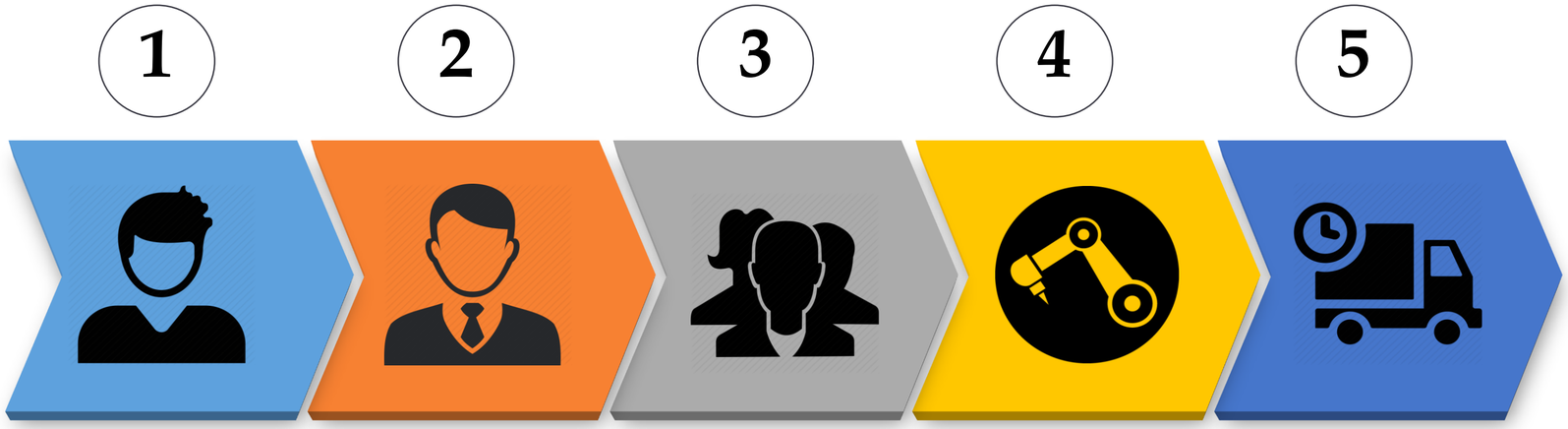
G&R
MACHINE TOOL, INC.
AUTOMATION · ROBOTICS · AGVs · WELDING

Est. 1996

DetroitRegionalChamber

MHCC
Michigan Hispanic Chamber of Commerce



Customer
Contact us by Phone, Email or Fax.

Sales
One of our Associates will help you to choose the best AGV based on your needs.

Design
G&R Engineering Team will design your individualized AGV as per your requirements

Manufacture
G&R starts manufacturing after Customer approval.

Delivery
Our Project Management Team will ensure delivery of your AGV as per the agreed timeline.

AGV BROCHURE

About G&R Machine Tool, Inc.

G&R Automation was established in 1996 and offers many years of experience in the design and building of special purpose machinery. In the last decade we have expanded our services and have become fully versed in the complete process of turnkey automated system solutions.

At G&R Automation we are committed to completing each job to the customer's complete satisfaction. Our one of a kind hands-on approach will guide you from concept to completion of each project. We will provide the newest technology, process, mechanical, and design engineering with the convenience of having all of these services handled in one central location. G&R Automation will also supply the technical and planning support of production personnel which allows the productivity and quality of each job to excel, minimizing lead time and reducing cost.

In addition to all of our services, our customer's can expect to receive the following: Precision built of tooling, Material Handling Systems, Robotic System Integration, Prototyping, Automated Guided Vehicles and PLC Logic Programming.
We believe that our Team of experienced, skilled and professional individuals working together has been key to the success and growth of G&R Automation. We look forward to meeting with you and providing your company with one of G&R Automation's custom built machines.

What is an AGV?

- A vehicle which transports material from a loading station to a unloading stations
- Highly flexible, intelligent and versatile material handling systems.
- A very flexible solution for the problem of integrating a new automated line into an existing environment by using automatic guided vehicle

Components of AGVS

- **The Vehicle** – No operator, fully automated
- **The Guide Path** – The path for the AGV
- **The Control Unit** – Monitors and directs system operations including feedback on moves, inventory, and vehicle status.
- **The Computer Interface** – Interfaces with mainframe host computer, the automated storage and retrieval system (AS/RS), and the flexible manufacturing system.

AGVS Load Transfer

Load Transfer of the vehicle means loading/unloading. There are two types of load transfer operations are:

Manual Load Transfer

- Manually loading and unloading the Vehicle.
- Use of forklift trucks, pallet trucks, roller, etc.
- Manually coupling/uncoupling towed vehicles

Automatic Loading and unloading

- Efficient system
- Use of powered roller, belt, and chain
- Powered lift/lower devices, push/pull devices
- Automatic couple/uncouple

Flow Path Design

Type of flowpath within the layout i.e. unidirectional, bidirectional or combination
Type of guidepath layout
Position of load transfer or loading /unloading stations
Number of stoppage stations
Storage space of the stations.

Advantages of AGV's

- Unobstructed movement
- Flexibility
- Locations, path, P/D points can be reprogrammed
- Easy to change guide path system
- Number of vehicles can be altered depending on requirement
- Greater reliability
- Less environmental problems
- Lower investment
- Higher operating savings on long run
- Minimal labor cost
- Easy maintenance
- Easy to interface with other systems
- Reduce workplace injury

Remote Dispatch Control System

Instructions are issued to vehicle from a remote control station via a human operator.
Control system sends instruction directly to the vehicle.
This type of system generally have automatic loading and unloading capability.

Manual Control System

The destination is inputted on the onboard control on the vehicle via a human operator after loading.
The vehicles moves along its designated path until it reaches its destination
Upon reaching destination, it stops for the human operator to direct unloading.
Efficiency depends on operators performance and varies tasks.

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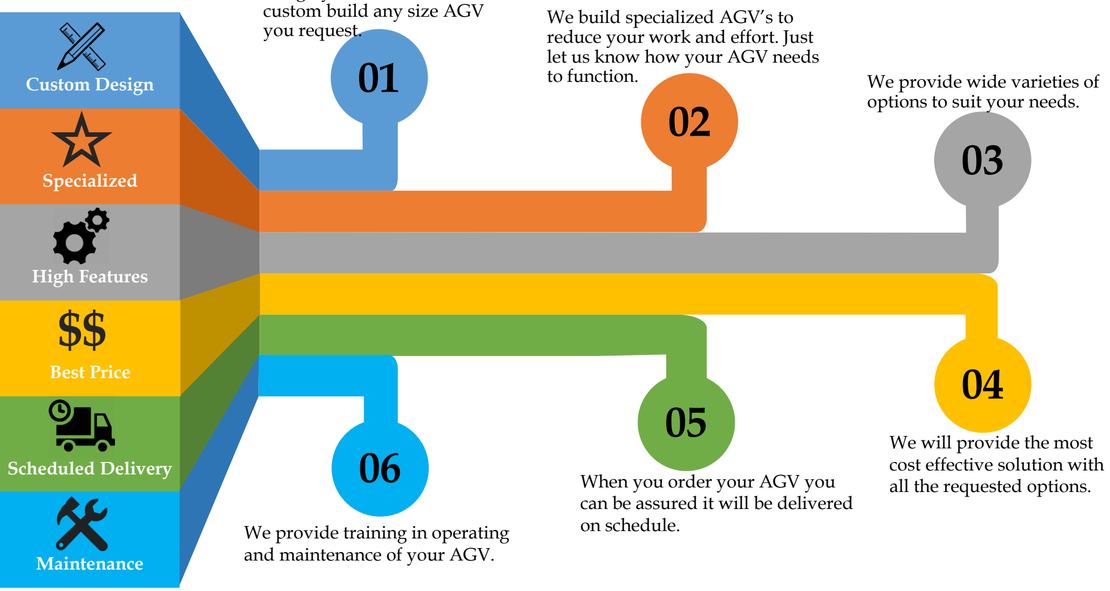
Why G&R ?



With an Upgraded Operation Console you can gain the Following:

Improved Functions

- The number of available stations increases to 200, and branches to 200.
- Speed setup increases to 15 speeds
- Timer starts are possible after stopping at a station
- Ability to adjust station stop(s) positions are possible
- Improved External I/O functions. Now they function much faster with new sensor setup.

Optional Functions

- Motor-powered lifter wheel option
- Vehicle towing and automatic uncoupling option

Reduced Control Unit Size and Improved Installation Freedom

- Volumetric ratio reduced by 50% from conventional AGV's.

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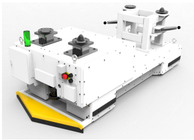
Leading AGV Manufacturer

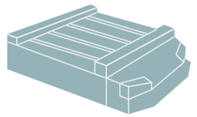
Choose your value added upgrade and we will incorporate it into your AGV. G&R can provide high function unit options for multiple solutions to meet all your needs

Advantages of G&R G-Cat AGV Kit

Low Cost

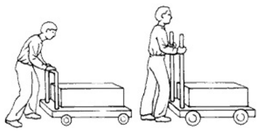


G&R M-Cat AGV KIT:
Cost effective units



Conventional AGV:
A standard vehicle costs tens of thousands of dollars.

Enhanced capabilities at cost effective pricing
We provide the best fit for your AGV with the most capabilities at cost effective prices. We are the performance, capability and cost leader in the industry.



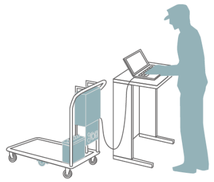
More time, more money for labor, less efficiency, less potential and less productive.

Less time, less money, less lost work days, more efficiency and more productive.

High Working Efficiency & Reduced Labor:
Save $$ on Labor & transportation and let the AGV's do the work for you faster, effective and at a lower cost. AGV's can work 24/7 which helps to increase productivity and saves your time and $$.

Simplicity

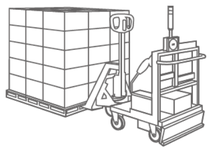
Easy Assembly:
The AGV kit is simple and easy to install. You can always get your add-on to modify/upgrade your AGV.



Quick & Simple Setup:
You are just a PC away from setting up your AGV, which allows you to program it per your individual requirements.

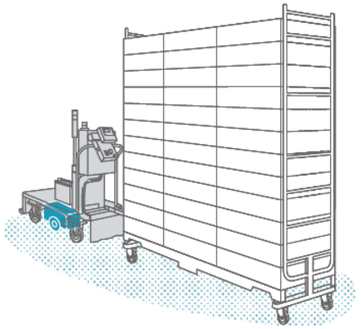
Flexibility

Customized Layout
You can customize your own AGV path. Just attach the magnetic tape on the floor for the AGV path. The start, stop, accelerate, decelerate functions can be easily setup and can be changed if your needs change.

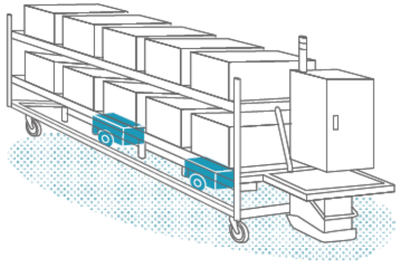


Create you own AGV
If you have an idea on how you would like your AGV to look, how long, how wide, how tall… let us know and we will build it for you.

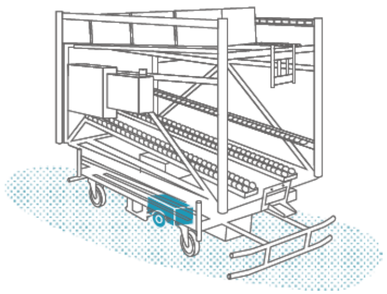
AGV Applications



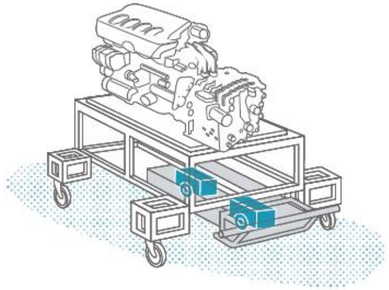
Cart Towing AGV
Use a AGV tow kit to Push-Pull tall stacks or heavy materials to your selected locations.



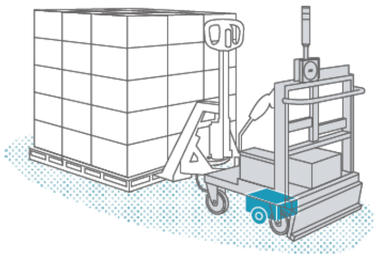
Box Delivery AGV
Carry multiple boxes/goods and make deliveries to any requested locations.



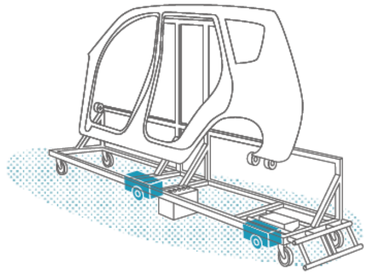
Inclined Conveyer AGV
The Inclined conveyer helps to load and unload heavy objects/parts with ease.



Heavy-Duty AGV
A Heavy-Duty AGV helps to transport heavy objects up to 1400Kg with little effort. It is possible to also move greater/heavier loads. Ask us how.



Hand-Pallet Towing Vehicle
An AGV with a pallet jack option installed is capable of transporting pallets. With this option the pallet jack can be removed from the AGV and used as a manual pallet jack.



Customized AGV
We offer customized solutions for longer or wide parts with multiple drive units. Transportation is easily stabilized. Our AGV's can be tailored to your specific needs.

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Customer Notes

Your Name:
Phone :
Email Id:
Company Name:
Shipping Address:

Product Size :
Weight :

Simple 5- Step Process

Customer
Contact us by Phone, Email or Fax.

Sales
One of our Associates will help you to choose the best AGV based on your needs.

Design
G&R Engineering Team will design your individualized AGV as per your requirements

Manufacture
G&R starts manufacturing after Customer approval.

Delivery
Our Project Management Team will ensure deliver of your AGV as per our agreed timeline.

A Promise to the Customer

- We treat your product as our own and we build them as if they are our's.
- Our well qualified and dedicated Engineering Team are committed to turning your innovative ideas into productive products. You can expect the highest level of craftsmanship at G&R Machine Tool, Inc.
- Meeting to your timelines and schedules and providing on-time delivery is our #1 priority
- Continuous Improvement of our products and processes allow us to stay on the cutting edge of technology and allow us to exceed your expectations.
- We follow our Quality Management System: ISO 9001:2008, ensuring each product meets your approval and satisfaction.

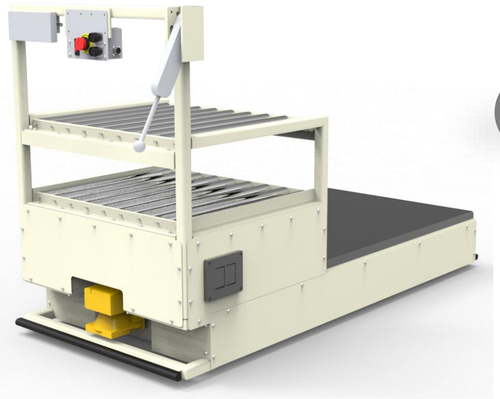
G&R Machine Tool Research & Development Lab

With our Research and Development Lab we continuously test and work on building the most innovative products. G&R Machine Tool Research & Development Laboratory is dedicated to scientific testing, innovation and research of AGV's and other G&R products. We always work to provide our customers with the most updated technology and integrating it with our leading engineering practices and products.

About G&R G-Cat AGV

Sleek Design

Highest Quality



Efficiency

Durable/Long Life

Easy Maintenance

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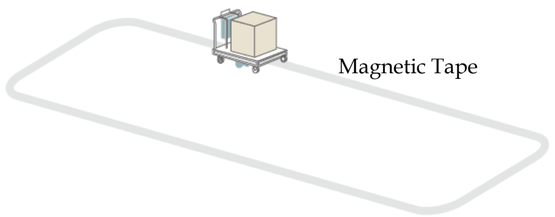
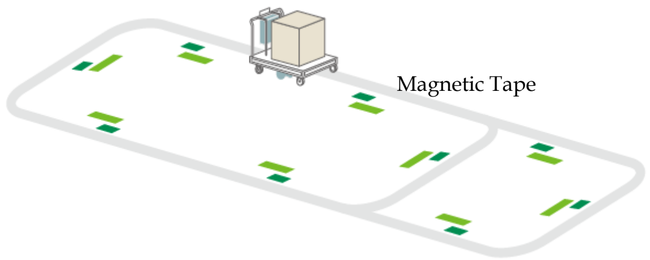
G-Cat Magnetic Tape AGV Route

Installing our user friendly Magnetic tape is easy. Layout the course/path and apply the Magnetic tape to the floor. Our special G&R magnetic tape has a high product life.



Command Marker Address System

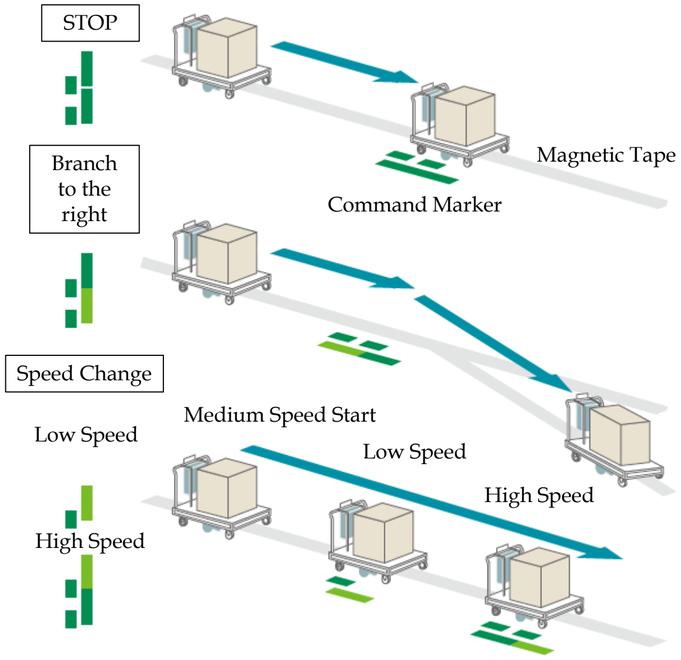
- Multiple commands can be executed according to a command marker in one position.
- Speed setting is possible up to a maximum of 15 speeds.
- A maximum of 200 stations and 200 branches can be set up.



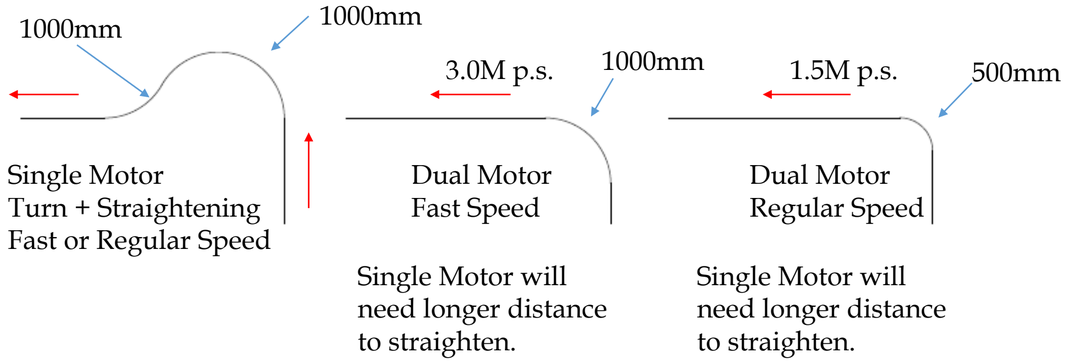
Command Marker System

When the AGV travels it reads the command markers which are fixed to the floor and allows it to execute its function.

A variety of command markers can be used to give instructions to the AGV, stop, branch, speed such as, etc.



G-Cat AGV Turn Radius



Fast = 3.0 Meters per min
Regular = 1.5 Meters per min

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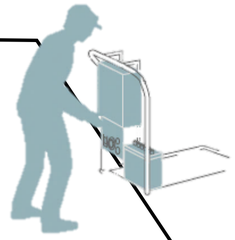
G-Cat AGV Path Details

Easy to Operate

Just select the station from the operating console and press the START button, the AGV starts moving towards it's destination.

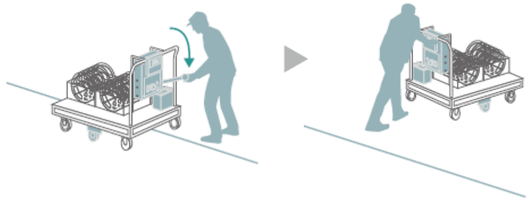


Specify the destination

Press the START Button

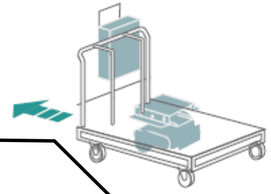
The AGV is designed to be used as an automated guided vehicle or it can be used in a manual method. Just lift the motor handle and the AGV/Cart will move easily in a manual mode.

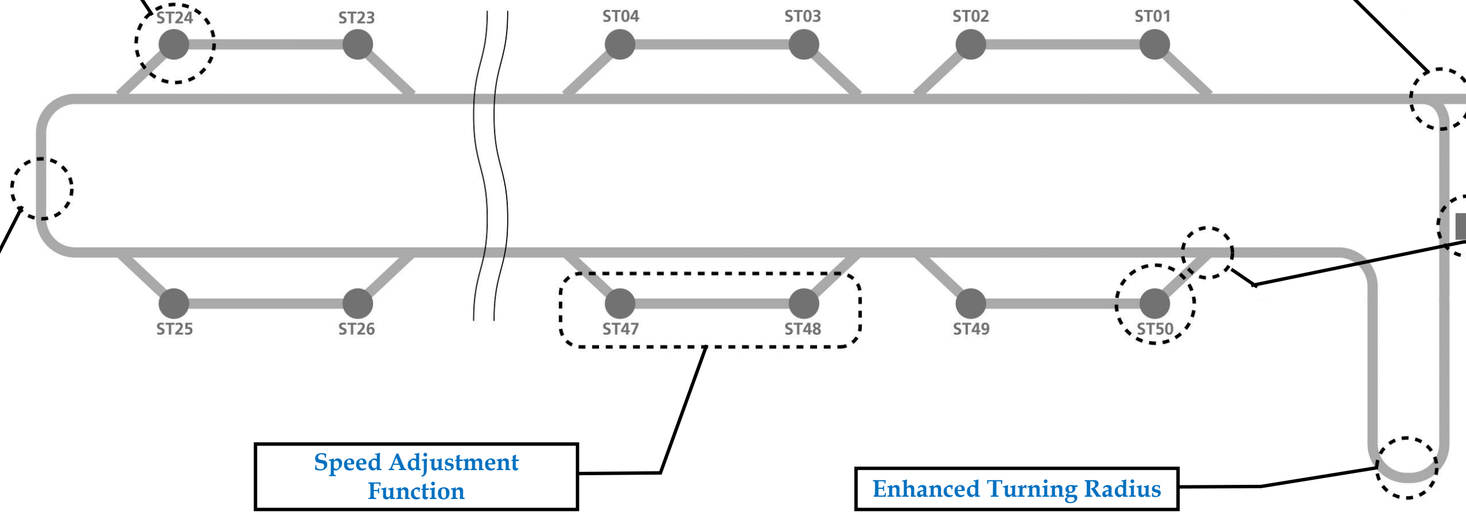
Switch to Manual by lifting the Handle



Traveling in Reverse

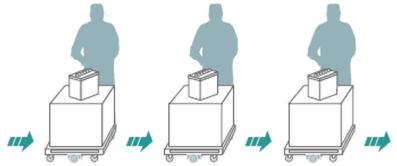
Single units provide forward traveling. Two units will allow forward movement and reverse along the "Same" path.





Speed Adjustment Function

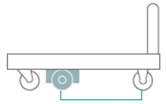
You can change your AGV speed in different zones. The maximum traveling speed is 60 meters per minute.



Use your AGV like a conveyer [Creep Traveling]

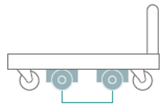
Enhanced Turning Radius

Due to 2-Wheel differential speed control, the AGV turns accurately and more stable.



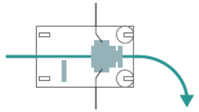
Wheel Base Length

Turn radius less than 90 degrees Wheel length x 0.75



Wheel Base Length

Turn radius more than 90 degrees Wheel length x 1.1

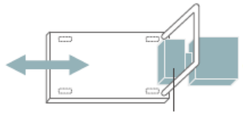


Inner Wheel

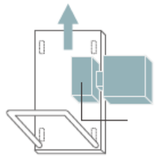
The left and right wheels are controlled independently making it possible for accurate turns and stable smooth running.

24-Hour Operation

Auto change-backwards
The AGV travels backwards to the Auto-charging station and connects itself to the charger and starts the charging process.



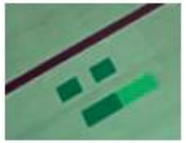
Auto change- side surface
A charging station is installed on the path with a charging terminal mounted on one side of the AGV.



200 Stations & 200 Branches

Operating Console A
Max 8 stations and 7 branches can be setup.

Operating Console B
Max 200 stations and 200 branches can be setup.



Command Marker
To setup the route of the AGV, a station marker is attached to a stop position and a branch marker is attached in front of each branch.

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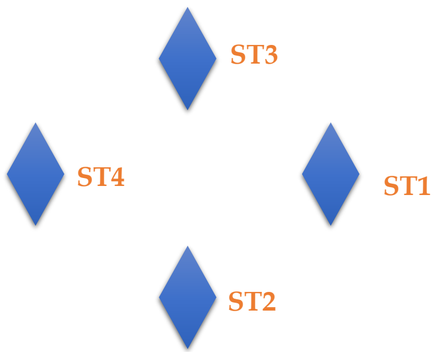
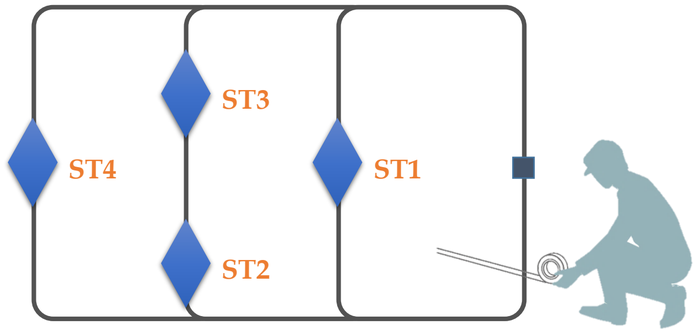
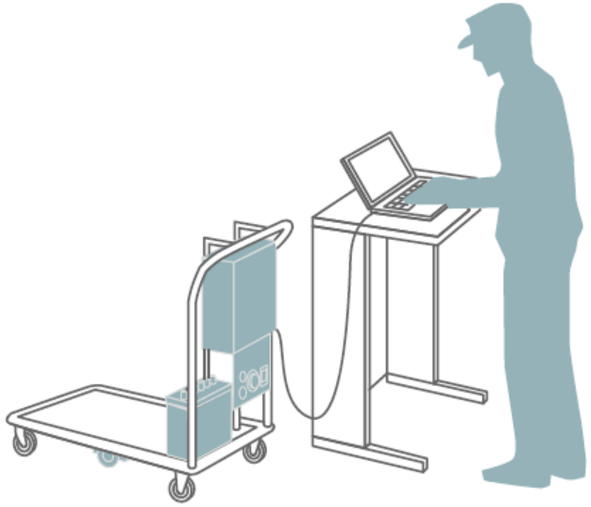
G-Cat Station Settings

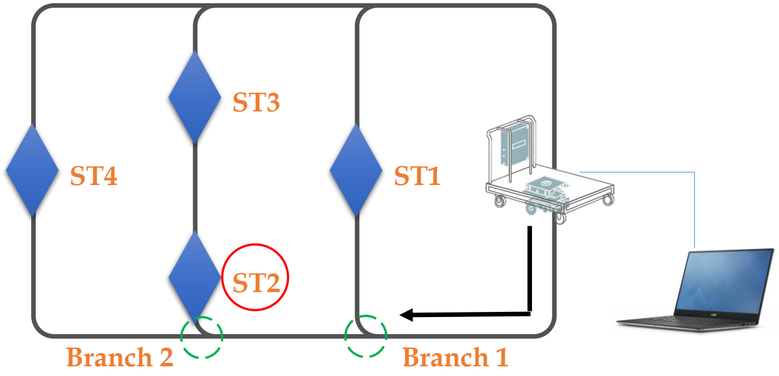


Below are examples of a requirement where four stop stations (ST) are located. It is suggested to define your AGV route/Path in advance.

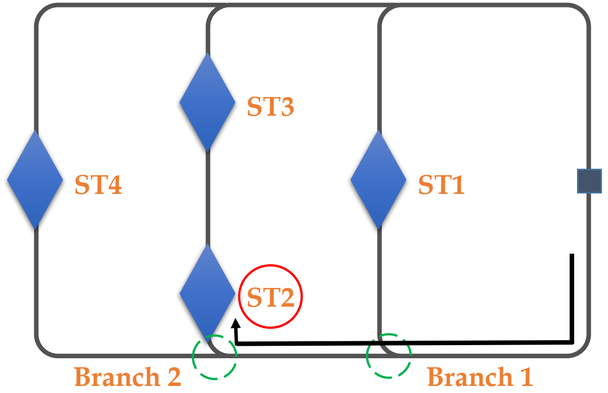


Once the AGV Path is defined just attach the Magnetic tape to establish the route and attach the command markers to establish the branches stops and stations.





Connect a personal computer to the control unit. Select the required destinations. For example, the setting for going to ST2 is instructed to go to the left at Branch 1, and to the right at Branch 2.



On the PC screen, select “left” for Branch 1 and “right” for Branch 2. By simply clicking on the screen for the selection of the destination station and branch directions, even a complex route can be easily set up.

The total number of stations that you can assign is unlimited.
For example:
If you need 15 stations you can repeat the same Station number for each group and create unlimited number of stations.

ST1 ST2 ST3 ST4 ST5
ST1 ST2 ST3 ST4 ST5
ST1 ST2 ST3 ST4 ST5

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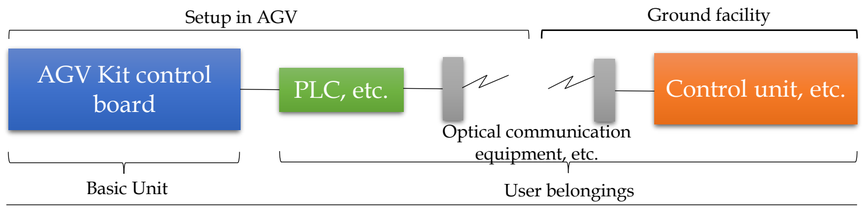
How I/O Systems Work?

There are several I/O Systems and features that can be used with our AGV's. Example of possible items with applicable I/O systems.

- Speed Setting
- Branch Direction
- Auto Start - Stop
- Forward/Backward
- Standby Instructions
- Destination Station Instructions



External Terminals

IN (INPUT)	Start, Stop, temporary stop, temporary low speed, bumper (for stop) branch signal, forward/backward changeover, external speed command, obstacle sensor stop prevention	**OUT** (OUTPUT)	Alarm, error, buzzer, ON guide monitor, branch direction monitor, marker sensor monitor, run, arrival signal, running direction monitor, running speed monitor

Wireless Controller for AGV

- Status Supervision
- Timer Start
- Standby Control

An Optional Wireless LAN can also used

- In instructions can be given to the AGV with a signal from the I/O system.
- You can call any AGV easily by using conveyor connection mode and the switch box connection mode.

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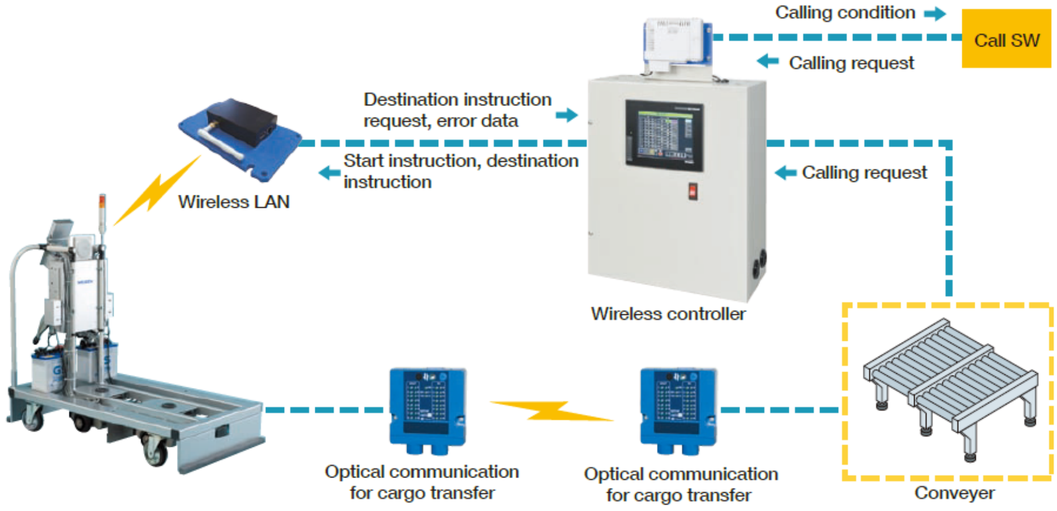
How Wireless Systems Work?

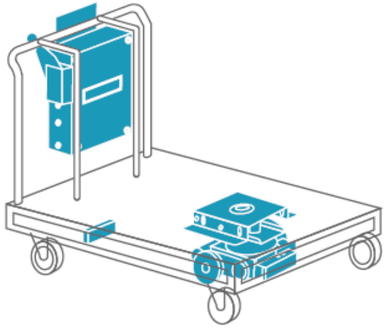


Customer Notes

Components of our G-Cat :

We choose the best quality parts which gives high life, greater efficiency, improved all with latest technology.

Main Unit



Driving Unit

Select your favorite type

Light-duty class unit
Size: W353xH228xL355mm
Min. ground height: 19mm
Self-mass: 25kg

Heavy-duty class unit
Size: W355xH239xL379mm
Min. ground height: 15mm
Self-mass: 25kg

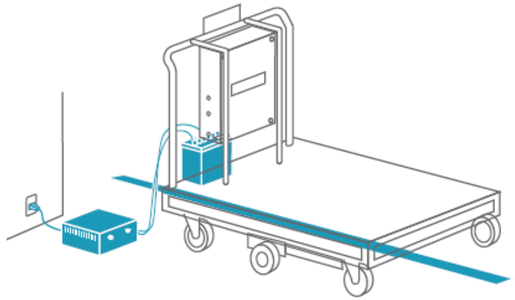
Control Unit
Contains a computer and a control unit.
Self-mass :10kg

Operation Switch
Power, Start, and Emergency Stop switches are provided.

Drive Unit Lifter
This device is used to lift the drive motor allowing the cart to be moved manually.

Marker sensor
This is a command sensor to read the command marker.

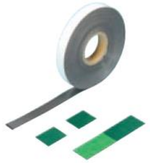
Optional Unit



Battery (12V)
Used as AGV power supply. Offers 20 % more power than the conventional same size battery. Different power options are available.

Battery Charger
Allows users to charge batteries during breaks or at the end of shift. Maintenance free and quick charging capabilities.

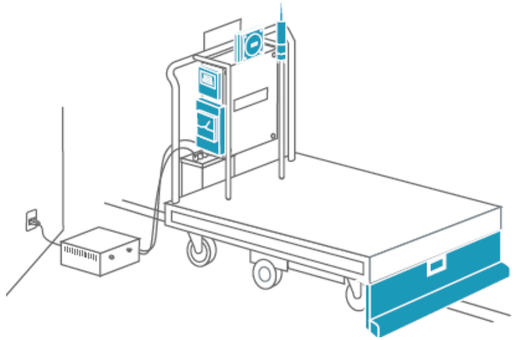
Programmable PLC
Control system that continuously monitors the state of input devices and makes decisions based upon a custom program to control the state of output devices of the AGV

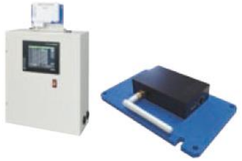


Magnetic Tape
These are used to guide the AGV

Operation Console Type A
Used for multi-spot stoppage with command markers. The AGV can stop at a maximum of 8 stations. A maximum of 7 branches can be set up. An error code is indicated in case of an error.

Operation Console Type 2B
Used for relative address type multi-spot stoppage. The AGV can stop at a maximum of 500 stations and a maximum of 500 branches can be set up. An error code is indicated in case of an error.





Wireless Controller
+
Wireless Lan unit
Helps to control the AGV wireless

Battery Voltmeter
The battery voltage is measured and displayed.

Rubber Profile
An emergency stop takes places when the bumper touches an obstacle.
* Dead zones are provided to both ends.

Obstacle Sensor
Prevents the AGV from Collision. Users can configure up to 16 different zone sets, each consisting of unique slow, stop, and emergency stop area settings for a total of 48 zones.
*May not detect small objects, or matte black objects.

Stack light
Provides visual and audible signals of AGV state or process event to individual operators. The lights indicate emergency stop, stop stations, etc. It has a controllable buzzer too.
* Other options available.

Data Transfer Sensor
Used when an instruction of AGV operation is given from ground level. This device is parallel type, data transmission device with infrared ray limit of 1 meter. Other models are also available.

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Multi-Functional AGV

Optional Functions

Manual Operation Pendant
This is a wired remote control. It is useful when moving an AGV manually and not along its designated route or path

Battery voltmeter (Digital type)
The battery voltage is measured
and digitally displayed.
(Not available for auto-chargers)

Reverse Travel Function
Choose this for your AGV to travel backwards. Two sets of driver units and guidance sensors are added to modify the control unit.

Reverse Function
This is a function for the simple backward travelling. It is applicable to a linear course and a large curvature. (Need min Magnetic tape radius of 1.5m). This function doesn't require an additional driver unit, just add guidance sensors.

Optional Upgrades

Electromagnetic Brake
The shifting of cargos at the time of cargo transfer and vehicle stoppage on a slope can be prevented. (Standard installation for heavy articles)

Encoder
With an encoder, Light-load-30m/min type vehicle can travel at lowest speed, 0.4m/min. Reading a pulse improves driving speed accuracy. This encoder function is used for assembly line type work or picking work while the AGV is still moving instead of conveyer.

Stopping Accuracy Upgrading
The stoppage accuracy is upgraded from the standard level.(±30mm → ±15mm) (Heavy-load type includes this option as a standard)
* The stopping accuracy is upgraded through the combination of the electromagnetic brake and the creep traveling function.

Extension of Power Supply
Power is fed to optional units. (24V x 1.8A)

I/O Connector & Harness
Dedicated connecters and harnesses are needed for using I/O.
If a customer elects a harnesses, a dedicated crimp tool is needed for termination.

Safety Features

The final safety of any AGV system rests with the end-user and all of his/her associates.
* Please refer to the JIS description.
(JIS D6802 Safety Rules for the Automated Guided Vehicle Systems)

Emergency Stop
To reduce the braking distance in an emergency stop the electromagnetic brake option must be installed (installed by default on heavyweight models).

Contact Prevention
There is a danger of fracture or similar injury when you collide with the AGV's safety bumper. The AGV stops after the bumper comes in contact with an obstacle. If the AGV has to be stopped before any contact, the use of an obstacle sensor is effective. In consideration of the worst case, the emergency switch should be located where it can be touched from any position.

Operation Check
To know whether the AGV is moving, there is a visual safety stack light that lights or blinks an audio method, or melody may also be used to notify of the running conditions.

Customer Notes

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G-Cat Specifications

	Light-duty class (MK2)			Heavy-duty class (MK5)	
	Standard type	High-speed type	Heavy load type	High-speed type	Heavy load type
Guidance system	Magnetic guidance system				
Traveling direction	Forward (Backward for optional)				
Rated load *1 1 unit / 2 units	250/350kg	250/350kg	500/700kg	500/700kg	1000/1400kg
Rated speed *2	30m/min	60m/min	30m/min	60m/min	30m/min
Stoppage accuracy	Standard ± 30mm (± 15mm for optional)*3			Standard ±5mm*3	
Gradability (5m continuous)	2% (at the rated load), 3% (at 70% load)				
Source voltage	DC24V				
Operating environment	Temperature 0~40°C, Relative humidity 20~80% Road surface step differences within 6mm (at 15m/min speed), road surface undulations within 10mm, groove width not more than 20mm				

*1. A self-mass is included.
*2. The standard frame is unloaded and the battery is fully charged.
*3. For the relative address unit, an optional stopping accuracy upgrading function can be added to make the stop position accurate to ±10mm.
*4. The selection of motor depends on the total weight of the AGV and your product (AGV frame + AGV Parts + Customer Product).

Basic Unit

Item	Specification	Type
Basic unit (Driver unit, control unit, operator switch, elevator lever, marker sensor)	Standard type	Light-duty
	High-speed type	Light-duty
		Heavy-duty
	Heavy load type	Light-duty
		Heavy-duty

Standard Vehicle

Item	Specification
Standard truck (completed truck)	Sheet metal vehicle type
	Hand-push vehicle type (light-duty only)
	Pipe vehicle type (light-duty only)
	Flat vehicle type
	Vehicle with a towing hook
	Vehicle with a towing hook (motor-powered)

Choose Your Options

Item		Specifications
1	Battery	24V(25, 35, 65, 100AH)
		Connector only
2	Charger	Separate charger (for AC 100V)
		Separate charger (for AC 200V)
3	Magnetic tape	For running guidance (W30mm×L25m) Pole N
		For marker (W50mm × L1m) Pole N
		For marker (W50mm × L1m) Pole S
4	Bumper	Bumpers for completed vehicles (forward)
		Bumpers for completed vehicles (forward/backward)
		Bumper alone (mm)
5	Battery voltmeter	Analog type
		Digital type
6	Onboard setter	Type A (Stop at 8 stations)
		Type 2B (Stop at 200 stations)
7	Wireless controller + Wireless LAN unit	For wireless LAN control (Ad hoc communication function provided)
8	Traveling safety function options	Obstacle sensor (forward)
		Obstacle sensor (forward/backward)
		Obstacle sensor (scanner type)
		Large sound buzzer (95dB)
		Running melody unit (95dB)
		Signal tower (red, yellow, green) (Buzzer incorporated)
9	Manual operation pendant	Used in common for forward/backward traveling
10	Driver options	Magnetic brake
		Encoder
		Stopping accuracy upgrading function
		Long-life steering sensor *4
11	Backward function	Simplified backward function (1 unit)
		Backward function (2 units)
12	Extension power supply for external equipment	Allowable up to 1.8A
13	Optical communication destination setter	For onboard, single side
		For onboard, both sides
		For ground side
14	PC connector cable	RS-232C cable

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G-Cat Pro AGV

NEW TECHNOLOGY

Our new G-Cat Pro AGV is built with the latest technology. It is an upgrade of our current G-Cat.
It comes with a micro super industrial PC which is integrated with the AGV.

- Self driven technology
- Dynamic Mapping
- Full online control
- Fully automated

G-Cat Pro AGV Route

Dynamic Mapping technology

Magnetic tape works in most applications, but if it wont, here comes G-Cat Pro. The G-Cat Pro comes with an integrated mini industrial PC which dynamically maps the AGV route. This is the latest technology in AGV's. It allows you to route your AGV much easier.

The G-Cat Pro AGV comes up with a user friendly software in which the user can change the AGV route and can also change the speed, forward and reverse of the AGV.

Advantages of Dynamic Mapping

Easy Navigation

- Positioning (utilizing scanner + wheel encoders).
- Accuracy of ±1cm in position and ±1 degree in heading.
- Mapping can be done with the regular AGV.
- No special mapping laser / survey needed.

Automated Driving/Route following

- Position, speed and steering control (also works with differential drive).
- The vehicle takes an order for a target destination and drives along the given route to this location.

Fleet Control

- Centralized control and traffic management of all vehicles – additional local controls on vehicle optional.

G-Cat Pro Advanced Battery Manager

The G-Cat Pro AGV Control software has a Advanced Battery Manager in which it continuously oversees the AGV's charging levels and send them to a charging location when needed for charging.

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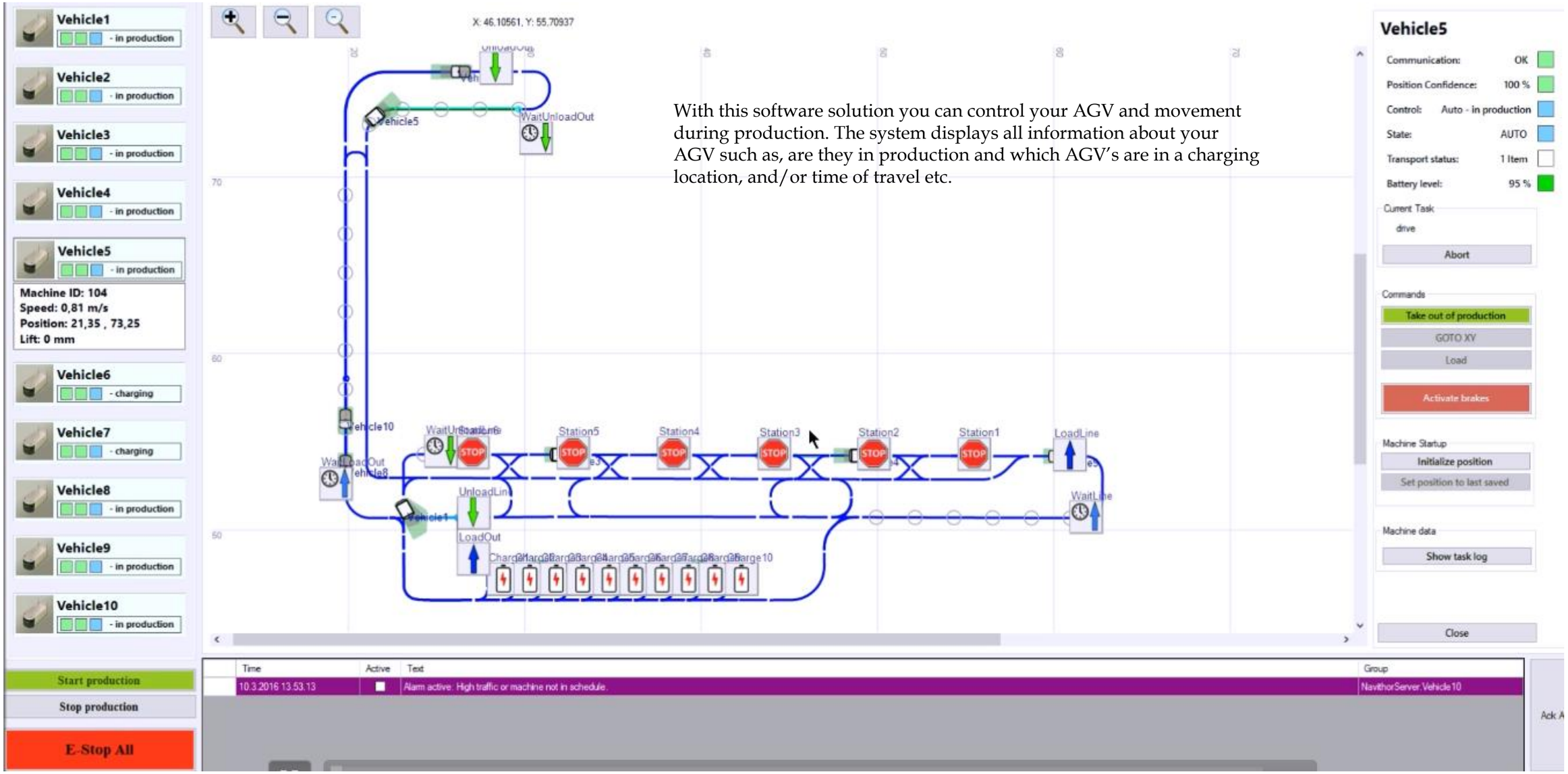
G-Cat Pro AGV Route Mapping Software



With this software solution you can control your AGV and movement during production. The system displays all information about your AGV such as, are they in production and which AGV's are in a charging location, and/or time of travel etc.

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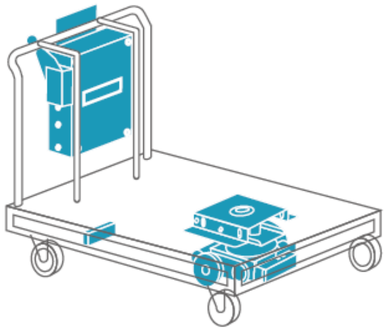
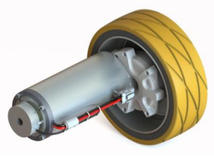
What is our G-Cat Pro AGV Made of?

We choose the best quality parts which provides longer life with greater efficiency, accuracy and latest technology.

Main Unit





High Feature Motor
500 KG Capacity maintenance free motor. Many variations available as per application.

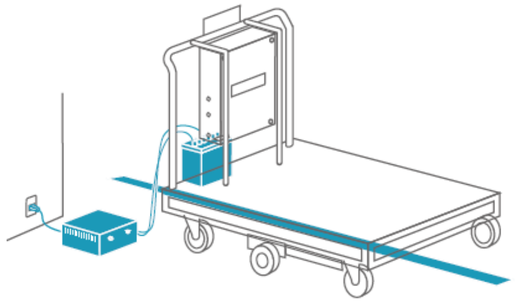
Industrial PC
Maps the AGV route Dynamic Mapping technology. Intel Gen4 Dual Core 2980U 1.6GHz Wireless support LTE, 3.5G, WLAN, GPS, GSM/GPRS, Bluetooth

Drive Unit Lifter
This device is used to lift the drive motor so the cart can be moved manually or out of the designated path.

Motor Controller
Allows the motor to go forward, reverse and controls the speed.

Battery voltmeter (Digital type)
The battery voltage is measured and digitally displayed.

Optional Unit



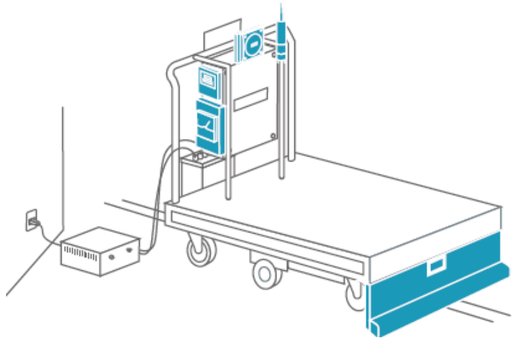
Battery (12V, 85Ah)
Used as AGV power supply. Offers 20 % more power than the conventional same size battery. Different power options are available.

Battery Charger
Allows users to charge batteries during breaks or at the end of shift. Maintenance free and quick charging capabilities.

Advanced Programmable PLC
The control system that continuously monitors the state of input devices and makes decisions based upon a custom program that can control output devices of the AGV. You can control this PLC from anywhere in the world using the internet.

Operator Interface Panel
Panel View Plus 6, 600 Color, 5.7 Inch, Display, TFT, Touch Screen

Battery Voltmeter
The battery voltage is measured and displayed.



Wireless Client
Helps to control the AGV wireless.

Wireless Access Point
Helps to connect to the AGV Wireless Client.

Rubber Profile
An emergency stop takes places when the bumper touches an obstacle.

Safety Laser Scanner
Prevents the AGV from Collision. Users can configure up to 70 combinations, each with one safety zone and two warning zones.
*May not detect small objects, or matte black objects.

Stack light
Provides visual and audible signals of AGV state or process event to individual operators. The lights indicate emergency stop, stop stations, etc. It has a controllable buzzer too.
* Other options available.

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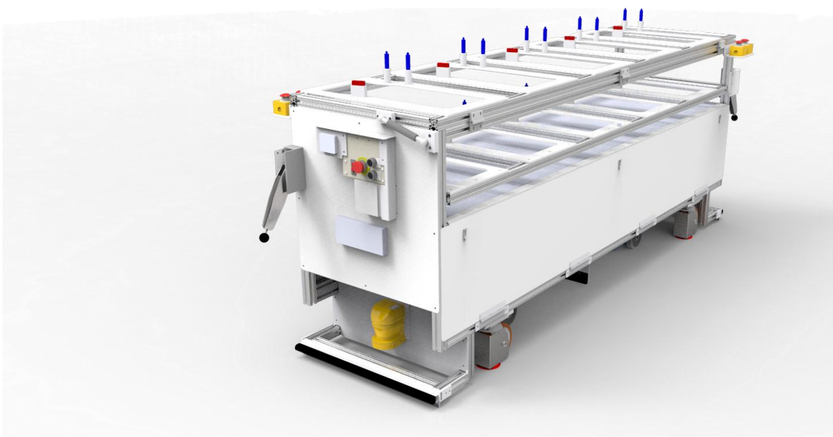
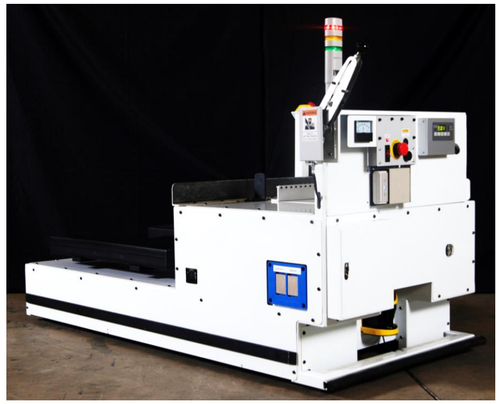
Some Examples of Past AGV Models:

Each AGV is fabricated to meet a specific customer need.

Motor: Single Motor
Type: Light Load
Battery: 24V
Options: PLC, Obstacle Scanner, Storage Box, Auto charger system.

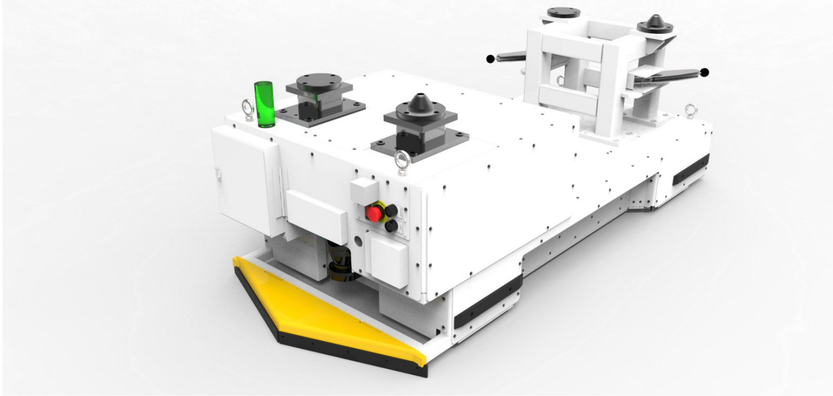
Motor: Dual Reverse
Type: Medium Load
Battery: 24V
Options: PLC, Obstacle Scanner, Bumpers, Motor Lift handle

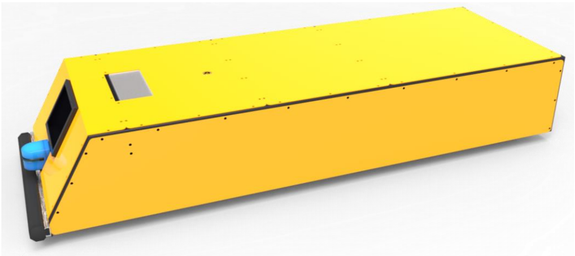




Motor: Simple Reverse
Type: Heavy Load
Battery: 24V
Options: PLC, Stack lights, Obstacle Scanner, Wi-Fi Connectivity, Bumpers, Volt Meter, Console B

Motor: Dual Reverse
Type: Super Heavy Load
Battery: 24V
Options: PLC, Dual Motor Lift handles, Wireless unit, Obstacle Scanner, Auto Charger, Bumpers, Voltmeter,





Motor: Dual Reverse
Type: Heavy Load
Battery: 24V
Options: PLC, Obstacle Scanner, Bumpers.

Motor: Single Motor
Type: Medium Load
Battery: 24V
Options: PLC, Stack Lights, Rollers, Side Lift Handles.

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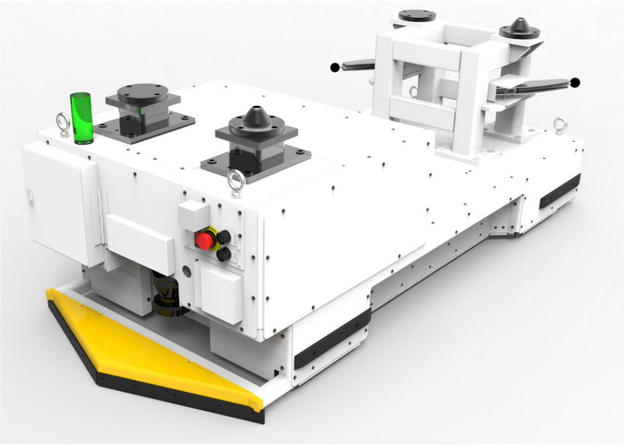

Our Products

- Robotic Systems Integration
- Controls
- Material Handling, Equipment, Manual Carts, Racks, Shelves, etc.
- Prototyping
- Specialty Systems, Fixtures and Guards

Our Products

- AGV's (Automated Guided Vehicles)
- Welding: Automated, Robotic, Manual
- Conveyors.
- Die transfer Equipment
- Guarding, Fencing
- Machine Services

Services

- Single Source Turnkey Automation
- Low Volume Production
- Machining - 40 Years' Experience
- Authorized OTC Repair Facility and Distributer.
- Process Engineering

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