Automatic Guided Vehicle Systems (AGVS)
Unit Load Carrier Vehicles
AGVS Benefits

- Deliver and move loads upon demand
- Zone containment of manual fork lift trucks
- Improved response time
- Safe vehicle movement
- Elimination of "conveyor walls"
- Adaptable to manual backup
- Re-usable asset
- Reduced product damage
- Better housekeeping
- Better discipline
- Improved logistics
- Electronic tracking of material
- Efficient scheduling
- Reduced aisle traffic
- Adaptable to future changes
- Reduction in workforce
- Flexible routing

AGV picks load from non-powered load stand using satellite drive mechanism.

Extensive AGVS Benefits:

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On the cover:

Model DC-40 (Unicar®): A 20,000 lb capacity unit load carrier vehicle picks up a stack of sheet metal parts from a stamping press.

### Specifications

#### Mechanical:

<table>
<thead>
<tr>
<th>Load Deck:</th>
<th>DC-20</th>
<th>DL-40</th>
<th>DC-40 (Unicar®)/DX-40</th>
<th>DC-60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deck Height Lowered:</td>
<td>15&quot;</td>
<td>15&quot;</td>
<td>15&quot;</td>
<td>15&quot;</td>
</tr>
<tr>
<td>Deck Height Raised:</td>
<td>10&quot; lift</td>
<td>10&quot; lift</td>
<td>10&quot; lift nominal</td>
<td>N/A</td>
</tr>
<tr>
<td>Capacity:</td>
<td>3,000 lbs max.</td>
<td>4,000 lbs max.</td>
<td>4,000/3,000 lbs max.</td>
<td>60,000 lbs max.</td>
</tr>
<tr>
<td>Drive Configuration:</td>
<td>Integrated module - motor, transmission, drive wheel</td>
<td>Motor, transmission, drive wheel in vertical column</td>
<td>Dual wheel drive with swivel casters</td>
<td>Planetary gear</td>
</tr>
<tr>
<td>Drive Motor:</td>
<td>1.5 HP, series wound</td>
<td>1.5 HP, series wound</td>
<td>(2) 1.5 HP motors</td>
<td>(2) 5 HP 10V DC series wound</td>
</tr>
<tr>
<td>Drive Wheel:</td>
<td>10&quot; dia. x 4&quot; wide rubber</td>
<td>10&quot; dia. x 4&quot; wide rubber</td>
<td>(2) 14&quot; O.D. x 4&quot; wide polyurethane</td>
<td>(4) 28&quot; O.D. x 10&quot; wide x 22&quot; I.D. polyurethane</td>
</tr>
<tr>
<td>Frame:</td>
<td>.375&quot; steel construction</td>
<td>.375&quot; steel construction</td>
<td>Unitized structural steel</td>
<td>Structural steel and 1/2&quot; plate</td>
</tr>
<tr>
<td>Brakes:</td>
<td>Electrical fail-safe brake</td>
<td>Automotive type drum and shoe design</td>
<td>Electric fail safe brakes</td>
<td>Electric fail safe brakes</td>
</tr>
<tr>
<td>Battery Compartment:</td>
<td>38.38&quot;L x 8&quot;W x 14.31&quot;H</td>
<td>32.75&quot;L x 13.5&quot;W x 25.62&quot;H</td>
<td>Roller conveyor access</td>
<td>64.5&quot;L x 28&quot;W x 30&quot;H</td>
</tr>
<tr>
<td>Battery Type:</td>
<td>270 AH capacity</td>
<td>Up to 570 AH capacity</td>
<td>24V, 200 AH capacity</td>
<td>48V, 1300 AH capacity</td>
</tr>
<tr>
<td>Manual Operation:</td>
<td>Pendant</td>
<td>Pendant</td>
<td>Pendant</td>
<td>Pendant</td>
</tr>
<tr>
<td>Approx. Weight:</td>
<td>2270 lbs, with battery</td>
<td>3200 lbs, with battery</td>
<td>3,000 lbs, with battery</td>
<td>20,000 lbs, with battery</td>
</tr>
<tr>
<td>Speed:</td>
<td>2.3 mph or 200 fpm</td>
<td>2.3 mph or 200 fpm</td>
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</tr>
<tr>
<td>Onboard Display:</td>
<td>Touch sensitive keypad with characters</td>
<td>Touch sensitive keypad with characters</td>
<td>Touch sensitive keypad</td>
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<tr>
<td>Turning Radius:</td>
<td>3' nominal and spin turn where necessary</td>
<td>10' minimum</td>
<td>10' minimum</td>
<td>10' minimum</td>
</tr>
<tr>
<td>Steering:</td>
<td>Drive wheel</td>
<td>Drive wheel</td>
<td>Bi-directional 2 wheel</td>
<td>Bi-directional 4 wheel differential (independent)</td>
</tr>
</tbody>
</table>

#### Control:

| Controller: | Single board computer | Single board computer | Intel based microprocessor | Intel based microprocessor |
| Electrical System: | 24V | 24V | 48V, 200 AHC | 48V, 1300 AHC |
| Speed Control: | Solid state | Solid state | Solid state | Solid state |
| Control Panel Modes: | Recirculate, maintenance, computer, onboard | Recirculate, maintenance, computer, onboard | Recirculate, maintenance, computer, onboard | Recirculate, maintenance, computer, onboard |
| Navigation System: | Wire | Virtual wireless or wire based | Virtual wireless or wire based | Virtual wireless or wire based |
| Positioning Accuracy: | ±1/2" | ±1/2" | ±1" longitudinal, ±1" latitudinal in stands | ±1/2" longitudinal, ±1/2" latitudinal in stands |
| Guidance Method: | 4 frequency phase detection | 4 frequency phase detection | Wireless (gyro) or wire based | Wireless (gyro) or wire based |

Note: Vehicle specifications are for reference only and are subject to change based on application.
A load is transferred automatically from the AGV to a wrapping machine. Load stabilizer grip raises during load transfer.

AGV transporting diesel engine to test station.

An AGV with automatic lift/lower deck accommodates 3 work-in-process loads.

The Company Behind the Leading AGV Product Line

Inventors of AGV Technology

The history of Rapistan Systems AGVS product group dates back to 1953 with the introduction of the world’s first automatic guided vehicle. Since then, our aggressive engineering has produced a series of breakthroughs, such as the first solid state controls (1962), the first microprocessor controls (1978), and the first autonomous guidance system - Virtual Path Guidance (1994).

Controlled Manufacturing

Rapistan Systems is one of the world's leading AGV system companies; able to retain total control of our own technology. From onboard controls to vehicle frames, Rapistan Systems designs and manufactures critical components in its own vertically integrated plant.

Heavy Duty Capacity

A bi-directional unit load AGV delivers a steel coil to a drop off station.

Accessibility in Service and Parts

Rapistan Systems offers a variety of maintenance, training, and service programs that will protect the investment you have made. A 24-hour 800 number puts you in touch with parts, service, and engineering resources 7 days a week.

Vehicle Features

Fully automated operation includes:

- Real-time continuous communications
- Onboard path routing logic
- Onboard traffic control logic (for multi-vehicle systems)
- Automatic return to battery charge area upon sensing low battery

Each USA manufactured AGV has:

- Drive motor, transmission, and drive wheel integrated in a balanced vertical column (DL-40) or in a single module (DC-40, DC-20)
- Rugged steel frame construction to withstand industrial environments

Automatic load transfer options:

- Roller conveyor
- Lift/lower deck
- Chain conveyor
- Satellite drive
- Extractor device

Efficient

AGV transporting diesel engine to test station.

Versatile

An AGV with automatic lift/lower deck accommodates 3 work-in-process loads.
System Controls

Smart AGV technology:

Rapistan Systems’ smart AGV technology provides decentralized system intelligence controls where they are most useful - onboard the AGV.

AGVs can communicate with each other, and with an optional Vehicle Manager PC anywhere in the system by means of a RF (Radio Frequency) CSM (Constant System Monitor) Communications Multiplexor.

The RF CSM re-transmits the location and status from each AGV to all other AGVs operating in the system. An optional Rapistan Systems Vehicle Manager PC is utilized when AGVs need to be scheduled by remote input.

A Vehicle Manager system can gather data from remote I/O devices and schedule all AGV assignments, utilizing an optimizing “look for work” strategy.

The RF CSM can also be networked with a Windows® format AGView color graphics system monitor.

Vehicle Controls

Control display panel features include:

- Easy to read, durable, 40 character by 2 line display
- Status, prompts, and error messages displayed in English
- Operator prompts for input (decreasing operator interface time)
- Display of vehicle’s current status, i.e., on path, off path, low battery, etc.
- Over 100 English text display messages
- Invalid entry notification which reduces input errors
- Easy to customize for special applications

Options:

- Virtual Path™ non-wire guidance
- Automatic charging
- Bi-directional guidance
- Towing package (DL-40 only)
- Vehicle Manager scheduling computer
- Dispatching via remote data entry terminal
- Host computer interface capability
- AGView color graphics system monitor and performance recorder

Simulation Optimizes AGV System Design

Rapistan Systems engineers bring to computer simulation a wealth of knowledge and experience in how AGV systems and controls operate. The resulting benefit is design experimentation, where system performance can be optimized before system implementation.
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- Optional satellite drive mechanism allows load transfer to non-powered stand.

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<td>Roller conveyor, chain lift/lower deck, extractor mechanism, parasitic drive</td>
<td>Application specific - lift deck or conveyor</td>
<td>Application specific - lift deck or conveyor</td>
</tr>
<tr>
<td>Deck Height</td>
<td>N/A</td>
<td>15&quot; with roller deck, 18&quot; with lift/lower deck</td>
<td>23&quot;/27&quot; with roller deck, 25.5&quot;/25&quot; with lift/lower deck</td>
<td>N/A</td>
</tr>
<tr>
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<td>10&quot; lift</td>
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<td>10&quot; dia. x 4&quot; wide rubber</td>
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<td>Up to 570 AH capacity</td>
<td>48V, 200 AH capacity</td>
<td>48V, 1300 AH capacity</td>
</tr>
<tr>
<td>Manual Operation:</td>
<td>Pendant</td>
<td>Pendant</td>
<td>Pendant</td>
<td>Pendant, tow ports - one at each end of vehicle</td>
</tr>
<tr>
<td>Approx. Weight:</td>
<td>2270 lbs, with battery</td>
<td>3200 lbs, with battery</td>
<td>3,000 lbs, with battery</td>
<td>20,000 lbs, with battery</td>
</tr>
<tr>
<td>Speed:</td>
<td>2.3 mph or 200 fpm</td>
<td>2.3 mph or 200 fpm</td>
<td>2.3 mph or 200 fpm</td>
<td>Variable, loaded: 130 fpm unloaded: 160 fpm</td>
</tr>
<tr>
<td>Onboard Display:</td>
<td>Touch sensitive keypad with characters</td>
<td>Touch sensitive keypad with characters</td>
<td>Touch sensitive keypad with characters</td>
<td>Touch sensitive keypad with characters</td>
</tr>
<tr>
<td>Rear Casters:</td>
<td>Dual 6&quot; dia. x 2.25&quot; wide poly</td>
<td>Dual 6&quot; dia. x 2.25&quot; wide poly</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Turning Radius:</td>
<td>4'</td>
<td>6'</td>
<td>3' nominal and spin turn where necessary</td>
<td>10' minimum</td>
</tr>
<tr>
<td>Steering:</td>
<td>Drive wheel</td>
<td>Drive wheel</td>
<td>Bi-directional 2 wheel</td>
<td>Bi-directional 4 wheel differential (independent)</td>
</tr>
</tbody>
</table>

**Control:**

| Controller: | Single board computer | Single board computer | Intel based microprocessor | Intel based microprocessor |
| Speed Control: | Solid state | Solid state | 48V, 200 AHC | 48V, 1300 AHC |
| Control Panel Modes: | Recirculate, maintenance, computer, onboard | Recirculate, maintenance, computer, onboard | Recirculate, maintenance, computer, onboard | Recirculate, maintenance, computer, onboard |
| Navigation System: | Wire | Virtual wireless or wire based | Virtual wireless or wire based | Virtual wireless or wire based |
| Communications: | Two way continuous | RF | RF continuous | RF continuous |
| Positioning Accuracy: | ±1/2" | ±1/2" | ±1/2 longitudinal, ±1/2 latitudinal in stands | ±1/2 longitudinal, ±1/2 latitudinal in stands |
| Guidance Method: | 4 frequency phase detection | 4 frequency phase detection | Wireless (gyro) or wire based | Wireless (gyro) or wire based |

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