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EXECUTIVE GUIDE

Best Practices in Achieving Consistent, Accurate Physical Counts of Inventory and Related Property

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Preface

Creating an effective and cost-efficient government has long been a public expectation. Achieving this goal will require federal agencies to produce useful, reliable, and timely information that can be used daily by the Congress, federal managers, and other decisionmakers. Inventory is one of the major areas in the federal government where useful, reliable, and prompt data are still generally not available.

To provide a framework and guide that federal managers can use to improve the accuracy and reliability of the government's inventory and related property data, we studied the inventory count processes and procedures of seven leading-edge private sector companies to identify the key factors and practices they use to achieve accurate and reliable physical counts. Physical counts of inventory are only one aspect of inventory control that contribute to accurate and reliable inventory records. This Executive Guide, while intended to assist federal agencies in achieving the objectives of the Chief Financial Officers (CFO) Act of 1990 and subsequent related legislation, is also applicable to any governmental and nongovernmental entity holding inventory or property and equipment. This Executive Guide describes the fundamental practices and procedures used in the private sector to achieve consistent and accurate physical counts. It summarizes the fundamental principles that have been successfully implemented by companies recognized for their outstanding record of inventory management.[1] Also, it explains and describes leading practices from which the federal government may be able to draw lessons and ideas. This guide applies to most forms of federal inventory, but certain of the discussed practices may not be applicable to various types of bulk, natural resource, and nonturning inventories, such as the Department of Energy's strategic petroleum reserve. Many of the concepts and controls for conducting physical counts discussed in this guide could also be applied to property, plant, and equipment, an area in which many federal agencies also face data reliability challenges.

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[1] See Appendix II, Objectives, Scope, and Methodology.

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Background

Accurate and reliable data are essential to an efficient and effective operating environment in the private sector as well as in the federal government. Inventory represents a significant portion of assets in the federal government and private sector. Therefore, managers and other decisionmakers need to know how much inventory there is and where it is located in order to make effective budgeting, operating, and financial decisions and to create a government that works better and costs less.

In the 1990s, the Congress passed the Chief Financial Officers Act of 1990 and subsequent related legislation, the Government Management Reform Act of 1994, the Government Performance and Results Act of 1993, and the Federal Financial Management Improvement Act of 1996. The intent of these acts is to (1) improve financial management, (2) promote accountability and reduce costs, and (3) emphasize results-oriented management. For the government's major departments and agencies, these laws (1) established chief financial officer positions, (2) required annual audited financial statements, and (3) set expectations for agencies to develop and deploy modern financial management systems, produce sound cost and operating performance information, and design results-oriented reports on the government's financial position by integrating budget, accounting, and program information. Federal departments and agencies work hard to address the requirements of these laws but are challenged to provide useful, reliable, and timely inventory data, which is still not available for daily management needs.

Managing the acquisition, production, storage, and distribution of inventory is critical to controlling cost, operational efficiency, and mission readiness. Proper inventory accountability requires that detailed records of produced or acquired inventory be maintained, and that this inventory be properly reported in the entity's financial management records and reports. For example, detailed asset records are necessary to help provide for the physical accountability of inventory and the efficiency and effectiveness of operations. Additionally, the cost of inventory items should be charged to operations during the period in which they are used. Physical controls and accountability reduce the risk of (1) undetected theft and loss, (2) unexpected shortages of critical items, and (3) unnecessary purchases of items already on hand. These controls improve visibility and accountability over the inventory, which help ensure continuation of operations, increased productivity, and improved storage and control of excess or obsolete stock.

Producing and maintaining accurate inventory data is a multifaceted issue. The ability to accurately count physical inventories is only one factor that must be considered in improving the reliability of inventory records. The ability to accurately count physical inventories is critical in verifying that inventory actually exists and that on-hand balances agree with financial and logistical records. This Executive Guide is intended to assist federal agencies and other governmental and nongovernmental entities in establishing and implementing inventory counting procedures that will contribute to the accuracy and reliability of inventory data.

In the private sector, the term inventory generally refers to items of property that are (1) held for sale as finished goods, (2) in the process of being produced or assembled for sale (i.e., work in process), or (3) raw materials and supplies used in producing goods, offering services, and accomplishing operational missions. The practices discussed in this guide are based on private sector inventories that are comparable in type, activity, and volume to inventories in the federal government, as listed in the following table.

Examples of Inventory Types Common to the Private Sector and the Federal Government
• Aircraft engines and turbines • Aircraft repair parts • Nuts and bolts • Electronics • Industrial tapes, adhesives, textiles, and fabrics • Medical supplies, equipment, and cosmetics • Office products • Packaging • Refrigerators, dishwashers, ovens • Sparkplugs, oil filters, fuels, and oils • Hydrofluoric acid, dyes, and gases • Insecticides and chemicals • Vehicle assembly parts • Aviation and vehicle electronic components and infrared devices

At the beginning of fiscal year 2001 the federal government reported $185 billion in inventory and related property consisting of a variety of finished goods, work in process, stockpile materials, commodities, seized and forfeited property, and other operating materials and supplies.

GAO and other auditors have repeatedly found that the federal government lacks complete and reliable information for reported inventory and other property and equipment, and can not determine that all assets are reported, verify the existence of inventory, or substantiate the amount of reported inventory and property. These longstanding problems with visibility and accountability are a major impediment to the federal government achieving the goals of legislation for financial reporting and accountability. Further, the lack of reliable information impairs the government's ability to (1) know the quantity, location, condition, and value of assets it owns, (2) safeguard its assets from physical deterioration, theft, loss, or mismanagement, (3) prevent unnecessary storage and maintenance costs or purchase of assets already on hand, and (4) determine the full costs of government programs that use these assets. Consequently, the risk is high that the Congress, managers of federal agencies, and other decisionmakers are not receiving accurate information for making informed decisions about future funding, oversight of federal programs involving inventory, and operational readiness.

An improved physical count process is only one of many corrective actions that will be required to resolve all of these deficiencies. Although conducting a physical inventory, comparing the count results to recorded quantities, researching differences, and determining and posting an accurate adjustment to the on-hand balance seems like a fairly simple, straight forward exercise, in reality it is not. There are many factors that can cause the record of on-hand inventory to differ from the physical quantity counted, including omission of items from the count, incorrect counts, errors in cutoff, and improper recording or reconciliation of count results.

This Executive Guide presents processes and controls used by private sector companies recognized as excelling in their ability to manage inventory and achieve consistent and accurate counts of physical inventories. Federal agencies effectively implementing these practices can resolve significant weaknesses in the federal government's property and inventory accountability and financial reporting by improving the accuracy of data being used for budgeting, financial, and logistical and operational management decision-making purposes. The practices presented are widely adaptable to a variety of inventory types, volumes, and dollar values. Management should determine the extent to which the practices are applied based on their assessment of the objectives of the count, characteristics of the inventory, capabilities of the inventory system, effectiveness of the system of internal controls, and availability of the organization's resources. The conceptual issues discussed in this guide are focused on inventory and related property, and under certain circumstances may be applied to property, plant, and equipment. Appendix IV lists other related publications that provide further guidance and information on related topics of financial management, human capital management, and system controls and requirements.

Identification and Characteristics of Leading-edge Companies

To help improve the accuracy and reliability of the federal government's inventory and related property data, we studied seven companies having leading-edge inventory count process and procedures to identify the key factors and practices in achieving consistent and accurate physical counts. The seven companies we studied were recognized by leading professional service experts, consultants, and academic and business/trade publications as having best practices in inventory management. For more information on the criteria we used to select these companies, see appendix II.

Leading-edge Companies

Boeing
Daimler Chrysler
DuPont
FedEx
General Electric
Honeywell
3M

Some of the seven leading-edge companies used more than one counting approach and allowed us to review their practices and processes at more than one operating location. A total of 12 separate locations (from the seven companies) were reviewed.

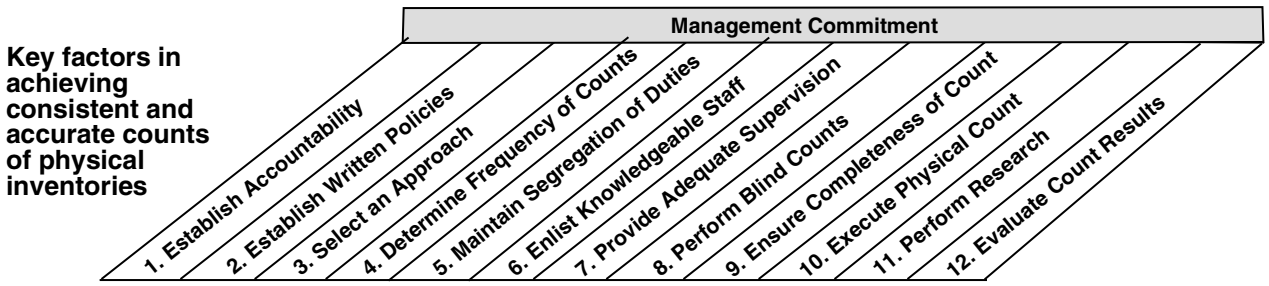
All 12 locations used one or both of the two primary approaches to counting inventory—cycle counting, in which a portion of the inventory is counted either daily, weekly, or monthly until the entire inventory has been counted over a period of time, and wall to wall counting, in which the entire inventory is counted at a point in time. Further discussion of these approaches may be found on page 20, key factor 3. In just one location, and for only a very small portion of its inventory, was sampling (in which merely a portion rather than the whole of the inventory was subject to count) used as a counting approach. At this location, a progressive approach was used where the location started with wall to wall and then moved to cycle counting once there was a proven track record of high accuracy and then moved to sampling. A location was only allowed to implement sampling after management had proven a strong control environment evidenced by multiple years of highly accurate cycle counts in which management could be assured of an accurate system. Once the location had moved to cycle counts or sampling, the high accuracy rates had to be maintained or the location was required to return to a wall to wall approach. However, because sampling was not predominately used by this or the other leading-edge

companies, the key factors contained in this report are discussed as they relate to cycle and wall to wall methodologies.

This Executive Guide discusses common characteristics and practices used by leading-edge companies to ensure that the development, execution, completion, and evaluation of a physical count of their inventories provides management with useful, reliable, and timely information for decision making and financial reporting. Specifically, we have identified 12 key factors common to these leading-edge companies—regardless of the inventory count methodology or combination of practices they used—which collectively ensure consistent and accurate count results. In addition, this guide presents comparative summaries of the goals, practices, and results of certain key factors, and provides case studies of leading-edge companies.

Key Factors in Achieving Consistent and Accurate Counts of Physical Inventories

The 12 key factors, presented in the following table are essential to leading-edge companies achieving consistent and accurate counts of physical inventories. Overarching all of these factors is top management's commitment to an environment that promotes sound inventory control.



The inventory count process is an integral component of an organization's internal control environment and management's commitment is critical to establishing effective and reliable internal controls. We observed management's commitment at every leading-edge company where attitude and leadership had created unique corporate cultures. A disciplined and structured culture, which fosters integrity, corporate values, and commitment to competence, begins with top management and is seeded throughout the organization at all levels of staff and supervisory personnel. Characteristics of strong management commitment include:

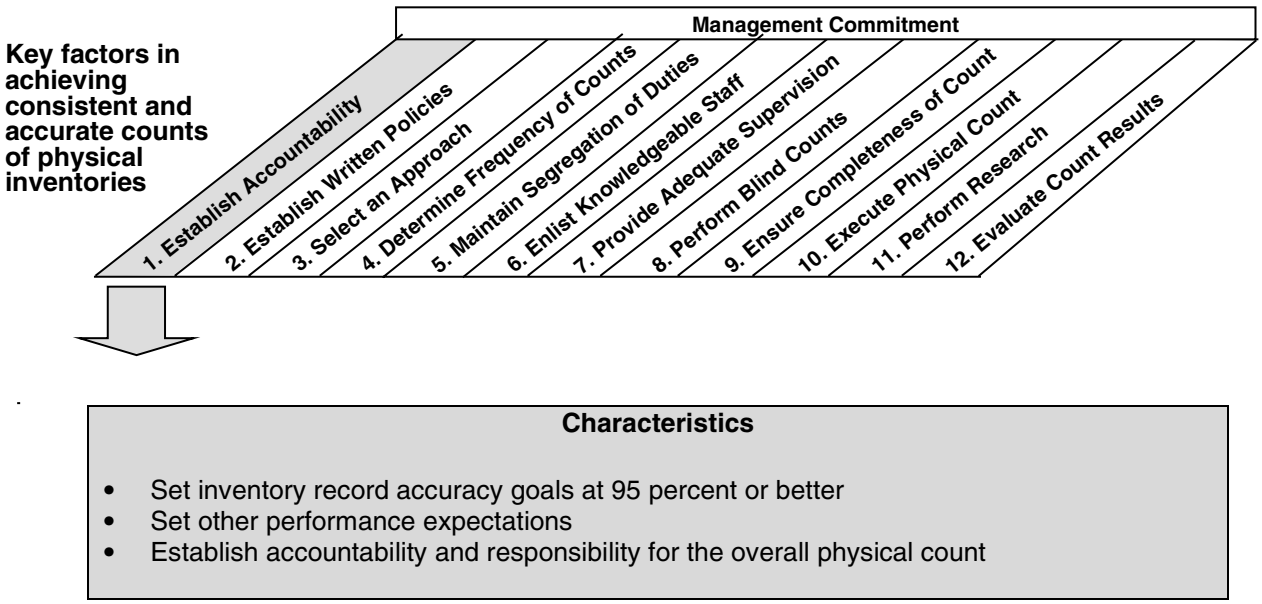
Top management advocates change and empowers employees to make changes.
Performance measures are aligned with corporate goals.
Technology and systems are invested in and realize a return.
Human capital is developed and retained.
Goals and results are communicated.

These characteristics were not just words in the mission statements of the leading-edge companies, but were in fact tools and practices employed by each of the companies to strategically manage change to enhance quality and profitability. In fact, few, if any, business practices remain static, including inventory count procedures. Senior representatives of each of the leading-edge companies discussed the need for and drive to improve cycle times, reduce costs, and reduce capital requirements by systematically reviewing their operations and processes. All seven leading-edge companies used fundamental methodologies to review their

practices: three were active participants in Six Sigma[2] and five developed other internal initiatives, including participative management improvement groups, benchmarking of practices to industry standards, and "accelerated work groups" to develop, test, and implement process improvements. As a result, the 12 key factors are an accumulation of continuously improved practices and controls for counting inventory and related property.

[2] Six Sigma and *Breakthrough Strategy* are copywritten methods of Six Sigma Academy to provide companies the tactics and tools for rapid, total business transformation.

Key Factor 1: Establish Accountability



One of the key factors in developing and implementing an accurate physical count process is to establish accountability. Establishing accountability for the inventory physical count process requires setting performance goals and holding the appropriate level of personnel responsible for the overall physical inventory process.

Performance Goals

Performance goals establish targets for achieving management's objectives and contribute to the overall mission of the organization. Leading-edge companies set performance goals for the physical count process either through the establishment of inventory record accuracy goals (i.e., to measure the degree to which the physical on-hand balance agrees with inventory records), or other measurable, results-oriented performance expectations.

Setting high goals for inventory record accuracy rates is one way of establishing accountability for the physical inventory count. High goals "stretch" the organization and personnel to perform inventory counts with increasingly superior precision. Experts agree that inventory record accuracy goals should be set at 95 percent or higher.[3] Six of the eight leading-edge locations performing cycle counts set performance goals by establishing inventory record accuracy goals that ranged from 95 percent to 98 percent.

[3] Brooks and Wilson, p. 22.

The other two locations performing cycle counts and all four locations performing wall to wall counts did not establish inventory record accuracy goals, but instead established other measurable performance expectations. Other performance expectations, as set forth by management, can also be used to establish high levels of accountability and measure the results of the physical count without explicitly setting inventory record accuracy goals. These other performance expectations measure aspects of the count, such as adjustments and the number of accurate counts. Targets for these other performance expectations are established by management and are typically based on impact to operations, including financial significance, effect on production or services, and compliance with policies and procedures. The four leading-edge locations performing wall to wall physical counts and the two cycle count locations that were not setting goals for inventory record accuracy established accountability through other performance expectations, such as dollar value and quantity of adjustments and number of accurate counts. For example, one leading-edge location set an expectation that net adjustments resulting from the count would not exceed 2 percent of the dollar value of the items counted.

Additionally, many of these expectations were also used by the locations that set goals for inventory record accuracy. Table 1 illustrates the range of performance goals and expectations used by the 12 leading-edge locations in establishing accountability.

Table 1: Performance Goals Used

Performance goals	Cycle count locations								Wall to wall count locations			
	1	2	3	4	5	6	7	8	9	10	11	12
Inventory record accuracy goals	98%	95%	98%	98%	95%	98%	a	a	a	a	a	a
Other goals												
Dollar value of adjustments	●	●	●	●		●	●	●	●	●	●	●
Quantity of adjustments	●		●	●	●		●					
Number of accurate counts	●		●	●								

Note: ● Indicates applicability to the 12 locations studied from the 7 companies selected.
a These locations did not establish inventory record accuracy goals.

Level of Accountability

Holding the appropriate level of management responsible and answerable for the overall inventory process establishes accountability for the physical inventory and is essential to achieving consistently accurate counts. Accountability within an organization should exist from the top of the organization to the lowest level. However, primary responsibility for the overall physical inventory counts should be specifically designated and assigned. Accountability for achieving performance goals should be established in job descriptions and expectations and

enforced through periodic performance evaluations and a reward system that measures the achievement of performance goals.

Direct accountability for the overall physical inventory count process was established by the leading-edge companies at the level responsible for managing the physical count process. The person or persons at this level were typically supervisors or managers of an inventory group that performed all counts and research, or a materials area supervisor/manager responsible for the inventory within his/her area. These individuals had specific responsibility for (1) planning the count, (2) organizing the count teams, (3) reviewing counts, (4) reviewing research, and (5) approving adjustments within established tolerances. The accountable person(s) were held responsible for achieving the company's performance goals, including inventory record accuracy, through personnel performance expectations and evaluations, which affected bonus and pay decisions.

Case Study

One of the leading-edge locations, a 700,000 square foot distribution facility, used a separate inventory group that performed all physical counts and researched all variances. The group consisted of a supervisor, inventory group leads, and counters/researchers. The supervisor of the inventory group was responsible for the overall physical count process, including organizing and supervising the count, performing research, reviewing and approving adjustments, and evaluating the results of the counts. The company had established accountability and responsibility for the overall physical count with the inventory group supervisor and the inventory shipping and receiving supervisor was responsible and accountable for receiving, storing, and shipping the inventory. These two supervisors were collectively held accountable for achieving the company's established inventory record accuracy goal of 98 percent based on an accurate physical count and the accuracy of the inventory records. This goal was included as part of the supervisors' expectations and evaluations and was used as a tool in determining merit raises and bonuses.

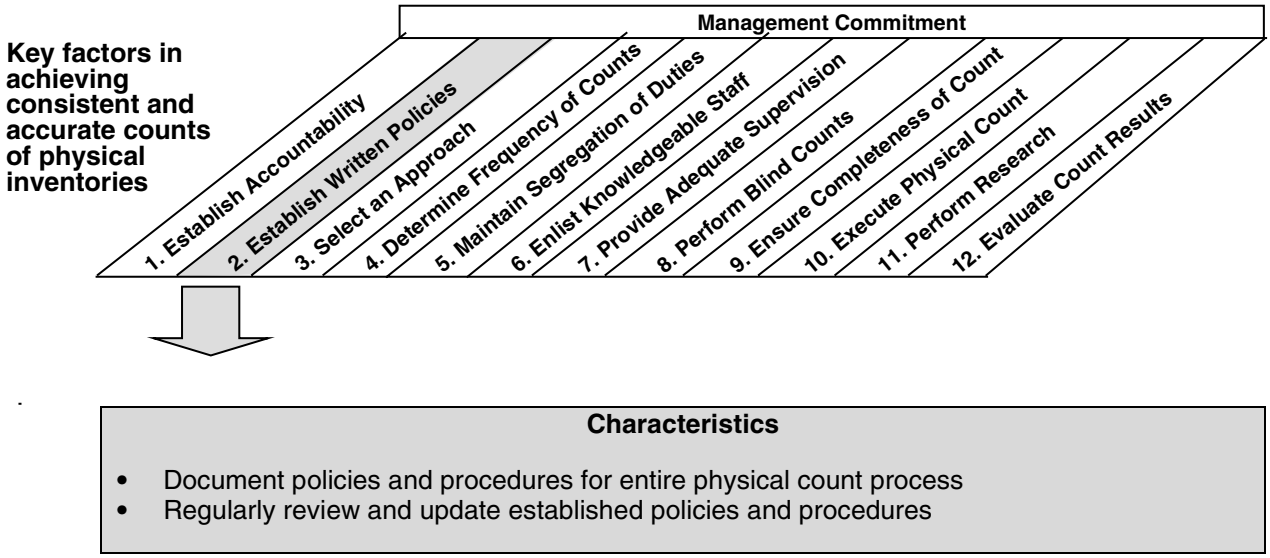
In addition to holding appropriate management levels responsible and answerable for the quality of the inventory count process, leading-edge companies often push accountability to the floor-level personnel performing the count. Personnel performing the count were held accountable for performing an accurate physical count of the inventory items, but not the accuracy of the count agreeing to the inventory records. For example, when a subsequent recount (discussed in key factor 10) revealed an error in the first count results, one leading-edge location used this information as an indicator that the first count team may have performed an inaccurate physical count, indicating the need for additional training.

Strategies to Consider

To establish accountability for the physical count process, senior executives could consider the following:

- Establish performance goals for the physical count that are aligned with the organization's mission, strategic goals, and objectives.
- Establish high measurement goals and continuously assess the organization's progress in achieving and maintaining those goals.
- Identify the line of authority and responsibility from top management to the level of the organization responsible for accomplishing a consistent, accurate physical count of inventory and related property.
- Develop employee/supervisor performance measurement systems to hold appropriate personnel accountable for achieving the organization's performance goals.

Key Factor 2: Establish Written Policies



Establishing and documenting policies and procedures are essential to an effective and reliable physical count. Policies and procedures demonstrate management's commitment to the inventory physical count process and provide to all personnel clear communication and comprehensive instructions and guidelines for the count. Establishing written policies and procedures helps ensure consistent and accurate compliance and application needed to achieve high levels of integrity and accuracy in the physical count process. Policies and procedures also become the basis for training and informing employees.

Well-documented physical count policies and procedures typically pertain to all aspects of the physical count process, including the activities or tasks that take place before, during, and after the physical count. Documented policies and procedures generally include everything an employee needs to know to complete the requirements of a specific task for the physical count.

Leading-edge locations established written policies and procedures addressing their physical inventory process. These policies and procedures include all aspects of the physical count including objectives of the count, types and timing of counts, instructions for counting and recording, and researching and adjusting variances. The policies and procedures at the leading-edge locations were written in sufficient yet succinct detail to explain the specific procedures and tasks to be performed. A table of contents from one leading-edge location's written policies and procedures manual, presented in figure 1, demonstrates the breadth of the location's policies and procedures. Detailed written, specific instructions on all the tasks involved in the physical count process were included within each of its sections.

Figure 1: Excerpt from A Leading-Edge Company's Policies and Procedures Manual

I. Why
A. Objective of the Physical Inventory Process
II. Planning
A. Inventory Methods
B. Record Definitions
C. Timing of Inventory
D. Review of Inventory Procedures
E. Physical Location Preparation
F. Cutoff Data Arrangements
G. Use of Specialists
H. Planning Meetings
III. Observing/Taking
A. Segregation of Duties
B. Forms
C. Recording Information
D. Inventory Movement During Taking
E. Obsolete, Damaged, and Slow-Moving Items
F. Inventories in Off-Site Locations
G. Preliminary Inventories
H. Review and Accountability
I. Bar Coding System
IV. Reconciliation
A. Summarization
B. Reconciliation
C. Timing and Approval of Adjustments
D. Recording of Inventory Adjustments
V. Computer Access and Security
A. System Security
B. Segregation of Duties
C. Processing Controls
D. Disaster Recovery
E. Documentation
F. Master File Changes
VI. Special Situations
A. Consigned Stock, Company Owned
B. Consigned Stock, Vendor Owned
C. Theft Sensitivity
D. Returnable Items
E. Special Materials
VII. Frequency
A. Inventory Type
B. Period
Appendix A Cycle Counts
A. Inventory Classification
B. Inventory Count Process
C. Inventory Accuracy
D. Inventory Tolerance
E. Cycle Count Inventory Adjustments
F. Management Reporting
G. Certification
H. Definitions
I. Checklist

Once policies and procedures have been established and documented, they must be regularly reviewed and updated. Policies and procedures that are regularly reviewed and revised to reflect changes in the process and tasks of the physical count reinforce management's commitment. Up-to-date policies and procedures provide a reliable and credible resource to employees, encourage compliance with management's directions, and form the basis for a reliable physical count process.

All the leading-edge locations regularly reviewed and updated their policies and procedures. The majority of the locations reviewed and revised their policies every 1 to 2 years, while others revised their policies any time there was a change in the process or specific tasks of the physical count.

Strategies to Consider

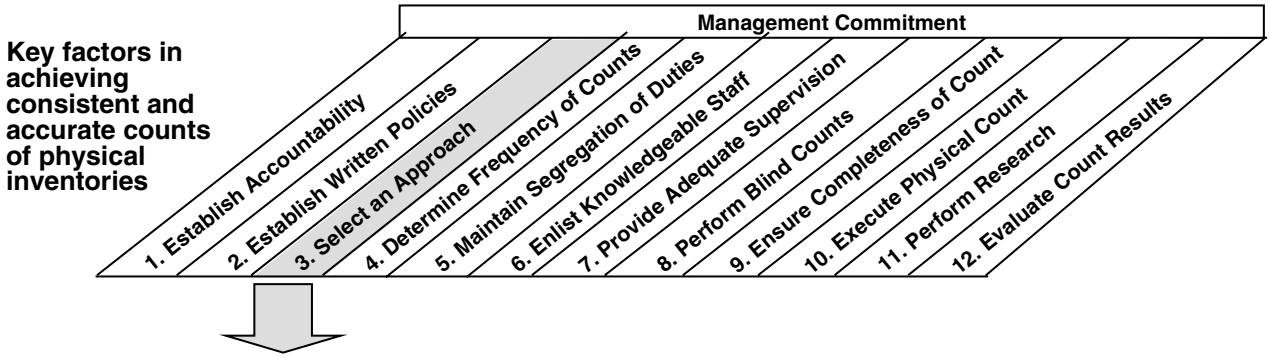
To establish effective written policies and procedures for the physical count process, senior executives should consider the following:

- Develop broad policies affecting inventories that are designed to attain management's goals.

- Develop written procedures for all aspects of the physical count processes, including
  - defining the current process and the individual tasks associated with the process and
  - procedures for and examples of filing and completing required paper work.

- Regularly review and revise policies and procedures for changes in the process and individual tasks.

Key Factor 3: Select an Approach



Characteristics

- Cycle counting supports operational and financial needs of the organization
- A wall to wall physical count supports financial reporting at a point in time
- In selecting the best physical count approach management should consider
  1) the objective or purpose of the count and the timing issues involved,
  2) the capabilities of the inventory system,
  3) the existing control environment over the inventory system and processes, and
  4) the characteristics of the inventory

The process of counting physical inventory is an essential control for operational efficiency and financial reporting. A physical count, when properly executed, verifies the existence of physical assets and the completeness and accuracy of records. Accurate inventory records are key to management's confidence in financial and other information used in decisionmaking.

The two predominant approaches used by the leading-edge companies to physically count inventory are cycle counting and wall to wall. Each approach offers distinct advantages and serves some purposes better than others. As a result, organizations may choose to use only one approach or a combination of approaches.

Cycle counting is a method by which a portion of the inventory is counted either daily, weekly, or monthly until the entire inventory has been counted over a period of time. Cycle counting serves two purposes: (1) it supports the reliability of the on-hand inventory quantities used in management decisions and financial reporting and (2) it normally results in increased operational efficiency. Cycle counts are used as a control mechanism to reduce the risk that the inventory process and systems are functioning incorrectly.

In the *wall to wall* approach the entire inventory is counted at a point in time, usually as of the end of an annual or interim period. This method is primarily used for financial reporting purposes in order to validate the amount of reported inventory.

Determining which approach or combination of approaches is the most appropriate for an organization is a key management decision. When selecting an approach, management should consider the objective and timing of the count, capabilities of the inventory system, the existing control environment, and the characteristics of the inventory.

The type of count performed is determined by management based on the reason for the count. Physical counts can be used to establish a balance on or as of a certain date for financial reporting, to monitor the accuracy of records in an inventory system, and to ensure that the proper inventory is available for operational needs. In determining the objective of the count, management should consider the time and resources available or needed to conduct and complete the count. We found that cycle counts were used to ensure that the balances in the inventory system were continuously correct for management decisions and financial reporting and to determine that recorded items were present to meet operational needs for production or distribution. We found that wall to wall counts were primarily used to establish a balance on or as of a certain date for financial reporting. In one instance, the wall to wall approach was used monthly to monitor the inventory system and meet operational needs.

Another primary consideration is the capability of the inventory system. There are two general types of inventory systems-perpetual and periodic. A perpetual inventory system maintains current item balances by recording receipts and shipments. In contrast, a periodic inventory system tracks receipts and shipments in a purchases account, and infrequently updates item balances. For cycle counting, a perpetual system is needed to provide current balances for reconciliation of the system and physical count quantities. We found that all of the leading-edge companies had perpetual inventory systems. Additionally, we found that five of the seven leading-edge companies used a perpetual inventory system with locator capability, commonly referred to as a locator system, which identifies the specific physical location of each individual item in inventory.

The existing control environment over the inventory system and related processes is also a consideration in selecting the type of count to conduct. Internal controls over the inventory system and processes should be effective in providing reliable information for conducting the physical count. Controls must exist to provide reasonable assurance that all transactions affecting the inventory balances are properly executed and recorded in the inventory system. Unless this is the case, balances in the inventory system do not provide a reasonable basis to compare to the physical count quantities. Inventory record accuracy rates, based on results of prior counts, may be an indicator of the strength of the control environment. A pattern of low accuracy rates or known control weaknesses may suggest that (1) the recorded balances in the inventory system are not reliable for conducting cycle counts and (2) a wall to wall count may be more appropriate to reestablish accurate inventory balances.

Characteristics of the inventory should be considered in selecting an approach. Management should consider if there are identifiable and distinct segments of the inventory that may lend themselves better to cycle counting, wall to wall counting, or a combination of both. Identification of distinct segments should include considerations of the size, dollar value, turnover, criticality to operations, and susceptibility to misappropriation, including theft, of the inventory.

All of the leading-edge companies use cycle counting or wall to wall or both to count inventory. A majority of these companies used the cycle count approach. However, some companies used a combination of wall to wall and cycle for separate identifiable segments of their inventory. Three companies varied their approach for separate segments of their inventory based on either the type of material (raw material, work in process, or finished goods), or by a division's or location's operations (distribution, warehousing, and manufacturing). For example, one company conducted wall to wall counts until such time as the accuracy of the balances was sufficient to support cycle counting. Another leading-edge company conducted cycle counts on work in process materials that were critical to operations and conducted monthly wall to wall counts on finished products that were a material portion of the plant's inventory and were subject to strong logistical and process controls.

Case Study

One leading-edge company had approximately 80 different facilities within the United States and manufactured and distributed a wide range of products from small units to large reels and bundles. This company used a combination of cycle counting and wall to wall counts based on the existing control environment and historical accuracy rates at its facilities. Facilities were allowed to move to cycle counting once the location had completed a wall to wall annual physical count and had demonstrated the ability to perform cycle counts by maintaining record accuracy rates above 95 percent and good inventory process controls for receiving, manufacturing, moving, and shipping of items. The facility also had to demonstrate adequate training procedures, processes, and a good system that would support cycle counts before a cycle count program would be approved. The facility would begin by cycling through its entire inventory four times per year. As the facility demonstrated its ability to maintain accurate inventory records by achieving high record accuracy rates and reliable systems and processes, it could reduce the number of cycles down to one per year. However, the reduction from four cycles to one cycle per year took approximately 6 years. Additionally, if the facility's inventory record accuracy fell below 95 percent it was required to submit a corrective action plan to address the causes of the low accuracy and conduct an annual wall to wall physical count, in addition to the regular cycle counts, until a 95 percent accuracy rate was once again achieved and maintained.

Strategies to Consider

To select a physical inventory counting approach, senior executives should consider the following:

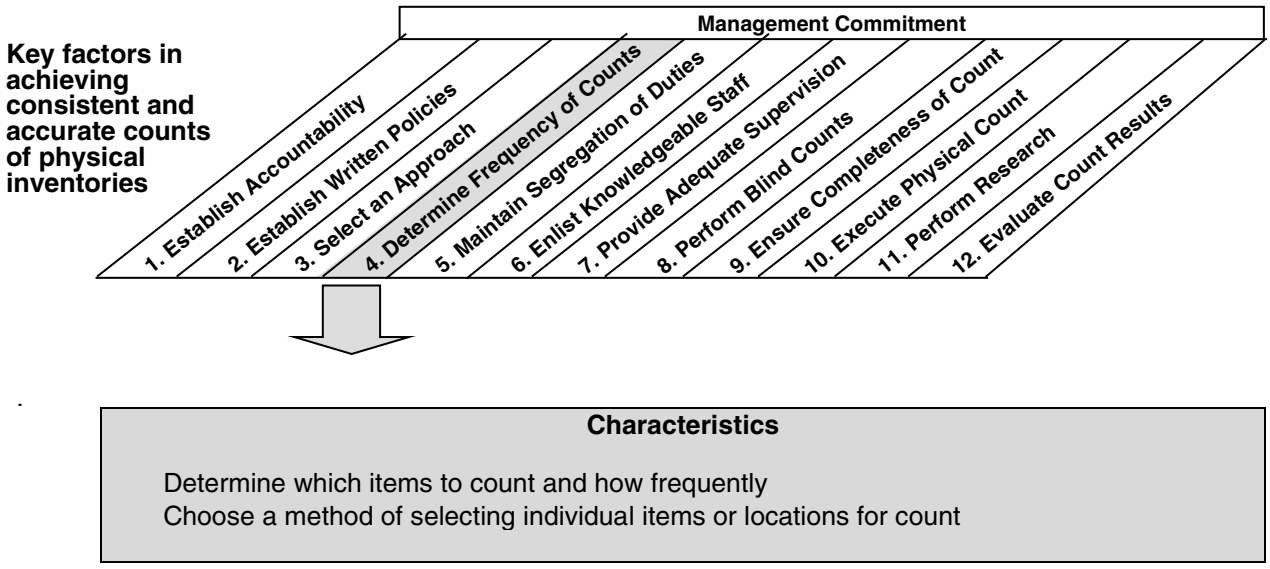
- Determine the objectives of performing the physical count
  - to establish a balance as of a specific date for financial reporting,
  - to monitor the accuracy of the inventory records for financial reporting and management decisions,
  - to ensure the availability of inventory to meet operational needs including mission readiness,
  - to identify excess or obsolete inventory.

- Assess the resources and timing needed to conduct the count.

- Evaluate the capability of the inventory system to
  - maintain item balances on a current or periodic basis, and
  - maintain balances by item location.

- Evaluate the existing control environment over the inventory system and processes
  - to ensure transactions are properly executed and recorded in the inventory system,
  - to determine that the inventory system provides a reasonable basis for comparison to the physical count, and
  - by considering existing or historical accuracy rates to support the assessment.

Key Factor 4: Determine Frequency of Counts



Counting an appropriate amount of the total inventory at a point in time or over a period of time with regular frequency helps to provide accurate inventory records for operational decisions and financial reporting. Management should count an appropriate amount of the total inventory by determining the desired frequency of counts and selecting a method of choosing individual items or locations to count.

Frequency of Counts

In order to count an appropriate amount of the total inventory, management must decide which inventory items to count and how frequently those items should be counted. The most desirable goal would be to count all of the inventory items at least once a year. However, maintaining accurate inventory records by counting items takes time and costs money. Since there are typically limits on these resources, the best way to balance control of the inventory and cost of the count is to focus on the items determined to be more important or of higher risk to the organization. Accordingly, it is not always practical to give the same treatment to each item; it may be desirable to segment the inventory into identifiable classes and assess the risk for each segment or class to determine the frequency of counts. For instance, management may determine that items critical to the production process, resulting in a high risk to the organization, should be counted every day, week, or month. In other instances, a segment of inventory that has little or no movement and does not represent a significant portion of the inventory, and thus has low risk, may be counted less frequently. The purpose of classifying items into groups or segments is to establish an appropriate degree of control over each item. Management should exert the highest degree of control (frequent counts) on the most important items, and the least control on less important items. Management may determine that there are

many degrees of control and importance depending upon the organization's needs and inventory characteristics. Management should consider the dollar amount, criticality to operations, and susceptibility to theft or fraud when segmenting the inventory and determining the frequency of counts for each segment.

Leading-edge locations used a variety of frequencies for various segments of their inventory. Locations performing cycle counts segmented their inventory by dollar value, activity or turnover, sensitivity or criticality, historical accuracy rates, or a combination of these elements in determining how often they would count. The frequency ranged from segments that were not counted at all, or less than once a year, to segments that were counted daily, monthly, quarterly, semi-annually, or annually, as shown in table 2. Locations that segmented their inventory by dollar value counted higher dollar value items more frequently than lower value items. In other instances, locations used a combination of dollar value and activity or turnover of items to segment their inventory, in which the higher dollar items by activity were counted more frequently, usually four times per year, than those that had low dollar value by activity, which were counted once a year. On the other hand, we found that locations performing wall to wall physical counts typically counted their entire inventory at least once a year at a point in time. However, we did note that one location performed a wall to wall physical inventory on one segment of its inventory every month, due to the dollar value significance of these items to the company's total inventory. Table 2 illustrates the frequency of counts for separate inventory segments at the 12 leading-edge locations.

Table 2: Frequency of Counts by Inventory Segments

Frequencies	Cycle counts locations								Wall to wall count locations			
	1	2	3	4	5	6	7	8	9	10	11	12
More than 4 times per year				●	●		●					●
3-4 times per year		●	●	●				●				
2-3 times per year		●						●				
1-2 times per year	●	●	●			●		●	●	●	●	
Less than once a year	●						●					

Note: ● Indicates applicability to the 12 locations studied from the 7 companies selected. For example location 1 segments its inventory by dollar value and counts one segment with items over $250 once per year and another segment with items less than $250 less than once a year.

Case Study

One leading-edge location (location 8 in table 2), manufacturing over 11 million electronic components each year, segmented its work in process inventory and varied the frequency of counts for each segment in order to achieve greater coverage of the material segments of the inventory. The work in process inventory was segmented based on the dollar value multiplied by activity or turnover, and placed in one of four separate segments. Segment A represented those items that were in the top 10 percent, segment B were items in the next 20 percent, segment C were items in the next 30 percent, and segment D was the remaining 40 percent. Each segment was counted with either greater or lesser frequency to achieve more coverage of the higher dollar activity items and less coverage of the lower dollar activity items each year. Segment A was counted four times, segment B was counted three times, segment C was counted two times, and segment D was counted once per year.

Method of Selecting Items

Once management has determined which items to count and how frequently, a method of choosing individual items or locations must be determined. The method should ensure that all items within the identified segments are chosen to achieve the desired frequency and an accurate count. Leading-edge locations used various methods to select items for count within an identified inventory segment. The most common method among leading-edge locations performing cycle counts was to select items sequentially by rows or geographic area within the warehouse or plant and work their way through the facility over a period of time. For example, one of the leading-edge locations divided its warehouse into geographic areas (shipping, receiving, and warehouse rows) and then selected an area to count each day.

Other methods used by the leading-edge locations to select individual items or locations for count included a random selection, weighted selection toward higher dollar volume or value items, and selection based on management's discretion. One of the leading-edge locations used a random method by which the inventory system tracked which items had been counted and which items still needed to be counted in order to ensure that all items were counted each year. The inventory supervisor manually entered how many items to select for count each month, and the inventory system randomly selected the desired number of items from those not counted. In another instance, one of the leading-edge locations selected the top 25 items by dollar value each day from a list of items that had not been counted. Locations performing wall to wall physical counts counted all inventory at a point in time by splitting the warehouse or facility into geographic areas and assigning count teams to each area to ensure that all inventory was counted.

Strategies to Consider

To determine the frequency of the physical counts, senior executives should consider the following:

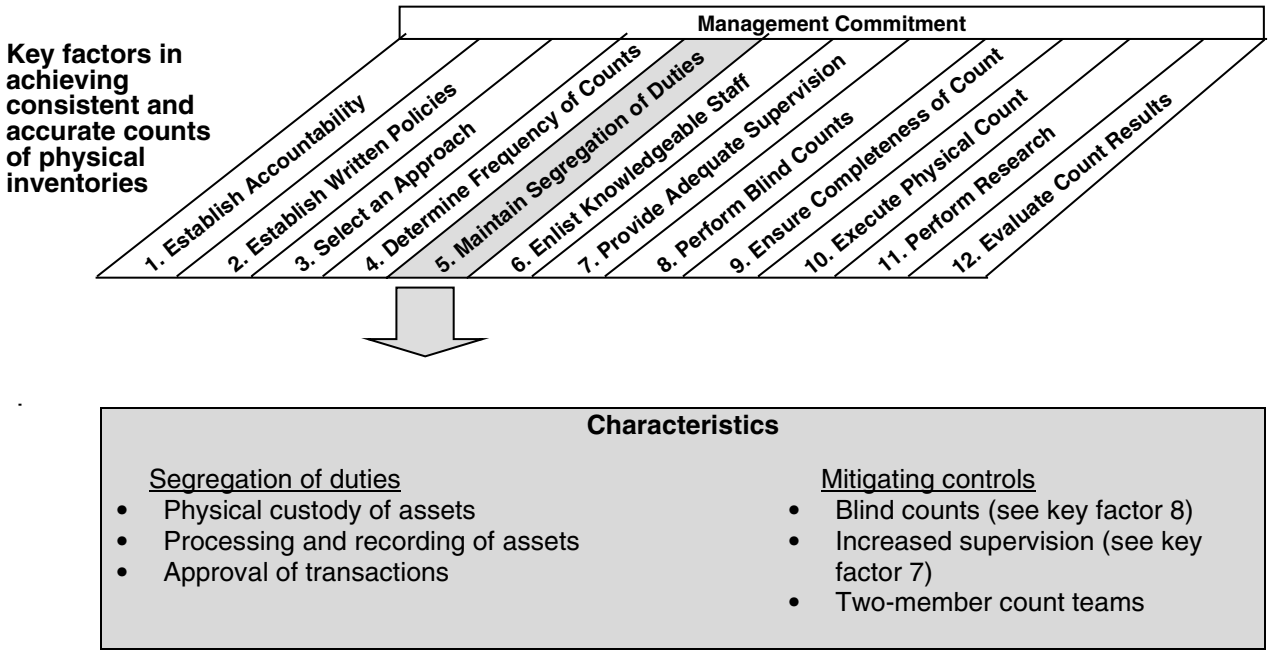
- Assess the resources and timing needed to conduct the count.

- Identify segments or classes of the inventory and assess each segments risk to determine the degree of control needed based on
  - activity or turnover,
  - dollar value,
  - sensitive or classified items,
  - items critical to production or mission readiness, and
  - items susceptible to misappropriation, including theft.

- Select a frequency to count each segment based on the assessed risk and degree of control needed such as
  - daily,
  - weekly,
  - monthly,
  - semi-annually, or
  - annually.

- Determine a method of selecting individual items for count such as
  - sequentially by row or area within the warehouse or facility,
  - random selection, or
  - weighted selection towards higher dollar, higher activity items.

Key Factor 5: Maintain Segregation of Duties



Segregation of duties, a commonly used and widely accepted internal control and business practice, entails dividing or segregating key duties and responsibilities among different people. Implemented effectively, this type of control reduces risk of error and fraud so that no single individual can adversely affect the accuracy and integrity of the count.

The key areas of segregation are (1) physical custody of assets, (2) processing and recording of transactions, and (3) approval of transactions. Ideally personnel performing any one of the above functions would not also have responsibilities in either of the other two functions. Thus, where practical, adequate segregation of duties for the physical count process includes using personnel who do not have overlapping responsibilities in (1) custody or access to the inventory items for count, (2) recording transactions resulting from the count, and (3) authority for approving adjustments resulting from the count. In situations where segregation of duties is not practical or cost-effective, other controls should be employed to mitigate the recognized risk. Such mitigating control procedures include blind counts (meaning that the counter does not know how many items are supposed to be there before or during the count process), increased supervision, and applying dual control by having activities performed by two or more people.

Physical Custody of Assets

To best accomplish segregation of duties, the normal job activities of the person performing the physical count should not include custodial activities such as receiving, shipping, and storing physical assets. We found that the strongest control employed by leading-edge locations was to

exclude those with asset custody from the counting activity. Five out of the eight leading-edge locations performing cycle counts accomplished segregation of duties by using a separate inventory group of dedicated counters with no other warehouse responsibilities to perform the physical count. The other three locations use warehouse personnel with normal warehouse responsibilities, such as shipping, receiving, and storing, to perform the count. These three locations implemented mitigating controls to reduce the risk of using warehouse personnel by performing counts in which the counters did not have knowledge of or access to the on-hand quantity. This is referred to as a blind count.

The leading-edge locations performing wall to wall physical counts used warehouse personnel or a combination of warehouse and nonwarehouse personnel to perform the physical count. This is normal procedure for companies performing wall to wall inventories, since it is usually an enormous task to count the entire inventory in a short time, such as a weekend. All four of these locations had implemented mitigating or dual controls to ensure proper counts and to reduce the risk caused by the lack of segregation of duties. These mitigating and dual controls included (1) performing blind counts, (2) increasing supervision, and (3) using two-member count teams.

Table 3: Segregation of Duties

	Cycle count locations								Wall to wall count locations			
	1	2	3	4	5	6	7	8	9	10	11	12
Personnel performing counts												
Inventory group of dedicated counters not having custodial duties	●	●		●			●	●				
Warehouse personnel having custodial duties			●[a]		●	●			●	●	●	●
Mitigating controls												
Blind counts			●	●	●	●	●	●	●	●	●	●
Increased supervision									●	●	●	●
Two member count teams									●	●	●	●

Note: ● Indicates applicability to the 12 locations studied from the 7 companies selected.

[a] This location used warehouse personnel to perform 1st and 2nd counts and utilized a separate inventory group to perform any necessary 3rd counts and research variances.

Transaction Processing and Recording

Personnel recording transactions that affect the on-hand quantities should not be responsible for the physical custody of the inventory or approval of adjustments. Segregation between the duties of recording transactions that result from the physical count and duties of custody or approval is essential to provide for the integrity of the physical count process. Personnel recording inventory adjustments to the on-hand balances at leading-edge locations did not have custodial responsibilities, such as shipping, receiving, and storing, and did not have to approve significant adjustments to the records.

Approval of Transactions

Personnel approving transactions that affect on-hand inventory balances should not be responsible for the physical custody of the inventory or recording transactions. Leading-edge locations have controls in place to manage and limit who has the authority to approve adjustments resulting from the count. Most locations assigned approval limits to different levels of management. As the dollar-value of the adjustment increased, the approval level moved up the management chain to a higher level of management.

Case Study

One leading-edge location, a distributor of prepackaged parts, accomplished segregation of duties by using a separate inventory group to conduct physical counts of inventory. In assembling this group and assigning responsibilities, management implemented the key areas of segregation, separating the duties of personnel responsible for the custody of the inventory (warehouse personnel), counting the inventory (cycle counters), and posting adjustments to the records (cycle count leads). The inventory group consisted of an inventory control supervisor, six cycle counters and one cycle count lead for the first shift, four cycle counters and one cycle count lead on the second shift, and three cycle counters and one cycle count lead on the third shift. Each counter was responsible for performing approximately 200 inventory item location counts per day and any necessary recounts. Responsibilities of the cycle count leads included preparing daily workload assignments for the counters, posting and monitoring adjustments to the record on-hand balances, and researching variances. The inventory control supervisor along with the leads determined the cause of variances between counted quantities and record on-hand quantities and implemented solutions to rectify underlying problems causing the variances.

Strategies to Consider

To implement and maintain effective segregation of duties in the physical count process, senior executives should consider:

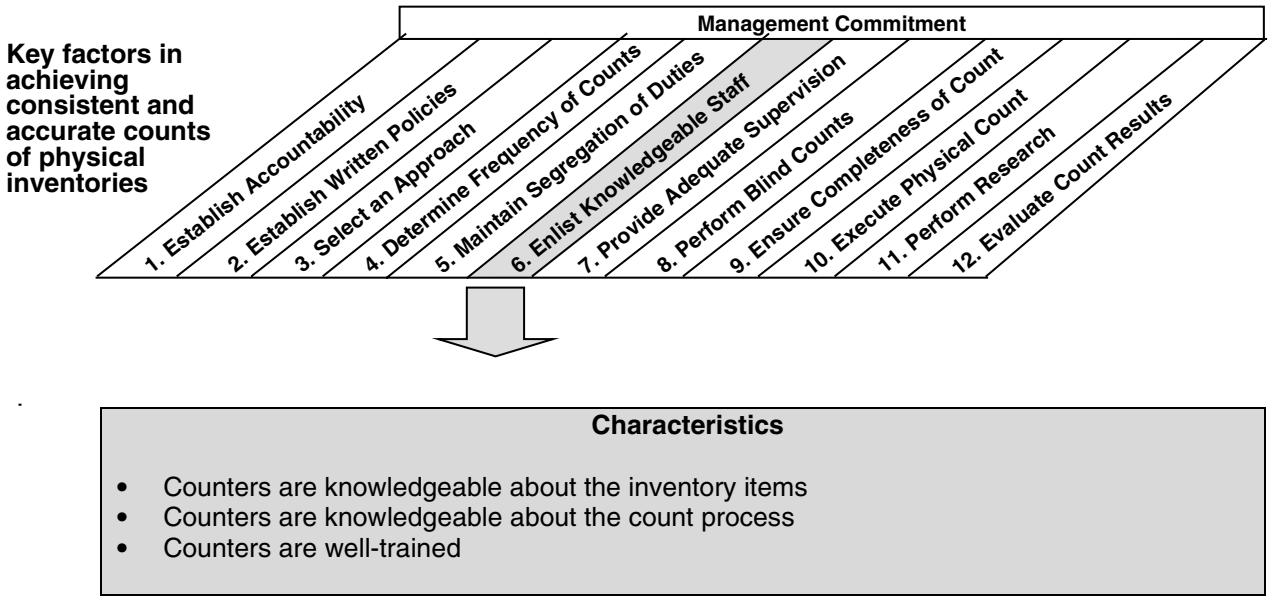
- Determine there are available resources to conduct the count and whether they have the appropriate knowledge and experience of the inventory and counting.

- Analyze the normal job duties of personnel performing the physical count, considering who has responsibility for
  - custody or physical control of the inventory,
  - processing and recording of inventory transactions, and
  - approval of transactions and adjustments.

- Determine whether controls may be impaired if any one person has been given responsibility for more than one activity noted in the previous strategy.

- Perform a risk versus cost analysis of any apparent control risks, and determine whether
  - duties may be reassigned, or
  - mitigating controls can be implemented, or
  - risk is at an acceptable level.

Key Factor 6: Enlist Knowledgeable Staff



Inventory counters who are knowledgeable about the inventory items being counted and the inventory counting procedures are critical to performing effective and accurate physical counts. It is important for inventory counters to be adequately trained; experienced, knowledgeable inventory counters increase the accuracy and efficiency of the physical count. In addition, counters most familiar with the plant layout and daily operations are more likely to conduct the counts quickly and resolve count discrepancies without having to conduct excessive research.

Counters Are Knowledgeable about the Inventory Items

Leading-edge companies normally use in-house personnel—whether a dedicated group or warehouse personnel—who have been chosen expressly because of their prior experience with and knowledge of inventory items. One major advantage of this approach is that experienced warehouse personnel are better able to distinguish between items that look similar but have different technical specifications. They are also more likely to correctly identify the items they are counting and provide accurate item descriptions and count quantities, decreasing the likelihood of needing second or third counts.

Additionally, experienced personnel are more familiar with the layout of plant and warehouse facilities and the movement of items within and between these facilities. They are aware of areas where items may be placed, either intentionally or unintentionally, and thus can more easily locate all the items that should be counted and potentially reduce misstatements in the quantities counted. They are knowledgeable about how items are packaged and stored as well as how items are used in a production line, so they can quickly and accurately count assigned items.

Eleven of the twelve leading-edge locations use personnel who have prior work experience and knowledge about the inventory items being counted. A promotion from the warehouse to the position of cycle counter within a dedicated count team of one organization was one way in which a leading-edge location trained, developed, and retained high-performing counters. Another location, which experienced high turnover and used personnel with varying degrees of experience, enhanced the knowledge of counters by providing on-the-job training and teaming new counters with experienced counters.

Counters Are Knowledgeable about the Count Process

Inventory counters should be knowledgeable about the count process to perform efficient and accurate physical counts. Leading-edge locations performing cycle counts typically use individuals whose sole function is conducting physical inventories. These dedicated counters, often designated as the inventory audit group, usually have considerable experience working in the warehouse before being promoted to an inventory counter position. Cycle counters normally have significant prior inventory experience, are well trained, are dedicated to only counting inventory, and perform counts routinely. Leading-edge locations performing wall to wall counts typically use warehouse personnel to perform the counts using effective mitigating procedures to compensate for the lack of segregation of duties, such as blind counts and two member count teams. Warehouse personnel may be less experienced in the count process because wall to wall counts are often performed only once a year. If personnel with lesser knowledge of the inventory perform the count, then increased supervision, training, and instructions are commonly required. One leading-edge location used administrative or other staff to supplement its count teams, teaming these employees with experienced warehouse inventory personnel.

Count Personnel Are Well-Trained

Training all counters and supervisors involved in the physical count reduces the risk of error in performing the count and communicates a consistent way to perform counts. Counters, supervisors, and individuals involved in research and adjustment of variances in the leading-edge locations all received appropriate training. At leading-edge locations this was typically accomplished through formal classroom training, on-the-job training, or a mix of the two.

The scope of training is generally dependent on the type of counts conducted, wall to wall and/or cycle counts. Leading-edge locations typically train counters on types of inventory, warehouse layout, unit of measure, recording of counts, computer systems, and use of radio frequency devices, if applicable. Leading-edge locations that use a separate inventory group to perform research and/or record adjustments typically provide training on researching variances, posting adjustments, and operating computerized inventory systems.

Case Study

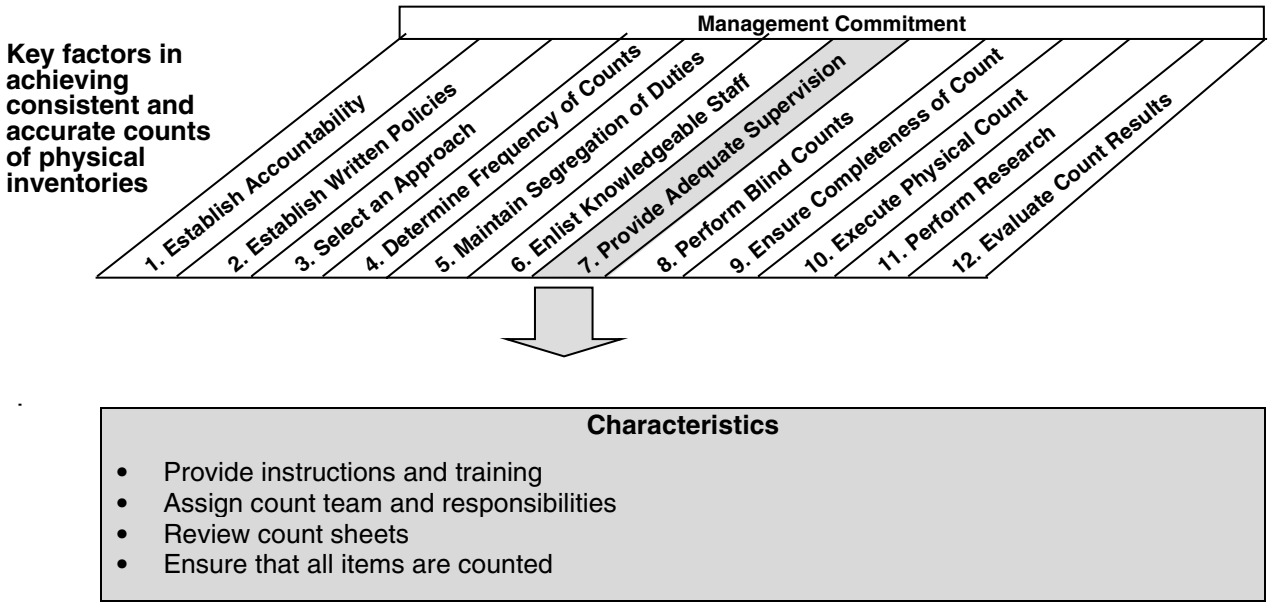
The dedicated inventory counter occupation in the inventory audit group of one leading-edge location is a well-paid, prestigious position. Candidates for this position are selected primarily from warehouse personnel with years of experience and an in-depth knowledge of the inventory items. The inventory audit group's commitment to excellence is such that newly recruited counters receive several weeks of formalized on-the-job training. New counters shadow experienced counters, who supervise hands-on training in specific areas, in accordance with a formal list of tasks and functions. The progress of each new counter is monitored by the group's supervisor and, before being allowed to conduct counts on their own, they must demonstrate mastery of the required tasks and functions. Once the new counter is on his/her own, their work is subject to increased supervisory review, including follow-up test counts by more experienced counters, until the employee meets required performance standards.

Strategies to Consider

To enlist knowledgeable staff in the physical count process, senior executives should consider:

- The amount of resources available to conduct the count.
- Experience and knowledge of the inventory and count process of the count team.
- Frequency of counts or time necessary to complete the count.
- Establishing a separate inventory group of dedicated counters.
- Assigning or promote personnel with prior experience in the warehouse and knowledge of the inventory a counting position.
- Providing on-the-job and classroom training of the count process to counters, supervisors, and personnel researching variances on aspects such as
  - types of inventory,
  - warehouse layout,
  - unit of measure,
  - RF devices,
  - computer system,
  - research (if applicable), and
  - supervision (if applicable).

Key Factor 7: Provide Adequate Supervision



Supervision, a key factor of the count process, includes directing the efforts of personnel and determining that the objectives of the inventory count have been accomplished. Elements of supervision include providing instructions and training, solving problems, and reviewing the work performed. Adequate supervision increases the likelihood of accurate and consistent counts and reduces the overall risk of incorrect or unreliable counts. Supervisor responsibilities include: (1) ensuring that counters are available to count, (2) selecting count team members, (3) assigning count team responsibilities, and (4) ensuring that the count is completed on time. Counters also make sure that needed supplies and equipment, such as count sheets, calculators, tape measures, scales for weighing, and forklifts are available. Supervision includes providing instructions and guidance to counters prior to and during the count and making sure that counters are following instructions. Supervisors also ensure that all inventory items are counted and that counters record counts on count sheets or other control devices.

Supervision can be applied at different levels and degrees depending upon the experience of the inventory counters and other controls that are in place. The level of supervision is typically either direct, on-the-floor supervision during the count, or indirect supervision in which the supervisor is not on the floor during the count, but instead uses controls that are in place to monitor count performance. Increased supervision in the form of direct supervision may be used as a mitigating control in instances where (1) the counts are infrequent, (2) there is a lack of segregation of duties, and/or (3) the counters are less experienced and knowledgeable about the inventory or count process.

The use of direct or indirect supervision at the leading-edge locations was generally dependent upon management's determination of the adequacy of segregation of duties. (See key factor 5.)

All leading-edge locations performing wall to wall physical counts used direct, on-the-floor supervision as one of their controls to reduce the risks discussed above. On the other hand, all leading-edge locations performing cycle counts used indirect supervision, some also using additional control mechanisms to monitor performance.

For example, as discussed in key factor 5, the strongest of controls for segregation of duties, found at five locations, was accomplished by using a separate inventory group of dedicated counters. These separate, dedicated counters were highly specialized and independent of routine inventory responsibilities. Because of their years of experience and knowledge of counting, their performance was not directly monitored by the supervisors. Supervisors monitored the number of counts being performed and the number of variances. They also concentrated on identifying the causes of variances between the counts and recorded on-hand quantities in order to identify solutions to correct the causes of the errors. The remaining three locations performing cycle counts used warehouse personnel to perform cycle counts without direct supervision. These locations reduced their risk of impaired segregation of duties by using personnel who were experienced and knowledgeable about the inventory and count process and by performing blind counts.

Case Study

One leading-edge location, an electronic component manufacturer producing 49,000 units per day with two warehouses totaling over 1 million square feet, performed daily cycle counts on the raw materials used on the production line and performed monthly wall to wall counts on the finished goods. The location used a dedicated inventory group to conduct its daily cycle counts, which included an inventory group supervisor and 14 dedicated counters. These dedicated counters attained their position through prior warehouse experience and as a result, were highly knowledgeable about the inventory and count process. Because of the experience and knowledge of these counters, the inventory group supervisor did not directly supervise the performance of the counts, but instead monitored the cycle counts by reviewing count cards for accuracy and completeness, to ensure that all items were counted.

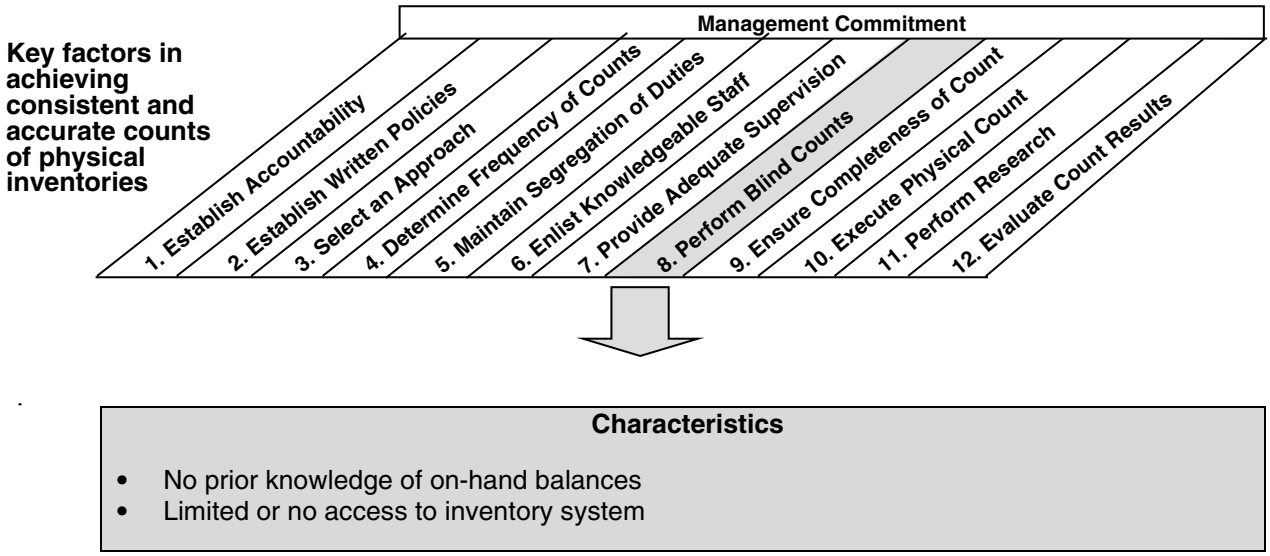
Once a month, the location performed a wall to wall count on its entire inventory of finished goods. The location used the dedicated inventory group that performs cycle counts as well as warehouse employees to conduct the wall to wall count. There were a total of 24 counters and each warehouse person was teamed with one of the dedicated cycle counters. There were three supervisors on the floor during the wall to wall physical count to directly monitor the count to ensure that the count teams were following instructions and that all items were properly and promptly counted. The degree of supervision was significantly increased for the monthly wall to wall counts because of the increase in the number of counters and to mitigate segregation of duties problems due to the use of warehouse personnel as members of the count team.

Strategies to Consider

To provide adequate supervision over the physical count process, senior executives should consider the following:

- The number of resources or teams performing the physical count.
- Frequency of the counts or the time necessary to complete the count.
- Knowledge and experience of the personnel performing the count.
- Whether there is adequate segregation of duties from responsibilities of asset custody.
- The assigned responsibilities of the supervisor such as
  - the availability of count personnel,
  - selection of count team members,
  - assignment of count responsibilities,
  - monitoring of performance, and
  - ensuring counters are following procedure and complete counts in a timely manner.
- Size of the warehouse or area subject to count.
- The number and complexity of items to be counted.
- Other controls that may be in place during the count, such as the performance of blind counts.

Key Factor 8: Perform Blind Counts



A blind count refers to the performance of a physical inventory count without the knowledge of, or access to, the on-hand quantity balance in the inventory records. Counters are provided the part number, description, location, and other information necessary to perform the count but not the item quantity information. Inventory items are counted and compared to the on-hand balance in the inventory records. If the blind count agrees with the record on-hand balance, there is a high level of confidence that both the count and the record on-hand balance are accurate.

Blind counts offer the greatest degree of assurance of accurate and reliable counts. If the record on-hand quantity is provided to the counters, there is a risk that the counters will not actually perform the count. They may visually look at the inventory, conclude that it agrees with the record on-hand quantity, and record the on-hand balance amount as the physical count. The counters may be influenced by the record on-hand quantity provided to them and make assumptions that are incorrect. For example, if there is a box of 20 items and the record on-hand shows the quantity as 1, the counters may be influenced to record the count as 1 instead of recording the correct unit measure count as 20.

We found that blind counts were one of the strongest control measures used at leading-edge locations. Counters did not have access to record quantity during the count at 10 of the 12 leading-edge locations. Specifically, six of the eight locations performing cycle counts and all four of the locations performing wall to wall counts performed blind counts.

An important consideration in deciding whether or not to perform blind counts is the strength of control provided by segregation of duties, as discussed in key factor 5. Counts at all locations performing wall to wall inventory were completed by warehouse personnel having potentially

conflicting custodial duties. However, management at these locations mitigated that increased risk by using blind counts and other controls. Conversely, the two locations performing cycle counts, in which the quantity was provided to the counters before or during the count, used a dedicated count team whose members had no other conflicting custodial duties. Management at these two locations asserted that this approach added to their efficiency by allowing counters the opportunity to solve variances often while they were at the inventory item location. They stressed, however, that the combination of segregated duties along with other control measures, such as maintaining a history of who performed counts by item and location and supervisory review, balanced the increased risk of providing the counters with quantity information.

Table 4: Blind Counts

	Cycle count locations								Wall to wall count locations			
	1	2	3	4	5	6	7	8	9	10	11	12
Blind counts												
Record quantity not accessed during the count			●	●	●	●	●	●	●	●	●	●
Personnel performing counts												
Inventory group of dedicated counters not having custodial duties	●	●		●			●	●				
Warehouse personnel having custodial duties count			●		●	●			●	●	●	●

Note: ● Indicates applicability to the 12 locations studied from the 7 companies selected.

Case Study

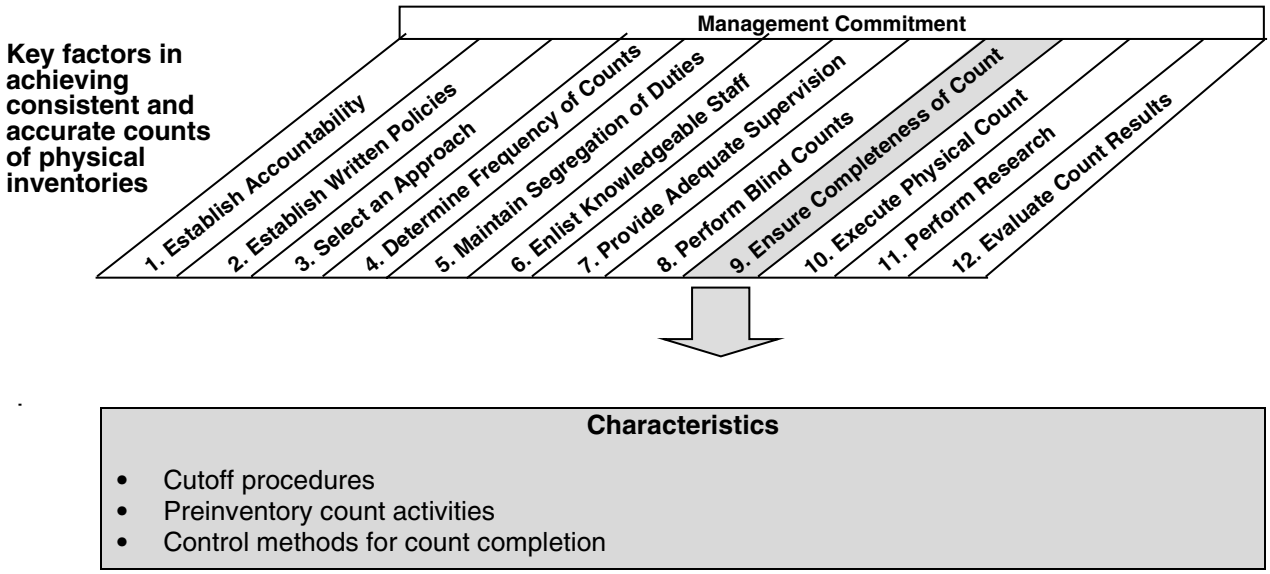
One leading-edge company with over 700 warehouse and distribution centers performed daily cycle counts. The company used warehouse personnel with normal warehouse responsibilities, including asset custody, to perform all first and second counts. A separate inventory control group was responsible for coordinating and overseeing their physical count(s), performing any third counts, and researching and reconciling variances. To reduce the risk of error or fraud increased by the counters having asset custody responsibilities, the company strengthened controls by using blind counts, and by restricting access to on-hand balances prior to and during the count.

Strategies to Consider

To effectively use blind counts during the physical count, senior executives should consider the following:

- Tools used to perform the count (count cards, count sheets, or RF Guns).
- Capability of the inventory system to not provide quantities on count cards or sheets, and restrict access to on-hand balances prior to and during the performance of the count, except for authorized personnel.
- Personnel performing the physical count and whether there is segregation of duties between the responsibilities of asset custody and physical counts.
- Personnel's experience and knowledge of the inventory items and the count process.

Key Factor 9: Ensure Completeness of the Count



A complete count requires that (1) the inventory being counted include all the items that should be present and not include items that are not part of the inventory and (2) control of the count process is maintained so that all inventory items that should get counted do in fact get counted. To facilitate the inventory being completely accounted for and accurately counted, there are a number of considerations that need to be made before the actual count begins. These considerations fall into three major categories:

- Cutoff procedures,
- Preinventory count activities, and
- Control methods for count completion.

Cutoff Procedures

Cutoff is the process of (1) controlling the movement of items between locations, such as in shipping, receiving, production, and rewarehousing and (2) coordinating the timing and verifying the movement of items with the related quantity changes in the inventory system. Cutoff is an essential procedure to ensure the existence and ownership of inventory. Cutoff can be achieved in a variety of ways, but the easiest way, in addition to verifying and coordinating the movement of items and the inventory records, is to conduct the count when operations are shut down or during a period when there is limited movement of inventory, such as the graveyard shift or weekends. All leading-edge locations performing wall to wall counts shut down their warehouse operations during the physical count.

One of the advantages of performing cycle counts is that companies do not have to shut down their entire operation, as is normally the case for wall to wall physical counts. The leading-edge

locations performing cycle counts typically do not stop the movement of inventory but instead use other controls to ensure that items are not erroneously omitted, included, or counted twice. These controls include (1) counting during a slow period of operations when there is little movement, (2) preventing any movement of the inventory items to be counted on the day the items are selected for counting, and (3) using system-generated transaction histories to trace the movement of items and reconcile the count.

Case Study

One leading-edge location addressed cutoff issues in its distribution center inventory by using a perpetual inventory system with locator capability. The difficulties of getting an accurate location count without shutting down operations were significantly reduced by stopping movement into and out of locations for the specific items selected for count that day. When the inventory system selected the items for that day's count, a "HOLD" indicator was placed by the system in the record for those items. Warehouse personnel were thus notified that, with certain exceptions, they were not to pick items from or store items in those locations until the "HOLD" is released. Inventory counters are required to complete all counts on the day scheduled and release "HOLDs" as the counts are completed, including any necessary recounts and research for variances between the quantity counted and record on-hand balances.

Preinventory Activities

Preinventory activities, primarily physical location preparation, are accomplished prior to the physical count in order to increase the efficiency and effectiveness of the count. Physical location preparation typically includes (1) organizing work areas and storage locations, (2) identifying and segregating items, (3) ensuring that all inventory items have labels or identification, (4) verifying that items are in the correct location, (5) precounting slow moving items, and (6) identifying excess/obsolete inventories. In the well run warehouses of the leading-edge locations we visited, most of these activities were part of their daily routine. Other preinventory activities needing consideration include the timing of the inventory, staffing and equipment requirements, review of inventory procedures, and instructions to and training of counters.

Control Methods for Count Completion

There should be a system to ensure that all inventory items are considered for count, including items on the receiving dock, in the warehouse, in the shipping area, in tractor-trailers, and at outside locations, such as owned or leased warehouses, public storage, or any other locations having inventory owned by the organization. For inventory outside the direct control of the organization, management may consider making arrangements to have the inventory counted by its own employees or by the people responsible for safeguarding the inventory. If its own employees are not used to count the inventory, management should consider making arrangements to have its personnel at the site to observe and verify that the count is preformed

accurately and completely. Leading-edge locations used three primary methods for determining the quantities of inventory items stored at outside locations: (1) they count the inventory as part of their physical count program, (2) they obtain written confirmation and/or monthly statements from the parties responsible for storing the inventory, or (3) they send representatives to observe the physical counting of the inventory.

Case Study

One leading-edge location with 20 distribution centers and 80 manufacturing facilities maintained inventory items in several different locations. Raw materials, work in process, and finished goods were stored in tank cars, trucks, pipelines, drums, bins, and racks. Additionally, inventory was stored at off-site locations controlled by the company and public warehouses outside the control of the company. To maintain the integrity of the inventory records, this location counted all inventory items within the company's control at least twice a year, and all inventory outside of its control was physically verified once a year. To verify completeness, inventory items within the company's manufacturing, distribution, and off-site locations were physically counted through regular cycle counts using prenumbered count sheets that were reviewed by supervisors. In addition, a company representative was sent to observe and verify the annual physical count of inventory items held at a public warehouse, and thus outside the control of the company.

As shown in table 5, control tools are used to determine that every inventory item gets counted. A manual system, such as count tags or count sheets, or a computerized inventory locator system that tracks an item's location, may be used to verify that every inventory item gets counted once and only once. Operations without inventory locator systems commonly use prenumbered count tags, sheets, or cards to ensure that all items are counted. For example, during a typical wall to wall physical inventory, personnel count the inventory item, record the count on the upper and lower part of the tag, and attach one part of the tag to the inventory item and give the other part to the control desk. The control desk accounts for all the prenumbered tags and compares the count to the record on-hand quantities. At the end of and during the inventory count process, the supervisor walks through the warehouse and visually inspects that a count tag is attached to every inventory item, which offers some assurance that all inventory items have been counted. The count tags attached to the inventory items also ensure that the inventory is not counted twice. A second check is done by the control desk crosschecking that all the inventory items recorded on the books have a physical inventory count recorded. Operations with inventory locator systems rely heavily on their systems to report any inventory items not counted and where the items are located.

Leading-edge locations rely on their computerized inventory systems to ensure that all recorded inventory items are counted. Those performing cycle counts generally have their computer systems generate a list of items (count sheets) to be counted each day. The system keeps track of all items counted and entered into the system. If an item is not counted, the system carries the item forward and repeatedly lists the item until it is counted. Supervisors can generate a report

(aging list) to list all items scheduled for a count but not counted. Some companies have their systems generate locations to be counted, and again the system tracks all locations that have not been counted. Nine of the twelve leading-edge locations also test the completeness of their systems by performing location counts[4] in addition to their regular cycle and wall to wall counts. In other words, they test for the possibility of inventory items existing on the floor that are not reflected in the records. They perform these procedures by selecting inventory items in the warehouse and tracing those items back to the record on-hand balances in the system.

Table 5: Control Methods to Ensure Completeness of Count

	Cycle count locations								Wall to wall count locations			
	1	2	3	4	5	6	7	8	9	10	11	12
Controls to monitor count completeness												
System tracks inventory items and/or locations counted	●	●	●	●	●	●	●	●	●	●	●	●
Location counts from floor to record	●	●	●	●			●		●	●	●	●
Counted areas are physically marked and walk-throughs are performed										●		●
Supervisors account for all count sheets and/or count tags	●		●	●	●	●		●	●	●	●	●

Note: ● Indicates applicability to the 12 locations studied from the 7 companies selected.

[4] Location counts are physical counts used by the leading edge locations to check the accuracy of their "floor to record" quantities, whereby all items in a location or area in the warehouse are counted and compared to the inventory records to ensure the proper recorded quantity and location of an item.

Strategies to Consider

To ensure completeness of the physical count, senior executives should consider:

- The organization's operating environment, time of operations, and it's ability to
  - suspend operations during the physical count,
  - perform counts when there is limited movement of the inventory, such as nights or weekends, and
  - prevent movement of items subject to count on the day of count only.

- Reliability of the inventory system to accurately capture and track transactions affecting the on-hand balances.

- Existence of slow moving or excess obsolete inventory items that could be segregated and precounted.

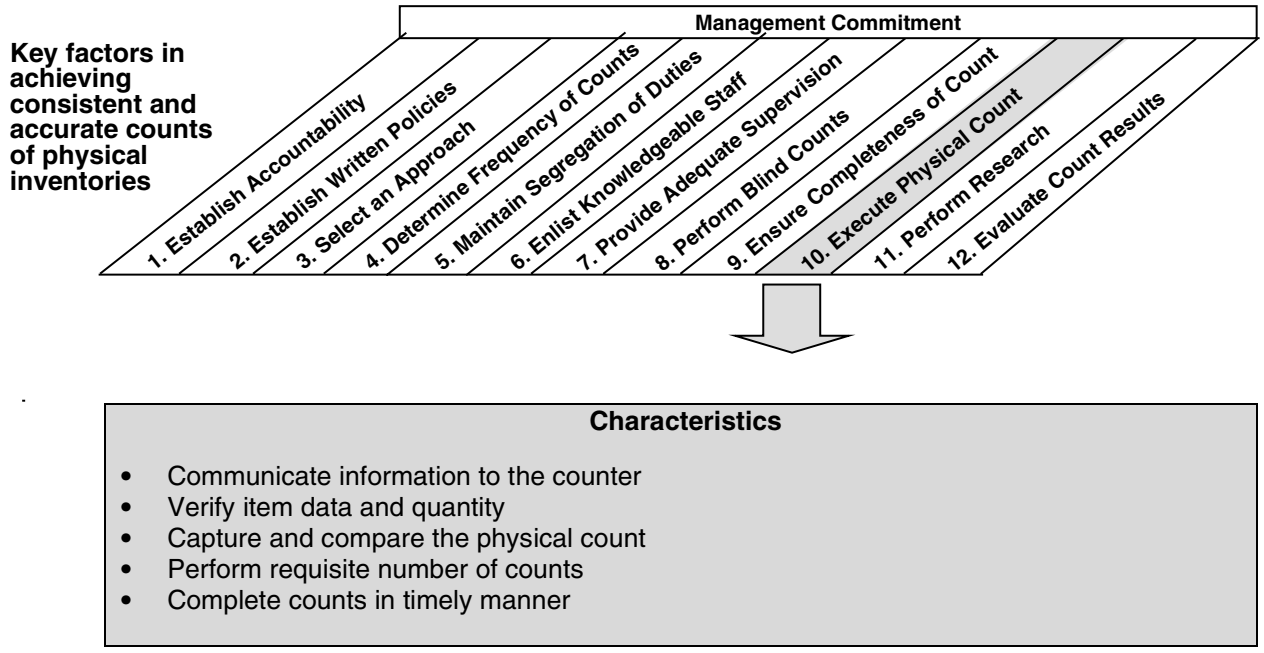
- Existence of inventory stored at outside locations and the personnel or organization responsible for verifying its physical existence.

- Use of prenumbered count sheets or tags and reconciliation of the numbers issued to the numbers returned.

- Reconciliation of items selected for count to actual items counted.

- Performance of additional counts where items are selected from the floor and compared to the inventory system.

Key Factor 10: Execute Physical Count



Practices discussed in earlier key factors lay the foundation for completion of physical count procedures. Properly executing the count provides accurate results for (1) comparison of the count to the recorded balances and (2) the posting of adjustments to the inventory records for financial and operational decision making. There are five key areas of consideration when executing the physical count including (1) communication of proper information to the counters, (2) verification of correct item information, (3) appropriate method to capture and compare the physical count to the inventory records, (4) determination of the number of requisite counts to perform before a count is accepted as final, and (5) timely completion of the count.

Communicate Information to the Counter

Communication of appropriate information ensures that counters have the necessary information to perform the count (i.e., items to be counted). Leading-edge location's communication to counters is usually in the form of a list of items to count, such as count sheets, or assigned zones to count, usually including stock location, stock number, description, and unit of measure. In instances where blind counts are not being performed, the quantity to be counted would also be included. This information is normally provided to the counters on count lists, sheets, cards, or on RF Guns (radio frequency devices).[5]

[5] RF Guns are handheld units that receive and transmit information to and from the inventory system. The counter usually scans a bar code for the item or location for count and the RF Gun displays the information for the item or location (i.e., unit of measure, stock number, location). The counter then

Verify Item Data and Quantity

Verification of data supplied to the counter ensures that the significant information in the inventory record is consistent with the physical information about the item. The data verified by counters at leading-edge locations typically included stock location, stock number, description, and quantity in instances where nonblind counts are being performed.

Capture and Compare the Count

The physical count includes the instrument or method used by the counter to record the results of the physical count for comparison to the on-hand balance in the inventory system. The leading-edge locations used a number of techniques to record the results of the physical count—some used traditional methods, such as manual count sheets or cards, while others used technical tools, such as RF Guns. When count sheets or cards are used, the actual physical count is recorded on the sheet or card and is then manually input into the computer system for comparison to the inventory record. When RF Guns are used, information is automatically uploaded into the computer system to capture the count for comparison to the inventory record on-hand quantities. The comparison of the actual count to the record on-hand balance determines the variance between the two and the need for recounts or research. The inventory record on-hand balances are typically not adjusted until recounts and research are complete. See key factor 11 for a discussion of adjustments to the record on-hand balance. The majority of the locations (cycle and wall to wall) used count sheets to record the physical count.

Perform Requisite Number of Counts

Number of counts refers to the number of times an item will be counted before a final count is accepted. The number of counts by leading-edge locations ranged from as few as one to any number determined by management to be appropriate. Counts performed past the first count can be based on any of the following: a difference between the count and record on-hand balance (variance), judgment of supervisors or management, variances exceeding established tolerances, and until two counts agree. There was no minimum number of counts required past the first count by the leading-edge locations. The maximum number of required counts varied from two counts up to the necessary number of counts until two counts agreed. Typically, two or three counts were performed.

If there is a variance between the count and the record on-hand balance, a second count is required. Segregation of duties should be reconsidered in assigning the personnel performing any additional counts. One of the leading-edge locations used a different count team to perform the second count. In this leading-edge location, the second count was accepted as the final, accurate count, after which personnel responsible for recording transactions, research variances and adjust the record on-hand quantity with the appropriate approval. Some leading-edge locations perform multiple, subsequent counts until such time as two counts conclude with the same quantities.

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enters the physical count quantity directly into the RF Gun and the count is automatically transmitted and captured in the inventory system for comparison to the on-hand balance.

Complete Counts in a Timely Manner

Timely counts are important due to management's reliance on the information in the inventory system for making operational decisions. Whether completing a single count or multiple counts, the leading-edge locations expected their count teams to complete their assignments as quickly as possible. The majority of the leading-edge locations expected the initial count and any necessary recounts to be completed within 24 hours.

Case Study

One leading-edge location, a 710,000 square foot distribution facility maintaining over 20 million finished products, performed its counting procedures with the precision of a well-trained military exercise. Its "army" of over a dozen dedicated counters cycled through the warehouse performing counts daily. Warehouse locations were mapped on an Excel spreadsheet, and the inventory group supervisor assigned zones (warehouse aisles) to each counter. Counters were provided via RF Gun (radio frequency device) data on individual items in his/her zone including stock location, part number, and unit of measure and description. An item's quantity was not obtainable by the counter. By scanning the bar-coded location number contained on a preprinted location marker and entering the item number from the container, the counter verifies the accuracy of item data contained in the perpetual record. Once the counter verified that the description was correct, he/she performed the count and enters the quantity into the RF Gun. These data are automatically uploaded into the inventory system to capture the count, at which time a real-time comparison of the counted quantity and the system balance was made. Any variance is reported to the supervisor via an on-screen or printed variance report. For inventory items having variances, second counts are required to be performed within 8 hours by a different counter. If after the second count, the variance remains greater than $400, then all locations in the warehouse containing that inventory item are counted on the next shift to ensure location and total item quantity accuracy.

Strategies to Consider

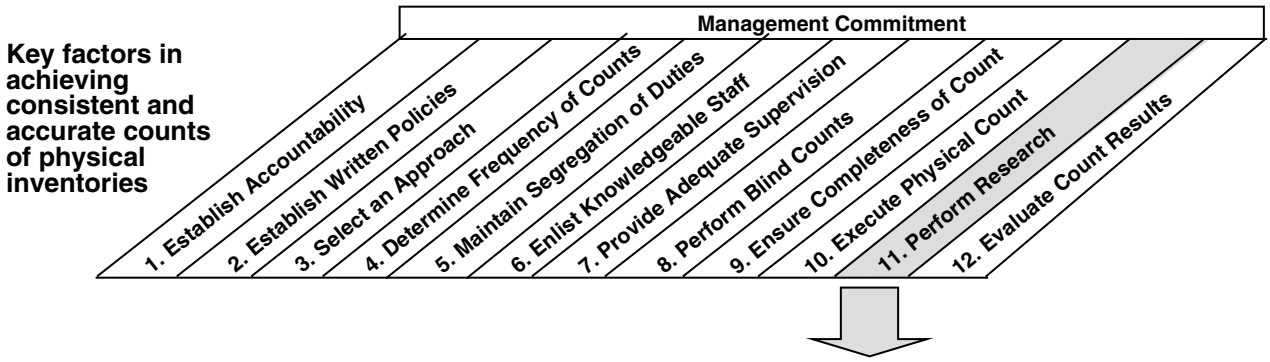
To effectively execute the physical count, senior executives should:

- Determine the data to be verified by the count by considering
  - knowledge and experience of the personnel performing the count,
  - the item data maintained in the inventory system or on location labels, and
  - whether blind counts are to be performed, requiring the restriction of access to on-hand balances.

- Determine the method to be used to capture and compare the count, such as count cards, sheets, or RF Guns, by considering
  - the capability of the inventory system, and
  - ability to use RF devices.

- Determine number of counts to perform by considering
  - resources necessary to perform additional counts,
  - personnel performing additional counts and their segregation of duties from asset custody and their knowledge and experience of the inventory and count process,
  - time necessary to complete additional counts promptly, and
  - characteristics of the inventory (unit of measure, size, dollar value, classification, and size of variance in quantity and dollar value) to establish tolerances for additional counts.

Key Factor 11: Perform Research



Characteristics

- Perform required research
- Complete research in a timely manner
- Refer variances to management and security for approval and investigation

Even with a strong control environment and sound physical count procedures, it is not unusual for there to be differences in quantities between the physical count and the record. Research of the cause, sometimes referred to as "root cause analysis," and reconciliation of the difference is an essential element of an effective physical count process. Research, when properly conducted, provides support for adjustment to the inventory records, identifies the causes of variances between the physical count and the inventory records, and provides management with information with which to implement corrective actions. The process of research includes performing the required analysis, promptly completing research, and referring variances to management for approval and/or security for investigation.

Required Research

Research is the process of investigating a discrepancy, often referred to as a variance, between the physical count and the on-hand balance. Variances may indicate that something is wrong with the inventory system or the warehouse operations that affect inventory balances. In order to reduce the potential for future errors in the inventory records, it is important to identify and correct the causes of variances. Management determines which variances to research and the extent of research necessary to identify the causes of the variances.

Management's determination of which variances to research includes consideration of dollar value, type of item, and the effect of the variance on the operations of the organization. As the impact of variances on the financial records or on the operation of the organization increases, it becomes more important to conduct extensive research. Management may also determine that the impact of certain variances is insignificant by establishing a low dollar or quantity tolerance

and allowing adjustment to the on-hand balance in the inventory system without requiring research. Leading-edge locations researched variances based on criteria established by management. The criteria established by management usually included setting quantity or dollar value tolerances. Tolerances ranged from zero, in which all variances were researched, to 5 percent, in which only those variances exceeding the established dollar value or quantity tolerance were researched. Others relied on the judgment of the researcher. Some locations used a combination of tolerances and researcher judgment depending upon the type of inventory or its impact to operations. Three of the eight leading-edge locations performing cycle counts had a zero tolerance for error for all inventory items and researched all variances. The remaining five locations researched variances that exceeded established dollar value or quantity variances by type of item, and/or on the basis of the researcher's assessment of the impact to operations. Two of these five locations had established tolerances ranging from zero to five percent based on product type. Locations performing wall to wall physical counts researched variances based on established dollar and quantity tolerances, as well as the judgment of the researcher. If a variance did not meet management's criteria for research, the on-hand balance in the inventory system was usually adjusted to reflect the actual physical count. Table 6 shows the established criteria for researching variances at leading-edge locations.

Table 6: Criteria For Variances Researched

Established criteria	Cycle count locations								Wall to wall count locations			
	1	2	3	4	5	6	7	8	9	10	11	12
Zero tolerance (all variances researched)	●		●	●	●	●						
Variances > $100		●							●			
Variances > $1000							●					
Variances > 3-5 percent quantity variance			●		●						●	
Judgment of researcher (based on impact on operations)					●		●	●		●		●

Note: ● Indicates applicability to the 12 locations studied from the 7 companies selected.

Once management determines which variances to research, it is essential to (1) correctly adjust the change in inventory balances to accurately reflect the physical on-hand quantity and (2) identify the cause of the variance. The extent of research may include reviewing (1) transaction histories, (2) shipping and receiving records, and (3) production usage records. We found that all of the leading-edge locations researched transaction histories, movement of items during the count, and shipping and receiving documents to ensure proper adjustment of the inventory records and identify causes of variances. After research was completed on the selected variances, an adjustment was posted to the on-hand balance in the inventory system to reflect the actual physical count.

Identifying the causes of variances is useful in detecting weaknesses in the underlying controls and individual processes that affect the inventory system record. Grouping and tracking the nature or type of errors into assigned codes is an effective tool for analyzing causes of variances and implementing corrective actions to reduce future errors. For example, a leading-edge location's assignment of error codes enabled the company to implement corrective actions and process improvements, which increased the location's inventory record accuracy and decreased operating costs. We found that four of the locations performing cycle counts assigned and tracked error codes. The number of error codes used by the leading-edge locations to identify causes of variances averaged 22 and included codes for incorrect entries, leaks or spills, wrong location, receipt error, stock picking error, and shipping error.

Case Study

One leading-edge location with over 113,000 stock numbers and approximately $222 million in inventory used a separate inventory group to research variances. Its research included reviewing transaction histories, shipping and receiving records, and documenting in-transit items to identify causes of variances. Also, management at the location had established criteria to determine what level of research was required for each type of item. The inventory was segmented into two primary types of items—type "A" and "B." A zero tolerance was established for type "A" items, for which all variances were researched. A 3 percent quantity tolerance for type "B" items was established for which only quantity variances in excess of 3 percent of the record on-hand balance were researched.

Timely Research

Prompt completion of required research is key to identifying and correcting the causes of variances. As the amount of time between the discovery of an error in the inventory records and research increases, the more difficult it is to identify the cause of the error. Adjustments posted promptly to the inventory and financial records provide reliable information for use by management. We found that the majority of the leading-edge locations performed and completed research either the same day as the original count or by the end of the following day. This allowed for timely adjustments to the inventory records and immediate corrective action to prevent future errors.

Approval and Referral of Adjustments

Approval of adjustments by management and referral of potential fraud or theft to investigators helps ensure reliable counts and research. We found that all of the leading-edge locations routinely referred adjustments to management for approval. As the dollar amount of the adjustment increased, the approval level within the company increased. The approval levels progressed from the lead or supervisor of the researcher up to the location or plant manager. Although the leading-edge locations indicated that they did not have significant problems with fraud or theft, some locations regularly reviewed adjustments and trends on items susceptible to fraud or theft in case referral to security or law enforcement was necessary.

Strategies to Consider

To effectively research variances arising from the physical count, senior executives could:

- Establish tolerances or criteria for selection of variances to research such as
  - effect on operations or mission readiness,
  - quantity and dollar value, and
  - characteristics of the items with the variance, such as sensitive, classified, or items susceptible to fraud or theft.

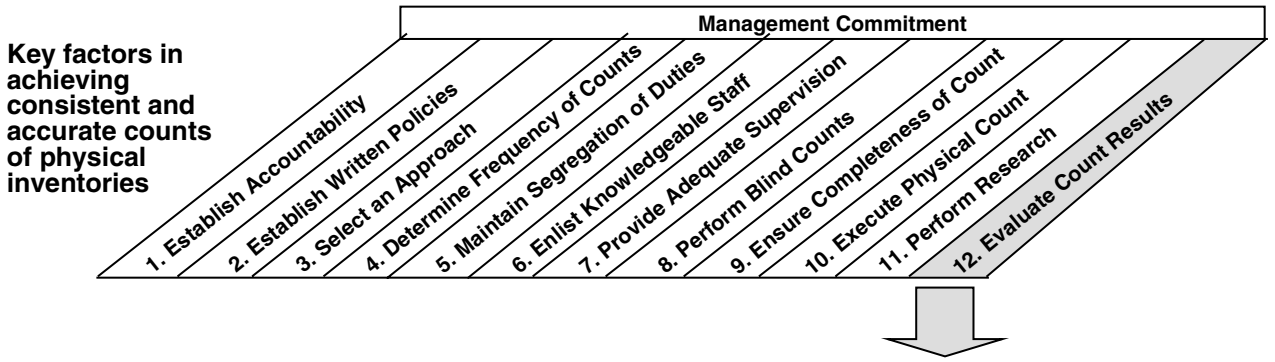
- Develop processes for how to perform research, such as procedures for reviewing movement of items during the count, transaction histories, and shipping and receiving documents, by considering
  - reliability of the inventory system to accurately capture transactions affecting the on-hand balance,
  - time necessary to complete the research promptly, and
  - knowledge of the personnel performing the research.

- Establish error codes that would identify the cause of variances.

- Set approval levels for adjustments that move up the chain of management as the dollar value increases or the nature of the item requires a higher level of approval.

- Define responsibility for reviewing adjustments and trends on sensitive and classified items and items susceptible to fraud or theft, and notify security or law enforcement.

Key Factor 12: Evaluate Count Results



Characteristics

- Measure the results of the physical count using performance measures
- Communicate the results of the physical count to counters, management, and warehouse personnel
- Modify policies and procedures to address necessary changes in the physical count process

Evaluating the results of the physical count is essential to an accurate and effective physical count process. The evaluation of the results gives management the necessary information for measuring the effectiveness of (1) the physical count and (2) corrective actions or improvements to the inventory process and system. Evaluation includes measuring the results of the count, communicating the results, and modifying existing policies and procedures.

Performance Measures

The results of the physical count can be measured several ways. Calculating an inventory record accuracy rate, summarizing the number and dollar value of adjustments, errors, or items counted, and tracking and analyzing error code frequencies are three ways to measure results.

A common method of measuring the results of the physical count is the calculation of an inventory record accuracy rate. Inventory record accuracy rates measure the degree of agreement between the balance in the inventory records and the physical count. When calculating inventory record accuracy, it is necessary to define what will be considered an error. An error can be defined in various ways, including (1) any error in the item record, such as location, description, and quantity or (2) quantity errors exceeding established tolerances. Tolerance is a range within which an actual value or quantity can disagree with the inventory record and still be considered accurate for the purposes of calculating inventory record accuracy. Tolerances are typically based on an item's or a segment of item's usage or volume, dollar value, lead-time, and criticality to production or operations. The range of tolerance may be as low as zero, in which all quantity differences are considered errors, upward to "X" percent, in which quantity differences only in excess of that amount are considered errors. Once the definition of

what constitutes an error has been established, the inventory record accuracy rate can be calculated. There are multiple ways of calculating inventory record accuracy; however, the common method is:

$$\frac{\text{Number of accurate items or records}}{\text{Number of items or records counted}} \times 100\% = \text{record accuracy rate}$$

Leading-edge locations evaluated the results of physical counts using various performance measures, including inventory record accuracy calculations. Six of the eight leading-edge locations performing cycle counts measured inventory record accuracy. Locations measuring inventory record accuracy defined an error as either (1) any error in the inventory record (quantity and location) or (2) any quantity error exceeding established tolerances. Established tolerances ranged from 0 to 5 percent; however, four of the six locations had a zero quantity tolerance for all items or segments of items. Three locations performing cycle counts had established separate tolerances for identifiable segments of their inventory based on type of item, dollar value, activity, or criticality of an item to operations. For example, one location (shown as location 3 in table 7) segmented its inventory by type of items (type "A" and "B"). It established a zero tolerance for the "A" segment, in which any difference in the inventory record counted as an error. It established a 3 percent tolerance for any quantity differences exceeding 3 percent of the on-hand balance for the "B" segment of inventory. Table 7 illustrates leading-edge locations' measurement of inventory record accuracy, definition of errors, and tolerances established by management for use in calculating inventory record accuracy.

Table 7: Performance Measures

Performance measures	Cycle count locations								Wall to wall count locations			
	1	2	3	4	5	6	7	8	9	10	11	12
Inventory record accuracy	●	●	●	●	●	●						
Other performance measures	●	●	●	●	●	●	●	●	●	●	●	●
Error definition												
Any error in the inventory record (location, quantity, stock number)	●	●										
Quantity errors												
Zero tolerance (all quantity differences are errors)			●	●	●	●						
Greater than 0 but less than 5- percent tolerance (quantity differences exceeding the tolerance are errors)			●	●	●							

Note: ● Indicates applicability to the 12 locations studied from the 7 companies selected.

The leading-edge locations performing wall to wall counts and two of the companies performing cycle counts did not calculate inventory record accuracy rates but instead measured the results of the physical count using other methods. These other methods included (1) total quantity adjustments, (2) total dollar value of adjustments, and (3) number of errors by error code. Quantity and dollar values of adjustments were measured in both gross (sum of the absolute value of adjustments) and net (mathematical sum of the adjustments). These other performance measures were also used by locations calculating inventory record accuracy rates in evaluating their physical count, as shown in table 7.

Communication of Results

Communicating the results of each physical count is essential to achieving and maintaining accurate, reliable counts and records and improving the results of future physical counts. The results of a count should be communicated to the people doing the work, including counters and warehouse employees, and to management. Communication of results to the counters reinforces the results of their work and the importance of reliable counts. Likewise, communication to warehouse employees makes them aware of the effect they have on the results of the count as they perform their daily activities and the importance of doing their jobs correctly. Communicating the results of the count conveys the importance of accurate records to all personnel and enforces management's dependence on personnel to achieve accurate records. Communicating the results to management ensures that management is informed and can then assess the impact on operations and implement corrective action.

All of the leading-edge locations communicated the results of the physical counts to management, counters, and/or warehouse personnel. Management was forwarded the results of the physical count in the form of reports containing inventory record accuracy, amount of adjustments, and trend analysis of error codes. Weekly and monthly meetings were held with the managers responsible for the physical count, warehouse operations, and other areas affecting the inventory. The meetings were used to discuss the results of the count, including inventory record accuracy, amount of adjustments, and trends or error codes in order to identify the impact to the company's operations and address problems. The results of the physical counts were communicated to counters and warehouse employees in the form of display boards or scorecards published for areas of the warehouse, which were displayed around the warehouse in highly visible locations. At one of the leading-edge locations, the results of the physical count and the impact each employee had on the accuracy of inventory records was discussed during a quarterly meeting with all employees.

Modification of Policies and Procedures

Once the results of the physical count have been evaluated and communicated, it is useful to "close the loop" of the physical count by considering indicated changes to the inventory count and management process and making appropriate modifications to policies and procedures. Management's assessment of the results of the physical count and employee feedback is useful in determining the effectiveness of the physical count. The results may indicate the need to count a particular item more frequently due to high errors. Conversely, an item that has not had any errors and little activity may be counted less frequently. In other instances, the makeup of the

inventory or the operations of the organization may have changed, in which case management may need to reconsider the significance of items and the frequency with which they should be counted. It is important that lessons learned from each physical count result in changes that improve the physical count process and inventory management process. We found that the leading-edge locations routinely updated policies and procedures for the physical count process as a result of changes to processes or systems, and at a minimum reviewed the adequacy of documented and performed procedures every 1 to 2 years.

Case Study

One leading-edge location, a 710,000-square foot distribution center with over 380 employees, used a variety of methods to evaluate and communicate the results of its physical count. Results were measured with a combination of an inventory record accuracy rate, dollar value and quantity of adjustments, number of accurate counts, and analysis of error codes assigned to variances. A daily report was sent to the inventory managers and supervisors summarizing the number of items counted, accuracy rate, and dollar value of adjustments. Once a week the results of the count were published and posted in the warehouse summarizing the current accuracy rate and trends, as well as successes and problem areas. The location also held weekly and biweekly meetings with operation managers, the inventory group supervisor, inventory managers for material returns and receiving, quality control, engineering, and the director of operations to discuss the results of the count and causes of the variances—the purpose of which was to correct problems and improve operations on a "real-time" basis.

Strategies to Consider

To evaluate the results of the physical count process, senior executives should consider the following:

- Establish performance measures that are aligned with organizational objectives and strategies and that are useful in evaluating the results of the physical count.

- Determine the methods to be used to measure performance of the count by
  - defining an error for purposes of measuring performance, and
  - establishing tolerances based on characteristics of the inventory and the quantity or dollar value of the variances to be considered in error.

- Establish mechanisms to communicate results and performance measures to counters, warehouse personnel, and managers.

- Establish routine meetings with managers from all aspects of the inventory process including the physical count, receiving, shipping, ordering, stocking, and production, to discuss results and measures and evaluate the causes of the errors to identify corrective actions and assign responsibility for those actions.

- Use results and performance measures as a basis to make changes to the process and modify existing policies and procedures to reflect changes in the processes.

Appendix I: Implementation Checklist

Planning, Conducting, Researching, and Evaluating a Count of Physical Inventory

(An Implementation Checklist)

This checklist is provided as an aid to making and documenting decisions in the planning, conducting, and/or auditing of the inventory count process and researching and evaluating its results. It is presented in the chronological order of the major steps of the process. References are provided to the **12 key factors** in the body of the report, which provide guidance in considering the issues and factors involved in the decision-making processes.

The checklist is segregated into the following four major sections, with eleven steps to consider categorized in the numbered subtitles, as follows:

Planning	1) Select an approach to the count 2) Determine count frequency 3) Organize the count team(s)
Counting	1) Accomplish appropriate cutoff 2) Perform pre-inventory activities 3) Count the inventory
Research and Adjustments	1) Perform research 2) Adjust the record
Evaluation of Results	1) Determine the record accuracy rate 2) Consider other performance measures 3) Communicate the results of the count

Planning	1) Select an approach to the count 2) Determine count frequency 3) Organize the count team(s)

1) **Select an approach—**The two basic approaches most used by leading-edge companies to count inventory are (a) cycle counting a portion of items over time or (b) a physical wall to wall count. The approach or combination of approaches that is best for your inventory will depend on specific circumstances. Management should consider the following major issues when making this decision.

Have You Considered	Report Section Providing Guidance	(Y)es, (N)o, N/A	Notes/Comments
a) the guidance provided in existing policies and procedures?	Establish written policies		
b) what approach(es) your inventory system will support? (See AIMD-98-21.2.4, Inventory Systems Checklist)	Select an approach		
c) the amount of time available and/or deadline issues involved?	Select an approach		
d) the primary objectives in conducting a physical count?	Select an approach		
e) whether existing system accuracy supports reliance on it?	Select an approach		
f) natural or logical segments of your inventory?	Select an approach		

Document your final conclusions for selecting an approach below. ***(e.g., The cycle counting approach is selected for the (ABC) segment(s) and/or the wall to wall counting approach is selected for (XYZ) segment(s).)***

2) Determine count frequency—Selecting how many, how often, and which items to count may not be as straightforward as it seems. Risk factors of mission and operational criticality, dollar values, quantity significance, rate of turn-over and pilferability, along with the following, should play a part in management's decisions.

Have You Considered	Report Section Providing Guidance	(Y)es, (N)o, N/A	Notes/Comments
a) the frequency with which all or certain items or segments should be counted?	Determine frequency of counts		
b) if the frequency of counts should be weighted to certain items or segments?	Determine frequency of counts		
c) if items to be counted should be selected randomly or otherwise?	Determine frequency of counts		

Document your conclusions for determining count frequency below. ***(e.g., Items in inventory segment(s) (ABC) will be randomly selected from a diminishing pool and counted, or cycled through, 4 times a year; segment(s) (XYZ) will all be counted once a month during the midnight shift.)***

3) Organize the count team(s)—The selection and organization of appropriate count team(s) is critical to controlling the count process and achieving accurate results. Considerations of who is going to perform, supervise, record, evaluate, and analyze the results of the count should be made by management after considering the following issues.

Have You Considered	Report Section Providing Guidance	(Y)es, (N)o, N/A	Notes/Comments
a) whether adequate segregation of duties can be accomplished?	Maintain segregation of duties		
b) whether the degree and level of supervision is appropriate?	Provide adequate supervision		
c) whether blind counts should be required?	Maintain segregation of duties & perform blind counts		

Have You Considered	Report Section Providing Guidance	(Y)es, (N)o, N/A	Notes/Comments
d) who should do counts subsequent to the first count?	Execute physical count		
e) how many people should be on a count team?	Maintain segregation of duties		
f) how many count teams are needed?	Execute physical count		
g) whether count team members are knowledgeable of the inventory and count process?	Enlist knowledgeable staff		
h) whether the necessary training has been provided to team members?	Enlist knowledgeable staff		

Document your conclusions for organizing the count teams below. ***(e.g., All cycle counting of the (ABC) and wall to wall counting of the (XYZ) segment(s) will be accomplished and/or supervised by individual members of the independent inventory audit group. Six two-person wall to wall count teams will be supplemented by shift warehousemen. All counts will be blind counts.)***

Counting

1) Accomplish appropriate cutoff
2) Perform preinventory activities
3) Count the inventory

1) Accomplish appropriate cutoff—The difficulties in achieving an accurate physical count of quantities on hand increase when items are moving into and out of, as well as between warehouse locations during the count. The risks to be concerned about include (1) not counting items that are moving, (2) counting items more than once that have moved, (3) counting items not yet recorded in the inventory records, or (4) counting items that have been removed from the inventory records. These risks exist for inventory movement at primary inventory locations, off-site storage, contract warehouses, consignment, and other locations. Management should weigh these risks and consider the following issues when deciding how to control them.

Have You Considered	Report Section Providing Guidance	(Y)es, (N)o, N/A	Notes/Comments
a) suspending shipping, receiving, production, etc., during the count?	Ensure completeness of the count		
b) the risk of relying on your system for control of cutoff issues?	Ensure completeness of the count		
c) other methods of reducing the risk of improper cutoff?	Ensure completeness of the count		
d) the risk of cutoff at the contractor warehouse and other inventory locations?	Ensure completeness of the count		

Document your conclusions for accomplishing cutoff below. ***(e.g., Temporary HOLDS, restricting movement into and out of item locations, will be placed on the daily cycle count items. Holds will be released as counts are completed, no later than the end of the day. All movement of all wall to wall count items will be suspended during the count.)***

2) Preinventory preparation—Prior preparation of the inventory, and the warehouse area housing it, can greatly increase the efficiency and accuracy of accomplishing the physical count of inventory on hand. Management should include the following in its consideration of preinventory issues.

Have You Considered	Report Section Providing Guidance	(Y)es, (N)o, N/A	Notes/Comments
a) organizing the inventory and warehouse to facilitate the count process?	Ensure completeness of the count		
b) identifying and segregating certain slow moving, excess, obsolete, and reserved items from other items?	Ensure completeness of the count		
c) precounting and increasing control of segregated, slow moving, excess, obsolete, and reserved items?	Ensure completeness of the count		

Document your conclusion for preinventory preparation below *(e.g., Warehouse routine is expected to maintain (ABC) inventory segments in a count-ready condition. The day prior to wall to wall counts, warehouse personnel will be detailed, under the supervision of the inventory audit group, to label, straighten, and precount as necessary.)*

3) Count the inventory—Actually counting the inventory is a critical step and deserves an appropriate level of attention and control. There are a number of options available in the process of the count and decisions in one area will affect decisions in another area. The following are issues that management should include in making those decisions.

Have You Considered	Report Section Providing Guidance	(Y)es, (N)o, N/A	Notes/Comments
a) how information about the item to be counted will be communicated to the counter?	Execute physical count		
b) what record data elements (e.g., quantities, description, location) should be provided to the counter?	Execute physical count		

Have You Considered	Report Section Providing Guidance	(Y)es, (N)o, N/A	Notes/Comments
c) the pros and cons of requiring blind counts?	Perform blind counts		
d) what record data elements the counter(s) are to verify?	Execute physical count		
e) the total lapse of time allowable to complete counting (including appropriate research) before requiring an adjustment?	Execute physical count & perform research		
f) when to require recounts (e.g., if first count does not equal record amount)?	Execute physical count		
g) how many recounts to require (e.g., until two counts equal)?	Execute physical count		
h) how the count supervisor will verify that the count is complete?	Provide adequate supervision & ensure completeness of the count		
i) how data elements verified for each item will be captured during the count (e.g., count sheets)?	Execute physical count & perform research		
j) how and by whom will the count's actual results be posted to the inventory system?	Execute physical count & maintain segregation of duties		
k) who should conduct recounts or verification of completed counts (e.g., someone other than the first counter)?	Execute physical count		
l) how to verify that all items selected for counting have been counted?	Ensure completeness of the count		

Document your conclusions for counting the inventory below. ***(e.g., Item description, number, and location only will be provided to and verified by cycle and wall to wall counters on sheets generated by the inventory locator system. Quantities counted will be recorded on the count sheet and compared to record on-hand balances maintained by the inventory audit group supervisor. Recounts, until two counts agree, will be conducted by an inventory audit group individual other than the original counter. The original counter will conduct and document research and propose needed adjustments to the group supervisor.)***

Research and Adjustments

1) Perform research
2) Adjust the record

1) Perform research—In the event of a discrepancy between the actual physical count and the recorded data element, appropriate research designed to determine the reason for the difference should be performed. The following are issues management should include in its considerations when making decisions of when to and who should conduct such an investigation.

Have You Considered	Report Section Providing Guidance	(Y)es, (N)o, N/A	Notes/Comments
a) when and where it may be appropriate to establish acceptable variances not requiring research?	Perform research		
b) the extent to which research should be performed?	Perform research		
c) using error codes to track the trends and frequency of the causes of discrepancies?	Perform research		
d) the required documentation and retention period for the research and adjustment of the records?	Perform research		
e) when discrepancies should be referred to management and/or security for investigation?	Perform research		
f) whether there should be a limit on the amount of time allowed to research a discrepancy before requiring an adjustment?	Perform research		
g) whether persons performing root cause analysis have responsibilities in areas of conflicting interest?	Perform research & segregation of duties		

Document your final conclusions for research and adjustments below *(e.g., All variances between physical count and record amounts are to be researched, or variances of less than X percent are to be adjusted without research, etc.).*

2) Adjust the record—Adjustments to the record are most critical when they affect on-hand quantities. Such adjustments will likely directly affect information used to make managerial decisions. They will also establish new quantity levels for effective internal controls designed to safeguard assets from unauthorized use or disposition. The following are issues management should include in its consideration when making decisions on who should make adjustments and how adjustments to on-hand quantities should be made.

Have You Considered	Report Section Providing Guidance	(Y)es, (N)o, N/A	Notes/Comments
a) what levels of authorization to require for adjustments to on-hand balances?	Perform research		
b) how to allow for and control exceptions to authorization requirements?	Perform research		
c) whether there should be a limit on the amount of time allowed to elapse before an adjustment is required?	Perform research		
d) whether persons making adjustments to on-hand balances have responsibilities in areas of conflicting interest?	Maintain segregation of duties		

Document your conclusions for adjusting the records below *(e.g., Adjustments to on-hand balances exceeding $XXX required documented approval by (middle management position), those exceeding $XX,XXX require documented approval by (senior management position), etc.).*

Evaluation of Results

1) Determine the record accuracy rate
2) Consider other performance measures
3) Communicate the results of the count

1) Determine the record accuracy rate—Inventory systems usually provide management information upon which potentially critical mission readiness and financial resource decisions are based. An appropriately calculated record accuracy rate is a telling measure of how dependable your inventory system is at maintaining accurate information. The following are issues management should include in its considerations when making decisions for calculating an inventory accuracy rate.

Have You Considered	Report Section Providing Guidance	(Y)es, (N)o, N/A	Notes/Comments
a) what discrepancies in the record will be considered errors in the accuracy rate calculation?	Evaluate count results		
b) the actual mathematical calculation to be used in determining the accuracy rate?	Evaluate count results		
c) how you will use the results of the accuracy rate calculation?	Evaluate count results & establish accountability		

Document your conclusions for evaluation of results below. ***(e.g., Discrepancies between any elements (e.g., number, description, location, quantity) verified by counters are considered errors. Or, quantity differences exceeding established tolerances are considered errors, etc.)***

2) Consider other performance measures—The results of physical counts may be measured by methods other than record accuracy rates. The following are issues management should include in its considerations when making decisions for calculating an inventory accuracy rate.

Have You Considered	Report Section Providing Guidance	(Y)es, (N)o, N/A	Notes/Comments
a) what other results/measurements are appropriate to your needs?	Evaluate count results		
b) how other measures can be expressed in relevant terms?	Evaluate count results		

Document your conclusions for consideration of other performance measures below *(e.g., Total net and total gross (quantity and/or value) adjustments to inventory over a period of time shall be considered to determine the effectiveness of the count and root cause analysis process, etc.).*

3) Communicate the results of the count—To maximize the usefulness of the physical inventory count, the results should be communicated to management and lessons learned should be incorporated in planning for subsequent physical counts. The following are issues management should include in its considerations when making decisions in communicating the results of the physical count.

Have You Considered	Report Section Providing Guidance	(Y)es, (N)o, N/A	Notes/Comments
a) how and what results you will communicate to management?	Evaluate results and perform research		
b) how and what results you will communicate to counters?	Evaluate count results		
c) how and what results you will communicate to employees who are responsible in areas giving rise to record accuracy errors.	Evaluate count results		
d) changes indicated to existing policies and procedures by the results and considerations made above?	Evaluate count results & establish written policies		

Document your conclusions for communicating the results of the count below *(e.g., Monthly written reports summarizing quantity and dollar amounts counted, adjustments made, results of root cause analysis, and frequency and trends in error codes will be prepared for management review, etc.).*

Appendix II: Objectives, Scope, and Methodology

To determine the principles fundamental to achieving consistent, accurate counts of physical inventories, our objectives were to (1) identify inventory counting procedures that have been successfully implemented by private sector companies recognized as leaders in inventory accuracy and (2) provide examples (case studies) of counting procedures used by these companies that might help federal agencies improve the accuracy and reliability of their inventory and property records.

To fulfill our objectives, we identified 80 companies, 77 of which were Fortune 500 companies, with large inventories that are considered to be leaders in inventory management. In order to identify these companies, we consulted with experts in the field of inventory management. Our contacts included professionals from the major accounting firms of KPMG Peat Marwick and Ernst and Young, LLP, and professors at the Massachusetts Institute of Technology and Ohio State University. We also researched publications issued by *CIO 100, Industry Week,* and the *American Productivity and Quality Center (APQC)*, and we considered companies that were winners of the prestigious Malcolm Baldridge National Quality Award.

From these 80 companies, we identified 22 companies having best practices in inventory management. Our selection was based on the company receiving recognition for outstanding inventory management practices by at least three of the above named sources. In order to confirm our selections as best practice companies, we sent a survey to each company to obtain information on inventory record accuracy rates, policies and procedures, physical count methods, research, training, and willingness to participate in our study.

Eleven of the twenty-two companies returned the survey; from the pool of eleven we selected seven companies willing to participate in our study. Our selection was based on (1) reported accuracy rates, (2) size and types of inventory, and (3) existing count procedures and controls. Based on these criteria, we selected the following companies:

Leading-edge Companies

Boeing
Daimler Chrysler
DuPont
FedEx
General Electric
Honeywell
3M

Some of the selected companies employed more than one counting methodology and allowed us to review their practices and processes at more than one operating location. A total of 12 separate locations from the seven companies were studied.

To gather the data needed from each company, we developed a structured interview checklist to cover the following areas: planning, execution, research, evaluation, training, and policies and procedures for the physical inventory count process. We consulted professional guidance issued by the American Institute of Certified Public Accountants and an accounting firm in designing the structured interview.

During each site visit, we completed our structured interview checklist through interviews with officials responsible for inventory management and record accuracy. We also toured the companies' warehouses, distribution centers, and production and assembly plants to obtain an understanding of how inventory counting procedures were implemented at these locations. We relied on company officials to describe their processes to us. We did not verify the accuracy of their statements or any information provided to us, but, wherever possible, we obtained and reviewed company documents describing the inventory counting and verification processes. The documentation we obtained was consistent with the information we reported. Based on the information we obtained from each of our site visits, we consolidated and refined the inventory counting principles and practices to those presented in this guide. We asked officials at each of the seven private sector companies we studied to confirm the accuracy and completeness of the information presented in the report and incorporated their comments as appropriate. However, we did not independently verify the accuracy of the information the officials provided.

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Appendix IV: Other Related Publications

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Appendix VI: GAO Contacts and Staff Acknowledgments

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