Top 5 Ways AGVs Drive Lean Efficiency and Reduce Costs in Manufacturing

Presented by:
Sarah Carlson, Daifuku North America
Brian Keiger, Grenzebach

Sponsored by:
AGVS
Automatic Guided Vehicle Systems

www.ProMatShow.com
What are Automatic Guided Vehicles?

- AGVs are driverless vehicles used to increase efficiency in plants and warehouses.
- AGVs have been used in manufacturing for the past six decades.
- Types of AGVs include:
  - Unit load
  - Automatic Guided Carts (AGCs)
  - Tow or tuggers
  - Forked vehicles
  - Custom vehicles
AGV Applications in Manufacturing

- Line side delivery of parts/tooling
- Assembly
  - Paced
    - Continuous moving line
  - Unpaced
- Material movement
- Removal of trash
- Engine marriage
Challenges Facing Today’s Manufacturers

• Reduce costs
• Improve safety
• Increase efficiency
• Attract and retain employees
• Decrease cycle times
• Improve bottom-line/show ROI
• Floor space constraints
• Lean manufacturing and Just-In-Time delivery goals
Conventional Material Handling Methods

- Towline conveyor
- Powered conveyor
- Lift trucks
- Manual labor
Today’s AGVs

• More affordable
• Better controls and software
  – Easy to program
  – Centralized controls
• Safer
• Increased battery and charging options
  – Flooded Lead Acid, NiCad, Lithium Ion, Sealed, Inductive Power, Fuel Cells
  – Battery charging options including fast opportunity charging
Navigation Options

- Laser
- Spot
- EyeWay
- Magnetic tape
- Range
- Inductive wire
- Multi-navigation
TOP 5 WAYS AGVs IMPROVE MANUFACTURING
#1 Reduce Costs

- Labor costs
  - Compared to fork trucks and manual methods
  - No overtime, breaks, missed time
  - Finding and retaining labor more difficult today

- Product and building damage
  - Predictable movement at a consistent speed

- Quick, easy and cost-effective installation versus conveyors
#2 Ultimate Flexibility

- Easy modification of guidepath
- Change carriers to accommodate future product changes
- Scalable – add or subtract vehicles to change capacity
- Fast opportunity charging allows vehicles charge in process
#3 Improve Safety and Ergonomics

- Less accidents versus fork trucks
  - ANSI B56.5 industry-accepted standard
  - Warning and protective fields
- Improved ergonomics for employees
  - Scissor lifts
  - Cleaner and quieter than conveyors
#4 Reduce Floor Space

- Less floor space required than conveyors
- No fixed assets required by conveyors
- Guidepath does not impede other traffic
- Customize guidepath to your building
  - Path can twist and turn around structures without costly conveyor turns
#5 Increase Productivity and Efficiency

- AGVs operate as independent carriers versus conveyors
  - AGVs can increase speed at any time
  - Redundancy – one AGV breaking down does not shut down entire system

- Reduces cycle time

- Integrates easily with other equipment and management systems

- Lean manufacturing goals are easier to achieve
AGVs CASE STUDIES
Mission Critical Manufacturing Automation

Solution

- Interceptor missile manufacturing
- All material movements now by AGVs
- 2 – 24’ long and 1 – 10’ long custom AGV
- Product transport between assembly areas and test areas
- Replaced manual carts that were pushed

Benefits

- Manufacturing now done with zero “lifts”
- Eliminated requirements for crane usage
- Product is ergonomically positioned
- Increased safety
- Increased flexibility for future changes
Line Side Delivery

- GM’s CAMI plant uses 14 tugger Automatic Guided Carts for line side delivery of fascias to the assembly line
- Parts are placed on a custom-designed carriers that deliver five parts at once Just-In-Time (JIT) and Just-In-Sequence (JIS)
- Magnetic tape guidance
- Nearly quadrupled production rates with same number of employees
Movement from Line to Heat Treatment

Project Description

- Material movement from line to heat treatment
- 4000 lbs. Skids
- Pick/drop to conveyors using proximity sensors
- Laser Guided Fork Truck
- 3+ AGVs
- Variable load sizes, loading into high temperature ovens
Movement from Line to Heat Treatment

Benefits

• Improved safety
• Reduced labor costs
• Increased productivity
• Reduced damage to facility
• Increased facility throughput
• More flexibility for layout changes
• ROI
Line Delivery from ASRS to Binders

Project Description

- Material movement from ASRS to Binder Lines
- 3,000 lbs. skids
- Pick from conveyors/floor
- Drop to floor
- Laser Guided Fork Truck
- 23+ AGVs
- Variable load sizes interfacing with overhead gantry
Line Delivery from ASRS to Binders

Benefits

- Improved safety
- Reduced labor costs
- Increased productivity
- Reduced damage to facility
- Increased facility throughput
- Flexibility and expandability for future operations
- ROI
Engine Manufacturing

Objective:
- Deliver steel sheets to laser cutting machines
- Deliver components to workstations
- Negotiate tight layout
- Move in & out of cutting machines without disruption to the existing process

Solution:
- AGVs with lift deck, bi-directional travel
- Wireless navigation
- Call/send pushbutton stations

Results:
- On-time delivery of sheet to cutting machines
- Delivery of components to work cells
- Modification to existing equipment not required
- Two way travel into and out of machining area
Magna’s Mobile Assembly Line

• Magna uses 36 Automatic Guided Carts (AGCs) to assemble front-end modules and fascias for Jeep SUVs
• AGC system replaced carousel conveyors
• Parts are transported between subassembly stations on AGCs guided by magnetic tape
• Finished products are delivered just-in-time (JIT) and just-in-sequence (JIS) with vehicles coming off paint line at auto plant
Benefits of Magna’s Mobile Assembly Line
Operating Costs - Conventional

- Typical fully-burdened fork truck operator per shift is ~$35k-45k
  - Two-shift operation
  - Varies geographically, labor pool
- Conventional sit down vehicle ~ $50k
- Monitors, software for WMS tie in
- Five vehicles
- Annual costs for damage/loss $10k
- Initial cost $250k
- Annual operating cost ~$400k
Operating Costs AGVs

- 8 - 3000 lbs. capacity AGVs, laser navigation ~$1.3M
- Elimination of 10 FTEs + $400k
- Elimination of facility/product damage budgets +10k
- Same annual maintenance costs
- \((\text{AGV Cap Cost}) - (\text{Conv. Cap Cost})\) (Annual Cost savings)
- 2.3 years

**assumes similar annual maintenance, uptime, utilization rates, 1:1.5 rounded up replacement ratio**
Key AGV Takeaways

• Reduces costs by decreasing labor, product damage and lower installation costs
  - Resolves turnover and training of employees
• Provides ultimate flexibility to scale up and down, modify guidepaths, and accommodate future product and process changes
• Improves safety and ergonomics
• Reduces floor space and eliminate barriers that come with conveyors
• Increases productivity and efficiency by reducing cycle times, providing redundancy and consistent throughput, and integrating easily with other equipment and systems
• Typical 2-3 year ROI is based on multi-shift operation, median labor rates (burdened)
For More Information:

Speaker #1 Sarah Carlson, Marketing Director
Daifuku North America
email: scarlson@DaifukuNA.com
Website: www.DaifukuNA.com
ProMat 2015 Booth #1013

Speaker #2 Brian Keiger, Chief Sales Officer (CSO)
Grenzebach
email: brian.keiger@grenzebach.com
Website: www.grenzebach.com
ProMat 2015 Booth #2919