



The AGV drives to and from the load on wheels...

Air Conditioners Moved on Air and Wheels

Aermec, the Italian manufacturer of air conditioning equipment, was founded in 1962. As early as, 1963, the Aermec brand was created, and today it represents both the products and the company. The company is a leader in its industry, and manufactures about 300 products for home, office and industrial customers. Manufacture is concentrated in Bevilacqua near Verona, northern Italy.

High degree of automation

Aermec invest heavily in product development and in state-of-the-art manufacturing methods, and two air bearing based Solving Movers are already in use. The process of manufacture is highly automated, and to move manufactured air conditioning units between different assembly stations, testing and finally to despatch, a laser guided Solving AGV (Automated Guided Vehicle) Mover, that is both air bearing and wheel based, has been installed. The AGV has a capacity of 2.1 tonnes, and is equipped with forks to move the different units, each placed on its own movable assembly platform.

Air bearings lift the load

When an operator is ready with a unit, he pushes a button, which activates the AGV. The empty Mover drives on wheels, but when it is about to lift the unit, it transfers to air bearings. These air bearings, supplied with air from a Movair overhead air supply system, lift the Mover off the floor and at the same time the assembly platform is lifted. Then the air conditioning unit is transported on air bearings to an unoccupied place at the next assembly station. To find an unoccupied position, the Mover communicates with a high-level control system via a radio link.

A flexible system that provides opportunities

The AGV has a steerable drive wheel and guide wheels in both forks, and it can drive forward, backward, in curves or rotate around its own centre. This provides the customer with a flexible handling system between the assembly stations and in the narrow aisles in the production hall.

The Solving AGV also provides Aermec with an advanced system that is easy to use and very flexible. The units are transported safely and with care, and since there are no fixed installations, it is easy to make changes to the layout if needed. With this modern, efficient and flexible handling system, Aermec can continue developing their products and manufacturing process, and at the same time maintain high product quality.



... When it is about to lift the load, it transfers to air bearings to lift the load from the floor



A Unique Paper Reel and Core Handling System

At the world's northernmost papermill, Stora Enso's Veitsiluoto Mill in Kemi, Finland, reels and cores are automatically handled using two Solving AGV Movers. The AGVs collect and deliver reels for the sheet cutter and also remove and transport empty cores. The

system is the first of its kind in the world, and can be monitored from the same location as the rest of the system, including the sheet cutter, the reel handling system and the wrapping lines.

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Airbus A380 Wings Fly, 2 Years Early!

Imagine a two-storey plane standing 24m high, over 70m long and almost 80m wide. It's sitting at the end of the runway, weighing over 500 tonnes, with 555 passengers on board, ready to fly up to 15,000 km. Four

enormous engines are ready to launch the Airbus A380, the world's largest passenger plane, on its maiden flight, yet it's the most fuel-efficient aircraft ever conceived.

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The 40m long wing, seen here from the side, lies on the radio-controlled Solving Platform Mover

Airbus A380 wings fly, 2 years early!

You'll have to wait until 2006 to see this extraordinary plane enter service, but each of the wings destined for the first batch of aircraft has already 'flown' on Solving Movers at the Airbus factory in Broughton, England. This factory has produced many of the wings for Airbus's family of aircraft, and the A380 wing is their largest.

Measuring 40metres long and weighing almost 40 tonnes, these are actually the largest wings ever manufactured for any civil aircraft.

How can the wing be moved?

At the new custom-built A380 wing facility Airbus was faced with the task of moving these giant wings from the

assembly area though inspection and into the paint plant. The original scheme comprised a wheeled Mover running on rails in the floor. With the combined weight of the raft and wing expected to be around 80 tonnes, this method was going to impose high point loadings on the concrete floor, and would have created obstructions to personnel and other traffic. An air-film Mover concept, which spreads the load evenly over large 'air bearings' was considered, and Solving was brought in to develop the idea further.

In co-operation with Morson Projects, experts familiar with wing handling, Solving supplied an air film Mover system to enable a single operator to manoeuvre the wing 'sideways' from one stage to another with extreme accuracy and safety.

Precision and safety

The 'raft' built by Morsons contains eight Solving modules, two electrical drives and an optical guidance system. An onboard control centre receives instructions from the operator's hand-held radio control console, and three further radio-controlled e-stops are held by lookouts, stationed at each end of the wing. The optical guidance system ensures extreme accuracy is maintained throughout the transport process, and a manual override is available should the raft be required to move to other areas.

The floor on which the Mover operates is entirely clear of any obstructions, and the option is available to drive or rotate the Mover in any direction if required. Apart from the low floor loadings, the Solving device is easy to operate, quiet and user-friendly. It requires little

maintenance, and provides Airbus with a solid, stable measuring raft when the air bearings are deflated (unlike a wheeled platform which requires a braking system to avoid movement).

Airbus Tooling Engineer, Alan Minshall, is pleased with the development: "Solving and Morsons have worked with Airbus as a team to ensure all our requirements are fully understood and appreciated. The largest commercial wings in the world are now able to fly before they are even attached to an aircraft!"

Metro-trains Both Floating and Rolling!

At the state owned ZELW – Zhuzhou Electric Locomotive Works – in the town Zhuzhou in central China, about 10 000 employees develop and manufacture electrical metro trains, including locomotives, metro cars etc. The company has built an entirely new plant equipped with European technology, including one Solving Mover for moving cars and two Solving Movers for handling components.

Optical guidance

The first Mover consists of two parts and drives in under racks placed below the front and rear parts of the car. The distance between these racks can vary from 5 to 30 metres. The air supply is routed through built-in hose reels in both units.

The Mover is manoeuvred from a radio control unit and when it moves between different stations, it follows a painted line in the floor. The optical guidance method is very precise, which is a great advantage when the cars are to be accurately transported to, and positioned at, the different assembly stations that resemble narrow parking spaces.

Transfers to rails

When the cars are to be moved over the maintenance pit, the air film based Mover transfers from air bearings onto wheels and rolls over the pit – so it runs on rails! To enable the transfer between floor and rails, the Mover is equipped with pneumatically raised adjustable rail wheels. All the functions of the Mover are taken care of by a programmable logic which is fitted on the Mover.

Handling of components

For handling components to the cars, two air film based Solving Movers with integral lifting tables are used. The larger one, with a three-tonne capacity, is equipped with drive wheels while the smaller one, with a one-tonne capacity, is manually controlled. Both these Movers are supplied with compressed air from hose reels that are placed next to the control cabinet. Using the lifting tables, the components can be lifted and attached to the cars, after pre-assembly.

In this state-of-the-art technology plant about 350 car bodies and other components will be manufactured every year, and they will all be moved with modern, safe, flexible and efficient Solving Movers.



With hydraulic lifting tables components are lifted up to the train for assembly



The Mover, floating on air bearings, optically follows the painted line in the floor until it reaches the rails, then it transfers to wheels

New Orders

Nedtrain, the Netherlands

The train repairing workshop Nedtrain Refurbishment & Overhaul Hlm has ordered two pairs of air bearing based Solving Movers for moving train carriages in their production facilities in Haarlem, the Netherlands. The lifting capacity of the complete system, consisting of two radio-controlled Solving Movers, is 80 tonnes. The equipment will be delivered and commissioned at the beginning of next year.

Hydro Aluminium, Germany

Hydro Aluminium will take delivery of a heavy duty wheel-based Solving AGV Mover for transporting aluminium coils between a production hall and a wrapping hall. The fully automated equipment will be used 24 hours a day, partly outdoors, and the load, weighing 15 tonnes, will be protected with a weatherproof covering.

Metso Minerals, Finland

Metso Minerals has ordered air bearing based Solving Movers with a lifting capacity of 50 tonnes to move their Lokotrack Crushers along the assembly line in the production hall.

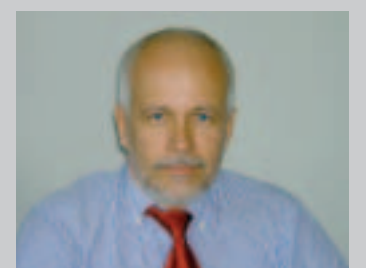
Volvo, Sweden

Volvo Lastvagnar in Gothenburg, Sweden is extending their cooperation with Solving and has ordered customised docking stations for their new production line for heavy trucks.

Thiess/Arup, Australia

Radiation shield doors weighing up to 40 tonnes will be handled with Solving's air film technology at an electron acceleration facility in Victoria, Australia. The project has been placed by Thiess Pty Ltd, who is the head contractor in the project. The end customer is Australian Synchrotron Project, and the equipment will be used for advanced research and development.

Solving Italia 10 years



Solving Italia was founded in 1994 to primarily handle the sales of Solving products in Italy. The company has been successfully run from the start by Managing Director Markku Mertanen. He has during the recent years built up an organisation that today consists of some 10 people, with focus on marketing, sales, project handling, start ups and after sales. Apart from Solving's range of products, the company's portfolio today includes products from other Finnish companies.

A Unique Paper Reel and Core Handling System

Stora Enso's Veitsiluoto mill in Kemi, Finland, is the fourth largest paper and cardboard manufacturer in Europe. With 1500 employees at the facility, office paper, coated mechanical paper and saw products are manufactured and shipped to the largest harbours in Europe all year around from the mill's integrated quayside.

In 2003 Stora Enso installed a modern production line for small sheets at Veitsiluoto mill in Kemi. The sheet cutter demands a rapid material flow, requiring reels to be inserted and cores to be removed quickly and efficiently. To manage this material flow, Stora Enso chose to install an automatic, wheel based Solving AGV Mover system.

Automatic function

Since the manufacturing process at paper mills almost never stops, the AGVs are designed for continuous use, 24 hours a day and 7 days a week. Together they serve 16 stations at the sheet cutter.

Two different loads are handled: paper reels and empty cores. One of the AGVs collects 3 tonnes paper reels from a floor level transporter and delivers them to the sheet cutter. During one day, it will handle approximately 350 tonnes of paper or 115 paper reels! When the sheet cutter has cut the paper to the required number of sheets and the paper reel is empty, the second Mover collects the empty core and takes it to the core handling facilities.

Design

The wheel based AGVs consist of a rigid steel construction and are driven by a 48 VDC electrical motor. They are

equipped with fixed, chargable NiCAD-batteries that are automatically charged at fixed locations after every change of reels. The AGVs simply drive over the charge plates that are cast into the floor and stay there for charging until the next driving order is received.

The drive wheel is combined with a steering unit and support wheels are placed in the lower, fixed forks. The load handling forks move up and down pneumatically to lift and transport the reels safely. The AGV Mover used for handling cores can also move sideways, to handle cores of different sizes.

Advanced control system

The AGVs are controlled from a PC-based system, incorporating the software needed to instruct the AGVs and to give them driving sequences. This computer communicates with the sheet cutter via Profibus: when the sheet cutter notices that it is about to run out of paper, it sends a signal to the PC-based control system which then activates the AGVs by sending a signal using a radio connection. When the AGVs are activated, they remove the empty cores and take them away, and also collect and deliver new paper reels.

The navigation system is based on inductive guidance via a wire laid in the floor, which the AGVs follow to find the right destination. The AGVs can also be activated manually via the main operator panel on the sheet cutter, both for removing cores and for delivering new paper reels.

Safety

To avoid injuries and collisions, the AGVs are equipped to the latest safety standards. For example, mechanical bumpers are fitted front and rear, which stop the AGV whenever an object makes contact. Photo cells are fitted on



Paper reels are automatically fed to the different stations of the sheet cutter

the AGV sides, which provide safety for personnel when driving around corners; audible signals and caution lights, and an emergency stop button, are also fitted to the AGVs. One of the areas where the AGVs are used is also screened off with light curtains – when the light curtain is broken the AGV stops, and it won't start again until the area is safe.

Unique characteristics

Because the whole system, including the sheet cutter, wrapping lines and AGVs, can be monitored from a single location on the sheet cutter, it is unique, and these components are linked using

state-of-the-art data transmission channels. It is also the only unmanned core-collection AGV in Finland, possibly the only one in a paper mill anywhere.

A functioning, efficient system

The AGVs were developed through intensive co-operation with the customer and the sheet cutter machine supplier, and the result has proved to be a satisfying success for the customer.

According to Lauri Pirnes, chief of the sheet cutter department, an additional capacity of 120 000 tonnes/year will be achieved with the total investment in the sheet cutter and

additional equipment. He also says that the working safety and ergonomics have been significantly improved the new core handling equipment, since the cores previously were handled manually, and that the integration of the control with the head panel at the sheet cutter has simplified the job for the personnel.

High-Capacity, Pedestrian-Controlled Pallet Trucks – an Eagerly-Awaited Development

In the paper industry, printing houses and workshops, there has always been a need for a simple and reliable high-capacity, pallet and paper-handling, pedestrian-controlled electric truck. With weights of up to 10 tonnes, these loads are usually moved relatively short distances.



The pallet truck is easily manoeuvred and controlled from the steering arm at the end of the truck.

To meet these needs, Solving has developed a series of heavy-duty wheel based pedestrian-controlled electric pallet trucks. These pallet trucks are manoeuvred and controlled from a tiller placed at the end of the truck. The trucks have a robust construction able to withstand heavy industrial use, whilst still being relatively lightweight. They are also smaller and significantly cheaper than alternative heavy load handling devices, and customised interface structures ensure each truck is designed specifically to suit the customer's needs.

A solution for the paper industry

One of the first of these new Solving trucks was delivered to Stora Enso's paper mill in Hamina, Finland, for handling reels of paper. This truck, with a 6-tonne load capacity, is exceptionally manoeuvrable and can rotate within its own length. Infinitely variable speed control further increases its flexibility. The truck is easy to use and is equipped with maintenance-free batteries and integral chargers. The hydraulic forks are customised to suit Stora Enso's reel sizes and can handle diameters from 750 to 1500 mm.

A cost efficient solution

Solving's trucks improve ergonomics because personnel no longer need to carry out heavy moves by hand, and a tight turning circle provides superior manoeuvrability. And one of the most significant advantages is the price – the heavy-duty pedestrian-controlled pallet truck is a significantly more cost efficient solution than the alternatives.

Customisation Results in New & Efficient Products

Product development is key within all businesses. To be a successful supplier, the starting point has to be the customer's needs. Solving has over 25 years experience of providing customised systems and it follows that we therefore create constant product development.

One example of customisation is our new product family that consists of high capacity, wheel based pedestrian-controlled pallet trucks. This range meets a need that until now not has been fulfilled. The result is, like all good solutions, both simple and cost-efficient.

Our core competence for many years has been air film technology, but with our new pedestrian-controlled pallet trucks we have taken a step into the world of wheels. This provides us with unique possibilities to adopt new technical solutions to satisfy our customers' needs. Solving's air and wheel-based Mover is a unique and efficient combination that has been successfully used in several projects.

Increased automation

Automation within material handling is increasing, and this leads to increased



demands on reliability, efficiency and ergonomics. Even when full automation is not necessary or even possible, parts of the production can still be automated, or perhaps easy-to-use manual or remote-controlled systems can be installed. Solving Movers will meet these demands. Our experienced after sales organisation is always available – ready to make the customer's handling processes safe, reliable and efficient.

We at Solving hope you find these articles of interest, and look forward to hearing from you soon!

Peter Björk, CEO

Volvo Choses Solving – Again!

Volvo's trucks are at the moment sold in more than 130 countries. In 2003, Volvo sold 75 312 trucks, and more than 95 % of them are in the heavy weight league (over 16 tonnes). This makes Volvo Trucks the world's third largest manufacturer of heavy-duty trucks. In the Tuve plant in Gothenburg, Sweden, four different models are being assembled, the FM and the FH models.

The Tuve plant is responsible for the manufacture of frame beams to several of Volvo's assembly plants, and these are manufactured in an almost fully automated line. For transporting steel coils to the frame beam line Volvo has chosen to install a Solving Coil Mover, just as they did in 1991

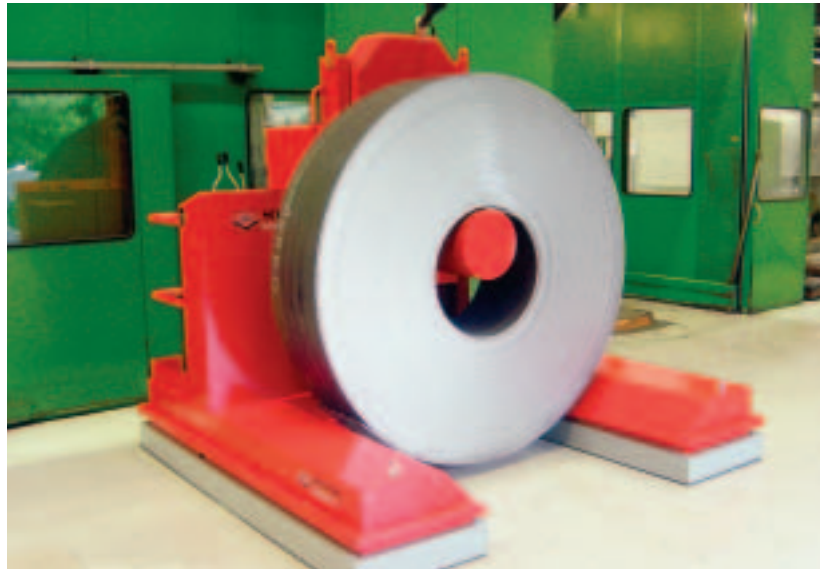
Both air and wheel based

The new Mover, with a capacity of 10 tonnes, is both air bearing and wheel based, unlike the previous one, which only was air bearing based. This dual mode is an advantage particularly in winter, since the steel coils have to be collected from an outdoor concrete area,

and it is better to drive on wheels when the concrete surface is snowy and icy.

The new Mover is equipped with hydraulic drive wheels that provide more power than the old pneumatic ones, and the Mover's lifting equipment is also hydraulic. When the Mover collects the steel coils from outside, one at a time, it lifts the load hydraulically, and transports it to a temporary storage for acclimatisation. When the coils have reached the right temperature after a few hours, they are transported into the production hall, lifted hydraulically and fed into a coiler in the production line

The Mover is controlled using hydraulic valves in the handlebar. The advantage with this technology is that the Mover can collect and position the coils in the narrow temporary storage with freedom and flexibility. The Mover can also rotate around its own centre and drive in curves to maximise the use of the available space. Another advantage is that the Coil Mover can easily be adapted if Volvo chooses to change the layout of the plant.



Steel coils, weighing up to 10 tonnes, are flexibly transported with the Solving Coil Mover

Efficient and reliable

With Solving's customized Coil Mover, Volvo can efficiently and reliably guarantee that raw material is fed on demand into its production of frame beams. After 12 years use of the old

Solving Coil Mover, it was therefore natural for Volvo to turn to Solving when they needed new handling equipment.



A large amount of glass sheets can be safely moved with the stable radio-controlled Mover

Floating Float Glass

Can you imagine warm liquid glass floating on molten metal? During this process, a bottom surface is formed that is absolutely smooth and level. The result is a surface with fire finished brilliance – simply the finest sheet glass you can produce. The product is called Float Glass and is manufactured at the glassworks of Manfredonia Vetro in Monte Sant Angelo in Italy. Every day, about 600 tonnes of Float Glass is manufactured in sheets with a thickness of 2 to 12 mm.

A stable moving platform

Understandably this results in a large amount of glass sheets that need handling between the production processes, between cutting, storing and in and out of the autoclave. The glass sheets are placed on trestles and are moved with a radio controlled Solving Platform Mover. The Mover is equipped with 12 air bearings and can move loads weighing up to 60 tonnes. It has two steerable drive wheels that make it possible to move loads in all directions and also to position the glass precisely at the cutting machine. The Mover is narrow and low profile, which is necessary when moving the load into the autoclave.

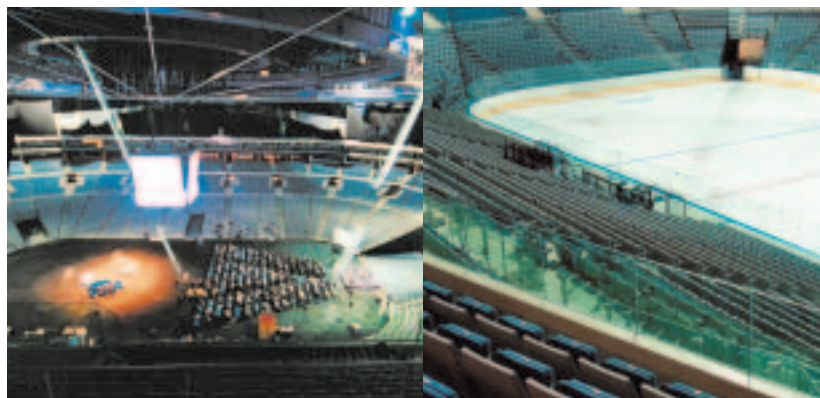
The Mover is manoeuvred with aid of a radio control, and the operator can then freely walk around the load during movement to ensure the movement path is clear.

From Ice-hockey Stadium to Concert Hall

The 2004 world championships in ice hockey took place in one of the world's most modern arenas, the Sazka Arena in Prague, Czech Republic. Sazka Arena is a multipurpose building with a 35,000 m² floor space built especially for the world championships, and it can hold as many as 18,000 visitors.

Complete air bearing system

The Sazka Arena is also used for exhibitions, fairs and concerts. For concerts, Grador group has built two stages that can be moved onto the ice. The scenery is normally kept under the galleries, and moved onto the ice using an air bearing system delivered by Solving. The system includes air compressors, an air supply system and carpets that are put onto the ice when moving the scenery.



The ultra modern multipurpose hall is used for sports events, fairs and concerts

Simple, fast and safe solution

The main advantage with using an air film system in this case is that it is a simple, fast and safe solution. The movement of scenery, weighing 11 tonnes each, onto the ice can be performed by two people in about 10 minutes! The scenery can also be freely positioned in any direction. The weight is

distributed over a large surface area which means that the ice remains intact.

According to Dagmar Kellerova at Grador Group, the air film system has proved to be a success, and the customer is very satisfied. This successful solution can be adapted for use in other similar arenas.

Safely from Painting to Assembly

The Finnish company Ab Närko Oy manufactures trailers and coach bodies and has recently taken delivery of a radio controlled, air film based Solving Platform Mover for moving frames from the painting line to one of the assembly stations.

Flexibility

In the painting facility, frames are moved using conveyor wagons suspended from the ceiling to the five end stations. The Solving air film Mover then picks them up for transportation to one of the three possible assembly stations chosen by the operator. This ensures that flexible production is achieved, which is a great advantage for the customer. The Mover does not need any fixed installations, which means that the rest of the production remains undisturbed.



The frame is positioned precisely with the aid of the integral lifting table

Precision

The air film Mover has a capacity of six tonnes and is equipped with a lifting table, to enable it to pick up and position the frames precisely at different heights. When the Mover picks up a frame, it is

precisely positioned under conveyor wagons and the frame is lowered onto the Mover. Movement then takes place with the aid of integral drive units and a remote control. The unloading of the Mover is also performed very accurately since air film technology enables precise positioning. This makes it safe working with the frames, an important issue when considering that a frame can be 2.5 m wide, 15 m long and weigh up to six tonnes.

Safety

Movement takes place in a safe and controlled manner since the frame lays securely on the Mover. The operator can freely walk around the Mover during handling and control it from the portable remote control, which also improves safety. As a result of these features, the Mover is easy to use, safe and efficient.



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