



## Automated Guided Vehicles

Damon provides intelligent and efficient logistic solution for industrial and commercial customers

## Company profile

Zhejiang Damon Technology Co.,Ltd. is a high-tech enterprise that specializes in researching and manufacturing AGV , providing intelligent , efficient and flexible integrated logistic solution for industrial and commercial customers. Company' s main products cover series of load vehicles, such as automatic transfer type, tail pull type, flatbed pull type, lifting type, table vehicle, heavyload platform type, forklift type and omni-directional. Technologies like vision and laser guiding are applied in our products, which can meet the needs of intelligent transportation in various industrial and commercial field. DAMON gives the first priority to user requirement, and provides tailor-made solutions for each individual client. Various products and integrated solutions has been applied in many Fortune-500 companies, which covers logistics, automobile, electronic manufacture, electrical equipment, electric power, specialized equipment and other industries. The company also provides flexible integrated logistic solution for E-business, express, logistics storage, pharmaceutical and other industries.

Our head office is located in Zhejiang Province, China, while research and sales offices are set in Shanghai. We provide qualified products and services to worldwide customers.

Main products: AGV and integrated logistic solution.

Application: E-commerce warehousing, automobile, household electrical appliances, power equipment, electronics manufacturing and so on.

Product lines: load type, automatic transfer type, tail pull type, flatbed pull type, lifting type, table type, heavy load platform type, forklift type, omni-directional.

Navigation Mode: Vision navigation , Laser navigation and magnetic  
Load Capacity: 50Kg-2000Kg



## Product Introduction

Advanced technologies are applied to the products, including infrared, laser, wireless communication, sensor, RFID, database, visual identity, magnetic induction and so on.

- Reduce labor and work intensity, lower logistic cost.
- Significantly reduce turnover products inventory.
- Real time tracking during whole process.
- Significantly reduce logistic error rate.
- Meet the requirements of small batches and multi-batch material delivery.



With several series of AGV product lines and dozens of specifications, intelligent handling needs in various industrial areas is satisfied.

- ① DR10 Load type
- ② DR20 Automatic transfer type
- ③ DR30 Tail pull type
- ④ DR40 Flatbed pull type
- ⑤ DR50 Lifting type
- ⑥ DR60 Table type
- ⑦ DR70 Heavy-load platform type
- ⑧ DR80 Forklift type
- ⑨ DR90 Omni-directional



## DR10

### Load type

Load type AGV is able to carry materials on its body. When it is working, AGV stops under the bottom of goods, and then goods are lift up and transported by AGV. It has advantages of simple movement, high working performance and safety. AGV is suitable for transport various and heavy goods between the two places, and also can be used as a flexible assembly line or processing line. It is commonly used in handling vehicle body, cart frame, container, large parts etc.

#### Features

- Simple movement
- High working performance
- High safety

### Specifications

No.	Item	Parameters
1	Maximum load capacity	2000kg
2	Driving speed	0-90m/min
3	Bearing surface minimum height	250mm
4	Battery	Lead-acid battery / Lithium battery (pump modules )
5	Running direction	Two-way
6	Node identification	QR code/RFID
7	Positioning accuracy	±5mm
8	Safety protection	Non-contact + contact
9	Sound-light alarm	Rotate sound-light alarm and music alarm
10	Charging	Manual / automatic(pump modules )
11	Wireless communication	WIFI
12	Turning radius	0mm
13	Navigation mode	Magnetic navigation/Vision navigation



## DR20 Automatic transfer type

Automatic transfer type AGV is equipped with powerful roller on the back to joint with production line, and can automatically perform loading and unloading. The finished products and semi-finished products can be transferred to AGV by transport tape or fixed rollers under unattended condition. The automatic transfer type AGV is applied for automated assembly line in factory with tailor-made docking component.

### Features

- Highly automatized
- High efficiency
- High Safety

## Specifications

No.	Item	Parameters
1	Maximum load capacity	2000kg
2	Driving speed	0-90m/min
3	Bearing surface minimum height	300mm
4	Battery	Lead-acid battery / Lithium battery (pump modules )
5	Running direction	Two-way
6	Node identification	QR code/RFID
7	Positioning accuracy	±5mm
8	Safety protection	Non-contact + contact
9	Sound-light alarm	Rotate sound-light alarm and music alarm
10	Charging	Manual / automatic(pump modules )
11	Wireless communication	WIFI
12	Turning radius	0mm
13	Navigation mode	Magnetic navigation/ Vision navigation



## DR30 Tail pull type

Tail pull type AGV can pull goods shelf through draft gear on AGV's trail. It can transport goods to specific location by vision navigation or magnetic navigation automatically. This type of AGV is flexible and simple in design, which is convenient for connecting with materials wagon. The vehicle is simple in structure without complicated parts and easy for manual operation. The AGV is suitable for distribution of various materials and finished goods in manufacturing industry.

### Features

- Flexible in application
- Suitable for pulling goods of low chassis and need no modification on shelf.
- Differential steering, short turning radius.
- Two-way drive.
- Simple structure, cost-effective.

## Specifications

No.	Item	Parameters
1	Maximum load capacity	2000kg
2	Driving speed	0-45m/min
3	Bearing surface minimum height	250mm
4	Battery	Lead-acid battery / Lithium battery (pump modules )
5	Running direction	One-way
6	Node identification	QR code/RFID
7	Positioning accuracy	±5 mm
8	Safety protection	Non-contact + contact
9	Sound-light alarm	Rotate sound-light alarm and music alarm
10	Charging	Manual / automatic(pump modules )
11	Wireless communication	WIFI
12	Turning radius	0mm
13	Navigation mode	Magnetic navigation/Vision navigation



## DR40 Flatbed pull type

Flatbed pull type AGV dives goods shelf through traction stick on the AGV's upper frame. This type of AGV can reach the bottom of the goods shelf, and automatically transport the shelf by vision navigation or laser navigation. When the cargo reaches the specific location, AGV and shelf automatically separate, and then AGV drags an emptied shelf away. The flatbed pull type AGV is applied in producing shop of various manufacturing enterprise for material transportation. It can choose the shortest path, even running under bottom of other equipment, which greatly reduces travel distance and increases turnover efficiency.

### Features

- Simple action
- High safety
- High turnover efficiency

## Specifications

No.	Item	Parameters
1	Maximum load capacity	2000kg
2	Driving speed	0-90m/min
3	Bearing surface minimum height	280mm
4	Battery	Lead-acid battery / Lithium battery (Pump Modules )
5	Running direction	Two-way
6	Node identification	QR code/RFID
7	Positioning accuracy	±5mm
8	Safety protection	Non-Contact + Contact
9	Sound-light alarm	Rotate sound-light alarm and music alarm
10	Charging	Manual / automatic(pump modules )
11	Wireless communication	WIFI
12	Turning radius	0mm
13	Navigation mode	Magnetic navigation/ Vision navigation



## DR50 Lifting type

The height of lifting platform of AGV can be adjusted to carry the cargo. And the lifting platform can be removed and the AGV be used as an ordinary bear type. It is applied in work shop with different height and mainly used for assembly line.

### Features

- Adapt to a variety of workplace
- Platform height is adjustable

## Specifications

No.	Item	Parameters
1	Maximum tractive capacity	1500kg
2	Driving speed	0-90m/min
3	Battery	Lead-acid battery / Lithium battery (Pump Modules )
4	Running direction	Two-way
5	Node identification	QR code/RFID
6	Positioning accuracy	±5mm
7	Safety protection	Non-Contact + Contact
8	Sound-light alarm	Rotate sound-light alarm and music alarm
9	Charging	Manual / automatic(pump modules )
10	Wireless communication	WIFI
11	Turning radius	0mm
12	Navigation mode	Magnetic navigation/ Vision navigation
13	Lifting height	0-50mm





## DR60 Table type

Table-type AGV can directly carry or tow materials wagon. The large space on its bearing platform makes it possible to carry irregular goods. The moderate height of its front part brings convenience of operation. Table-type AGV has a wide application scope.

### Features

- Intelligent obstacle avoidance.
- Large space of bearing platform.

## Specifications

No.	Item	Parameters
1	Maximum load capacity	2000kg
2	Minimum height of bearing platform	250mm
3	Driving speed	0-90m/min
4	Battery	Lead-acid battery / Lithium battery (Pump Modules )
5	Running direction	Two-way
6	Node identification	QR code/RFID
7	Positioning accuracy	±5mm
8	Safety protection	Non-Contact + Contact
9	Sound-light alarm	Rotate sound-light alarm and music alarm
10	Charging	Manual / automatic(pump modules )
11	Wireless communication	WIFI
12	Turning radius	0mm
13	Navigation mode	Magnetic navigation/ Vision navigation



## DR70 Heavy-load platform type

Heavy-load platform AGV can carry goods of large size and weight, e.g. tire, and can be designed according to customer demand.

### Features

- Large loading capacity.
- Smooth transportation.

## Specifications

No.	Item	Parameters
1	Maximum load capacity	2000kg
2	Minimum height	280mm
3	Driving speed	0-90m/min
4	Battery	Lead-acid battery / Lithium battery (Pump Modules )
5	Running direction	Two-way
6	Node identification	QR code/RFID
7	Positioning accuracy	±5mm
8	Safety protection	Non-Contact + Contact
9	Sound-light alarm	Rotate sound-light alarm and music alarm
10	Charging	Manual / automatic(pump modules )
11	Wireless communication	WIFI
12	Turning radius	0mm
13	Navigation mode	Magnetic navigation/ Vision navigation



## DR80 Forklift type

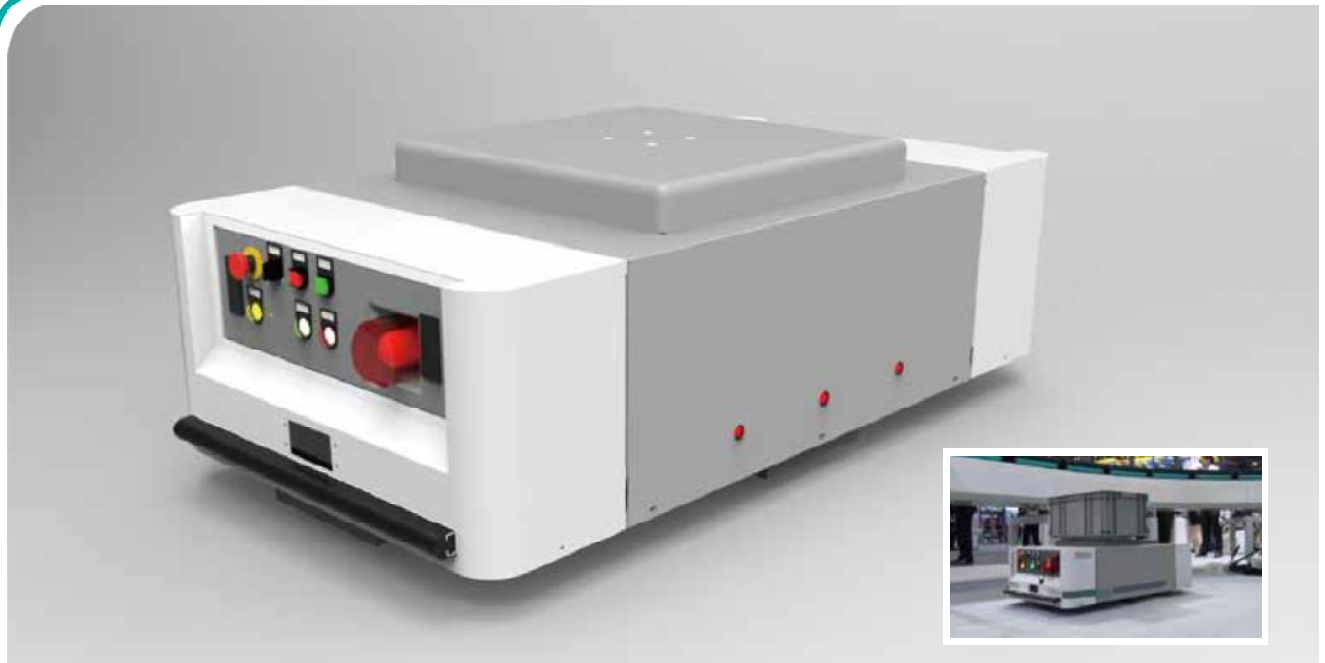
Forklift type AGV carries material on pallet. This kind of AGV can lift cargo with huge weight. It can be applied for stacking of warehouse and transporting of shelf in factory.

### Features

- It is suitable for carrying goods shelf of low chassis with little changes on work site and shelf.
- Three point suspension with short turning radius
- Varied specifications

## Specifications

No.	Item	Parameters
1	Maximum load capacity	1500kg
2	Driving speed	0-72m/min
3	Bearing surface minimum height	0mm
4	Battery	Lead-acid battery / Lithium battery (Pump Modules )
5	Running direction	Two-way
6	Node identification	RFID
7	Positioning accuracy	±10mm
8	Safety protection	Non-Contact + Contact
9	Sound-light alarm	Rotate sound-light alarm and music alarm
10	Charging	Manual / automatic(pump modules )
11	Wireless communication	WIFI
12	Turning radius	0mm
13	Navigation mode	Magnetic navigation/ Vision navigation



## DR90 Omni-directional type

The aim of design for this product is smart, delicate and reliability. It can run freely in any direction with cargo's posture unchanged. This feature makes it suitable for intensive production line and warehouse.

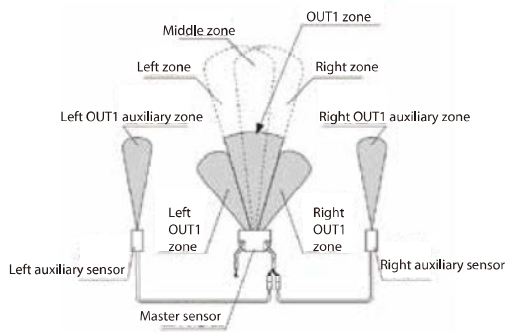
### Features

- Four directional navigation: The navigation device is installed in four directions which allows free switching navigation with cargo's posture unchanged
- All directional movement: The vehicle can adjust steering angle to run straight line in any direction.
- Safety: Duplicate protection system, including sensors installed in four sides of vehicle and mechanical protective equipment, ensures safe running of AGVs.
- Extensibility: Combined with automatic transfer device, manipulator and high-rise warehouse, a variety of automatic logistics lines and automatic production lines can be achieved.

## Specifications

No.	Item	Parameters
1	Maximum load capacity	250kg( according to customer requirement)
2	Weight	150kg
3	Driving speed	0-30m/min
4	Battery	Lead-acid battery / Lithium battery (Pump Modules )
5	Running direction	Omni-directional mobile/ four direction guide
6	Node identification	RFID
7	Positioning accuracy	Straight left and right runout $\pm$ 20mm/ Turning left and right runout $\pm$ 20mm
8	Safety protection	Non-Contact + Contact
9	Sound-light alarm	Rotate sound-light alarm and music alarm
10	Charging	Manual / automatic(pump modules )
11	Wireless communication	WIFI
12	Turning radius	Pivot steering
13	Navigation mode	Magnetic navigation/ Vision navigation

## Infrared & Mechanical collision avoidance system



DeRee AGV uses duplicate protection system, i.e. infrared electric module and mechanical protective equipment, to ensure personnel security and equipment running safely. The system adopts infrared electric module, which scans front area of AGV and chooses different collision avoidance methods according to distance between AGV and obstacle.

- AGV slows down and stops when obstacle (or person) is detected.
- AGV will automatically run again after the obstacle is removed.
- When infrared photoelectric module does not work or AGV doesn't stop in time, the AGV will execute emergency stop after obstacle (person) contacts mechanical collision avoidance system.

### Protection standard

#### Infrared photoelectric module

- Sensing distance: 0.5~3m adjustable
- Braking distance under full load: 0.2~0.5m

#### Mechanical protection

- Sensing time: 0.1s
- Braking distance: 0.2m

Laser barrier sensor can be applied in collision avoidance system for a better protection according to customers' requirements.

## Laser collision avoidance system

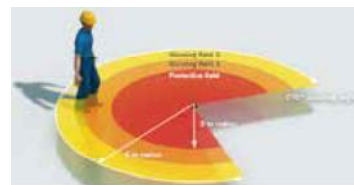
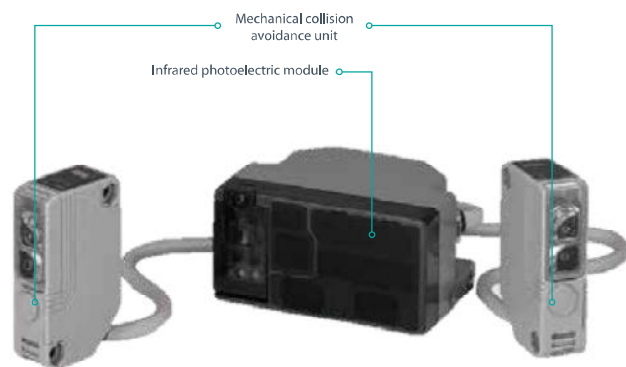
Safety laser scanner will provide better safety detection and alarm function. It is optional to customers with special safety needs.



Mechanical collision avoidance unit



Infrared photoelectric module



Laser detection zone

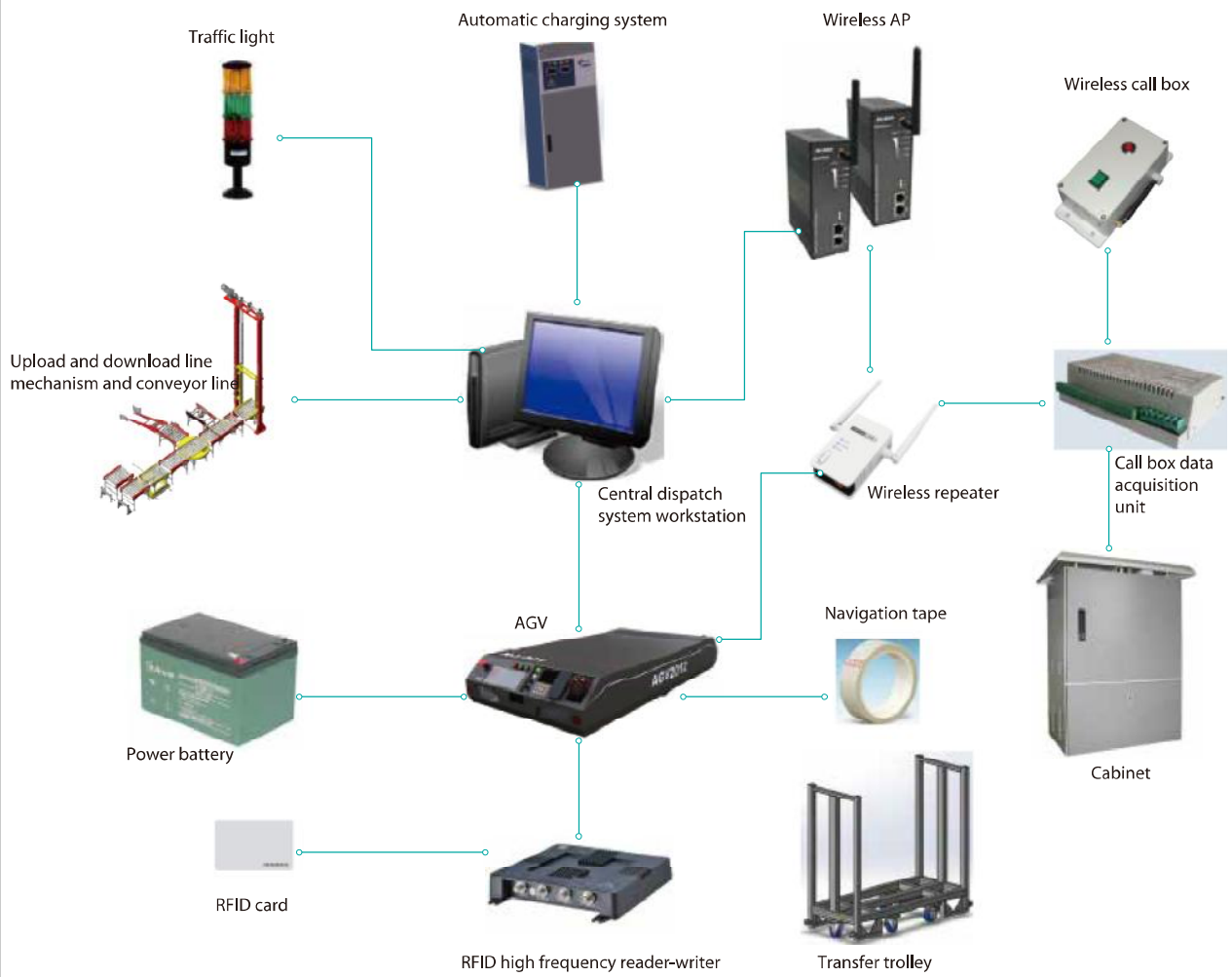


Safety laser scanner

### Technique Specification

No	Model	S300 mini
1	Light-emitting element	Lasing diode
2	Detection region	16 protected area, 32 warning region
3	Detection distance	0-8m adjustable
4	Detection angle	0-270° adjustable
5	Ambient Temp	-10—50°C
6	Ambient humidity	35—95%RH
7	Ambient illuminance	Incandescent light bulb: 15000 lux or less

## System components



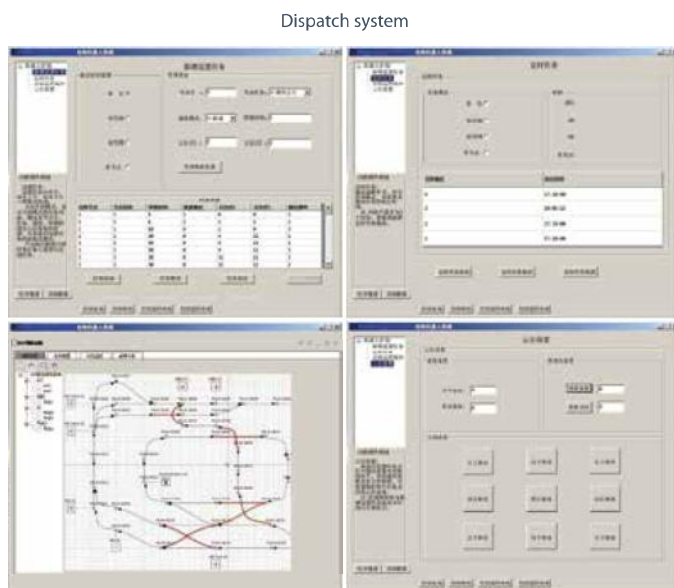
## Network architecture



The integrated solutions is composed of dispatching system, AGV, call center, electric control cabinet, AP, etc. The intelligent handling system systems are connected by wireless communication and signal cable, covering whole area of the factory.

## Central dispatch system

The AGVs in intelligent logistic solution are controlled and dispatched by the central control dispatching system which can supervise, control and dispatch AGVs at the same time. User can find information such as state, location and task of each AGV from system HMI, and automatically or manually assign a new mission to leisure AGV. User also can add functions like failure warning, traffic control, system remote upgrading or maintenance to the system according to actual demands.

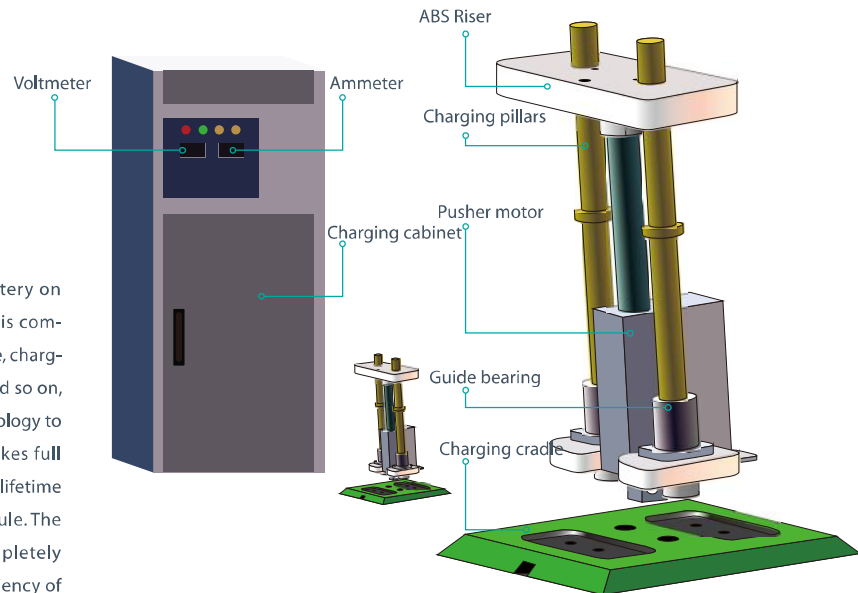




## Options

### Auto charge

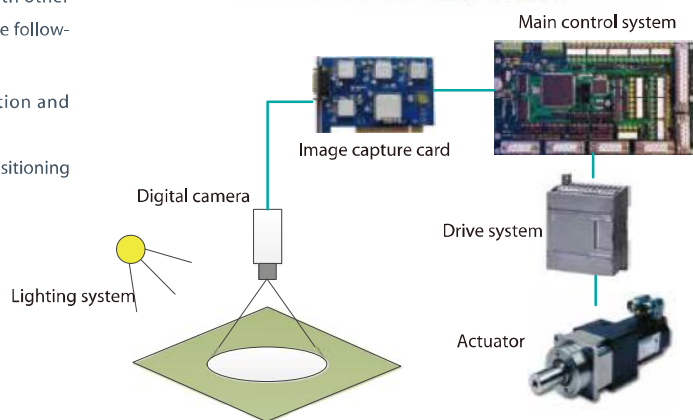
The power is provided by the battery on AGV. Automatic charging module is composed of push-rod electric machine, charging copper, linear guide bearing, and so on, which applies quick charging technology to online equipment. The system makes full use of battery, and extends battery lifetime through automatic charging module. The whole process of charging is completely automatic and improves work efficiency of factory.



### Visual Identity

Visual navigation system uses CCD camera to get image of road and recognize the path. Visual navigation module takes oil paint line or tape on the floor as path identification sign. It can quickly identify the path by using computer vision technology while the guiding controller controls the AGV accurately on tracking path. Comparing with other navigation technologies, visual navigation has the following advantages:

- Simpler and more reliable on multi-station and multi-route identification
- Digital image feedback achieves precise positioning of vehicle
- Easy for route settings with flexibility.
- Lower maintenance cost
- Easy to reroute





## Electronics manufacturing industry

### Hon Hai Group

Industry:3C

#### Solution:

From 2014, Zhengzhou Foxconn used mobile workstation of AGV series carrying manipulator and visual identity system, which can replace artificial and realize the production assembly and CNC automatic production with accuracy of 1mm.

#### Keyword:

Mobile workstations, AGV, manipulator, visual identification system.

#### Features:

This series AGV can be operating 24 hours continuously under limiting efficiency. We are the unique supplier for Foxconn in this filed.

It carries manipulator and visual identity system on AGV, replaces workers in assembly line and CNC operation, the working accuracy reaches 1mm. This flexible production unit could realize automated production of all CNC. At present, the production line of the newest iPhone will also use this AGV for unattended production.

	Before	After
Manpower	3 shifts/day,1 person/shift	Replace 3 persons
Fault rate	1.33%	0.05%
OPEX	2.8k RMB /month/station	1k RMB /month/station
Summarize: significantly reduces labor and management cost and improves product quality.		



## Elevator manufacturing industry

### OTIS

Industry: elevator

#### Solution:

As the first subsidiary of OTIS Group to introduce AGV system, OTIS Chongqing chooses our company as its supplier after careful investigation and comparison among several suppliers of domestic and overseas. It introduced first set of AGVS system in 2012, and used for transportation of elevator cab. The application stage II extended on the basis of the original system in 2014. This system is a benchmarking project in OTIS group.

#### Keyword:

Intelligent logistics system, Flatbed AGV, First set

#### Features:

Automatic detection and transportation of large size materials.

- OTIS group choose our product as first introduced AGV system.
- AGV is used for carrying and conveying key components like elevator car wall, implemented in two phases.
- This system is a benchmark project in OTIS.



## Household appliance manufacturing industry

Midea

Industry: Household appliance

Solution :

Midea Group introduced the first AGV system from our company in 2012, including 62 production units, 14 AGVs and one dispatching system. According to production status, each production unit automatically calls AGV to corresponding production line and carrying goods through dispatching system.

Keywords:

Intelligent logistics system, transfer AGV, first set.

Features:

Real-time and flexible material delivery can be achieved by dispatch system.

-This AGV system is used for delivery of air conditioner assembly line.

-The solution includes 62 production units, 14 AGVs and one set of dispatch system.

-Each production unit can call AGVs by dispatch system for real time and fully automatic material delivery.





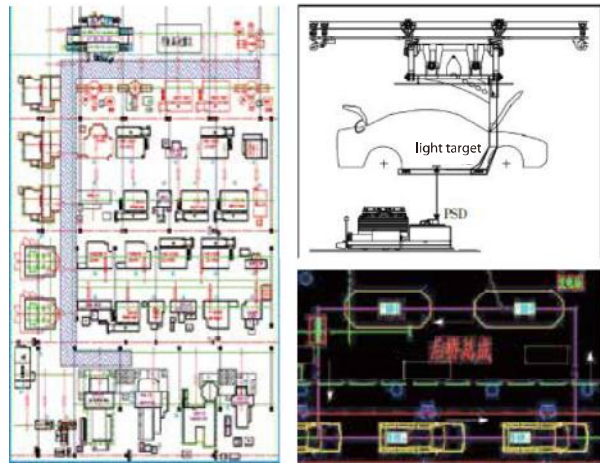
## Automobile and auto parts manufacturing industry

### BAIC Group

Phase I system includes one central control system, 3 Automatic charging stations, 12 AGVs(Laser PSD tracking, Load type 1T), to automatically complete carry and assemble work for 3 rear axle production line. The AGV runs back and forth along planned rectangular roadmap between rear axle packing line and rear axle assembly line. The AGVs carry rear axle to assembly line and move together with the cart body on slings. Then worker installs rear axle to the car with assistance of AGV.

### Dongfeng Group

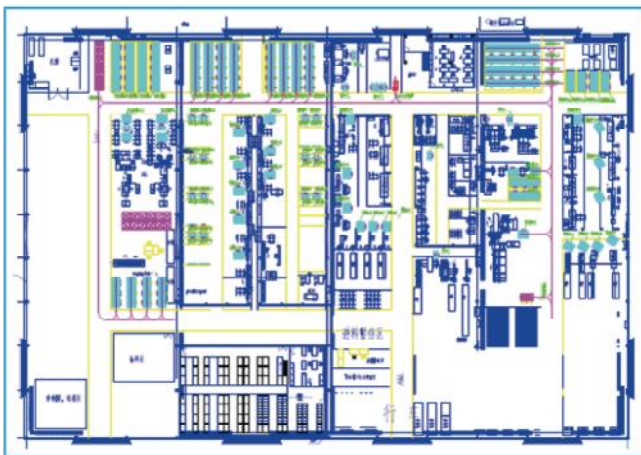
The system includes one set of central control system, one set of automatic charging station, 3 AGV (load type, two-way drive, infrared collision avoidance), automatically delivering goods in production line of reducer shell and cover of bearing. There totally will be 4 lines to use AGVs.



## Logistics equipment manufacturing industry

### Damon Group

Forklift AGV is used in this project for smart handling of key components, semi-finished products and finished products. The system can automatically detect occupation situation of cargo space in each storage area and then adjust position for storage of goods shelves. The AGV is compatible with man-driving forklift truck operation.



## Integrated manufacturing industry

### XIZI Group

Industry: Elevator manufacturing

Solution:

XIZI Forvorda introduced heavy load flatbed pull type AGV and automatic transfer type AGV in 2014 for transportation of large casting parts of elevator. After first set of AGV, XIZI sequentially introduced our equipments for new application.

Keyword:

Intelligent logistics system, flatbed AGV, steel plate floor

Features:

This series of AGV can run stably on the ground of steel plate, and it is the first one that can run in this ground environment in China.



## Battery manufacturing industry

### Grepow battery

Industry: Battery

Solution:

Grepow company introduced various series of AGVs, which connect with MES system in an integrated intelligent logistics system. At present, Greeble is continuously introducing our AGVs products in its factories to build up automated logistics.

Keyword:

Intelligent logistics system, transfer agv, first set.

Features:

AGV system connects with MES system in an integrated intelligent logistics system. This product series is the first AGV that can identify painted route in China till now.



## Part of Fortune 500 clients

No.7 SGCC(State Grid Corporation of China)

No.32 HorHaPrecisionIndustry(Foxconn)

No.151 United Technologies (OTIS)

No.152 China Southern Power Grid

No.221 China Telecom

No.224 Canon

No.248 BAIC Group

No.354 SHARP

No.409 Quanta Computer

