



INVENTORY MANAGEMENT™

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Improving Logistics and Supply Chain Management

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How to Reduce Inventory Through Safety Stock & Lot-Size Optimization

One of the newer ways to grow and increase shareholder value is to reduce inventory without negatively impacting operating costs or customer service. Reducing inventory, as many inventory managers recognize, frees up cash that can be used to grow the business. Yet, there's more to the equation.

“Lower inventory increases shareholder value through lower ongoing operating expenses related to maintaining inventory, improves speed-to-market through faster sell-off of old products, and
continued on page 10

When Working With Metrics—The Fewer The Better Is The Rule

Performance measurement is fundamental to achieving excellence. Yet, these compelling questions remain: Are we really receiving the greatest impact from all of the data that is being collected? Or, are we actually drowning from too much data, and instead, wasting many potential improvement opportunities?

Focus on key performance indicators. “We need to discern leading indicators that will give us advance notice of anticipated results,” Joni White, CFPIM, Joni White & Associates (Sterling, Va.)
continued on page 12

IN THIS ISSUE:

How to Reduce Inventory Through Safety Stock & Lot-Size Optimization 1

When Working With Metrics—The Fewer The Better Is The Rule 1

Use Postponement To Optimize Inventory In Customer-Driven World 2

Inventory Management Key To Field Service Optimization Efforts 4

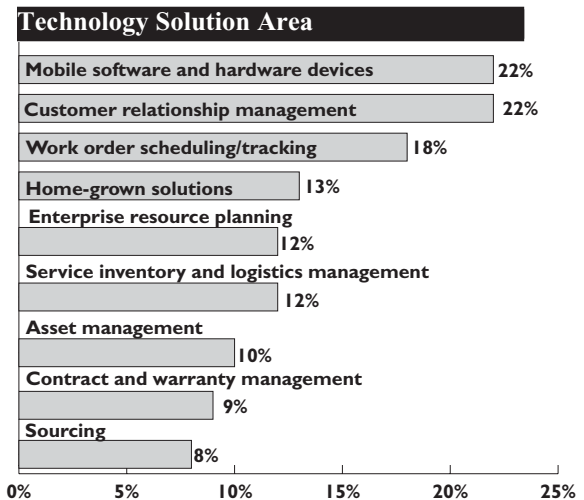
Inventory Control Mgrs. Earn Above-Average 3.5% Salary Increase 6

IMR Miscellany 8

IMR Calendar 14

Inventory Manager’s Forum 15

Service Parts Inventory Management Technology Falls Behind Other Solution Investments .. see page 4



(Source: Aberdeen Group)

Use Postponement To Optimize Inventory In Customer-Driven World

By James W. Lawton

One of the biggest challenges in manufacturing today is that of delivering what customers want, when they want it, while meeting the financial imperative to keep inventory levels down. Whether driven by build-to-order (BTO) strategies like Dell's, or pressure to meet inflexible standards for 99.999% service levels from "big box" retailers like Wal-Mart, manufacturers are taking a closer look at the value of postponement as an inventory management strategy.

A major driver, I believe, in the renaissance of postponement is the need to better address the cost versus service level equation. This balancing act is also driving a new approach to viewing and managing the supply chain. Measuring the costs and opportunities across the entire process allows manufacturers, for the first time, to truly understand if, when and where postponement can enhance their overall business performance.

Who are the candidates for postponement?

Electronics, consumer packaged goods and certain food and beverage manufacturers are prime examples of organizations that may benefit from taking a closer look at how postponement can help improve flexibility and reduce inventory costs. These companies, while delivering products with little in common, do in fact, face several of the same business challenges, namely:

- Unstable demand,
- Lead times for customer delivery that are signifi-

cantly shorter than the length of the entire supply chain,

- Large proliferation of SKUs,
- Commonality of components,
- Stringent customer service level requirements, and
- Product lifecycles that span multiple material buys.

Making the move to a postponement strategy. Like any manufacturing strategy, postponement requires careful evaluation and execution to avoid common pitfalls and ensure that the benefits support the ultimate goal: getting products into the hands of the buyer, at a higher margin, without incurring inventory excesses that undercut profits.

Most manufacturers typically manage their supply chains in a linear process. However, in today's manufacturing environment, where supplier variability and demand uncertainty wreak havoc with the best laid plans and where consumers want what they want, this model results in excess inventory, the need to expedite raw materials or finished goods much more frequently, and additional human and capital resources.

There is a better way! By viewing the supply chain and the inherent interdependencies holistically, manufacturers can understand and mitigate the effects of uncertainty while at the same time satisfying customer needs at the lowest total supply chain cost. The methodology for designing and optimizing the supply chain includes:

- Modeling and viewing the supply chain from end-to-end, to also include the interdependencies and supply and demand variability.
- Calculating total supply chain cost, including inventory-related costs.

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- Calculating optimal planning policies.
- Evaluating cost and performance of alternate supply chain structures and sourcing options.
- Quantifying and prioritizing multiple supply chain initiatives simultaneously.

These steps have already helped more than 30 Fortune 500 manufacturers determine not only whether to postpone product differentiation, but where in the process and how to implement the strategy for maximum effectiveness.

The rules of thumb when leveraging postponement. Regardless of how you choose to implement postponement: form-, geographic-, or pull-based, there are several key lessons that should be remembered. They include:

► **Beware the “squeezing the balloon” phenomenon.** With the growth in the popularity of outsourcing and the promise of lower labor, materials and production costs, it’s important to factor in the inherent lengthening of lead times in measuring the overall value.

Delaying differentiation to the point closest to the actual demand pipeline can mitigate the impact of long lead times in support of an outsourcing strategy.

► **One size doesn’t fit all.** Rarely is a blanket approach across all product lines, or even product families the right approach.

One Fortune 1000 manufacturer of data storage products, for example, found that not only did it want to evaluate the strategy for the various types of products (CDs, CD-Readable, CD-Read and Write-able, and floppy disks), but it also wanted to go down to the next level to evaluate the entire process for each, including fabrication, packaging, labeling, bundling, and custom labels.

The resulting hybrid approach, where each product family had a distinct postponement strategy, based on the unique characteristics of its process, allowed the company to hone its strategy to increase service levels.

► **Don’t underestimate the “Wal-Mart effect.”** Increasingly, manufacturers serving the “big box” retailers find themselves between a rock and a hard place. These customers are driving the

performance metrics, often with negative impact on the manufacturer’s cost structure.

A leading provider of glue and other adhesive products, as an example, turned to postponement to help it cost-effectively deal with the impact of Wal-Mart’s demand that it move service levels from 95% to 98%. The surprise benefit: the new strategy resulted in higher sales, driving more shelf space allocation and expanding the manufacturer’s market share.

► **Product redesign may be a by-product.** Not all products are designed with postponement in mind.

A case in point: adding a processor in a notebook computer when the customer-specific requirements were defined at the order stage sounded like a good idea. But, unfortunately for the team at this Top 3 manufacturer of consumer electronics products, the component’s sensitivity to handling required a significantly more robust production process to ensure functionality and quality.

In the next generation of the product, redesigning the printed circuit board eliminated the issues and allowed the company to incorporate the processor at the final stage.

► **Don’t forget incentive systems.** As with any fundamental change in business process, it’s critical to consider the entire system, and to be explicit in defining how constituents and the process will be measured.

Historically, decisions regarding the supply chain have been made at each discrete stage, with leaders for each stage measured on how well they meet the metrics for their link of the supply chain. But like the balloon in the first point, reducing spending costs in one area frequently exacerbates costs further up or down the value chain.

At one of the world’s largest packaging manufacturers, the decision to adopt a postponement strategy for one division came from the company’s COO, who had the authority to direct the initiative and help the team reconfigure its thinking to drive a new set of metrics for performance: one that measured the entire supply chain.

continued on page 4

Use Postponement To Optimize Inventory In Customer-Driven World

continued from page 3

► **The “right answer” is rarely obvious.** Supply chains are incredibly complex, and manufacturers can’t afford to guess. While conventional wisdom can be useful in determining when postponement makes sense (the point at which inventory becomes a liability), there’s little doubt that intuitively knowing at which point that happens is nearly impossible. In a linear supply chain, one manager’s liability is another’s asset.

► **Cost vs. service: The ultimate trade-off, or not?** The ability to win the cost vs. service battle is increasingly becoming an issue for the boardroom as well as the production floor.

Once it was impossible for manufacturers to achieve excellence in both categories. Now, postponement may provide a foundation for reaching the industry’s Holy Grail: just the right amount of inventory, at the right place, when it’s needed. □

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COMING IN FUTURE ISSUES OF INVENTORY MANAGEMENT REPORT:

- Do You Know Your Inventory Carrying Costs? How To Determine ‘True’ Costs
- Globalization, Outsourcing, and the Supply Web: Three Trends with Significant Impact on Inventory Management
- Supply Chain Planning and Its Relationship to Inventory
- What Collaboration Practices Are Really Working to Reduce Inventory and Why
- The Latest Development From the RFID Arena

Inventory Management Key To Field Service Optimization Efforts

Service parts inventory management is the linchpin in many field service organizations. Consider that after-sales service accounts for 10% to 40% of revenue for many industrial and service companies, and up to 50% of inventory investment. No wonder that field service, long considered a tactical cost center is rapidly becoming a strategic focus in many companies.

“Standing in the way of optimized field service delivery are insufficient metrics to gauge and improve field service performance, and disjointed processes across service inventory management and customer relationship management,” Mark W. Vigoroso, vice president, Aberdeen Group, Inc. (Boston, Mass.; mark.vigoroso@aberdeen.com), observes.

Where does your field service organization rate? Vigoroso, in his research study (*The Field Service Optimization Benchmark Report*), finds that survey respondents fall into one of three categories (laggards, industry average, best-in-class) based on their characteristics in four key classifications (see table):

► **Process (responsiveness to customer needs, field service metrics in place).** Firms that proactively diagnose and predict customer service requirements and that measure field service excellence based on overall customer experience consistently performed better than firms that are reactive or unresponsive to customer requirements and that have limited field service metrics in place.

► **Organization (corporate focus/philosophy, level of collaboration among stakeholders).** An enterprise’s underpinning corporate philosophy significantly impacts its field service management performance, Vigoroso observes. “Companies organized around a value system focused primarily on customer satisfaction, versus alternatives like operational excellence or product innovation, tend to realize higher customer retention

rates and a better first-call resolution success rate.”

► **Knowledge (visibility into technician and inventory data, currency, and accuracy of data).** “Vast quantities of data and intellectual property support most field service organizations, all of which needs to be dynamically captured, stored, shared and updated,” Vigoroso explains. Herein lies the Achilles’ heel of many field service operations, as 83% of the survey respondents say

they have limited to moderate visibility into field service personnel capacity and service parts inventory availability.

► **Technology (scope of field service automation, productivity tools).** Optimized field service delivery involves the coordination and synchronization of the components of people, parts, process, and data, which is an impossible feat

continued on page 6

Where Does Your Field Service Organization Fit in This Self-Diagnosis?			
Process	Laggards	Industry Average	Best-in-Class
	<ul style="list-style-type: none"> ● Unresponsive to customer repair and maintenance needs ● Limited metrics in place to measure field service excellence 	<ul style="list-style-type: none"> ● Reactive to customer repair and maintenance needs ● SLAs serve as primary metric for measuring field service excellence 	<ul style="list-style-type: none"> ● Proactively diagnose and predict customer service requirements ● Overall customer experience serves as primary metric for measuring field service excellence
Organization	<ul style="list-style-type: none"> ● Corporate values revolve around product innovation ● Limited collaboration among stakeholders 	<ul style="list-style-type: none"> ● Corporate values revolve around operational excellence ● Some collaboration among stakeholders 	<ul style="list-style-type: none"> ● Corporate values revolve around customer satisfaction ● Real-time collaboration among stakeholders
Knowledge	<ul style="list-style-type: none"> ● Limited visibility into field personnel capacity and inventory availability ● No stakeholder (call center, control desk, field worker) has the most current and accurate view of business data 	<ul style="list-style-type: none"> ● Some visibility into field personnel capacity and inventory availability ● Data visibility declines in currency and accuracy moving from call center, to control desk, to field worker 	<ul style="list-style-type: none"> ● Real-time visibility into field personnel capacity and inventory availability ● All stakeholders (call center, control desk, field worker) have access to the same real-time data
Technology	<ul style="list-style-type: none"> ● Zero to one of the four field service components (people, process, parts, and data) automated ● Spreadsheet-based status and tracking tools 	<ul style="list-style-type: none"> ● Two to three of the four field service components (people, process, parts, and data) automated and synchronized ● Web and e-mail-based status, tracking, and communication tools 	<ul style="list-style-type: none"> ● All four field service components (people, process, parts, and data) automated and synchronized ● Mobile on-demand status, tracking, and communication tools
<i>(Source: Aberdeen Group)</i>			

Inventory Management Key To Field Service Optimization Efforts

continued from page 5

without some measure of technology support, Vigoroso claims.

However, taken as a whole, he observes that companies are not bullish on investing in most field service-related technology over the next year or two; yet they are not entirely dormant he quickly points out.

Leading companies are opportunistically focusing on customer relationship management and mobile solutions. About 12% of the respondents say they will make service inventory and logistics management technology investments in the next 12 to 24 months (see cover illustration).

The steps to success. Whether trying to gradually move the field service organization from “laggard” to “industry average,” or more aggressively to “best-in-class,” requires the following actions to spur performance improvement:

- Proactively monitor and fulfill customer requirements, versus waiting for breakages or outages to occur at the customer’s site.
- Measure performance based on overall customer experience.
- Foster a corporate culture and business processes oriented around client satisfaction.
- Increase collaboration among internal stakeholders.
- Support all critical stakeholders’ visibility into current and accurate customer, inventory, and service data.
- Automate and synchronize as many of the four field service components as possible (people, process, parts and data).
- Eliminate paper- and spreadsheet-based processes, and consider Web, e-mail, and mobile technology solutions. □

Inventory Control Mgrs. Earn Above-Average 3.5% Salary Increase

Inventory control managers, this year, as a composite, earned an average salary increase of 3.5%. This raise was more than that received by other managers in the operations/logistics group (3.2% average hike in salary), and outpaced the all middle management group (3.3%).

Annual increase in total compensation really disappointing. However, the average increase in total cash compensation received by inventory control managers was a dismal 1.9% average, far below the 3.2% reported for the all middle management group, and lagging the 2.4% received by their colleagues in the operations/logistics job function category.

Overall, the average increase in total cash compensation was disappointing for many of the positions tracked by *IMR* (see table, page 7). Going against the trend, distribution managers fared very well, receiving an average raise of 5.1%, while warehouse managers saw a hike of 3.7%, and traffic managers were at 3.6%.

When it came to salary increases, almost all of those tracked fared better than their colleagues. For example, warehouse managers (3.8%) were followed by distribution managers (3.7%), with manager of materials and fleet managers each receiving an average 3.5% boost in salary.

What inventory control managers earned this year. Nationally, the annual salary for inventory control managers was \$66,600, while they earned \$70,800 in average total cash compensation. Regionally, they earned an average \$72,200 (salary), and \$75,900 (total cash compensation) in the northeast, and \$68,000 (salary) and \$72,100 (compensation) in the north central area, followed by the south central region (\$65,000, \$70,000), southeast (\$63,900, \$68,900), with the west coast trailing (\$63,400, \$66,900) as reported in the *2004/2005 Geographic Report on Middle Management Compensation* (Watson Wyatt Data Services, Rochelle Park, N.J.; www.WWDSsurveys.com).

For the record, salary increase budgets down from last year, and it doesn't improve next year.

This year's survey respondents reported an overall (all employees combined) average salary increase budget of 3.5%, down 0.1 percentage point from what was granted last year, says the Watson Wyatt data.

SSMR's sister publication, *Report on Salary Surveys*, in its 2005 Merit Pay Increase Survey, indicates that next year's merit pay raises will be 3.4%, the same as that forecast for this year, re-

maining at its lowest level in seven years. Companies are forecasting raises for their midlevel employees to be as much as 5.7%, and as little as 2.3%, the publication indicates.

The actual 2004 merit pay increase was 3.1%, even lower than the 3.4% the publication originally forecast for the year. Significant merit pay increases were reserved solely for the top performers while workers in the mid- to low-range received raises of 1% or less. □

2004/2005 Inventory & Logistics Management Compensation Profile (Selected Manager Titles)

	Annual Salary				Bonus		Total Cash Compensation				Salary Range		
	Avg	Percentile	Median	75 th Percentile	Avg Paid	% of Avg Sal.	Avg	Percentile	Median	75 th Percentile	Avg Min	Avg Mid	Avg Max
Inventory Control Manager													
<500 employees	68.8	50.9	65.6	78.5	10.0	14.5	73.8	50.9	78.6	85.7	57.2	75.1	92.8
500-2,000	68.1	60.0	69.6	77.8	7.1	10.2	72.1	60.0	74.4	84.0	57.0	73.0	88.9
2,000-7,500	67.5	58.0	68.0	74.8	6.0	8.5	71.4	61.8	71.7	82.3	54.4	70.6	86.7
7,500 and over	64.9	53.2	62.7	71.9	6.1	9.4	69.1	56.3	66.1	77.7	52.2	67.4	82.5
All organizations	66.6	55.5	65.2	74.5	6.6	9.8	70.8	58.5	68.9	80.4	54.2	69.9	85.7
Supply Chain Manager													
<500 employees	82.2	80.2	85.3	90.5	7.4	8.6	86.0	81.5	90.4	95.5	68.9	86.8	104.7
500-2,000	84.2	72.2	82.7	95.9	9.8	11.4	91.9	79.0	89.4	104.2	66.1	85.1	104.2
2,000-7,500	87.5	79.4	88.2	96.4	10.9	12.1	95.0	80.5	94.0	109.3	71.4	93.2	114.9
7,500 and over	88.9	76.1	92.3	101.3	13.6	14.2	98.6	79.5	95.3	117.7	68.1	89.4	110.7
All organizations	86.8	76.7	86.2	96.7	11.6	12.6	95.0	79.9	94.0	107.9	68.4	89.0	109.5
Manager of Materials													
<500 employees	72.4	62.2	72.4	79.2	8.1	10.8	76.5	68.1	74.1	84.4	56.0	72.6	89.1
500-2,000	79.2	65.4	79.8	92.7	7.6	9.4	84.3	69.6	81.0	98.2	63.3	80.8	98.3
2,000-7,500	80.9	70.3	81.2	90.3	10.8	12.9	87.4	72.0	88.6	99.1	63.2	82.2	101.2
7,500 and over	80.8	68.2	82.8	91.7	7.4	8.7	84.7	71.4	86.0	94.3	60.2	79.6	99.0
All organizations	79.0	67.9	79.0	90.2	8.3	10.1	83.8	70.4	82.3	94.2	61.0	79.3	97.7
Distribution Manager													
<500 employees	72.3	67.7	72.5	83.3	12.2	16.3	79.1	69.8	79.7	91.8	52.8	68.6	84.2
500-2,000	74.6	63.0	74.9	85.2	6.7	8.9	78.6	64.9	77.2	90.0	58.1	75.4	92.7
2,000-7,500	71.1	59.1	68.5	78.2	9.7	12.0	78.3	61.2	71.9	86.7	57.6	74.6	91.5
7,500 and over	70.5	57.0	66.3	80.9	16.1	19.1	80.2	59.3	71.1	93.5	55.1	72.4	89.8
All organizations	71.2	59.2	68.0	81.3	13.5	16.3	79.6	61.3	72.2	92.2	55.7	72.9	90.1
Warehouse Manager													
<500 employees	59.9	53.8	56.9	70.1	4.9	7.9	62.1	54.8	59.6	74.0	47.2	59.7	72.3
500-2,000	63.3	50.5	60.6	75.4	7.8	11.5	67.1	51.3	63.9	82.5	48.6	62.5	76.4
2,000-7,500	60.1	49.4	57.2	68.5	4.9	7.5	63.5	51.5	58.7	74.2	48.1	61.8	75.3
7,500 and over	56.7	47.1	54.5	63.0	6.7	12.2	59.9	50.5	57.6	66.1	47.8	63.0	78.2
All organizations	58.6	48.8	55.7	66.3	6.3	10.7	61.8	50.6	58.4	70.7	47.9	62.4	76.9
Traffic Manager													
<500 employees	67.0	53.0	65.5	71.2	6.7	9.4	70.3	56.2	68.0	75.5	48.2	62.6	77.0
500-2,000	67.9	61.3	65.8	72.8	8.4	11.7	72.7	61.8	68.7	83.0	53.5	68.5	83.4
2,000-7,500	69.4	61.1	67.1	78.6	7.2	10.1	74.0	64.3	73.4	84.0	54.9	70.9	86.9
7,500 and over	69.7	61.4	70.5	75.4	7.1	9.6	73.7	63.4	71.7	81.1	53.6	70.6	87.5
All organizations	68.9	61.3	67.3	75.7	7.4	10.2	73.1	61.8	71.3	81.5	53.5	69.6	85.6
Fleet Manager													
<500 employees	65.8	50.8	65.9	80.6	11.6	16.6	74.5	54.4	71.6	97.5	—	—	—
500-2,000	77.4	58.7	72.4	95.7	6.6	7.6	81.5	61.9	72.5	103.5	60.2	77.4	94.5
2,000-7,500	76.0	63.2	74.1	86.3	7.7	9.0	81.5	66.2	74.7	91.2	59.6	76.9	94.3
7,500 and over	77.4	67.8	77.3	85.1	8.9	11.5	85.0	74.3	81.8	92.4	58.0	77.1	96.1
All organizations	77.0	67.3	75.8	85.0	8.7	11.2	84.1	72.5	81.3	92.4	58.3	77.1	95.8

(Source: 2004/2005 Geographic Report on Middle Management Compensation)

IMR

● **IMR inventory management tip of the month: Adopt kanban and pay-at-consumption.**

“About 80% of our spend is concentrated into 31 suppliers,” explains the senior supply chain manager at a small producer of vacuum products. “Our leverage helps to make these concepts feasible. In addition, our suppliers love it because they enjoy more business, can level load their manufacturing facilities, and use more cost-effective transportation,” she relates.

● **Manufacturing activity grows, as inventory levels decrease.** The *Manufacturing ISM Report on Business* (Institute for Supply Management; www.ism.ws) for July reveals that economic activity in the manufacturing sector grew for the 14th consecutive month. In addition, manufacturers’ inventories reversed direction and declined slightly in July, while the July Customers’ Inventories Index decreased 1.5 percentage points from the previous month to 37.5. Respondents to the ISM survey indicate that their customers do not have sufficient inventories on hand at this time.

● **ClearOrbit announces availability of SO Drop Shipment.** Extension to collaborative product line, SO Drop Shipment (ClearOrbit; www.clearorbit.com), allows users to manage the ordering, shipping, and inventory management transactions associated with partners that are drop shipping items based on booked sales orders. Accessible from anywhere on the globe, over the Web, or via XML, the new software provides drop-ship partners with a database-driven collaboration tool that offers visibility to sales orders that require shipment of inventory stored at off-site or remote locations. With full track, trace and control over the most complex virtual supply chains, SODS executes these transactions in real-time, based on data in the manufacturers’ or distributors’ ERP.

● **Local vs. offshore suppliers and the service channel.** “I have a major concern about offshore suppliers and making sure that consideration is given to the total cost of acquisition,” Nicholas N. Testa, Jr., CFPIM, CIRM, chief executive officer, Acuity Consulting (Cypress, Calif.; ntesta@acuityconsult.com) declares. “It’s not only the total cost of acquisition today, when you’re buying lots of the item or product, but also the cost of acquisition later when you’re trying to service the end-product in the service channel, and buying only five, instead of 50,000 pieces,” he explained at *Interlog 2004 Summer* (Worldwide Business Research, Ltd.; www.wbresearch.com). The 50,000 easily fits in the truck or container, but the five, you have to fly, he notes. “So, recognize that local suppliers in some cases make sense, they really can be better choices than going overseas sometimes.”

● **Oracle unveils latest version of supply chain management applications.** Oracle Supply Chain Management 11i.10 (Oracle Corp.; www.oracle.com) helps companies manage risk and compliance in the supply chain. New capabilities include: expanded electronic signatures and records capabilities supporting compliance; RFID-enabled transactions to automatically track inventory movement throughout the supply chain; liability analysis for generating an accurate up-to-date analysis of corporate exposure to inventory and work-in-process risk; freight payment and auditing; and integration with Oracle Internal Controls Manager. In addition, new lean capabilities include scarce inventory allocation for fulfilling orders, LPN and lot-serial receiving, and catch weight support.

● **UPS’ “warehouses in the sky.”** UPS (www.ups.com) has expanded its Trade Direct services by adding air capability to the options for moving goods into the U.S. UPS Trade Direct services streamline the supply chain by making it easy to move goods directly from international factories through customs to multiple U.S. locations, eliminating the need for warehouse stops at the border for repacking. Trade Direct Air joins Trade Direct Ocean and Trade Direct Cross Border services.

Miscellany

● **Sharpen your security practices.** “Terrorist threats heighten everyone’s interest in sharpening security practices,” notes Joel R. Hoiland, president and CEO, IWLA, The Association for Logistics Outsourcing (www.iwla.com). To minimize your exposure to security or terrorist attacks, he advises: 1. Screen employees as well as contractors and vendors. “Go beyond the basics,” he urges. Have a job candidate’s social security number checked to ensure its validity and extend criminal history check outside the local jurisdiction. In addition, don’t limit the background check to the initial hiring date. “Many factors can change throughout a person’s life, and checks should be run each time an employee is promoted, especially if that person is being considered for a more security-sensitive position,” Hoiland maintains. 2. Review your existing security efforts periodically. “If you haven’t evaluated your procedures in the past five years, it’s probably outdated and ineffective,” he states. 3. Use state-of-the-art technology such as high-tech alarm devices, digital video systems with enhanced imaging and global positioning satellite technology in trucks—particularly those carrying hazardous materials.

● **RedPrairie announces “sweeping” set of enhancements.** The 2004.2 release (RedPrairie Corporation; www.redprairie.com) includes enhancements for all major applications, including globalization and compliance, and optimization. For example, compliance checking and optimization has been added for the shipping of dangerous goods via multiple modes including truck, rail, air cargo, air passenger and ocean freight for domestic and international shipments including labeling and documentation requirements. Optimization enhancements include a new heuristic slotting capability that dynamically adjusts slotting based on work performance, and a new family of algorithms within the transportation system that enable personalization of costing down to the order item level.

● **Name change for Council of Logistics Management to become effective in January 2005.** The Council of Logistics Management will become the Council of Supply Chain Management Professionals (www.cscmp.org) effective January 1, 2005. “People in our profession now have an expanded and more critical role within our companies than we did ten or even five years ago,” Elijah Ray, CLM’s 2003-2004 president noted in making the announcement. With a broader emphasis on the entire supply chain, CSCMP will provide its members with enhanced content that incorporates not only logistics, but also procurement, manufacturing operations, and sales/marketing functions.

● **Lean and six-sigma do go hand-in-hand.** “Both lean and six-sigma have been used individually very effectively, but the combination of the two results in a dynamic synergy,” notes Dale Billet, CPIM, CIRM, director, RSM McGladrey, Inc. Both approaches have significant benefits, but using either strategy alone will result in areas that will not be improved, he insisted at the 46th *Annual APICS International Conference* (www.apics.org). For example, using only lean techniques, he relates, “will not enable you to determine if a process is under statistical control.” If the process is not in control, lean efforts will not bring the process under statistical control. “Companies that have attempted to reduce inventories significantly with a lean approach found that they had localized success but not significant inventory reductions until six-sigma was utilized in conjunction with lean,” Billet notes. Conversely, using six-sigma cannot dramatically improve lead times despite reducing variation significantly. Lean and six-sigma are both needed.

● **WERC reports on warehousing salaries and wages.** The 2004 edition of *Warehousing Salaries & Wages* provides updated information on 15 warehousing-related positions. Copies are available (\$50 for WERC members; \$100 non-members) from the Warehousing Education and Research Council, 630-990-0001; fax, 630-0256; e-mail, wercoffice@werc.org; or, visit www.werc.org.

How to Reduce Inventory Through Safety Stock & Lot-Size Optimization

continued from page 1

reduces the cost of poor quality because fewer units are produced prior to the discovery of a quality problem,” Dan Strike, CPIM, six sigma black belt, 3M, details.

In fact, he offers, “One way to reduce inventory is by optimizing two of the most significant types of inventory: cycle or lot size inventory and safety stock.” 3M is still in the initial phases of “institutionalizing” the optimization of lot sizes and safety stock across the company. However, Strike reports that they already have been able to achieve a \$10.9-million in inventory savings by “optimizing lot sizes and safety stock with no negative impact to operational costs or customer service levels.”

3M’s inventory reduction methodology. “Inventory should be reduced through a two-step methodology,” Strike emphasized at the 46th Annual APICS International Conference (Alexandria, Va.; www.apics.org). He identified the steps as:

► **Optimize lot sizes and safety stocks for the current supply chain conditions.** Experience indicates that this step can yield a 20% to 30% reduction in inventory without increasing operating costs or decreasing product availability, he expressed. This step has a dual purpose:

—It provides a cash benefit.

—It links the planned inventory levels to the causes of inventory. Now, he explains, “when the process is improved (lower lead times, reduced variability, lower set-up cost, and the like) there is an immediate reduction in the amount of planned inventory.”

► **Change the supply chain conditions.** After the first step is successfully undertaken, planned inventory levels will be optimal given the current supply chain conditions.

“What-if” analysis should be done to determine the most significant root causes of the optimized levels of lot size and safety stock, and improve-

ment strategies should be formulated to address these root causes, he recommends, but cautions, “The benefits of this step can be far greater than the benefits of step one, but implementing this step is generally more difficult.”

Optimizing lot sizes in the “real” world. “Unfortunately, optimizing lot sizes in the real world is rarely as simple as applying the classic EOQ formula to all your SKUs,” Strike notes.

Today’s advanced planning and scheduling systems can utilize linear programming and may be capable of handling these real-world complexities, he explains. However, there are other simpler and lower cost options.

The real-world limitations can be addressed with the same “minimize total cost” approach used by the classic EOQ model. Here’s how:

► **Build a total cost equation that is a function of the lot size.** Be sure to include all relevant costs, Strike guides. Costs may include inventory-carrying costs, set-up costs for each product in the fixed production sequence, major and minor set-up costs, freight costs, and distinct handling costs for cartons, layers, and pallets.

“Developing the total cost equation that includes all the relevant costs is the easy part of this step, gathering accurate input data is the hard part,” he cautions.

► **Find the lot size that minimizes total cost.** “The simple calculus used to derive the classic EOQ formula cannot be used because the total cost function either has discontinuities or has multiple local minima,” Strike explains.

A simple alternative is to write a computer program (Visual Basic within Excel is one option) to evaluate the total cost equation for all reasonable lot size values and report back the one that results in the lowest total cost. “Often there is a way to apply a smart search algorithm to help the program find the optimal lot size faster, but with today’s computer power,” he notes, “even the ‘mass enumeration’ approach will not take long.”

Overcoming the limitations of “classic” safety stock theory. The most significant limitation is the assumption of normality in the distribution of

DDLT (demand during lead time). The normal distribution is quite robust so moderate departures from normality are acceptable.

However, SKUs with slow-moving or intermittent demand over the lead time may have DDLT distributions that are so non-normal that the classic equation produces very poor results, which typically underestimate the safety stock required. Strike recommends a three-step process to overcome this limitation:

► **Measure normality.** There are a number of complex methods to measure the degree of normality of a set of data. However, for non-negative data (like demand) a simple surrogate measure can be used, he maintains.

The measure is the co-efficient of variation (CV). The higher the CV, the more likely the data will be non-normal. “Experimentation indicates that the classic equation for safety stock performs poorly for any SKU with a CV greater than one,” he explains. The following steps are recommended for SKUs with a CV greater than one.

► **Create an empirical, discrete DDLT distribution.** Rather than using known statistical distributions found in advanced inventory management texts, Strike proposes the following:

—Divide your historical demand data into lead time lengths. For example, if your lead time is seven days and you have 365 days of historical demand, then your distribution will be comprised of 52 data points, each equaling the sum of seven days demand.

“This option is simple but is not very robust, especially when the lead time is long, because the final DDLT distribution will not have very many data points on which to base the safety stock,” Strike explains. “And the variability of lead time is not considered.”

—Use random sampling. With this method, he reports, “you can create thousands of data points for your empirical DDLT distribution.”

For each point, randomly select a lead time according to the historical mean and standard de-

viation of lead time. Then randomly select “lead time” number of data points from your historical data and sum.

“If each of your historical data points is independent, then you can select each of your ‘lead time’ data points randomly,” he explains. If you have patterns, dependence, or correlation between your historical data points, then randomly select the first point and take the ‘lead time’ data points sequentially from the first point, Strike instructs.

“This method is considerably more robust because a large number of data points can be generated with many possible values, and it accounts for variability in lead time,” he notes.

► **Determine safety stock.** “Using your empirical DDLT distribution and a simple computer program, calculate the safety stock required to meet your desired customer service level,” Strike offers. The computer program will need to search the DDLT distribution to find where safety stock would have to be set to provide the required service level.

“This method of addressing non-normality is simply answering the question, ‘what safety stock would have been needed historically in order to provide the required customer service level?’” he continues.

“However, the answer is more robust because the random sampling approach allowed us to base the safety stock off more possible values that occurred historically,” Strike notes.

Making improvements beyond optimization. “Making improvements to cycle inventory and safety stock beyond optimization requires us to change the supply chain conditions,” Strike moves on.

In other words, the values of the input variables in the equations need to be changed. The following two-step process should be used to determine how to change the supply chain conditions, he advises.

► **Perform a “what if” analysis on the key input variables to determine the potential ben-**

continued on page 12

How to Reduce Inventory Through Safety Stock & Lot-Size Optimization

continued from page 11

efits. For example, varying the key inputs of mean lead time, standard deviation of lead time, mean demand, and standard deviation of demand will provide insights as to which one of these inputs is most strongly driving the need to carry safety stock (root cause analysis) and how changes in these inputs affect the safety stock required (sensitivity analysis).

► **Execute those improvement activities that are cost-justified.** The “what if” analysis performed in step one will provide insights into potential benefits of changing each of the key inputs. This information, along with an estimate of costs to make the improvements, allows you to determine which improvement activities are cost justified, he maintains.

3M’s keys to successful implementation of lot size and safety stock optimization. Strike outlines the following:

- Both initial and ongoing “refresher” education on lot size and safety stock optimization for planners.
- A plan for how often the lot sizes and safety stocks should be recalculated with clearly-defined accountability and responsibility to ensure optimized parameters do not become outdated.
- Planned implementation of new parameter values. Large changes in safety stock values can result in dramatic changes in manufacturing requirements, he notes. Large changes should be phased in at the appropriate times.
- Defined metrics to regularly measure cycle and safety stock inventory levels in conjunction with measures of product availability and related operating costs.

“It is critical that inventory be optimized, not simply reduced,” Strike emphasizes. “Reducing inventory without simultaneously considering the impact to operating costs and customer service simply results in a temporary ‘swing of the pendu-

lum.’ As soon as managers see a negative impact on operating costs or customer service, they will call for increasing inventory back to previous levels,” he cautions. “These methods,” he assures, “will lead to sustainable inventory reduction without negative consequences for cost and service.” □

When Working With Metrics—The Fewer The Better Is The Rule

continued from page 1

suggests. “According to the 80/20 rule, two or three KPIs will provide a clear snapshot to gauge cross-functional process status,” she insisted at *Congress for Progress 29* (Mid-Atlantic Chapters of APICS; www.cp-apics.org).

Meanwhile, from the trenches, Randy Moseley, distribution center manager, 3M (Dekalb, Ill.; rmosley1@mmm.com), insists that, “KPI’s keep you competitive, and provide a link between individual performance and meeting customer and organizational expectations.”

KPI’s target key areas to manage toward your company vision, he maintained at the *WERC 27th Annual Conference* (Warehousing Education and Research Council, Oak Brook, Ill.; www.werc.org). “Basically, you have to take that company vision and break it down into workable units,” he describes. “If you don’t do that, it is difficult to connect to the people on the floor. Further, it provides your front line supervisor concentration points, and provides feedback to the employees on how the company and their department is doing towards the goals,” Moseley details.

Kate L. Vitasek, managing partner, Supply Chain Visions (Bellevue, Wash.; kate@scvisions.com) also insists that metrics be aligned to strategy. “That’s really your foundation, and if you’re measuring and aren’t supporting your strategy, then you’re probably going in the wrong direction of where you want to go,” she explains.

Define the correct KPI's. “Basically, you start with the corporate goals and determine how each of the functions and organizations support those goals,” Vitasek offers. “Then you define, ‘what are the tactics and measures that will or could support that strategy,’” she notes.

“All employees need to know how KPI measures are derived and why they are so important,” White adds. “At the shop floor level, you challenge the employees to understand those particular measures that they have control of,” Vitasek maintains.

Meanwhile, Moseley takes the following path to determining his KPIs:

► **Cover key areas you want/need to drive as determined by your customers.** “If you don’t, it’ll be like aiming for a target that you can’t see,” he notes.

► **Use language/terminology that is meaningful to people.** “If you don’t connect with the people who are picking the orders, receiving the trucks, they will not know what you’re talking about,” he explains. “Forget about the jargon they don’t understand.”

► **Know your key X's on KPI, and what causes them to move up or down.** “If you have a situation where you’re trying to improve costs or service, know what will change it, and what the people can do that will make a difference,” Moseley explains.

► **Link your KPI's to best practices in the industry.** “It’s easy to say, ‘do better than last year,’ but ask yourself, ‘is it really good enough?’” he advises.

► **Use process charts.** “Review trends, look at control limits, but don’t overreact to a single datapoint, especially if you’re within the control points,” Moseley advises. “More importantly, don’t get your management to overreact, and continue to focus on the trend.”

Validating the value add. VVA is a process developed by Vitasek that helps to establish department metrics that support the overall corporate

objectives and links accountability to achieve goals where the work gets done. “It also creates an environment where employees use their metrics to drive positive change in the business,” she insists. Her five step process includes:

► **Define company objective.** Articulate the corporate objective, such as “I want a five percent profitability bottom line, how can you in receiving impact that?”

► **Determine VVA statement/metric.** “Challenge each of the departments to come up with their VVA statement, essentially, how they add value to achieve the corporate goal,” she explains. Create value-add statements that are substantially under your team or area’s control and contain measurable performance goals.

For example, she cites as actual statements made by clients: Our team adds value by maintaining 98.36% or better on-time and in-full shipments. Or, our team adds value by maintaining 99.21% or better accuracy on material procurement.

Then, determine which three or four metrics are critical to the success of your functional team.

► **Measure against VVA.** Summarize data so that results are obvious, make it easy to see if goals are being met, and include historical data to track trends are the quick tips.

She also recommends measuring on a more frequent basis, such as fill rates and inventory accuracy on a daily basis. By measuring on a more frequent basis, she explains, “you can see if your action has had an impact faster, and obtain near real-time results.”

► **Build Pareto of reasons.** “Essentially, determine and understand why you are not meeting your goals,” Vitasek states. For example, create a Pareto chart to show where to focus your efforts. Such as, for the action, why orders are late, chart the reasons, which might include: out of stocks, documents, bill of materials, quality, picking, carrier, or administration.

continued on page 14

When Working With Metrics—The Fewer The Better Is The Rule

continued from page 13

Often your failures are caused by another department, she offers. But with the Pareto chart, you'll at least have some factual ammunition, and a direction to follow. And, don't be reluctant to use the "old" bromide: Ask "why" five times if needed.

► **Take action.** "Taking action will help to drive change to improve your performance," she notes. "By sharing your VVA data it helps to mitigate emotions and finger pointing, and explore all actions to solve the problem.

Again, taking the cue from a client, she provides an example: We are working with purchasing to determine which suppliers have slipped; actively issue corrective actions for suppliers with late shipments, and ensure all supplier statement of works/contracts have receiving goals outlined.

Remember: It's all about getting better performance. The goal should be to get performance out of your performance management process, and not to just create a series of metrics, Vitasek insists.

"Where you have metrics but no performance, it's because no one is taking action," she maintains. Metrics are just a dashboard to say you need to auto-correct, so taking action is what it's all about.

She also cautions: The more measures that you have, the more difficult it is to keep up and to take action on them. "So, if you're starting your metrics process, have no more than three or four in each department and strive to hit their goals," Vitasek advises. "When you hit the goal, find a new metric to achieve, and continue to do this until you get the overall company performance up." □

IMR Calendar

RFID BOOTCAMP: New York, Oct. 4; San Francisco, Nov. 8; Orlando, Fla., Nov. 16; Boston, Nov. 29. Sign up today for early registration discounts: www.rfid-world.com; 800-608-9641.

COUNCIL OF LOGISTICS MANAGEMENT'S 2004 ANNUAL CONFERENCE: Philadelphia, Pa., Oct. 3-6. Contact member services department at 630-574-0985.

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Inventory Manager's Forum

Distribution software suite improves inventory management and customer satisfaction goals

Situation: An importer in the gift market arena operates a 10,000-square foot warehouse and maintains an inventory that includes 750 SKUs which are sold to retailers in the U.S. and Canada.

Problem: “Our current software application was not able to provide us with timely information,” the warehouse manager explains. Additionally, too much time and effort were spent trying to manually analyze and track critical information from the growing numbers of customer orders being received.

Solution: They selected the PointForce distribution software suite (TECSYS Inc.; www.tecsys.com) after conducting a search of several software providers. “The solution gives us immediate access to relevant information and tightens up our business procedures, with information flowing from order to shipping,” the warehouse manager explains. “By eliminating the manual steps, we enter the data only once and are then able to track it, trace it, and report it as we need it. The new software solution has given us an edge in customer satisfaction, inventory management and reporting that exceeds our distribution and customer requirements.”

Improved inventory planning helps manufacturer boost customer service in service parts area

Situation: A major manufacturer of heating and air conditioning equipment has increased its global presence during the past several years by establishing an extensive sales, service and parts distribution network to address the special needs of its customers.

Problem: “With the expansion we were undergoing, we also had to improve the visibility of demand and inventory, improve our customer service levels for the service parts and finished goods, while also continuing to reduce costs,” the logistics vice president offers.

Solution: The company opted for the Logility Voyager Solutions (Logility, Inc.; www.logility.com) based primarily on their experience with the Logility Voyager WarehousePRO that has been in its parts operation to optimize receiving, picking, shipping and cross-docking functions since 2001. “We decided on the Logility Voyager Demand Planning, Inventory Planning, and Replenishment Planning solutions that better predict future demand, synchronize inventory investments and provide the desired service levels,” the executive maintains. For example, the inventory planning solution calculates the optimal balance between inventory quantities and desired levels of service based on industry best practices. And the replenishment planning solution determines the best balance between customer service levels and inventory requirements, factoring in current orders, commitments and desired inventory investment.

New TMS enables food products provider to return transportation management in-house

Situation: A leading producer of a variety of food brands has doubled its revenues and volume since its merger with another producer and marketer of packaged food products. The company handles tens of thousands of shipments per year, from manufacturing locations to distribution centers.

Problem: “We had previously outsourced our transportation management activity, but since the merger we now see significant cost benefits and scalability by bringing freight management in-house once again,” the logistics manager offers.

Solution: “Our solution is the Web-native LeanLogistics transportation management system (www.leanlogistics.com), which enables us to daily optimize the transportation process, allowing us to best utilize the capacity of our carriers with fewer internal resources,” he explains. The solution provides the food processor with complete planning, execution and settlement, enabling them to centralize transportation command and control. “We can now do everything ‘in-sourced’ more efficiently, as the solution provides us with better analysis for continuous moves and greater visibility of shipments for us and our customers.”

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