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ADVANCED STORAGE FOR SMART INTRALOGISTICS

HUBMASTER®

STORAGE AND HANDLING SOLUTIONS

BASSTECH ENGINEERING GROUP

Quality and Warranty with Experience

BASSTECH ENGINEERING GROUP is the designer and manufacturer of the **HUBMASTER® System, a Specialized Store and Lift Technology for the most demanding industries. Fully automatic or semi-automatic with an operator.**

Thanks to our extensive experience in supplying products to the intralogistics industry, we have developed **a profound** understanding of our Customer needs and expectations in all their storage projects.

BASSTECH ENGINEERING GROUP is the manufacturer and turn-key integrator of intralogistics solutions 4.0, which are:

- **INTELLIGENT**
- **HIGH PERFORMING**
- **DURABLE**

We develop unique products and solutions to meet the highest industry standards at all stages of the:

- **DESIGN**
- **PLANNING**
- **IMPLEMENTATION**

Our focus is on Customer experience, providing **excellence** at all stages of the project, with an international multi-cultural team of **experts** and through passion for perfection, expertise and know-how. Our team benefits from:

- **TRACK RECORD AND EXPERIENCE**
- **TECHNICAL BACKGROUND**
- **PASSION FOR PERFECTION**

We develop solutions according to the strictest international standards, such as the CMAA (Crane Manufacturers Association of America) and CE standards, assuring an added value solution and safe return on investment always.

We're endorsed by a technical team with more than 20 years' experience in the sector.

INTRALOGISTICS INNOVATION

EXPERIENCE

Stacker crane concept running from the top, originally developed in the 1970's in the USA.

Basstech Engineering Group continues innovating and developing the concept year after year.

Thanks to Basstech's innovation, the system is today also available as an automatically operated system.

TECHNOLOGY

Storage density and maximum accessibility when operating in very small spaces

It guarantees a productive and efficient operation of your warehouse.

Adapted to all current standards and the most demanding sectors.

Available in wide aisle versions, very narrow aisle and also for automatic operations without operator.

SAFETY

It responds to the concerns of the industry in regard to the reduction of accidents with material handling devices.

HUBMASTER® is an excellent alternative to work where accidents are more common: in narrow aisles.

Integrated Active Safety Systems protect your assets and guarantee the profitability of your investment.

Learn how the new standards of the HUBMASTER®
INCREASE THE PRODUCTIVITY, EFFICIENCY AND SAFETY OF YOUR OPERATIONS.

ADVANTAGES OF THE HUBMASTER® SYSTEM

SAVE TIME AND BOOST PRODUCTIVITY

A single operator can efficiently manage all sorts of loads with ease, without any specific training in forklift operation.

AVAILABLE IN AUTOMATIC OPERATING MODE

For applications in medium to low cycles. It is ideal in warehouses where implementation can't be justified due to the current alternative automatic storage and retrieval systems (such as AS/RS stackers, focused on high speeds or AGVs).

OPERATE IN VERY NARROW AISLE ENVIRONMENTS

Full usability starting at 1.30 m aisles.

ENJOY TOTAL MOVEMENT CONTROL

Speeds and accelerations of the **HUBMASTER®** are programmed to suit each application and are limited in different control areas within the aisle, depending on the current direction of movement. The built-in sensors of the HUBMASTER provide an active safety management of position and movement.

UNIVERSAL USE

The **HUBMASTER®** can be configured to function pretty much on any type of pallet or cantilever racking and auxiliary structures. It operates in multiple aisles, allowing for one lift to quickly changes aisles in reduced transitions.

OPERATES ON ANY SURFACE CONDITION

Flat and even floors are not required with the **HUBMASTER®,** since the equipment operates without touching the floor, running on guide rails installed on top of the racks.

SUPERIOR STRENGTH

The standard program of the HUBMASTER has a variety of capacities up to 3,000 kg and various height rack configurations that reach over 10 meters in height up to 10 m rack heights. Other custom configurations available.

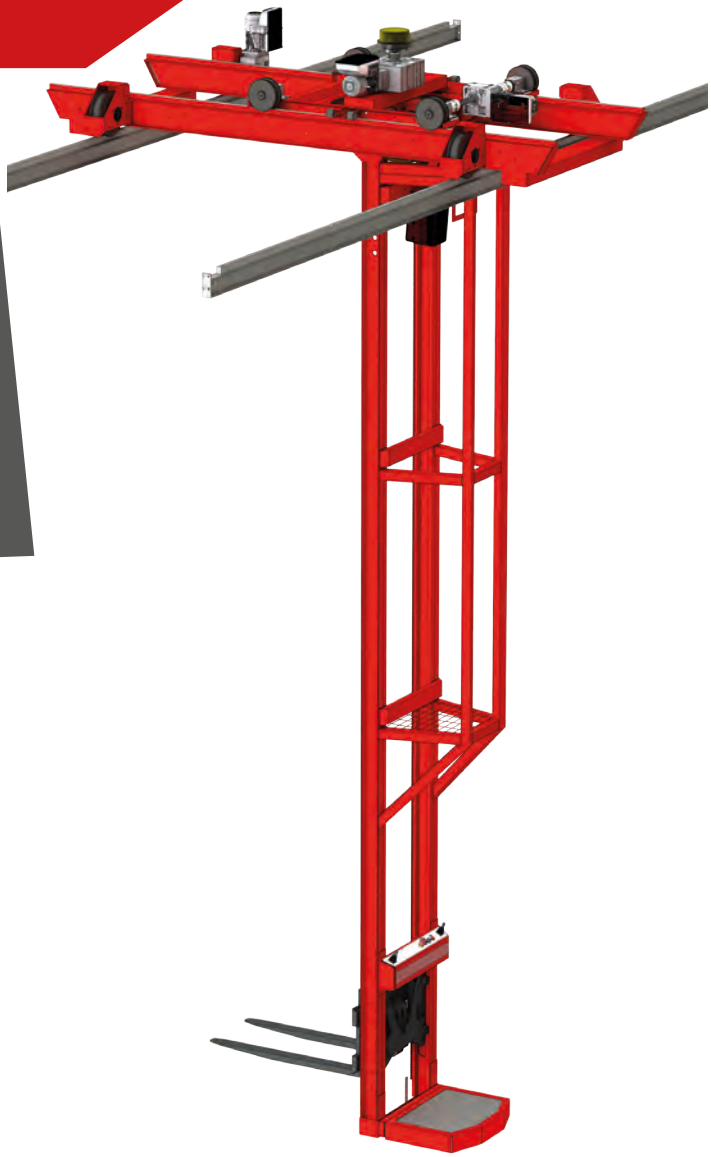
USE IT WITH OVERSIZED LOADS

Laterally move the HUBMASTER and do not rotate the load to minimize aisle widths with oversized items.

ERGONOMIC DESIGN

Enables any operator to use it with minimal training. The 360º infinite rotation of the mast provides maximum control and maneuverability.

HOW DOES THE HUBMASTER® WORK?



The HUBMASTER® System is an overhead rail-mounted stacker crane, used for stacking and retrieving loads in and out of a racking system.

The system is **delivered together** with the racking system or mounted on top of existing structures.

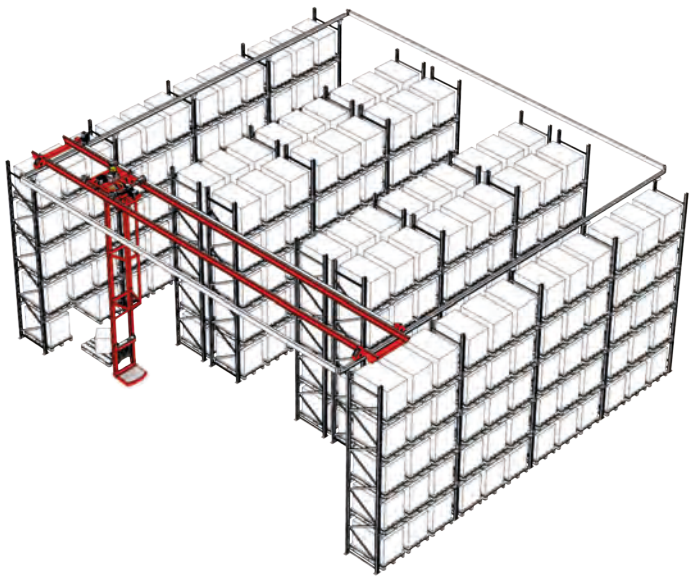
The **HUBMASTER®** System is provided with the following movements:

- **Lifting and lowering of the load along its vertical mast**
- **Longitudinal movement along rack aisles**
- **Lateral movement across rack aisles**
- **360 degree continuous rotation available in some models**
- **180º fork rotation (with the tri-lateral forks carriage)**

HUBMASTER® standard systems handle palletized loads and adapt to a wide range of load dimensions, from very large loads to very long loads that can be extracted laterally.

CONFIGURATIONS

The HUBMASTER® is available in a number of different configurations to suit your existing warehouse space and storage requirements.



For example:

TRIPLE AISLE SYSTEM WITH CROSSOVER

System with six rows of rack, which allows the **HUBMASTER®** to move from one side of the system to the other. Eliminates the need for three single aisle HUBMASTERS if throughput frequency allows to.
This configuration is a more cost effective than purchasing three single aisle units and is especially interesting in automatic systems.

STANDARD SYSTEM MODELS

The HUBMASTER® system is delivered including racking or support structures, as a full turn key integration.

The models in the standard **HUBMASTER®** program satisfy the load and height capacity needs of a wide variety of applications.

These same models are also available in full automatic version.

HUBMASTER* MODELS	LOAD (kg)	HEIGHT (m)	MINIMUM AISLE (m)(1)	MINIMUM AISLE (m)(2)
HML-MiniLoad	50	6	0.6 (3)	0.8 (4)
HM50W**	500	5	2	2.2
HM50	500	10	1.35	1.75
HM100	1000	8.5	1.35	1.75
HM150	1500	7	1.5	1.9
HM200	2000	5.5	1.7	2.1
HM250	2500	5	1.9	2.3

*Other customized solutions are also offered and developed on request.
**HML50 is a manually driven HUBMASTER machine with electrically assisted lift function.

(1) EUROPALET w=1200 mm, l= 800 mm
(2) EUROPALET w=800 mm, l=1200 mm

(3) 400mm-deep bucket
(4) 600mm-deep bucket

HUBMASTER® FORK CARRIAGE OPTIONS

STANDARD FORKS CARRIAGE

Forks are fixed in place and manually adjustable for different pallet pocket centers. Recommended for wide aisle applications.
The fitting is also available in electric mode.

TRI-LATERAL FORKS CARRIAGE FOR VERY NARROW AISLE APPLICATIONS (WITH FORK ROTATION)

Allows loads to be picked up and deposited in three positions:

- **FRONTAL**
- **LEFT SIDE**
- **RIGHT SIDE**

Recommended for very narrow aisles.

TELESCOPIC FORKS CARRIAGE FOR VERY NARROW AISLE APPLICATIONS (NO FORK ROTATION)

Forks carriage is configured for low loads and for double-deep racking systems.

DIMENSIONING OF THE RACKS FOR THE HUBMASTER® INTEGRATION

The **HUBMASTER®** System is delivered together with the racking, as a full turn key integration. However, it is also possible to design the system for use on top of other existing structures.

Our technical know-how allows us to design and adapt a **HUBMASTER®** system to almost every type of existing racking system.

We provide consultancy services in case the existent racking system requires structural analysis to ensure its full stability under the **HUBMASTER®** transferred loads.

OPERATION IN FULL AUTOMATIC MODE

In its latest evolution, and due to the large market demand for automatic systems, the HUBMASTER® system has been adapted as an alternative to AGV forklifts and AS/RS systems for fully automatic use without an operator.

In automatic mode, all the benefits of the standard **HUBMASTER®** System are maintained in regard to its configuration and use.

The additional sensorization adapted to an automatic system allows a 100% autonomous operation.

By means of its own machine control software, integrated with the warehouse management software, flexibility and efficiency of use are guaranteed 24 hours a day.

Like the non-automatic system, you can easily change the aisle and use the same **HUBMASTER®** lift in several aisles, with the consequent economic savings.

WCS - FUNCTIONALITIES AND INTEGRATION WITH WMS / ERP

HUBMASTER® AS/RS AUTOMATIC SYSTEM

The **HUBMASTER®** system **control software** (WCS) controls the stacker crane PLCs and the HUBMASTER P&D stations in **real time** for **easy and efficient** integration with other intralogistics subsystems in the warehouse (such as robots, sorters, palletizers, labelers, etc).

The software has been specifically designed for its **integration** with warehouse management software (WMS) and enables the **management** of retrieval orders and load storage according to strategies. These can be defined according to the operation's **specific requirements**.

For example, storage strategies can be defined according to the **turnover** requirements of each reference (ABC), or retrieval strategies can be defined according to the needs of **later processes** such as automatic palletizing of orders.

Similarly, the WCS software can:

- **REGISTER NEW MERCHANDISE THAT IS ENTERED INTO THE SYSTEM**
- **KEEP TRACK OF INCIDENT LOGS**
- **GENERATE REPORTS ON THE KPI'S TO BE DEFINED**
- **CONTROL THE LOCATIONS AND UNITS STORED, AND REASSIGN THEM AUTOMATICALLY ACCORDING TO THEIR POPULARITY**

CHARACTERISTICS

TYPE OF LOADS

The **HUBMASTER®** system is available for:

- **PALLETIZED LOADS**
- **LONG LOADS**
- **LOW LOADS**

It is conceived of as a system for medium and low operating cycles, where current systems do **not** offer solutions.

AISLE CHANGE

The **HUBMASTER®** allows a single system to **move through multiple aisles** of the automatic warehouse via a **simple** transition carried out in very little space. In this way, the use of a single machine is shared throughout several aisles

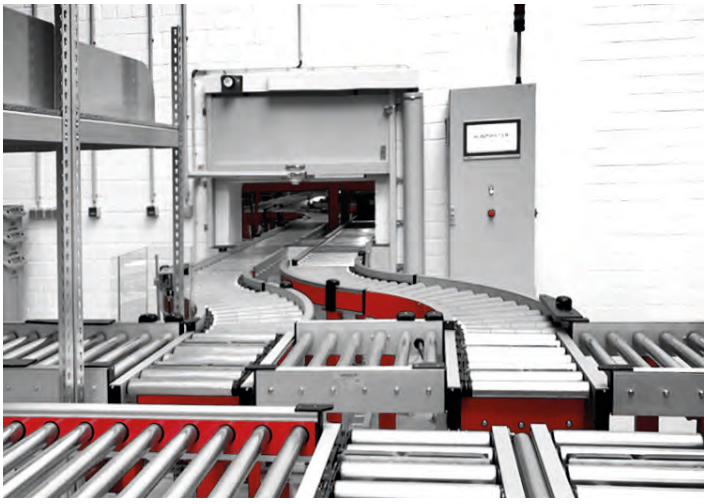
This makes for a very reasonable design in those layouts where planning for a stacker crane in each aisle represents an **oversizing of the solution.**

FORKS CARRIAGE SYSTEMS

In its standard configuration, the **HUBMASTER®** is configured with a **single or trilateral fork carriage.**

In the case of low loads, the **HUBMASTER®** system is configured with a **single- or double-deep telescopic head for handling boxes.**

PICKUP AND DROP STATIONS (P&D / GTM)



The **HUBMASTER®** system includes P&D stations for the **automatic retrieval of loads from the automatic warehouse**, via roller or belt conveyors, as the case may be.

For automatic **box-storage** systems, goods-to-man **picking stations**, as well as other integrations for the calculation of weights and volumes are included, depending on the application.

COMPETITIVE ADVANTAGES

The **HUBMASTER®** system enables a very economical and attractive alternative to current solutions in the market, in the following cases:

- **CEILING HEIGHTS**

When the warehouse has low ceilings, up to 10m in height, it does **not justify** the investment in classic AS/RS type high-productivity systems.

The **HUBMASTER®** system works on rails installed above the racks, which is why the system's height must be limited according to parameters such as load weight and acceleration.

- **MEDIUM AND LOW CYCLES**

Warehouses with **dynamic requirements** for medium and low operating cycles, where the possibility of using **the same machine** in several aisles offers even greater competitive advantages.

- **DENSITY AND SAFETY**

Warehouses that could benefit from improvements in storage density, while at the same time improving operation safety beyond what can be offered by AGV forklifts.

Typically, **chemical or frozen** product warehouses, where environmental conditions are demanding.

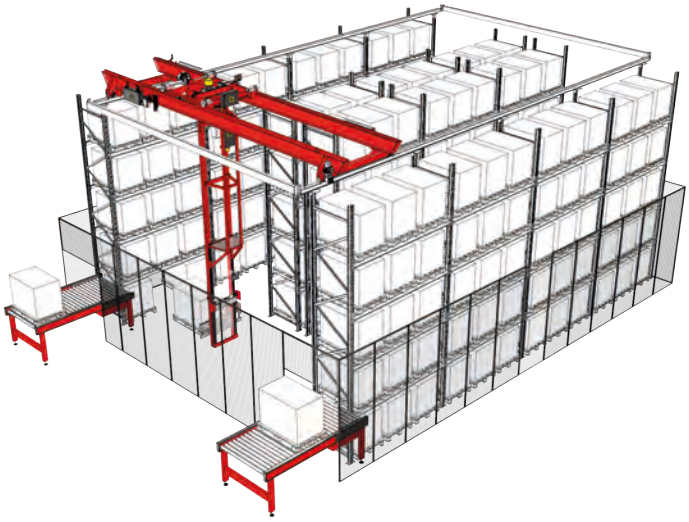
- **TRACEABILITY**

Warehouses that could benefit from improvements in traceability and **error reduction.**

The automatic **HUBMASTER®** system offers a solution for all those applications that can be **automated**, but which until now have not found an answer among current automatic systems in the market due to their **high implementation costs.**

VERSIONS

The automatic versions differ from one another according to the type of load that it is handled:

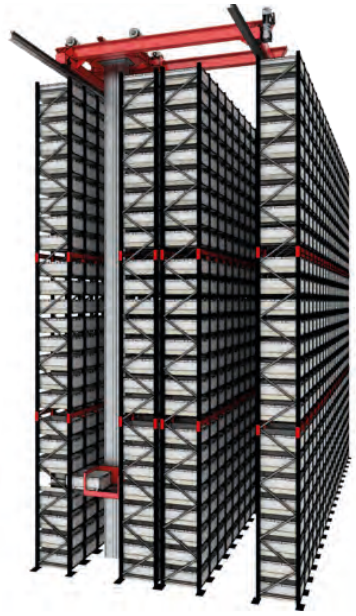


HMA SERIES - HUBMASTER® AS/RS (PALLETS)

Preserving all the benefits of the machine with operator, the movements have been automated in order to allow a:

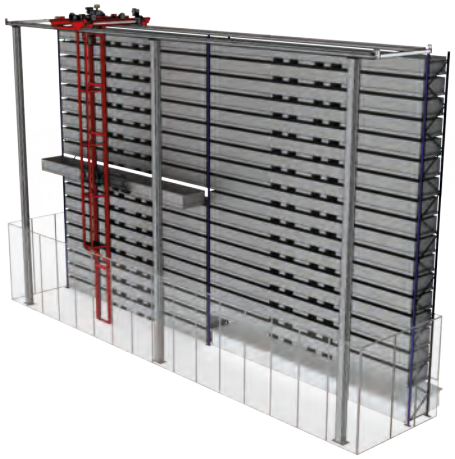
- **100% autonomous operation, without human intervention**
- **The system is controlled by a WCS machine control software, specially developed for the HUBMASTER® system management**

This **stacker crane** is on the market to offer a solution for complete pallet storage and retrieval operations, at a medium cycle speeds.



HML SERIES - HUBMASTER MINILOAD (BOXES)

The **HUBMASTER®** Miniload version comes along as a **simplification** of the pallet solution. Preserving the premise of orienting technology for medium-low turnover operations, this system **guarantees** storage densities typical of automatic systems for boxes. It enables sharing the same **HUBMASTER®** in multiple aisles, cycles requirement permitting, which provides an additional **economical advantage. Suitable** for both plastic and cardboard boxes, either in single-or double-depth shelf storage.



SPECIAL HMX SERIES - HUBMASTER FOR SPECIAL LOADS

Frequently, **special and oversized load storage** tends to have no solutions from the main stacker crane manufacturers. At **HUBMASTER®**, we are committed to developing **customized solutions**, maintaining the simplicity of our concept and as such avoiding an excessive increase in costs.

MODELS

HUBMASTER® has developed an automatic systems program consisting of the following models:

HUBMASTER MODEL*	LOAD (kg)	STORAGE (m)	MINIMUM AISLE WIDTH (m)(1)	MINIMUM AISLE WIDTH (m)(2)
HML50	50	6	0.6(3)	0.8(4)
HMA50	500	10	1.35	1.75
HMA100	1000	8.5	1.35	1.75
HMA150	1500	7	1.5	1.9

(1) EUROPALET w=1200 mm, l= 800 mm (2) EUROPALET w=800 mm, l=1200 mm (3) 400mm-deep bucket (4) 600mm-deep bucket

This program is complemented by customized systems according to customer requirements.

RETURN OF INVESTMENT (ROI)

HUBMASTER® AS/RS AUTOMATIC SYSTEM

There are multiple technologies that enable **automating the work** of storing and retrieving units in a warehouse.

The market trend of AS/RS system manufacturers is marked by the main consumers of these technologies, which tend to be Retailers and Large Distribution. In this context, the trend is clear and tends towards **high-speed, high-productivity systems.**

This casuistry of the market presents an unavoidable dilemma: **Technologies present in the market do not present an acceptable ROI for medium-low turnover operations.**

The following graphs provide an outline:

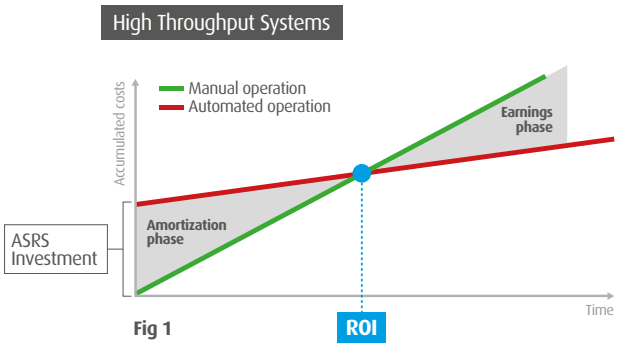


Fig 1

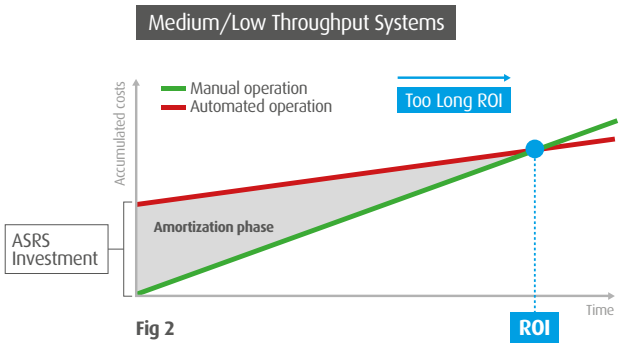


Fig 2

Fig 1: The first graph shows that a major investment in an AS/RS system obtains an **attractive return** if the difference between the daily costs of manual operation are significantly higher than the daily costs generated by an **automatic operation.**

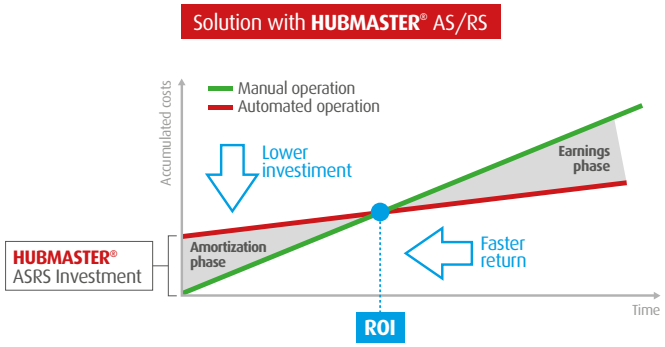
This is the case for intense logistic flow operations, since they generate manual operating costs that are, in turn, **important.**

Fig 2: given that the flows are medium/low, we have a proportionally major investment in an AS/RS system. In this case the costs differential are **not so high** and the return is excessively delayed.

The portfolio of **automatic HUBMASTER® technologies** has been designed precisely for the second scenario.

The vision has been to devise a simpler AS/RS system with lower dynamic capacity, with lower speed technology and construction designed for medium/low flow scenarios, guaranteeing an ROI that would be impossible to achieve with technologies currently on the market.

Comparatively:



SYSTEMS INTEGRATION

Implementing **custom-made automatic systems is the key to sustainable growth** through containment of logistics costs.

Hubmaster's AS/RS systems enable integration with **existing** equipment, while also anticipating **future expansions.**

Our Solutions Development Department projects always having **qualitative and quantitative** visibility of the growth forecast.

According to each case, we make proposals of greater or lesser scope, which include the following equipment:

- **Conveyors, which connect the P&D stations to the rest of the Center's areas.**
- **GTM Picking Stations (goods-to-man).**
- **PTL systems (pick & put to light).**
- **Box and unit sorters.**
- **Palletizing and order creation robots.**
- **WCS and WMS software implementations.**

OPERATION IN VERY NARROW AISLES

When the HUBMASTER® is configured with a trilateral forks carriage, all the benefits of the standard system are obtained, plus the bonus of working in aisles from 1.30 m wide.

The trilateral forks carriage allows rotation and translation of the forks independently of the rotation and movements of the mast of the **HUBMASTER®**.
The mast can be configured additionally with its own rotation or without it, depending on the characteristics of the installation.

It is thus possible to reach the loads on both sides of the aisle and extract them from the rack by means of the translation of the forks, avoiding the displacements of the **HUBMASTER®** beyond its longitudinal movement along the aisle.

Comparison between the HUBMASTER® System and industrial VNA forklifts (with trilateral forks):

- Operation in very narrow aisles, just like VNA forklifts.
- High resistance or super flat floors are not required.
- Direct savings in infrastructure costs and floor renovations.
- Change of aisles in just 2.0 m compared to the typical 5.5 m of VNA forklifts.
- Great space saving at the end of the corridor: The **HUBMASTER®** lift does not transport batteries, so it occupies very little space and does not require additional space at the end of the aisle to reach to the last racking position.
- In **HUBMASTER®** systems with operation in multiple aisles, the guidance systems in each of the corridors are not necessary. This provides an important economic saving.
- Works 24 hours a day without the expensive VNA forklift batteries. It does not need battery recharging systems, nor special measures for the evacuation of gases emitted during the battery recharging process.

CONCLUSIONS:

The system is very suitable for obtaining very narrow aisle warehouse layouts and maximizing the storage volume, with a clear economic advantage, compared to traditional VNA forklifts.
The HUBMASTER® is especially recommended in warehouses with low ceilings, up to 10 m in height, where the condition of the floor does not allow operating with VNA forklift without an expensive adaptation to this type of machines.

OPERATION IN SEMI-AUTOMATIC MODE

We also offer the **HUBMASTER®** in semi-automatic mode, with all the same characteristics as the automatic system, but with an operator, a platform and a control panel. This system is controlled by the operator, but its use is constantly monitored by sensors.

The HUBMASTER® Active Safety Sensors control movements and speeds inside of the aisle for a safe operation regardless of the operator's skills.

ZONES / MOVEMENTS / SPEEDS

The colour coded areas show the different zones in an aisle where the HUBMASTER modifies its behavior according to the settings in the control software.
The permitted motions according to each location is depicted with the colour coded arrows.

RED AREA

No Access Area
No motion is permitted once the **HUBMASTER®** is in this area.

Red Arrows
Movement is not allowed.

ORANGE AREA

Slow Motion Area
The **HUBMASTER®** speed is restricted in this area.

Orange Arrows
Low speed is active.

GREEN AREA

Free Motion Area
Free Motion Area. All variety of motions and speeds are allowed.

Green Arrows
All speeds are allowed.

Zone definitions and their configuration parameters of speed and acceleration can be modified and adapted to the needs of each application with the control software of the **HUBMASTER®** System.

AFTER-SALES SERVICE

WARRANTY

The **HUBMASTER®** system is built with components from leading European brands and enjoys a 3-year warranty.

The Warranty includes:

- Any defect in the materials
- Manufacturing and / or product design defects
- Provision of a new spare part or repair of the part to restore its original condition
- Shipment of the part to the customer's site

EXTENSION OF THE WARRANTY

There is the possibility of extending the standard warranty by acquiring an additional Warranty Extension Program.

CRITICAL PARTS

We offer a program of spare parts stored in our central warehouse, which keeps critical spare parts with immediate availability (24h). The spare parts are shipped under the corresponding commercial warranty of the manufacturer of the original component.

TECHNICAL SERVICE

Preventive maintenance contract

Certifies compliance with maintenance and service instructions, providing priority access to official technical personnel, with reduced travel and labor rates.

Corrective maintenance contract

Various modalities are offered: from the immediate availability of a technical team to response in hours.
The contract can include an uninterrupted telephone service (24h/7days) providing assistance and troubleshooting services.

CONSULTING SERVICES

The experts at **HUBMASTER®** Storage & Handling Solutions are also specialists in consulting projects, supported by:

- Considerable experience.
- Knowledge of the global intralogistics market.

Consultative studies are performed, evaluating the data in detail to ensure maximum productivity and efficiency of the customer's logistics centre operations.

SOLUTION INTEGRATION

In the design of our clients' warehouses and in the optimisation of their general operations, we seek to respond to complex scenarios that require specialised solutions. The solutions that we provide act in a consistent and unified manner.

The integration of intralogistics solutions is another of our strengths, and we offer turnkey implementations in terms of more that just design, for example:

- **Conveyor belts and rollers.**
- **Goods-to-Man (GTM) type Picking Stations.**
- **Line ends with robotic cells for automatic palletising.**
- **Pick/put to light (PTL) systems.**
- **Etc.**

GUARANTEED SOLUTIONS

Our technical team in intralogistics consulting will analyse your case and recommend the best solution:

- **The flow and storage of goods more efficient in its centre.**
- **The implementation of the latest technologies available in the market, and the best suited to the required solution.**
- **Implementation of fully automatic solutions with short-term returns on investment.**
- **Generation of technical documentation.**
- **Dynamic analysis and simulations to visualise the proposed solution.**
- **Integration and project management for full implementation of the systems.**

NORMS AND GUIDELINES

The **HUBMASTER®** has been designed and manufactured in accordance with the following:

EU DIRECTIVE:

- Directive 2006/42/CE
- Directive 2014/35/UE

Harmonized European Standards:

- EN 15011:2011. Cranes - Bridge and gantry cranes.
- EN 528:2008. Stacker cranes. Safety.
- EN 13001-1:2015. Cranes - General design - Part 1: General principles and requirements.
- EN 13001-2: 2014. Cranes safety - General design - Part 2: Load effects.
- EN 13001-3-1:2012. Cranes - General design - Part 3-1: Limit states and proof competence of steel structures.
- EN 13135-1:2003. Cranes - Equipment - Part 1: Electrotechnical equipment.
- EN 13135-2: 2010. Cranes - Equipment - Part 2: Non-electrotechnical equipment.
- EN 13557: 2004. Cranes - Controls and control stations.
- EN 60204-32: 2008. Safety of machines - Electrical equipment of machines - Part 32: Requirements for hoisting machines (IEC 60204-32:2008).
- ISO 22986: 2007. Cranes – Stiffness – Bridge and gantry cranes.

AMERICAN STANDARDS:

- CMAA Specification no. 70-2015. Specifications for top running bridge and gantry type multiple girder electric overhead travelling cranes

- ASME B30.18-2011. Stacker Cranes (Top or under running bridge, multiple girder with top or under running trolley hoist).

The **HUBMASTER®** maximizes safety incorporating proven electrical circuit techniques and extra mechanical features.

All safety-related parts of the control system in the HUBMASTER meet and exceed the requirements of Performance Level C from EN ISO 13849-1:2008 according to the specifications in EN 15011:2011 as well as the applicable Performance Levels for components and safety functions described within EN 528:2009.

The Safety Function for the Emergency Stop button is implemented using the Safe Torque Off feature for parallel drives and controlled by an electronic non-delayed safety relay with manual reset.

When the safety function is requested, all motors are switched off according to stop category 0 of EN60204-1:2006, hence stopping by immediate removal of power and mechanical brakes engaging automatically.

Derailment protection is included in all HUBMASTER's travelling wheels.

End of travelling and traversing tracks are equipped with slow down electrical switches and mechanical end stops.

A redundant free fall prevention device on the forks carriage is incorporated for extra safety.

Specifications subject to the evolution of technology and specific machine designs.

NO BATTERY

The HUBMASTER® does not run on batteries.

Forklifts need charging every day. If for any reason the forklift cannot be charged, the next day it will not work. The operator could forget to plug it in the charger the previous night, battery charger circuit breaker could switch off the charger when nobody is around, power failures during the night and overnight shortcircuits can happen when nobody is around and can be the cause of a fire.

The **HUBMASTER®** does not require any charging because it does not have batteries.

Power from the warehouse can be switched off during the night avoiding the fire hazard from short circuits when nobody is around.

If power shortages are a concern, the system can be installed with a power generator for backup. The **HUBMASTER®** is always ready to work.

POWER CONSUMPTION

The HUBMASTER makes you more eco friendly.

Typical consumption values for stackers are 2.2 kW to carry loads and 5.5 kW to lift loads. (Typical values depending on model and make with similar lift capacities).

The **HUBMASTER®** only needs 0.55 kW to move loads (75% more efficient) and 2.9 kW to lift loads (48% more efficient), which means cost reduction in the day to day.

The use of less power and the lack of batteries to recycle also means the **HUBMASTER®** is more eco-friendly than the alternative forklift.

HUBMASTER®

STORAGE AND HANDLING SOLUTIONS

Rambla Catalunya 98 Barcelona, Spain.

+(34) 93 301 29 34

sales@hubmaster-system.com

www.hubmaster-system.com

BASSTECH ENGINEERING GROUP S.L.

HUBMASTER® Storage and Handling Solutions are available in your region in partnership with