WEEK 10 - ROBOTICS PROJECTS

Understanding the concept of AGV in different industrial sectors

Introduction: Automated Guided Vehicle

- An Automated Guided Vehicle is an automated material handling system which moves along predefined or preprogram path along an aisle from one station to another to MH operation.
- Most AGV are driven by electric motors powered by storage battery.
- Good for high labor cost, hazardous, or environmentally sensitive conditions.
- AGVs good for low-to-medium volume medium-to-long distance random material flow operations (e.g., transport between work cells in a flexible manufacturing system (FMS) environment)

Material handling system:

Movement of the materials or other parts in a manufacturing process or a warehouse facilities, effects directly the plant's output

Material transportation is achieved by

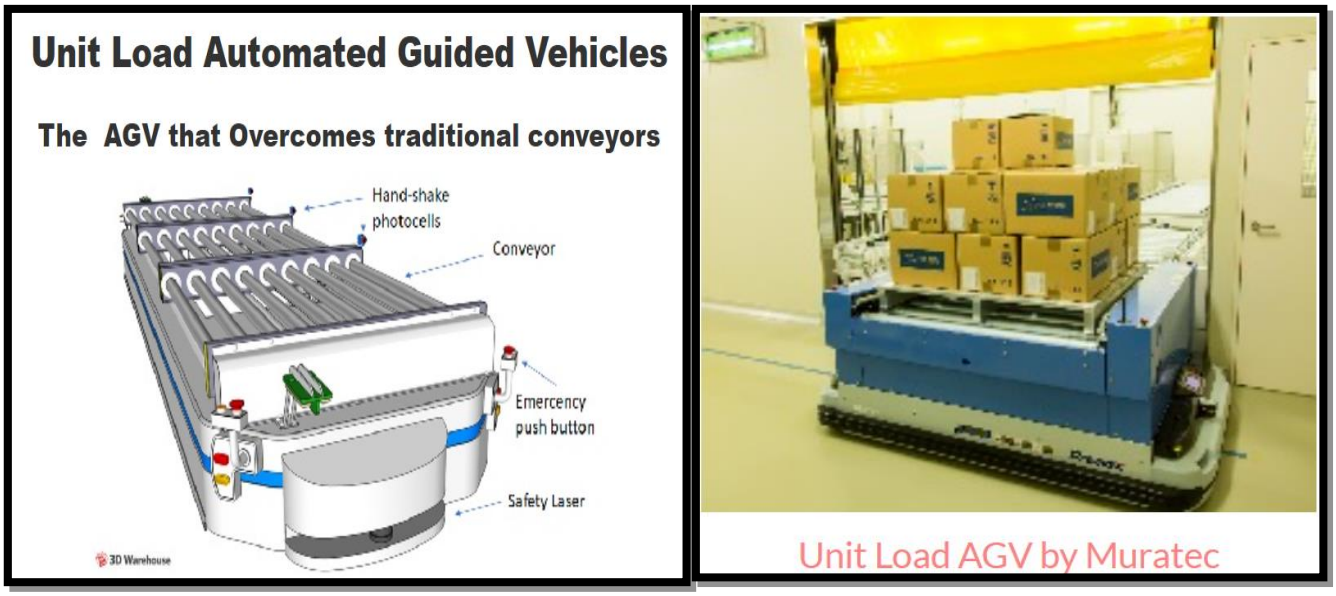
1. Industrial trucks
2. Automated guided vehicles
3. Mono rails and rail guided vehicles
4. Conveyers
5. Cranes and hoists

Types of AGVs

1. **Towing vehicle –**
    - It was the first type of AGVs to be introduced and still in use.
    - A common application is moving heavy payloads over large distances in warehouse or factories with or without intermediate pick up and drop off points along the route.
    - It's an efficient type of transportation system.

2. Unit load transporter-

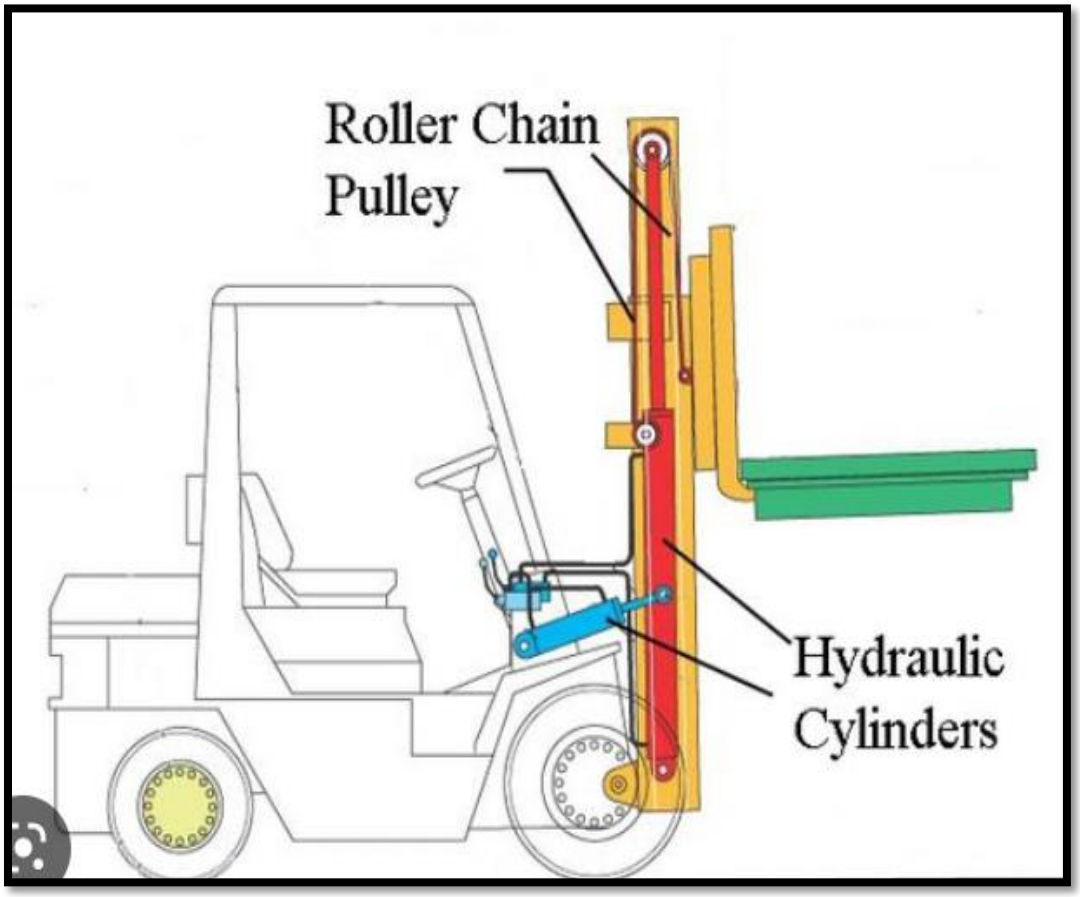
- These are used to move unit loads from one station to other. They often equipped for automatic loading and unloading of pallets, by means of powered rollers, belts etc.
- Light load unit containers are relatively small vehicle with corresponding light load capacity (500lb or less).
- An assembly line AGV is designed to carry a partially completed sub assembly through a sequence of assembly workstations to build the product.



3. **Pallet trucks-**move palletized loads along predetermined routes

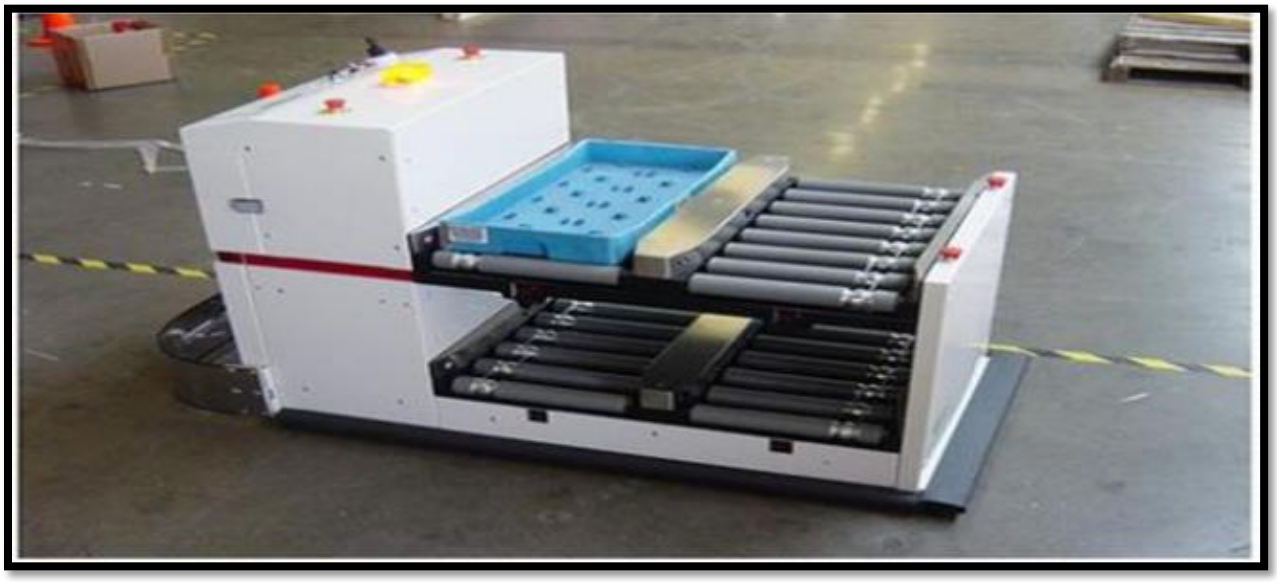
4. Forklift trucks –

- Have ability to pick up and drop off palletized loads both at floor and on stands.
- They can also stack loads in racks
- Equipped with sensors so there is no need of human operator.
- Expensive AGVs so they are applied only in the system where full automation is required.
- Limited to palletized loads with ability to different height facilities.



5. Light load transporter-

- Capacity less than 500lb.
- Used to handle small light parts over moderate distances.
- Designed to operate within limited space



6. Assembly line vehicle-

- Carries major subassemblies.

- Provides manufacturing flexibility by permitting parallel operations in the manufacturing process.
- Low expensive and easy to install
- Variable speeds and dwell intervals can be programmed.
- Speed is the range of 100 to 200 ft/min, capacity is 500 to 2000lb.

Understanding the concept of AGV in different industrial sectors

Automated Guided Vehicles (AGVs) are load carriers that are capable of moving autonomously around distribution centers, manufacturing facilities, and warehouses with no driver on board.

AGV systems are widely used for jobs that would usually be handled by conveyor systems, forklifts, or manual carts, such as repetitively moving large loads of materials of all kinds.

What can be transported by an AGV?

- Raw materials
- Work-in-process
- Finished products

- AGVs are currently being used in a **wide range of applications,** like transporting **raw materials** that include (but are not limited to) **metal, paper, plastic, and rubber.** One example of this is the transporting of raw materials from a receiving dock to a warehouse or even directly to the production line.
- AGVs are capable of consistently and reliably delivering necessary **raw materials with no need for human intervention**. This further ensures that there is no interruption in a company's production line output.

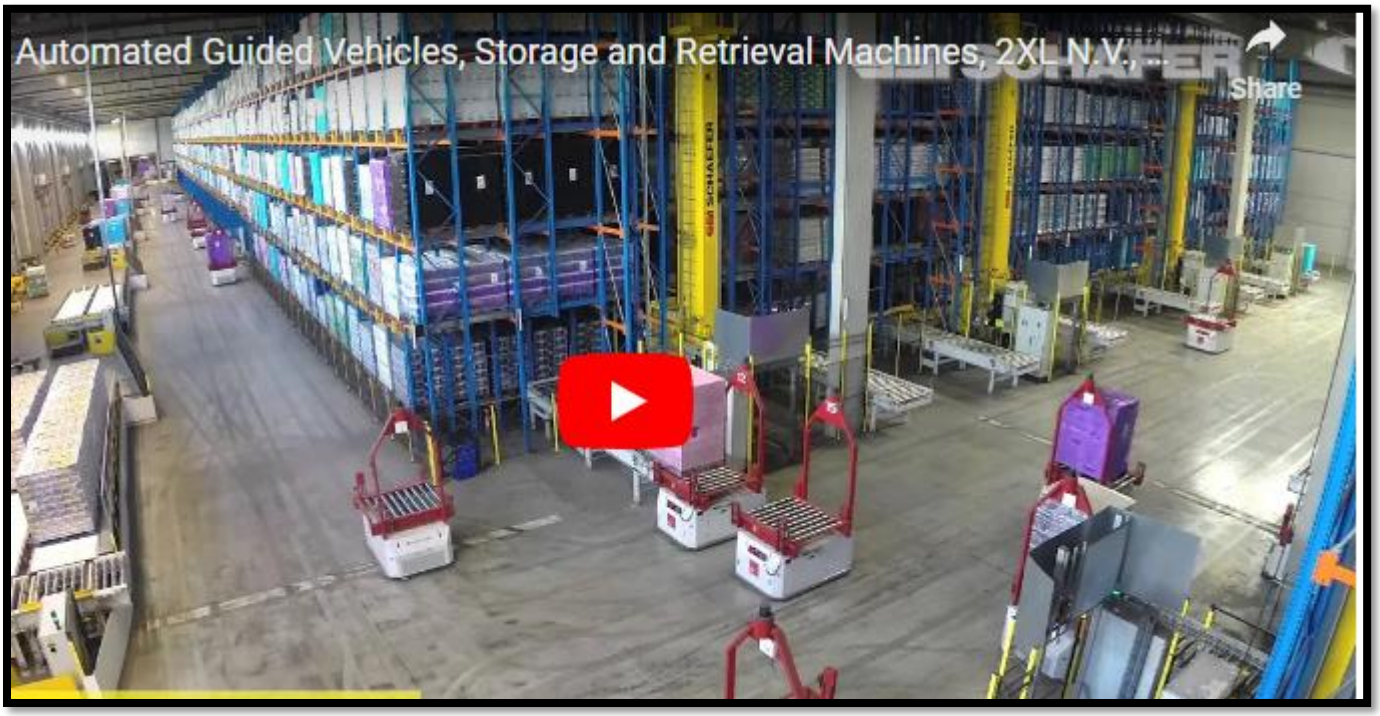
- Self guided vehicles don't just transport raw materials but are also utilized in **work-in-process applications and transporting the completed goods,** thereby supporting manufacturing or production lines.

- **In a work-in-process application,** AGVs would move the parts or materials from one workstation to the other or from a warehouse to the production lines. This provides the efficient movement of those materials that are needed for the manufacturing process.

- Without them, the manufacturing process could simply come to a halt because processing lines ran out of materials and a worker would have to retrieve the materials needed and then manually transport those materials to the production lines.

- AGVs are also widely used in the process of **picking and handling** (both inbound and outbound) for replenishment.

- One example is that AGVs could be used for transporting inventory from the receiving bay to the storage locations.



- They could also transport materials from l**ong-term storage locations to a forward-picking location** for the express purpose of replenishing stock. This can ensure that sufficient inventory will

be readily accessible to the pickers, which makes the entire order-picking process much more efficient.

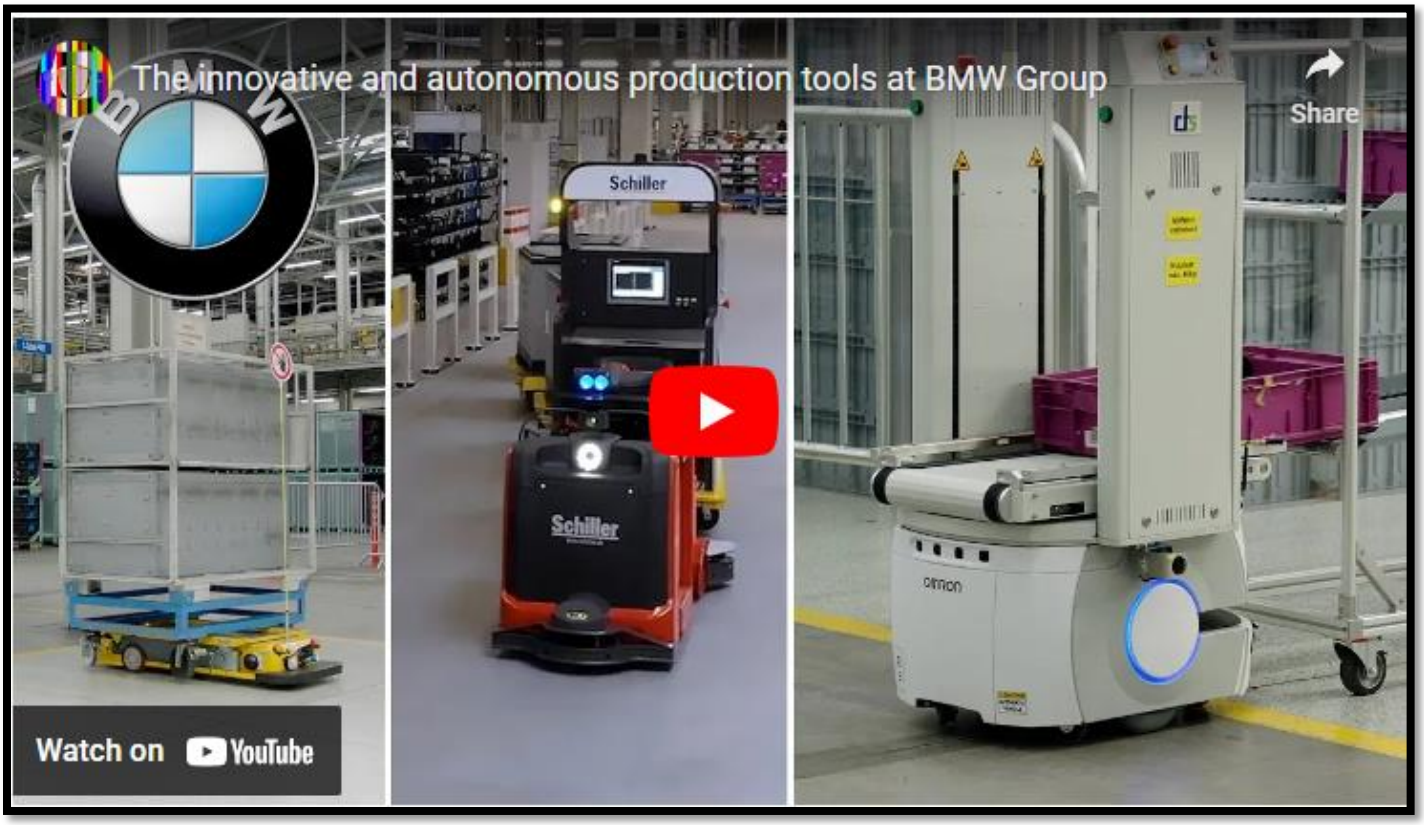
Applications for AGVs - Where are Automated Guided Vehicles Used?

AGV are used in many different industries, including:

AUTOMOTIVE

AGVs are used in the **automotive industry** in the following areas:

- Chassis lines
- Engine and gear box assembly lines,
- Final assembly and trim manufacturing processes,
- Just-in-time parts
- Pre-production staging



FOOD & BEVERAGE

- This type of production requires a very delicate handling process as the products are sensitive to human impact. Among a number of applications in this field, AVGs are often used for:

- Transporting baking trays between the ovens and the production lines.
- In both the production and transportation of food and beverage containers.
- Integrating certain applications with shuttle-shelving systems inside warehouses with high bay areas.

HEALTHCARE & PHARMA

- Currently, the pharmaceutical industry is making more and more use of AGVs to meet the high demands of both quality and hygiene.

- They're regularly being used for transporting medical devices pallets from the high-temperature sterilization cells to deep-stacking radio shuttle warehouses.

- In addition, AGVs can interface with Automated Storage and Retrieval Systems (ASRS) for many pharmaceutical business applications.

- AGVs are used in Hospitals to transport meals, waste bins, linen, sterile supplies, etc. Learn more here: AGV Hospital

PACKAGING

- In the packaging industry, the use of AGVs is on the rise. From companies that are producing packaging materials to others that are regularly using packaging for many of their products, a large number of them have said that AGVs have had a positive impact on their organizations. These days, AGVs are reliably delivering major savings to all segments of the packaging industry.

Typical packaging applications include:

- Moving empty pallets, cans, bottles, containers, labels, layer or slip sheets, lids/caps, wrappers, and more.
- Transporting from the end of the product line to staging or storage.
- Delivering materials from their storage to their point of use.

PAPER & PRINTING

- The paper and printing industry was actually one of the first sectors to utilize AGVs for transporting and **handling massive paper reels** and then storing them in printing facilities and paper mills.

- In printing plants, AGVs move the paper reels from the stripping stations into the high-bay warehouses. Then, they can deliver them directly to the presses.

PRODUCTION

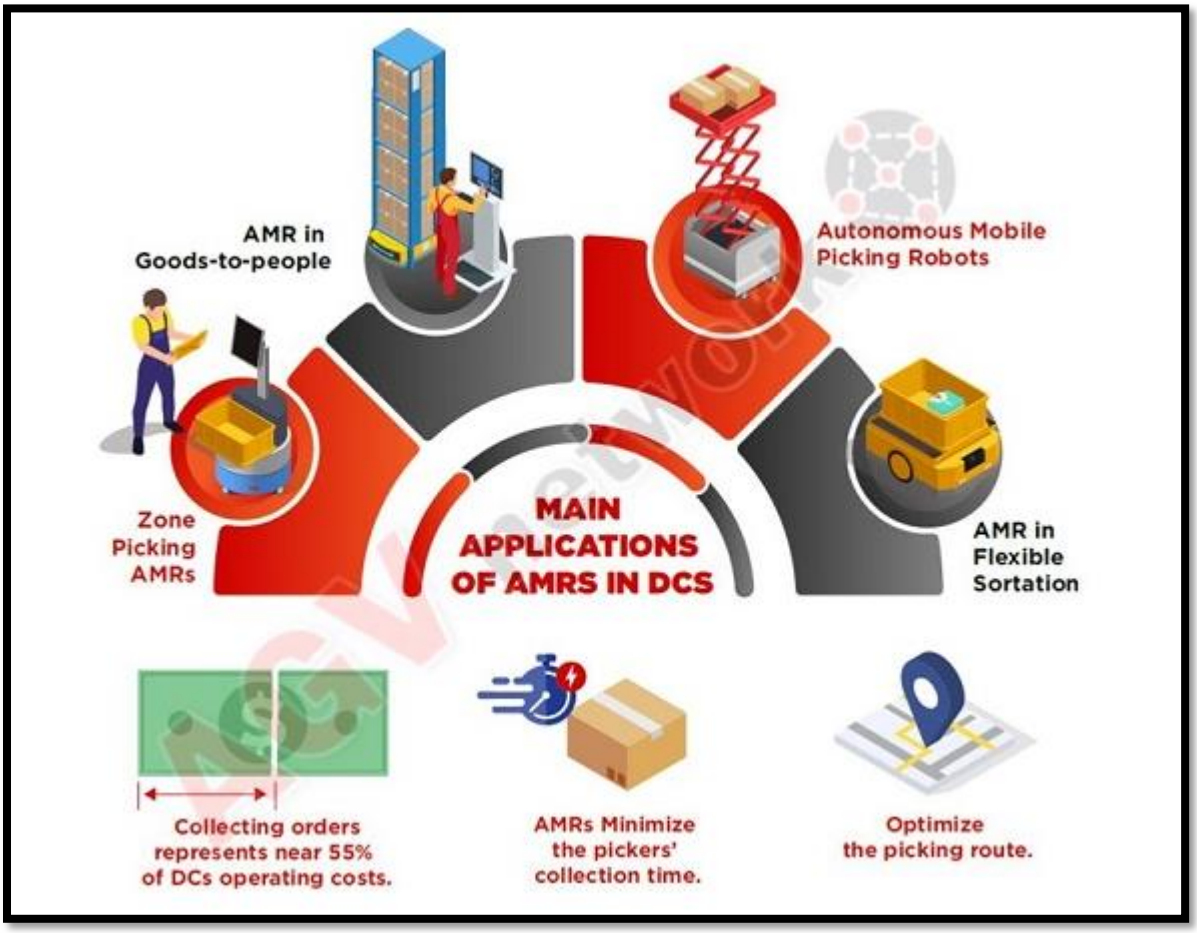
- AGVs can also be utilized for moving materials **from a warehouse to the production lines** or from one production line to another. Today's AGVs can be connected via production computer systems and operating in synchronization with production flow requirements and manufacturing orders.

- AGVs can also be used as an AGV Assembly Line production lines replacing old fashion chains, mats or conveyors.

WAREHOUSE & DISTRIBUTION

- Increased productivity, seamless scaling, and lower labor costs, all within the same footprint are some of the benefits of **AGVs in the fields of warehouse and distribution**.

- The use of AGVs in warehouse is not new, tipical racking warehouses are efficiently managed by Warehouse Robotic Forklifts such as Automated Reach Trucks or Very narrow Aisle AGV.



- AGVs in warehouses means that workers are capable of doing more work faster, easier, and much more accurately than they ever could before.

- The use of Autonomous Mobile Robots in warehouses and distribution centers can not only bring the work to the worker but also eliminate all of the unproductive walking time for significantly lowering cycle times and improving productivity.

- In addition, AMR warehouse improves health safety and workplace ergonomics while also helping with the recruiting and retention of workers.
- Workers don't have to push those heavy carts or spend their days walking behind robotic carts that only end up slowing down and limiting their productivity.

- With AGVs, warehouses **can process more orders with less labor and faster** with increased flexibility for seamlessly scaling whenever needs change or the business grows.

- The end result is **lower cycle times, more picking, and less walking**, eliminating the wasteful and unproductive walking time and making the workflow easier and much faster.

- Because **AGVs bring the work to the worker,** they can focus on what they do best, which is picking.

- In fact, **AGVs can dramatically improve worker productivity by two to three times,** which enables lower labor costs, higher pick rates, and exceptionally faster cycle times. And, when necessary, workers can even alternate between picking, re-stocking, and putaway tasks seamlessly, which helps improve an operation's overall efficiency.

- **E-commerce fulfillment** of today is centered around the ability to deliver a first-class experience to clients and customers.

- The major challenge is efficiently delivering improved productivity but also with lower facility and labor costs while still managing organizational growth, volume spikes, and seasonal peaks. Just **adding more people is definitely not the easiest option nor the best**.

- And, as the needs of companies worldwide grow and change, AGVs can make scaling and adapting of today's e-commerce retailers to today's evolving demands much easier. This, in turn, means meeting and exceeding customer expectations.

LINK: https://www.agvnetwork.com/agv-applications