

## AUTOMATIC GUIDED VEHICLE SYSTEM (AGVS) PLANNING GUIDE

FROM 100 LBS TO 100 TONS...  
WE MOVE YOUR MATERIAL  
AUTOMATICALLY.

- Standard & Custom Vehicles
- Windows NT Offboard Control  
& Operating System
- Wire & Wireless Guidance
- Retrofits
- OEM Supplier
- Since 1988

LVC      LVA      FLB      FLA

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**1 INTRODUCTION**

**Standard and Custom Designed AGV's with Turnkey System Installations**

AMERDEN Inc. has been in the AGV business since 1988 and specializes in standard and custom AGV systems. We offer rugged vehicles with technical simplicity for tough conditions, plus modern designs with high reliability and ease of maintenance.

We have designed this planning guide to identify your automated material handling transport requirements. Please fill in all of the requested information. If an item is not applicable, please mark with 'N/A'.

The planning guide covers all aspects of an AGV System and can be used as a reminder for important items needing special attention.

**2 AGVS APPLICATION QUESTIONNAIRE**

In order to justify implementing an AGV System, please read the following questions addressing safety, economical, and technical issues. The higher the number of "YES" answers indicates the greater the positive impact an AGV System will have on your operation.

Yes No

- Do you plan to operate, or are you currently operating on multiple shifts?
- Are you planning to increase production?
- Is your production steady and frequent?
- Are the load pickup points predetermined?
- Do you need to transport supplies back to the production lines?
- Are the loads consistent in configuration and size?
- Is the load transported to a 'common' location for i.e. testing, quality control, wrapping?
- Is the work in progress sometimes dispatched for abnormal operations?
- Do you require dynamic tracking of material and production?
- Do you have recurring damage or injury by forktrucks?

Additional Comments

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AUTOMATIC GUIDED VEHICLE SYSTEM (AGVS) PLANNING GUIDE

**3 CUSTOMER INFORMATION**

Name of Company \_\_\_\_\_

Address \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_ Email \_\_\_\_\_

Project Manager \_\_\_\_\_

Project Engineer \_\_\_\_\_

Director of Operations \_\_\_\_\_

Other Plant Locations \_\_\_\_\_

Owner \_\_\_\_\_

Address \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_ Email \_\_\_\_\_

Contacts \_\_\_\_\_ Website \_\_\_\_\_

Type of Quote       Firm       Budget       Paid Study

Installation Start \_\_\_\_\_ Commissioning Date \_\_\_\_\_

**4 PLANT INFORMATION**

New Facility       Existing Facility       Expansion       Plant Drawings Available

Column Size; Main \_\_\_\_\_ Secondary \_\_\_\_\_

Minimum Clearance Height in Operating Area \_\_\_\_\_

Minimum Clearance Height in Doorways \_\_\_\_\_

Tightest Passage \_\_\_\_\_

Floor Type & Condition \_\_\_\_\_

Any Floor Obstructions, i.e. Manholes, Stairs, Troughs \_\_\_\_\_

Ramps; Length \_\_\_\_\_ Height \_\_\_\_\_

Metal Bridges, Expansion Joints, Rail Crossings \_\_\_\_\_

Automatic Door Passages \_\_\_\_\_

AGV Control Room Location \_\_\_\_\_

AGV Maintenance Area Location \_\_\_\_\_

Battery Charging / Maintenance Area \_\_\_\_\_

Environment \_\_\_\_\_ Min. \_\_\_\_\_ °F      Max. \_\_\_\_\_ °F

High Current Wiring or Strong Magnetic Fields? \_\_\_\_\_

Additional Comments \_\_\_\_\_

**5 PLANT OPERATION**

This information is provided by the customer to indicate the anticipated system size, level of automation, and the operational and economical justification.

- System Operation       1 Shift                      Days per Week  
                                  2 Shifts                      Days per Week  
                                  3 Shifts                      Days per Week

Additional Comments

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- Application Type     Assembly Line       Multi-Loops/Paths     Single Loop  
 Production - Transporting finished goods to storage/shipping  
 Production - Transporting material to production lines  
 Production - Transporting material and goods to/from production lines  
 Job Shop - Flexible Machining Systems (FMS)  
 Job Shop - Routing products in process between departments  
 Warehousing       **Shipping**       **Receiving**

Other / Comments

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**6 OFFBOARD CONTROL**

Our standard, fully automated AGV System is controlled by a Pentium PC running NT 4.0 and radio communication. Indicate other preferences.

- Host Computer, type
- 
- Standard AGV Computer Control, other
- 
- Inventory Control
- 
- Fully Automated System       Pushbutton Control                       Vehicle Keypad Control
- 
- Remote Terminals, Number and Locations
- 
- Remote Printers, Number and Locations
- 

Communication

- FM Radio                       Inductive                       Infrared                       Spread Spectrum
- 

Comments

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AUTOMATIC GUIDED VEHICLE SYSTEM (AGVS) PLANNING GUIDE

**7 SYSTEM THROUGHPUT**

Select loads/hour or moves/hour, depending on which suits your application type best. The numbers should be estimated averages, indicate any planned production increases, and peak production if critical.

_____	Loads/hr	<input type="checkbox"/> Entering	_____	<input type="checkbox"/> Exiting	_____
_____	Loads/hr	<input type="checkbox"/> Peak	_____	<input type="checkbox"/> Future	_____
_____	Moves/hr	<input type="checkbox"/> Peak	_____	<input type="checkbox"/> Future	_____

**8 TRANSPORTS AND DISPATCH**

To/From  Conveyor  Deep Lane  Floor  Rack  Stand

Other \_\_\_\_\_

Height(s) of conveyor, rack, or stand \_\_\_\_\_

Racks or other \_\_\_\_\_

Number of locations for both pick-ups and drop-offs \_\_\_\_\_

Number of locations for pick-up only \_\_\_\_\_

Number of locations for drop-off only \_\_\_\_\_

Comments \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**9 LOAD DATA**

End Products \_\_\_\_\_

Type of Products/Material to be transported via AGVs \_\_\_\_\_

Describe Load  Stable  Non-Stable \_\_\_\_\_

Comments \_\_\_\_\_

\_\_\_\_\_

Load Type or Containment Media  Bin  Cart  Fixture

Pallet  Rack  Roll  Slipsheet

Other \_\_\_\_\_

Size without Load, L x W x H \_\_\_\_\_

Weight without Load, lbs. \_\_\_\_\_

Load Size only, L x W x H \_\_\_\_\_

Maximum Weight of Load only, lbs. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

AUTOMATIC GUIDED VEHICLE SYSTEM (AGVS) PLANNING GUIDE

Sketch of Complete Load

Side View

End View

Top View

Additional Comments

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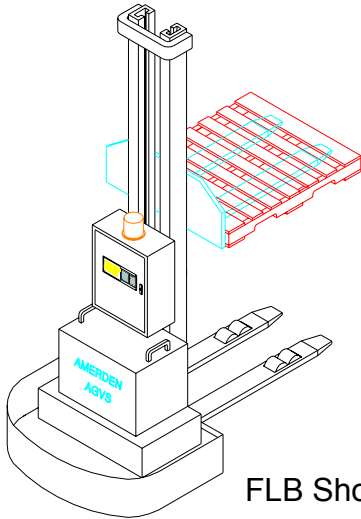
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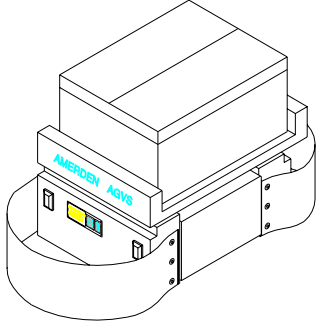
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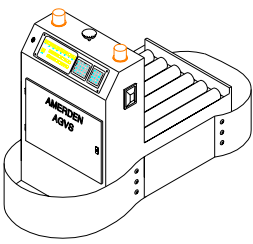
## AUTOMATIC GUIDED VEHICLE SYSTEM (AGVS) PLANNING GUIDE

### 10 VEHICLE TYPE

The selection of vehicle type is determined by load handling. A fork vehicle is the most flexible, it can usually do all the tasks of a unit load/platform vehicle.

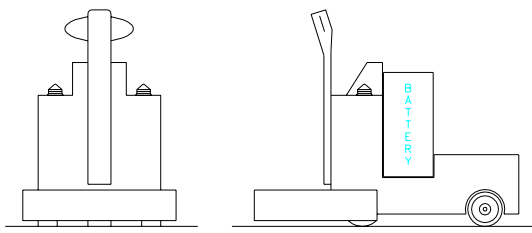
 <p style="text-align: right; margin-top: 10px;">FLB Shown</p>	<p><input type="checkbox"/> <b>FL - Fork Lift</b>   <input type="checkbox"/> FLA Straddle type   <input type="checkbox"/> FLB Under-rigger</p> <p><u>Lifting Height</u></p> <p><input type="checkbox"/> Low, 2 feet   <input type="checkbox"/> Medium, 6 feet   <input type="checkbox"/> High, 16 feet</p> <p><input type="checkbox"/> Other _____</p> <p><u>Capacity</u>   <input type="checkbox"/> Standard, 4,000 lbs.   <input type="checkbox"/> Other _____</p> <p><input type="checkbox"/> Pallet Fork   <input type="checkbox"/> Roll Fork   <input type="checkbox"/> Single Fork</p> <p><input type="checkbox"/> Double Fork   <input type="checkbox"/> Clamp   <input type="checkbox"/> Other</p> <p>Other Description _____</p>
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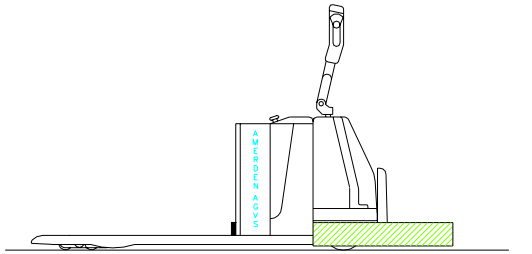
 <p style="text-align: right; margin-top: 10px;">LVA</p>	<p><input type="checkbox"/> <b>LVA - Low Vehicle A</b> Standard transfer height 30"</p> <p><u>Transferring</u></p> <p><input type="checkbox"/> Belt   <input type="checkbox"/> Chain   <input type="checkbox"/> Liftdeck   <input type="checkbox"/> Roller   <input type="checkbox"/> Tooling Fixture</p> <p><input type="checkbox"/> Other _____</p> <p><u>Capacity</u>   <input type="checkbox"/> Standard, 4,000 lbs.   <input type="checkbox"/> Other _____</p>
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 <p style="text-align: right; margin-top: 10px;">LVC</p>	<p><input type="checkbox"/> <b>LVC - Low Vehicle C</b></p> <p><u>Transferring</u></p> <p><input type="checkbox"/> Belt   <input type="checkbox"/> Chain   <input type="checkbox"/> Liftdeck   <input type="checkbox"/> Roller   <input type="checkbox"/> Tooling Fixture</p> <p><input type="checkbox"/> Other _____</p> <p><u>Capacity</u>   <input type="checkbox"/> Standard, 500 lbs.   <input type="checkbox"/> Other _____</p>
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## AUTOMATIC GUIDED VEHICLE SYSTEM (AGVS) PLANNING GUIDE

### 10 VEHICLE TYPE (continued)

 <p style="text-align: center;">AGT</p>	<input type="checkbox"/> <b>AGT - Automated Guided Tugger</b> <input type="checkbox"/> Automatic Hitch <input type="checkbox"/> Manual Hitch <input type="checkbox"/> Single Cart <input type="checkbox"/> Multiple Cart, # _____ <u>Capacity</u> <input type="checkbox"/> Standard, 500 lbs. <input type="checkbox"/> Other _____
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 <p style="text-align: center;">APT</p>	<input type="checkbox"/> <b>APT - Automated Pallet Truck</b> Lifting Height 8 inches <u>Capacity</u> <input type="checkbox"/> Standard, 4,000 lbs. <input type="checkbox"/> Other _____
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<p>NA not shown</p>	<input type="checkbox"/> <b>NA - Narrow Aisle Vehicle - Pallet Handler</b> <u>Lifting Height</u> <input type="checkbox"/> Medium, 6 feet <input type="checkbox"/> High, 16 feet <input type="checkbox"/> Other <u>Capacity</u> <input type="checkbox"/> Standard, 4,000 lbs. <input type="checkbox"/> Other _____
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**Custom Vehicle - Describe**

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**11 SYSTEM LAYOUT**

An approximate layout is necessary in order to establish the number of vehicles required and to gain insight into the system complexity. Please provide any of the following;

- Layout with AGV path and stations marked
- CAD  Hard Copy  Sketch below

Scale:  = \_\_\_\_\_

A large rectangular grid for sketching the system layout, consisting of 30 columns and 30 rows of small squares.

AUTOMATIC GUIDED VEHICLE SYSTEM (AGVS) PLANNING GUIDE

**12 VEHICLE QUANTITY CALCULATION**

Station No. → ↓ or Name		1	2	3	4	5	6	7	8	9	10	Subtotals	
<b>1</b>	Distance												
	Trips per 8hr shift												
	Dist. X Trips												
<b>2</b>	Distance												
	Trips per 8hr shift												
	Dist. X Trips												
<b>3</b>	Distance												
	Trips per 8hr shift												
	Dist. X Trips												
<b>4</b>	Distance												
	Trips per 8hr shift												
	Dist. X Trips												
<b>5</b>	Distance												
	Trips per 8hr shift												
	Dist. X Trips												
<b>6</b>	Distance												
	Trips per 8hr shift												
	Dist. X Trips												
<b>7</b>	Distance												
	Trips per 8hr shift												
	Dist. X Trips												
<b>8</b>	Distance												
	Trips per 8hr shift												
	Dist. X Trips												
<b>9</b>	Distance												
	Trips per 8hr shift												
	Dist. X Trips												
<b>10</b>	Distance												
	Trips per 8hr shift												
	Dist. X Trips												

Distance = Length of travel, in feet, between stations

**Instructions**

1. Add all 'Trips per 8hr shift' rows
2. Add all 'Trips per 8hr shift' subtotals for Total Trips (A)
3. Add all 'Dist. X Trips' rows
4. Add all 'Dist x Trips' subtotals for Total Distance (B)

<b>Total Trips (A) →</b>	
<b>Total Distance; ft. (B) →</b>	

*Please turn to the next page for calculations*

**12 VEHICLE QUANTITY CALCULATION (continued)**

$$\text{Total vehicles required} = \frac{\text{Total Trips(A)} \times \text{PDT}}{\text{Hrs/Shift} \times 60 \text{ min.}} + \frac{\text{Total Distance(B)}}{\text{Hrs/Shift} \times 60 \text{ min.} \times \text{FPM} \times \text{EF}}$$

**PDT** *Pick and Drop Time* The time it takes for a vehicle to slow down, stop, deliver or pick up the load and leave. A common PDT is 1 minute.

**Hrs/Shift** *Hours per Shift* For the example below, 8 hours per shift is used.

**FPM** *Feet per Minute* This is the average speed of the vehicle. The number will vary depending on the AGV layout. Maximum speed is 200 FPM. A good number, used in the example below, is 170 FPM, or 85% of full speed.

**EF** *Efficiency Factor* The efficiency factor is used to compensate for battery change/charging, waiting times, traffic stops, human intervention, etc. .90 is a commonly used number.

**Example:**

*AGV System  
Running an 8 hour shift(Hrs/Shift)  
300 total trips(A)  
200,000 feet of total distance(B)  
1.0 minute of pick and drop time(PDT)  
Average speed 170 feet per minute(FPM)  
.90 efficiency factor(EF)*

$$\frac{( 300 \text{ trips} \times 1.0 \text{ min.} )}{( 8 \text{ Hrs/Shift} \times 60 \text{ min.} )} + \frac{200,000 \text{ ft.}}{8 \text{ Hrs/Shift} \times 60 \text{ min.} \times 170 \text{ ft/min.} \times .90} = 3.35 \text{ vehicles, or 4 vehicles are required}$$