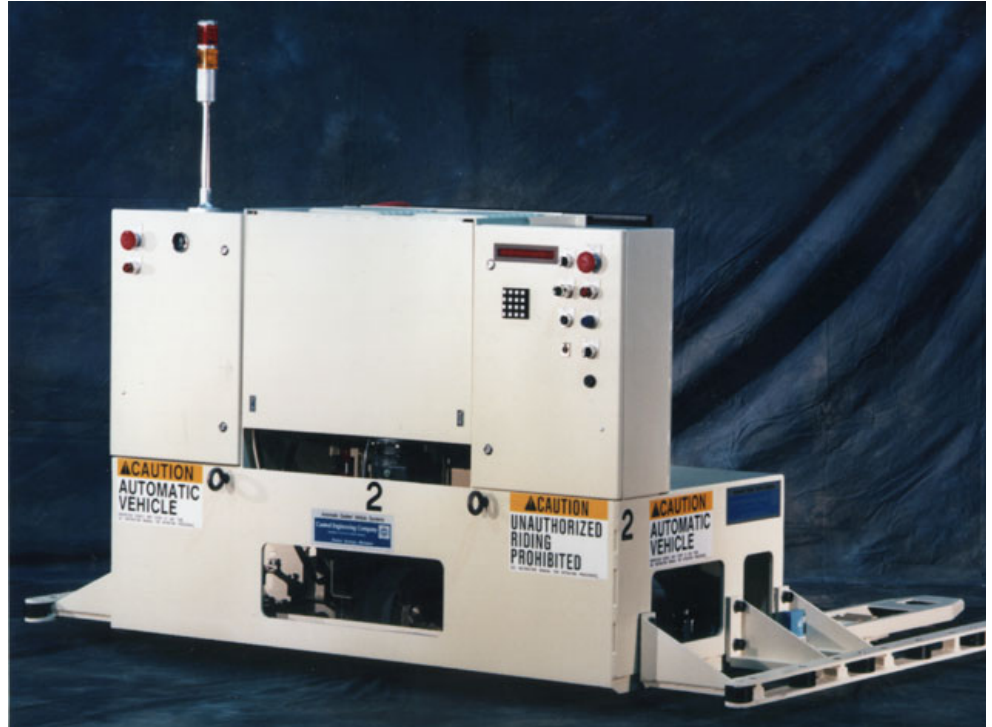


# Automatic Truck Unloading with AGVs

## Challenge

A major U.S. automotive manufacturer required an integrated material handling system for an engine receiving, delivery and storage system. The material handling system connects a just-in-time over-the-road truck delivery system from a nearby engine manufacturing plant, to the two final assembly lines in the main plant.

This facility is one of the most integrated motor vehicle manufacturing operations in the United States, with the capability to produce more than 440,000 automobiles a year.



*Automatic Truck Unloading AGV for Engine Receiving, Delivery and Interim Storage.*

## New Material Handling System Requirements

The new material handling system would be required to operate for a minimum of 10 years in this application.

The new system would have to be installed during the manufacturer's annual summer shutdown which necessitated fast track delivery and installation.

Engine racks stacked two high and ten deep, with three engines per rack arrive just-in-time at the final assembly plant. The trucks enter one of two pairs of docks, each serving a separate assembly line.

The new material handling system would be required to automatically remove the racks from

the truck, destack the racks, and strip individual engines from them. The individual engines are then transported directly to an overhead Power & Free conveyor for delivery to the assembly line, or to temporary buffer storage if an engine is not required immediately in the planned assembly sequence.

Empty racks would need to be loaded into the empty truck for return to the engine plant, to repeat the cycle.

The new material handling system was required to be compatible with the existing over-the-road trucks.

## Solution

The Jervis B. Webb Company supplied an integrated material handling system that included:

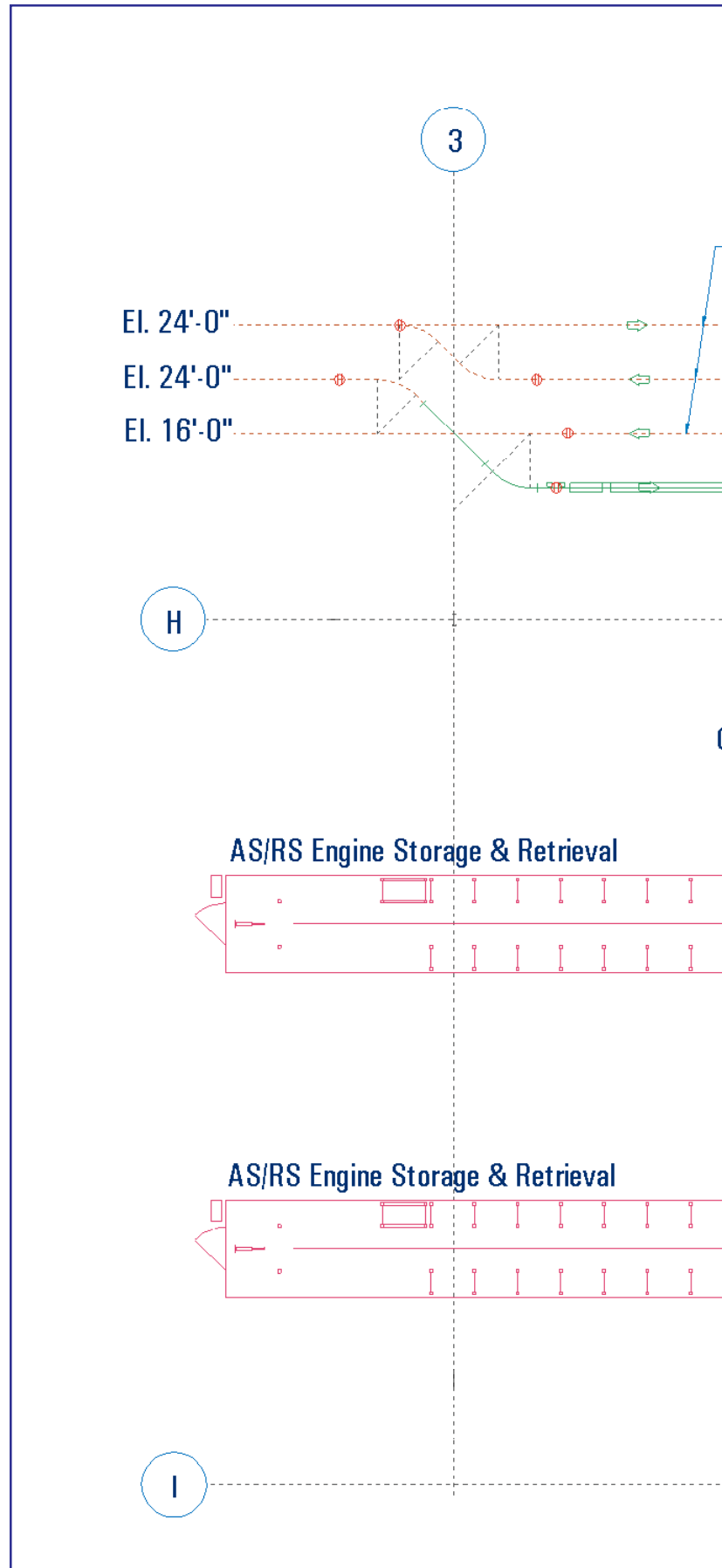
- An **Automatic Guided Vehicle System** to remove full sets of racks, stacked two high, from over-the-road trucks, and refill the trucks with empty racks, stacked two high back into the trucks;
- A **Heavy Duty Roller and Chain Conveyor System** to transport full and empty racks from AGV drop point, to de-stacking, to engine stripping station, to re-stacking, and finally to AGV pickup point;
- A **Power & Free Conveyor** to transport engines on engine pallets from rack stripping, and from the buffer storage system to the engine hang point.
- An **Automatic Storage and Retrieval System** to buffer engines that are not in sequence because of final assembly line “pull-outs” or sequencing problems at the engine plant.
- All inventory controls, conveyor tracking software, and interface to the assembly plant’s assembly line sequencing database were supplied to complete the integrated material handling system.

The AS/RS saved hundreds of square feet of plant floor space and provided 100% accessibility to every load in the buffer system.

Two heavy duty “pallet jack” type AGVs were supplied. When idle, each AGV sits at a charge station located between the two truck docks it services, automatically charging its battery. The vehicles are guided by state-of-the-art digital guidance, which features very high guidance reliability and self-tuning of the guidepath circuit. When entering a truck trailer parked at one of the two dock areas, the AGV uses mechanical guidance arms. These arms guide the AGV while it is in the truck, which may not be aligned exactly perpendicular with the truck dock opening.

## AGV System Benefits

- Immediate, on-the-spot truck unloading service
- Elimination of manual fork trucks in receiving area
- Labor reduction
- Repeatable, consistent full rack delivery and empty rack return
- Bar code reader matches JIT requirement with load. If load is incorrect, AS/RS retrieves correct engine style and delivers to overhead Power & Free conveyor.



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### Material Handling System Layout

Overhead Power & Free Conveyor

Empty Carriers

Loaded Carriers

Loaded Carriers

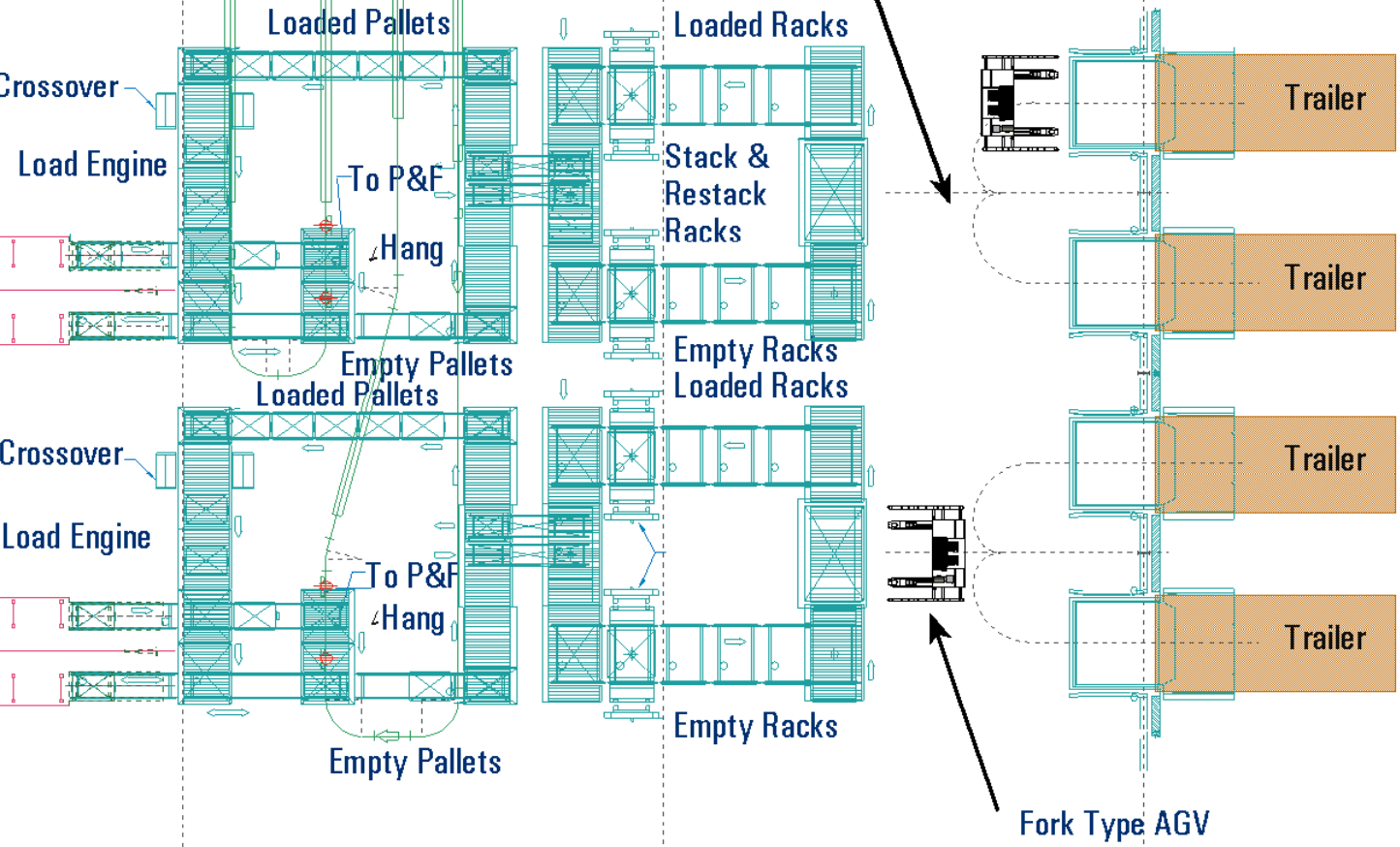
Empty Carriers



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Agv Path



### AGV System Highlights

- Two HV-3™ Pallet Jack Type Vehicles
- Vehicle is battery powered, electrically driven and electrically steered
- Pallet jack mechanism is hydraulically activated
- On-board VCC-2 with I/O controls
- Bi-directional guidance
- Pendant for manual control
- Automatic opportunity charging
- Automatic charging controls
- Lift-out style battery compartment
- Battery discharge indicator with low battery LED
- Digital based wire guidance system
- 32-character diagnostics display
- 48 volt DC electrical system
- Emergency stop buttons
- Electric drive motor with fail safe spring-set brake(s)
- Hour meter

### Conveyor System Features

- Heavy-duty skid plates to accommodate AGV forks
- 6000# structural steel supports
- Double-wide rollers on roller flight conveyors
- Non-lube JIC-type air cylinders
- Engine skid grabs with sub-base mounted air control valves and v-groove precision CAM rollers
- Skid transportation and accumulation conveyor
- Skid stacker and destacker
- Pallet transportation and accumulation conveyor
- Power & Free engine hang position
- AS/RS interface conveyors
- Integral PLC controls

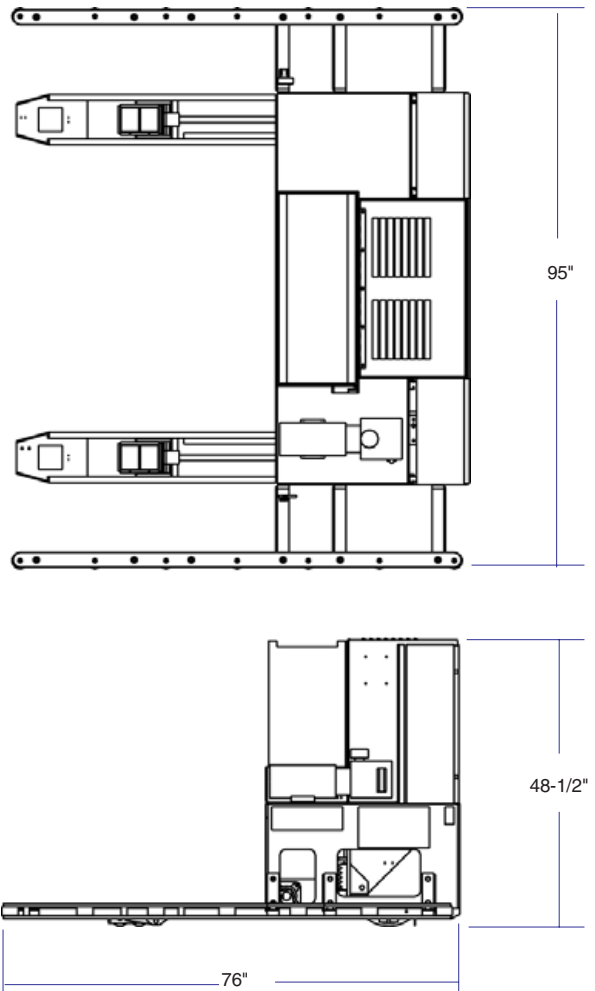
### Power & Free Conveyor Features

- Lift / lower track section
- 100% load tracking
- On-line accumulation

### AS/RS System Features

- 96 storage locations
- 100% inventory management
- 100% accessibility to all loads
- Buffer storage and delivery in build sequence as needed

Vehicle Dimensions



### Vehicle Features

Horizontal Travel Speed .....	80 Feet Per Minute
Vehicle Weight .....	7,000 Pounds
Load Dimensions .....	28" Long, 41" Wide, 31" High
Load Capacity (per rack) .....	5,500 Pounds

**For Further Information, Please Contact:**

**ISO 9001** 34375 W. Twelve Mile Road  
**CERTIFIED** Farmington Hills, MI 48331 USA

Phone: 1-248-553-1220 FAX: 1-248-553-1228

Visit us at [www.jervisbwebb.com](http://www.jervisbwebb.com)

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MATERIAL HANDLING SYSTEM SPECIALISTS

