Universiti Malaysia PAHANG
Engineering • Technology • Creativity

Automated Manufacturing System

Topic 6: Material Transport System

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- Material transport systems are necessary in manufacturing and production environments to transport materials from one location to another.
- Transportation is an important factor in manufacturing and production environments because the materials or products always need to be carried out between processes or between factories.

- Material Handling Industry of America (MHIA) defined material handling as the storage, movement, protection and control of materials throughout the manufacturing and distribution process, including their consumption and disposal.

- Transport methods can be classified as below:
  - Intermittent transport
  - Continuous transport

- Intermittent transport can be divided into:
  - Trackless transport
  - Orbital transport

- Example of Trackless transport:
  - Automated Guided Vehicle (AGV)
  - Manned forklift

- Example of Orbital transport:
  - Ceiling type bogie
  - Linear transport
  - Ground type bogie

- Continuous transport
  - Often used in two types of load:
    - Carton
    - Pallet

- Carton
  - Belt conveyor
  - Roller conveyor
  - Chain conveyor

- Pallet system
  - Roller conveyor
  - Chain conveyor
  - Vertical conveyor

- There are five types of material transport equipment;
    - industrial trucks
    - automated guided vehicles
    - monorails and rail-guided vehicles
    - conveyors
    - hoists and cranes.

- AGV is the most often used equipment in manufacturing facility or in a warehouse
- first introduced in 1950s and followed a fixed path

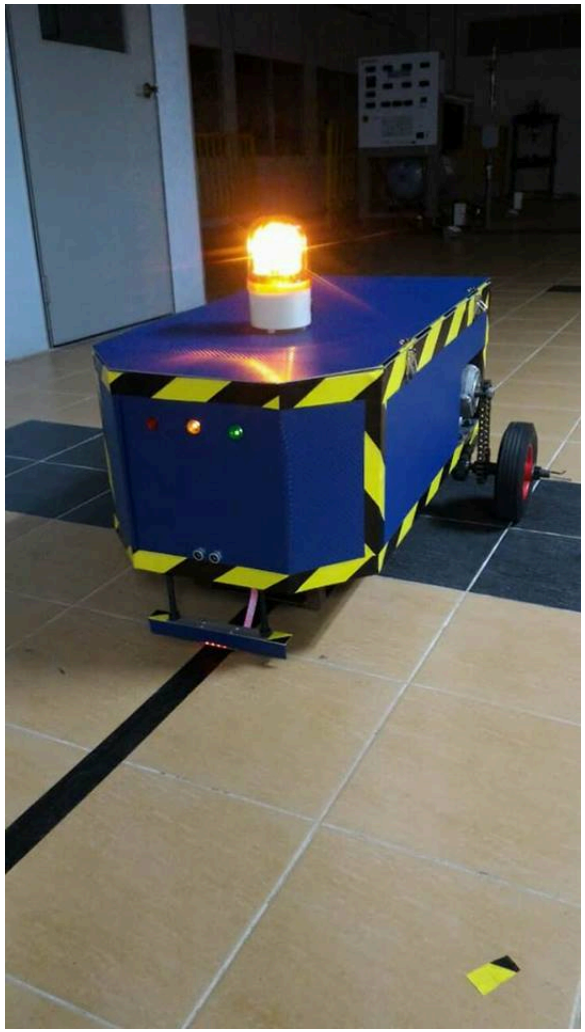
- Application of AGV
  - supply and disposal at storage and production areas
  - assembly platform
  - retrieval in warehouse
  - supply and disposal for special tasks such as at nuclear plant

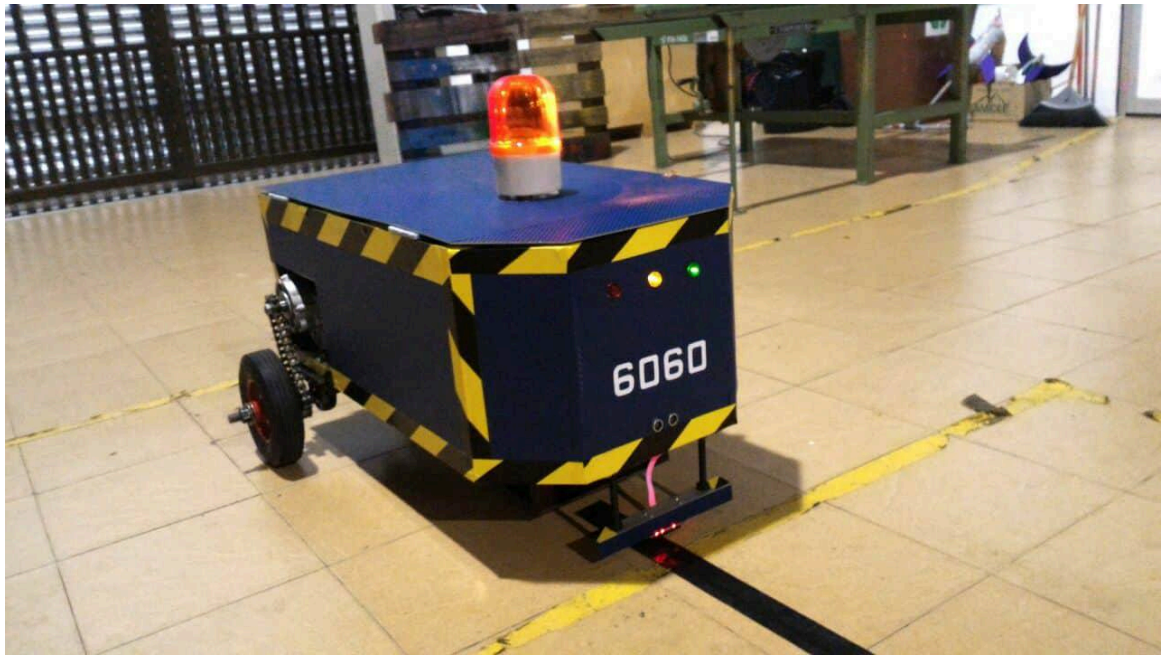
- The advantages of AGV are:
  - the degree of freedom of layout is large,
  - stopping precision can be secured,
  - self-avoiding function to avoid collision,
  - rear-end collision is added.

- AGV can be divided into 3 types:
  - 1. Driverless Train
  - 2.Pallet Trucks
  - 3.Unit Load Carries

- Driverless train
  - Towing vehicle that tow one or more and form a train
- Pallet Trucks
  - Used to move palletized loads and can handle heavy loaded
- Unit Load Carries
  - Used to move loads from one station to another and can automatically load and unload the pallet.

- Guidance systems of AGV (Automated Guided Vehicle) are:
  - electromagnetic induction,
  - optical tape,
  - magnetic tape,
  - laser etc.





Example of line follower AGV

- Recently, linear transport vehicles are used as orbital transport.
- linear motor is used to convey precision parts such as semiconductor wafers and magnetic heads.
- The advantage of linear motor is capable of high-speed conveyance and it is easy to steeply convey or vertically convey.
- Moreover, because it is non-contact, it can be used in a clean room, and maintenance is rarely required.