



THE UNICARRIERS MATERIAL HANDLING GUIDE

# Improving driver safety and productivity in the warehouse

# Ergonomics, environment and safety

Ergonomics, environment and safety are important aspects of the complex MH world. Financial indices such as productivity, profit and level of service depend on a functioning work environment.

- Buildings and premises must be functional and allow as uninterrupted a flow of goods as possible.
- The handling system must be able to cope with an increased goods flow and labour input.
- The goods must be capable of being handled in an efficient and ergonomic manner.

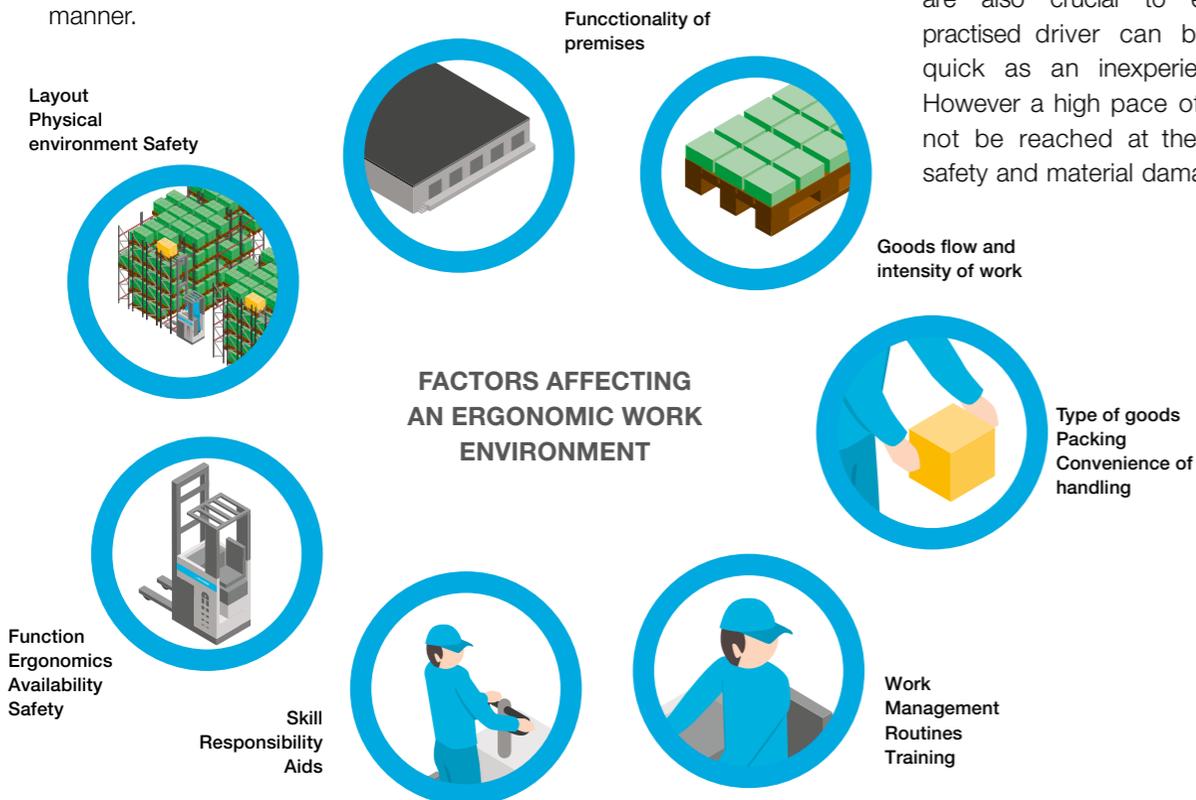
- Rules and procedures must be clear and appropriate to the nature of the work.
- Truck drivers must have training and the right skills.
- Trucks and other equipment must be the correct ones for the kind of handling involved.
- Trucks must be able to deliver the right performance and have good ergonomics.
- Safety requirements must be satisfactorily met by all equipment and at all stages of handling

- The physical environment must make the work easier. Problems of climate, noise, air, light, fire safety, and chemical health risks must be dealt with satisfactorily.

## ORDER AND TIDINESS – A PRODUCTIVITY FACTOR

“Order and tidiness” are essential to a good work environment and play their part in increasing efficiency.

The truck driver's experience and skill are also crucial to efficiency. A practised driver can be twice as quick as an inexperienced driver. However a high pace of work must not be reached at the expense of safety and material damage.



## Ergonomic factors

### PUT A PRICE ON ERGONOMICS

Measures to improve the ergonomics of materials handling can be priced. Not only as an investment but also as a gain in productivity. It is therefore important to analyse how effectively the truck fleet can be used in a warehouse environment.

Problems like having pallets out of position, inadequate handling areas and obstacles in the aisles can reduce efficiency.

The ability of the truck driver is very important. The difference in efficiency between a trained, quick driver and a less experienced one may be 100%, which affects productivity.

Three factors influence handling time:

- Top speed – an experienced driver can use the full performance of the truck
- There may be big differences in time for cornering and positioning.
- There may be big differences in time for picking up and putting down loads.

### EXAMPLE:

A small distribution warehouse has a high rate of turnover – 19 times/year. Number of pallet positions 2400.

### Whole pallet handling

Pallets in/day 150  
 Buffer to picking position/day 100  
 Buffer to delivery/day 50

### Picking

Order lines/day 2000  
 Items/order line 2  
 Weight/item kg 5

Loading/unloading of lorries is in the hands of the drivers and is not therefore included in the calculation. The layout may be considered appropriate to the warehousing operation.

Three ergonomic variations are tested. Average values for speed, driving skill and order and tidiness = 100%.

### TEST 1

Normal case

### TEST 2

Order and tidiness below average. Inexperienced truck driver

- Top speed 90%
- Cornering, positioning 80%.
- Picking up and putting down load 140%
- Order and tidiness 90%

### TEST 3

Order and tidiness above average. Experienced truck driver

- Top speed 100%
- Cornering, positioning 120%.
- Picking up and putting down load 90%
- Order and tidiness 120%.

PALLETS/HOUR ORDER LINES/HOUR	NORMAL	TEST2		TEST 3	
	PERFORMANCE	PERFORMANCE	INDEX	PERFORMANCE	INDEX
WHOLE PALLET IN	25.4	20.5	81	27.4	108
BUFFER TO PICKING	19.9	16.6	83	21.3	107
WHOLE PALLET OUT	21.9	18.0	82	23.1	105
PICKING	52.7	50.3	95	54.5	103
LOGISTICS COST €	10.10	10.40	103	9.90	98

### ANALYSIS

There are big differences in performance in whole-pallet handling. In test 2 performance drops by 17–19% depending on the task, whereas picking is 5% less efficient. The difference is natural because whole-pallet handling requires more precise driving for positioning and taking pallets into and out of the racking. In test 3 the efficiency of whole-pallet handling is 5–7% improved, and picking approx. 3%. The example shows that ergonomic factors may be of considerable importance to productivity.

## PICKING AND ERGONOMICS

Line picking is manual work and can be made more efficient by ergonomic improvements. The effort required to pick goods within a range of 40 cm as compared with 100 cm may be less than half. The picking depth of shelves should also be as short as possible to allow the picker to work efficiently throughout his shift.

If there is a lot of picking, it is worthwhile to place the pallets with the long side towards the picker.

Picking from level 1 can be made easier by raising the pallet about 20 cm from the floor. If the goods are heavy the pallet can be placed on a drawer unit to facilitate access. The shape and pick-ability of the packages is also relevant.

## PICKING TRUCKS AND ERGONOMICS

The truck is the picker's most important aid. It may have a number of ergonomic functions which make picking easier.

The truck may have an independent fork lift. This means that the setting-down surface is always at a convenient level.

The forks on which the pallet or roll container stand can be raised and lowered.

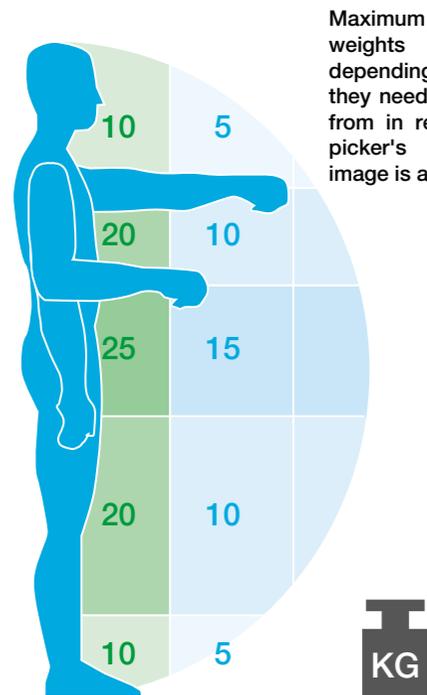
When picking from high levels the picker must feel safe. Stability is essential. Side restraints must be secure but not interfere with the work. Alignment with the picking position must be quick and accurate, which calls for good manoeuvrability.

Low-level picking is usually very intensive and requires great efficiency on the part of the picker.



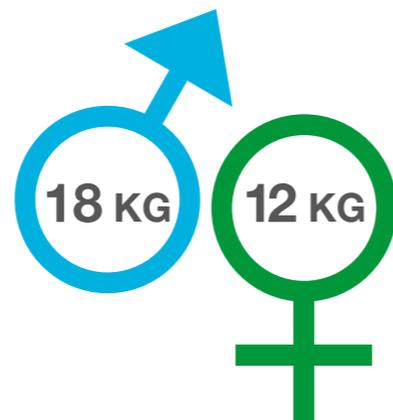
Trucks for low-level picking must have a low step-in because the picker is continually stepping on and off. Control functions must be designed to permit convenient driving/manoeuvring when the driver is walking beside the truck.

Low-level picking from level 2 is becoming increasingly common. The driving position is then lifted by about 90-180 cm. The lifting movement must be quick and smooth.



Maximum safe item weights can vary, depending on where they need to be picked from in relation to the picker's body. This image is a guide.

The order picker has to work efficiently throughout his shift. This is essential for high productivity. The performance depends on the weight and accessibility of the goods. A picker may have handled 10 to 15 tonnes of goods during a shift. The physical conditions are therefore significant. With an independent forklift the picker can put the goods down at a convenient height.



The maximum recommended lifting weights vary, depending on whether the picker is male or female.

## Long-side or short-side storage eur-pallet

### HOW MUCH MORE DOES LONG-SIDE STORAGE COST?

From an ergonomic point of view long-side picking is preferable. That is, the pallets have their longer side turned towards the aisle. The picker reaches the goods more easily and quickly.

The disadvantage is that long-side storage requires more room (more floor space) and therefore entails an additional cost.

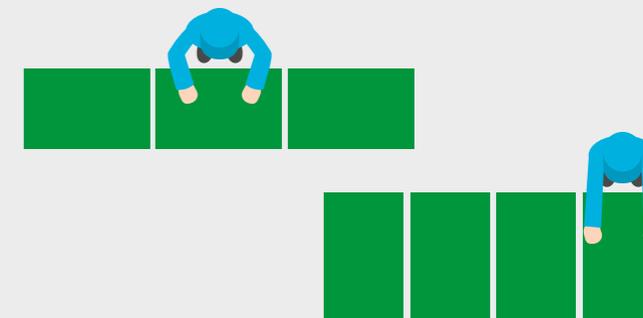
The advantage is the reduced picking time.

### A HIGH-BAY PICKING STORE

Approx. 5400 pallets are stored at 6 levels. Picking takes place from levels 2 to 6 with high-level picking trucks. The aisle width allows trucks to pass. The picking need is 5000 order lines/day. This is based on 1200x800 mm pallets.

PICKING	LONG-SIDE	SHORT-SIDE
FLOOR AREA REQUIRED, m <sup>2</sup>	5829	4950
TRAVELLING DISTANCE/ORDER LINE, m	33.8	25.2
TRAVELLING TIME/ORDER LINE, sec	29.8	24.4
TRANSACTIONS TESTED	36	36
TRANSACTIONS (order lines)/HOUR	35.8	34.3
TRUCKS REQUIRED (average)	18	19
WORKING TIME/DAY	139.5	145.8
LOGISTICS COST/ORDER LINE	0.80	0.77

PRICE OF LONG-SIDE HANDLING IS APPROX. 2%



### ANALYSIS

- Taking into account the less expensive storage equipment and handling equipment, the difference is about 8%.
- The difference for 1200x1000 mm pallet is only about 6%.
- When the greater picking efficiency (total logistics cost) is also considered, the difference drops to approx. 2%.

The time taken for picking with short-side storage may increase dramatically depending on the number of articles per pallet, their shape, pickability and weight. This is because of the difficulty in reaching the last articles on the pallet.

Another factor is the picker's physical capacity, which is tested more severely by short-side picking. This may result in slower work.

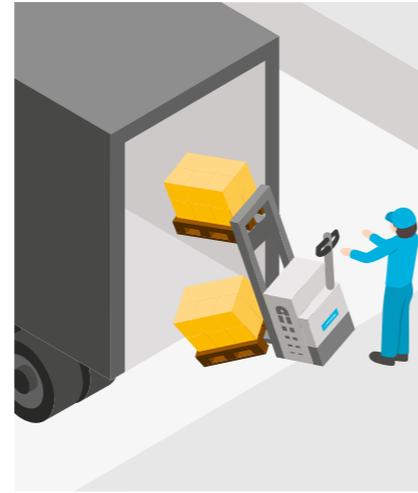
A compromise between short-side and long-side storage is possible, where all the picking positions or frequent picking positions have long-side pallets. Others can be placed short-side outwards. There is supplementary racking for such an arrangement.

## PROPER SAFETY

Safety covers a wide range of concepts. Everything from the physical work environment, trucks and equipment to individual compliance with instructions and laws.

Special safety regulations may be needed if the goods are dangerous, theft-prone or sensitive to water damage.

The proper safety level can help to enhance efficiency and reduce costs.



## TAKE MEASURES

Much damage can result if racking collapses or tips over. It is important not to overload it, and there should be regular inspections.

Truck and pedestrian traffic should be kept apart.

Accidents on loading bays can be avoided by securing loading ramps.

The ramp can also be fitted with a guard to stop trucks driving onto the lorry. Signal systems can also improve loading bay safety.

## IMPROVE THE WORK ENVIRONMENT

The causes of accidents are many, and a poor work environment may often be a contributory cause. Keeping everything tidy and in good order helps a lot. And the more aware everyone is of safety and safety measures, the more responsible everyone will feel for making sure rules are observed.

## TRAINING PRODUCES RESULTS

Training can do a lot to improve safety. Regular in-service training of truck drivers has shown to give very good results.

Supervisors obviously have to keep abreast of the latest rules and regulations. They must also be aware of the chain of responsibility and their place in it if an accident occurs. Injury and damage can be prevented by training and a company's own rules.

The commonest accidents in warehouses are foot injuries and crushing.



## TRUCK COMPUTER GIVES WARNING

Modern trucks are equipped with a computer which monitors all functions. It indicates if there is a fault or gives a warning before a breakdown occurs.

Such equipment is a part of the safety concept. To be able to drive a truck with a computer the driver must state

his personal identification number (PIN code). The computer registers the truck operations and the driver can be informed if he has made any mistakes or driven recklessly.

## STRESS INJURIES

Driving a truck can be a considerable physical strain. The most vulnerable parts are the neck, shoulders and left arm (from heavy steering). This is not only a matter of comfort, but may also affect safety and efficiency.

In addition if the work environment is not good, if the drivers risk injury while working.

## RIGHT TRUCK

The importance of the right truck cannot be overstated. The right truck means

the one that's most appropriate for the tasks it has to perform. It should give the driver the maximum chance of doing the job in the best manner.

It should be well integrated into the handling system and be an efficient unit in the total truck fleet.

Choosing the wrong truck can lead to big losses in productivity. The choice of truck depends on the handling arrangement which gives a low logistics cost. Ergonomics and LCC must be taken into account. The form of financing is also important. An agreement which enables trucks to be changed has many advantages. If the range, the turnover or the volume of goods change, more suitable trucks can be brought in.

Simulation technology makes it possible to monitor handling regularly in order to determine which trucks give the best handling results.

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