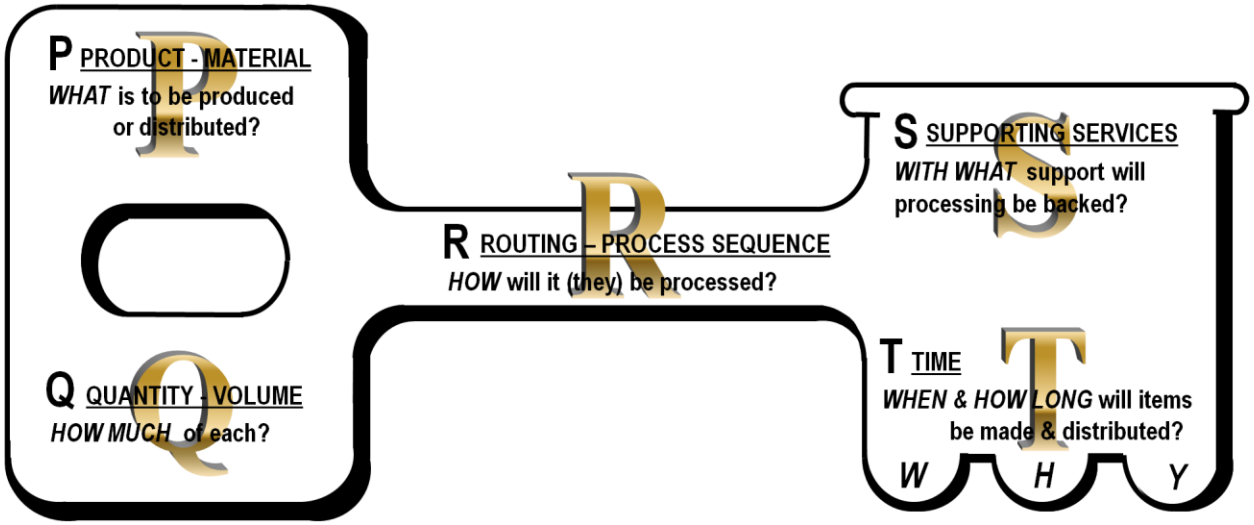
How to Lay Out a Warehouse or Distribution Center

Key Input Data for Layout Planning: PQRST

Main Points

1. Facilities planning requires five types of key input data.
2. For ease of recall, the five key inputs are designated by the five-letter sequence: P-Q-R-S-T. These stand for:
   - *Products* (or materials or services)
   - *Quantities* (sales volumes & inventory)
   - *Routing* (or processes of necessary operations)
   - *Supporting Services* (for people, processes and information systems)
   - *Timing* (operating hours, seasons, urgency…)
3. The facilities planner must collect data from others for each of the five key inputs.
4. When collecting data, be sure to challenge its correctness and underlying assumptions, especially regarding "R" the routing or process.
5. This act of challenging is symbolized by the letters W-H-Y on the teeth of the key.

Key Inputs



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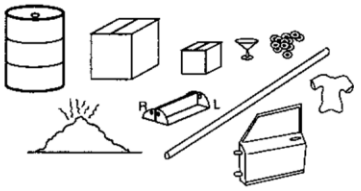
Notes

Five Key Elements Influence Warehouse Layout Planning

P — PRODUCT (Materials, Items & Orders)

The layout must be planned for the physical characteristics of items and orders. Storage areas will be defined for common material storage groups – items with similar physical characteristics, common ordering patters, or other controlling factors.



Q — QUANTITY (Flows & Levels)

Quantity has two different meanings:

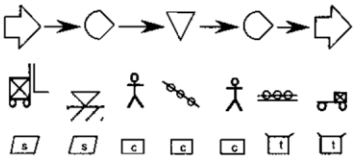
- Flow rate in and our (Intensity of flow)
- Inventory level (Quantity on hand)

Great differences in flow or inventory levels will lead to separate methods and areas for fast and slow movers, and for high- or low-quantity items.

R — ROUTING (Process Sequence & Methods)

The purpose of warehouse layout is to support and enable the desired process, methods and routing of materials from receipt through shipment.

Distance moved should be minimized on routes with high intensities of flow.

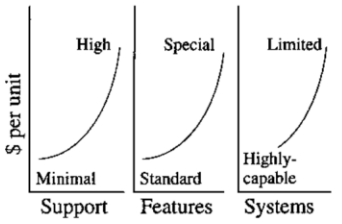


S — SUPPORTING SERVICES (Surroundings & Systems)

Maintenance, battery charging, personnel areas and the like are supporting services that need placement in the layout.

Features of the building and site are surroundings that will influence the layout.

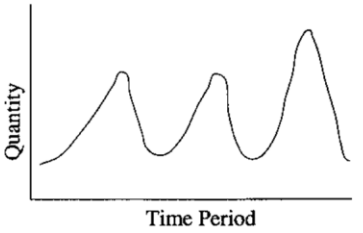
Information systems for managing activity will also influence methods and layout.



T — TIME (Timing, Regularity, Urgency, Duration)

The regularity and duration of activities influences the size, throughout and capacity of the layout. Dock schedules, ordering cut-offs, and working hours must all be considered.

Periodic peaks and seasonality must be identified and considered.



Main Points

1. Items with common physical characteristics, order structure or other factors can typically be stored and picked in the same way and will often be stored in the same area.
2. Using these 15 factors, hundreds or even thousands of items can be grouped into a few manageable categories for selection of storage methods.
3. Procedurally, it is best to start with the five physical characteristics, since differences here will usually have the most impact on picking and storage methods. Then consider order structure, and finally other factors as may be appropriate.
4. The same factors can be used to classify materials for purposes of selecting material handling methods. Here, the five physical characteristics are most important and often sufficient for classification. Order structure and other factors typically have less significance.

Factors Affecting the Grouping of Materials

- **Physical Factors**
  - Size
  - Weight
  - Shape
  - Risk of Damage
  - Condition
- **Order Structure**
  - Popularity
  - Order Quantity
  - Similarity (family)
  - Time or Urgency
  - Seasonality
- **Other Factors**
  - Annual Usage
  - Turnover or Stock Level
  - Value or Special Condition
  - Procedures
  - Regulations

- We refer to items that will be stored in the same way and area as a storage group.
- We refer to items that will be moved (handled) in the same way as a material class.
- Storage groupings typically consider more characteristics than material handling classes.
- Each group or class of material should consist of items which are similar in one dominant characteristic or in a combination of several characteristics. Basically, we want each group to be capable of being stored in the same way – that is to say, by the same storage and handling methods.

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Notes

Main Points

1. In order to size storage areas, we must know the amount of inventory that will be on hand.
2. It is good to know the maximum and minimum inventory levels for items and item-families. But sizing of storage areas should typically be done for average inventory levels. Otherwise, too much capacity will be provided, since all items are not at their maximum at the same time.
3. The only exceptions would be if fixed storage assignments must hold maximum amounts because the items cannot be stored in additional, separate locations.
4. For purposes of storage grouping and zoning, flow analysis, and eventual slotting, we need to know popularities (order frequencies) and order sizes.
5. Compiling this information may require assistance from the Information Systems department.

INVENTORY AND SALES QUANTITIES

P-Q Data

Plant: *Oil Products, Ltd.* Project:
By: *KH* With: *RM*
Date: *8-11* Sheet: *1* of *1*

	Materials, Products, or Family of Products	Number of different items or articles	Sales volume in units per year	Inventory Level: Minimum Units	Inventory Level: Maximum Units	Inventory Level: Average Units	Sales Quantities -- Number of Sales Orders Per Week: Cartons: One or more pallets	Cartons: Cartons (less than full pallet load)	Cartons: Cans (less than full carton)	Drums: Four drums or more	Drums: Less than four drums	Remarks
1	M1 Carton	1	41,000	170	1,470	820	16	48	16			
2	M3 Carton	1	38,000	160	1,410	785	15	47	16			
3	M1 Drum	1	5,500	25	215	120				7	28	
4	M4 Carton	1	24,500	100	1,100	600	11	32	11			
5	G2 Carton	1	13,500	55	925	485	10	28	10			
6	M3 Drum	1	3,000	15	155	85				6	21	
7	V5 Carton	1	13,500	55	725	390	7	21	7			
8	M4 Carton	1	2,500	10	140	75				5	17	
9	G2 Drum	1	1,350	6	116	61				3	12	
10	V4 Carton	1	9,250	40	590	315	2	6	2			
11	M Carton Family	7	40,250	805	4,000	2,400	4	34	37			
12	M Drum Family	3	2,650	55	265	160				3	29	
13	T Carton Family	7	30,650	615	3,100	1,860	4	40	44			
14	V Carton Family	3	7,500	150	750	450	1	13	14			
15	G Carton Family	5	7,900	320	1,580	950		14	34			
16	G Drum Family	5	450	30	140	85					8	
17	R Drum Family	15	1,150	100	460	280					8	Keep above freezing point
18	R Carton Family	22	6,850	550	2,740	1,645		45	100			Keep above freezing point
	Cartons	51	235400	3030	18530	10775	70	283	191			
	Drums	26	14100	231	1351	791				24	123	
	Sales Quantities -- Units per Week						3010	1410	270	162	170	

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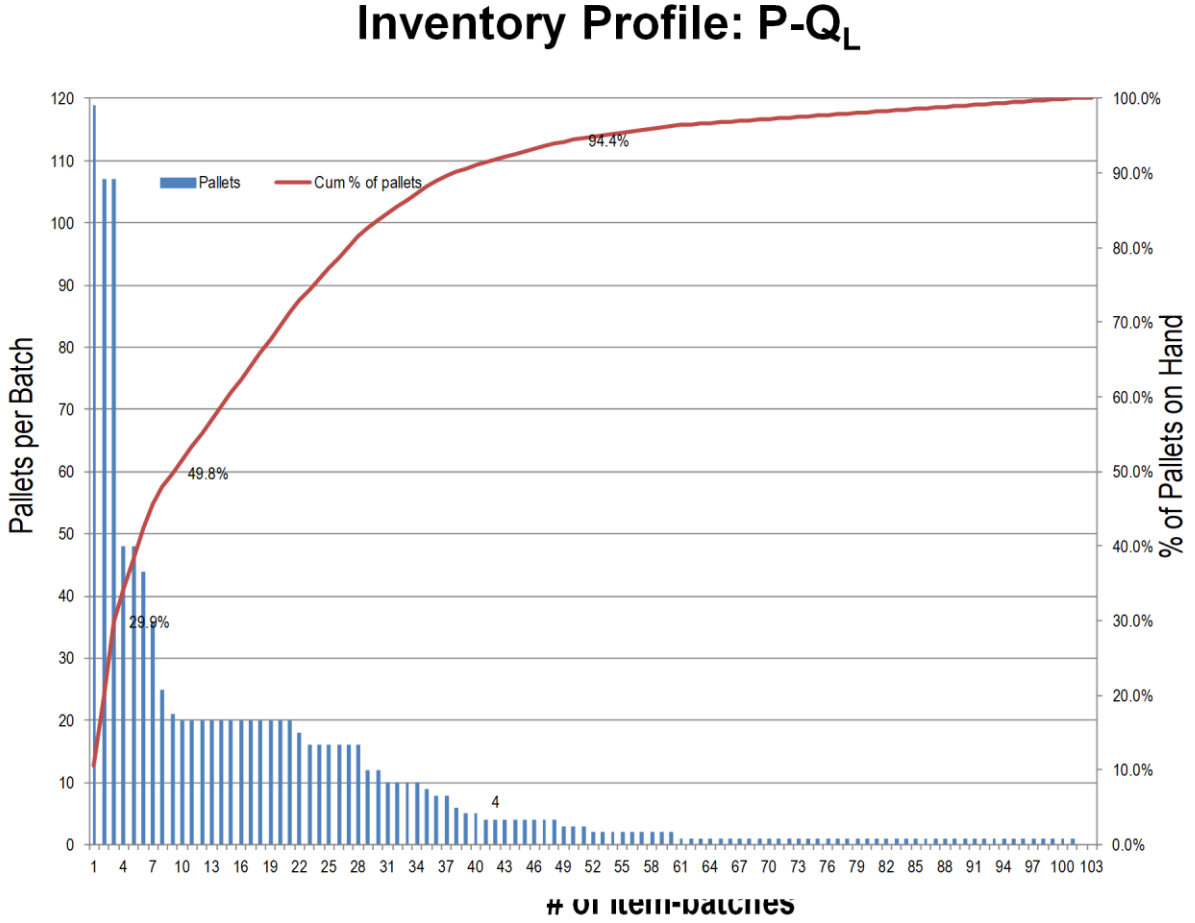
Notes

Main Points

1. An inventory profile is essential to determine the best storage methods.
2. Items on hand in large counts of stored units will typically use a different method than those with low counts.
3. If stored items are subject to date-lot or batch code consumption -- using the oldest first -- the profile should be plotted in stored units per item-batch, not just per item.
4. In this example, a few stored batches are very large. At the other extreme, about 40% of stored batches consist of only 1 or 2 pallets.
5. Space can be saved by using high-density storage methods for the large batches: deep lane floor stack if stackable; drive-in rack if not; deep lane shuttle rack if budget permits.
6. For small item-batches, the need for accessibility works against high-density methods.



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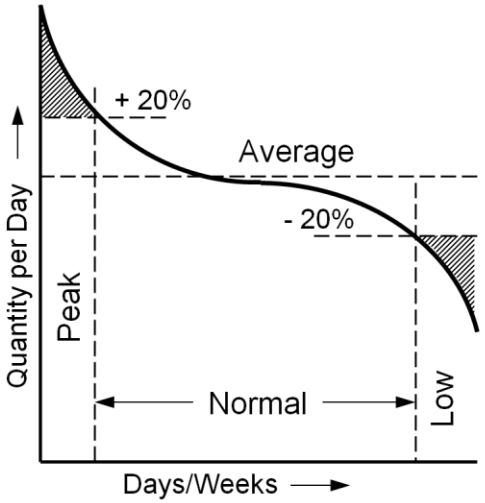
Notes

Order Filling – The Through-Put

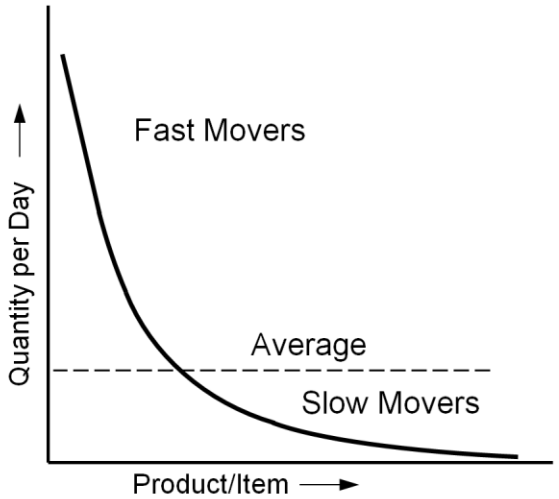
Main Points

1. Many specific analyses should be performed to properly plan an order-filling operation.
2. Two that should always be performed are the Seasonality profile and the Product-Quantity Plot.
3. If the peak-to-trough range is extreme, the planner may need two solutions, one for peak and one for off-peak periods.
4. When a few fast-movers account for a significant percent of total volume, the methods used for these items will often be different than those used for slow movers.
5. Beware of single, "one-size-fits-all" methods and solutions.



Seasonality or Peak-to-Trough

Total through-put arranged in order of decreasing quantities. The diagram tells us how often we have a "peak" or a "low" situation.



Product-Quantity Plot

The through-put per item, arranged in order of decreasing quantities. The plot tells us the daily (or other interval) usage of each item or article and splits them into "fast movers" and "slow movers."

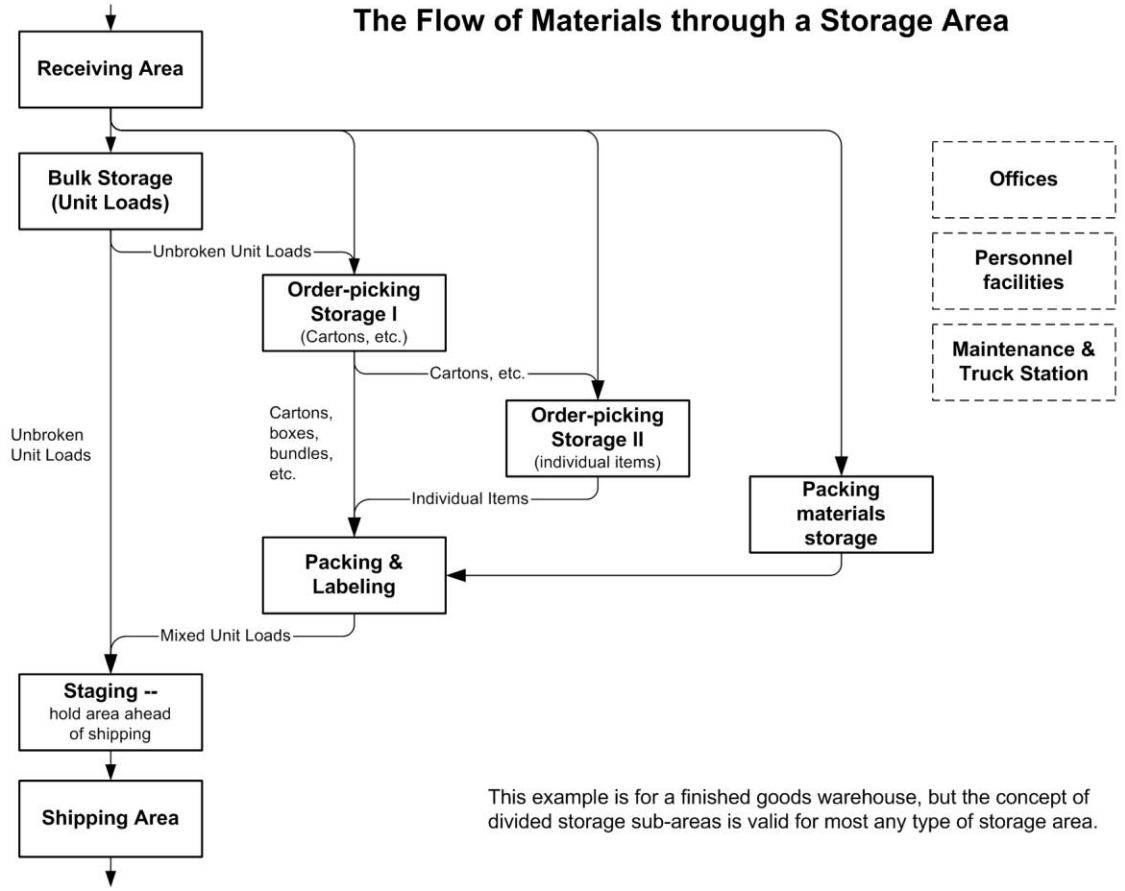
Notes

Main Points

1. Virtually all storage facilities or areas exhibit the flow pattern shown here – from receipt through putaway, then via picking or retrieval to staging and issue or shipment.

2. The number of sub-areas depends upon the extent to which stored loads are broken down and picked as cases, cartons, or individual packs or items.

3. Storage blocks may be further sub-divided by storage group or material class.



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Notes

Main Points

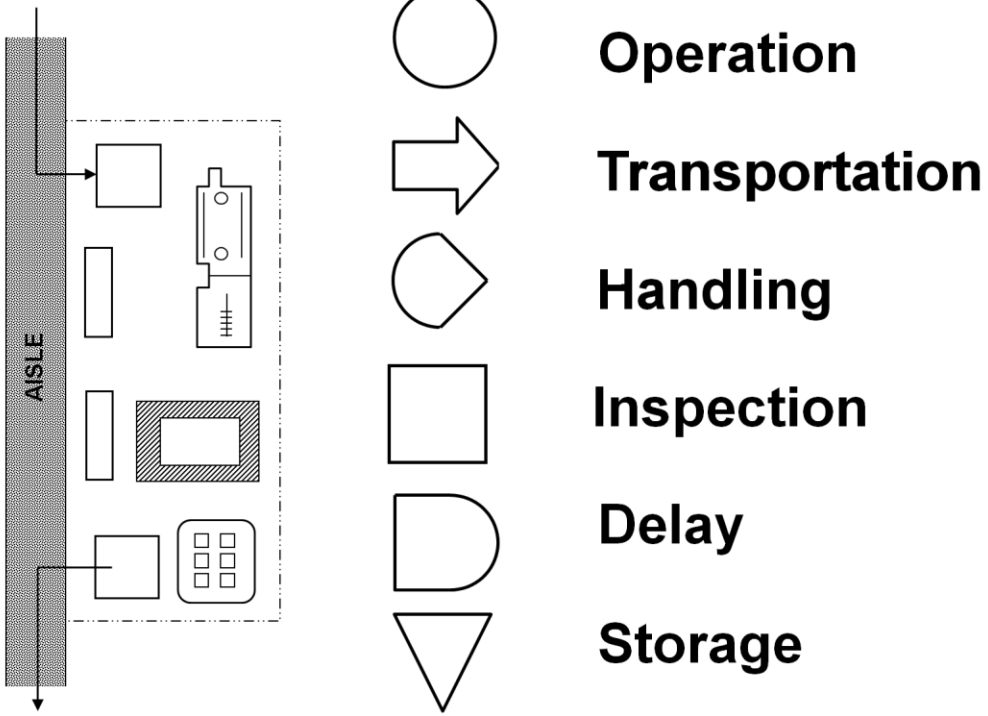
In industry, six things happen to parts or materials:

1. An operation changes the physical form of products or materials.
2. A transportation changes the location of products or materials.
3. A handling changes the position of products or materials as they are arranged or prepared for another action.
4. An inspection verifies and changes the status of products or materials.
5. A delay is a temporary hold when conditions do not permit or require the performance of the next planned action.
6. A storage holds products or materials against unauthorized removal.

These symbols (except for handling) are the standard ASME process charting symbols as defined in ANSI Y15.3M 1979. (They are available in Microsoft Visio as the TQM stencil).

Process Analysis

Six Things Can Happen to The Material(s) or Part(s)



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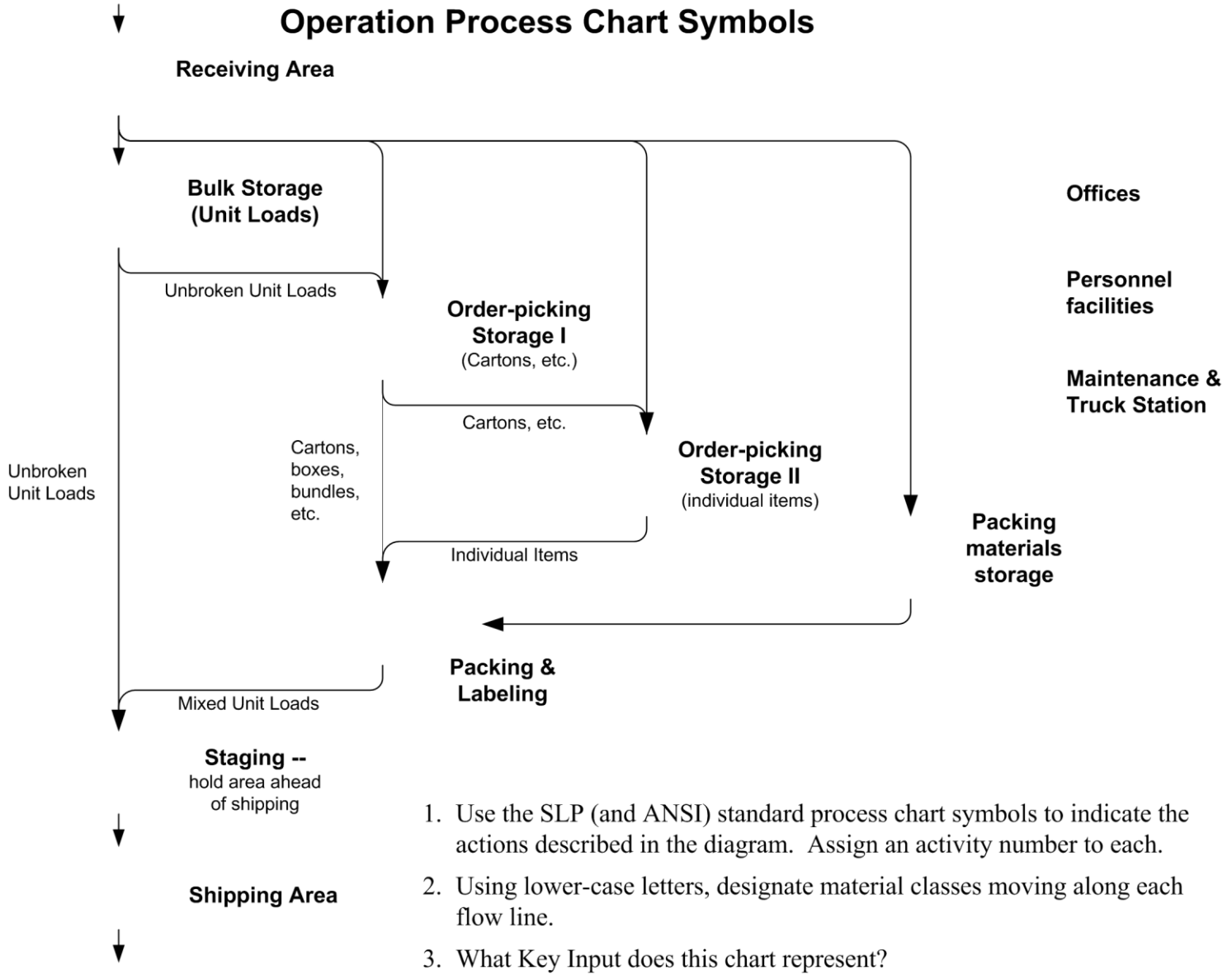
Notes

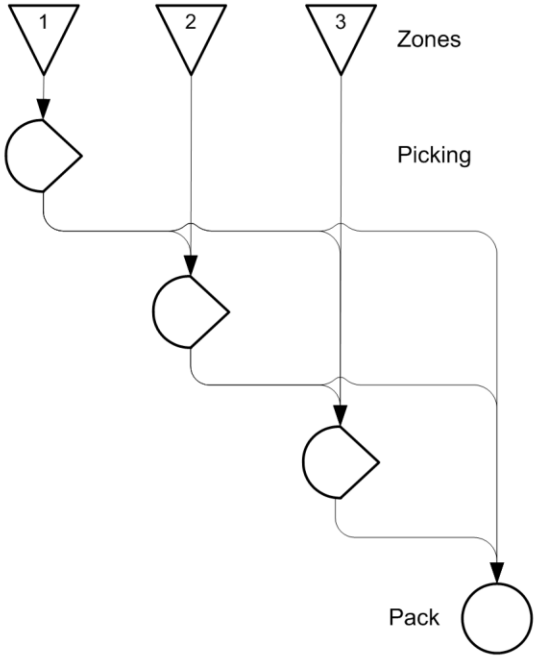
Operation Process Chart Symbols



1. Use the SLP (and ANSI) standard process chart symbols to indicate the actions described in the diagram. Assign an activity number to each.
2. Using lower-case letters, designate material classes moving along each flow line.
3. What Key Input does this chart represent?

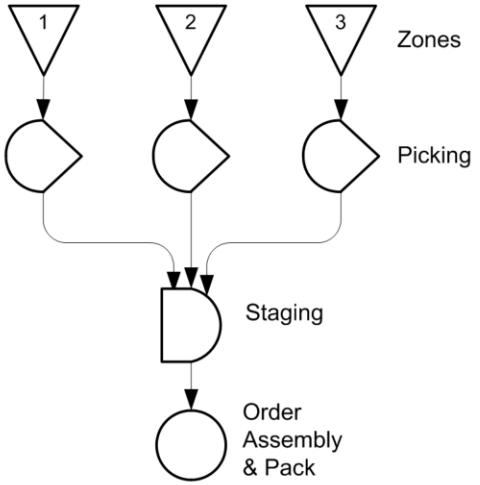
Typical Storage Facility Routings

Progressive picking



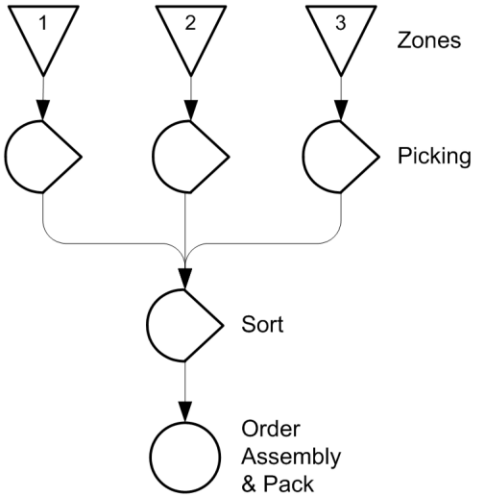
- Orders pickers visit zones in a defined sequence.
- Orders are assembled as picked.
- A zone is skipped when the current tour does not require its items.
- Common when some items must be picked first or last.

Zone pick; independent delivery



- Item-zones may be visited or picked in any order or concurrently.
- Outputs flow from each zone directly to order assembly and pack.
- Any load building or packaging requirements are met there.

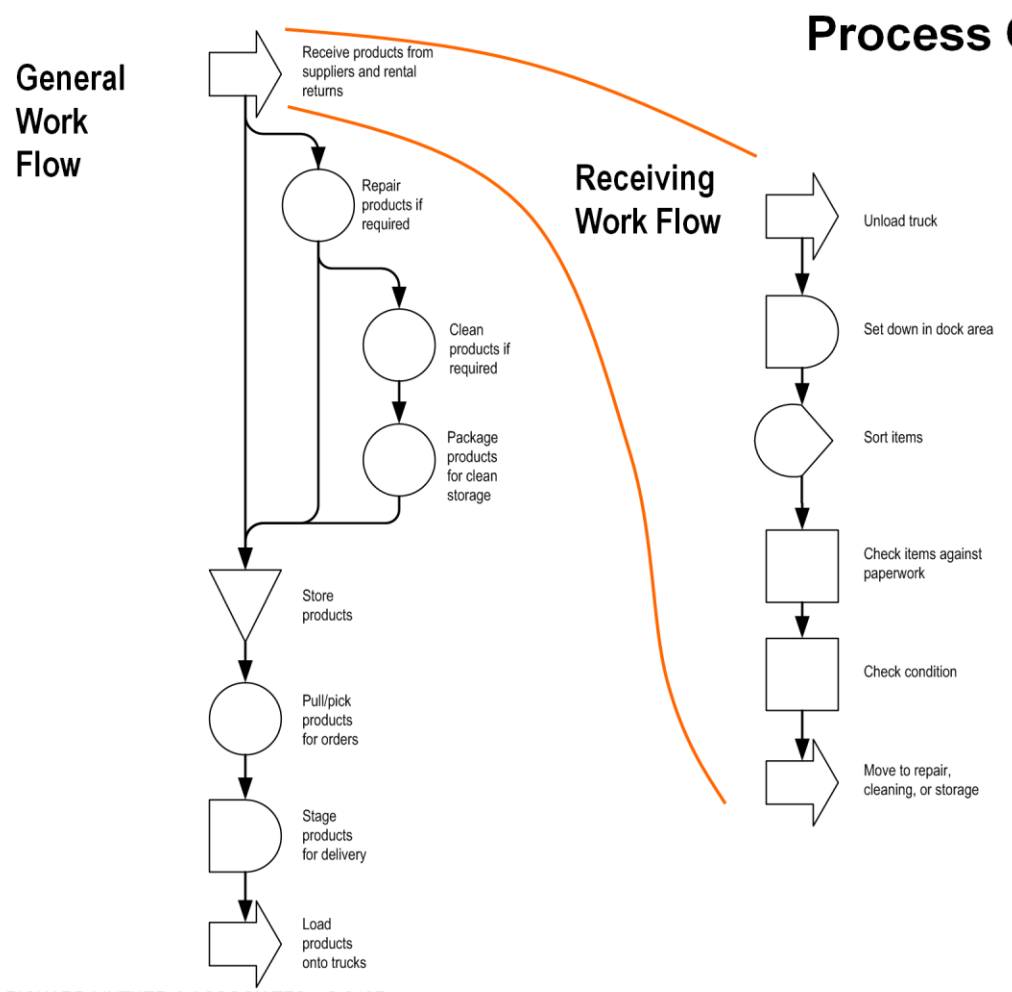
Zone picking with sortation



- Item-zones are picked independently.
- Picked items are conveyed to order assembly and pack on a sorting conveyor.

Main Points

1. The operation process chart is a key input to layout planning.
2. It is also the best tool for analyzing and finding opportunities to improve a process. For this reason, the process chart and any improvement planning should precede layout planning.
3. Process charts can be drawn at varying levels of detail.

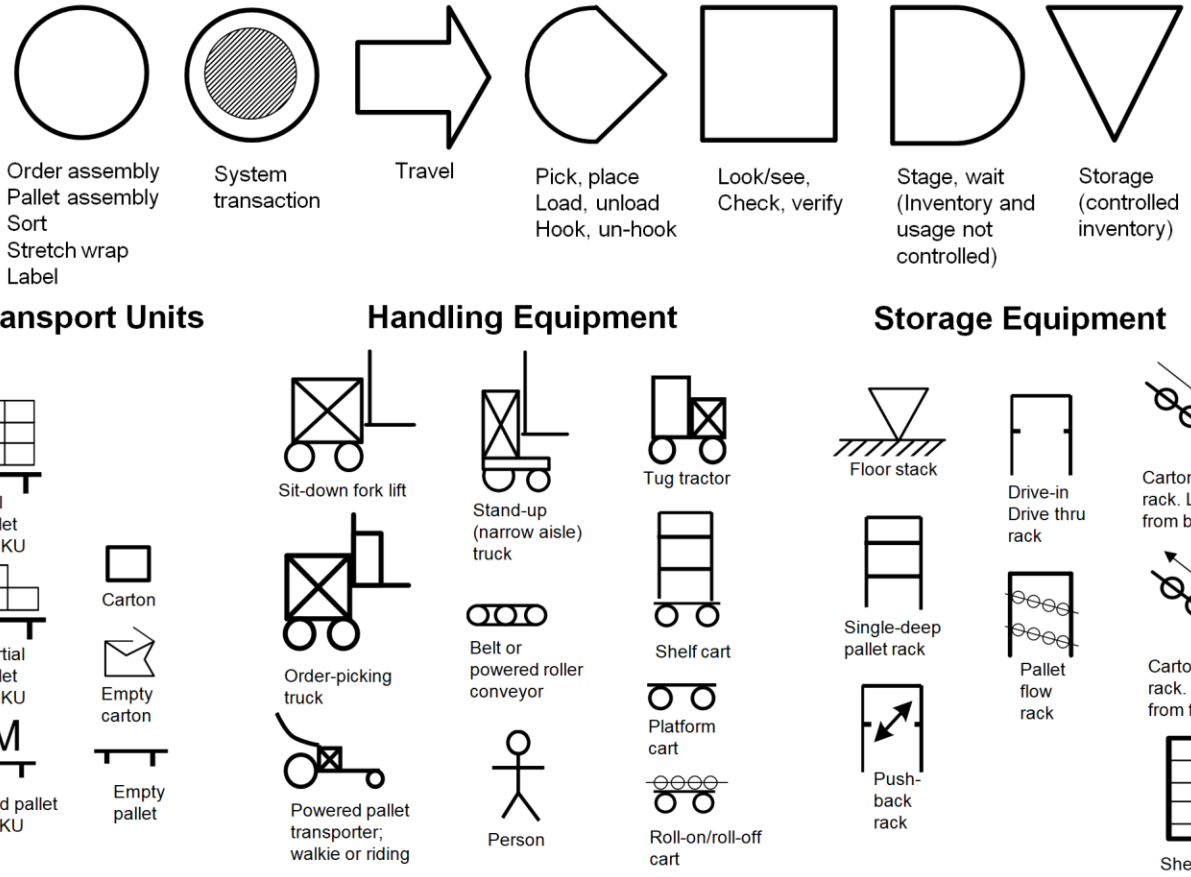


Notes

Main Points

1. Process charting symbols show operations performed but not the equipment being used.
2. Here, a standard set of simple icons enable the planner to the indicate equipment used,
3. Transport Units refer to the loads traveling between operations.
4. Handling Equipment enables the travel operations.
5. Storage Equipment enables the holds – staging or storage.
6. Fuller sets of symbols are available in Microsoft Excel at www.RichardMuther.com Register for Downloads and look for 1245, 1247, 1248 and 2247.

Process Chart & Equipment Symbols



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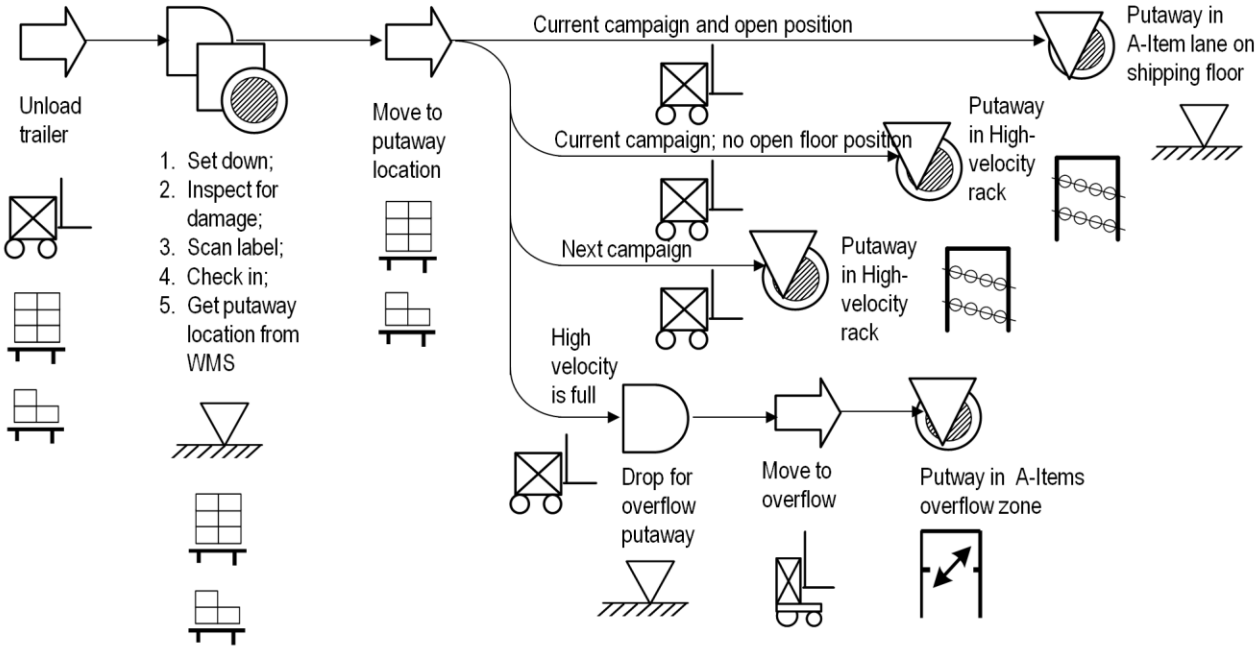
Notes

Main Points

1. Process chart symbols show sequence of operations performed.
2. Equipment symbols show material handling, storage and transport units at each operation.
3. Notes explain the operations and flow paths in greater detail.
4. In this process, the putaway can follow four paths. Putaway on the shipping floor is the preferred and expected path for currently active products. But if floor positions are full, or the product is not currently active, three other paths are possible and must be provided for.
5. Documenting processes in this way helps to identify and plan for exceptional conditions.

Example of Process Chart with Equipment Symbols



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Notes

Main Points

1. The operation process chart uses six standard symbols to describe physical actions. Developed in the late 1920s by Frank and Lillian Gilbreth, this type of chart was popularized in the 1930s and '40s by Allan Mogensen, in his Work Simplification Program of Continuous Improvement. In the 1950s two symbols for information processing were added by Ben Graham, in his popular program of Paperwork Simplification.
2. Mogensen called for asking five questions and "why?" about each operation, followed by five possible actions to simplify work before standardization.
3. In classical application, symbols are numbered sequentially by type in order of their appearance. The last symbol of each type shows the number of such actions in the process. Thus, as pictured here, a receiving process consists of:

   1 physical operation
   0 storages
   5 inspections
   1 handling
   3 delays
   4 moves
   4 information processing steps

4. This example combines some operations. With more space and detail these could be broken into additional symbols for sub-operations and even motions if desired and appropriate.

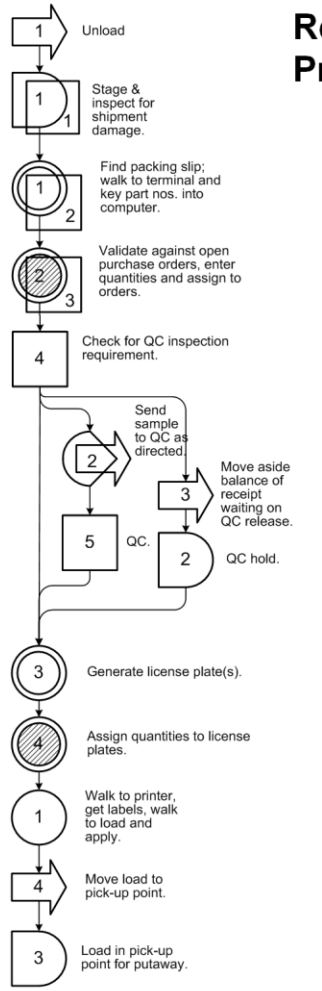
Operation Process Chart

Analysis

1. What is the purpose of this operation? Why?
2. Where should this operation be done? Why?
3. When should this operation be done? Why?
4. Who should do this operation? Why?
5. How should this operation be done? Why?

Action

1. Eliminating unnecessary activity.
2. Combining or changing the place where an operation is performed.
3. Combining or changing the timing or sequence of the operation.
4. Combining or changing the person who performs the operation.
5. Simplifying or improving the method, including the tools, fixtures, or machinery used.



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Notes

Main Points

1. When the process is straight-forward, without frequent or important assembly or disassembly operations, the process analysis can be made on a pre-printed form.
2. The Flow Process Chart is a classical industrial engineering tool. It was developed in the late 1920s by Frank and Lillian Gilbreth, and popularized in the 1930s and '40s by Allan Mogensen, in his Work Simplification Program of Continuous Improvement.
3. Built into the chart are classical analyses and actions that may improve the process.
4. Pre-printed symbols assure that we identify all moves and record their distance and quantity or intensity of flow. Processing, delay, and storage times can also be recorded.

Note:

Form 531 is available in Microsoft Excel format from our website at www.RichardMuther.com

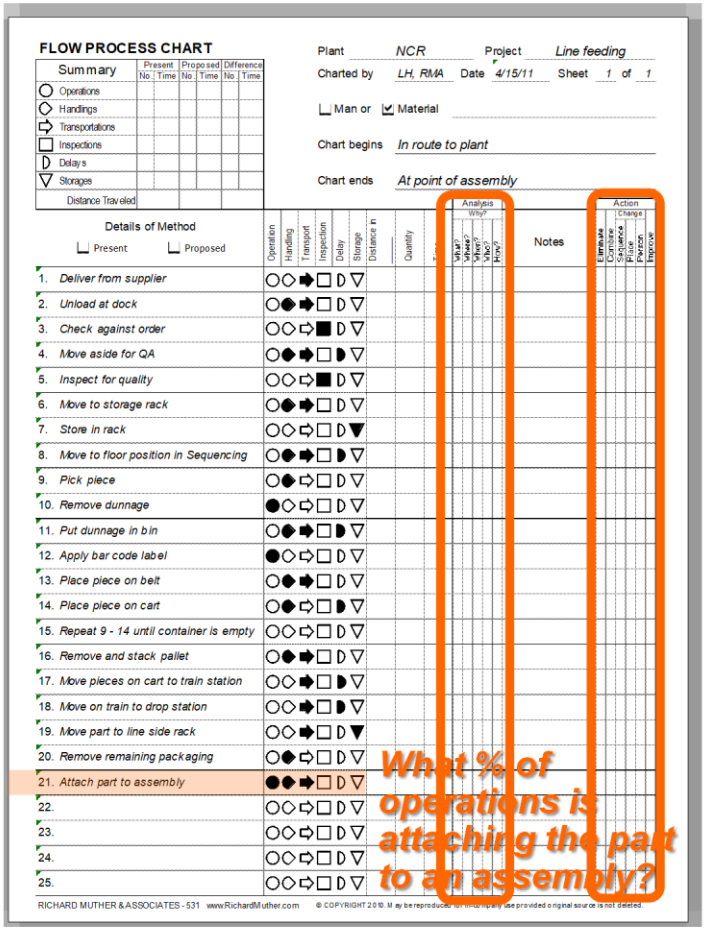
Pre-Printed Flow Process Chart

Analysis

1. What is the purpose of this operation? Why?
2. Where should this operation be done? Why?
3. When should this operation be done? Why?
4. Who should do this operation? Why?
5. How should this operation be done? Why?

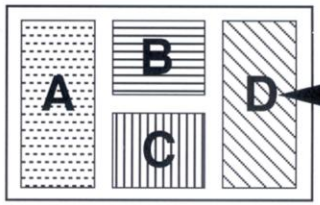
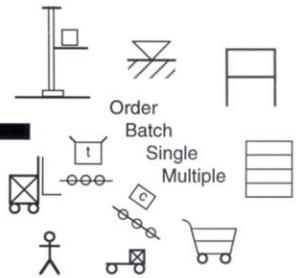
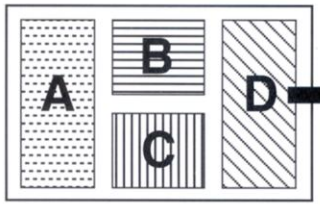
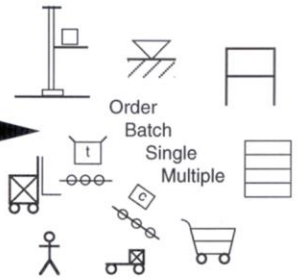
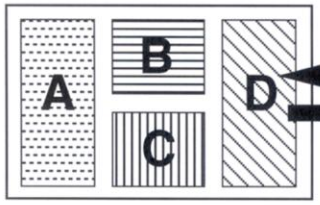
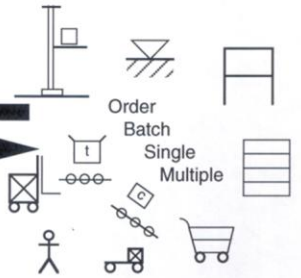
Action

1. Eliminating unnecessary activity.
2. Combining or changing the place where an operation is performed.
3. Combining or changing the timing or sequence of the operation.
4. Combining or changing the person who performs the operation.
5. Simplifying or improving the method, including the tools, fixtures, or machinery used.



Notes

Types of Projects and Integration of Planning Methods

Project Scope	Layout	Handling, Storage & Operating Methods
Methods planning only. Not a layout project. **Condition 1**		 **Open**
Layout planning only. Methods as a Key Input (R) to layout planning. **Condition 2**	 **Open**	 **Fixed**
Facilities & operations planning. Use Key Inputs to set methods. Then use iterative planning procedures. **Condition 3**	 **Open**	 **Open**

Main Points

1. Reading from left to right, this chart shows common choices of equipment at each stage of the warehousing process.
2. To make sound equipment selections, the planner should understand the basic choices at each stage, recognizing that these may differ for material-storage groups.
3. Note the inclusion of storage equipment. Choice of storage equipment must be compatible with material handling and order-picking equipment "on both sides."
4. In warehouses, the planning challenge is to choose the best *combinations* of handling-and-storage equipment.
5. When the primary mission of the warehouse is order fulfillment (as opposed to bulk or long-term storage), the selection process should start "in the center," with the choices of storage and order-picking equipment and then "bolt on" the handling equipment bringing material in and taking it away.
6. First, identify the best choices for each material storage group. Then decide if second choices or even third should be accepted for the greater good of commonality and flexibility, assuming that all choices can be cost-justified.

Basic Warehousing Functions and Equipment Commonly Used In Implementing Them

Receiving	Identification & Sorting	Move to Storage	Storage	Order Picking	Order Consolidation	Packing	Loading	Record keeping
Carts Trucks Conveyors	Manual Mechanical Electrical	Manual Conveyor Hand Truck Power Truck Lift Truck Automatic Guided Vehicle (AGV) Tow-line Tractor-Trailer Train Crane Hoist Stacker Crane Special Device	Floor Shelf Bin Conveyor Rack fixed flow Pallet floor rack fixed flow Carousel	Manual Lift Truck Conveyor Carousel Crane Hoist Stacker Crane Storage Machine **Move to Shipping** Conveyor Hand Truck Power Truck AGV Tractor-Trailer Train Tow-line Lift truck Crane Hoist Stacker Crane Storage Machine	Manual Conveyor Hand Truck Power Truck Tow-line Tractor- Trailer Train Crane Hoist Stacker Crane	Manual Mechanized	Manual Conveyor Hand Truck Power Truck Lift Truck Crane Hoist Stacker Crane Special Device	Manual Automated

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Notes

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Main Points

1. Generally, material storage groupings will be based on differences in the physical characteristics (P) and usage patterns (Q) of ordered items.
2. These differences will often result in different processes and methods (R) for picking, storage, and material handling (transport).
3. When practical, methods decisions should be made ahead of layout planning. Then, alternative layouts will be developed and evaluated for a single, chosen set of methods.
4. In some cases, the choice of methods and their impact on the layout will be so significant that the methods decisions must wait and be made in conjunction with layout evaluation. In such cases, the planners will be evaluating alternative layouts that vary in terms of picking, storing and handling methods.

Planning Warehouse/DC Methods

- Plan processes and methods (R) by Material-Storage Group (typically based upon similarities and differences in P-Q)
- Decide processes and methods in the following order:
  1. Order-picking
  2. Storage
  3. Material Handling
  4. Integration of Picking, Storage & Handling
- If methods decisions cannot be reached without layouts, then develop layouts for each alternative set of methods and evaluate them to together.

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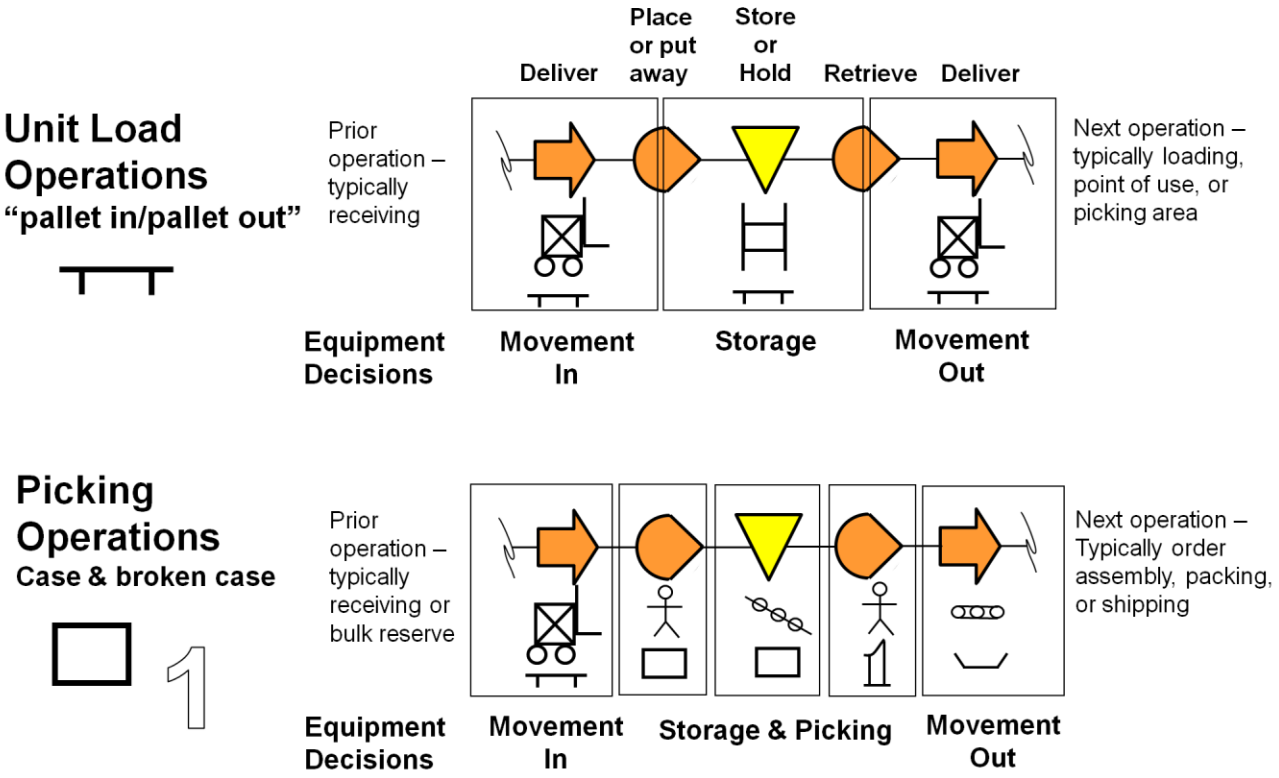
Notes

Main Points

1. Material moves through storage areas in five sequential operations:
   - Transport: Deliver from prior operation.
   - Handling: Place or put away into storage.
   - Store or hold.
   - Handling: Retrieve or withdraw (order picking).
   - Transport: Deliver or take away to next operation.
2. In unit load operations, the equipment used to deliver and take away typically performs the handling into and out of the storage equipment. Thus, only three equipment decisions are required.
3. In case picking, broken case or "each" picking operations, the unit of material typically changes form as it is put away and/or picked from storage. These "handlings" may be performed by a person, or by a piece of specialized equipment other than that used to deliver and take away.
4. Thus, five equipment decisions are required and the equipment used for material movement must be compatible with that used for storage and picking.

Handling, Storage and Picking Equipment



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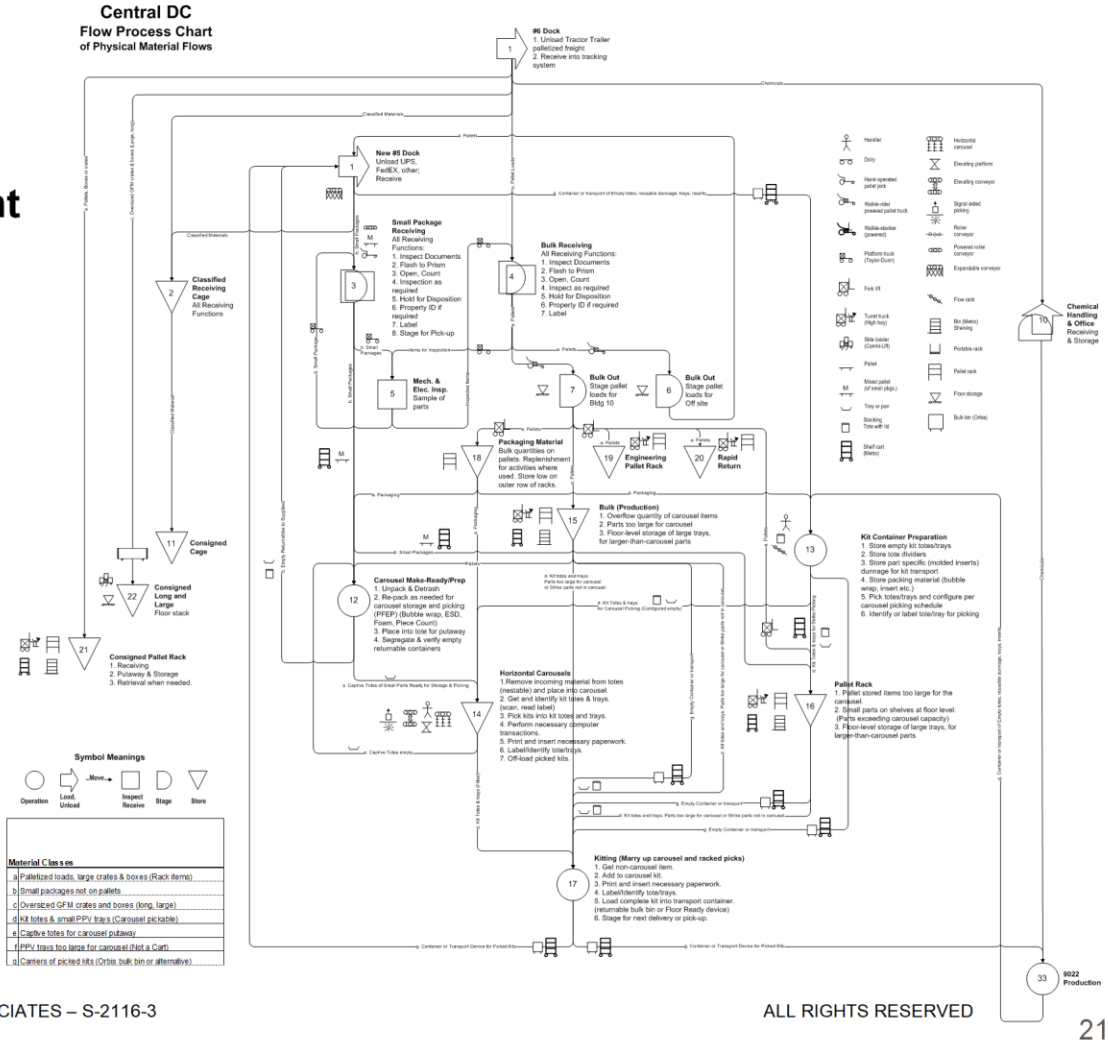
Notes

Main Points

1. Flow process chart input for laying out a central warehouse to supply three manufacturing plants with purchased components.
2. Numbered symbols represent major activities and areas to appear in the layout. Symbols indicate the type of operation performed.
3. Text explains operations performed at each activity-area.
4. Flow lines between symbols show material flow paths (routes).
5. Letters on flow lines indicate material classes (types of material) moving on each flow path.
6. Equipment symbols indicate how picking, storing and material handling will be performed.

Example of Material Flow Process Chart with Equipment Symbols



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Notes

Main Points

1. Process support areas are rarely identified on a process chart or values stream map.
2. As a result, they are often overlooked when focusing on layout and flow of stored product and order picking.
3. Collectively, these areas may consume 5% to 7% of space underroof.
4. They are also a source of activity relationships – some of which will be important for reasons other than flow of materials.
5. Personnel support may consume another 5% to 7% of space underroof, or even more if the facility houses significant clerical activity such as order processing, procurement, or sales.
6. Personnel support areas are also a source of important relationships other than flow.

Typical Supporting Services

Process support

- Battery charging
- Fork truck/cart parking
- Maintenance
- Equipment storage
- Empty pallet storage
- Supply storage
- Recycling & compacting
- Inspection; QA hold
- Rework/re-pack
- Dump & donate
- Electrical & other utility rooms
- Temperature & humidity controls

Personnel support

- Front offices
- Floor offices & workstations
- Employee entrance/time clock
- Security office
- Training/meeting room(s)
- Break areas/cafeteria
- Restrooms/ Lockers

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Notes

Main Points

1. Planners should know the hours and days of operation for each activity-area in the layout.
2. Sequential operations that are not running concurrently may require buffer space or capacity between them.
3. Peak periods and their impacts should also be understood. Typically these include seasonal and holiday demands, cut-off times on ordering, and possibly calendar-related behavior in sales.

Time-Related Variables

- Hours of operation – by process or activity-area
- Shifts & days
- Seasonality
- Cut-off times
- Other calendar-related causes of peaks and variability in flow intensity
- Calendar-related variability in inventory levels

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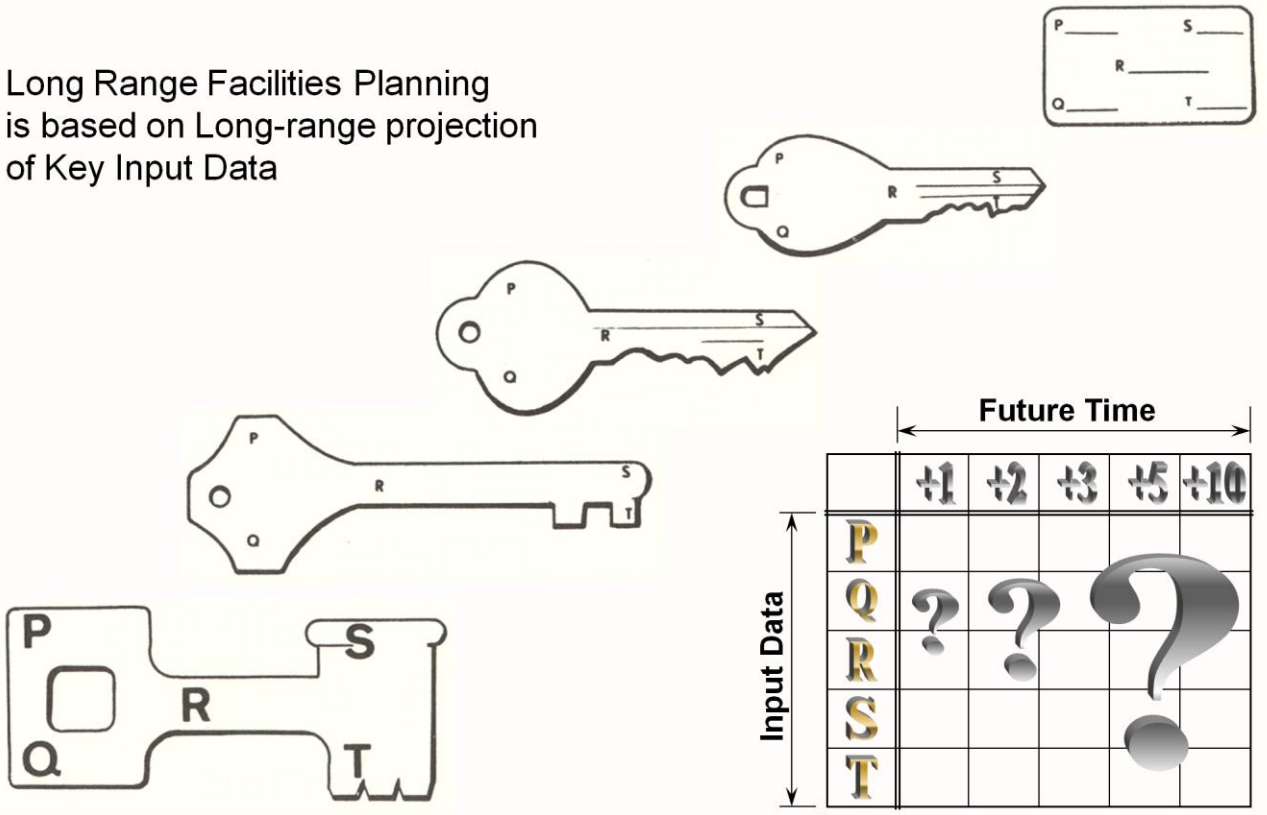
Notes

Main Points

1. Key inputs are always changing and evolving.
2. Projecting key inputs is essential when planning major capital investments with long useful lives.
3. Projecting key inputs requires a seat at the table where business strategies and plans are made.
4. Since long-range projections and access to business strategy are often sensitive, be prepared to educate senior management on your need to know.

Projecting Key Input Data

Long Range Facilities Planning
is based on Long-range projection
of Key Input Data



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Notes

Main Points

1. The Forecast Summary is a compact way to summarize long-range thinking and plans for the five key inputs.
2. The completed Forecast Summary should be reviewed and confirmed by top management. It should be consistent with stated or published business plans.
3. Several pages may be required to record all relevant information.
4. It is generally helpful to summarize the recent past and the present as points of reference for statements about the future.
5. The Forecast Summary for each site or facility should be updated annually or when significant changes are made in business plans or supply chain strategies.

Forecast Summary

FORECAST SUMMARY

- ■ Product Charatcteristics - P
- ■ Sales - Production Quantities - Q
- ■ Process/Routing Changes - R
- ☐ Supporting Services/Utilities - S
- ☐ Time/Timing Changes - T

Entries this sheet cover: P-Q-R

Plant: Dollar Days, Inc. Project: L-R DC Plan
By: RH, AK With: LH, KS
Date: 8 Aug. Sheet: 1 of 2

	-5 years	Today	+1 year	+3 years	+5 years
Product Lines & Mix	8 lines; 3000 SKUs Majors: paper products; soda/water/grocery; Soap & detergent; health & beauty.	10 lines; 5000 SKUs New major: health & beauty. Added: seasonal & toys. More profitable items.	No change in lines. Add 700 SKUs; drop 300.	No change in lines. More SKUs and SKU turnover. Add/drop 1,000 per year; 7,000 total SKUs.	No change.
Order Types & Mix	Will Call 20%; 25 lines Add On 10% 2 - 5 lines Store Delivery 70% 25 - 250 lines/order	No change.	No change.	Will Call and Add On less than 20%.	Will Call and Add On less than 15%.
Order Volumes	Annual growth rate 15% 50,000 orders	10% 90,000 orders	10% 100,000 orders	10% 120,000 orders	7% 130,000 orders
Inventory Levels	5 weeks' supply Some large close-out and overstock buys on short notice.	4 weeks' supply, but more items from China in large receipts. Seasonals in single large buy.	No change.	No change.	Target 3 weeks' supply.
Receipts	240 pallet per day. 5 Truckloads, 3 Container loads, mostly small deliveries from local suppliers.	405 pallets per day. 10 Truckloads, 5 Container loads, 25 Bobtails & pups, 20 Small cargo vans/day	450 pallets per day.	500 pallets per day.	640 pallets per day. 14 Truckloads, 10 Container loads, 40 Bobtails & pups, 32 Small cargo vans/day
Picking Methods	Pick to pallet jack from decked shelving and floor stack. Heavy lines on bottom of pallet.	Pick to pallet transporter.	Pick to pallet transporter from flow rack on bottom tiers of pallet rack.	Possible use of stock picker to pick from upper tiers of rack (Too many SKUs for floor only).	Will call from flow rack to pallet. Delivery orders to conveyor and sort by destination then item size & weight.
Storage & Handling Methods	Reserve floor storage. Pallet rack for active picking and forward reserve. Sit-down forklifts.	Narrow-aisle, stand-up trucks. Pallet transporters for order picking.	No change.	No change.	Separate Will Call from Delivery picking. Delivery picking to conveyor instead of pallet transporters.

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Notes

Here's What I Know

Question	Which Answer Is (Most) Correct	Got It
1. Which of these is *not* a Key Input to Systematic Layout Planning (SLP)?	A. P-Products B. Q-Quantities C. R-Relationships D. S-Supporting Services E. T-Timing	
2. With respect to Products (or materials) being picked and stored in the layout, the planner should understand:	A. Physical characteristics: Sizes, shapes, weights conditions… B. Quantities to be picked (*flow* rate) and stored (inventory *level*). C. Both A and B.	
3. Routings (process or sequence of operations) should be visualized as charts or diagrams.	A. True. B. False.	
4. To fully understand a process we must also know how each operation will be performed and the equipment to be used.	A. True. B. False.	
5. Work Simplification is a procedure and set of questions used to challenge and improve an intended process before layout planning begins.	A. True. B. False.	

Here's What I Know

Question	Which Answer Is (Most) Correct	Got It
6. If we have not yet decided how an operation will be performed or the equipment to be used, our project is one of "methods planning."	A. True. B. False.	
7. We can plan a layout with confidence before deciding our methods and equipment.	A. True. B. False.	
8. Which methods are likely to have the *most* impact on facility layout.	A. Order picking and storage B. Material handling to and from pick and store	
9. If material-storage groups are diverse in P & Q, their methods (R) are likely to differ.	A. True. B. False.	

Here's What I Know

Question	Which Answer Is (Most) Correct	Got It
10. Supporting services for process and personnel are key inputs because	A. They create layout relationships other than flow. B. They have space requirements that may be significant. C. Both A and B.	
11. T-Timing is a key input because:	A. Activities in the layout may have different hours or periods of operation with resulting needs for buffer space. B. Capacity and floor space may be affected by hours and days of operation. C. Peak periods and seasonality may influence flow rates and floor space. D. All of the above.	
12. When the layout must last for several years or longer, planners should make projections of the Key Inputs to detect any changes that may affect the layout.	A. True. B. False.	