

NO MORE SWEAT OR TEARS

Automated
guided vehicles
are making
inroads on
safety and the
bottom line.

By Paul Sharke, Associate Editor



One of two automated forklifts at the Fort Myers processing operation drags an empty wire container behind it. This carrier typifies the several varieties of mail containers in the facility.

YOU'VE BEEN ACCOSTED by them yourself, those electric vehicles that ferry folks around the airports. The honk that grows louder from behind as you lug your baggage through the terminal means only one thing: Clear the way or risk certain flattening.

Pedestrians don't have much of a chance any more. Even in New York City, where walkers outnumber vehicles many times over, it's a regular event for auto traffic to blow through red lights or try to push through a crowd as the great mass of foot traffic begins constricting the street from both sides.

More sense prevails in the controlled environment of a U.S. Postal Service processing facility in Fort Myers, Fla. There, at least, pedestrians are granted their rightful way.

The heavily automated facility is a test case for the post office's experiment in integrated mail processing.

YOUR MANNERS ARE SHOWING

According to Roger McLarry, an operations support specialist at the Fort Myers facility, the twin automated

forklifts and lone "tugger" the postal service installed there several years ago are quite polite. They move at a walking pace, he said, and never fail to yield to people or objects in the way. They emit visual and audible warnings as they travel through the place.

The 41-bay facility handles both letters and flat mail from about that many post offices, encompassing 88 ZIP codes, McLarry said. Although several processing facilities within the postal system incorporate tray management systems, the Fort Myers facility is unique as the test site for the Universal Transport System. This system handles sacks, parcels, and trays for letters and flat mail, which are fully compatible with the range of automatic processes at the facility.

The automated guided vehicles, or AGVs, move pallets and wheeled containers between the sorting equipment and the loading dock, McLarry said. That consigns manned forklifts and towmotors to the dock and away from the sorting machinery and workers inside, he added.

To find their way, the three vehicles from AGV Products Inc. of Charlotte, N.C., rely on laser guidance, wall-

mounted reflectors, and a PC-based controller running the company's routing software.

The vehicles follow a route through the building, but can also be summoned by employees. A vision system observes the floor from overhead. When full pallets are placed over ground markings, the vision system alerts the AGVs of waiting loads after detecting a change in contrast.

According to AGV Products' Darin Boik, who managed the Fort Myers project, laser-guided AGVs have been around for about a decade, having practically supplanted wire-guided installations, which dominated for many years, as well as the shorter-lived inertial systems that followed. He expects that future AGVs will be able to key into local positioning systems—the indoor equivalent of the global positioning system—especially if the accuracy of the fledgling technology improves as expected.

REFLECTING WELL ON AGVs

For the Fort Myers AGV project, personnel installed a grid of reflectors in the building. The vehicles, bouncing laser light off these reflectors, triangulate their *x-y* coordinates and their headings. A confidence factor helps the vehicle place either more faith or less in its knowing where it is, thereby accounting, say, for variations in a scan off a dirty reflector.

Increasing plant safety by eliminating the driver in forklift operations is an attractive benefit of AGV systems, though by no means the biggest draw, Boik said. That honor goes to reducing labor costs, he explained.

Still, AGVs don't have to push the limits of plant speed

restrictions or cut corners in order to clock out at 5 p.m. An AGV's very need to follow instructions makes it a model employee. Three redundant on-board systems maintain constant survey of the terrain ahead, Boik explained. Laser scanning, infrared object detection, and plastic bumpers make up the three systems, serving to slow the vehicle when a field is breached and to stop it when the field is impinged, he said.

Although Boik was not aware of any U.S. safety standards that specifically govern AGVs, the safety standard ANSI/ASME B56.5-1993 (Guided Industrial Vehicles Automated Functions of Manned Industrial Vehicles) forbids safety systems from being controlled through software, he said. Instead, electromechanical systems provide AGVs with a fail-safe means of avoiding people and things.

In addition to systems for preventing collisions, AGVs come fitted with load monitor systems to avoid overloading or uneven weight distribution, Boik said. When it comes to load handling, high repeatability has a positive effect on product damage when compared with manual operations.

Safety was on everybody's mind at the USPS's Processing and Distribution Center in Brooklyn, N.Y., as that facility began looking at ways of automating material handling.

Mike Maravas, a technical manager with the post office's engineering headquarters in Merrifield, Va., recently finished acceptance tests for an inertia-based prototype system in Brooklyn that operates along 3,000 linear feet of magnetic guide path embedded in the floor. The second

robot patrol

ActivMedia Robotics of Amherst, N.H., takes another approach to AGV navigation. Relying on structural and immobile building elements, its PatrolBot security robot and its PowerBot AGV learn the way around a plant without any retrofitting of grid systems or wires, enabling quick setup, according to company CEO Jeanne Dietsch.

A security specialist, PatrolBot excels at helping the lone night guard monitor an entire facility. It patrols a fixed route, Dietsch explained, or gets dispatched to plant locations where fixed sensors are

A PatrolBot moves onto its charger.

picking up disturbances. The guard merely has to tell the PatrolBot where to go by clicking on a floor plan map that's displayed on the control room panel, and the AGV finds its way there, steering around any obstacles.

On the scene, the robot can pan, zoom, and focus a combination of surveillance and night vision cameras on a rising gauge or a leaking valve. Or, armed with specialized sensors, it can take data at regular intervals while avoiding the necessity of instrumenting every data point with a sensor of its own. The robot can also patrol hazardous environments, Dietsch said.

ActivMedia makes small AGVs for security, hazard monitoring, materials handling, and delivery.





An automated towmotor pulls three general purpose containers down an aisle at the Fort Myers facility. A full GPC can weigh as much as 1,200 pounds.

phase of the project may stretch the guide path to over 10,000 feet, he said.

Engineers are evaluating inertia-guided systems and laser-guided systems for the project's next phase.

KEEPING AISLES CLEAR

Awareness training of its members played a big part in convincing the union that AGVs at the Brooklyn facility would not bring harm to the personnel there. Workers are trained to watch for AGVs and to interact with them safely. They are instructed to keep clear of AGV travel paths whenever an unmanned vehicle is approaching. An AGV that has stopped due to a path obstruction will automatically reset after 3 seconds, issue an alarm, and flash a signal light, before continuing on the way.

That's quite a bit different from the supervisor-required key restarts of the post office's previous foray into AGVs in the early 1980s, Maravas said. A dozen test sites along the East Coast proved that the wire-guided AGVs of the day weren't suited for post office work. Only two such vehicles from that era are still in operation today.

But workers in Brooklyn are expected to take an active role in their interactions with the AGVs. For instance, the white plastic skirts that rise from floor level along the front of the vehicles are not called "bumpers" but "giant E-stops," Maravas explained, reinforcing the part facility

personnel play in ensuring their own safety.

On the other hand, the AGVs are expected to avoid the workers in every situation imaginable. A laser scanning curtain was added to the AGVs to protect against any possible spots unseen by bumpers or infrared devices. Anyone crossing the curtain stops the AGV.

Local unions were asked for their input and concerns about the AGVs. Adjusting the system in response to these concerns ensured that the AGVs could travel safely around the building. The maintenance department helped during the installation and testing, by pointing out how system operation could be improved and by consolidating preventive maintenance procedures.

TECHNOLOGY OWNERSHIP IS VITAL

Such ownership of technology plays an important role in its acceptance. In the old days, an AGV vendor's field tech would have to visit a plant every time a change was needed in the guide path. Nowadays, with most if not all AGV manufacturers storing guide paths on AutoCAD software, changing a route involves only laying it out on the computer and downloading the changes to the AGVs—tasks handled routinely by facility personnel.

Coupled with laser guidance and wireless communications, these major advances by today's AGVs may just make them work for the post office this time around, Maravas said. ■