Storage & Inventory Control

Storage and Inventory Control include the activities related to holding material and the processes of counting and transacting the material as it moved through the warehouse. Best practice attributes for the following process groups are covered:

- Location Management and Review
- Product Data and Special Requirements
- Inventory Control System
- Transaction Processing
- Cycle Count
- Inventory Strategy

Location Management & Review

Companies need to match the layout of storage areas with the basic operation of the warehouse. The layout of a warehouse that supports an adjoining manufacturing facility will have different requirements than a facility supporting product distribution or a facility that supports end-user fulfillment. Some operations place emphasis on replenishment, others on product picking or order fulfillment.

Regardless of the mission of the warehouse, best practice companies have designed storage systems to meet the needs of the current and planned mix of storage types. They have **optimized storage locations and layouts** to fit product without the need to restack or re-palletize it once received. Best practice companies have excellent cube fill rates.

In addition to optimizing fill rates, storage locations should **minimize travel time**. If a product is in high demand, it should be placed close to its next point of use. In this case, demand should be based on the number of times the product is require—not on the number of units required. The difficulty of retrieval should also be considered in travel time: higher demand product should be placed on the most easily-accessed storage space, typically floor level for racking and between waist and shoulder level in pick racks (golden zone).

Not all companies have the requirement to track product by lot or serial number, but if required, best practice companies have integrated that capability into their warehouse and shipping processes and use the system of record to manage the lot and serial number data.

Most companies put a lot of effort into the initial layout of the warehouse; however, industry surveys will tell you that as many as half the companies do not have an ongoing process in place to review their layouts. Many only look at layouts when prompted by a major change in volume, a large shift in efficiency or some other event.

Reviewing how storage areas are configured and having processes in place to reconfigure storage areas as product mix changes is critical to maintaining high levels of space utilization and efficiency. Making continuous small adjustments to racks, shelving or other storage equipment can have a great impact on space utilization.

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Product Data & Special Requirements

All warehousing software runs on data; therefore, product and storage location data must be kept current and accurate. Product data should include all characteristics including cube data and lot/serial number information. Special requirements should also be noted in the system so that product can be directed to special storage areas.

Special storage areas may segregate items with odor transfer, fire risk or those that require temperature control. High-value product might require caged and/or controlled access storage. Best practice companies maintain all information on a single system of record and keep it current and accurate.

Inventory Control System

It's often said that inventory is money; and that you should keep track of inventory as you would money. The activities and technology to maintain inventory accuracy are typically referred to as **inventory control**. The basics of effective inventory control programs are:

- **Processes and Procedures:** Well-documented and defined processes are the foundation of inventory control. Processes should detail specific tasks and requirements. The procedures should be the only way inventory is managed and transactions processed.
- **Training:** Employees need to have a complete understanding of procedures and expectations.
- **Compliance:** Address any non-compliance issues quickly. Documented processes should be the only acceptable way.
- **Cycle Counts:** Perform counts to determine both inventory accuracy and to identify problem areas that need to be addressed.
- **Inventory Metrics:** Measure the accuracy of inventory activity and transactions to minimum standards. Use measurements to drive process improvements.
- **Employees:** Control employee turnover in positions that perform inventory transactions. New employees are much more likely to make mistakes. Also address poorly-performing employees. If re-training is not helping an employee, you need to remove him or her from positions that impact inventory accuracy.
- **Storage:** Crowded, unorganized and improperly or poorly-marked storage areas subject product to damage and are prone to inventory transaction errors. Inventory control benefits from good housekeeping and warehouse organization.
- **System:** The process of controlling and managing inventory is made easier by having a single system of record. Transactions should flow seamlessly between Order Management, Warehouse Management, Transportation Management and Financial Management Systems.
- **The Right Company Mindset:** Just like customer service, safety or quality, inventory accuracy must be seen as every employee's responsibility, not just the responsibility of those who perform inventory transactions. All levels of the organization should promote it and support it.

Best practice companies follow the basics and ensure systems are in place to support inventory accuracy.

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Transaction Processing

Accurate and timely inventory balances are required to meet customer satisfaction goals. Personnel and lift trucks should be outfitted with portable RF devices that allow employees to perform transactions as product is moved. Using barcode and RFID tags helps to improve transaction accuracy and reduce keystroke errors. Best practice companies use a single system of record and perform transactions in real time.

Cycle Count

Cycle counting is an inventory accuracy audit technique, in which inventory is counted on a cyclic schedule rather than once a year. Most effective cycle counting systems require the counting of a certain number of items every workday with each item counted at a prescribed frequency. The key purpose of cycle counting is to identify items with on-hand quantity errors, thus triggering research, identification, and elimination of the cause. Benefits to a cycle count program include:

- Improvement to ongoing inventory accuracy
- Resolution of invitatory discrepancies and the problems that caused them
- Reduction of the need for physical inventory counts
- Improvements in operational efficiency: when you are continuously counting, the warehouse must be well organized and employees become more attuned to both physical inventory control and to inventory accuracy in the system
- Facilitates continuous improvement programs, stock reduction programs, excess and obsolete monitoring programs and identification of damaged or spoiled stock
- Improved customer service through more accurate order commitments

The real power of cycle count is in identifying problems and resolving the root cause so that the errors do not occur in the first place. Put processes in place to drive accuracy at the front end, train personnel, have documented procedures, use barcodes to help validate product, and motivate employees to be accurate.

Cycle counting should be continuous and system generated. Commonly, companies use an **ABC analysis** to prioritize counting. To determine the ABC classification, the number of units sold (the velocity) is multiplied by the unit cost, and then the material is ranked from highest to lowest. Typically the top 70% of the value makes up the “A” class, the middle 20% make up the “B” class and the bottom 10% makes up the “C” class; however, this will vary from company to company. Some companies may also assign a “D” class to obsolete or very slow moving inventory or expensed inventory.

Based on the 80/20 rule, the “A” parts make up the majority of the inventory value but a minority of the number of parts in inventory. Most companies adjust the ABC groupings so that the “A” parts can be counted at least once per month, “B” parts once a quarter and “C” parts at least once per year. When a company is using storage locations, the cycle count process should record the total part count as well as the location count accuracy. RF transactions should also support the cycle count process.

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Inventory Strategy

Best practice companies use vendor managed inventory (VMI) and supplier stocking programs that are system supported. VMI is the practice of holding suppliers responsible for determining order size and delivery timing, usually based on inventory data. In vendor stocking programs, the supplier is asked to deliver product to a specific stocking or pick location. The supplier is required to replenish only material used from the location or to an established stocking level. The goal of these programs is to increase inventory turns and reduce stockouts.

Systems and processes should also support **just-in-time** (JIT) and **Kanban-based replenishment processes**. JIT is an inventory reduction strategy that feeds production lines and pick-areas with products delivered when they are needed ("just in time"). Developed by the auto industry, it refers to shipping goods in smaller, more frequent lots. Kanban, as it refers to replenishment, is an inventory process where standard container or lot sizes are used.

Companies should have an aggressive program to manage excess and obsolete inventory. Slow-moving, obsolete and excess inventory that fills warehouse space is costing the company money. When assessing the impact of this inventory, consider the cost of the inventory AND all related costs, including warehouse space (cube) cost, insurance costs, inventory taxes, as well as the cost of maintaining (moving, counting and re-shelving) the inventory.

There are indirect costs too, obsolete inventory takes up what could be productive warehouse space and impacts a company's return on assets performance. Looking at this class of inventory as a percentage of the total inventory value may be sobering. Many experts have found that 25%, and as much as 45%, of a company's inventory value including carrying costs fall into this category. Best practice companies understand the financial implications of holding non-productive inventory and have processes and strategies to minimize its impact.

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STEP 1. Process Benchmarks for Storage & Inventory Control

Review this chart and consider your processes as they relate to the listed attributes. You may want to check or highlight the description that sounds most like your operation.

Storage and Inventory Control – Process Benchmarks					
Process Group	**Poor Practice**	**Inadequate Practice**	**Common Practice**	**Good Practice**	**Best Practice**
Location Management and Review	No WMS to control location and rotation. No process for serial number tracking Poor cube fill rates, cube fill not tracked Review of locations for sizing and access is not completed regularly	Storage locations do not consider SKU volume No capability to track serial number and lots Poor cube fill rates Storage locations are not regularly reviewed for proper sizing	High volume SKUs may be grouped together Capability to track serial number and lots, may be standalone system Average cube fill rates Storage locations are reviewed annually to assure best access and proper sizing	Storage locations for high-volume SKUs are contiguous, and FIFO rules assure proper lot control Systemized capability to track serial number and lots Good cube Fill rates Storage locations are reviewed regularly to ensure best access and proper sizing	Storage systems designed well for current mix of storage types and needs Capability in WMS system to track serial number and lots, integrated into warehouse and shipping processes Excellent cube fill rates Storage locations are reviewed regularly to ensure best access and proper sizing
Product Data and Special Requirements	No product cube data available on system No process to segregate products with special requirements	No product cube data available on system Inconsistent manual process to segregate items with odor transfer, fire risk or requiring temperature control No controlled access areas	Basic product cube data available but not held on system Manual process or standalone data base, to segregate items with odor transfer, fire risk or requiring temperature control Caged and controlled access available for high value items	Product cube data and basic product data, available, held on system System supported process to segregate items with odor transfer, fire risk or requiring temperature control, items are stored in special areas Caged and controlled access for all high value items	System includes all product data characteristics including cube data & lot/serial numbers System driven process to segregate items with odor transfer, fire risk or requiring temperature control, items are stored in special areas Caged and controlled access for all high value items

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Storage and Inventory Control – Process Benchmarks					
Process Group	**Poor Practice**	**Inadequate Practice**	**Common Practice**	**Good Practice**	**Best Practice**
Inventory Control System	Multiple systems used to manage warehouse and inventory Multiple systems that must be manually reconciled	WMS operated manually to control location and rotation. Inventory control system manually reconciled or batch interface Multiple systems that must be reconciled	Standalone systems. WMS, inventory control managed across multiple systems that must be reconciled Multiple systems that are reconciled through system integration	WMS integrated or interfaces with ERP system, inventory control reconciled by system interface Single system of record	Order Management to WMS to Transportation Management Systems integration Single system of record
Transaction Processing	Manual or paper transactions Transactions may require data entry into multiple systems Inconsistent transaction processing	Manual data entry Transactions batch processed	Some RF-based inventory transactions Transactions may be batch updated	RF-based truck mounted and portable, inventory transactions Transactions in near real time	RF-based truck mounted and portable, inventory transactions Transactions in real time
Cycle Count	No cycle count program	Inadequate manual cycle count program in place	Manual cycle count program in place Cycle count process only records count variance	System generated cycle count program Cycle count process records total count and location count accuracy Cycle count process is supported by RF transactions	Continuous system generated cycle count program in place Cycle count process records total count and location count accuracy Cycle count process is supported by RF transactions
Inventory Strategy	JIT and Kanban processes not used Poor excess and obsolete processes	No or limited JIT and Kanban processes used to support replenishment No vendor managed inventory VMI) programs Excess and obsolete inventory not managed or tracked well	Processes support JIT and Kanban replenishment programs Limited VIM programs in place Excess and obsolete managed and tracked well	System and processes support JIT and Kanban replenishment programs VMI may be used for some products Programs in place to manage excess and obsolete inventory	System and processes support JIT, Kanban replenishment VMI and supplier stocking programs are used and are system supported Aggressive programs to manage excess and obsolete inventory

Supply Chain Visions- *Best Practice Process Attributes and Benchmarks*
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STEP 2. Assessment for Storage & Inventory Control

Directions: Rank your processes against the Storage & Inventory Control Benchmarks in STEP 1. Use this chart to check which column best represents your process groups. In some cases, you may find that you fall between rankings and you can add 0.5 to the lower rank. Once each process is assessed, total the values for the group.

Storage and Inventory Control – Self-Assessment					
	Poor Practice	**Inadequate Practice**	**Common Practice**	**Good Practice**	**Best Practice**
Rank	**1**	**2**	**3**	**4**	**5**
Location Management and Review					
Product Data and Special Requirements					
Inventory Control System					
Transaction Processing					
Cycle Count					
Inventory Strategy					
Self Assessment Score Total					

STEP 3. Ranking Ranges for Storage & Inventory Control

Directions: Use this table to compare your self-assessment score TOTAL to the Storage and Inventory Control section score rankings listed here.

Storage and Inventory Control - Ranking					
	Poor Practice	**Inadequate Practice**	**Common Practice**	**Good Practice**	**Best Practice**
Section Score Rankings	**6**	**12**	**18**	**24**	**30**

Our self-assessment score TOTAL of _____ means that we rank as
❒ *poor* ❒ *inadequate* ❒ *common* ❒ *good* ❒ *best practice* in this area.

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STEP 4. Key Performance Metrics for Storage & Inventory Control

The table below provides quantitative benchmark data on a selected number of KPIs relevant to Storage and Inventory Control. Each KPI is scaled from *Major Opportunity* to *Best in Class*. The values provided are from a recent WERC Benchmarking Study.

Storage and Inventory Control – Key Performance Metrics (KPI)

KPI	Poor Practice	Inadequate Practice	Common Practice	Good Practice	Best Practice
	Major Opportunity	*Disadvantage*	*Average*	*Advantage*	*Best in Class*
Average warehouse capacity used	<78%	>=78% and <85%	>=85% to <87%	>=87% and <95%	>=95%
Peak warehouse capacity used	<90%	>=90% and <95%	>=95% to <98%	>=98% and <100%	>=100%
Inventory count accuracy	<95.6%	>=95.6% and <98.4%	>=98.4% and <99.3%	>=99.3% and <99.9%	>=99.9%
Days raw material on hand	>=86	>=38.8 and <86	>=25 and <38.8	>=14.8 and <25	>14.8
Days of finished goods inventory on hand	>=90	>=51 and <90	>=30 and <51	>=14 and <30	>14
Inventory shrinkage as a percent of total inventory	>=1.25	>=0.544 and <1.25	>=0.074 and <0.544	>=0.0043 and <0.074	>0.0043
Lost sales (% SKUs Stocked Out)	>=5%	>=3% and <5%	>=1.08% and <3%	>=0.14% and <1.08%	>=0.14%

KPI Definitions

KPI	Definition	Calculation
Average warehouse capacity used	The average amount of warehouse capacity used over a specific amount of time (month to month or yearly).	average capacity used / average capacity available
Peak warehouse capacity used	The amount of warehouse capacity used during designated peak seasons.	peak capacity used / capacity available
Inventory count accuracy	Measures the accuracy (by location and units) the physical inventory compared to logical inventory: If the warehouse system indicates that 10 units of part number xyz are in location 29, inventory count accuracy indicates how frequently one can go to such a location and find that the physical count matches the system count	absolute value of the sum of the variance between physical inventory and perpetual inventory (by location and by units)
Days raw material on hand	The number productive days before raw material supply are consumed.	gross raw material inventory / (value of transfers / 365 days)
Days of finished goods inventory on hand	The number of days of finished goods inventory on hand. Measures the volume of finished goods inventory needed to support your business. Lower is better - pending service levels are being met.	average daily balance of inventory / average rate of "sales" or use for past 3 months in units per day
Inventory shrinkage as a percent of total inventory	The amount of breakage, pilferage, and deterioration of all inventories relative to total inventory. Usually stated in terms of value; not unit	sum (value of breakage, pilferage, deterioration to all inventory) / total value of all inventory
Loss Sales (% SKUs Stocked Out)	An important risk indicator: what percent of sales were lost due to stockouts.	$ sales that were lost (i.e. they did not become backorders) / total sales

WERC Benchmarking Study 2007
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Case Study: Consider Cycle Counting to Improve Inventory Processes and Procedures

*WERCSheet June 2006, f*rom "Taking on the Responsibility of Inventory Management"

If the warehouse doesn't yet have a cycle counting program, William F. Latham, president, Leading Principles for Dynamic Management, Sumner, WA, urges that one be started so that the warehouse management team can begin to identify and improve inventory processes and procedures.

There are four primary activities in cycle counting: counting, reconciliation, problem research, and problem correction. While all four are necessary and each requires some type of cost, which one will ultimately improve the business?

For the answer, consider a person in your receiving area who has difficulty counting. If your cycle counting initiative only included counting, and you only corrected the record, nothing has changed. The operator is still introducing wrong counts into the system. Even if you counted the part, reconciled the records, and made some minor adjustment, the problem still isn't corrected.

However, if you do some research to locate the source of the problem, yet do not attempt to institute a change in the receiving process or personnel, errors will still occur as the source of error remains. It's only when you go through the entire process and take action by correcting what's "broken" in the receiving area that you improve the process and business.

That's not to say that, upon investigation, the operator in receiving did anything wrong. In fact, other error-causing reasons that might have been uncovered can range from incorrect data on the packing slips to a broken counting scale. But once the root cause is identified and repaired, the process should be corrected.

There are several benefits to a cycle counting program, one of which is a definite improvement in inventory accuracy. Another not so obvious benefit is that, typically, large quantities of safety stock are specified to mitigate against problems related to the original inventory levels. "Once the problems are eliminated and you have accurate data, you can then take down a significant amount of that safety stock investment, which will result in a tremendous reduction in your carrying costs as well" Latham explains.

As a case in point, he tells of a distributor who was engaged in an industry and product where even though process improvements might be made, no appreciable market share gains were made. Nevertheless, the distributor implemented a cycle counting process, and even though no market share increase was realized, the organization was able to maintain the same level of customer service, but with a 50% less inventory requirement. Once the distributor got the processes under control it found that it also didn't need as much safety stock as before.

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