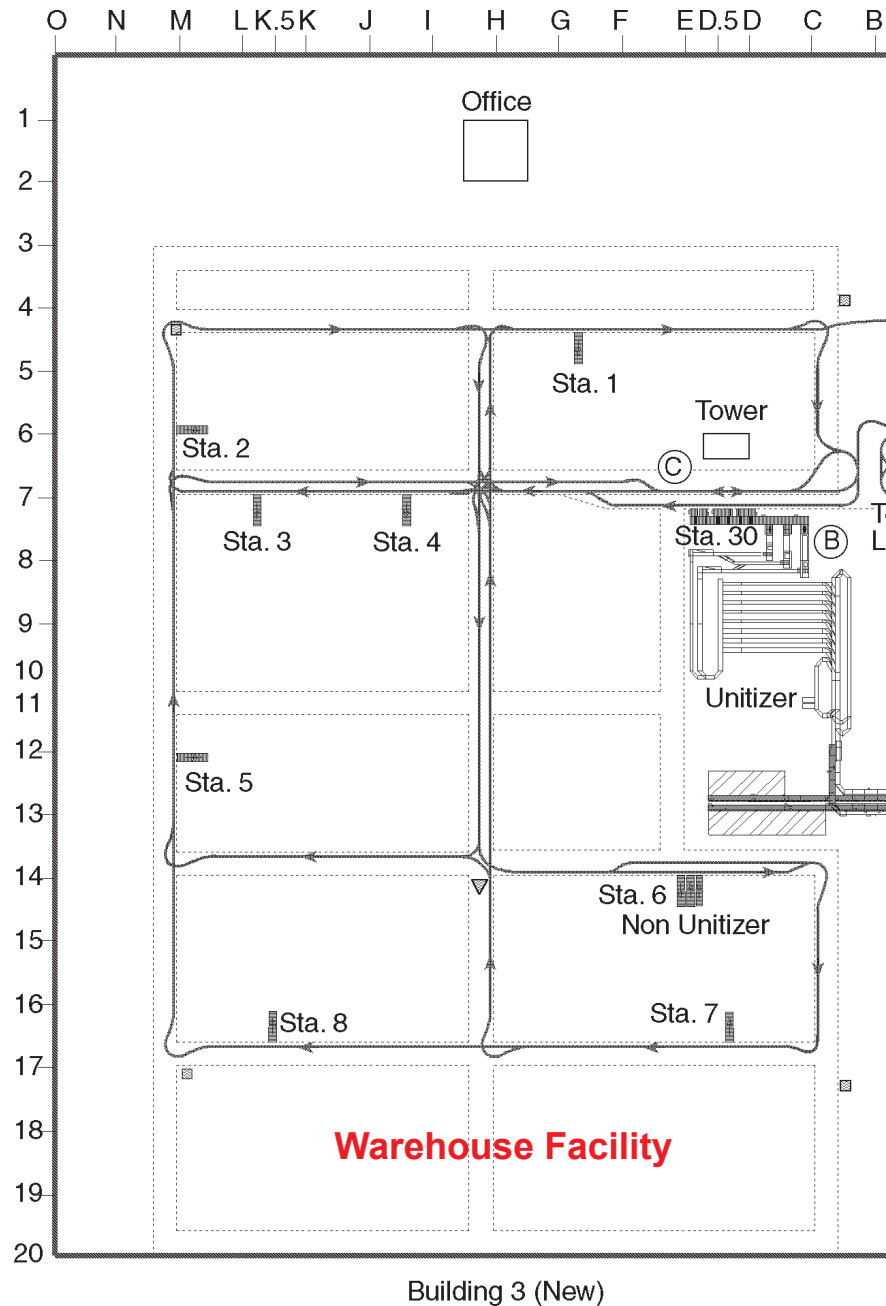
When the pick-up spurs are fully loaded (up to six loads), the loads are transferred to an Auto-Trans™ dual pallet AGV towing two automatic double pallet trailers. Each train delivers its loads to one or more of the eight drop-off conveyors organized into zones throughout the warehouse.

The AGVs are controlled throughout the system by the Vehicle System Manager (VSM™) which utilizes a DEC MicroVAX 4000 with hot backup switch over, host interface, unitizer interface, and PLC interface. The VSM is responsible for vehicle dispatching, routing, and intersection traffic control. VSM communication is provided by a radio base station capable of full-duplex communication to the vehicles.

Vehicle battery charging is monitored by the VSM, which directs the vehicle to the manual battery swap station when the battery is 75% discharged.

In addition to controlling the AGV functions of the system, the VSM also is used to dispatch clamp/fork trucks drivers via radio frequency terminals to perform various storage and retrieval tasks.

The clamp/fork truck operator can define the type of task to be performed and the desired zone in which to operate. It is then up to the VSM to assign the operator to report to an area within the zone to perform a desired task. The terminals on board the clamp/fork trucks consist of 8-line by 40 column displays and have a full alphanumeric keypad. The operator must confirm both pick-up and drop-off transactions to the VSM.





Spider rotators at the unitizing area "B".



Two AGVs parked at the unitizer output "C" waiting load pick-up via right angle transfer.



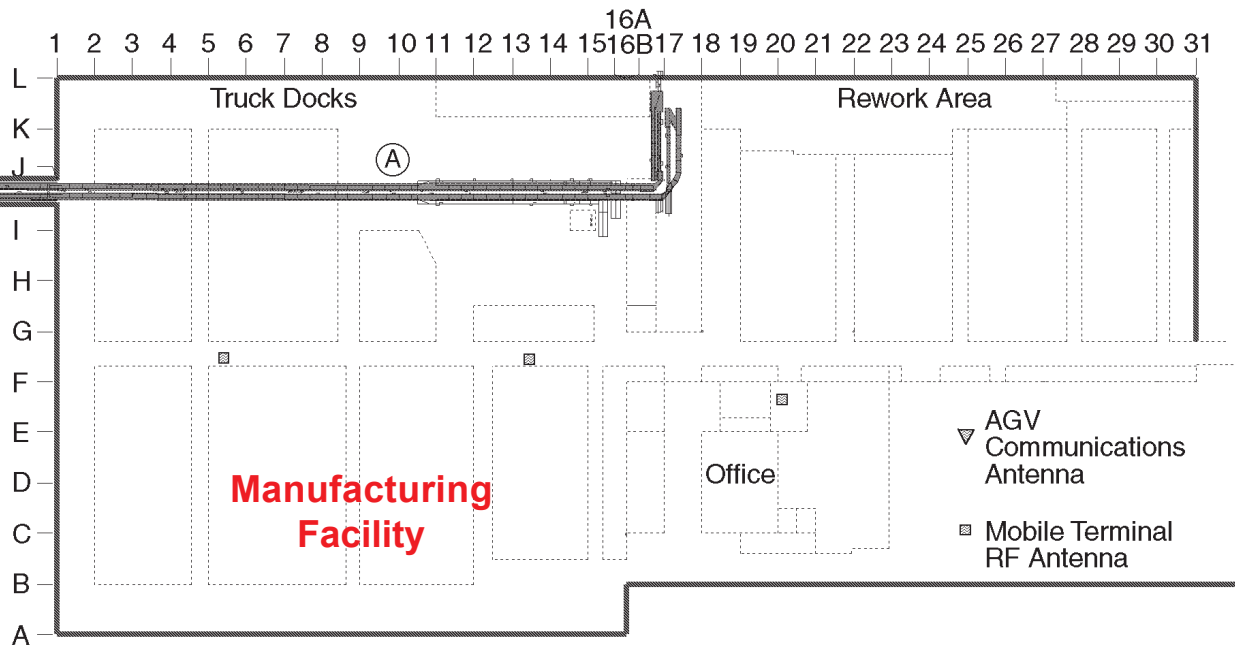
Ceiling supported conveyors "A" transporting loads from production to warehousing.



AGV at a typical drop off station carrying six loads per train.

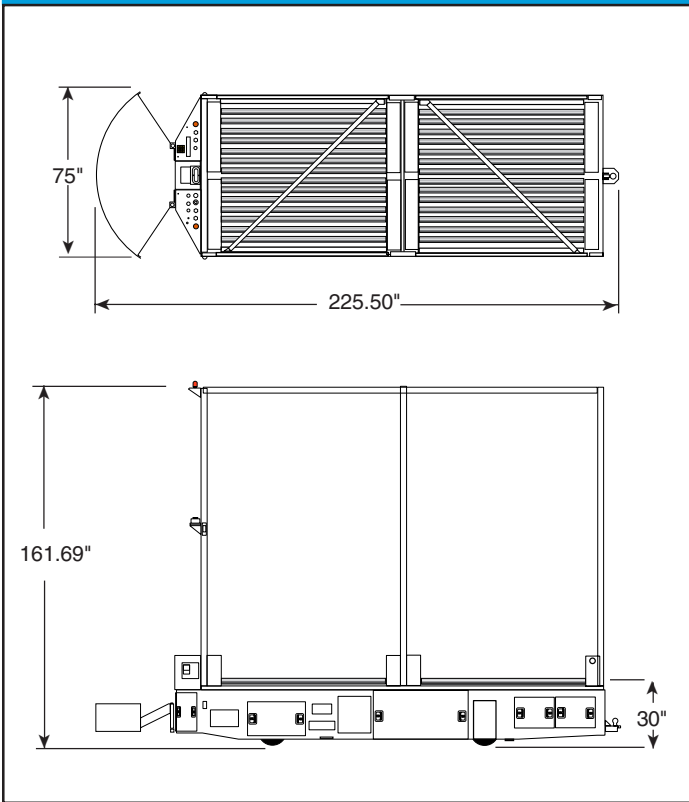
A
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AGV Charging



Building 2 (Old)

Vehicle



VEHICLE

- Auto-Trans™ Dual Load Handling Vehicle
- Special Dual Load Conveyor Transfer Trailers
- On-board Microprocessor
- 32-Character Display & Keypad
- English Language Diagnostics
- Sleep Mode (reduced current draw stand by mode)
- Continuous Radio Communication
- Full Manual Controls
- Optic Object Detection
- Transponder Location Sensing

SPECIFICATIONS

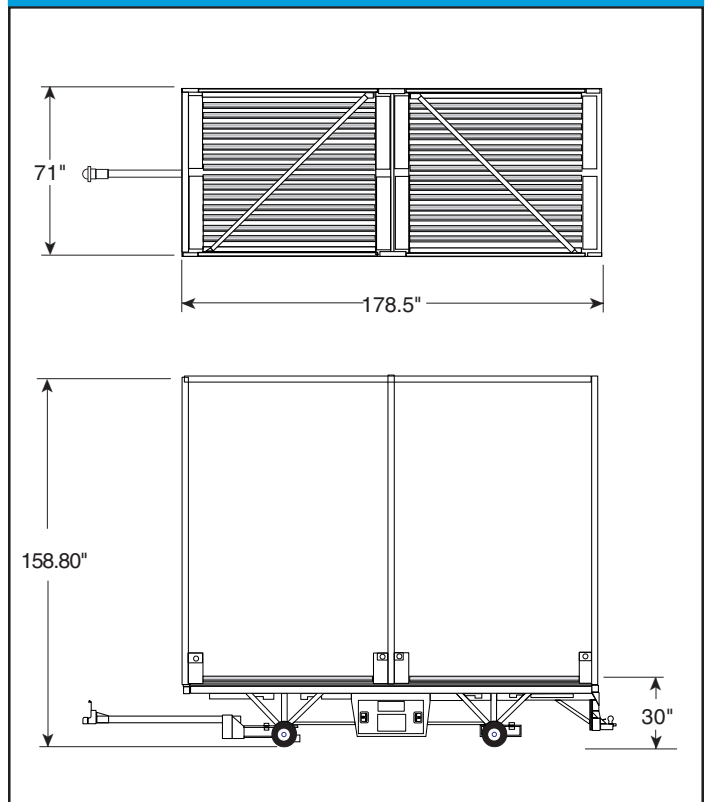
Capacity	9,600 lbs or 1600 lbs per conveyor
Vehicle Width	3' 4"
Vehicle Length	7' 4"
Vehicle Height	4' 6"
Vehicle Speeds (automatic)	200 FPM
Speed Control	GE EV-1 SCR
Stopping Accuracy	+/- 1/2"
Turning Radius (reduced speed)	8'

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Trailers



VEHICLE SYSTEM MANAGER

Software:

- Vehicle Traffic Control & Blocking
- Vehicle Routing and Dispatch
- "Color Graphics" Monitoring
- Detailed Report Generation
- Real-time FM Radio Communication
- Inventory and Storage Control

Hardware:

- DEC MicroVAX 4000
- VT340 Color Graphic Terminals
- DECNET Host Interface
- Opto 22 remote I/O for P/D Station Interface
- Interface with unitizing system
- Interface with conveyor system PLC
- Interface with manual clamp/fork trucks

Jervis B. Webb Company
MATERIAL HANDLING SYSTEM SPECIALISTS

