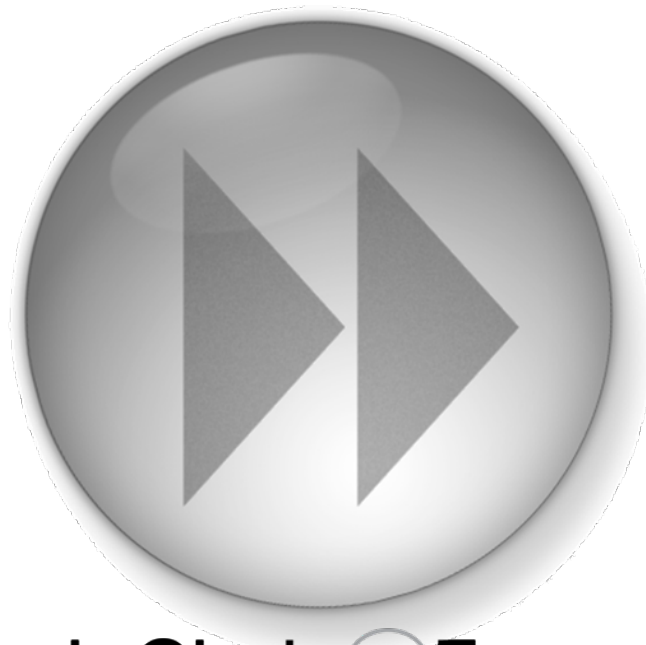




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# Automation Mythbusters

Track 4 Session 8



Supply Chain  **Forward.**

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# Abstract

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- ▶ **The rewards of automation in the warehouse or DC are many. However, legendary myths remain as to the ‘inflexibility’, ‘high cost’ and ‘business risk’ associated with taking that leap from the nice dry pier of manual warehousing into the open waters of technology. This candid discussion will diagnose those myths, cite examples of what-not-to-do, and then explain how to smartly design and apply appropriate technology and bust those myths.**

# Agenda

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- ▶ **Introductions**
- ▶ **Common Automation Myths - Facts & General Considerations**
  1. **Automation Is Too Expensive**
  2. **Automated Systems Are Not Flexible**
  3. **Automated Buildings Are Not Reusable**
  4. **Automated Systems Are Not Reliable**
  5. **Automated Systems Are Not “Green”**
  6. **Automation Will Fix All My Problems!**
- ▶ **Key Takeaways & Questions**

# Myth #1. Automation Is Too Expensive

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## Facts

- ▶ Automated systems may have higher upfront cost but are generally less expensive to operate in the long run
- ▶ In some cases, automated systems may be less costly to construct compared to alternative conventional solutions

## Considerations

- ▶ Run the numbers; look at long term cost of ownership
- ▶ Depreciation rules for conventional and automated facilities are very different
- ▶ Consider leasing options as an effective way to minimize initial cash outlay



# Sample Cost Comparison

	Automation	Conventional	Conventional Cost Basis
Building Costs (GC):	\$19,624,982	\$33,220,000	\$50 per sf plus \$15k per dock door (x40)
Fire Protection:	\$1,805,412	\$1,625,000	\$2.50 per sf
Storage Racking:	\$17,647,059	\$10,400,000	\$130 per location (x 80000)
Automation Equipment:	\$10,905,882	NA	
Material Handling Equip:	\$669,500	\$2,060,000	40 forklifts @ \$38000 + \$4500 battery (x2) + \$1500 charger + \$3000 RF unit & radio
<b>Total Investment:</b>	<b>\$50,652,835</b>	<b>\$47,305,000</b>	
<b>Automation Delta:</b>	<b>\$3,347,835</b>		
Forklift Operators:	\$1,024,647	\$3,224,208	\$13/hr burdened rate moving: - 14 PPH from Production to Storage - 14 PPH from Storage to Dock Staging - 18 PPH from Dock Staging to Truck
Maintenance:	\$416,000	\$208,000	4 full time @ \$25/hr burdened
Power Consumption:	\$110,399	\$878,436	Lighting: 2 Watts/ sf @ 7.5 cents per kWh Forklift: 500 Watts/hr @ 6240 hrs/yr per unit
<b>Total Operational Costs:</b>	<b>\$1,551,046</b>	<b>\$4,310,644</b>	
<b>Automation Delta:</b>	<b>-\$2,759,598</b>		
<b>Payback (in Months):</b>	<b>14.6</b>		

# Myth #2. Automated Systems Are Not Flexible

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## Facts

- ▶ Automated systems are typically less flexible than conventional counterparts
- ▶ A well designed automated system can provide the desired degree of flexibility



## Considerations

- ▶ Identify key areas that require flexibility (throughput, process, packaging, order profile, etc.) before you evaluate technologies
- ▶ Consider Automated Guided Vehicles (AGVs) for flexibility in throughput & material flow
- ▶ Design systems with room for future expansions
- ▶ Understand the long term volatility of each forecasted operating numbers

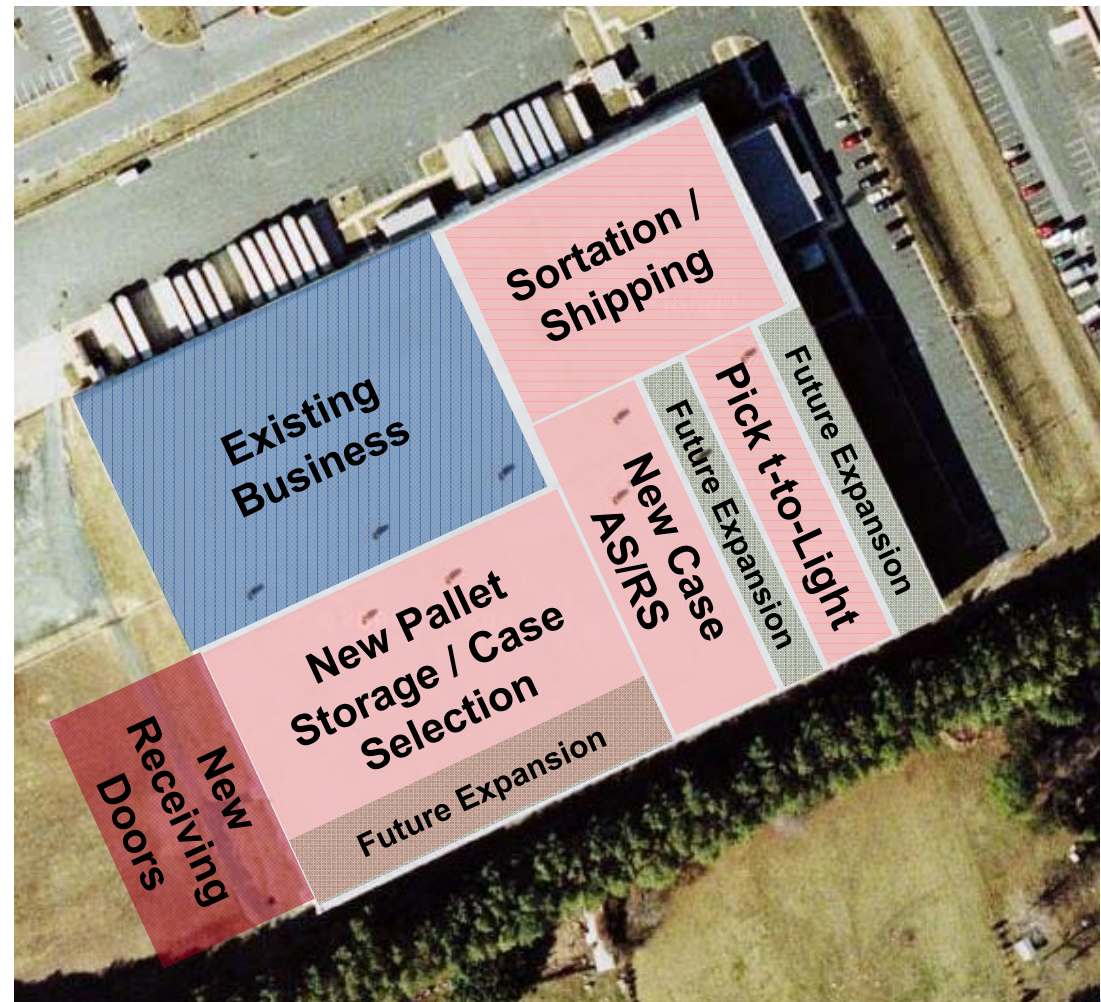
# Design Flexibility

## Design Requirements

- ▶ Bringing in new business unit into existing building
- ▶ High volume case & each picking application
- ▶ Plan for 7% annual growth

## Solution Considerations

- ▶ Streamlined material flow
- ▶ Modular design
- ▶ Future expansion considerations



# Design Flexibility

## Design Requirements

- ▶ Limited # SKUs
- ▶ Plan for 5% annual increase in SKU count
- ▶ Lot sizes will be shrinking long term

## Solution Considerations

- ▶ Consider storage solutions that favor medium/large # SKUs with small/medium lot sizes

Typical Configuration	Relative Floor Density	Relative Spatial Density	Typical Space Utilization	Average Move To Access Pallet	Selectivity	Consider When
1-Deep ASRS (15 High x 1 deep)	65%	49%	H	1	H	Large # SKUs Small lot sizes
2-Deep ASRS (15 High x 2 deep)	79%	59%	H	2	M	Medium # SKUs Medium lot sizes
3-Deep ASRS (15 High x 3 deep)	85%	64%	M	2	M	Small # SKUs Large lot sizes
Deep Lane ASRS [10 High x 10 deep]	95%	59%	L	6	L	Very small # SKUs Very large lot sizes

# Myth #3. Automated Buildings Are Not Reusable

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## Facts

- ▶ A high-rise AS/RS is a single purpose building
- ▶ Many warehouse buildings are leased and are built to 30-35' clear height for reusability
- ▶ Distributors are more concerned about these issues than manufacturers

## Considerations

- ▶ Consider modular technologies that can fit within a conventional warehouse:
  - ▶ Automated Guided Vehicles
  - ▶ Automated Storage & Retrieval Machines that replace forklifts in non-rack-supported captive aisles
  - ▶ Automated Case Storage & Retrieval Machines
  - ▶ Carousels

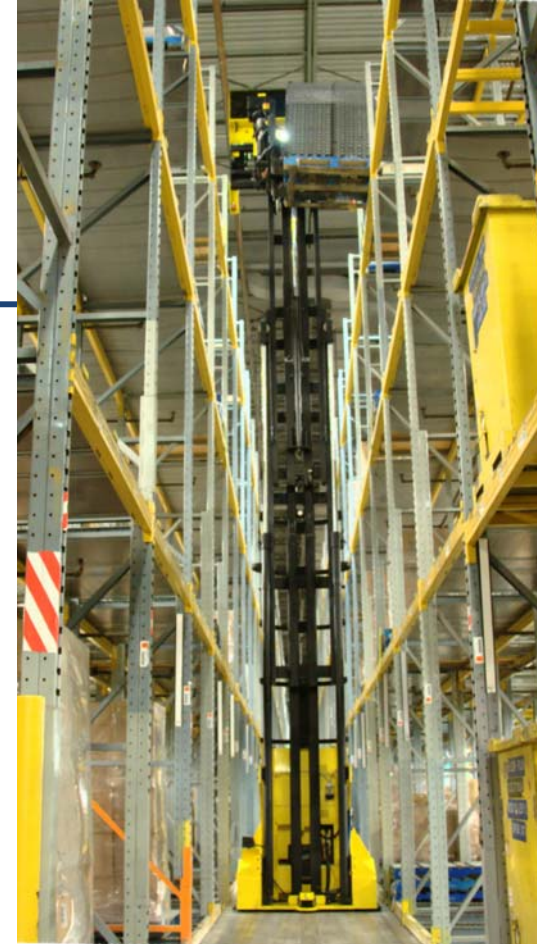


# Pallet Handling Technologies

	MANUAL VNA LIFT TRUCK	VNA FORK AGV	ROTATING FORK SRMS	AS/RS
COST PER UNIT	\$	\$\$	\$\$\$	\$\$\$\$
FIT EXISTING RACK SYSTEM	++++	++++	+++	+
LIFT HEIGHT	++	++	+++	++++
PRODUCTIVITY	+	++	++	+++
EQUIPMENT LIFE CYCLE	5-10 YEARS	10-15 YEARS	10-15 YEARS	20 YEARS
ANNUAL MAINTENANCE COST	\$\$\$	\$\$	\$\$	\$\$
ENERGY EFFICIENCY	\$\$\$	\$	\$\$	\$
LABOR EFFICIENCY	LOW	HIGH	HIGH	HIGH
OFF-SHIFT OPERATION	NO	YES	NO	YES
INVENTORY ACCURACY	LOW	HIGH	HIGH	HIGH

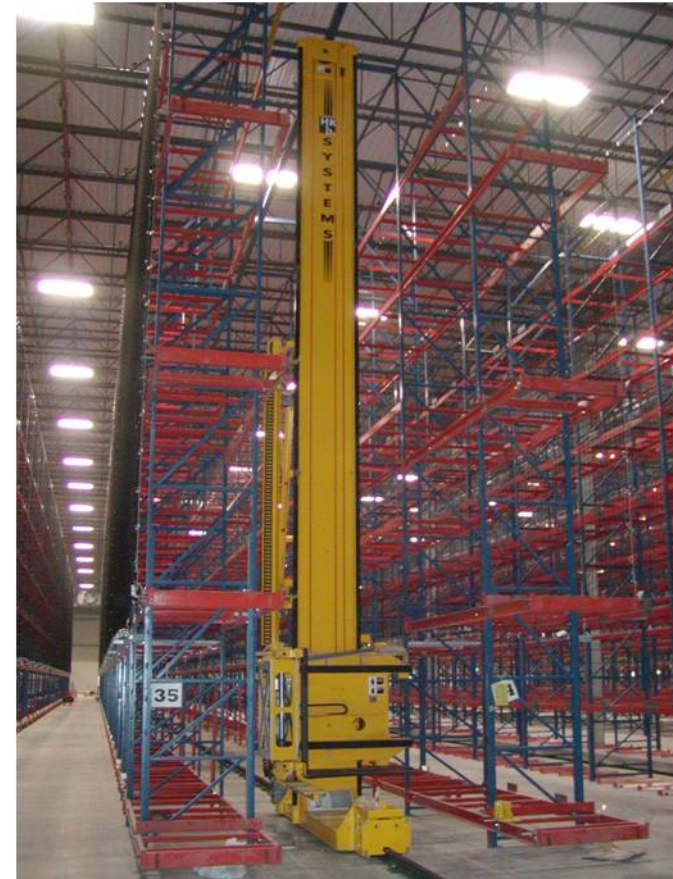
# VNA Fork AGV

- ▶ **Ideal for existing warehouses**
  - Utilizes existing facility with typical fork truck aisles and standard post and beam and/or flow racking up to 35 feet tall
- ▶ **More flexible than AS/RS or hybrid VNA system**
  - Easily scalable for changing business conditions
- ▶ **Productivity increases without labor increase**
  - Reduce labor cost
  - Allows 24x7 operation of “Lights Out” warehouse
  - Contributes to Green Supply Chain



# Rotating Fork SRM

- ▶ **Replaces manual fork truck operations**
- ▶ **An automated Storage & Retrieval Machine (SRM) that fits in existing conventional warehouses with 30-60 feet ceiling height**
- ▶ **Uses forks to handle standard shop pallets interfacing with standard low cost pallet racks**



# Myth #4. Automated Systems Are Not Reliable

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## Facts

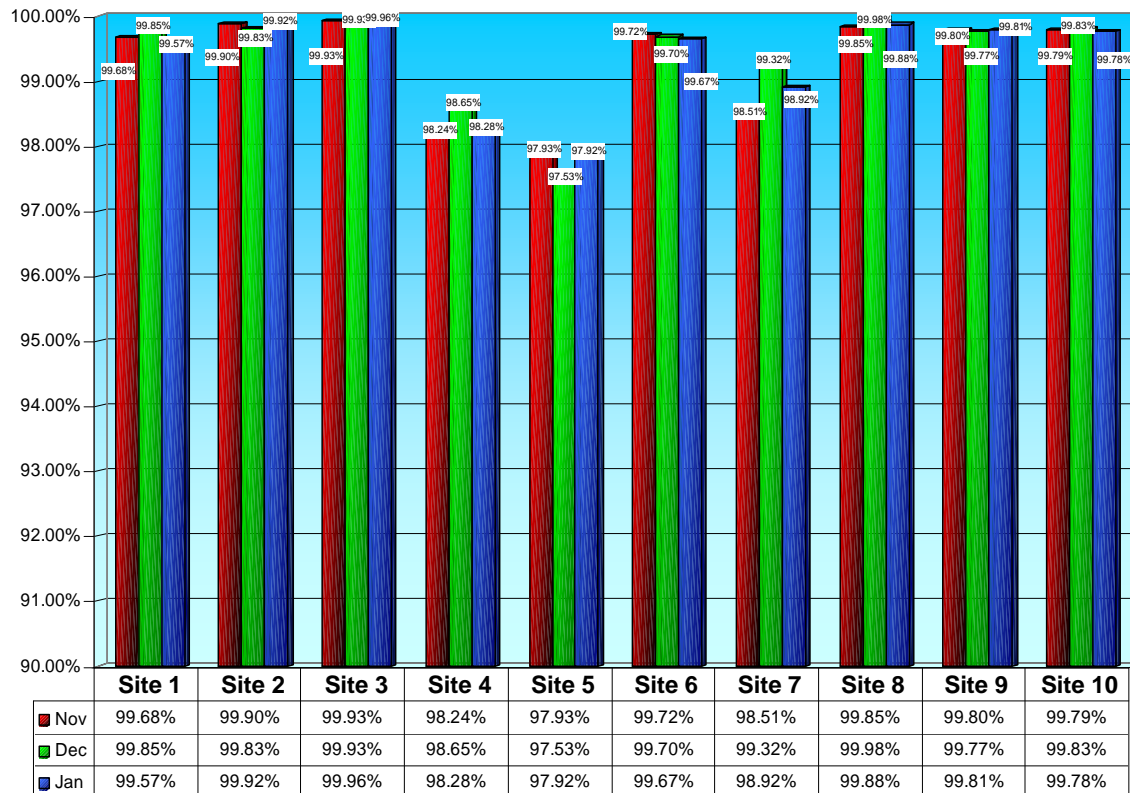
- ▶ A disciplined maintenance program is essential to ensuring system reliability
- ▶ Manufacturers like Ford & Caterpillar rely on automated material handling equipment to deliver parts to their assembly lines just in time

## Considerations

- ▶ Identify single points of failure and develop contingency plans during the design phase
- ▶ Adopt a rigorous, ongoing and disciplined maintenance program
- ▶ Maintain inventory of critical spare parts in-house



# Myth #4. Automated Systems Are Not Reliable



**98% uptime means 9.6 minutes down/day!**

- ▶ **System uptime is not same as system availability**
- ▶ **System uptime defined as sum of each equipment's uptime**

**\*\* Actual Values From Existing HK Customers**

# Myth #5. Automated Systems Are Not "Green"

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## Facts

- ▶ High-rise AS/RS building are environmentally friendlier than their conventional counterparts





## Considerations

- ▶ A high-rise AS/RS has a much smaller footprint than a conventional building
- ▶ Reduced footprint reduces rainwater remediation issues
- ▶ Fully automated warehouses do not require any lighting!
- ▶ Compact design requires significantly lower energy for heating/cooling

# Myth #5. Automated Systems Are Not "Green"



-  Conventional Footprint
-  Automated Footprint

# Myth #5. Automated Systems Are Not "Green"

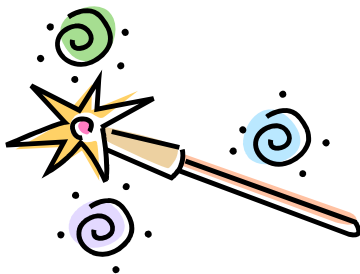
Parameter	Conventional	Automated	Savings
Energy for Lighting	3,750,000 kWhr/year	125,000 kWhr/year	3,500,000 kWhr/year
Energy for Refrigeration			In excess of 15%
Energy for MH Equipment	4,485,000 kWhr/year	2,365,000 kWhr/year	2,120,000 kWhr/year
Order Processing Equipment	31 Lift Trucks 21 Pallet Jacks	12 Lift Trucks 18 Pallet Jacks	19 Lift Trucks 3 Pallet Jacks
DC Construction Materials	33,750 Tons of Concrete	13,182 Tons of Concrete	20,568 Tons of Concrete
DC Construction Debris to Landfill	120 tons of debris	22 tons of debris	98 tons of material recycled

# Myth #6. Automation Will Fix All My Problems!

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## Facts

- ▶ Automating an inefficient process will result in an inefficient system
- ▶ Automation does not address people or cultural issues
- ▶ There is no one technology that solves all problems



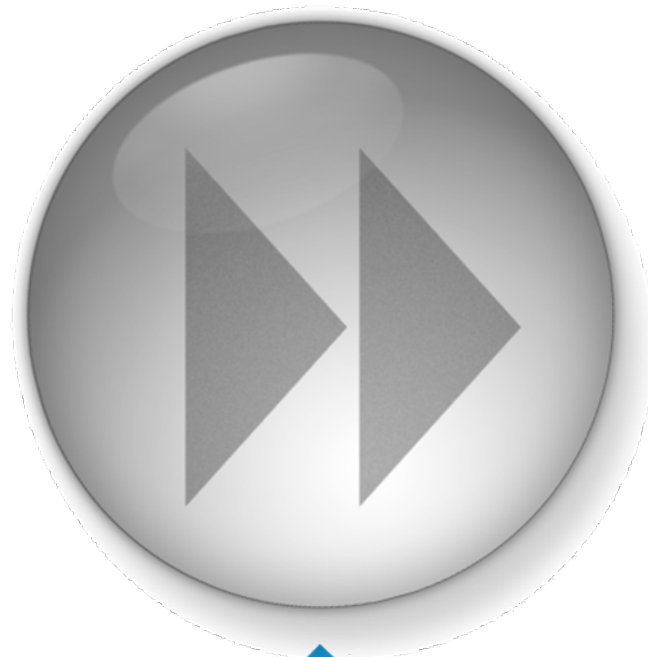
## Considerations

- ▶ Review and reengineer your processes before embarking on an automation project
- ▶ People and change management issues are just as important in an automated facility as in a conventional
- ▶ Automated solutions typically involve integration of multiple technologies

# Key Takeaways

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- ▶ **Keeping the status quo with a conventional operation may be the easy choice but not necessarily the right choice!**
- ▶ **There are a wide range of automated material handling systems today that are more affordable and reliable than ever before.**
- ▶ **A thorough analysis of your operation and future needs is a critical first step to selecting technologies that can meet your unique requirements.**
- ▶ **ROI Tool <http://hkplanet.net/resources-tools.cfm>**



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Questions?