

# **On-Line Training Program**

## **Module 5**

### ***Will AGVs Work for Me?***

**AGVS Product Section**

**of**

**MHI**

# Collect project information

- Transportation system, assembly system or other type of AGV system
- Identify load type
  - Is the load a pallet?
    - Pallet size for all pallet types
    - Pallet weight for all pallet types
  - If not a pallet, identify load type
    - Load type and size
    - Load weight



# Collect project information

- Identify load interface locations
  - Place on a facility drawing the approximate area of each pickup and deposit location
  - Uniquely identify each location
- Identify preferred travel path for AGVs
  - Identify travel distance between each pickup and deposit location
- Identify load movement quantities
  - Number of loads to be moved from each pickup location to each deposit location each hour
  - Identify any peaks that could occur



# Sample throughput matrix

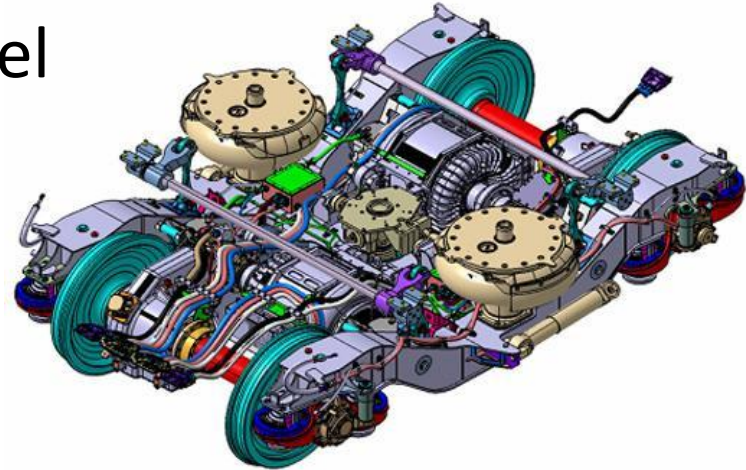
	D1	D2	D3	D4	D5	D6	Total
P1	5	0	0	0	2	0	7
P2	0	4	4	0	0	5	13
P3	0	0	0	2	2	2	6
P4	2	0	0	3	3	0	8
P5	1	1	0	0	0	5	7
P6	0	3	5	0	0	0	8
TOTAL	8	8	9	5	7	12	49

- Capture the moves per hour on the chart
  - P is pickup location
  - D is deposit location



# Calculate number of AGVs needed\*

- Data needed
  - Average travel speed of AGV (provided by AGV supplier)
  - Average load/Unload time
  - Type of charging desired (opportunity, swap)
  - Distance AGV will travel



\*Typically these calculations are done by an AGV supplier or consultant

# Example

- System has one pickup (A) and one deposit (B)
- Distance between A & B is 1,000 feet. Round trip is 2,000 feet.
- Loads moved per hour is 10
- Vehicle travel speed is 200 fpm
- Load/Unload time is 0.5 minutes
- In-vehicle charging
  - See spreadsheet next page



# Sample spreadsheet

## Vehicle Throughput - Average Round Trip

Location		Distance (feet) Round Trip	Loads Per Hour		Min/trip	Load Time	Unload Time	Working Min/hr
From	To		Average	Peak	200 ft/min			
a	b	2000	10		10.00	0.5	0.5	110.00
					0.00	0.5	0.5	0.00
					0.00	0.5	0.5	0.00
					0.00	0.5	0.5	0.00
					0.00	0.5	0.5	0.00
					0.00	0.5	0.5	0.00
					0.00	0.5	0.5	0.00
					0.00	0.5	0.5	0.00
					0.00	0.5	0.5	0.00
					0.00	0.5	0.5	0.00
					0.00	0.5	0.5	0.00
					0.00	0.5	0.5	0.00
					0.00	0.5	0.5	0.00
					0.00	0.5	0.5	0.00
		Total	10					0.00
Total Working Minutes Per hour								110.00

Delays =  
Traffic 10% 1.10 121.00  
Charging factor = 20% for opp and 5% for swapout 1.20 145.20

Vehicles/Utilization	1	242.00%
	2	121.00%
	3	80.67%
	4	60.50%



# Example

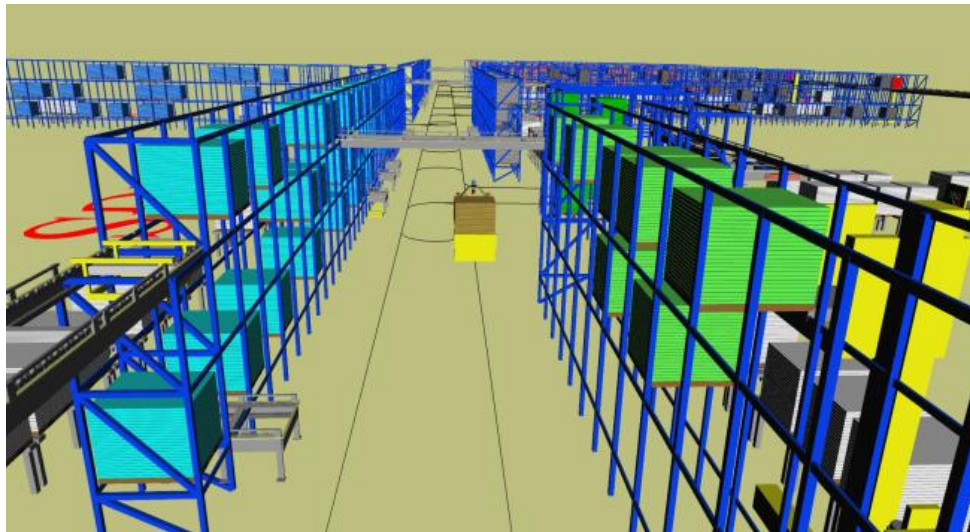
- 3 AGVs will do the movement at 80% utilization





# Simulation

- A simulation can also be created to identify the required number of AGVs
  - It is the most accurate method to validate the required number of vehicles; however, can be time consuming
  - Allows for modification to easily consider “what if” scenarios and varying production levels



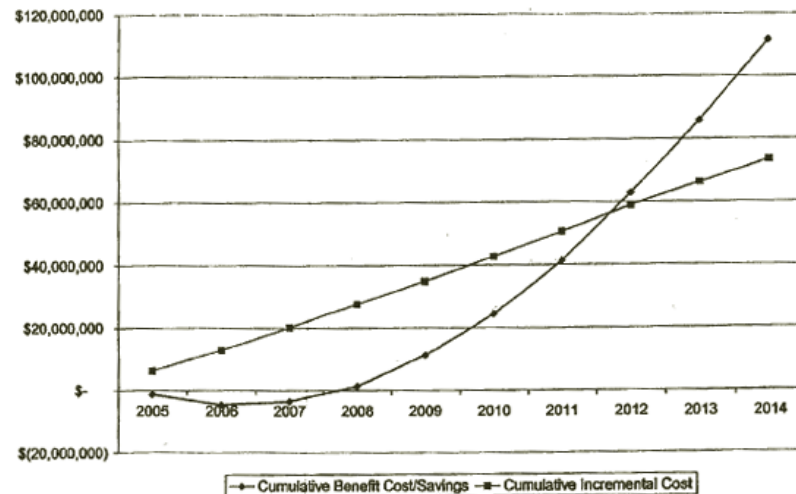
# Project justification

- Project justification is required for most companies to prioritize where money may be invested. The most common justification methods are:
  - Pay back analysis
  - Return on investment (ROI) analysis



# Pay back analysis

- Pay back analysis is the quickest method to gauge the viability of any project. Simply divide the investment by the annual savings. If the result is within the pay back period set by your company then the project is justified.



# Return on investment

- ROI analysis is a more detailed approach to project justification. Typical ROI calculations are performed for a minimum of five to ten years. Most AGV suppliers can be contacted for sample spreadsheets.



***For More Information:***

Contact the  
**AGVS Product Section**  
of  
**MHI**

<http://www.mhi.org/agvs>