

# Lean 2.0: Take Lean To The Next Level with Dynamic Picking Systems

White Paper

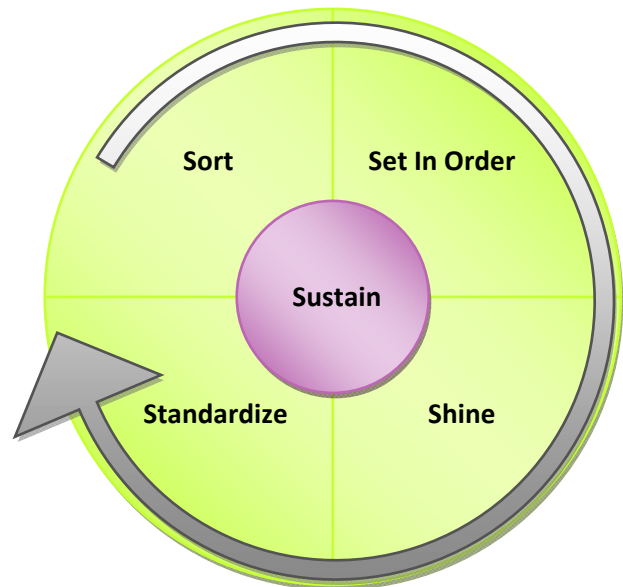
*Utilizing horizontal carousels, vertical carousels and vertical lift modules (VLM) to reduce waste and enhance production processes for further lean gains.*



## Introduction

Companies that have invested time and resources required to make their manufacturing, warehousing and/or distribution processes Lean are well acquainted with both the 5S workplace organization methodology and the seven standard principles for cutting waste. In the 5S method, five phases are included:

1. **Sort** – Eliminate unnecessary tools or parts
2. **Set in Order** – Clearly identify a place for every component used
3. **Shine** – Keep all work areas and processing equipment clean
4. **Standardize** – Create identical processes and workstations where identical work is performed
5. **Sustain** – Maintain the new practices while continually seeking out new ways to improve performance and processes<sup>1</sup>



A key part of the final phase—**Sustain**—requires operations managers to engage in an ongoing effort to identify additional areas of waste reduction and process flow improvements within their facilities.

The focus typically falls on the “Seven Deadly Wastes,” a concept coined after World War II by Taiichi Ohno, developer of the Toyota Production System at Toyota Motor Corporation. The seven wastes are defined as:

1. **Overproduction:** *Producing more than is needed for immediate use.*
2. **Delay/Waiting:** *Any delay between the end of one process and the start of the next activity.*
3. **Transportation/Conveyance:** *Unnecessary movement of products, materials or information.*
4. **Motion:** *Unnecessary movement of people, such as walking, reaching and stretching.*
5. **Inventory:** *Any raw material, work-in-process, or finished goods that exceed what is required to meet customer needs just in time and to maintain process stability.*
6. **Over-Processing:** *Using more energy or activity than is needed to produce a product – or adding more value than the agreed standard.*
7. **Defects/Correction:** *Any production that results in rework or scrap.<sup>2</sup>*

Eventually, however, many managers find their facility is as Lean as it can be. When that happens, it’s time to consider new areas for process improvements and waste reduction. Material handling—and, more specifically, inventory storage—in a variety of areas throughout a facility often presents an

<sup>1</sup> “5S Best Practices,” Quality Assurance Solutions, accessed October 10, 2012, <http://www.quality-assurance-solutions.com/5S-best-practices.html>.

<sup>2</sup> Joel Sutherland and Bob Bennett, “The Seven Deadly Wastes of Logistics: Applying Toyota Production System Principles to Create Logistics Value,” Lehigh University Center for Value Chain Research, accessed October 10, 2012, <http://www.distributiongroup.com/articles/SevenWastesofLogistics.pdf>, 3.

opportunity for an investment in automated storage and retrieval equipment to support the implementation of Lean methodologies. Areas for consideration include:

- Buffer storage of materials or components used in the manufacturing process
- Central manufacturing supply areas
- Finished goods distribution
- Kanban/Just-in-Time inventories
- Kitting operations
- Maintenance parts storage
- Work-in-Process applications

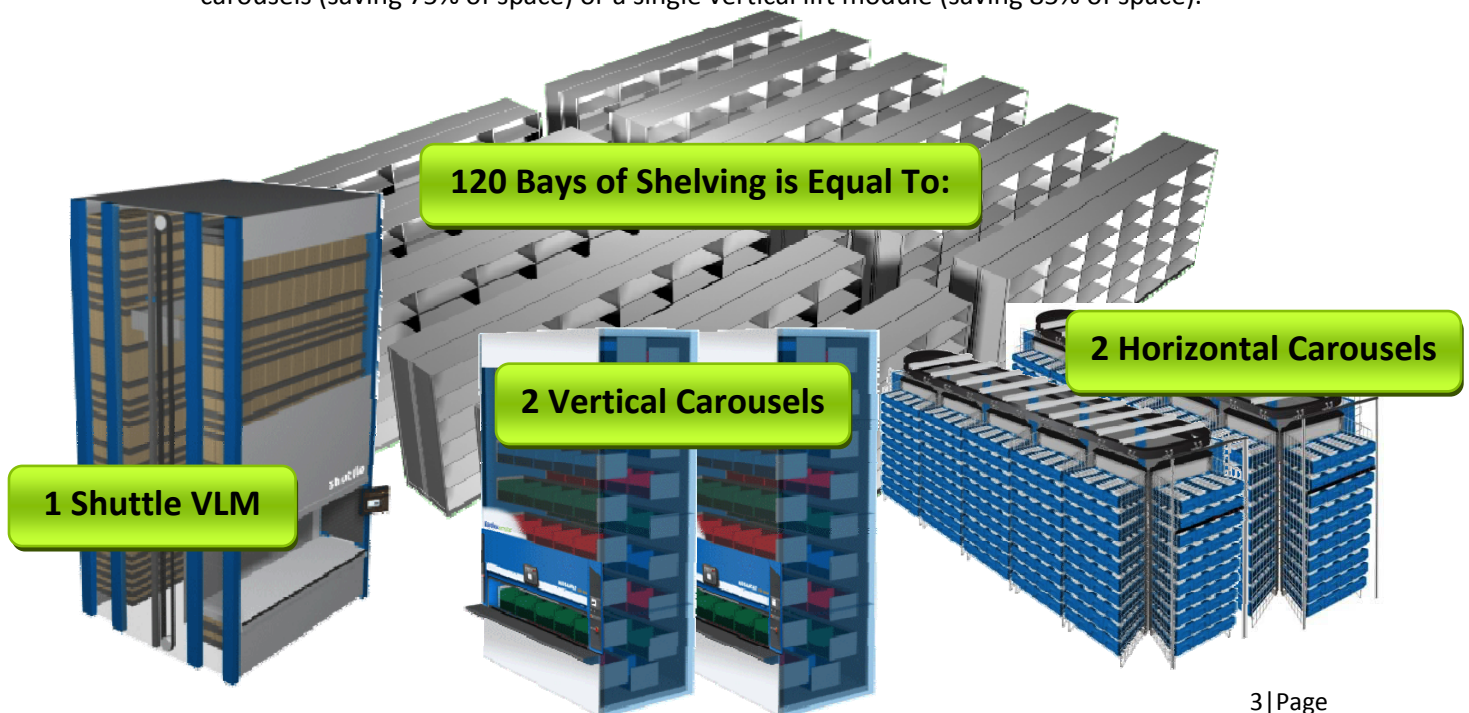
This white paper outlines how an investment in automated storage and retrieval equipment—such as horizontal carousels, vertical carousels and vertical lift modules (VLMs)—will further eliminate waste in these areas in a variety of ways, while simultaneously redefining processes for greatly enhanced productivity and accuracy.

## Opportunities for Waste Reduction and Process Improvements

Implementing an automated storage and retrieval system—such as vertical carousels, horizontal carousels or vertical lift modules—will address as many as five key contributors that work to reduce the seven potential wastes within a facility. These include:

- Floor space
- Poor productivity
- Less than 100% accuracy
- Lax inventory control and security
- Improper ergonomics

**Floor Space:** Implementing high density automated storage equipment immediately reduces the amount of square footage required to store inventory. The equivalent amount of inventory held in 120 bays of static shelving can be condensed into two horizontal carousels (saving 66% of space), two vertical carousels (saving 75% of space) or a single vertical lift module (saving 85% of space).

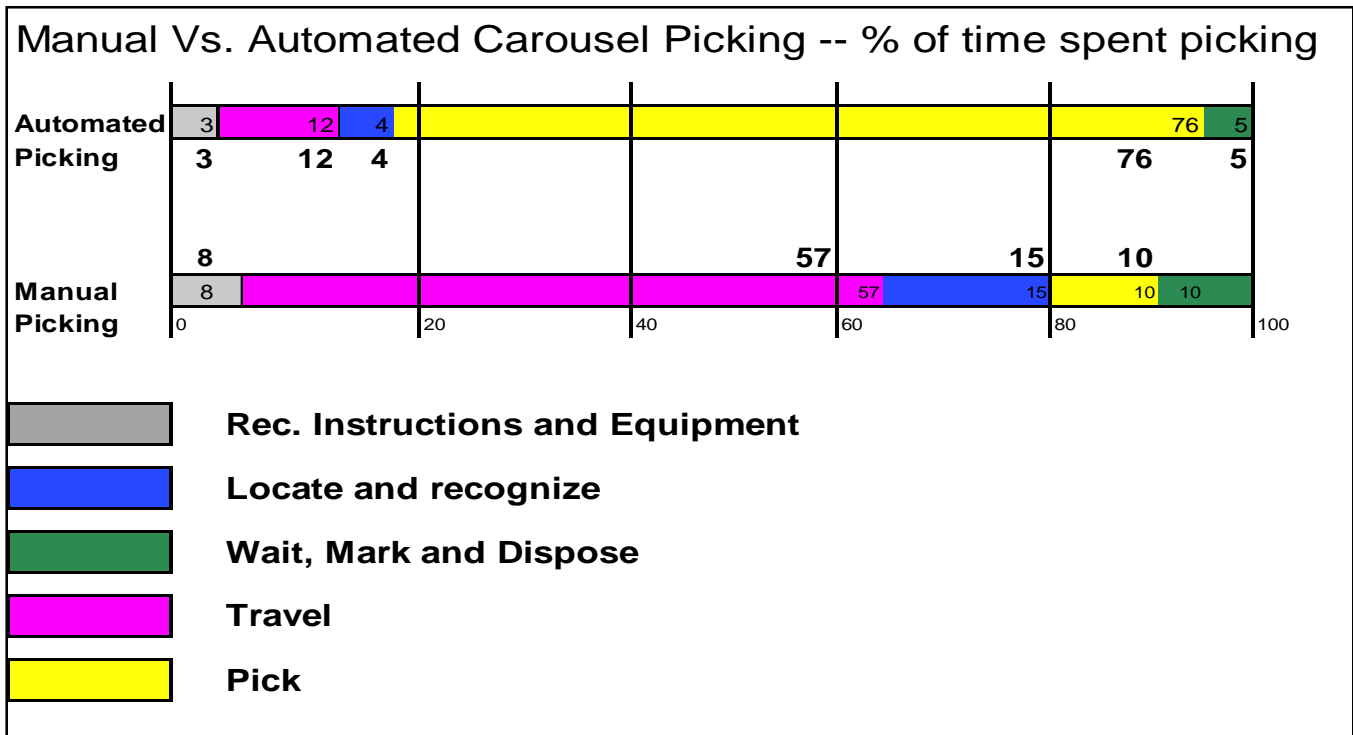


These space efficiencies can be further leveraged either through the storage of more products in the same amount of facility footprint, or via an expansion in the number of stock keeping units (SKUs) stored. Alternatively, the opened-up areas can be repurposed for other, more profitable processes. These could include such value-added activities as:

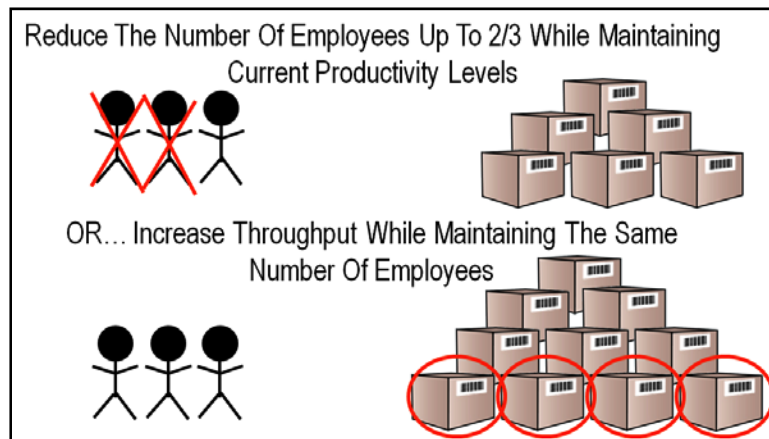
- **Kitting** – Grouping of individually separate but contextually-related items
- **Manufacturing** – Expansion of fabrication or assembly processes for higher volume throughput
- **Quality Control** – Extension of current inspection and measurement activities for quality assurance and faster identification and correction of defects

***Lean Impact:** By maximizing floor space, automated storage and retrieval systems effectively reduce **overproduction**, unnecessary **processing** and **transportation**, and enable better management of **inventory**.*

**Productivity:** Because automated storage and retrieval technologies deliver the required item directly to the operator via the “goods to person” concept—rather than the operator having to travel any distance to locate and retrieve the item—both wait time and unnecessary transportation are radically reduced.



This can result in productivity increases from 200% to 600%, and as many as two-thirds of a facility's workforce can be reassigned to other tasks without a loss in throughput. Alternately, the same number of staffers can pick a correspondingly increased number of orders, further boosting production.



For facilities with a high degree of seasonal hiring to accommodate spikes in customer demand, training time is considerably shorter with automated storage and retrieval systems, thanks to integrated pick-to-light technology that indicate pick location, part description and quantity. A temporary worker unfamiliar with a facility's layout can be stationed at an automated storage and retrieval work cell for highly productive picking after just a brief introduction to the system.

Further, automated storage and retrieval systems can store more work-in-process products that can be picked as needed for small batch, higher value finishing work on a Just-in-Time basis as part of a Kanban process. Each system is easily configured for storage of multiple product sizes, and can be quickly altered as needs change. By allowing a facility to keep only the necessary amount of inventory or parts required, the systems dramatically cut overproduction. Additionally, by placing those automated storage units and their contents in closer proximity to work cells, both wait time and the potential for product damage during transit diminish.

**Lean Impact:** To enhance productivity, automated storage and retrieval systems deliver items to the operator to reduce unnecessary or excess worker **motion**, cut **transportation** and **delays/waiting** and lower the potential for damage that causes **defects** or requires **correction**. They also enable better management of **inventory** to eliminate **overproduction**.

**Accuracy:** In addition to delivering the items directly to the operator, most automated storage and retrieval systems incorporate advanced picking and inventory tracking technologies, such as pick-to-light technology that indicates the precise SKU location and quantity to be picked. This increases picking accuracy exponentially—achieving rates up to 99.9%—due to a reduction in processing errors. It is estimated that more than 35% of facilities experience ongoing error rates of 1% or more. Although 1% may sound like a slim margin for improvement, it can quickly add up, as illustrated here:

Average Facility	
250	Lines per Hour
X 3	Average SKUs/Order
750	SKUs Picked Per Hour
X 8	One 8 Hour Shift
6,000	SKUs Picked Per Day
X 1%	Mispick Rate
60	Mispicks Per Day
X \$100	Average Cost Of A Mispick
<b>\$6,000</b>	<b>Total Lost Revenue Per Day</b>

A facility picking 250 lines per hour, averaging three SKUs per order, and running one 8-hour shift per day picks 6,000 items daily. If 1% of those picks are incorrect, that translates to 60 mispicks. The cost of each mispick—including the expenses associated with shipping the item back, processing it upon receipt, returning it to stock, and loss of customer satisfaction—can average as much as \$100 apiece, or more<sup>3</sup>. Therefore, 60 mispicks equal \$6,000 in lost revenue a day.

**Lean Impact:** To improve accuracy, automated storage and retrieval systems include light directed technologies that increase picking accuracy through simplified **processing** to eliminate mispicks that would be considered **defects** by a customer and must be **corrected**.

**Inventory Control:** Key to the efficiencies delivered by horizontal carousels, vertical carousels and vertical lift modules is integrated inventory management software. In addition to keeping track of the contents stored within, the software also interfaces with a facility’s warehouse management system (WMS) and enterprise resource planning (ERP) systems. This function allows managers to closely monitor stock levels in real time—and potentially eliminate physical counts—to reduce the amount of inventory they must have on hand.

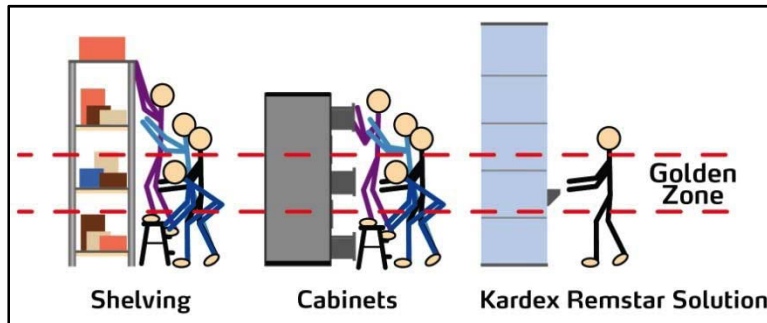
Further, every SKU stored in an automated storage and retrieval system is secure. To access contents, authorized operators can be required to first input a software-traceable personal login and password, enabling missing or misplaced items to be quickly tracked back to an individual. This enhanced level of accountability and security eliminates inventory shrink and its negative impact on the bottom line.

**Lean Impact:** For better **inventory control**, automated storage and retrieval systems utilize software that closely monitors inventory levels, eliminating **overproduction** and unnecessary **motion**, such as conducting physical stock counts or **delays/waiting** required by searches for misplaced items.

**Ergonomics:** Every item stored in an automated storage and retrieval system is delivered to the operator at the correct ergonomic work height, called the “Golden Zone” (waist-high to eliminate bending down to retrieve an item stored low, or stretching up to grab an item stored high). It also minimizes

<sup>3</sup> Hannah Kain, “Simple Fulfillment Errors Will Affect The Bottom Line,” accessed October 11, 2012, <http://www.alom.com/resources/focus.asp?file=002.inc>.

unnecessary or excessive motions required for retrieval of items from drawers or shelves, such as lifting, reaching, walking, stretching, bending, pushing, pulling, twisting, spinning or stooping. Likewise, ladders and climbing are no longer necessary. Because the chance of worker injury is substantially lessened, absenteeism, insurance premiums and claims for worker's compensation will be reduced.



**Lean Impact:** For enhanced ergonomics, automated storage and retrieval systems deliver items to operators at the correct height, eliminating unnecessary **motion**, extensive travel and **transportation** time to locate the goods, and **delays/waiting** associated with manual picking processes.

To learn more about how automated storage and retrieval technologies can help your facility achieve Lean 2.0, contact your Kardex Remstar representative today.

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## SIDEBAR A

### Lean 2.0 In Action: VLMs Contribute To Lean, Just-in-Time Manufacturing Process

With more than 100,000 projection systems installed worldwide, Christie technologies include custom-built solutions for cinema, large audience environments, control rooms, business presentations, training facilities, 3D and virtual reality, simulation, education, media and government. The company manufactures all of its projectors in a 200,000-square-foot facility, with operations based on the Kaizen Lean Manufacturing philosophy. Utilizing a Just-in-Time process, all of the company's projection systems are configured to order in a 24-hour turnaround time.

When the company began to expand into new markets and territories, management needed to find a way to accommodate an increase in both orders and production requirements. With orders swelling, Christie needed to double the number of sub-assembled projectors kept on hand. Previously, the facility maintained an inventory of 100 sub-assembled projectors, each stored on a cart measuring 2 x 3 feet. Doubling that system would have required expansion of both the building's footprint and headcount—neither of which coincided with the company's dedication to Lean.

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With production already at capacity and limited room for expansion, Christie installed two Shuttle Vertical Lift Modules (VLMs) from Kardex Remstar. The VLMs each hold 100 of the sub-assembled projectors and still have room for additional capacity as needed. Each VLM occupies only 180 square feet, compared to the 600 square feet occupied by the previous cart system, providing 70% floor space savings. The recovered floor space has been used to expand the sub-assembly process from six to nine assembly stations.

Additionally, employees no longer need to move or maneuver carts holding heavy projectors to locate the item needed to fill an order. Instead, each VLM's automatic tray extractor presents a tray and indicates the appropriate projector's location to the operator, who uses an ergonomic hoist to remove it from storage and send it along to processing. The former method required four workers as much as 20 minutes each to find projectors. The new system allows two operators to complete tasks in less than one minute.



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## SIDEBAR B

### Lean 2.0 In Action: Replacing Shelf Storage with VLMs Supports Uptick in Production

National Oilwell Varco provides oilfield products and services—from spare parts to comprehensive drilling systems such as rig equipment, integrated systems and downhole tools—to the oil and gas industry. The company's Houston, Texas warehouse supplies parts to the manufacturing floor under a Lean 5S program. However, as plant capacity increased, so did the challenge of keeping the warehouse organized and stocked with the right parts.

In the facility's previous layout, all 9,000 handled parts were stored in open shelving. Workers averaged 4.72 minutes per pick. To decrease that time, the warehouse was redesigned to include three Shuttle Vertical Lift Modules (VLMs) from Kardex Remstar. Inventory was profiled to relocate roughly 3,000 of



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the parts into the VLMs—with the ultimate goal of moving all high usage parts (approximately 5,000) into the systems eventually.

Now, about half of the parts for an order are picked from the VLMs and the other half from the shelving. The VLMs average 1.85 minutes per pick, and because other parts were relocated to more accessible shelves, time spent picking from shelving has been reduced to 3.43 minutes. Workers now pick orders 44% faster using less labor. The VLMs automatically bring the parts directly to each operator, eliminating walking, climbing and stooping to retrieve items. Workers no longer push carts, repetitively move and climb stairs, or reach under shelving into dark corners.

Additionally, the parts that have been relocated to the VLMs occupied 2,654 square feet of floor space when previously stored in shelving. The three VLMs occupy only 797 square feet, opening up 70% (or 1,857 square feet) of shelving space. The company chose to leave a portion of the shelving in place to store parts that were previously stored outside. With the rest of the recovered space, management relocated manufacturing's staging area into the warehouse, speeding up delivery of completed orders, as well as creating a safer work environment by moving parts and trip hazards off the floor.



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## About Kardex Remstar

Kardex Remstar, LLC, a company of the Kardex Group, is a leading provider of automated storage and retrieval systems for manufacturing, distribution, warehousing, offices and institutions. For information about the company's dynamic storage solutions, call 800-639-5805 or visit [www.KardexRemstar.com](http://www.KardexRemstar.com).