

AGVs Increase Production Through Efficient Handling of Paper Rolls

Challenge

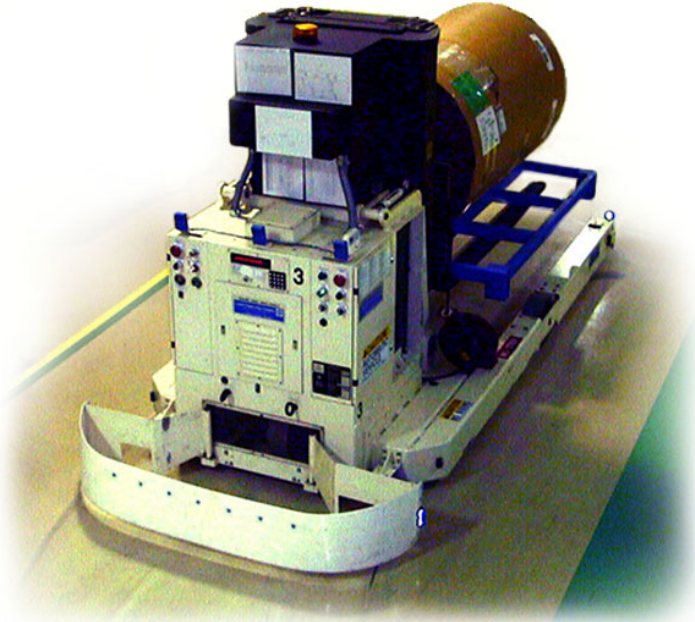
A world leader in advanced office automation and imaging products needed a material handling system to accomplish the following:

- Decrease damage to the paper rolls caused by existing fork truck handling
- Increase production
- Allow for future expansion of storage facilities
- Provide accurate inventory control and tracking systems

The material handling system would require interfaces with other system elements such as Automated Storage/Retrieval Systems (AS/RS), roller conveyors, roll carts and automatic lifters.

The system would also have to be capable of expanding to meet anticipated growth requirements and flexible enough to handle variations in production requirements.

The reliability of the material handling system was a concern because the existing Automatic Guided Vehicle (AGV) system at their facility, provided by another vendor, had many maintenance problems.



Multi-purpose AGV Forks are designed to accommodate rolls, rolls on pallets, and trash bins.

System Requirements

The system would be responsible for moving material between the warehouse, coater, coater staging, AS/RS, and slitter areas. The material to be moved includes rolls of paper, AS/RS pallets (loaded and empty), core bins and trash bins.

Typical material flow would involve:

- Base paper rolls from the warehouse to the coaters
- Silicone coated paper from the coater-to-coater staging
- Glue coated product from coater to AS/RS
- Palletized loads from the warehouse to slitter stations
- Trash bins from waste transfer areas to/from the trash compactor area
- Rejected product from the coaters and slitter to the warehouse

Solution

The new automatic guided vehicle system selected has functioned reliably and provided several years of continuous operation in a busy, multi-shift operation. The system is designed for transporting paper rolls, cores, pallets with master rolls, and waste roll wrappers between the storage, warehouse, and production equipment.

The three vehicle AGV system utilizes non-wire, inertial guidance to allow for guidepath changes for future expansion of the system. The fork style vehicles are equipped with a beveled fork which allows handling of both paper rolls and pallets. These fork style vehicles are designed to lift 6,000 pound loads to an elevation of at least 142". This allows paper rolls to be stored three levels high in the coated roll storage area. Currently, floor storage is provided for the rolls, but the system allows growth to a rack storage system in the future.

AGV safety features include emergency stop bumpers on the front and on the rear straddle arms. In addition, object detection sensors are located between the straddle arms.

System Control Features

The Vehicle System Manager (VSM) communicates with the AGVs, performs traffic vehicle management, and initiates load movements within the system. The VSM is a DEC MicroVAX 3100 based system. The VSM directs and coordinates the vehicles in the system by communicating with them through a FM radio link. When loads are to be transported to a specified area, the VSM directs the appropriate vehicle to perform the operation.

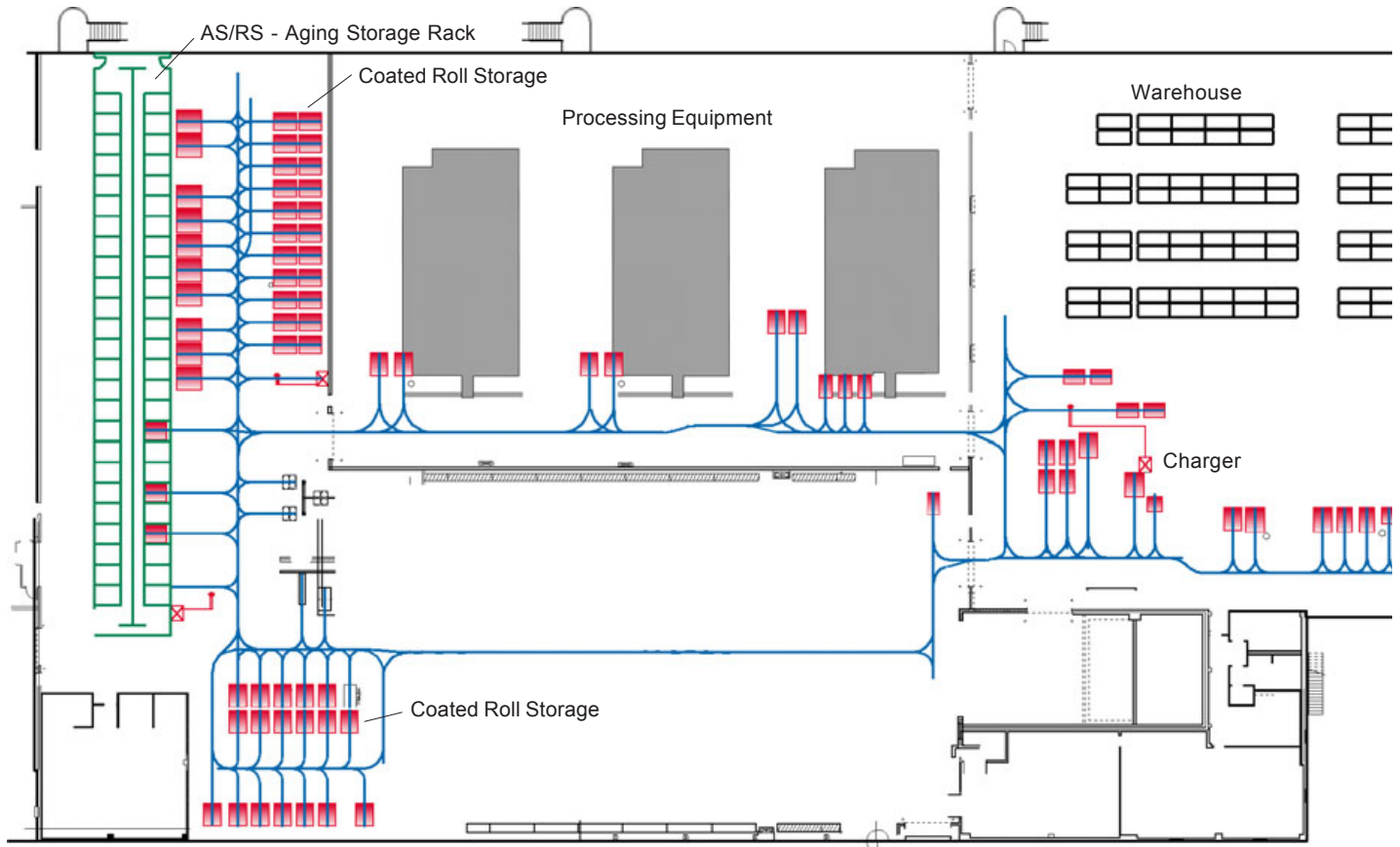
The Material Handling Rack Inventory Control System (MHICS) is responsible for tracking inventory in the Aging Storage Rack, and in the Coated Roll Storage area. It maintains the rack inventory database, selects roll storage/retrieval locations, accepts load movement requests from operators, and notifies the VSM of move requests.

Smart Charging

Webb engineers determined automatic opportunity charging would be the most effective battery charging system for this application. Each vehicle is equipped with controls which allow the vehicle to automatically recharge its batteries at designated charging locations. Spring loaded charge contacts are provided on the vehicle to charge the vehicle's batteries from charging plates that are slightly raised on the plant floor.



A steady touch, reducing product damage, was a major benefit of the system installation.



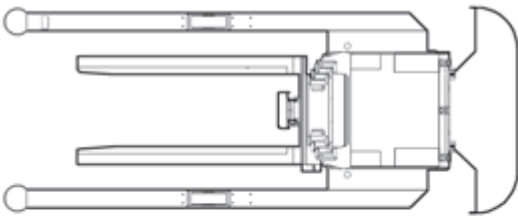
Storage/Retrieval Advantages

The Automated Storage and Retrieval System (AS/RS), installed Jervis B. Webb, provides high density storage of paper rolls without damage versus the manual system which was dependent upon the skills of a fork truck operator.

The AS/RS services the Aging Area utilizing a Storage/Retrieval (S/R) machine, which rides on a rail in the center of the storage aisle. The S/R machine provides the ability to perform 19.6 dual cycles per hour; a dual cycle involves storing one roll of paper and retrieving another. This is twice the capacity required to meet future expansion capacity.

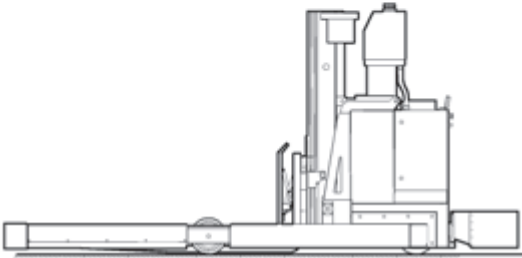
AGV System Benefits

- Reduces material handling cost and product damage when compared to manual means of product transport
- Effective inventory tracking & control interfaced with material handling system
- Opportunity charging system enables continuous operation by automatically recharging vehicle batteries at multiple charging stations
- System reliability much improved over previous system. Most downtime situations are easily corrected and limited in nature
- Non-wire inertial guidance navigation system provides flexibility to easily relocate pick/drop stations or expand the system
- Automated supply of raw materials to the coating equipment reduces downtime compared to manual means of material supply
- Improves product quality through automated quality control



Vehicle Specifications

Capacity, Gross Load 6,000 lb (max.)
 Vehicle Size 14' 9" long, 5' 9" wide, 6' 9" high
 Stopping Accuracy +/- 1"
 Maximum Travel Speed (empty) Normal...180 FPM Creep 30 FPM
 Turning Radius (reduced speed) 3 feet

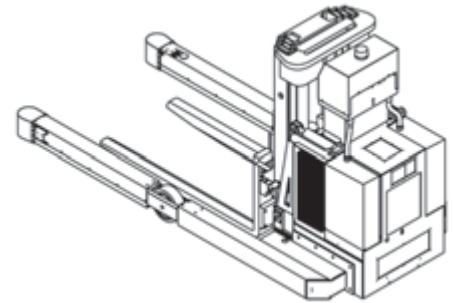


Mast Specifications

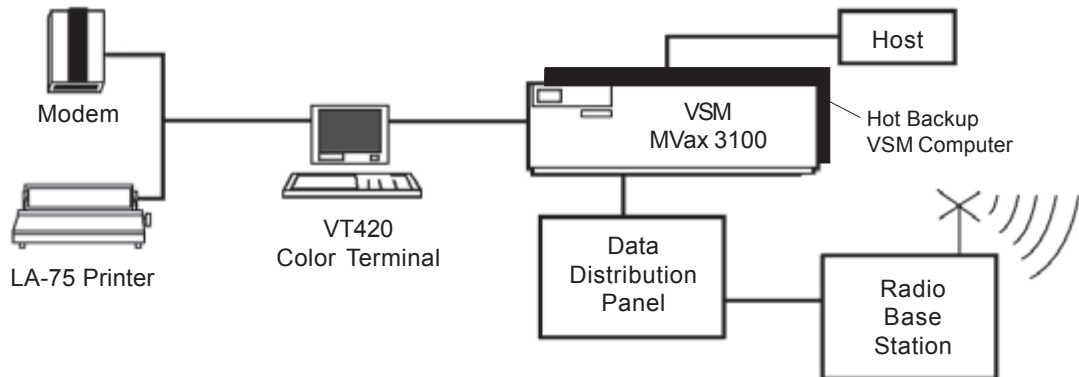
Lift Style 3 stage, hydraulic with electric motor
 Lift Height 142" (max.)
 Speed 10 FPM (max.)
 Positioning Accuracy +/- 5"
 Fork Length 72"

System Highlights

- 3 Horizontal/Vertical Fork Style Vehicles
- Bi-directional vehicles
- Solid State Speed Control
- Non-wire inertial guidance system with patented SmartMark™ technology
- Emergency bumpers/safety devices
- Automatic opportunity charging system with battery discharge indicator and hour meter
- DEC MicroVAX 3100 VSM
- Hot backup VSM computer
- Radio communications
- Zone/accumulation blocking
- Material Handling Rack Inventory Control System
- Automated Storage/Retrieval System



System Control Configuration



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Jervis B. Webb Company
 MATERIAL HANDLING SYSTEM SPECIALISTS



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