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Narrow Aisle Survey Training



Hyster Company's commitment to quality and performance has made us a leader in lift truck manufacturing and engineering for more than 70 years. With one of the broadest lines of lift trucks available, Hyster provides its customers with a single source solution.

Why are you doing a survey?

Be sure to recognize the survey as a SALES opportunity. This is an opportunity to get inside your customer's operation, to establish relationships, and to gather information from the actual users of the product.

You can use the survey as a chance to pre-sell ideas or to correct misconceptions. You can be more than a just another sales person. You can offer your services as a consultant...for free.

Narrow Aisle Trucks

- Straddle
- Single Reach
- Double Reach



In today's competitive marketplace, warehouse facilities must be designed to maximize space and minimize load handling while maximizing throughput. Narrow aisle storage facilities may be defined as having aisles between seven and nine feet wide. It is common to stack four or more levels high, especially in expensive freezer or refrigerated applications.

Hyster's line of Narrow Aisle trucks can open new sales opportunities for you. More than 14,000 reach and double reach trucks were sold in North America in 2001. Hyster manufactures several types of narrow aisle trucks. Today we will concentrate on Straddle, Reach, and Double reach trucks. Reference: Reach trucks (single and double) represent greater than 55% of Class II trucks sold, straddle trucks represent less than 1%, Order selectors represent 35%, Very Narrow Aisle 8%.



You will see how many aspects of the warehouse's dimensions, from rack systems to load and pallet sizes can impact the truck you recommend. After completing this training, and with a thorough understanding of the customer's existing trucks, applications and racks, you will have a better understanding of how to best serve your customer.

Conducting A Survey

- **Working with the warehouse supervisor.**



This survey is an excellent tool designed to aid you in effectively and efficiently gathering information. This information is essential in specifying the correct truck for the application. The survey should be completed with the warehouse supervisor and should take 30-45 minutes.

If they are not available, have them assign someone to you, to help measure and tell you the different dimensions, what they usually use, and you will also be able to find out inside information this way as to what they like and dislike about the current layout.

Supplies for Your Survey

- Clean Rags
- Survey Forms
- Pad of Line Paper
- Sandpaper
- Clipboard
- Knife
- Mirror
- Rubber Bands
- Camera & Extra Film
- Flashlight
- Tape Measure
- Chalk
- Extra Pen or Pencil
- Business Cards

Filling Out The Survey

TYPE OF NARROW AISLE APPLICATION	
☐ Straddle	☐ Reach ☐ Double Reach
EXISTING EQUIPMENT	
Manufacturer _____	
Model _____	No. of Trucks _____
Capacity (max) _____ lbs. @ _____	Voltage () 24 () 36
Capacity _____ @ _____	MFH _____
Outrigger I.D. _____	O.D. _____
Mast Type _____	Mast O.A.H. _____
Max. Fork Height _____	Fork Length _____ Truck Length _____
Running Hours Per Year _____	
Battery Compartment Size W _____	x D _____ x H _____
Load Wheels: Size _____	Material _____
Battery Model _____	Charger Model _____
Options _____	
Duty Cycle	
A. Number of shifts _____ Average hours of truck use per shift _____	
Maximum hours of truck use per shift _____	
B. Average Run _____ ft. and frequency _____ per hour	
Maximum run _____ ft. and frequency _____ per hour	

The first step you must complete in the survey is to identify what type of narrow aisle equipment is currently in use. This information will lay the foundation for the current working situations. It covers general questions about the manufacturer and model of the existing trucks. Information is also needed on the overall dimensions of the truck and types of batteries in use. You will find this information on the truck data plates and by taking some simple measurements. It is important to discuss the need for true capacities - maximum capacity with relation to fork height vs. capacity at maximum fork height. Make note of the fact that the questions in each section become more specific. By reviewing what the customer is currently using and how the warehouse is currently planned for configuration, you can determine if there a more cost-effective way of handling today and/or tomorrow products. (Page one of survey form)

How would you figure out how much the truck is really used per day. Take down the hour meter, and come back the next day at the same time, to get actual usage. How often are they changing the battery. Don't take the customers word, get a dialog going, where they can give you inside information. People love to hear themselves talk. And while talking, people love to complain.

Filling Out The Survey

Duty Cycle

- A. Number of shifts _____ Average hours of truck use per shift _____
Maximum hours of truck use per shift _____
- B. Average Run _____ ft. and frequency _____ per hour
Maximum run _____ ft. and frequency _____ per hour
- C. Ramps? _____ Yes _____ No If yes, frequency _____ per hour
Ramp Length (L) _____ ft. Ramp Rise (R) _____ ft.
Ramp Grade (G) _____ % (Grade=100xR/L)
- D. Low stacking Time _____ % High Stacking Time _____ %
- E. Average Load _____ lbs. @ _____ Load Center
Maximum Load _____ lbs. @ _____ Load Center
- F. Environmental Modifications? _____ Yes _____ No
_____. E.E. _____ Freezer / Corrosion greater than zero degrees
_____ Freezer / Corrosion less than zero degrees
_____ Freezer Temperature _____

(Page two of survey form)

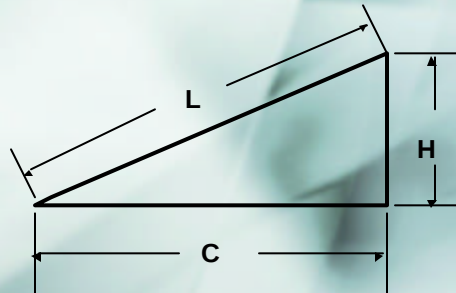
Next you will need to address the duty cycle of the truck. This data is performance-related and is critical to specifying the correct truck. How many times have you heard from a customer that the truck did not perform to their expectations? Understand the application and environment thoroughly before making a recommendation.

Find out shift schedules and approximate hours of truck use. Ask what the average run distance will be and how many times in an hour the truck will be expected to travel that distance.

Most people today use a reach truck as they would use a narrow aisle.

How does a freezer impact the battery? It decreases the life 10% for every 10 degrees below freezing

Ramps and Grades



Check to make sure if ramps are involved. If they are, find out the length and rise to determine grade percent.

Note: Narrow aisle trucks are intended for use on smooth, level surfaces. Extreme caution should be exercised if narrow aisle trucks encounter ramps with a grade of 4% or better.

To calculate grade percent:

$$\% \text{ grade} = 100 \times \frac{\text{total ramp rise (H)}}{\text{horizontal ramp length (L)}}$$

$$\% \text{ grade} = 100 \times \frac{H}{C}$$

If only L and H can be measured:

$$\% \text{ grade} = 100 \times \frac{H}{\sqrt{L^2 - H^2}}$$

Rack Configurations

- **Maximum Rack Height**
- **Average and Maximum Weight**



You will need to know how much time is spent loading and unloading lower levels versus higher levels. You will need to determine the weights of average and maximum loads. You will also need to determine the average run length for put away or retrieval. Why? All of this information is necessary for determining duty cycle and will also impact battery specifications.

Modifications

- **EE**
- **Freezer / Corrosion**
- **Reverse Steer**



Depending on the application you will need to determine if modifications are necessary, such as electrically enclosed modifications(EE), freezer modifications, or reverse steer. Reverse steering occurs when the truck turns in the opposite direction from what the the steering wheel is turned when traveling forks first. This is generally implemented in trucks which spend much of the time traveling chassis first.

Performance

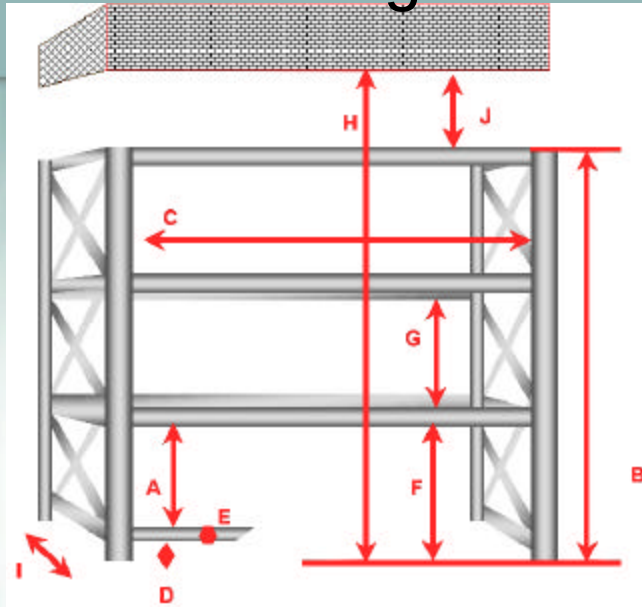
- **24 or 36 Volts**
 - ✓ **Running Hours**
 - ✓ **Travel Speeds**
 - ✓ **High Stacking Time**

Performance requirements such as travel speeds and lift speeds will impact the selection of truck voltage, 24 or 36 volts. On trucks that have a voltage option, 36 volts is recommended when

- 1) running hours per shift exceeds five hours
- (2) high stacking time exceeds 50%
- (3) ramps exceed 4%
- (4) higher travel speeds are desired and
- (5) the truck is used in freezer applications.

There are occasions when the customer's existing battery and charger will impact the choice of voltage.

Rack Configurations



Note; Have the students refer to Figure 1 on page 3 in the Narrow Aisle survey to follow along and understand measurements.

The next section of the survey covers selective and double reach racks. It is critical to get exact measurements of each component of the rack. Errors in calculating rack size or configuration will affect your truck recommendation. A thorough understanding of why we need to take all measurements (items A through I) and their effects on truck features and functions is the best way to build confidence in specifying the right truck.

Rack Configurations

- **Distance between Load Beams**



You must take the measurements of several areas of the rack. You must take a vertical measurement that corresponds to the rack locations A and G. Note; there must be a 6" clearance between the top of the load and the horizontal load beam above it. Do not take for granted that upper level rack locations are the same height as lower levels. This can impact load backrest measurements.

Accessing Rear Load



It is crucial that the backrest clears the load beams in double reach applications.

Reference: Hyster's backrest extension is 48" high, but shorter heights are available to 36".

Selective & Double Reach Rack

- **Measurement B is determined by measuring from the floor to the top of the top load beam.**



(Measure to floor)

This is a critical measurement. You must measure from the top beam to the floor, but you must also consider pallet underhang and fork deflection as well. An error of a couple of inches in this measurement could cause you to have to retrofit a mast in the field.

Selective & Double Reach Rack

- Maximum Fork Height
- Pallet Underhang
- Deflection

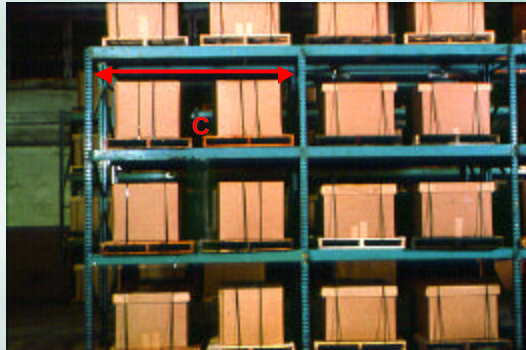


To determine maximum fork height you must also compensate for pallet underhang and deflection. To offset these possibilities, add a minimum of 7" to the B measurement if 240" or less, 9" if B is between 240"-300", and 11" if above 300".

Deflection is the amount of "sag" in the forks that is experienced when the mast and reach attachment are extended

Selective & Double Reach Rack

- Spacing



Measurement C determines the horizontal rack bay opening. Normally, two to three loads are stacked side by side between the rack columns. Straddle truck applications require 6" between loads and between loads and rack columns. When using reach trucks, spacing can be reduced to 4" or less.

Selective & Double Reach Rack

- **Horizontal Rack Bay Opening**



The horizontal rack opening is one of many factors affecting load spacing and right angle turn. The larger the space, the sooner the truck can begin its turn, resulting in a tighter turn. Horizontal rack opening can also impact base arm width.

Selective & Double Reach Rack

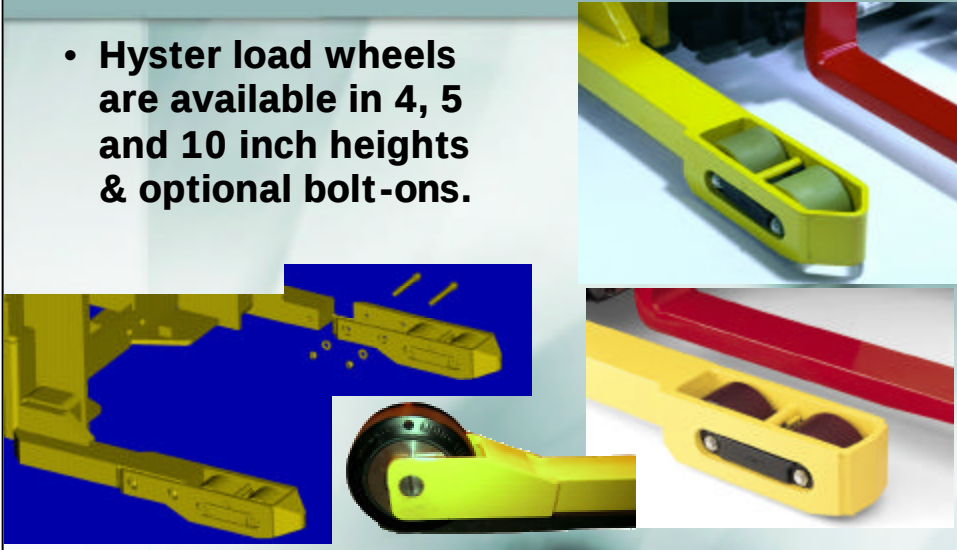
- **Under Beam Clearance**



Measurement D is the clearance under the bottom load beam (providing there is one). Make sure this measurement is greater than the height of the load wheel or base arms.

Load Wheels

- Hyster load wheels are available in 4, 5 and 10 inch heights & optional bolt-ons.



Hyster Load wheel are available in 4,5, and 10 inch heights. This can be critical information if there is a bottom load beam that the load wheels must pass under. **DISCUSSION OF TOE BOXES IS LATER ON SLIDE 45!**

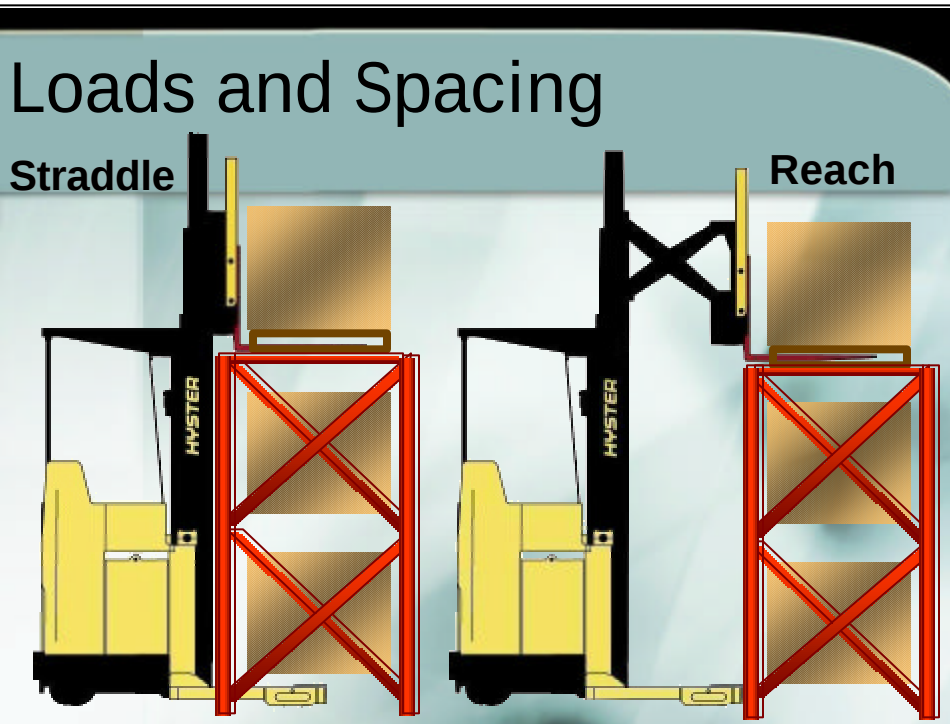
Selective & Double Reach Rack

- Vertical distance from floor to bottom of first load beam



(Measure to Floor)

Measurement F is the vertical distance from the floor to the bottom of the first load beam. “F” measurements are more common than “A” measurements. One big advantage is the ability to use pallet trucks since loads are on the floor. Remember, the backrest must clear load beams in deep reach applications. Standard backrest extension is 48” high.



Allow 1" to 2" plus the load wheel height (average 7") between the load and the horizontal load beam for up and over base arms (reach). Straddle trucks need only 1" to 2" for retracting between base arms.

Selective & Double Reach Rack



Measure the distance between upper load beams, G, if it is different from A or F. Occasionally, distance between load beams is greater higher up.

Remember, A is the distance from the bottom load beam(if one exists) to the underside of the load beam on the second level.

F is the distance from the floor to the underside of the bottom load beam on the second level.

Ceiling or Lowest Obstruction

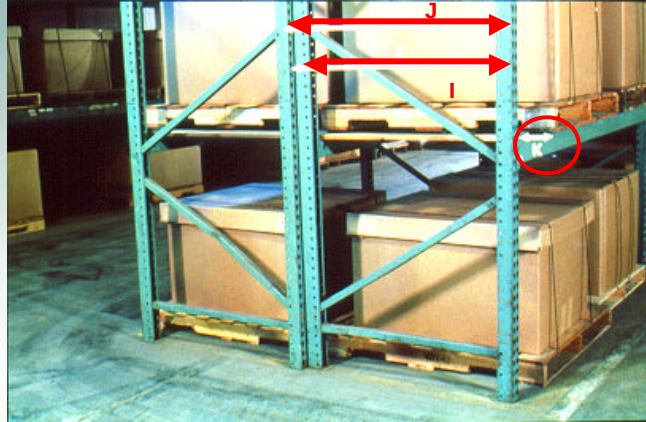


- **Measure to Floor**



You must also consider the vertical distance between the floor and the ceiling or the lowest obstruction “H”. It affects the maximum fork height or requirement for lift limit option. In addition, the load backrest extension (48”) can also interfere with obstructions or ceiling. (i.e., HVAC ductwork, conduit, pipes, sprinklers, etc.)

Selective & Double Reach Rack



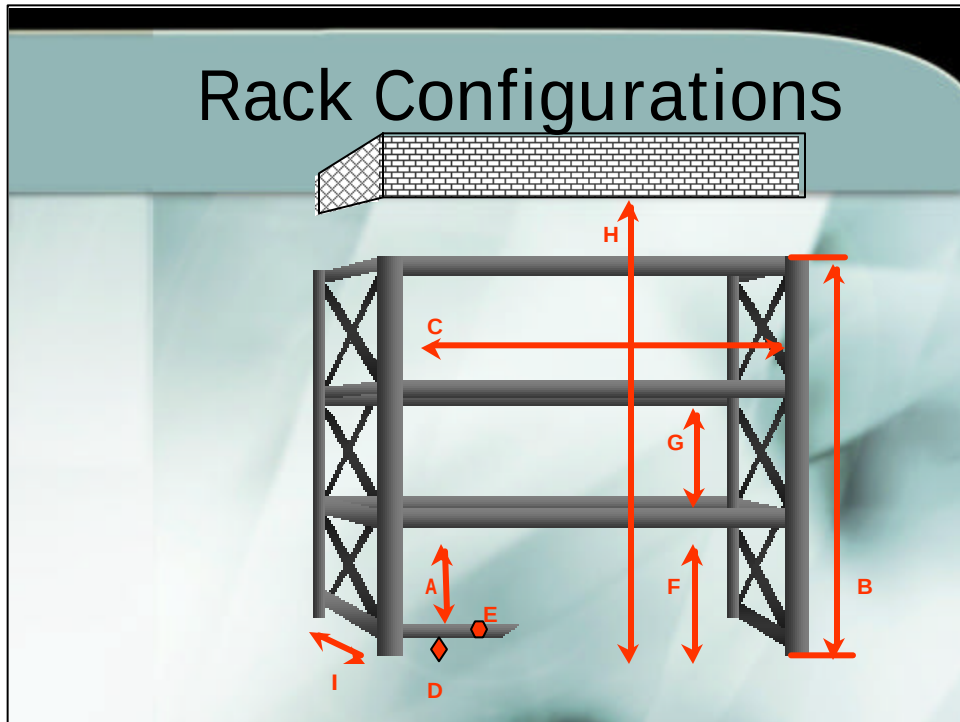
Measure the distance from the front of the rack to the back of the rack, I , because it too, affects the load overhang. J is the distance between the front face of rack and second pallet or load in a double reach rack. The measurement of the front load overhang is K . It will also affect reach requirements, so add K to J for total.

Double Reach Trucks



- Hyster Double Reach trucks have a double extension of 42".

- N25XMDR3 & N30XMDR3 add 12.6" fixed extension; 54.6" total.
- N30XMXDR3 add 12.3" fixed extension; 54.3" total.
- Add 1" more for sideshifter



END OF RACK CONFIGURATION SECTION

Before moving to the next section on Drive-in racks, take time to solicit comments from the group ABOUT selective and double-reach racks.

(Encourage Salespeople to share tips or techniques for taking rack measurements, i.e., using a rubber band to attach a tape measure to the forks of a truck to measure upper level racks.)

Drive-In Racks



Have students turn to page six of the survey form to refer to diagrams of drive-in racks.

When a drive-in rack is used, a different set of measurements must be taken. Drive-in racks are designed without horizontal load beams running parallel to the aisle, allowing operators to drive the truck right into the rack system. Drive-in racks are normally anywhere from 3 to 6 rows deep. Drive-ins provide high density but can restrict access to loads, and under-utilize space due to honeycombing. Honeycombing occurs when a storage location is partially filled and cannot be completely filled without blocking existing stock.

Drive in Racks are restricted to LIFO. Last-in, First-out. FIFO refers to first-in, first-out, which is next to impossible with drive-in racks.

Then there is FIST. First-in, still-there. (Note: We believe this phrase was coined by Glenn Spiers.)



Drive-In Racks

- Since the truck actually enters the rack, certain dimensions must be checked.

Drive-In Racks



Refer to figure 3a on page 6 of the survey. In drive-in racks, A is the horizontal distance between load supports. This distance affects mast width as well as rear guard width. This distance must be 1" to 2" wider than the mast width. Narrow aisle trucks may require special modifications for use in drive-in racks.

Drive-In Racks



Next, measure B, the vertical distance from the floor to the top of the first load support and C, the vertical distance from the floor to the bottom of the first load support. B and C affect the chassis clearance.

Drive-In Racks



Measurement D is the vertical distance between the floor and the bottom of the second load support. It affects the overhead guard height. The pallet supports could obstruct the overhead guard and prevent the truck from entering the rack.

Drive-In Racks



Measure the horizontal distance between rack upright columns, E to determine the maximum base arm O.D. Note that it is necessary that the distance between the rack uprights be a minimum of 1" - 2" wider than the base arm O.D. Measure the horizontal distance between the base plates, F, (only if different from E) to determine the maximum base arm O.D. G is the height of the base plate and may affect the base arm side plate.

Make note of the bolt positions of the rack frames to insure that they do not obstruct base arms.

Drive-In Racks



To determine maximum fork height, you must measure H, the distance from the floor to the top of the highest load support. Remember, as stated earlier, add 7" if 240" or less, 9" if 240"-300", and 11" if 300" or above.

Measurement I is the vertical distance from floor to ceiling or lowest obstruction, and also determines the maximum fork height.

Doorways



There is one more measurement that must be taken. It is not part of the rack, but is equally important and is easily overlooked. You must measure the doorways from the lowest door clearance in the operating area. It not only affects the overall height, but other factors as well. For example, OAH could limit maximum fork height.

Don't forget to measure building entrance doors as well. It could be embarrassing to have have to remove the mast to get the truck inside.

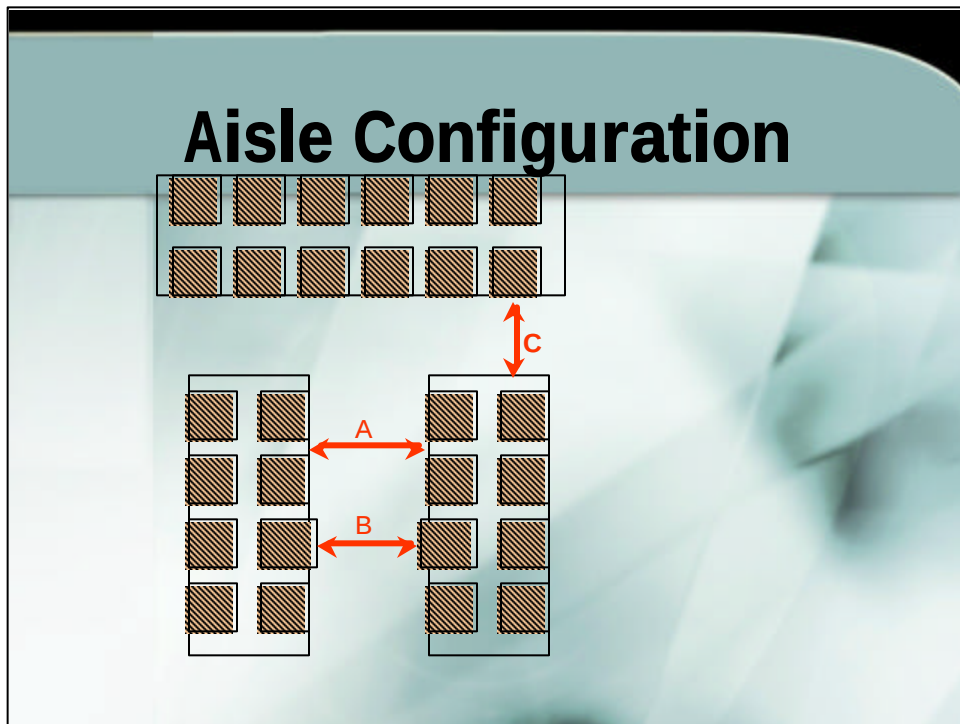
(Refer to figure 4., page 7 of the Narrow Aisle survey form.)

Are we done yet?



It seems like all you have been doing up to now is taking measurements. It may seem laborious and unnecessary, but now you have a good indication of what truck you will be recommending. There are just a few more areas you need to address before making a recommendation.

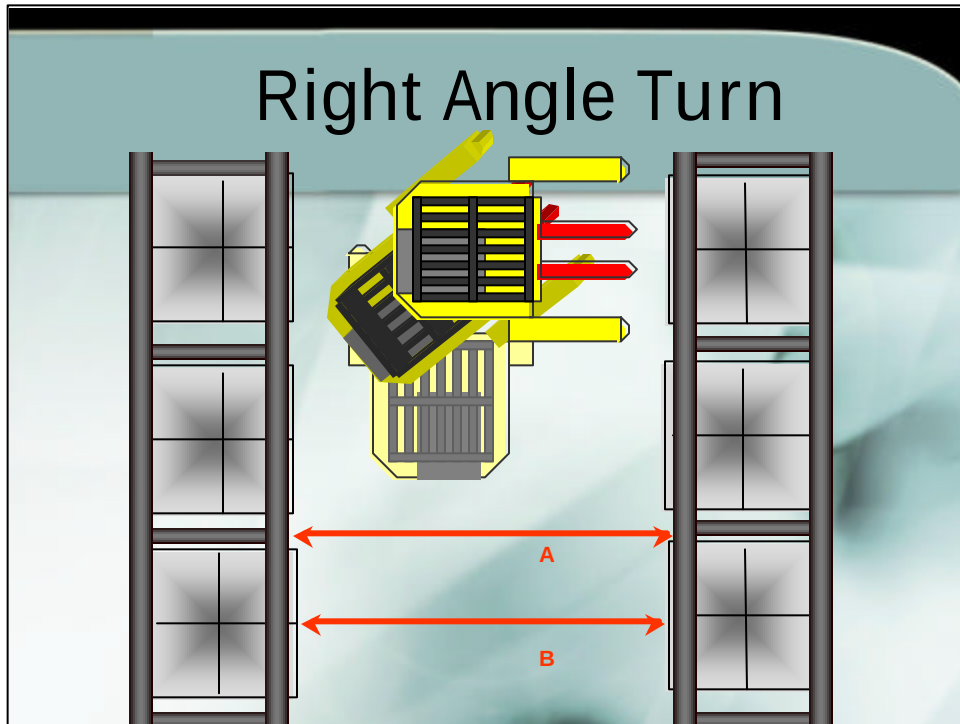
(Any questions on drive-in racks and doorways?)



Refer to Figure 5, page 8 of Narrow Aisle Survey form.

There are three more dimensions you will need to take: A, the distance between racks, B, the distance between loads, and C, the width of the end or intersecting aisle. Then ask if at any time, is it necessary for two trucks to pass in the same aisle. To safely pass another truck in an aisle, you need to recommend a minimum of 6" Between trucks and 6" between truck and rack loads. That comes up to 18" in addition to both truck widths.

Reference: Chassis widths on Hyster narrow aisle trucks run 40"-44". However, the base arm O.D. is the most critical because it represents the widest dimension of the truck.



Using the smaller aisle measurement A or B, you can determine the right angle dimensions. Other factors affecting right angle turn calculations include truck length (truck length is the length from base arm tip to rear bumper), load size, loading space, distance between loads, and base arm O.D.

Reference: Consult technical guide for published right angle turn dimensions or contact Hyster Company's product specialist.

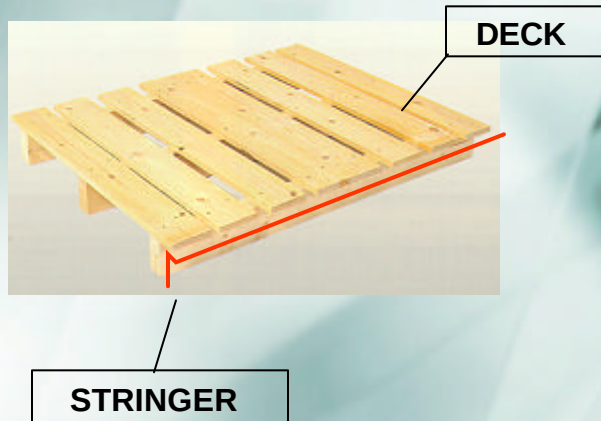
Pallets

- **Winged**
- **Flush**
- **GMA**



The three most widely used pallets are the winged pallet, the flush pallet, and the GMA (Grocery Manufacturer's of America) pallet. The GMA pallet is most often used in grocery distribution facilities. Pallets generally come in 40, 42, or 48 inch widths. When referring to pallet dimensions, refer to the stringer length first. (i.e., a GMA pallet is 48"x 40".)

Winged Pallets



The winged pallet is constructed so that the deck overhangs its stringers. With this style loads can be stacked tightly in the rack, while still allowing room for the straddle arms.

Flush Pallets



The flush pallet's top and bottom decks are the same width and are flush with the side stringers.

GMA Pallets

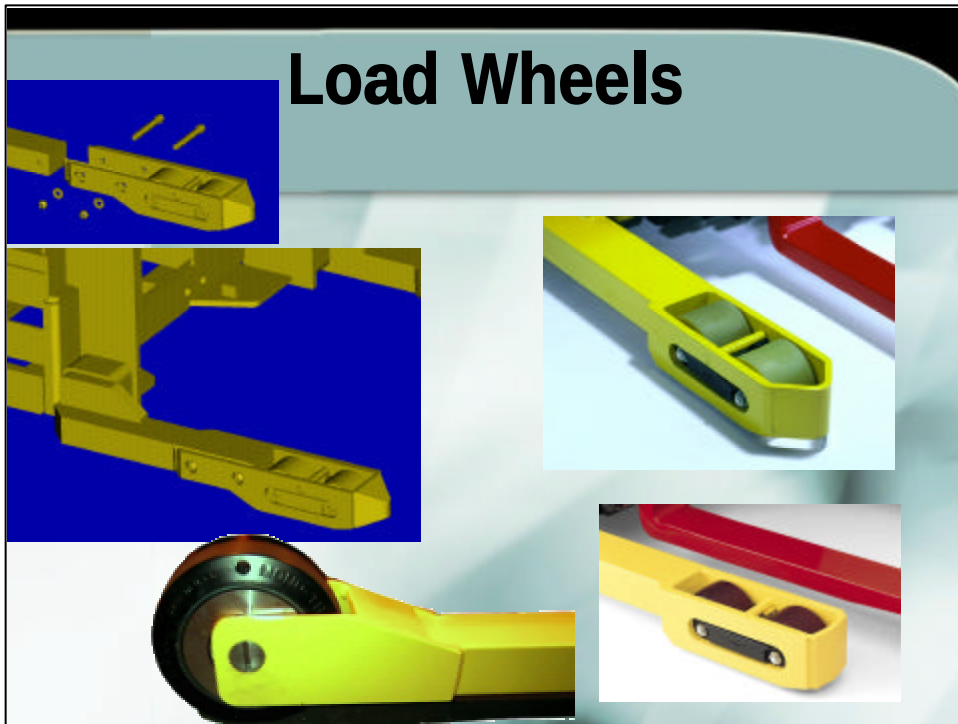


A generic reference to the pallets used in grocery manufacturing, distribution and retailing; historically, a "GMA pallet" meant it was a pallet specified by the Grocery Manufacturers of America. It incorporates consistent dimensions on all aspects of pallet construction and has openings on all sides for four-way pallet handling.

Fork Length



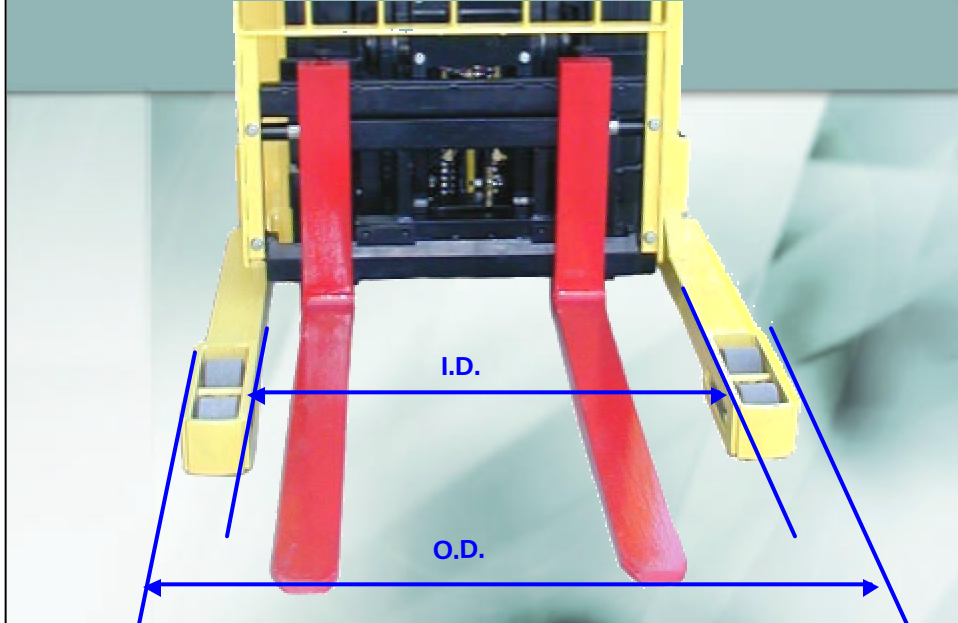
Once you know the pallet and load size you can determine the fork length. The fork length should be at least $\frac{3}{4}$ of the pallet load length.



Please turn to page 6 of the survey (fig. 6, load wheels) for a discussion on wheel type and size. Depending on the type of floor, optional wheels may be necessary. Larger optional load wheels are available for rough floor applications.

Blunt toe caps are standard on single reach trucks. Pointed toe caps are standard on straddle and double reach trucks. They assist in aligning the load during load placement. When specifying load wheels, make special note of the floor conditions. This could impact the type or size of the load wheel. For example, are the floors wet or dry? Are there cracks, chuckholes, uneven surfaces, etc.?

Base Arm Dimensions



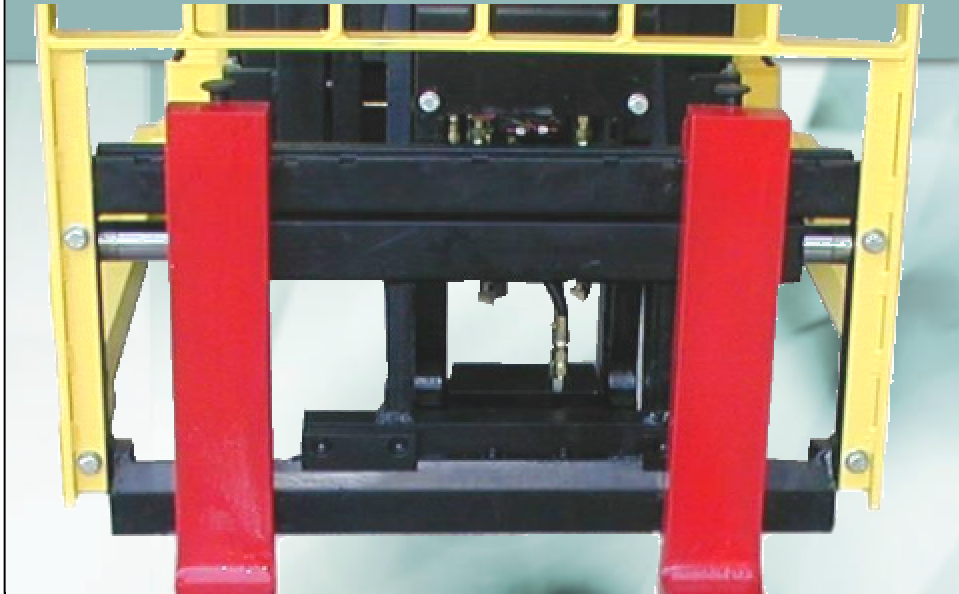
You need to determine the base arm I.D. and O.D. Note again fig. 6 and the affects of wheel sizes on O.D.

Base Arm Dimensions



Some models with optional smaller load wheels are also available for low base arm heights when using wing pallets in reach applications. Narrower base arm tips and load wheels are available for use in applications where I.D. and O.D. dimensions must be kept to a minimum.

Integral Sideshifter



Hyster's integral sideshifter does not diminish load capacity. Find out if a sideshifter is required.

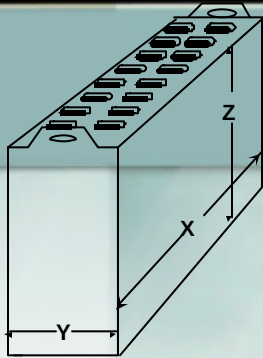
Batteries

- **Battery Dimensions**
- **Voltage**



When replacing existing equipment, note that batteries come in all shapes and sizes. It is critical that you specify a truck that can use the existing battery, or be sure to inform the customer that a new battery and possibly battery charger will be required. Make sure that you can determine the weight of the existing battery to insure that it falls in the correct weight range specified.

Batteries



Battery Compartment	N50XMA3 24V	N50XMA3 36V	N30XMR3	N40XMR3	N45XMR3
S	38.88x12.5x31.18		38.9X12.5X31.2		38.9x16.6x31.2
M	38.88x14.62x31.18	38.8x14.62x31.18	38.9x14.6x31.2	38.9x14.6x31.2	38.9x18.8x31.2
L	38.88x16.62x31.18	38.8x16.62x31.18		38.9x16.6x31.2	38.9x21.1x31.2

Battery Compartment	N25XMDR3 24V	N25XMDR3 36V	N30XMDR3	N45XMXR3	N30XMDXR3
S			38.88x16.62x31.18	38.88x12.5x31.5	38.88x12.5x31.5
M	38.88x14.62x31.18	38.88x14.62x31.18	38.88x18.75x31.18	38.88x14.6x31.5	38.8x14.6x31.5
L	38.88x16.62x31.18	38.88x16.62x31.18	38.88x21.12x31.18	38.88x16.6x31.5	38.8x16.6x31.5

Narrow Aisle Survey



Questions / Comments?

We trust that this presentation has given you a better understanding of Narrow Aisle applications and the thought required to insure that the correct truck is specified. If you have additional questions, please call David Edwards, Sales Training Developer in Greenville, NC at 252-931-5706.