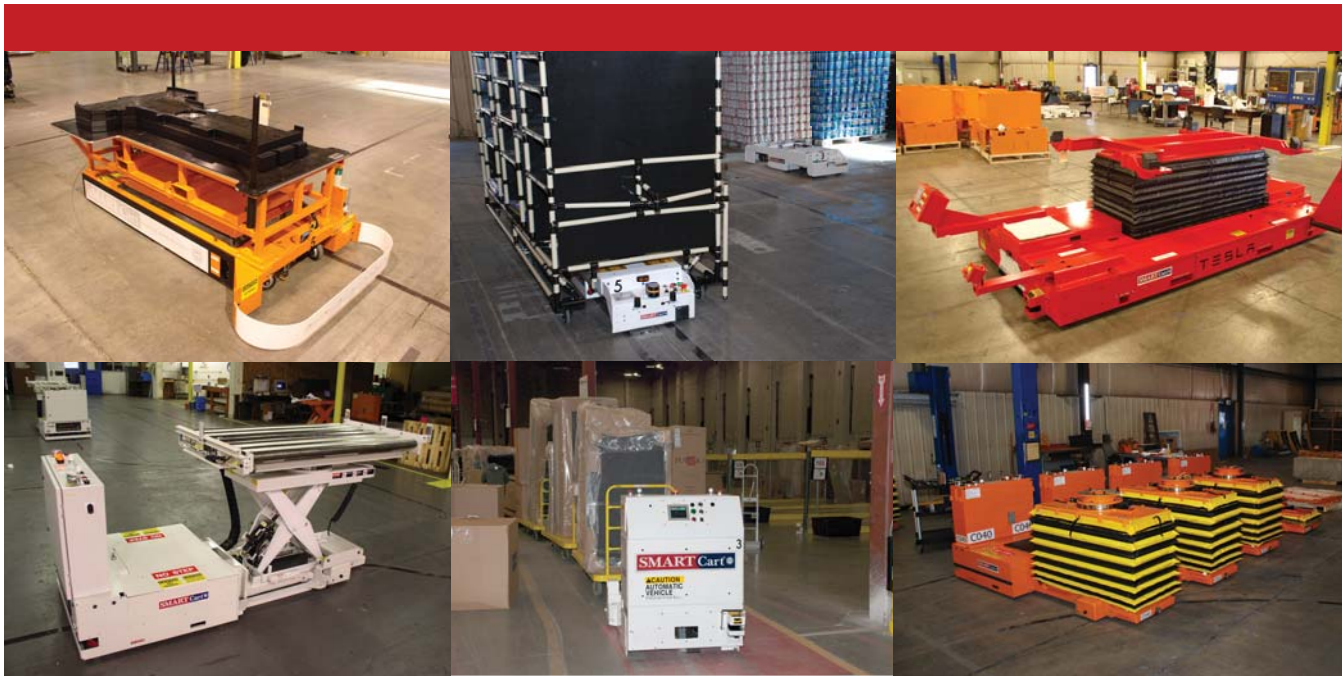
SMARTCART®

Automatic Guided Cart Installed Systems



DAIFUKU WEBB

JERVIS B. WEBB COMPANY

BD Holdrege

Holdrege, Nebraska

A pallet jack is towed by a SmartCart AGC via a custom “hook” on the pallet jack. The AGC travels between the production line and warehouse. The AGC is equipped with Panelview, which selects the destination of the AGC. Two people were reassigned to other work as a result of the system resulting in a 100% ROI in less than six months.

Model:	100 HD Tugger
No. of AGCs:	1
Operational:	August 2004 to January 2006
System Type:	Pallet Transport
Guide Path:	Magnetic Bar
System Active:	8 hours per day, 5 days a week
Load:	2000 pound trailer
Communication:	none
Battery Charging:	10-amp manually plugged into wall power at end of day.

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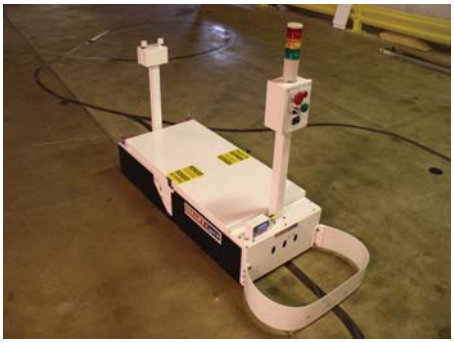
Donco Air Products

Albion, Iowa

A SmartCart AGC tows trailers of miscellaneous parts around the factory, helping to reduce material handling costs.



Model:	100 HD Tugger
No. of AGCs:	1
Operational:	December 2004
System Type:	Parts Delivery
Guide Path:	Magnetic Tape
System Active:	8 hours per day, 5 days a week.
Load:	2000 pound trailer
Communication:	none
Battery Charging:	10-amp charger manually plugged into wall power at end of day

Ethan Allen

Eldred, Pennsylvania

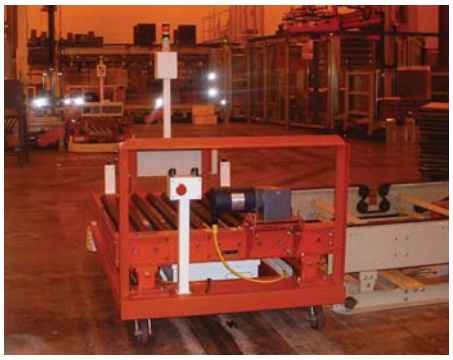
A SmartCart AGC travels 1000 feet from one end of the building to the other delivering finished product from the end-of-the-line to shipping. This process change from man-aboard tow motors allowed for the reassignment of two workers to other duties, resulting in a 100% ROI in less than eight months.

Model:	100 HD Tugger
No. of AGCs:	1
Operational:	June 2006
System Type:	Product Delivery
Guide Path:	Epoxy Coated Magnetic Tape
System Active:	8 hours per day, 5 days a week
Load:	2000 pound trailer train
Communication:	none
Battery Charging:	8-amp charger stowed on AGC is manually plugged into wall power at the end of day.

Graham Packaging

York, Pennsylvania

Five SmartCart AGCs are equipped with a conveyor deck to allow automatic load/ unload from a conveyor system. The PLC indicates when banded pallets are ready for pick up at one of five pick-up points. The AGCs transport pallets to one of two drop-off conveyors for stretch wrapping. The CMS traffic control system prevents collisions. One fork truck driver was reassigned to other work on four shifts. The system was expanded to add 1 SmartCart.



Model:	100 HD w/Conveyor
No. of AGCs:	5 **+ 1**
Operational:	March 2005 **System Expansion April 2011**
System Type:	Pallet Transport
Guide Path:	Epoxy Coated Magnetic Tape
System Active:	24 hours per day, 7 days per week
Load:	1200 pound pallet
Communication:	Wireless 802.11b
Battery Charging:	Four 24-amp automatic chargers at pick stations.

Hearth & Home Technologies

Lake City, Minnesota

Three SmartCart AGCs travel on an isolated path, servicing two to three delivery points on the production line. The AGCs travel between the stock room and various stations every hour. The line operator and stock attendant fills/empties the trailers. As a result of the AGC system, 14 workers were reassigned to other jobs.

Model:	100 HD Tugger
No. of AGCs:	3
Operational:	July 2003
System Type:	JIT Delivery
Guide Path:	Magnetic Bar
System Active:	8 hours per day, 5 days per week
Load:	2500 pound trailer train up to 8 trailers
Communication:	none
Battery Charging:	10-amp charger stowed on AGC is manually plugged into wall power at end of day.

H.J. Heinz

Florence, South Carolina

SmartCart AGCs provide automated delivery of empty pallets and removal of full pallets from multiple, robotic palletizing cells. Full pallets are then delivered to an automated stretch wrapper. The system eliminated fork truck drivers from interfacing with robotic equipment.

Model:	300 DC
No. of AGCs:	3
Operational:	March 2010
System Type:	Pallet Transportation
Guide Path:	Magnetic Tape
System Active:	24 hours per day, 5 days per week
Load:	One 2500 pound full pallet and one empty pallet
Communication:	Wireless 802.11a
Battery Charging:	Two 40-amp automatic charging stations in loop

Imasen Bucyrus Technology, Inc.

Bucyrus, Ohio

Five SmartCart AGCs vehicle system transport racks of parts to assembly lines. Racks of painted parts are exchanged for empty racks at the paint line, while subassemblies are also transported to other work cells. Optical communications are employed by the work stations to tell AGCs what needs to be done, while the CMS system performs all traffic management responsibilities. This system was a cost effective replacement for an AGV system.

Model:	100 HD Custom
No. of AGCs:	5
Operational:	July 2008
System Type:	Rack Transportation
Guide Path:	Magnetic Tape
System Active:	16 hours per day, 7 days per week
Load:	625 pound racks
Communication:	Wireless 802.11a and Optical Transceiver
Battery Charging:	On board 20-amp manual plug-in chargers, charge vehicles during the off shift.

Macy's Inc.

City of Industry, California

SmartCarts tow up to eight carts that are connected together like a train and loaded with furniture. SmartCarts deliver a train of empty carts to the inbound drop lane. It automatically decouples from the train and then moves to the outbound lane where it automatically couples with a train of carts that are loaded with furniture. The SmartCart finally delivers the furniture to one of five assigned drop zones where it is manually unloaded near the dock doors. The SmartCart system is helping Macy's achieve its LEAN warehousing objectives by increasing efficiency and reducing labor costs (helped eliminate nearly one shift and a half per day).

Model:	300 Tugger
No. of AGCs:	5
Operational:	December 2009
System Type:	Product delivery
Guide Path:	Magnetic tape and magnetic bar
System Active:	8 hours per day, 6 days per week
Load:	Furniture on carts
Communication:	Wireless 802.11b
Battery Charging:	Automatic opportunity charging at three stations

MAHLE-Tennex North America

Murfreesboro, Tennessee

An injection machine operator loads, stacks and indexes pallets on a conveyor. The PLC indicates when stacks of nested pallets are ready for pick up at one of four pick-up points. Two SmartCart AGCs transport pallets to the warehouse drop-off conveyor. Fork trucks unload the warehouse conveyor as time allows. The CMS traffic control system prevents collisions. One fork truck driver was reassigned to other work on four shifts.

Model:	100 HD
No. of AGCs:	2
Operational:	March 2004 to September 2005
System Type:	Pallet Transport
Guide Path:	Epoxy Coated Magnetic Tape
System Active:	24 hours per day, 7 days a week
Load:	1300 pound pallets
Communication:	Wireless 802.11b
Battery Charging:	24-amp automatic charging each trip to warehouse.

Mark IV

Montreal, Quebec, Canada

12 SmartCart AGCs deliver totes containing process components to the assembly line while simultaneously transporting trailers of finished goods back to the warehouse. An operator loads parts (in totes) onto the vehicle, attaches an empty trailer and selects destinations via the CMS. Upon reaching its destination, the vehicle stops, an operator removes the parts and releases the vehicle. The SmartCart automatically moves to the next location. Following release from its last destination, the SmartCart returns to the warehouse to await its next command.

Model:	100 TT
No. of AGCs:	12
Operational:	September 2009
System Type:	Parts Delivery
Guide Path:	Magnetic Bar
System Active:	8 hours per day, 5 days a week
Load:	Small totes on vehicle towing 1,000# trailer
Communication:	Wireless 802.11a With CMS
Battery Charging:	Automatic opportunity charging

Presto Products

Appleton, Wisconsin

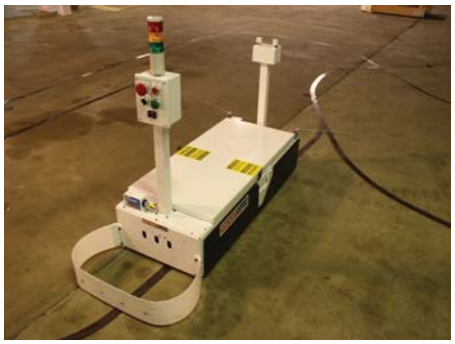
Model 300 fork vehicle picks palletized goods and delivers them to a centralized stretch wrapper. The vehicle is also responsible for moving empty pallets back to the palletizing station.

Model:	300CF Counterbalanced fork
No. of AGCs:	1
Operational:	May 2011
System Type:	Pallet handling
Guide Path:	Magnetic tape
System Active:	8 hours per day, 5 days a week
Load:	Palletized product weighing 1500 pounds
Communication:	Wireless 802.11b/g
Battery Charging:	Automatic charging

Proctor & Gamble

Auburn, Maine

The SmartCart AGCs delivers material to nine destination within the warehouse. The destinations can be selected using the front panel touchscreen HMI while the SmartCart is at the loading station.



Model:	100 HD Tugger
No. of AGCs:	1
Operational:	February 2009
System Type:	Product Delivery
Guide Path:	Magnetic Tape
System Active:	24 hours per day, 7 days a week
Load:	Four 220# Boxes
Communication:	None
Battery Charging:	24-amp automatic charging during loading

Rock Tenn

Conway , North Carolina

Four SmartCart AGCs provide unmanned transportation of finished goods between robotic palletizing lines and the stretch wrapper. At each of the palletizing lines the loads are picked up as they are formed. The AGCs then deliver them to a stretch wrap conveyor. The system provides unmanned handling in a 24/7 robotic operation.

Model:	300 with a dual or single conveyor deck
No. of AGCs:	4 – 2 dual deck models and 2 single deck models
Operational:	May 2011
System Type:	Material delivery
Guide Path:	Magnetic Tape
System Active:	24 hours per day, 7 days per week
Load:	Finished paper products
Communication:	Wireless 802.11
Battery Charging:	Automatic opportunity chargers

Sanyo Solar

Salem, Oregon

Boxes and totes are moved from band saws to a Daifuku automated storage & retrieval system, and then delivered from the ASRS to squaring saws. The SmartCarts combined with multiple Daifuku ASRS provide a very efficient, highly automated material handling system.

Model:	100HD Custom w/Conveyor
No. of AGCs:	4
Operational:	September 2009
System Type:	Load Transport
Guide Path:	Magnetic Tape
System Active:	16 hours per day, 7 days a week
Load:	Boxes and Totes
Communication:	Wireless 802.11g
Battery Charging:	Two 40-amp automatic charging stations

Solutia

Pensacola, Florida

Six standard conveyor deck SmartCart AGCs provide automatic load and unload of pallets of nylon pellet bags and boxes. The system provides transportation from the end of filling lines to buffer zones, the loads are sorted on gravity conveyors for full pallets or a single lane of powered conveyor for partial pallets. This new system crosses paths with a Webb AGV. The systems are integrated to provide seamless traffic control.

Model:	300SC
No. of AGCs:	6
Operational:	September 2008
System Type:	Pallet Transportation
Guide Path:	Magnetic Tape
System Active:	24 hours per day, 7 days per week
Load:	2,350 pound pallets of nylon pellets
Communication:	Wireless 802.11a
Battery Charging:	4 - 40 amp automatic charge stations on path

Sonoco

Hartsville, South Carolina

The SmartCart handles the delivery of slit paper rolls from the paper machines to a warehouse conveyor. Paper machines produce parent rolls that are slit. These rolls are then placed on a pallet “eye-to-the-sky” and conveyed to a station. The SmartCart picks up the roll from the station and transports it to a deposit conveyor. This conveyor transports the rolls to the warehouse. Since this is a straight line transfer application, SmartCarts were the only solution that could meet the required throughput and keep the floor area free of encumbrances.

Model:	Custom
No. of AGCs:	2
Operational:	August 2010
System Type:	Finished Goods Delivery to Warehouse
Guide Path:	Bar Magnet
System Active:	8 hours per day, 6 days per week
Load:	Paper Roll on Pallet 10,000# Max.
Communication:	Wireless 802.11a
Battery Charging:	Fast charge Automatic with Thin Plate Battery Technology

TISA

Princeton, Indiana

Nineteen SmartCart AGCs are used to deliver full racks of parts to and return empty racks from an assembly line. The AGC automatically engages the load by tunneling under the rack and utilizing a pop-up pin. AGC traffic is controlled by the CMS and wireless call boxes pushed by operators. The AGC system allowed the customer to avoid the cost of material handling labor of man-aboard tow motors.

Model:	100TT
No. of AGCs:	19
Operational:	July 2009
System Type:	Rack Delivery/Parts Delivery
Guide Path:	Magnetic Tape
System Active:	16 hours per day, 5 days per week
Load:	Automotive Parts
Communication:	Wireless 802.11a
Battery Charging:	Three 40-amp automatic charge stations in loop

Western Container

Fife, Washington

SmartCart AGCs deliver bins of preforms created in an injection molding process to dumpers that feed blow molding machines. These preforms are blown into plastic bottles. Smartcarts take product from gravity conveyors where product is staged for each blow molding line. Staging of product at a central location saves labor over more frequent delivery to each blow mold line.

Model:	300CF
No. of AGCs:	4
Operational:	October 2008
System Type:	Container Delivery
Guide Path:	Magnetic Tape and RF Tags
System Active:	24 hours per day, 7 days per week
Load:	550 pound plastic bins
Communication:	Wireless 802.11a
Battery Charging:	Three 40-amp automatic charge stations in loop

Western Container — Rancho Cucamonga, California

SmartCart AGCs deliver bins of preforms created in an injection molding process to dumpers that feed blow molding machines. These preforms are blown into plastic bottles. SmartCarts take product from gravity conveyors where product is staged for each blow molding line. Staging of product at a central location saves labor over more frequent delivery to each blow mold line.

Model:	300CF
No. of AGCs:	5
Operational:	August 2009
System Type:	Bin Transportation
Guide Path:	Magnetic Tape and RF Tags
System Active:	24 hours per day, 7 days per week
Load:	550 pound bins
Communication:	Wireless 802.11g
Battery Charging:	Five 55 amp automatic charge stations in loop

Western Container — Tolleson, Arizona

SmartCart AGCs deliver bins of preforms created in an injection molding process to dumpers that feed blow molding machines. These preforms are blown into plastic bottles. SmartCarts take product from gravity conveyors where product is staged for each blow molding line. Staging of product at a central location saves labor over more frequent delivery to each blow mold line.

Model:	300CF
No. of AGCs:	3
Operational:	September 2009
System Type:	Bin Transportation
Guide Path:	Magnetic Tape and RF Tags
System Active:	24 hours per day, 7 days per week
Load:	550 pound bins
Communication:	Wireless 802.11g
Battery Charging:	Three 40-amp automatic charge stations in loop

Yaskawa Electric

Buffalo Grove, Illinois

The SmartCarts transport full custom made dumpster carts from pick up locations out to the waste compactor. The SmartCart custom dumping actuator dumps the carts waste load into a 15 yard compactor. The SmartCart then signals the compactor to process the waste. When the compactor becomes full it signals the SmartCart system and the waste hauler is automatically notified to exchange the compactor container. These SmartCarts enabled the workers to focus on product assembly and not “taking out the trash”, saving several hour in production time.

Model:	100TT
No. of AGCs:	2
Operational:	May 2010
System Type:	Trash Removal to Compactor
Guide Path:	Magnetic Tape
System Active:	8 hours per day, 5 days per week
Load:	Scrap Paper and Cardboard
Communication:	Wireless 802.11a
Battery Charging:	Manual Charging

Yaskawa Electric

Buffalo Grove, Illinois

Description for the 300CF: The SmartCart picks up finished product from the assembly line and delivers it to the warehouse. Once a pallet is ready to be picked up, an operator at the assembly station will signal the AGC via wireless pushbutton to pick up the full pallet and deliver the load to the warehouse. The AGC will return to the station with an empty pallet so the operator can continue to palletize the finished product.

Model:	300CF Counter Balance Fork
No. of AGCs:	1
Operational:	May 2010
System Type:	Transporting Pallet Loads From Assembly to Warehouse
Guide Path:	Magnetic Tape
System Active:	8 hours per day, 5 days per week
Load:	Palletizied Components
Communication:	Wireless 802.11a
Battery Charging:	Manual Charging


SMART Cart
SMART Cart

MANUFA

ACH

Saline, Michigan

Seventy SmartCart AGCs are used to help build instrument panels (cockpits) for automobiles. The AGCs are loaded/unloaded with operator-assisted manipulators and travel continuously at a slow customer-adjustable speed through the instrument panel build stations. The AGCs must receive a permissive signal to continue through each build station from a customer-supplied Factory Automation System. The system also sequences instrument panels into the proper delivery sequence at the shipping dock. Changes to the production line (AGC speed) can be made easily via an off-board PLC operator input screen.

Model:	100 HD LHF
No. of AGCs:	70
Operational:	20 – January 2008, 40 – March 2008, 70 – May 2008
System Type:	Assembly line
Guide Path:	Magnetic Tape
System Active:	8 hours per day, 5 days per week
Load:	600 pound IP and rotator
Communication:	Wireless 802.11a
Battery Charging:	19 24-amp automatic charge station in loop

Danfoss Drives

Loves Park, Illinois

The AGCs index from station to station throughout the motion control drive assembly process. The SmartCart vehicles move the drive from the beginning of assembly all the way through the process and interface with an ASRS where the drive is tested.

Model:	300 Custom with scissors, lift turntable, and conveyor deck
No. of AGCs:	7
Operational:	February 2011
System Type:	Assembly
Guide Path:	Magnetic tape
System Active:	8 hours per day, 5 days a week
Load:	Control drives weighing 1500 pounds
Communication:	Wireless 802.11B/G
Battery Charging:	Automatic charging

DCL

Concord, Ontario

The SmartCart AGC allows operators to manually load parts at three build stations and automatically deliver parts to the paint line or packaging stations. The system eliminates material handling labor and provides the customer with a low-cost method of introducing automated material handling systems to their facility.

Model:	100 Unit Load
No. of AGCs:	1
Operational:	January 2008
System Type:	Parts Delivery
Guide Path:	Magnetic Tape
System Active:	8 hours per day, 5 days per week
Load:	200 pound parts
Communication:	none
Battery Charging:	Manual plug in

Harley-Davidson

Kansas City, Missouri

Fifteen SmartCart AGCs help build motorcycles. All AGCs index at the same time on the production line based on PLC programmable time. The AGCs are loaded/unloaded with operator-assisted manipulators. The AGC system offers ergonomic access via a specially equipped hydraulic lift.

Model:	100 HD Custom
No. of AGCs:	15
Operational:	February 2005
System Type:	Assembly Line
Guide Path:	Magnetic Tape
System Active:	20 hours per day, 5 days a week
Load:	500 pound motorcycle sub-assembly
Communication:	Wireless 802.11b
Battery Charging:	20-amp charger stowed on AGC is manually plugged into wall power at the end of day.

Harley-Davidson

York, Pennsylvania

Twenty SmartCart AGCs are used to help build motorcycles. All AGCs index at the same time on the production line based on PLC programmable time. The AGCs are loaded/unloaded with operator-assisted manipulators. The AGC system offers ergonomic access via a specially equipped hydraulic lift.

Model:	100 HD Custom
No. of AGCs:	17
Operational:	May 2006
System Type:	Assembly Line
Guide Path:	Magnetic Tape
System Active:	20 hours per day, 5 days a week
Load:	1000 pound motorcycle
Communication:	Wireless 802.11b
Battery Charging:	20-amp charger stowed on AGC is manually plugged into wall power at the end of day.

Harley-Davidson

York, Pennsylvania

These custom SmartCarts serve as an assembly platform for a continuous motion assembly line and provide transportation through post assembly, test, repair, and crating operations. Each SmartCart has a universal fixture mounted on a rotator/lift deck. The custom lift deck provides ergonomic access to assembly line personnel and allows all bike models to be mounted to the SmartCart. The SmartCart system allowed Harley-Davidson to combine several assembly lines into a single assembly line.

Model:	200 Custom
No. of AGCs:	115
Operational:	Phased installation February-July 2011
System Type:	Assembly-line
Guide Path:	Magnetic tape
System Active:	20 hours per day, 5 days a week
Load:	Motorcycle/tricycle weighing up to 1400 pounds
Communication:	Wireless 802.11a
Battery Charging:	Fast opportunity charging

John Deere

Horicon, Wisconsin

Eighty-eight SmartCart AGCs help build tractors. All AGCs index at the same time on the production line based on PLC programmable time. The AGCs are loaded/unloaded with operator-assisted manipulators. The AGCs are specially equipped with hydraulic lifts for easy access to work. Off path movement of the AGCs is accomplished via pendant control.

Model:	200 Custom
No. of AGCs:	88
Operational:	June 2005
System Type:	Assembly Line
Guide Path:	Magnetic Tape
System Active:	20 hours per day, 6 days a week
Load:	1800 pound tractor
Communication:	Wireless 802.11b
Battery Charging:	5 40-amp automatic charging stations in loop.

Johnson Controls

Northwood, Ohio

Fourty-five SmartCart AGCs with rotating fixtures index through multi-station assembly line. Replaced Power & Free conveyor system, due to flexible path, ease of re-configuration and portability.

Model:	100HD LHF
No. of AGCs:	45
Operational:	November 2008
System Type:	Assembly Line
Guide Path:	Magnetic Tape
System Active:	16 hours per day, 6 days a week
Load:	800 pounds
Communication:	Wireless 802.11a
Battery Charging:	Four 24-amp automatic charging stations in loop

Johnson Controls

Northwood, Ohio

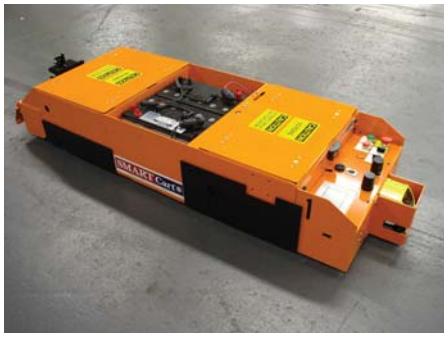
Two independent (crossing) SmartCart AGC loops receive empty shipping pallets (1 of 2 types), stop at appropriate product load stations, and transport loaded pallets to appropriate shipping sequencer. AGC preferred over fixed conveyors due to open area and flexible path.

Model:	100HD LHF with Rotating Pallet Fixture
No. of AGCs:	16
Operational:	June 2009
System Type:	Pallet Delivery
Guide Path:	Magnetic Tape
System Active:	16 hours per day, 6 days a week
Load:	750 pound fixture & load
Communication:	Wireless 802.11a
Battery Charging:	12-amp charger stowed on AGC is manually plugged into wall power at end of day.

Johnson Controls

Northwood, Ohio

Two Model 100TT SmartCarts deliver material to the assembly lines. Operators manually hook up a trailer of kitted material for delivery. The trailers are towed behind the SmartCart. Full trailers are manually unhooked at the line, and an empty trailer is attached for return to the kitting area. The system provides labor savings by automatically delivering materials to the assembly line.



Model:	100 Tugger/Tunnel
No. of AGCs:	2
Operational:	December 2009
System Type:	Parts Delivery
Guide Path:	Magnetic Tape
System Active:	8 hours per day, 5 days a week
Load:	Trailer of parts for assembly line
Communication:	Wireless 802.11a
Battery Charging:	off board 20 amp manual chargers used during off shift

Johnson Controls

Westpoint, Georgia

SmartCart Model 100TT deliver pallets of seats from the assembly lines to the shipping conveyor. Each SmartCart is equipped with tapped pads, which serve as a mounting point for a seat pallet fixture. The SmartCarts interface with an empty pallet conveyor system to receive an empty shipping pallet. The SmartCart then stops at robotic loading cells to get the front driver's and passenger seats, and then gets a rear seat from another assembly line. Some car models require two pallets of seats. The pallets are delivered to the shipping conveyor in the proper build / shipping sequence. The SmartCart system reduces labor by automatically delivering seats to the shipping conveyor in the proper sequence.

Model:	100 Tugger/Tunnel
No. of AGCs:	25
Operational:	November 2009
System Type:	Seat Delivery
Guide Path:	Magnetic Tape
System Active:	16 hours per day, 5 days a week
Load:	Pallet of seats
Communication:	Wireless 802.11a
Battery Charging:	Opportunity battery charging

Johnson Controls

Whitby, Ontario, Canada

Ninety-nine SmartCart AGCs were used to help build instrument panels (cockpits) for automobiles. All AGCs indexed at the same time on the production line based on PLC programmable time. The AGCs, which were loaded/unloaded with operator-assisted manipulators, moved over 1.2 million loads.

Model:	100 LHF
No. of AGCs:	99
Operational:	February 2002 - October 2008
System Type:	Assembly Line
Guide Path:	Magnetic Tape
System Active:	19 hours per day, 6 days a week
Load:	700 pound fixture & load
Communication:	Wireless 802.11b
Battery Charging:	10-amp charger stowed on AGC is manually plugged into wall power at end of day.

Johnson Controls, Inc.

Shelbyville, Kentucky

Two model 100 TT SmartCarts are used to deliver kitted materials to a seat assembly line. Each SmartCart is dedicated to its own loop which takes parts from kitting area for either the driver or passenger front seat assembly line. Johnson Controls mounted their own rack to secure kitted parts to the tapped pads of the standard model 100 TT SmartCart.

Model:	100 TT
No. of AGCs:	2
Operational:	April 2011
System Type:	Delivery of kitted material
Guide Path:	Magnetic tape
System Active:	20 hours per day, 5 days a week
Load:	Kitted material for seat assembly
Communication:	Wireless 802.11
Battery Charging:	Fast opportunity charging

Johnson Controls, Inc.

Georgetown, Kentucky

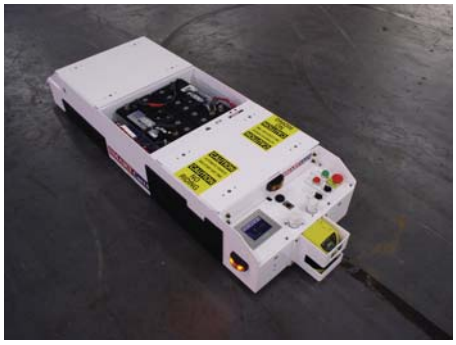
18 SmartCart model 100 TT vehicles deliver pallets of seats from assembly lines to a shipping conveyor system. Each SmartCart is equipped with tapped pads that serve as a mounting point for a seat pallet fixture. The SmartCarts receive an empty shipping pallet by traveling under a conveyor that lowers the pallet onto the SmartCart as it drives through the station. The front seats are loaded onto the pallet by a robot, the rear seat is manually loaded. The seat set is then delivered to the shipping conveyor where the shipping pallet is lifted off the SmartCart as it travels through/under the shipping conveyor.

Model:	100 TT
No. of AGCs:	18
Operational:	July 2011
System Type:	Seat delivery
Guide Path:	Magnetic tape
System Active:	16 hours per day, 5 days a week
Load:	Pallet of seats
Communication:	Wireless 802.11a
Battery Charging:	Fast opportunity charging

Johnson Controls, Inc.

Whitby, Ontario

These SmartCarts are used to transport seat assembly components from warehouse load/kitting positions to line side assembly stations. Vehicles are manually released and directed to appropriate stations. The system uses a unique 16-zone safety laser for both personnel/obstacle detection and traffic control. This allows multiple vehicles to operate on shared paths without the need for communication or a cart management system computer.



Model:	100 TT with 16 zone laser
No. of AGCs:	2
Operational:	April 2010
System Type:	Tunneling trailer transport
Guide Path:	2500 feet of magnetic tape with protective cover
System Active:	15 hours per day, 5 days a week
Load:	Wheeled racks
Communication:	None
Battery Charging:	Manual charging

Kubota

Gainesville, Georgia

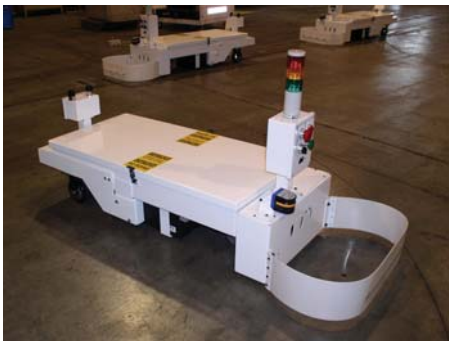
Nine SmartCart AGCs are equipped with a special automatic couple/decouple hitch and load carrying deck. Empty assembly trailers are automatically coupled and towed through parts picking zones ending with the trailer receiving a vehicle frame from an overhead lift mechanism. The AGC decouples the trailer and travels to the unload station at the assembly line. The AGC system eliminated the need for man-aboard tow motors. The additional SmartCarts move welded metal fixtures between weld and assembly areas.

Model:	200 Tugger
No. of AGCs:	9 **+ 4**
Operational:	February 2007 **System expansion June 2011**
System Type:	Parts Delivery
Guide Path:	Magnetic Tape
System Active:	24 hours per day, 7 days per week
Load:	Miscellaneous parts for assembly line
Communication:	none
Battery Charging:	8-amp manual chargers stowed on cart **+ Auto charging**

Kubota

Gainesville, Georgia

Seven SmartCart AGC tow pairs of trailers from parts load station to assembly stations where operator first loads a completed assembly on the empty trailer, then unloads parts from second trailer to assembly fixture. The AGC then released to the finishing line load station where completed assembly is unloaded. It then returns to parts load station. AGC system replaced manually pushed carts, ensuring throughput with reduced labor content.



Model:	100HD Tugger
No. of AGCs:	7
Operational:	August 2008
System Type:	Parts Delivery
Guide Path:	Magnetic Tape
System Active:	8 hours per day, 5 days per week
Load:	Parts for assembly line - 1500 pounds
Communication:	Wireless 802.11a
Battery Charging:	24-amp automatic charging in loop

Toray Carbon Fibers America

Decatur, AL

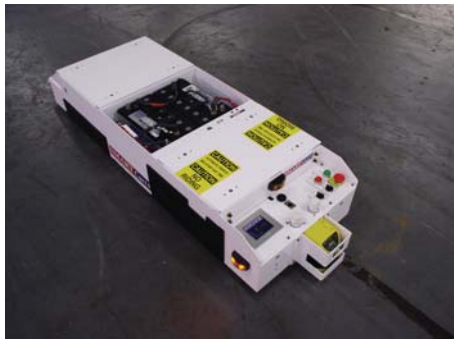
The SmartCart AGCs are a part of a subsystem to an overall material handling system. The AGCs provide automated delivery of bobbins to/from a spinning operation. The automatic guided carts interface with fork style AGVs for delivery of bobbins to/from an ASRS. The new vehicles are used to transport special carts to/from these areas.

Model:	200 TT bi-directional
No. of AGCs:	2
Operational:	June 2011
System Type:	Special cart handling delivery
Guide Path:	Magnetic tape
System Active:	24 hours per day, 7 days a week
Load:	Special trailers of bobbins
Communication:	Wireless 802.11
Battery Charging:	Automatic charging

Toyotetsu America, Incorporated

Somerset, Kentucky

19 SmartCart 100 TT vehicles deliver trailers of raw material to a welding cell and remove finished goods for storage. This system eliminated the manual handling of trailers that was previously done by operators.

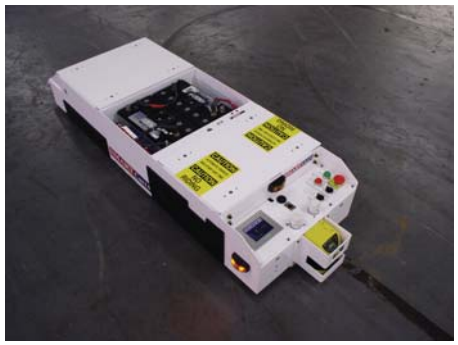


Model:	100 TT
No. of AGCs:	19
Operational:	April 2011
System Type:	Material delivery and storage
Guide Path:	Magnetic tape
System Active:	16 hours per day, 5 days a week
Load:	Parts weighing 300 pounds
Communication:	Wireless 802.11b
Battery Charging:	Automatic fast charging

Trim Masters Incorporated

Bardstown, Kentucky

18 SmartCart AGCs run on two separate loops working independently to carry custom load handling frames of parts for seat subassembly lines. The solution was implemented because of its scalability and flexibility.



Model:	100 TT
No. of AGCs:	18
Operational:	December 2011
System Type:	Seat subassembly line
Guide Path:	Magnetic tape
System Active:	20 hours per day, 5 days a week
Load:	Automotive seat assemblies
Communication:	Wireless 802.11
Battery Charging:	Manual charging at end of shift

Yamaha

Newnan, Georgia

Seventeen SmartCart AGCs move All Terrain Vehicles (ATV) through the final trim section of the assembly line. AGCs index according to plant PLC indicated job interval, providing a stationary work area for line workers. Equipped with a low profile frame and manual turntable, these vehicles provide workers an ergonomic interface to the ATVs.

Model:	200 LHF
No. of AGCs:	17
Operational:	May 2008
System Type:	Assembly Line
Guide Path:	Magnetic Tape
System Active:	24 hours per day 5 days per week
Load:	1200 pound all terrain vehicles
Communication:	Wireless 802.11g
Battery Charging:	3 40-amp automatic charging stations in loop.


10

Ashok-Leyland

Tamil Nadu, India

SmartCart AGC moves an engine between assembly cells. AGC is fitted with a cradle that allows a truck engine to be loaded using a crane, transported 50 feet, and unloaded in a similar manner. Using a SmartCart was the most cost effective and least invasive method to perform the required operation. This SmartCart application is the first full bidirectional guided installation.

Model:	300 Tugger
No. of AGCs:	1
Operational:	June 2010
System Type:	Transportation
Guide Path:	Magnetic Tape with Protective Tape
System Active:	8 hours per day, 5 days per week
Load:	Diesel Truck Engine
Communication:	none
Battery Charging:	One 40-amp Automatic Charger

Chrysler

St. Louis, Missouri

Forty-seven SmartCart AGCs are used to deliver instrument panels. Pallets are robotically loaded onto AGCs and transported to the side of the assembly line where it is manually unloaded and inserted into an automobile. The AGC delivery system provides floor transport quicker than an overhead conveyor system. As a result, less loads need to be stored in the system, allowing for additional time in the broadcast window.

Model:	100 HD LHF
No. of AGCs:	47
Operational:	July 2007
System Type:	Parts Delivery
Guide Path:	Magnetic Tape
System Active:	16 hours per day, 5 days per week
Load:	400 pound IP on pallet
Communication:	Wireless 802.11b
Battery Charging:	9 24-amp automatic charge stations in loop

Chrysler

Valencia, Venezuela

Engines are dressed and loaded onto SmartCart AGCs. The AGCs transport engines to the production line where they are raised into place with a customized hydraulic lift. The AGC system improved plant safety and layout because the engine dressing process was moved away from the production line.

Model:	200 Tugger
No. of AGCs:	5
Operational:	August 2006
System Type:	Assembly / Transport
Guide Path:	Magnetic Tape
System Active:	8 hours per day, 5 days per week
Load:	1500 pound engine/transmission
Communication:	Wireless 802.11b
Battery Charging:	20-amp charger stowed on AGC is manually plugged into wall power at end of day.

Chrysler

Dundee, Michigan

These custom SmartCarts move racks of finished engines from a robotic loading cell to the shipping dock. SmartCart AGCs are equipped with a lift deck to transfer the racks at the dock. The AGCs then bring empty engine racks back to the robotic cell.

Model:	300 Custom
No. of AGCs:	5
Operational:	December 2011
System Type:	Engine delivery
Guide Path:	Magnetic tape
System Active:	16 hours per day, 5 days a week
Load:	Finished engines on shipping racks
Communication:	CMS & PLC
Battery Charging:	Automatic opportunity charging

Chrysler JNAP

Detroit, Michigan

SmartCart AGCs move trains of full and empty carts between receiving and trim line. AGCs feature a timer that “wakes up” AGCs at beginning of first shift. This system is capable of running 24/7 and will achieve a payback in about one year.

Model:	300 Tugger
No. of AGCs:	27
Operational:	June 2010
System Type:	Multiple Car Transport
Guide Path:	Magnetic Tape w/protective tape & Bar Magnet
System Active:	16 hours per day, 6 days per week
Load:	Trailer Trains of Carts 6,000# Max Load
Communication:	Wireless 802.11a
Battery Charging:	Six 80-amp automatic chargers between drop-off & pick-up

Ford Motor Company of Australia

Melbourne, Australia

This SmartCart automatic guided cart allows Ford Motor Assembly Plant #1 to easily recycle fender protectors. The AGC pulls two trolleys that carry light foam fender protectors. Operators at either end of the 302 meter long circuit manually load and unload the trolleys.

SMARTCART
SMARTCART
SMARTCART

Model:	100 TT
No. of AGCs:	1
Operational:	December 2011
System Type:	Manual dispatch
Guide Path:	Bar magnet
System Active:	-
Load:	Trolleys carrying light foam fender protectors
Communication:	NA
Battery Charging:	Manual charging

Fuji — Malaysia

Model 50 SmartCart transports seat frames from frame build station to seat assembly area. The SmartCart is equipped with non-powered rails that match up to rails at the Frame Build area and the Assembly area. Workers manually transfer the seat frame on and off of the SmartCart. This system provides labor savings as the SmartCart replaces a manually pushed cart.

Model:	50
No. of AGCs:	1
Operational:	September 2009
System Type:	Seat Transport
Guide Path:	Magnetic Tape
System Active:	8 hours per day, 5 days per week
Load:	250 pound seat pallet
Communication:	none
Battery Charging:	One 12-amp manual charger

GM CAMI — Ingersoll, Ontario, Canada

Fourteen SmartCart AGCs are used for a Just-In-Time (JIT) fascia delivery system. Parts are picked from the stock area and delivered to the production line. The AGCs are manually loaded/unloaded by operators. The AGCs are equipped with custom carousels for easy part access and load sensing for automatic release from the delivery point. Due to area restrictions near the production line, fascias could not be stored in close proximity to the usage point. The AGC system was less than half the price of other options and require no material handling laborers. April 2009 these vehicles were redeployed to other in-plant operations.

Model:	100 HD LHF
No. of AGCs:	14
Operational:	July 2005
System Type:	Parts Delivery
Guide Path:	Magnetic Tape
System Active:	20 hours per day, 6 days per week
Load:	4 - 50 pound parts in ergonomic positions
Communication:	Wireless 802.11b
Battery Charging:	5 24-amp automatic charging stations in loop.

GM CAMI — Ingersoll, Ontario, Canada

SmartCart AGCs system is used for line side testing of vehicle electrical systems (GMC Terrain & Chevrolet Equinox). SmartCarts sequence test devices alongside the assembly line where they are plugged into the car by an operator. Following test, the operator unplugs the device and releases the SmartCart which returns to the queue area. Traditionally, overhead conveyors (Power & Free or electrified monorail) have been used for this application. The SmartCart system was chosen because it is cost effective, easily modified, installs quickly and requires no overhead or floor support structure.

Model:	100 HD Unit Load
No. of AGCs:	5
Operational:	February 2009
System Type:	Line Side Electrical Testing
Guide Path:	Magnetic Tape
System Active:	24 hours per day, 6 days per week
Load:	Electrical Test Devices
Communication:	none
Battery Charging:	Two 24-amp automatic charging stations in loop.

GM Battery Plant — Brownstown Township, Michigan

SmartCart AGC delivery system moves battery components from a pallet load area to the assembly machine. This system uses 28 refurbished AGCs that were from GM plants that were shut down. system was expanded with eight additional SmartCarts to increase throughput.

Model:	100 HD LHF
No. of AGCs:	28 **+ 8**
Operational:	September 2010 **System expansion April 2011**
System Type:	Build Line for Batteries
Guide Path:	Magnetic Tape
System Active:	Pending
Load:	Battery Cells and Completed Batteries
Communication:	Wireless 802.11a
Battery Charging:	Automatic charging stations in loop with additional on-board maintenance charger.

General Motors (LDTA)

Lansing, Michigan

Fifty-one SmartCart AGCs are equipped with dual roller decks that receive pallets of seats or cockpits at the receiving docks. The AGCs then proceed to the main assembly line where components are unloaded with manipulators. The AGC system eliminates the need for fork truck or tow motor drivers.

Model:	100 HD w/ Gravity Conveyor
No. of AGCs:	51
Operational:	July 2006
System Type:	Pallet Delivery
Guide Path:	Magnetic Tape
System Active:	20 hours per day, 6 days per week
Load:	Pallet of seats or cockpits
Communication:	Wireless 802.11a
Battery Charging:	2 24-amp automatic charging stations in loop.

General Motors (LGR)

Lansing, Michigan

Fourteen SmartCart AGCs are used to assemble a hatch door on an automobile. All AGCs index at the same time on the production line based on PLC programmable time. The AGCs are loaded/unloaded with operator-assisted manipulators. The AGCs are customized with manual turntables (not shown) for easy access to work.

Model:	100 HD LHF
No. of AGCs:	14
Operational:	June 2006
System Type:	Assembly Line
Guide Path:	Magnetic Tape
System Active:	20 hours per day, 6 days a week
Load:	Rear hatch for automobile
Communication:	Wireless 802.11b
Battery Charging:	2 24-amp automatic charging stations in loop.

General Motors

Oshawa, Ontario, Canada

Twenty-six SmartCart AGCs transport hoods and deck lids from one tooling cell to another. This system utilizes AGCs from a previous GM installation at a facility that had shut down.

Model:	100 HD LHF
No. of AGCs:	26
Operational:	December 2008
System Type:	Parts Delivery
Guide Path:	Magnetic Tape
System Active:	20 hours per day, 5 days a week
Load:	Sheet Metal Parts - Hoods and Deck lids
Communication:	Wireless 802.11b
Battery Charging:	8-amp charger stowed on vehicles, plugged in at shift end

General Motors

Wilmington, Delaware

Fifty-three SmartCart AGCs are used to help build automobiles. All AGCs index at the same time on the production line based on PLC programmable time. The AGCs are loaded/ unloaded with operator-assisted manipulators. The AGCs are specially equipped with replaceable drive modules for easy maintenance. The AGC system provides a scalable material handling solution with unencumbered access.

Model:	200 LHF
No. of AGCs:	53
Operational:	February 2005 - July 2009
System Type:	Assembly Line
Guide Path:	Magnetic Tape
System Active:	8 hours per day, 5 days per week
Load:	2500 pound automobile
Communication:	none
Battery Charging:	4 40-amp automatic charging stations in loop.

General Motors

Ramos, Mexico

Transmission cases are loaded onto the pallet and delivered to the assembly line by custom 100TT SmartCart AGCs. Empty transmission pallets are then picked up and delivered back to the transmission load station.

Model:	100 TT with roller deck
No. of AGCs:	6
Operational:	September 2011
System Type:	Transmission delivery
Guide Path:	Magnetic tape
System Active:	16 hours per day, 5 days a week
Load:	Automotive transmissions
Communication:	None
Battery Charging:	Automatic opportunity charging

Honda of Canada

Alliston, Ontario, Canada

Eleven SmartCart AGCs help build axles for automobiles. All AGCs index at the same time on the production line based on PLC programmable time. The AGCs are loaded/unloaded with operator-assisted manipulators. The AGCs are specially equipped with laser bumpers. The AGC system allows production to take place across the aisle from the main assembly line without interrupting aisle traffic.

Model:	100 HD LHF
No. of AGCs:	11
Operational:	April 2004 - March 2008
System Type:	Assembly Line
Guide Path:	Magnetic Bar
System Active:	19 hours per day, 6 days a week
Load:	1250 pound load & fixture
Communication:	Wireless 802.11b
Battery Charging:	3 24-amp automatic charging stations in loop.

Nissan

Aquascalientes, Mexico

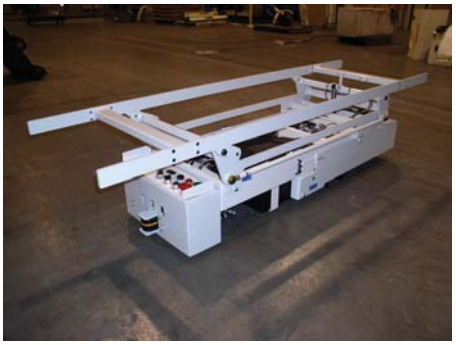
Five SmartCart AGCs transport empty engine pallets to the production line where the pallets are loaded by an operator with a manipulator. Filled pallets are returned to their origin where they are traded for empties. Line rate is one pallet per minute. The AGC system saves two people per shift (over three shifts). Pay back on the investment was less than 18 months.

Model:	200 w/ 2 Conveyors
No. of AGCs:	5
Operational:	September 2006
System Type:	Pallet Delivery
Guide Path:	Magnetic Tape
System Active:	23 hours per day, 5 days per week
Load:	2 - 600 pound engine pallets
Communication:	Wireless 802.11b
Battery Charging:	Three 40-amp automatic charging stations in loop.

Nissan

Canton, Mississippi

Twelve SmartCart AGCs are used to transport parts from the kitting area to line side, helping reduce material handling costs.



Model:	100 HD w/ Lift
No. of AGCs:	12
Operational:	May 2008
System Type:	Rack Delivery
Guide Path:	Magnetic Tape
System Active:	16 hours per day, 5 days per week
Load:	Small Parts Bins
Communication:	Wireless 802.11a
Battery Charging:	20-amp manual chargers stowed on cart

Nissan

Decherd, Tennessee

Five SmartCart AGCs run constantly to transport racks of parts from the picking area to the production line. The AGC system eliminates the need for labor to manually push carts or tow with a tow motor.

Model:	100 HD Tugger
No. of AGCs:	5
Operational:	January 2008
System Type:	Parts Delivery
Guide Path:	Magnetic Tape
System Active:	22 hours per day, 5 days per week
Load:	500 pound rack
Communication:	none
Battery Charging:	Battery charge & swap

Nissan

Smyrna, Tennessee

Five SmartCart AGCs are used to transport parts between stations, helping reduce material handling costs.

Model:	100 HD Tunnel/ Tugger
No. of AGCs:	5
Operational:	August 2006
System Type:	Parts Delivery
Guide Path:	Magnetic Tape
System Active:	8 hours per day, 5 days per week
Load:	Miscellaneous parts for assembly line
Communication:	none
Battery Charging:	8-amp manual chargers stowed on cart.

Nissan

Smyrna, Tennessee

Sixteen SmartCart AGCs transport empty trailers to a kitting area, where trailers are manually loaded. The AGCs with full trailers proceed to production line where they slow to match line speed and kits are manually unloaded. Once empty, they return to the kitting area. The system eliminates the need for labor to manually push carts or tow with a tow motor.

Model:	100 HD Tugger
No. of AGCs:	16
Operational:	August 2007
System Type:	Kitting/Parts Delivery
Guide Path:	Magnetic Tape
System Active:	16-20 hours per day, 5 days per week
Load:	1600 pound trailer train
Communication:	Wireless 802.11g
Battery Charging:	Battery swap & charge

Nissan

Smyrna, Tennessee

Eight SmartCart AGCs are used to transport parts from the kitting area to line side, helping reduce material handling costs.

Model:	100 HD Tunnel/ Tugger
No. of AGCs:	8
Operational:	May 2008
System Type:	Parts Delivery
Guide Path:	Magnetic Tape
System Active:	16 hours per day, 5 days per week
Load:	Small Parts Bins
Communication:	none
Battery Charging:	20-amp manual chargers stowed on cart.

Tesla Motors

Fremont, California

These custom SmartCart 300 vehicles are used for chassis assembly, door and trim assembly and battery handling for electric cars. Two of the three versions include ergonomic lift decks that enable the assembly workers to raise or lower the vehicles depending on assembly requirements.

Model:	300 Custom three versions
No. of AGCs:	40
Operational:	December 2011
System Type:	Vehicle assembly
Guide Path:	Magnetic tape
System Active:	16 hours per day, 5 days a week
Load:	Automotive vehicles
Communication:	Wireless 802.11a CMS & PLC
Battery Charging:	Automatic opportunity charging


SMART Cart

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