



**X-PAPER**

# SAFE AND EFFICIENT TRANSPORT OF AIR CARGO AT THE TERMINAL

A MULTITUDE OF TASKS - ONE VEHICLE



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# EDITORIAL!

ONE SYSTEM FOR ALL  
HANDLING TASKS AT THE  
AIR CARGO TERMINAL



The handling of goods and products at the air cargo terminal is complex: Goods must be transported quickly and safely from A to B. It is important to meet a wide variety of requirements, be it in terms of weight, transport safety, speed or temperature sensitivity. In order to optimally load aircraft, baggage, freight or post are bundled in unit load devices (ULDs). ULDs are made up of pallets and containers, allowing for the easy transport of goods and products in large quantities. In the air cargo sector, numerous vehicles are in operation to carry out the handling, storage and transport of these ULDs.

**Everything is easier with the X-Way Mover: This vehicle combines multiple functions and is therefore able to take over the entire handling process at the terminal. Handling equipment such as slave pallet movers, truck docks, stackers, dolly docks or transfer vehicles are therefore superfluous and can be replaced by a single vehicle.**

The concept of the X-Way Mover originated back in 2004. Growing customer demands in the air cargo sector led to the idea of developing a multi-purpose vehicle for five application areas. The basis was a classic vehicle platform, which was gradually expanded to include additional components. From the customer request to a special-purpose vehicle ready for serial production – this is a tried- and tested approach by the companies HUBTEX and DIMOS.

In this whitepaper, we discuss the varying requirements in ULD handling and give an overview of the different uses of a multifunctional transport vehicle. We will show you how to optimise your handling processes with the X-Way Mover. Naturally, all of the requirements of the International Air Transport Association (IATA) are adhered to.

Happy reading!

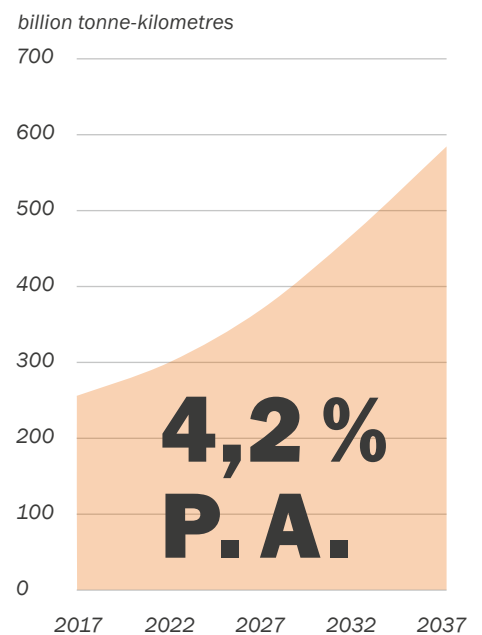
Hans-Joachim Finger,  
Managing Director at HUBTEX

Alfred Schütz  
Managing Director at DIMOS

# VARIED REQUIREMENTS IN ULD HANDLING

The numbers speak for themselves: In 2018, air cargo worldwide amounted to approximately 62 million tonnes, which corresponds to about one percent of the world's international trade volume, according to the German Aviation Association (Bundesverband der Deutschen Luftverkehrswirtschaft, BDL). However, based on the value of goods in international trade, air cargo is a major contributor at 35 percent. Given that the global air cargo volume has risen steadily over the past few years, BDL expects long-term growth to continue in the future. The latest study by the Frankfurt University of Applied Science predicts that transport services will more than double over the next 20 years. There are strict requirements for transport, especially for products from the pharmaceutical industry. Fast and efficient handling is required at the terminal in order to transport medicines and perishable goods such as food or plants to their destination as quickly and cost-effectively as possible.

➤ *Boeing forecast of the global air cargo growth*



Sources: Frankfurt University of Applied Science 2019, Boeing 2018

## AIR CARGO GOODS INCLUDE:



**ELECTRICAL GOODS**



**JEWELLERY AND PRECIOUS STONES**



**OPTICAL EQUIPMENT**



**CLOTHING**



**AIRCRAFT, SPACE AND MOTOR VEHICLES**



**AID SUPPLIES**



**PHARMACEUTICAL AND CHEMICAL PRODUCTS**



**PLANTS**



**MACHINES**

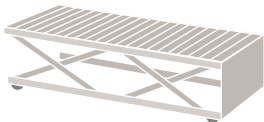
## CONCLUSION

Therefore, it is primarily high-quality, fragile and time-sensitive goods that are transported by air cargo.

# WHAT IS THE PROCESS FOR HANDLING AIR CARGO?

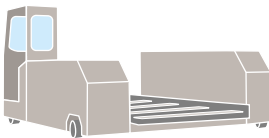
From unloading the trucks and placing in storage to loading the goods on the aircraft, there are a number of different vehicles carrying out a variety of tasks in the air cargo sector.

## THE FOLLOWING VEHICLES ARE USED FOR TRANSPORT AND HANDLING OF ULDs:



### ➤ Truck Dock:

A stationary device with a hydraulic lifting unit, which allows air cargo to be loaded into and unloaded out of trucks. The conveyor is brought to the same level as the truck loading ramp for this purpose. Horizontal transport of the ULDs is usually carried out by a roller conveyor.



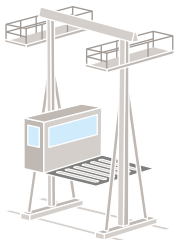
### ➤ ULD Mover:

ULD Movers are wheeled, unsprung platform transporters for the transportation of ULDs. Dolly docks are used airside to transfer ULDs to and from airfield transport vehicles. The dolly train transports multiple ULDs on the apron to the aircraft.



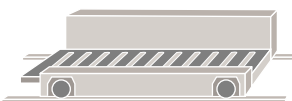
### ➤ ULD Pallet Mover:

An electrically operated industrial truck for transporting slave pallets. ULDs are transported using these pallets, which are made of sheet metal and have multiple rows of rollers. The pallets can be lifted using a lifting unit.



### ➤ Elevating Transfer Vehicles (ETV)

ULDs are stored in a racking system in the terminal for a certain period of time. The Elevating Transfer Vehicle moves the ULDs horizontally and vertically via a lift and roller conveyor. The device is guided by rails.



### ➤ Transfer Vehicle (TV):

Vehicles that handle the horizontal transport of ULDs on one level. They can be operated semi-automatically and fully automatically and consist of a simple construction with integrated roller conveyor. The transport direction is usually predetermined by rails.

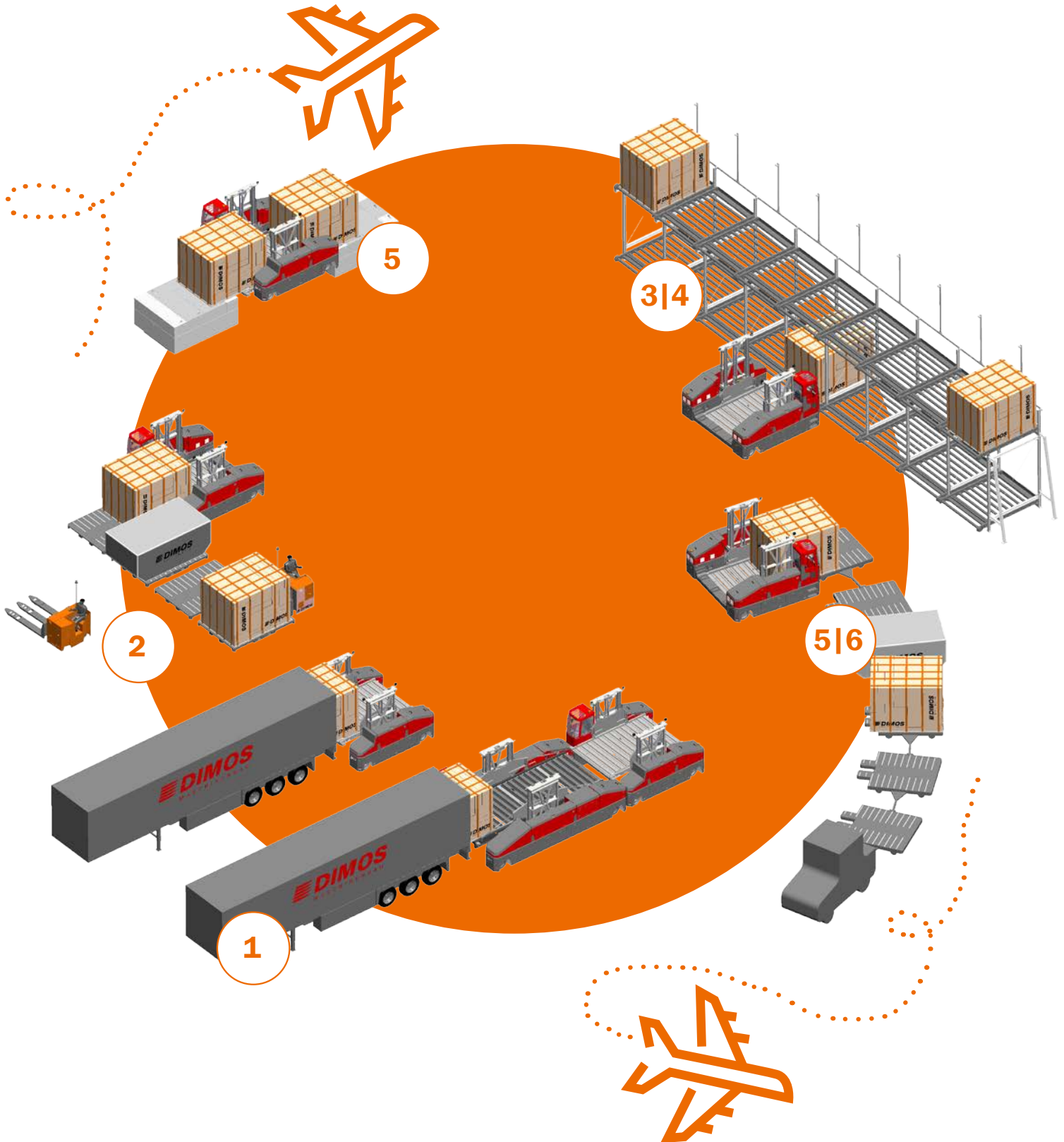


## PREVIOUS CLEARANCE PROCESS

- 1** The landside handling process begins with the **unloading of the goods**, which the lorry delivers overland. To do this, the truck drives to a truck dock. There, goods and ULDs are unloaded and transferred to front loaders, slave pallet movers or dolly trains, which transport the goods to workstations.
- 2** At the workstations, the **air cargo is picked, unpacked, new goods are packed** and the air cargo is now ready for pickup.
- 3** **ULDs are stored on racks** using Transfer Vehicles or Elevating Transfer Vehicles.
- 4** The **removal of ULDs from the storage area** is also carried out by ETVs. Once again, front loaders, slave pallet movers or dolly trains are used.
- 5** Dolly docks transport the goods to the airside. The dolly dock also serves as a **collection point for ULDs and pallets** that are unloaded from incoming flights for further processing in the cargo terminal.
- 6** Finally, the dolly train brings the ULDs to the apron, where they are **loaded onto the plane**.



## FUTURE CLEARANCE PROCESS – ONE VEHICLE FOR ALL TASKS



# CHECKLIST ✓

## WHAT YOU CAN ACHIEVE WITH A MULTIFUNCTIONAL TRANSPORT VEHICLE?

### The ideal vehicle ...

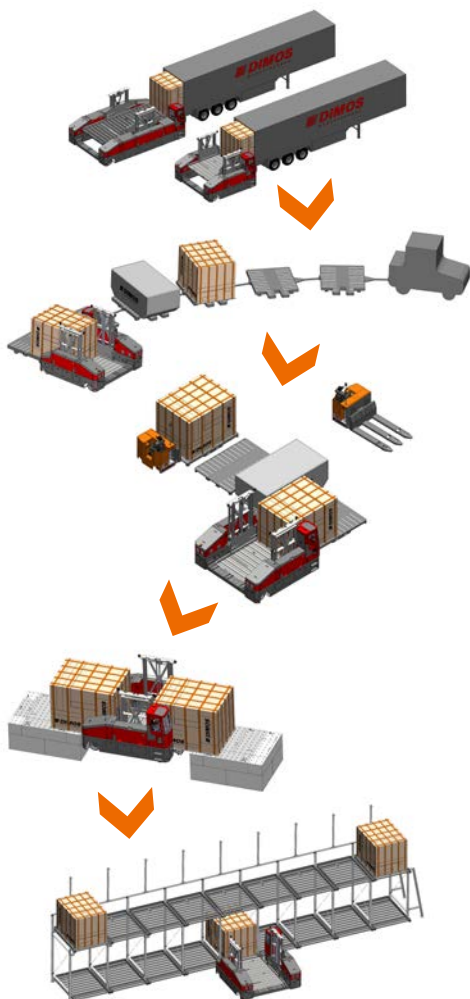
Can you imagine a single vehicle taking over the different tasks in the air cargo sector? This handling device would have to be versatile and adapt to the local conditions. The following checklist defines the features and characteristics that a perfect transportation and handling solution must offer.

- ✓ **ALLOWS THE TRANSPORT OF GOODS AND ULDS WITHOUT SCRATCHES, BREAKS OR OTHER DAMAGE**
- ✓ **OVERCOMES SYSTEM LIMITATIONS, IS INSENSITIVE TO TEMPERATURE AND CAN BE USED IN MANY DIFFERENT WAYS (INDOORS AND OUTDOORS).**
- ✓ **LEADS TO AN INCREASE IN ENERGY EFFICIENCY THROUGH THE USE OF ELECTRIC DRIVES AND POWERFUL MOTORS.**
- ✓ **LOWERS OPERATING COSTS BY USING STATE-OF-THE-ART TECHNOLOGY WITH MINIMAL REPAIR REQUIREMENTS.**
- ✓ **DOES NOT NEED MUCH SPACE FOR TURNING AND STEERING, MAKING IT IDEAL FOR CONFINED ROOMS AND SPACES.**
- ✓ **OFFERS A LONG SERVICE LIFE AND HIGH AVAILABILITY.**
- ✓ **OFFERS A BACKUP SOLUTION TO ENSURE HIGH PROCESS RELIABILITY.**
- ✓ **OFFERS A HIGH LEVEL OF COMFORT FOR THE DRIVER AND ALLOWS AN OPTIMAL VIEW OF THE WORKING AREA.**
- ✓ **PROVIDES A HIGH DEGREE OF FLEXIBILITY WHEN CARRYING OUT ALL THE WORK REQUIRED IN THE TERMINAL. IT SHOULD BE POSSIBLE TO ADAPT EQUIPMENT VARIANTS AND ADD-ONS TO INDIVIDUAL REQUIREMENTS AND DIFFERENT WORK PROCESSES.**
- ✓ **MEETS THE IATA STANDARDS.**



# THE X-WAY MOVER AND ITS APPLICATIONS

The X-Way Mover features all the properties of the ideal multifunctional transport vehicle for the air cargo sector. This multi-purpose vehicle enables fast, efficient and cost-effective ULD handling. The new generation of versatile devices is a joint offering from HUBTEX in Fulda and DIMOS in Petersberg. The international manufacturers of industrial trucks and special vehicles have been working closely together in the field of air cargo since 2017. Back in 2004, DIMOS designed a combined handling vehicle for the air cargo sector, which has now been enhanced and optimised with additional functions.



## THE X-WAY MOVER TAKES OVER THE ENTIRE ULD HANDLING PROCESS FROM LANDSIDE TO AIRSIDE.

### THE VEHICLE IS PERFECT:

- for loading/unloading trucks, and can therefore replace truck docks
- for loading/unloading dollies, and can therefore replace cargo transporters
- as an Elevating Transfer Vehicle for loading and unloading air cargo across up to three levels
- for indoor and outdoor use. The hybrid drive is able to switch between diesel and electric power.
- for loading and unloading slave pallets and slave pallet systems as a back-up for slave pallet movers
- as a back-up device for larger freight facilities
- as a transfer vehicle for stationary freight facilities

### THE X-WAY MOVER

The X-Way Mover can handle up to 40 ULDs per hour. Depending on the requirements, the vehicle is available in different models and can be upgraded at any time. The latest generation of the series includes the X-Way Mover 140 and the X-Way Mover 70. Both vehicles are equipped with soft elastic tyres and are suitable for indoor and outdoor use.

# PERFECTLY EQUIPPED!

## VARIETY OF REQUIREMENTS AND TASKS



1

### OPTIMAL MANOEUVRABILITY

The new HX steering (limitless 360° steering) leads to increased manoeuvrability of the vehicles. Even in confined spaces, the X-Way Mover offers optimal manoeuvrability, and is able to switch from longitu-

dinal to transverse travel without stopping. The patented HX steering results in reduced tyre wear and accelerated work processes. The steering mechanism is also intuitive and easy to use.

2

### IMPRESSIVE LOAD CAPACITY

The construction of the vehicles is based on a modular system in which load capacities, lift heights and vehicle widths can be adapted to the particular application in accordance with the IATA standard. The most recent model, the X-Way Mover 140, carries loads up to 14,000 kg and is specially designed to handle 20-ft. ULD containers. The X-Way Mover 70 is suitable for handling 10-ft. ULD containers and has a load capacity of up to 7000 kg. As a result, its outer dimensions are smaller than those of the X-Way Mover 140. Both vehicles have two masts for maximum stability and a platform width of 2500 mm. The lift heights vary between 200 and 7200 mm.

3

## COMFORT FOR THE DRIVER

The weather-proofed and air-conditioned cabin of the X-Way Mover is designed for optimal ergonomics. The driver benefits from excellent all-round visibility and increased ease of use. The information terminal has been redesigned and provides important information about the vehicle and its operation. For example, the exact wheel position of the vehicle can be displayed.

4

## SAFE TRANSPORT

The X-Way Mover's 2500-mm wide platform is equipped with a robust, electro-hydraulic roller deck that can be controlled proportionally. To gently move the ULDs, the rollers on the load transfer side are covered with rubber. Retractable load protection devices prevent the ULDs from slipping. In many terminals, electric front loaders are currently being used to unload and load the trucks.

Since these trucks do not have a multidirectional running gear, wider aisles are required. The ULDs are lifted with the forks and moved to the destination – often under tight time constraints. Damage to the goods cannot be prevented in many cases. The X-Way Mover, on the other hand, can be used both indoors and outdoors, and transports the goods gently and safely with the roller deck.

5

## LOW EMISSIONS AND EFFICIENT OPERATION

The focus of development for the latest generation of the X-Way Mover is the electric drive, which will in future cover all airport applications. Whereas previous systems were limited to outdoor use on the apron or indoor use in the logistics processing area, the X-Way Mover is not restricted to specific locations. This is thanks to the fast charging times of lithium-ion batteries. However, the use of these lithium-ion batteries is usually only suited to multi-

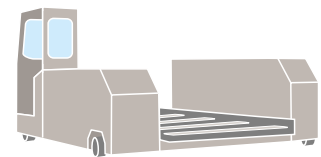
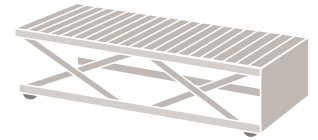
shift operations with longer operating hours. For shorter operating times, high-performance lead-acid batteries are available as an alternative. The charging infrastructure and the existing drive technologies of the entire vehicle fleet at the airport often prevents the electrification of the trucks. Therefore, the X-Way Mover is also available with a diesel drive motor for outdoor use only or a hybrid drive for combined indoor and outdoor use.

6

## ACCELERATED HANDLING PROCESS

By replacing individual vehicles and stationary equipment such as the Elevating Transfer Vehicle in the terminal, the storage capacities can be doubled or even trebled with the same space requirement. By eliminating the interfaces, the entire work process is optimised and accelerated. The X-Way Mover can remove goods from the truck and transport them directly to the first, second or third rack level for storage. The multi-purpose vehicle offers a complete logistics solution from airside to landside.

## ALL IN ONE DEVICE: THE X-WAY MOVER



7

### FLEXIBLE AND EXTENDIBLE

The X-Way Mover is available in different versions depending on requirements. Thanks to its modular design, the X-Way Mover can initially be used in its basic form, for example as a ULD mover, but can be enhanced at any time with additional functions. Thus, the vehicle is individually configurable and can be adapted to changing operating conditions. For example, different platform types can also be selected. If the vehicle is to be used as an Elevating Transfer Vehicle, a platform with friction wheel drive is recommended. The roller conveyors are then moved asynchronously in the rack system without the need for an external drive for the storing position.

8

### REDUCED OPERATING COSTS AND CONSTANT AVAILABILITY

Since a single vehicle is used in the air cargo area instead of many individual vehicles, maintenance and operating costs are reduced enormously. Efficiency increases because there is less downtime of individual vehicles or even no downtime at all. When multiple X-Way Movers are used in parallel, device failures are no longer a problem since the

vehicle can be used universally for various work processes and therefore offers a replacement for every single ULD handling step. For vehicles with a hybrid drive, the battery is recharged during diesel operation. Even a complete replacement of the battery pack can be carried out in no time at all. Therefore, the X-Way Mover can be used 24/7.





The X-Way Mover can be tailor-made to meet the individual requirements of the user.



# THE BASIC X-WAY MOVER WITH VARIOUS OPTIONAL EXPANSIONS

**THIS ALLOWS THE X-WAY MOVER TO BE ADAPTED TO INDIVIDUAL REQUIREMENTS AND BUDGET ALLOWANCES**



#### **360-degree HX steering**

The patented HX running gear can be added as an option to increase manoeuvrability.



#### **Lift system extension**

The entry-level model can be extended with a lift system that can reach a lift height of between 200 mm and 1200 mm (truck unloading height).



#### **Different lift mast variants**

The lift system can be flexibly extended by adding various lift mast variants in order to achieve a lift height of up to 7200 mm.



## THE BASIS

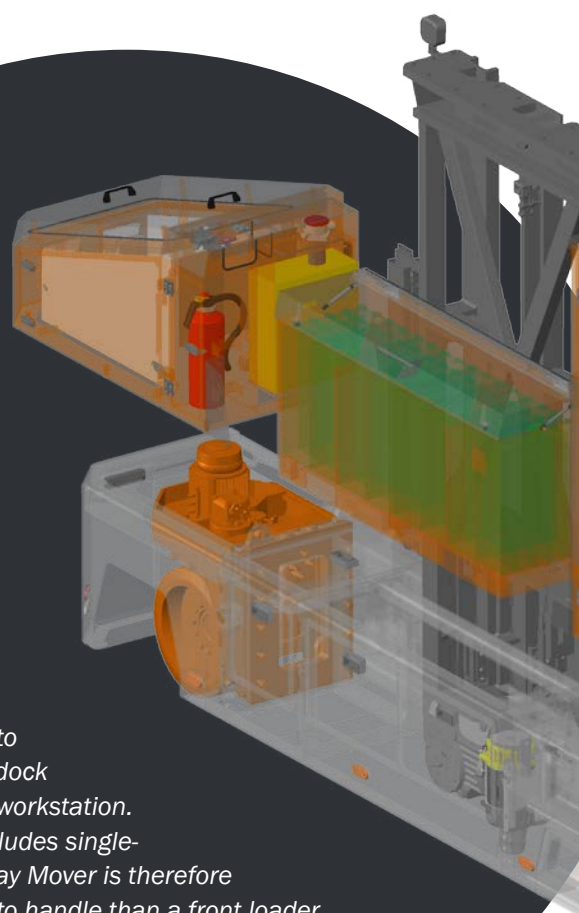
As a basic model, the X-Way Mover replaces the front loader or ULD mover. The vehicle has a rigid platform. The lift height can reach 1200 mm in order to receive ULDs from the dolly dock and transport them to the workstation.

The basic equipment includes single-axle steering. The X-Way Mover is therefore significantly easier to handle than a front loader and damage to ULD containers can be avoided in the future.



#### **Two-mast system**

The four-mast system can be replaced by a two-mast system that allows for better driver visibility and lower service costs.





#### Optimised user interface

The new HIT 3 user interface can be added as an option. The multifunction display provides the driver with important information such as wheel position, speed or battery charge status in a simple, clear graphical display.



#### New battery technologies

Conventional lead-acid batteries can be integrated. Alternatively, high-performance lithium-ion / lithiumpolymer batteries are available. This results in significantly lower wear and increased energy density.



#### Modified driver's cab

The cab can be mounted on the left or right. This means that the X-Way Mover is suitable for both lefthand and right-hand traffic at airports.



#### Individual platform types

The X-Way Mover is available with different platform types:

1. a simple platform (straight)
2. a platform with unlocking mandrel (dolly counterpart)
3. a platform with integrated friction drive. Additional costs for driven conveying equipment in high-bay storage system will be avoided.



## AGV OF THE FUTURE

Customers are expressing an increasing demand for automation of airport operations. The focus is on the automated transport of ULDs from one terminal to another to increase efficiency, safety, availability and cost-effectiveness. AGV versions of the X-Way Mover are the perfect replacement for conventional transport vehicles inside the airport. Particularly when used in tunnels and on covered connecting routes, the future-oriented X-Way Mover designs offer enormous advantages in terms of terminal exchanges / terminal changeovers.

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*The trucks mobility is a great advantage and can save up to 50% of the storage space.*





# A GLIMPSE INTO THE FUTURE: AUTOMATION SOLUTIONS AND X-WAY TRANSPORTER

The X-Way Mover can be coupled to interfaces with existing systems and can be optimally integrated into the handling process. Since the X-Way Mover is limited to the transport of individual ULDs due to its dimensions, partners HUBTEX and Dimos have developed a ground-breaking concept as a replacement for dolly trains: the X-Way transporter. This allows multiple ULDs to be transported to the apron to load

the aircraft. Conventional transport vehicles often have a length of up to 20 metres, which results in increased space requirements and difficulty manoeuvring. In contrast, the X-Way transporter is extremely manoeuvrable due to its multidirectional steering mechanism and smaller space requirement.

Recurring routes and processes make the handling sector ideally suited to auto-

mation solutions. Interfaces to the warehouse management system are created to map and optimise material flows. Another important step is the introduction of Automated Guided Vehicle (AGV) systems, which are used to transport and handle air cargo. Using autonomous systems to connect multiple logistics halls offers advantages for the customer with regard to efficiency and process optimisation. The batteries can be changed automatically at designated battery replacement facilities. Since depleted batteries are replaced with charged batteries in the shortest possible time, the vehicles are available on an almost continuous basis.



## HUBTEX AND DIMOS

HUBTEX and its partner DIMOS are system suppliers in the air cargo sector. Together they are developing sustainable vehicles and logistics solutions to further optimise handling processes.



Video of the application at HUBTEX-TV:  
[youtu.be/WcrkXM\\_qZH8](https://youtu.be/WcrkXM_qZH8)

# ABOUT US

**HUBTEX.** IS THE LEADING INTERNATIONAL MANUFACTURER OF CUSTOM-MADE INDUSTRIAL TRUCKS, SIDE LOADERS AND SPECIAL EQUIPMENT FOR THE TRANSPORT OF LONG, HEAVY AND BULKY GOODS.

The company, which was founded in 1981, develops and manufactures vehicles that maintain an efficient flow of materials and goods in the tightest of spaces from its headquarters in Fulda. The side loaders and industrial trucks are marketed through a global network of over 60 sales and service partners.



Customers rely on HUBTEX vehicles as they can be tailored precisely to the demands of a warehouse, particularly when picking goods in extremely narrow aisles. During order picking,

HUBTEX industrial trucks must meet a wide variety of requirements: Large-volume wood materials, panels and profiles must be transported with care and efficiency.

Drawing on over 30 years of industry experience in machine construction, HUBTEX works with the customer to develop individual concepts. The result is customer-specific solutions with unique optimisations that meet the highest quality standards.

**HUBTEX.**



## **DIMOS SUPPLIES ITS CUSTOMERS WITH A LARGE NUMBER OF INDUSTRIAL TRUCKS FOR THE TRANSPORT AND STORAGE OF GOODS AND PRODUCTS.**

The family-owned company based in Petersberg near Fulda provides four-way trucks, transverse lift trucks, reach mast trucks, order picking systems and compact trucks as well as heavy-duty platform transporters for transporting a wide variety of loads. The company, which was founded in 1993, also supplies tool changers.



In 2004, DIMOS developed the X-Way Mover for major international airports. The multi-functional vehicle is designed to IATA standards and is currently used by four of the ten largest air cargo companies in the world.

All DIMOS products are optimally designed for every application and individually adapted to the customer's requirements. The company aims to provide the highest quality, reliability and competent service. In the field of

custom-made products, DIMOS is one of the market leaders in Germany.

** DIMOS**



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