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Welcome to Session 115

Small-Scale Automation – Storage & Retrieval Systems

Presented by:

Mark Schmidt

Central Regional Manager

Sponsored by:

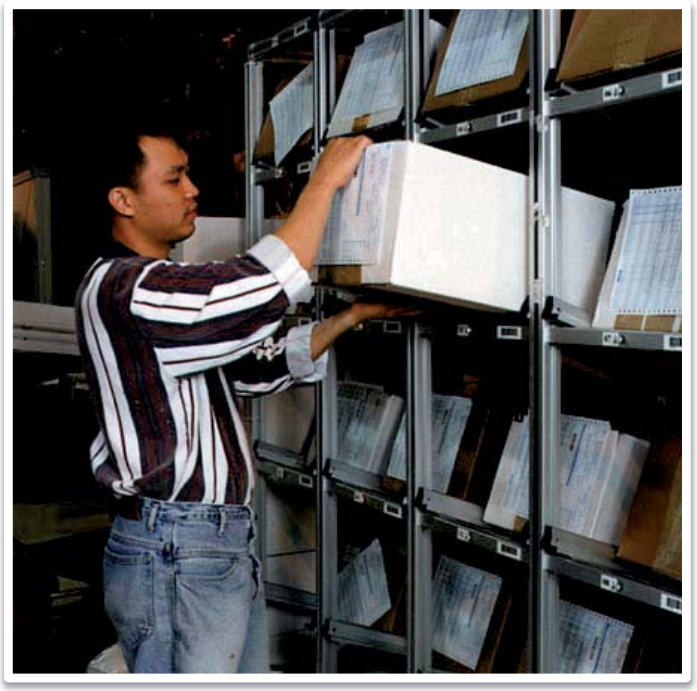
DAIFUKU WEBB

Successful Businesses Give Customers What They Want.

Competitive Pressures and the after-effects of a recession are making the benefits of automated materials handling hard to ignore.

- Customers expect a *"Perfect Order"*
  - Delivered on time
  - Error free
  - Undamaged
  - Lowest handling costs
- They have more choices than ever and all the information they need – at a key stroke.
- Customers today don't settle...they call the shots.

Achieving a “Perfect Order”



- Meet Key Process Indicator (KPI) goals for:
  - Productivity
  - Inventory levels
  - Space density
- Implement supportive handling and information technologies
- Evolve your business to keep up with customer demands using:
  - The **Lean Principles** of Successful Companies

Meeting Customer Demands

Material Handling Technology Has Changed and is Scalable

- Products have evolved
  - Storage
  - Handling
  - Transportation
  - Information Technology

Strategies cause change:

Pull replacing *Push*, *Lean*, and *Agile*

Where are you on Technology Scale?

1960's

2000's

Category		1970's	1980's	1990's	
Storage	Bulk/Floor Rack Shelving	Bulk/Floor Rack Shelving Carousels	Bulk/Floor Rack Shelving Carousels	Bulk/Floor Rack Shelving Carousels	Bulk/Floor Rack Shelving Carousels
Industrial Trucks, AS/RS	CB Fork Truck Pallet Jacks	CB Fork Truck Pwr Pallet Jack NA Fork Truck AS/RS UL&ML	CB Fork Truck Pallet Jacks NA Fork Truck AS/RS UL, ML VNA Fork Truck Carousel w/ I/E AS/RS Box AS/RS Deep Lane	CB Fork Truck Pallet Jacks NA Fork Truck AS/RS UL, ML VNA Fork Truck Carousel w/ I/E AS/RS Buffers AS/RS Deep Lane Vertical Lift Store	CB Fork Truck Pallet Jacks NA Fork Truck AS/RS UL, ML VNA Fork Truck Carousel w/ I/E AS/RS Buffers AS/RS Deep Lane Vertical Lift Store
Transportation	Conveyors Unit & Case Handcarts	Conveyor Handcarts AGVS Overhead	Conveyor Handcarts AGVS Overhead	Conveyor Handcarts AGVS Overhead	Conveyor Handcarts AGVS Overhead
Information Technology	Enterprise	WMS1 CRT Terminals	WMS2 CRT Terminals RF Terminals	WMS3 CRT Terminals RF Terminals Computers PDAs	WMS4 Flat screen Terms RF Terminals PDAs DPS TMS
Strategies	Bulk manufacturing - Push Bulk distribution	Case & Piece distribution JIT mfg	JIT Kanban Lean mfg (TPS) ZBB inventory	JIT Kanban Lean mfg Agile PTL JIS 6 sigma	JIT Kanban Lean mfg Agile mfg PTL JIS 6 sigma Lean distrib Dynamic slotting TMS

What Companies Should be Doing…

- Re-engineering operations, from the logistics perspective, to adopt the benefits of “Lean” manufacturing, warehousing and distribution principles.

The Customer Has Always Been King…but…

The Customer is King

- Pace of change is accelerating.
- Whole levels of the customer supply chain are being eliminated.
- Customers demand greater variety and service.

"It used to be a late delivery meant an irate customer. Now it means a cancellation."

- Larry Brown, Senior VP, Dell Computer

What Are the Issues?

- Supply chain simplification
- Reducing errors
- Cutting inventory and reducing order fulfillment cycle time
- Provide Value-added services in high-throughput environment
- Getting and keeping qualified labor
- Rapid pace of unforeseeable change
- Returns (reverse logistics)

Foundation for Success in Today's World

- Develop a lean & agile attitude in your operation
- Focus on the process rather than on individual tasks or an approach

***Lean* and *Agile* are core competencies for profitable business**

Yesterday's answers won't solve today's problems.

Today automating a process:

- **Can be beneficial to reduce production or fulfillment cycle times.**
- **In most cases doesn't need to be a large scale investment.**

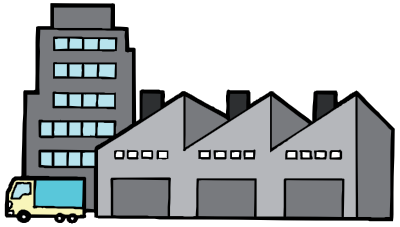
Misperceptions of Small-Scale Integrated Technology

- Limited range of applications (big systems only)
- Throughput too low
- Too expensive; not justified
- Long implementation cycle
- Reliability; mechanical & controls issues
- People to take ownership

Principles of Internal Logistics to Justify Considering Small-Scale Automation

1. **Objectivity** is the key to exposing true opportunity
2. **Distance is the enemy** of productivity.
3. **Faster is always better** – Reduced cycle time means less cost and higher quality
4. **Touch management** is critical
5. **Real time management of inventory** and order tracking is critical
6. **Customers and suppliers** are critical to the success of a "Lean" enterprise
7. **Operator involvement**: Empower the workforce to control the flow of the process and give them the visibility to make productive, informed decisions.

Lean Principles Apply to Small Scale Automation



Manufacturing and Warehousing

- Eliminate safety stock
- Visual Kanbans

- Cellular production
- Paperless production
- 6 sigma production quality

- Cut production cycle time
- Eliminate non-value operations

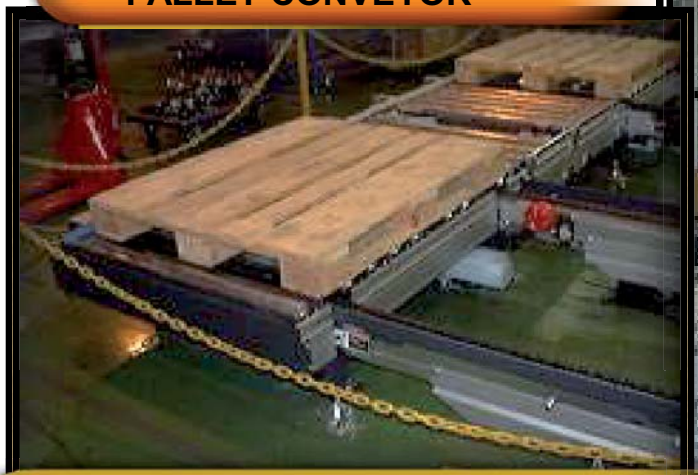
- Greatly minimize safety stock
- Electronic buffers/sequencers & real time inventory control
- Cellular picking
- Paperless order fulfillment
- 6 sigma shipping quality and inventory accuracy
- Cut fulfillment cycle time
- Eliminate non-value touches

"Lean" promotes speed, accuracy, low costs, low inventories and helps deliver the perfect order

Scalable Point-of-Use Materials Handling Automation Technologies to Improve your Process.

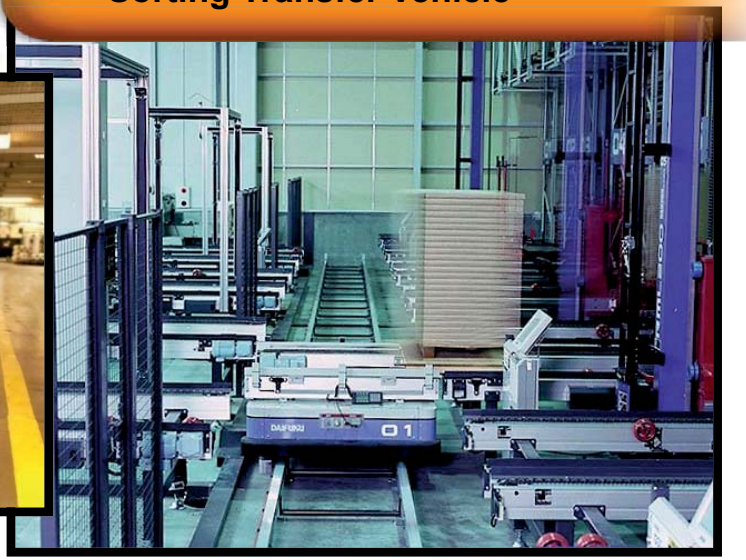
Automated Storage & Retrieval

PALLET CONVEYOR



TRANSPORT & ACCUMULATION CONVEYOR

Sorting Transfer Vehicle



PICK-TO-LIGHT System

Automated Guided Vehicles

Automated Storage & Retrieval Systems (AS/RS)

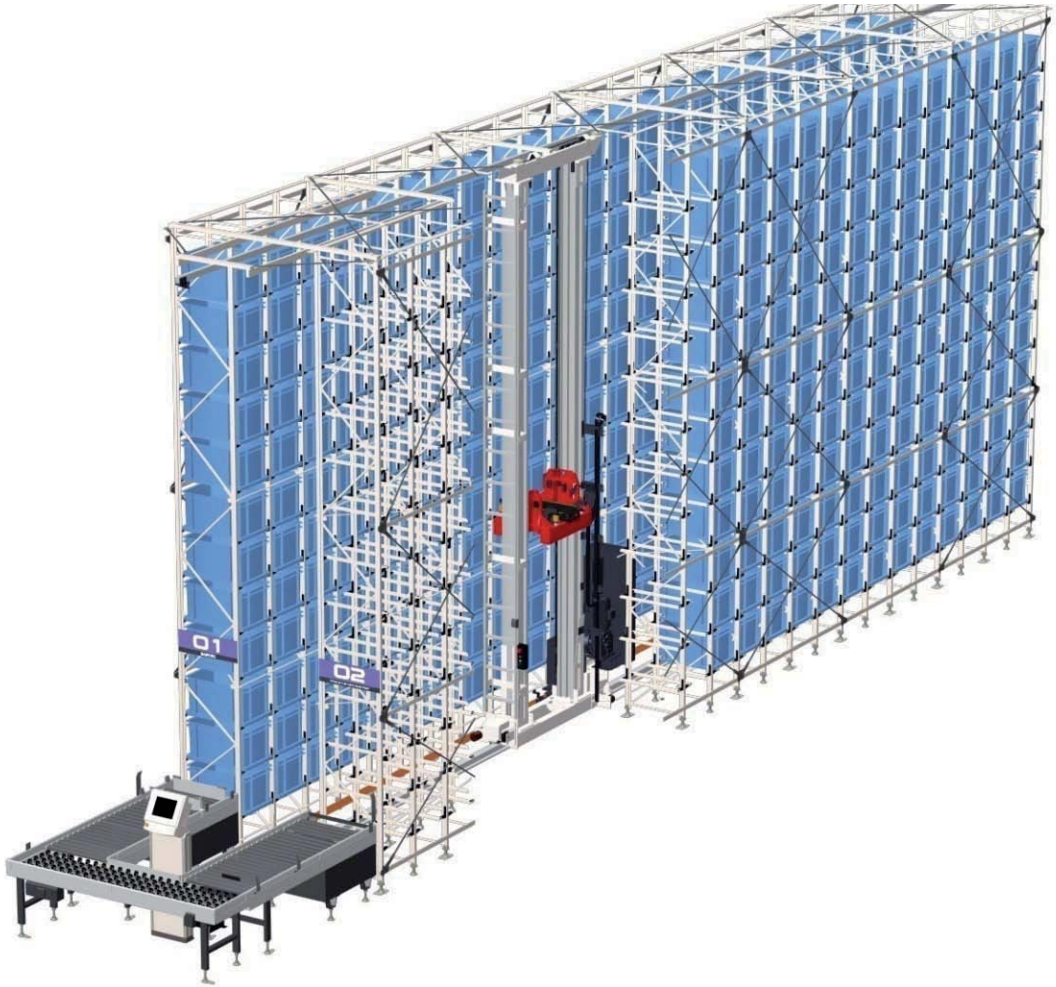
- A combination of equipment and controls that handles, stores, and retrieves materials with precision, accuracy and speed
- Benefits:
  - Recapture floor space
  - Improve efficiency/productivity
  - Improved throughput
  - Inventory accuracy and control
  - Reduced labor cost
- Expandable
  - Length
  - Additional aisles
- Scalable
  - Simple Stand Alone, Manually Controlled
  - Computer Controlled AS/RS
  - Totally integrated into multiple processes.

AS/RS Video

AS/RS Technology Supports Today's Trends

- AS/RS is less "storage", more "staging" for Raw, WIP and FGI
- Broader range of industries and companies use AS/RS and supporting technologies
- U.S. recognizes AS/RS provides density and control already understood in Europe and Asia
- Asia is racing ahead with AS/RS
- AS/RS is a key subsystem for Lean Manufacturing and Distribution

Automated Storage and Retrieval System



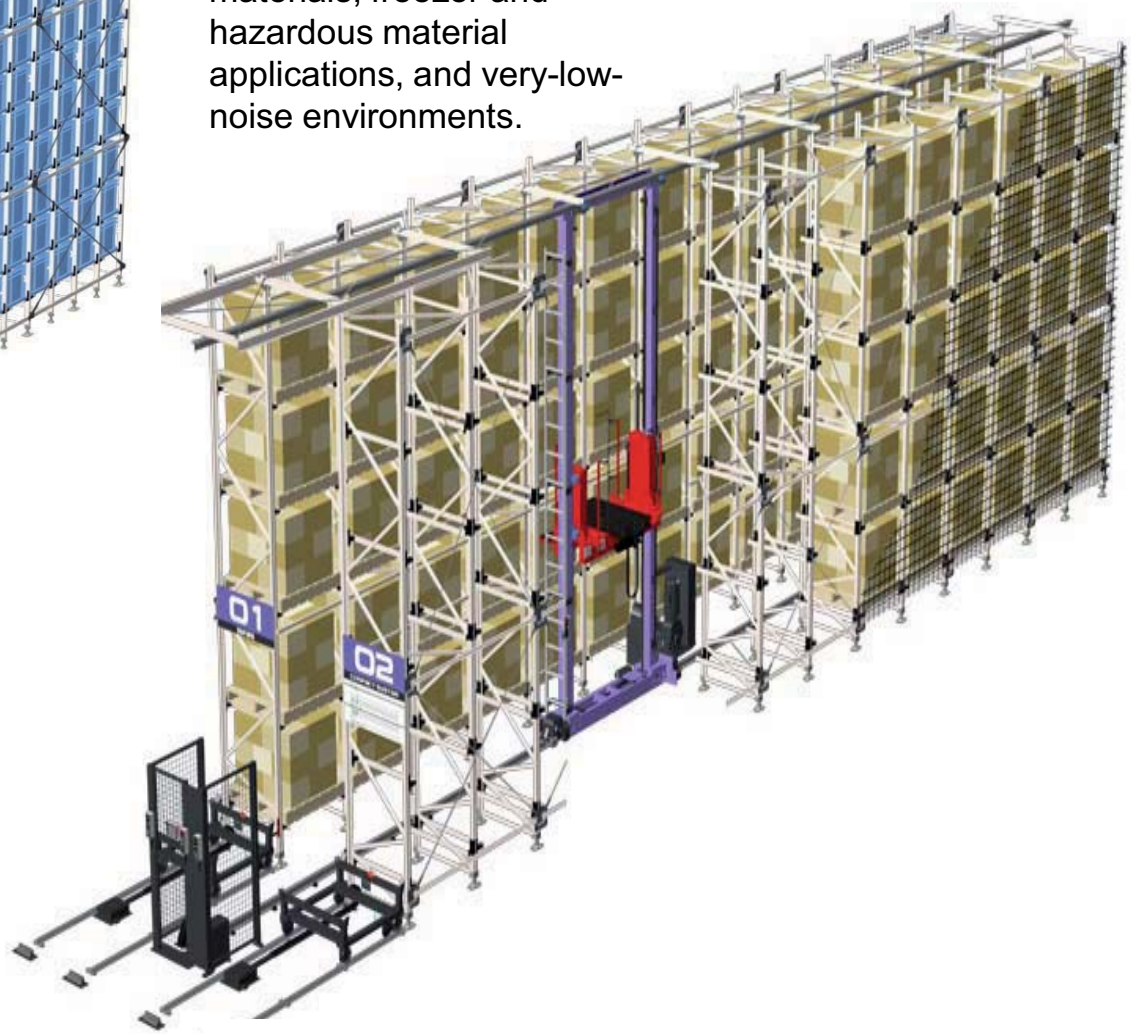
Mini-Load (case & tote).

Variety Of Load Handling Methods

The mini load offers single or dual shuttle, frame, robotic arm, or extractor load transfer method. Choose the method that best fits your needs.

Special Loads

Special models can accommodate long or bulky materials, freezer and hazardous material applications, and very-low-noise environments.



Unit-Load (Pallets/Boxes/Long Loads).

The Business Case

Hargrove

Gas Fireplace
Logs & Accessories

The Old Process

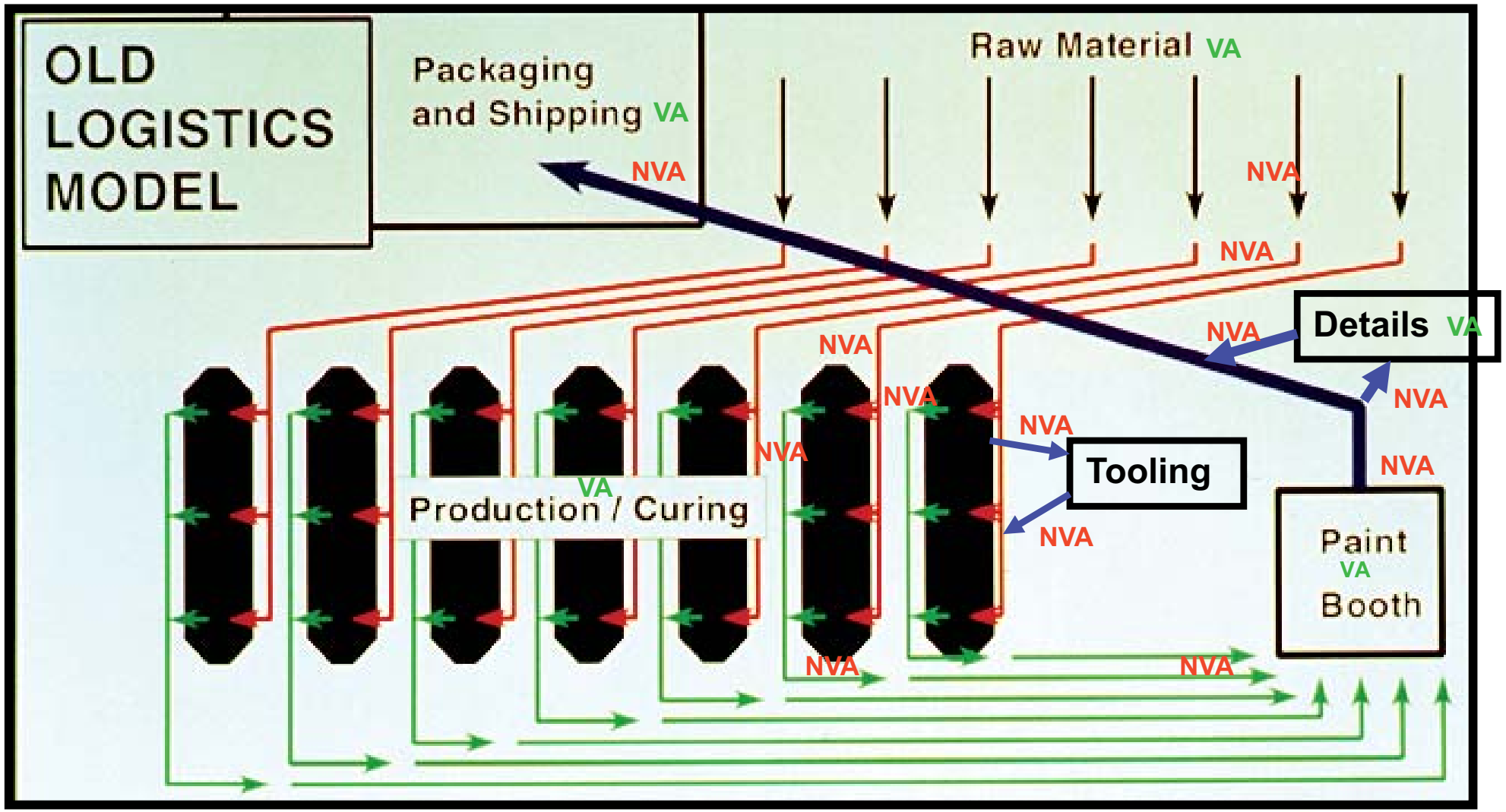
Walk Through/Study Revealed

- Could not meet increasing customer demand
- Labor-intensive operation (14 NVA to 5 VA steps)
- Dust pollution from mold cleaning
- High worker's compensation claims
- Poor cure-time process control
- Long, unpredictable cycle times (variance)
- Wrong mix of product for log sets caused missed shipments
- Severe space limitations

The Old Process

Scoresheet

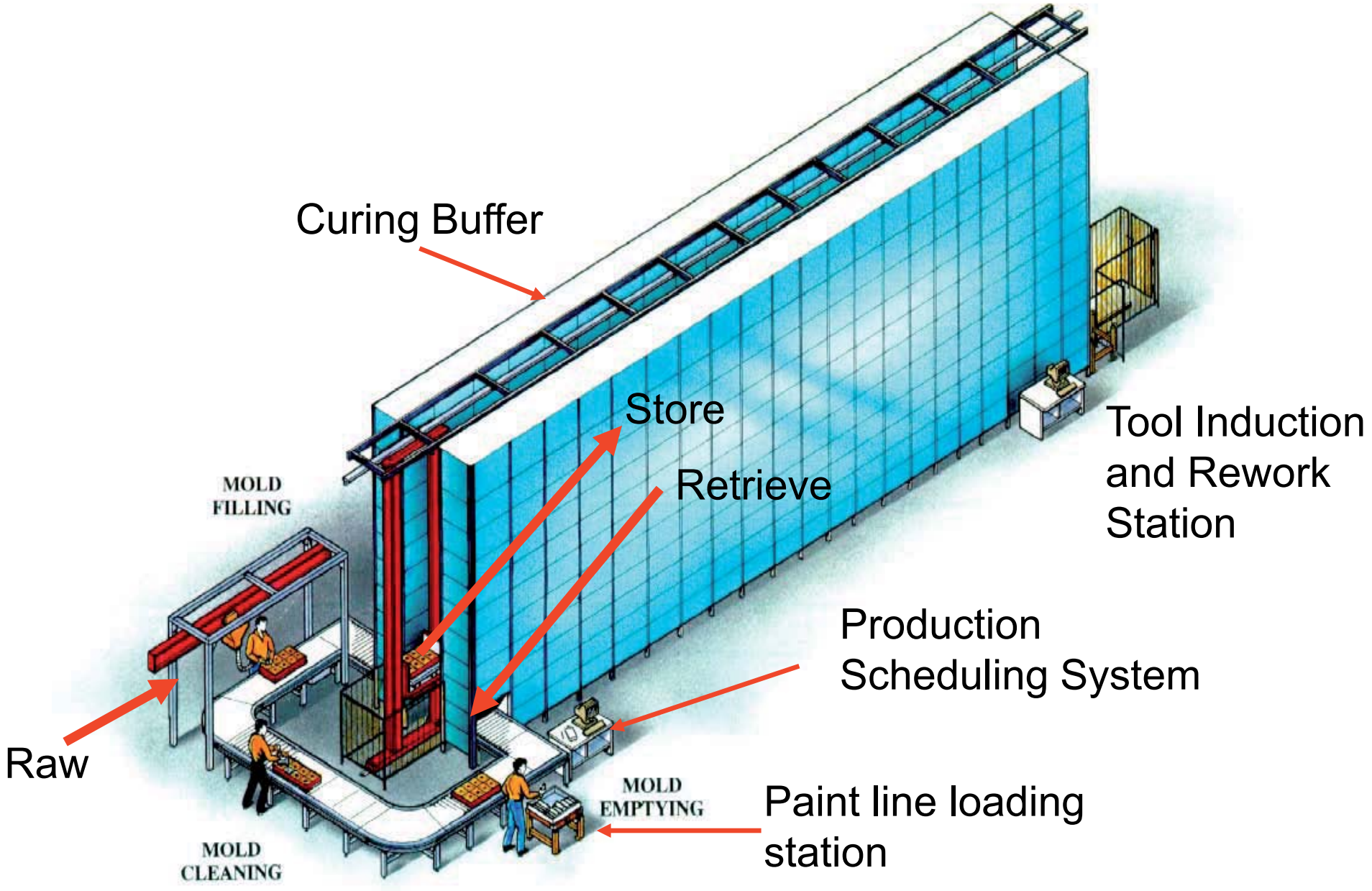
5-VA 14-NVA



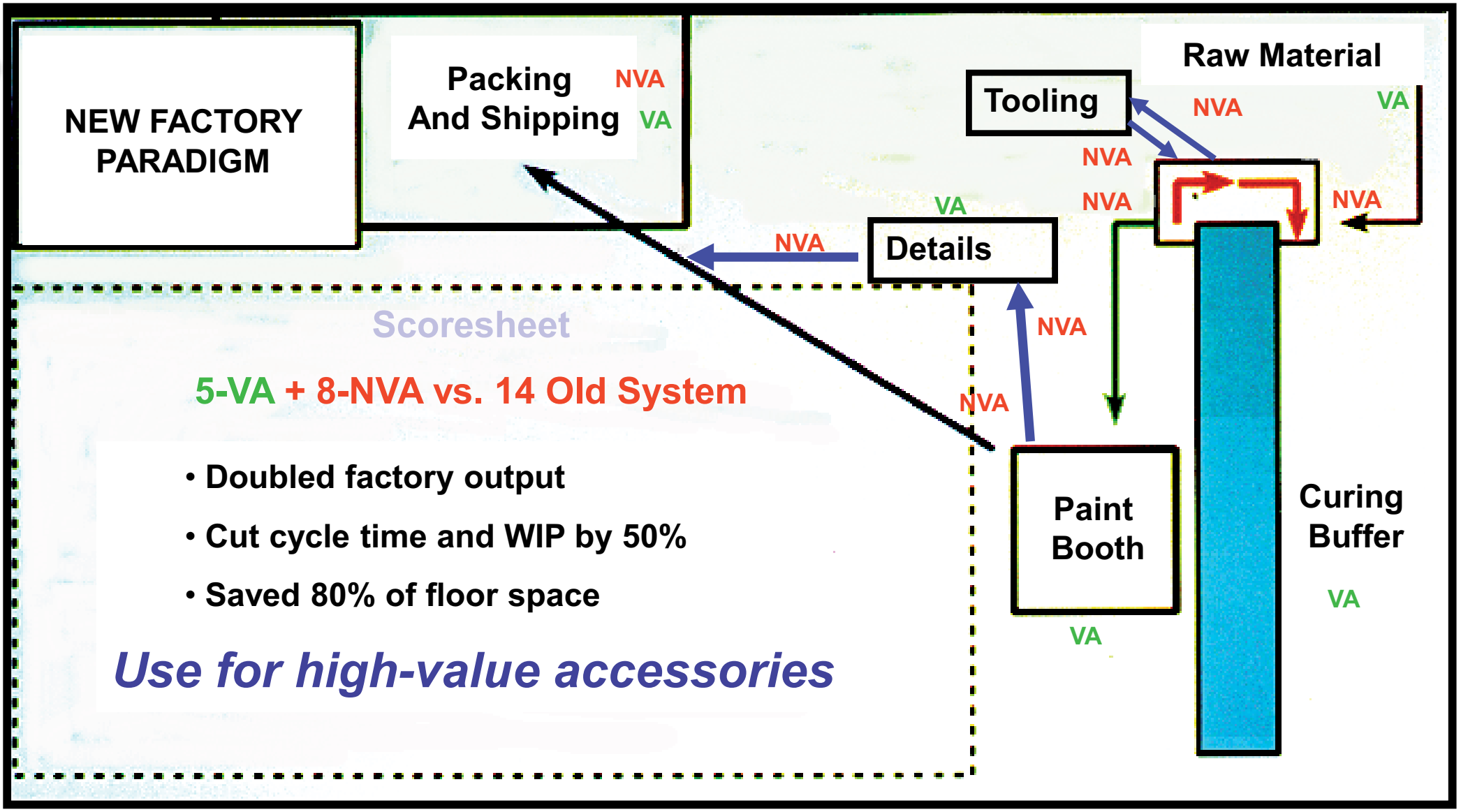
The Alternatives Considered

- Purchase additional land and build a new factory/warehouse
- Capitulate: Settle for decreasing market share (Milk the cow)
- Change their processes to increase capacity and utilize available space more efficiently

The New Process



The New Process



Mold Pouring

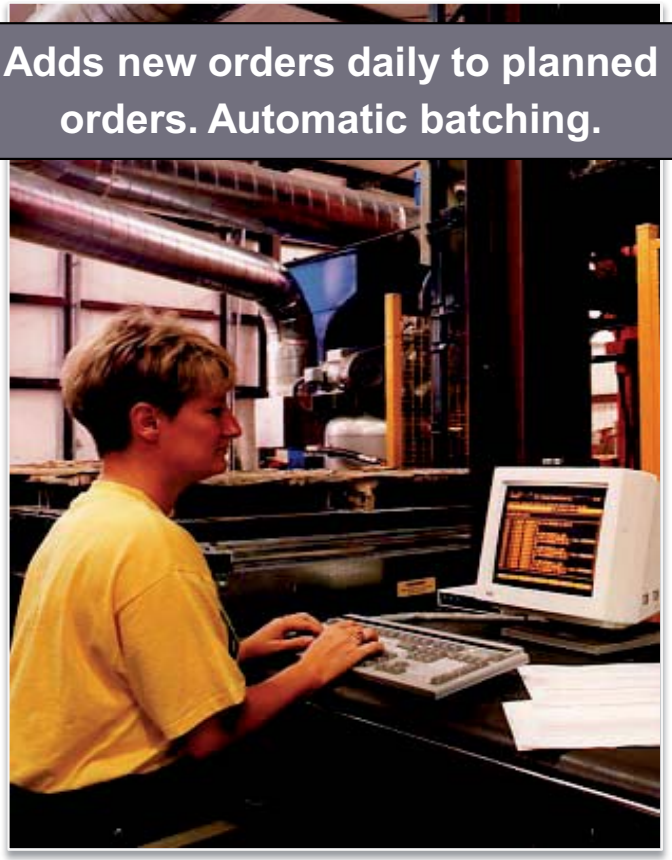
Open rack sides for improved curing

Vibration table to improve mold details after fill station

Flow

Operator Console

Adds new orders daily to planned orders. Automatic batching.



The Results – Process was Broken

- **Lean:**
  - Cut cycle time by 50%
  - Tripled production with fewer people
- **Asset Utilization:** Saved 80% of floor space; added (high margin) accessories
- **Quality:** Tooling, rigorous cure time control
- **Inventory Control:** Achieved ~100% accuracy
- **Environment:** Reduced dust pollution from mold cleaning
- **Safety:** Reduced compensation claims
- **Longevity**: 15 years & counting

Focus on the process rather than on individual tasks or an approach.

Supply Chain Solution: Delphi Case Study

- DELPHI: 1st tier wire harness supplier.
- ARD Logistics Automotive Business Unit: 3PL local to Mercedes plant.
- Mercedes SUV assembly plant is end user.
- Just In Time/Just In Sequence system for vehicle specific harness (built to order).
- May '05 MMH article: "From Juarez to Cottondale".

Challenges

- Size/weight of harness in tote – 2’x6’x1’H, 135 lbs. Handling assists required.
- Rigorous sequencing to **match line-set broadcast**
- Small system footprint
- 100% on-time order fulfillment for all situations short of natural disaster = mission critical system
- Schedule: 4 weeks concept to order; 6 month implementation

Value Chain Participants

Mercedes, Tuscaloosa County, AL

R-Class

M-Class

Just In Time/ Just In Sequence Assembly

Build Orders

Assembly Broadcast

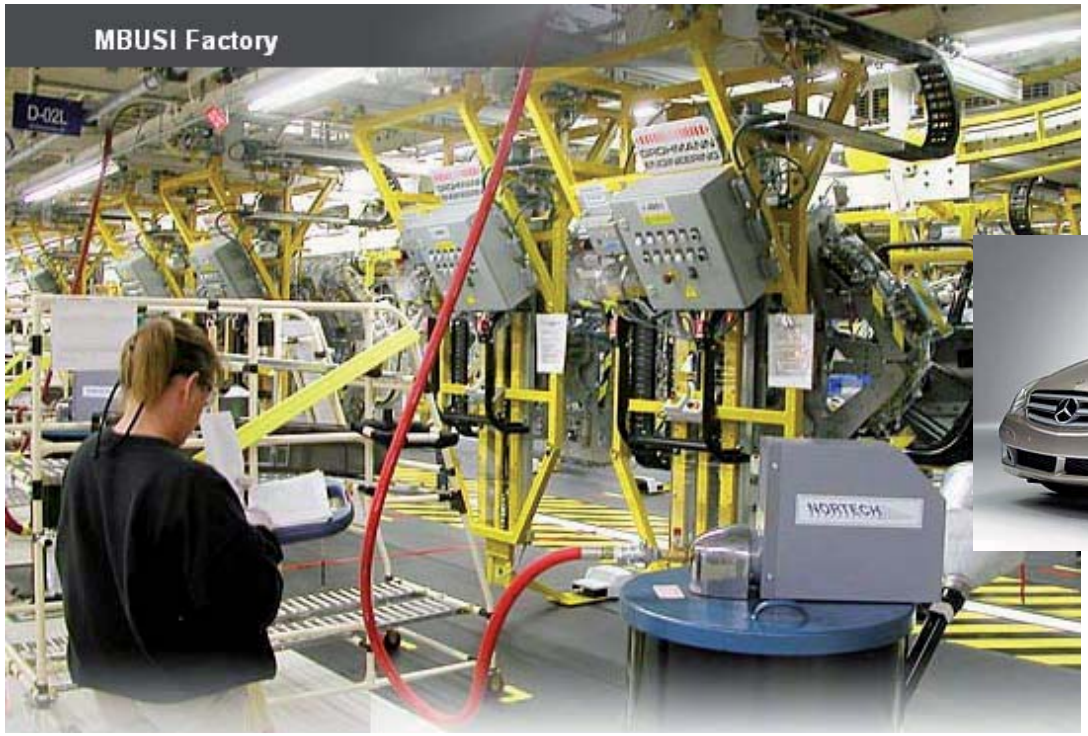
12 miles

1200 miles

Delphi, Juarez

ARD Logistics, Tuscaloosa County, AL

Mercedes Benz U.S. International



Assembly Inventory = 2 hours

M-Class

R-Class

GL-Class

Delphi - Juarez

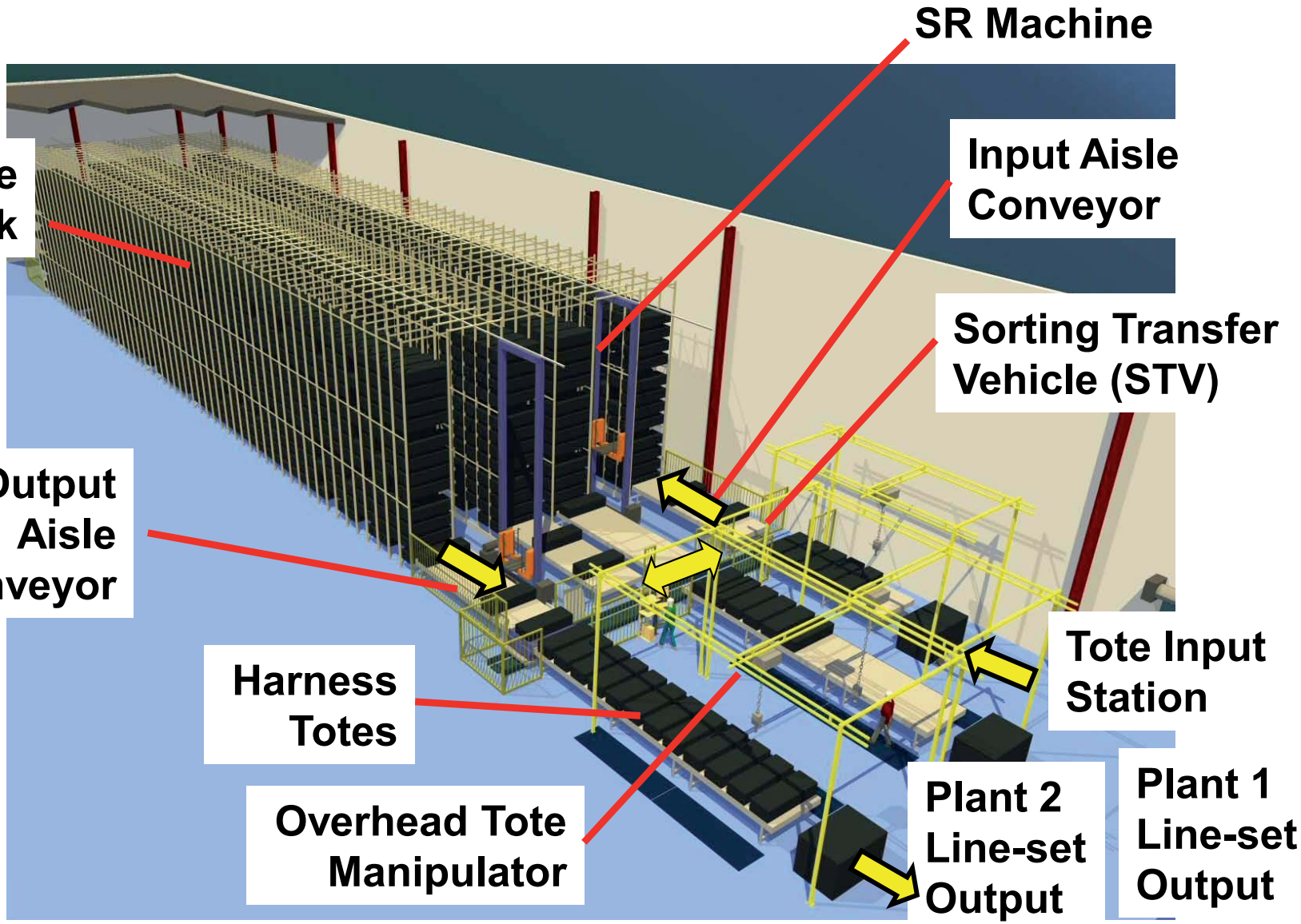
Vehicle and engine harnesses shipped in same tote

Build

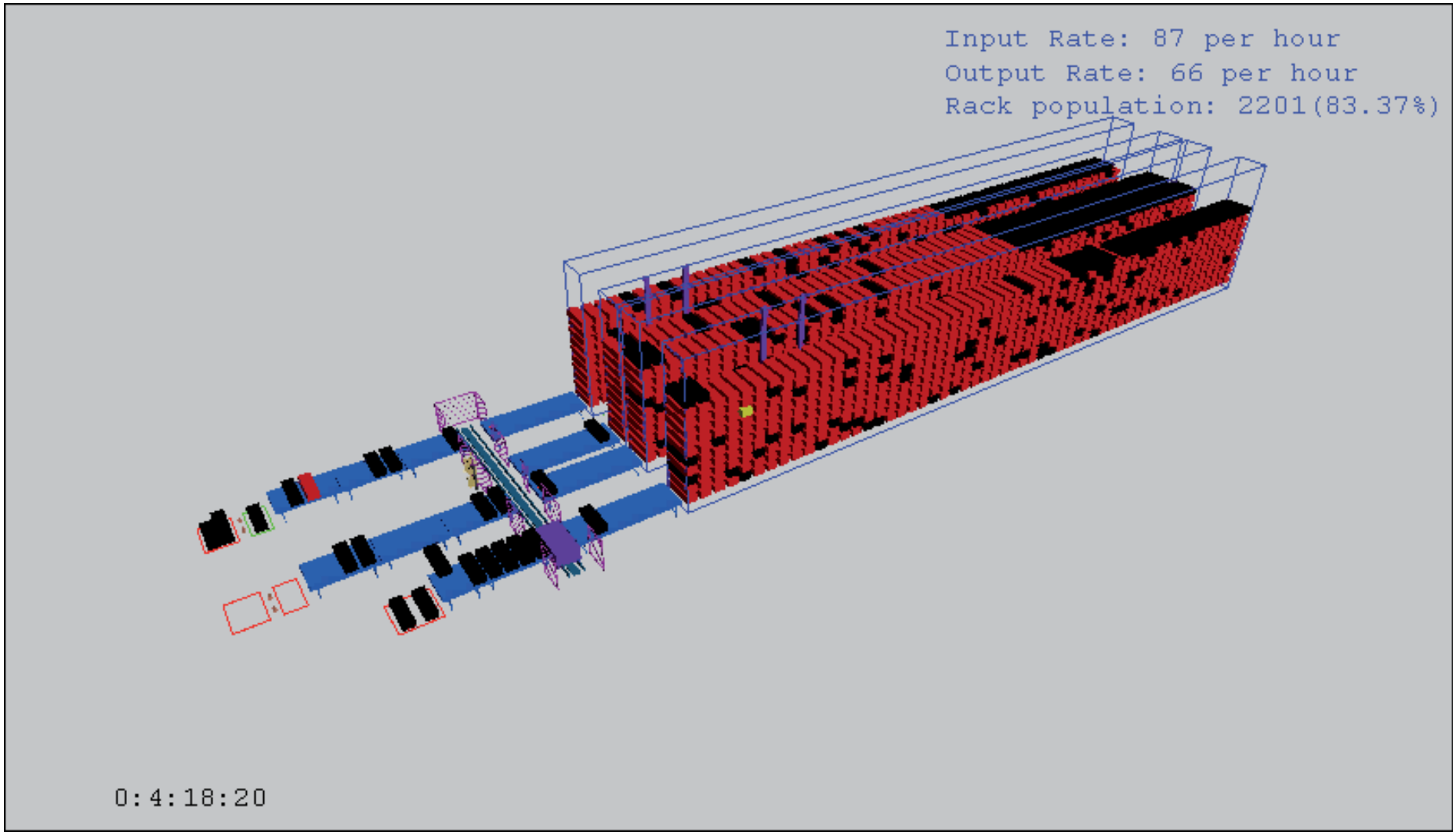
Test

Ship:
Packing &
Palletizing

Delphi JIT/JIS Harness AS/RS Buffer



Delphi JIT/JIS Harness AS/RS Simulation



The Results – Customers part of Process:

- **Lean Supply Chain:**
  - Harnesses built to order in Juarez plant, shipped in returnable totes, buffered near Assembly plant
  - Sequences harnesses for delivery to installation station
  - Broadcast signal to line side max. time = 2 hr. 19 min.
- **Asset Utilization:**
  - Minimum footprint for buffered harnesses
  - 7 month total schedule to implement
- **Ergonomics:** No manual lifting and handling of totes
- **Agility:** Every harness is equally selectable from 2 days inventory
- **Inventory Control:** Each harness is electronically received, tracked and shipped. 100% audit trail.

The Business Case

Von Duprin
Indianapolis, Indiana

Business Profile

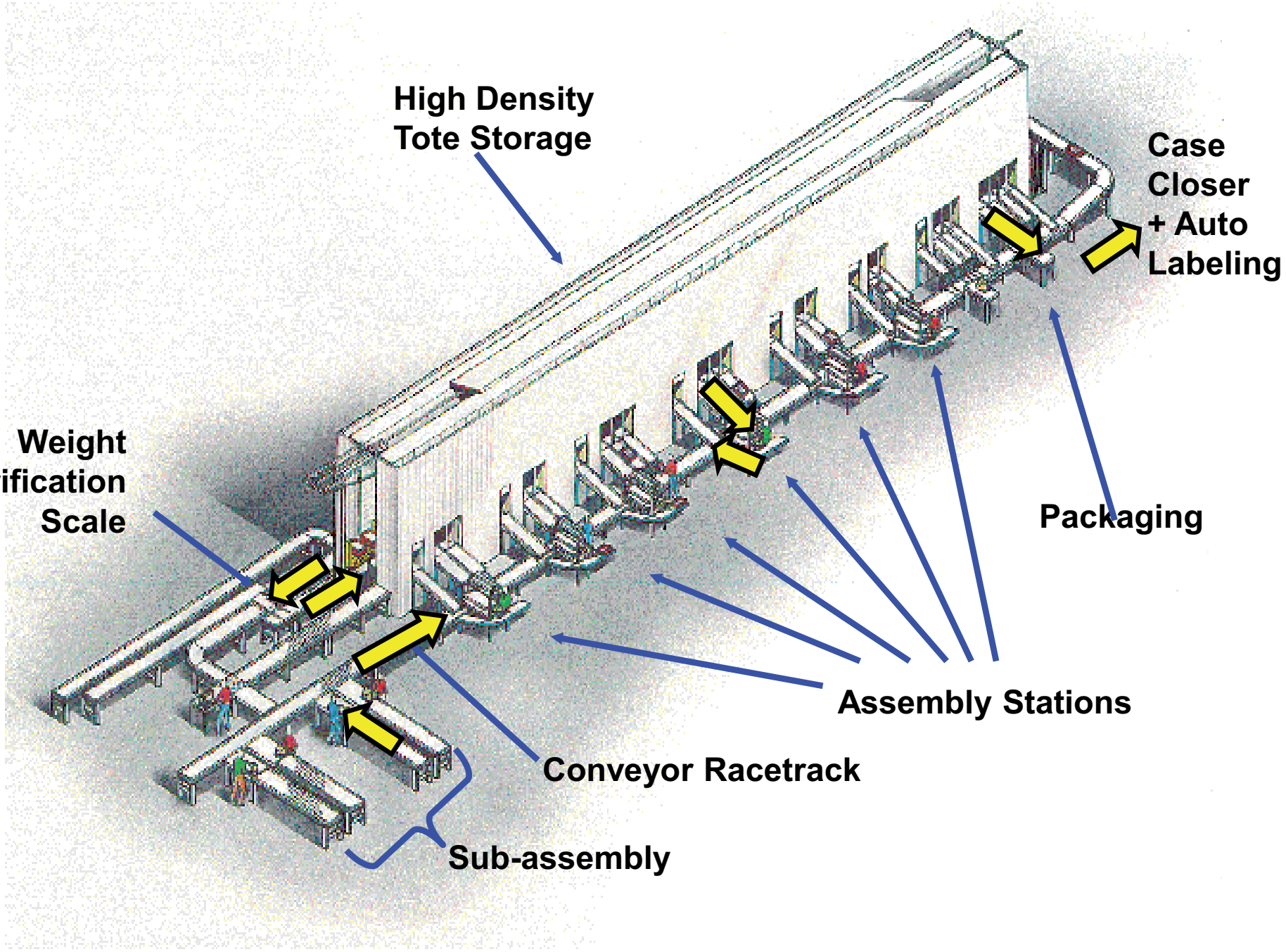
Type of business:	Door parts manufacturing
Revenue range:	$200 million
Number of employees:	500
Number of customers:	Thousands
Annual units shipped:	7,000 - 12,000 units a day

The Old Process

Walk Through/Study Revealed

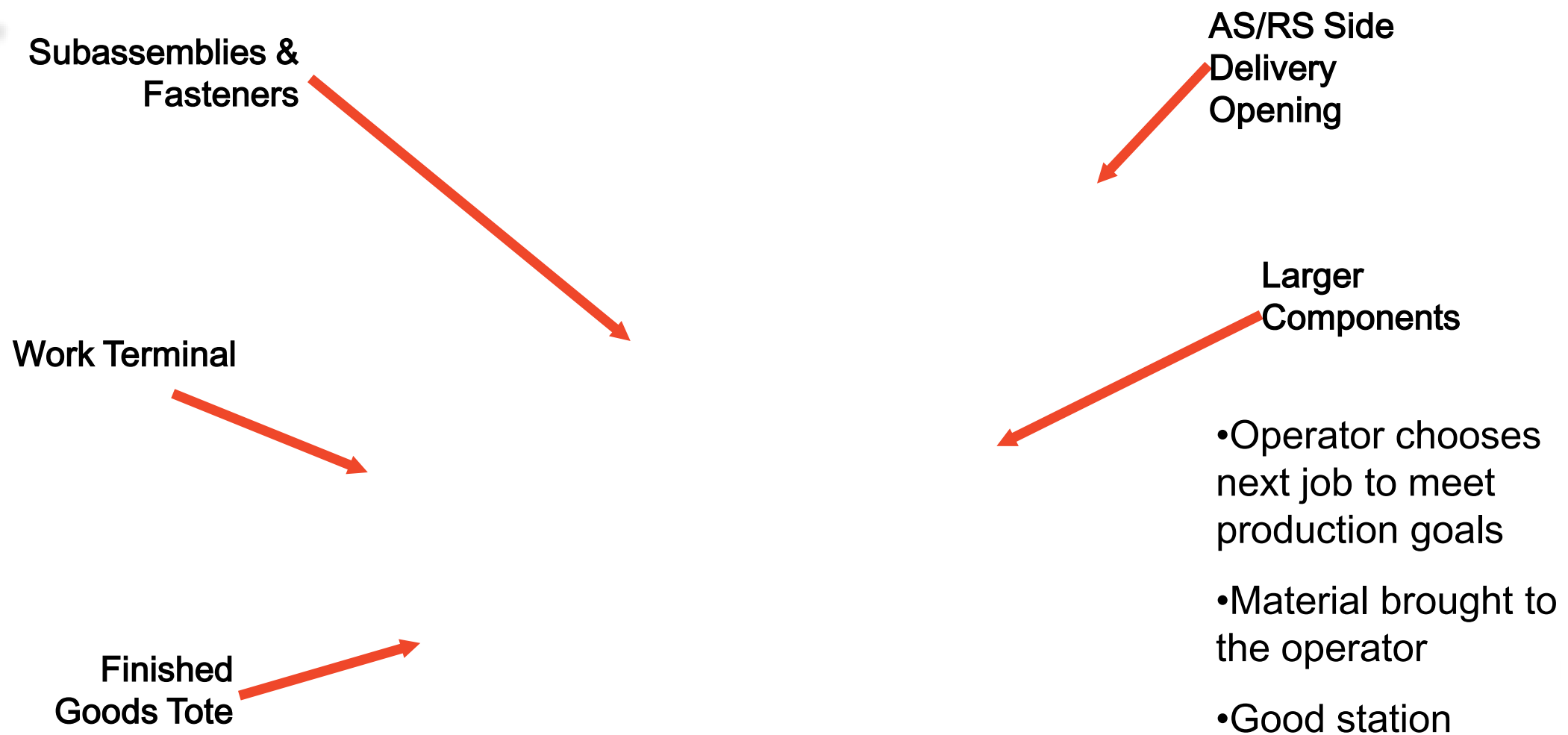
- SKU proliferation: Increasing quantity of architecturally specified products
- Customer demand for J-I-T delivery could not be met
- Market did not accept long lead times
- Frequent damage to finish & rework
- WIP inventory too high attempting to meet demand
- Net: Processes did not support customer demand

The New Process: Build to Order



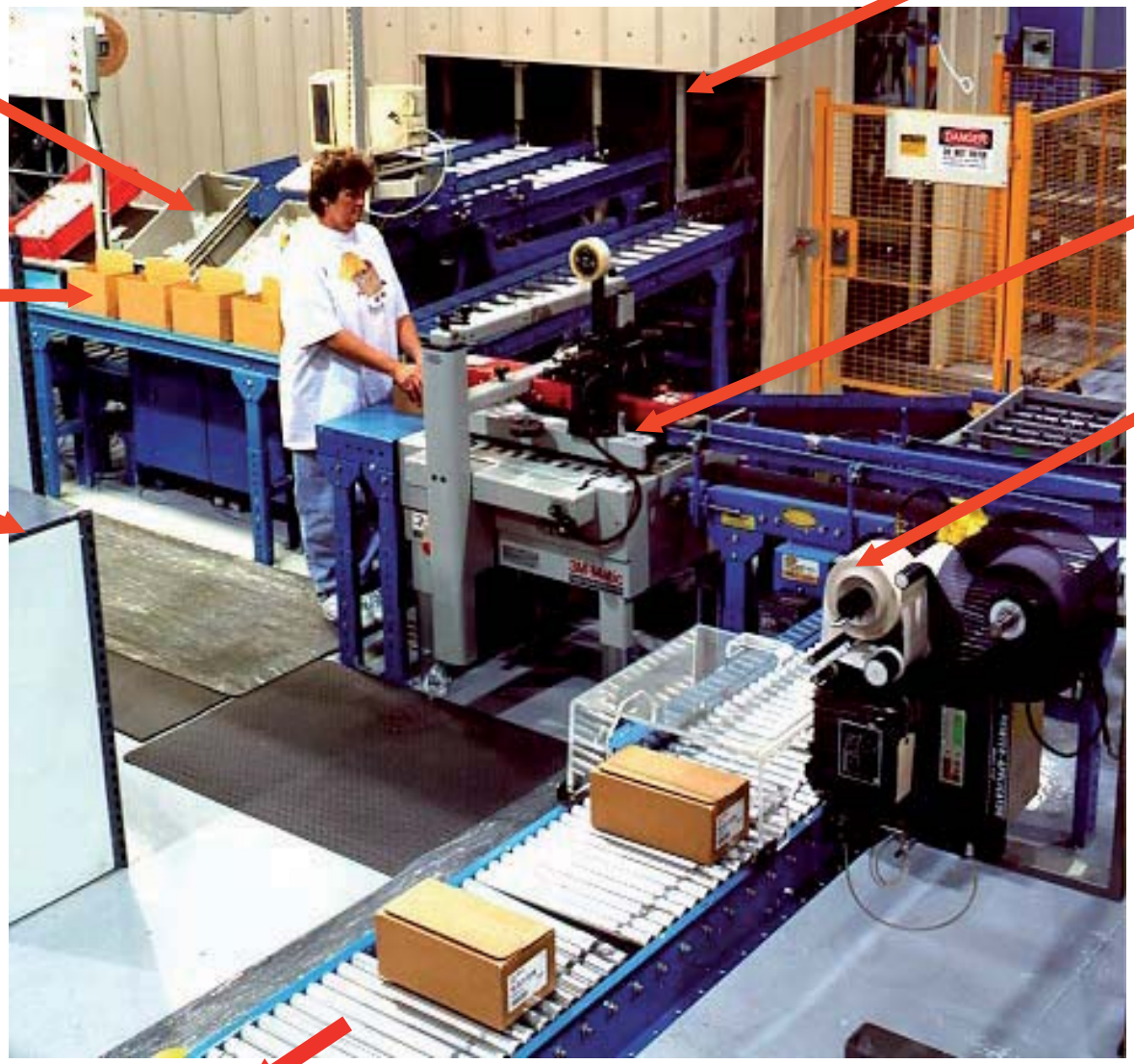
Material Control Station

Typical Work Station



- Operator chooses next job to meet production goals
- Material brought to the operator
- Good station ergonomics

Packing Station



How is Von Duprin a Different Process?

- Non-value added handling is done with a predictable, automated system
- The operators are ergonomically positioned and **pull the work through their station at their own pace**
- Workloads are balanced by operators to support planned flow
- Real-time systems help the operator **make better decisions** about what to do next

The Results – Workers Control Own Pace

- **Agility:** Met customer demand for JIT delivery
- **Lean:**
  - **Cut cycle time by 72%**
  - **Reduced WIP by 34-65%, category dependent**
  - **Raised operator productivity by 54%**
- **Quality:** Improved out of box product quality
- **Inventory:** Achieved ~ 100% accurate inventory control. **Only stockroom exempt from physical inventory.**

Small Scale Storage & Retrieval Systems Can Supports Today's Trends.

How do you get started realizing this trend?

Step 1 - The Walk Through

- Where does the process hurt?
- What is your current productivity?
- What change barriers exist?
- How appropriate is the process for today's business? Future?

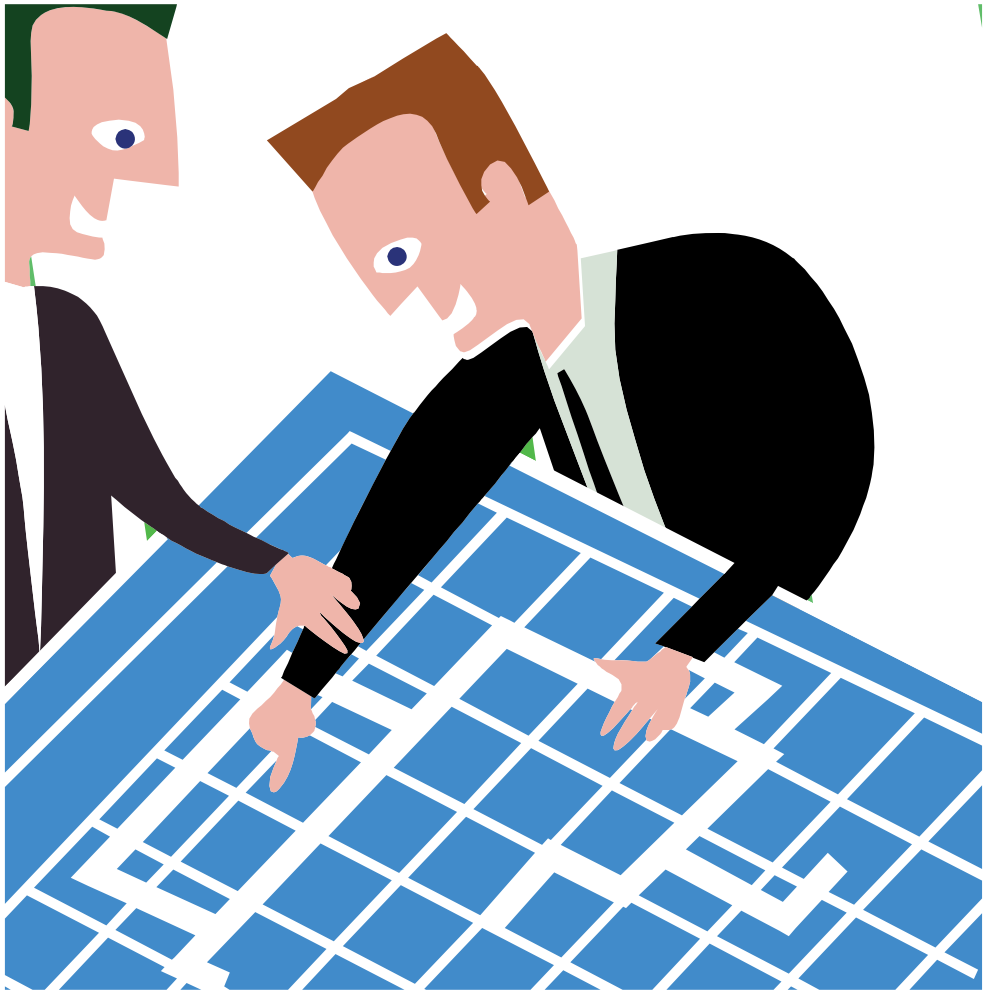
What Then?

- Brainstorm improvement opportunities
- Filter opportunities through the Principles for logistical success
- Decide on the next steps
  - Consider using outside resources/counsel

Step 2 - Benchmark (visit & learn)

- Visit system installations
- Visit websites
- Expand your knowledge & experience to better prepare for management approval

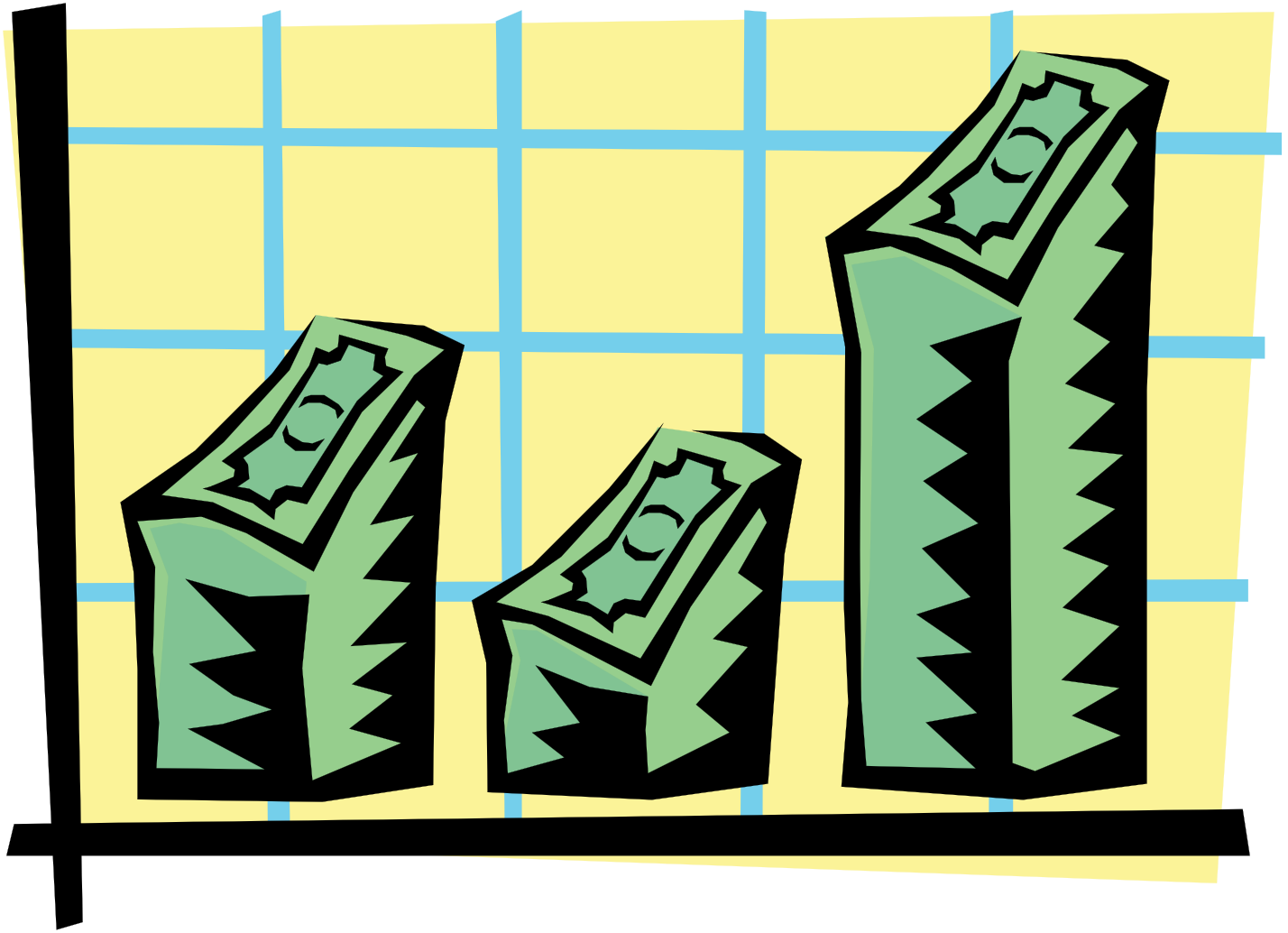
Step 3 - The Preliminary Design



Perform a Logistics Study

If strapped for resources and time, engage outside expertise.

Step 4 - Justification



Build the financial case.

Justifying Your Investment

TRADITIONAL JUSTIFICATION

- ☐ Labor savings
- ☐ Space savings
- ☐ No new building construction
- ☐ Safety

AGILITY ENABLERS

- ☑ Speed/Cycle Time
- ☑ Accuracy
- ☑ Customer satisfaction
- ☑ Quality
- ☑ Mass Customization
- ☑ Pull Systems
- ☑ Responsiveness
- ☑ Competitive advantages
- ☑ Elimination of shipping errors

Agility increases market share and should get the credit.

Agility enablers have a softer tangible financial value and are defined by:

- Increased customer satisfaction
- Elimination of shipping errors
- Direct and indirect labor savings
- Eliminating new building construction
- Improved efficiency and employee satisfaction
- Visibility
- Competitive advantage

Step 5 - Executive Summary (Buy In)

Why do you need an Executive Summary?

- Projects require a strategic plan for Senior managers
- Executives don't have time (or the desire) to get into detailed technical material…and you don't want them to
- It makes your case quickly, concisely, and logically
- It acts as your own checklist to ensure you've done your homework

Executive Summary Contents

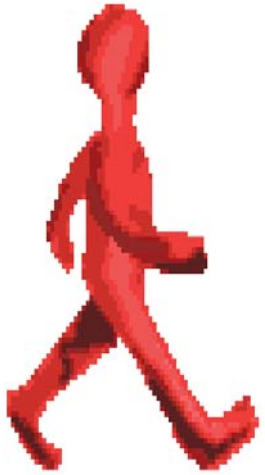
- How current system works
- Why it must be changed
- What alternatives have been considered
- How the new system meets the business requirements
- How much the new system will cost
- How will the new system be justified
- The design-build process and timeline
- The next steps

Step 6 - Select an Integration Partner

Things to look for in an integration partner

- Breadth of products and project experience
- Integration capabilities – all ranges of technology
- Commitment and “partnering” track record
- Depth and range of technical resources
- Quality commitment/reputation
- Project management systems and procedures
- History of on-time and on-budget performance

…and it all starts with a simple Walk-Through



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