AGVS of MHI Presents Navigating the Mobile Automation Landscape

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Session Description – ‘Navigating the Mobile Automation Landscape’

A proliferation of automated mobile vehicle types is occurring and transforming the industry. This session will define the similarities and differences to mobile automation terms like AGVs and AMRs, describe the best use-case practices, and provide the context for making sound ROI calculations in mobile automation.

Key Takeaways
• This session will define the similarities and differences to mobile automation terms like AGVs and AMRs
• Describe the best use-case practices
• Provide the context for making sound ROI calculations in mobile automation
Agenda

• Definitions
  – AGV, AMR, etc.
• Terms
  – similarities and differences to mobile automation terms
• Best use-case practices
• Making sound ROI calculations in mobile automation
The Alphabet Soup of Mobile Automation

- AGV-Automatic Guided Vehicle
- AGC-Automatic Guided Cart
- AMR-Autonomous Mobile Robot
- ATL-Automatic Trailer Loader
- LGV-Laser Guided Vehicle
- VGV-Vision Guided Vehicle
- AMV-Autonomous Mobile Vehicle
- SDV-Self Driving Vehicle
Sorting it Out – Really all are AGVs
Examples Visually

AGV = Laser Guided Vehicle

VGo = Autonomous Mobile Robot

Automatic Truck Loader

Automatic Guided Cart

Vision Guided Vehicle
Terms

• Navigation/Guidance
  – Laser
  – Natural Target
  – Optical
  – Camera
  – Inertial
  – Magnetic
  – Wire
  – Path
• On Board software
• Upper Level software
Navigation/Guidance

• Laser

Laser scans environment to find Targets or Reflectors
Navigation/Guidance

- Optical
  - Using some level of Vision technology to follow a Colored strip on the floor

- Camera/Vision System
  - Drive or walk the vehicle along your desired routes. During training, the vehicle’s “eyes” capture and build a robust, 360 degree map of the world around it
Navigation/Guidance

- Inertial
  - Magnets marks
  - 1 to 6 meters apart
  - Solid State Gyro
  - Encoders
Navigation/Guidance

- Magnetic Guidance
  - Tape or Bar Magnet
    - In Floor or on Floor
    - Generally less Expensive
  - Wire Guided (Oldest Technology)
    - Electrically charged wired embedded in the floor
    - AGV follows the wire

Magnetic Sensor on AGV follows Magnetic Tape, Magnetic Spots or Magnetic Bar embedded in the floor.
Navigation/Guidance

- Natural Target
  - Contour Guidance
  - Lidar
  - Natural Feature Recognition
  - SLAM
    - **Simultaneous Localization And Mapping**

Sensor on the front of the Robot/Vehicle Captures Images of obstacles
On Board Software

- How You Program or Configure an AGV or Robot
- Controls all functionality of the individual unit
- Communicates to the Upper Level Control System via Ethernet, Radios and other Technologies

- Path Definition and Vehicle functions
- Blocking and Traffic
Upper Level Software

- Traffic Cop
- Main Communication Channel between AGVs/AMR and Customers MES, WMS type systems
- Generate Efficiency Reports of the System Vehicles
- Graphically Shows the Systems Running and where the Vehicles are in the system
- Shows Alarms and errors in System
- Schedules Maintenance of the Vehicles
- Runs on Mobile Devices
- Runs on Server Grade PCs and Virtual Machines
AGVs Used Functionally for

- Transport
- Receiving/Putaway
- Picking
- Transfer
- Storage/Retrieval
- Loading/Unloading (ATL/ATU)
- Assembly line
Transport

- Counterbalance
- Tugger
Transport

• Deck
  – Roller
  – Lift
Receiving/Putaway

- High lift
- From AS/RS
Picking
Transfer
Storage/Retrieval

- AS/RS functionality
ATL

- Adjustable masts
- Multi-pallet
Assembly Line
Assembly Lines - Index and Dwell Layout / Animation
Assembly Lines - CML Layout / Animation
ROI Calculations

• What to Consider in Your ROI Calculations?
  – Labor Reduction
  – Product Damage
  – Building Damage
  – Worker Safety
  – Higher Efficiency in Output
  – Ergonomic & Medical Issues
ROI Calculations

- What to Consider in Your ROI Calculations?
  - In a Slow Economy, 12-24 Months ROI is typical
  - Today's Economy, 24-36 months ROI is Acceptable
  - Some Industrial Industries will use 4-5 years
  - Many Companies are Leasing vs. Buying the Capital Equipment to improve the ROI
  - Medical Issues and Insurance Cost will typically override ROI considerations
Conclusion

- Lots of names, but they are all AGVs
- Wide range of functionality
- Viable ROI
Who we are

• Leading AGV system and component suppliers
• Mission: Promote growth and effective use of automatic guided vehicle systems (AGVS) in manufacturing, warehousing, distribution and other key markets
AGVS – POWERED BY MHI - COMING EVENTS

• AGVS Webinar – Coming Summer of 2018
  – Update will be sent to your email
• PackExpo in Chicago, October 14-17, 2018
  – Booth # 8958 (McCormick Upper Lakeside)
  – Educational Seminar - TBD
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