

# Automated Guided Vehicle Systems: For profitable business

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## ABSTRACT

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**The time before an automated system pays for itself is very short, especially when used in shift work. Labour costs can be reduced, and/or workers can be freed for more productive tasks. An automated system is in operation 24/7, with no interruptions to the process. It is also possible to rent an automated system, leaving no capital tied up in the investment.**

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## I. INTRODUCTION

Robots do not need rest time, holiday, and wages or salary thus robots are best employee to work with. Automated Guided vehicle (AGV) is a robot that can deliver the materials from the inventory to the technician automatically on time. This system is on time always and more precise. The robot can be accessed wirelessly i.e. a technician can directly order the robot to deliver the components rather than order it via a human operator (over phone, computer etc. who has to program the robot or ask a delivery person to make the delivery). AGV are smart enough to take decision on their self. To avoid collision with human workers or obstacles, a proximity detector is added to avoiding accident.

Automated guided vehicles increase efficiency and reduce costs by helping to automate a manufacturing facility or warehouse. The AGV can tow objects behind them in trailers to which they can autonomously attach. The trailers can be used to move raw materials or finished product. The AGV can also store objects onboard. Some AGVs use forklifts to lift objects for storage. AGVs are employed in nearly every industry, including, pulp, paper, metals, newspaper, and general manufacturing. Transporting materials such as food, linen or medicine in hospitals is also done.

## II. LITERATURE SURVEY

The first big development for the AGV industry was the introduction of a unit load vehicle in themid-1970s. This unit load AGVs gained widespread acceptance in the material handling marketplace because of their ability to serve several functions; a work platform, a transportation device and a link inthe control and information system for the factory. Since then, AGVs have evolved into complexmaterial handling transport vehicles ranging from

mail handling AGVs to highly automated automatictrailer loading AGVs using laser and natural target navigation technologies.

Material handling inmanufacturing system is becoming easier as the automated machine technology has improved.One of the material handling methods that has been widely used in most industry nowadays isthe Automated Guided Vehicle System or better known as the AGVS. It has become one of hefastest growing classes of equipment in the material handling industry (Tanchoco and Bilge,1997). Until today there are many researchers that have shown interests in improving thesystem in order to achieve more productivity and flexibility in manufacturing environments.According to (Groover, 1987) an Automated Guided Vehicle System (AGVS) is a materialshhandling system that uses independently operated, self propelled vehicles known as theautomated guided vehicle or AGV that moves along defined pathways between delivery pointsor stations. A typical AGV will consist of the frame, batteries, electrical system, drive unit,steering, on board controller and work platform

## III. AGV COMPONENTS

### A. Mechanical

The Mechanical components include chassis and the steering system.

Chassis act as a frame for attaching components. It carries the load of other components and the payload. Act as sacrificial component to prevent damage of expensive payload in case of accidents. Steering system is for steering the AGV.

### B. Electrical

Electrical components include the motor and the power supply for the motor itself.

### C. Electronics

Electronic components provide sensing, logical decision and control of the vehicle. It includes microprocessor for the decision logic, the motor driver as both sensing and control of motor.

#### D. Computer

The Computer acts as a viable substitute for a central computer that provides the AGV's with the path to proceed.

### IV. APPLICATIONS

AGV has helped hundreds of companies in various industries automate their production processes, handle awkward loads, and streamline warehouse operations. Increasing efficiency while decreasing overhead; we provide custom automation solutions that meet specific needs.

#### A. Assembly line

Assembly Line AGVs and AGCs are commonly used in place of traditional assembly lines or can also replace in-floor tow lines. These AGVs are most commonly ordered at tape guided configurations but are also available in Laser, Spot and Wire guidance for maximum layout flexibility. They offers standard and customized solutions to meet the end user's unique requirements. Below you will find various assembly line and production vehicles that can be applied to various applications.

#### B. Raw material handling

Automatic guided vehicle systems will provide consistent, just-in-time flow of raw materials, such as steel, rubber, plastic or other materials, to keep your production machines operating at maximum capacity.

Requests for delivery of raw materials can be automatically scheduled via an interface with production control software or manually by production machine operators. Benefits of using an AGV System include Improved safety with AGVs that move in a controlled and predictable manner with safety sensors for obstacle detection.Reduced labor costs by eliminating simple jobs related to material movement, and reassigning those workers to areas where they can add more value to the company's products.Reduced product damage with gentle handling of loads.Improved material tracking is easy with computer controlled vehicles which communicate with plant controls. Little to no plant modifications/bulky conveyors needed – which represent permanent obstacles and are inflexible for future plant modification.

#### C. Hospital sector

ATLIS (Automated Transport and Logistics Integration Systems) AGV was specifically designed for the hospital and health care industry to provide safe, efficient automatic transportation of goods. The goods typically transported by our ATLIS System include carts of dietary/food items, medical/surgical supplies (case carts), linens, trash, regulated medical waste, pharmaceuticals, items for decontamination centers, and general housekeeping items. In the hospital, this AGV system links the central processing areas such as the kitchen, laundry, trash dock, receiving, sterile stores, etc. with the patient floors. Materials are processed in these areas and are sent automatically using the Automated Transport System (ATS) transporters to the appropriate patient floor. Similarly, materials can be sent from the patient floors back to those central processing areas. Requests for material movement are made with user friendly touch screens or portable handheld PDAs. The system is

fully integrated to automatically operate doors, elevators/lifts, cart washers, trash dumpers, etc.

### V. SCOPE AND FORECAST

Automated Guided Vehicles (AGVs) are battery powered autonomously working vehicles generally used for transporting goods and equipment in house in an industry without human intervention for guidance. This increases reliability and efficiency of material handling on floor. The technology started with wire guided navigation system and

evolved to 3D vision guiding navigation system. In modern era, apart from transport, AGVs are used as mobile work platform, link in the control and information system for factory as well.

### VI. STATISTICS

The increasing interest in AGVS is reflected in the sales figures which reached a new peak in 2006 with a volume of 200 Mio. EUR according to a yearly survey among European AGVS producers carried out by the PSLT. The current developments promise that automated transport systems will be of high relevance in the future as well. The trends of the different markets and thus the development of the AGVS-manufacturers are also of particular importance for investment decisions of customers. Customers have to ensure that the acquired technology is future-oriented and that the manufacturer will be available at the market segment of AGVS in the long term. The selected AGVS-manufacturer should be available for service and support of the system as well as for spare part logistics for a long time. In comparison to the year 2000 about a quarter of the AGVS-manufacturers are on the one hand "new" vendors. On the other hand the "old" vendors offer new and different achievement profiles today. Both aspects point out the dynamics on the vendor side, which offers with more than twenty five European AGVS-manufacturers a large variety. A substantial indicator for the market tendency of AGVS is the annual number of AGVS put into operation. The key number for the European manufacturers is issued by the PSLT based on the information of the AGVS-manufacturers. The number of AGVS put into operation world-wide by European AGVS-manufacturers sums up to over 3.300 new systems with about 27.500 Automated Guided Vehicles in total.

### VII. BOOST EFFICIENCY

AGVs have been around for a while, although rising labor costs and increased affordability have recently given the industry a boost. Today, AGVs play an important role in the design of new factories and warehouses as more companies recognize the technology as an efficient, dependable and versatile material handling solution.The increasing popularity of AGVs is due to the cost savings and efficiencies that can be gained in manufacturing and distribution facilities. These futuristic vehicles run on the plant floor and help move product from point A to point B without the need for an onboard operator or driver. This makes AGVs cost effective for a variety of industries, including automotive, food and beverage, chemicals and plastics, commercial print, paper and pharmaceuticals.AGVs often move raw material to a manufacturing line and finished product to a distribution area, which helps companies focus employee time on value-

added activities, while the AGVs handle the mundane movement of materials. They also help reduce labor-related costs and product damage, improve safety and ensure on-time material delivery

### VIII. VERSATILE SOLUTION

The ability of AGVs to fit in tight areas and adapt to changes make them suitable for any business with manufacturing plants, warehouses or distribution centers. Benefits include higher productivity, continuous operation, reduced product damage, improved process flow, improved safety and elimination of non-value-added activities.

### IX. CONCLUSION

a) Significant technological advancements contributed to increase the attractiveness of Automated Guided Vehicle Systems for the users. They essentially concern the modularity, the standardization, the navigation system, the energy concept, the automation of series vehicles and the safety system. For manufacturers of AGVS internationalization and globalization represent new challenges. China and other newly industrialized countries offer chances for the future. The first systems were already put into operation in these countries. Great efforts are undertaken by European vendors to install reference assets. In this connection long-term export possibilities for AGVS-manufacturers are of particular interest. In addition China itself is currently developing AGVS for their own market.

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