VERY NARROW-AISLE WAREHOUSES

FROM VIRTUAL DESIGN TO EVERYDAY OPERATION

ATLET

AN OUTLINE OF ATLET'S SERVICES AND TRUCKS FOR VERY NARROW-AISLE WAREHOUSES



The Modern Narrow-Aisle Warehouse

More and more companies are turning to narrow-aisle warehouses in order to make better use of the space in their premises. At the same time they find they can create an efficient handling system and a good working environment.

For several decades Atlet has been developing both narrow-aisle trucks and logistics simulation methods in order to be able to offer optimized narrow-aisle solutions. Atlet offers a comprehensive concept for the introduction of narrow-aisle stores.

From virtual commissioning and evaluation of possible layouts, to implementation of the final choice.

Trucks, equipment, financing and after-sales service, together with follow-up and fine tuning when in actual operation.



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A typical aisle width in a narrow-aisle store is approx. 1.6 metres. Storage heights are from approx. 6 metres to 15 metres. "Slowdown" function at the beginning and end of the aisle.

Narrow-aisle trucks:

Atlet OMNI DCR and OMNI DCT "man-up" trucks for whole-pallet handling plus picking.

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Atlet URF "man-down" trucks for whole-pallet handling only. Atlet OPH, OPC, OPS high-level picking trucks from the Ergopicker series with effective picking heights up to 9 metres.

For transfer to the P/D stations an Atlet reach truck or Atlet stacker is used.

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STORAGE CAPACITIES

Narrow-aisle warehouses can save 25% of space or more

The term "narrow-aisle" is the normal designation for an aisle less than 2 metres wide, usually between 1.2 and 1.8 metres. The narrow aisle permits more efficient use of floor space than conventional wide aisles.



The same number of pallets can therefore be stored in an area 25% smaller in a narrow-aisle warehouse.



If we add the fact that the storage height can be used more effectively in a narrow-aisle warehouse with specially adapted trucks, there is a further increase in storage capacity.

AN OPTIMIZED STORE

An optimized storage solution means one with a costeffective balance between storage cost and handling cost.

Where turnover is low, the storage cost is crucial; where turnover is rapid, handling cost is more important.

OPTIMUM UTILIZATION



The table permits a quick comparison of different storage arrangements from the point of view of storage capacity, accessibility and logistics costs (operating cost/pallet).

	Dallet Backing S	torogo Svetome		
Block stacking Pallet turnover rate	Pallet Racking Storage Systems Handling Methods			
Conventional store High	Conventional pallet racking with Reach trucks	VNA with Crane system or trucks		
Narrow-aisle store Low	Conventional pallet racking with Stackers	VNA with trucks or Double deep		
Double-deep	Low	High	Number of pallet locations	

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HANDLING OF WHOLE PALLETS

Truck: Atlet URF "man-down".

Narrow-aisle truck with forks that swivel 180°. Very high driver comfort with seat adjustable to body build, mini steering wheel, and fingertip controls.

High performance. 48 volts AC. 20% longer battery life.

The Atlet URF is suitable for both narrow-aisle storage and in combination with picking by picking trucks.

Rail-guided or wire-guided in the narrow aisle.





CHOOSING A NARROW-AISLE WAREHOUSE

A necessity or an opportunity

When there is a need for expansion within an existing building/ground area, a narrow-aisle warehouse is a reliable solution which retains a high handling efficiency. But there may also be other reasons for choosing a narrow-aisle store:

- New building/extension on limited or expensive land
- Increased number of pallet positions within existing walls
- Existing storage area needed for other purposes
- Merging of dispersed stores into one
- Space-saving storage of slow-moving goods
- Trimmed down intermediate or finished goods store
- Supplementary purposes, e.g. buffer stock
- Improving efficiency of picking/storage

GAINING FROM A SMALL STORAGE AREA

The following example illustrates how a narrow-aisle store can be more cost-effective than a traditional store requiring a larger area.

General assumptions	Pallet position requirement 2000 standard pallets.
Turnover rate 11.2 tim	es/year.

Store A = Wide-ais	<u>le store</u>	Store B = Narrow-aisle store
Width m	43.2	21.5
Length m	48.0	41.1
Height m	5.0	9.5
Storage area sq.m	2071	885 (57% less)
Storage volume sq.	m. 10357	8405 (19% less)
Truck: R	each truck	Narrow-aisle stacker
Building annual cost € Warehouse fittings annual cost €	113 914 9 538	69 503 11 854
Logistics cost € per pallet/year	67.9	53.5 (21% less)

The example shows a cost saving of no less than 21% achieved with a narrow-aisle store and a more compact and higher building (alternative premises).

The turnover rate naturally influences the choice of height of the store/building. A high warehouse is not normally ideal for a high turnover. *(Simulated in ALA.)* **Tifón Corporación Industrial, S.A**

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DOES AUTOMATION PAY?

When optimizing utilization of space, a pallet silo (crane-served store) is an alternative. A comparison of the profitability of a conventional store, a narrow-aisle store and a pallet silo store shows that productivity does not equate with degree of mechanization.

The degree of mechanization/automation of a storage system may be measured as the difference between the total logistics cost of the system and the staff cost component.

The degree of mechanization can be said to be 100 % only when the system has no staff costs.

Example:

Total warehouse logistics cost	100~%
Of which, staff costs	-25 %
Degree of mechanization	75 %

Pallet silo

<u>General assumptions</u> Pallet position requirement 4000 positions. The goods flow is 300 pallets/shift.



17 metres high, three automatic cranes. P & D station for transfer of pallets. Transfer between pick-up/ delivery areas is provided by manual stackers.

Shifts	1	2	3	
Staffing	3	6	9	
Staff cost %	12.7	22.5	30.3	
Logistics cost/pallet €	7.00	4.00	3.00	
Degree of mechanization %	87.3	77.5	69.7	

Narrow-aisle warehouse

Narrow-aisle stackers. P & D station for transfer of pallets. Transfer between pick-up/delivery areas is provided by manual stackers.				
Shifts	1	2	3	
Staffing	5	10	15	
Staff cost %	34.7	51.5	61.4	
Logistics cost/pallet €	2.40			
Degree of mechanization %	65.3	48.5	38.6	
Conver Direct pick-up	<u>Conventional warehouse</u> Direct transfer between storage positions and pick-up/delivery areas by reach trucks.			
Shifts	1	2	3	
Staffing	4	8	12	
Staff cost %	26.6	42.0	52.1	
Logistics cost/pallet €	4.50	2.80	2.30	
Degree of mechanization %	73.4	58.0	47.9	

The narrow-aisle store thus gives a very good productivity compared with a highly automated pallet silo. This is despite the fact that the staff cost component is substantially higher. In addition it is more flexible. *(Simulated in ALA.)*



PICKING

Truck: Atlet Ergopicker. Four basic models with effective picking heights from 4.6 to 9.1 metres.

For line-picking from pallets and shelf compartments. Free-ranging all over the warehouse. Railguided or wire-guided in narrow aisles. Very good ergonomics. Resilient, unobstructed floor (no pedal).



Diagonal driving for maximum speed in the narrow aisle.



Power controls and mini steering wheel with choice of positioning and driving direction.



BUILDING A NARROW-AISLE WAREHOUSE

Order structure, turnover and flows determine the layout

Modern logistics argue for narrow-aisle storage. With IT and smart ordering procedures stores can be slimmed down while maintaining a high rate of turnover. Short storage times. Problems only arise when queuing times get too long. This makes it important to simulate different layouts and possible flows in search of an optimized solution. (Simulated in ALA.)

<u>Examples</u>

2000 pallet positions. 5 storage levels. Aisle width 1.5 metres. Picking from the four highest levels. Queuing time in %.

Layout 4 aisles, aisle length 50 metres.

Test 1: 20 order lines average/picking order. 1.3 items per line. Test 2: 20 order lines average/picking order. 2.2 items per line. Test 3: 20 order lines average/picking order. 5.3 items per line.

Layout changes to 8 aisles, length 25 metres.

Test 4: 20 order lines average/picking order. 1.3 items per line. Test 5: 5 order lines average/picking order. 1.3 items per line.

Queuing time %		4 aisles x 50 m	1	8 aisles x 25 m		
Staffing	Test 1	Test 2	Test 3		Test 4	Test 5
2 trucks/shift	2.0 %	5.0 %	7.0 %		1.8 %	0.3 %
3 trucks/shift	4.8 %	8.0 %	8.6 %		4.1 %	1.2 %
6 trucks/shift	8.8 %	9.5 %	13.9 %		8.2 %	3.3 %
8 trucks/shift	11.1 %	12.5 %	23.7 %		10.7 %	4.0 %

In tests 1, 2 and 3 the queuing time increases with the number of items/order line. If the limit for queuing time is set at 10 %, 7 trucks/shift can work in test 1, 6 trucks/shift in test 2 but only 3 trucks/shift in test 3.

By doubling the number of aisles and halving their length to 25 metres, the queuing time can be reduced. The number of order lines/picking order also has an effect.

TRAVEL DISTANCES AND POSITIONING ACCORDING TO FREQUENCY



The above example shows how important it is to cut distances as much as possible. Long aisles may cost time both in queuing situations and for travelling.

Positioning according to frequency is a common method

of shortening cycle times, but there is a lot of work involved in introducing positioning according to frequency in an existing store. For this reason the strategy should be simulated in the Atlet Logistics Analyser and evaluated according to different circum-

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NARROW AISLES OR A COMBINATION?

In zones with heavy traffic, movement can be made easier by widening one aisle to allow trucks to pass. Only a little space is lost but a lot of time is saved.



Another way of improving the floor area/time ratio is to use flowracks for certain items. The pallets are loaded into

the long side of the racking. The pallet then rolls down to the picker in the narrow aisle, giving FIFO.

CHOOSING THE RIGHT FLOORING

The floor is a sensitive part of a high-bay store. It must withstand the heavy concentrated loads imposed by high racking. In guided aisles the floor is worn only by the wheel tracks, which calls for a very hard-wearing floor covering.

Floor heating makes a positive contribution to the working environment.

The floor must also be flat. The higher the racking, the more level the floor must be in order to give problem-free truck movement. If there is unevenness, this may cause the truck to sway and foul the racking at high levels.



A) is classed as a normal floor. Allows an unevenness of ±5 mm per 2 metres.



A) normal floor up to 3 metres

B) is classed as a flat floor. Allows an unevenness of ±3 mm per 2 metres.



B) flat floor up to 6 metres

C) For floors in warehouses over 6 metres high (narrow-aisle stores) superflat floors are needed. The classification allows an unevenness of only ±1.5 mm per 2 metres.



C) superflat floor over 6 metres



WHOLE PALLET AND PICKING

Truck: Atlet OMNI with 180° swivel or with laterally telescoping forks. Effective handling height from 0 to 15.5 metres.

The Atlet OMNI is a "man-up" truck for a wide range of duties. Both for entry into stock and withdrawal of whole pallets and for line-picking. Goods are normally taken into stock via a P & D station.

The truck can go anywhere in the warehouse, but is rail-guided or wire-guided in the narrow aisles. Diagonal travel for maximum speed.

The Atlet OMNI has a very high capacity and a very high technological and ergonomic standard.







The position of the Omni's controls can be specified to suit the driver's preference.

OPTIMIZE THE PROJECT

Always begin with virtual commissioning

Atlet has been in the front line since the 80s with virtual commissioning of stores and goods flows. The *Atlet Logistics Analyser* has guided thousands of warehouse projects worldwide. It is a superior method of designing and calculating any handling system. The *Atlet Logistics Analyser* takes account of the whole operating picture. Each order profile and handling movement can be simulated and analysed. Warehouse layouts, resources and turnover rates can be matched.

HOW IS IT DONE?

The work process can be illustrated diagrammatically as shown below.



CALCULATE DEGREE OF UTILIZATION

Varied graphic design for different purposes. Simulatable drawings, performances and

detail studies of each element of the handling process.

A fundamental question in a logistics project is the utilization of the warehouse capacity.

- Will the resources be adequate or not?
- Where is the optimum degree of utilization?
- And how prepared are we for change?

Reliable answers can only be obtained by systematic start-up – reflecting reality in a simulated flow. Only then do unsuspected bottlenecks become apparent.

Important – Begin with simulations and evaluations before building or constructional changes are decided or begun. The

size, quality and layout of the building are very important parameters in obtaining a satisfactory or optimized warehouse solution and operation.

ATLET - YOUR PARTNER ALL THE WAY

Atlet manufactures trucks, puts them in studied operating environments, and offers after-sales service and

Customized trucks
and equipmentProject liability for
logistics solutionsFlexible
financing agreements
Tifon Corporacion Industrial, S.AMobile service with flexible
operating contracts

financing. Four points which together give the customer an expert truck partner with responsibility for both reliable operation and productivity.

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TRANSFER TO PALLET STATION

Transfer trucks serve the narrowaisle store with palleted goods which are deposited in the P & D stations on the short side of the racking. The P & D stations are usually 4–6 levels high with a metre between beams.

The transfer trucks can also provide transport of goods after picking and transfer of whole pallets to the dispatch area.







Atlet UNS TERGO AC Power Plus. A powerful truck with superior ergonomics and performance. Individualized driving characteristics.



Atlet AB, S-435 82 Mölnlycke, Sweden Tel: +46 31-98 40 00 Fax: +46 31-88 46 86 info@atlet.se www.atlet.com

Tifón Corporación Industrial, S.A Barcelona, Madrid, Valencia, Alicante, Castellón 902 115 371 | www.carretillasatlet.com | info@carretillasatlet.com