Case Study:

Snyder's-Lance

Integrates Robotics Into End of Line Material Handling



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Who is Lance?

Snyder's-Lance

- \$1.7B Company
 - \$.9B Lance
 - \$.8B Snyder's
- 4th Largest Snack Producer
- Chips, Pretzels, Cookies & Crackers
 - This project is baked goods only















Archway





Snyder's-Lance

















Lance Road to Automation

- 1913 Philip Lance Founds Company
- 1938 Implements Own Ovens
 - 1950-1960 Vending; Single-Serve Focus
 - 1980's Automated Packaging Grows
 - 1990's First Robotics
 - 2009 Case Study
 - 2010 Snyder's Merger
 - 2012 Palletizing-Pallet Handling Automation
 - 2013 System Implementation

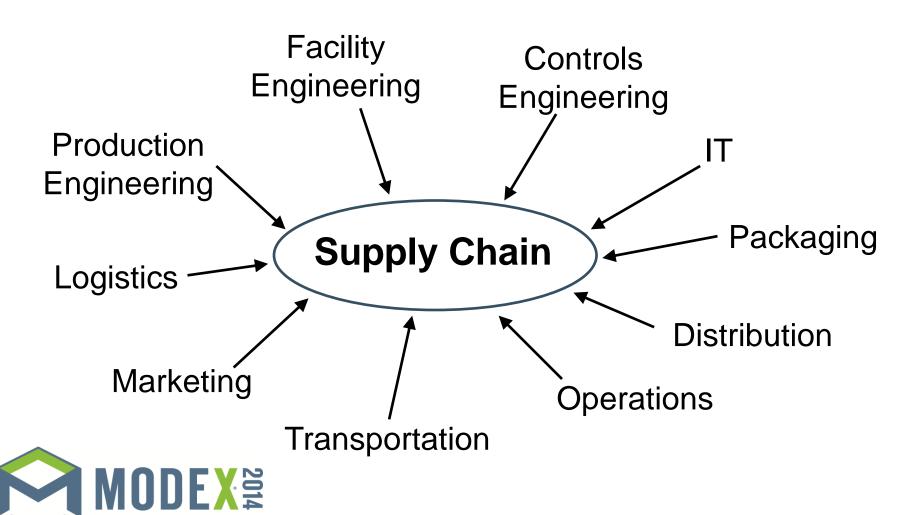




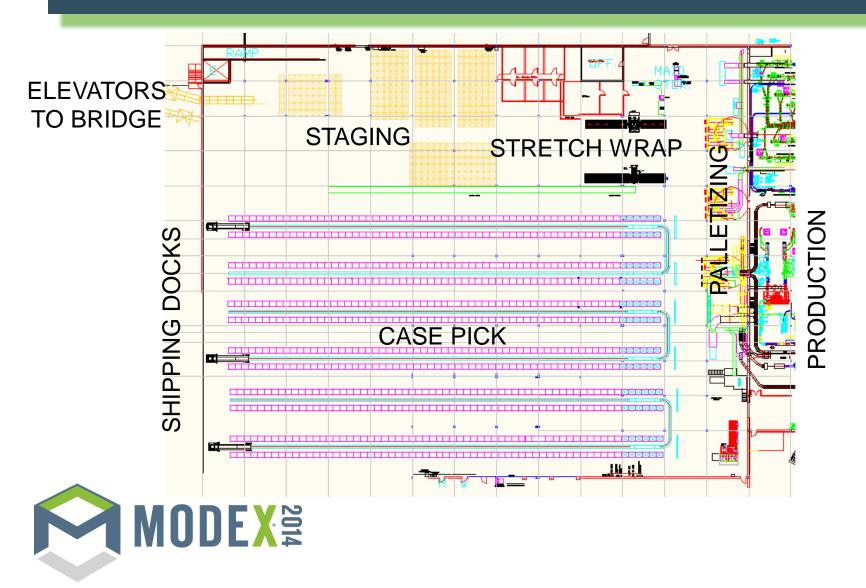




Lance Road to Automation



Operations Year 2012



Palletizing Observations 2012

Robots, Unitizer & Manual Palletizing In Use

Robotic

- (3) Fanuc M410i
- Tired & worn
- Fully depreciated
- Out of warranty
- No longer supported
- Compliance to current standards?



Unitizer

- Single-sku capability
- Fully depreciated
- High maintenance
- Out of warranty
- Inflexible



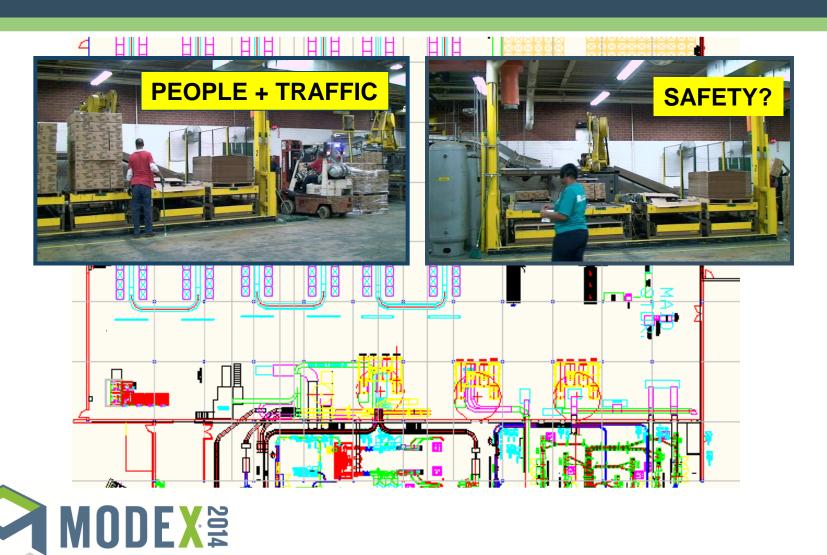
Manual

- Serves multi sku's
- Labor intensive
- Backup to robotics





Palletizing 2012



Traffic Flows 2012



Pallet Handling Labor

- Transport empty pallets (single) to robots
- Transport & place slip sheets to pallets
- Place tier sheet pallets into fixtures
- Retrieve empty tier sheet fixtures from robots
- Transport tier sheet fixtures to robots
- Transport palletized loads to stretch wrap
- Create and apply pallet LPN label
- Actuate and attend stretch wrapping
- Transport wrapped loads to staging
- Transport staged loads to warehouse elevator



Realize Opportunities

- Capture Labor Savings of Pallet Handling
- Create Space for Production Expansion
- Replace Palletizers
- Improve Info Accuracy and Trackability
- Integration of Supply Chain Information



Solution Challenges

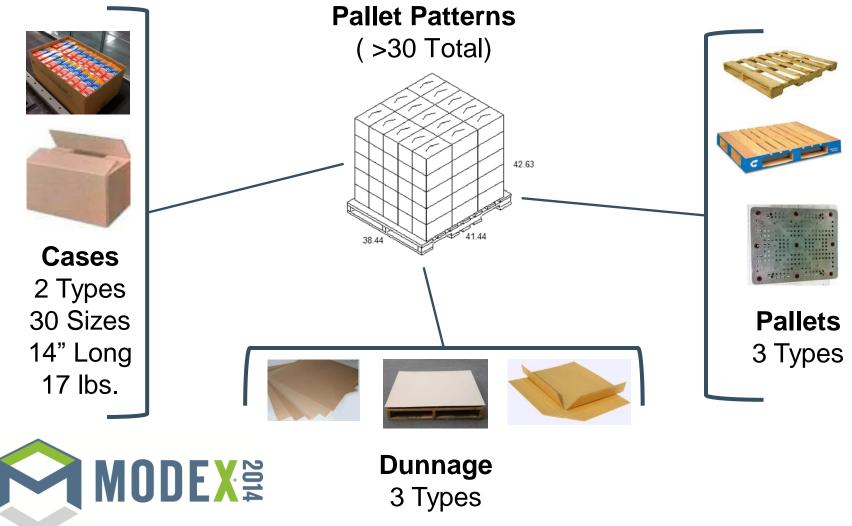
- Fluidity of Production SKU Mix
- Production to Distribution Communication
 - Verbal (radios) and paper
- Case Identification
- Technical & Organizational
- Physical Constraints
 - Building column spacing
 - Ceiling clearance: 15' clear
 - Vehicle traffic flow paths
 - Proximity of new packaging lines







Pallet Load Definition

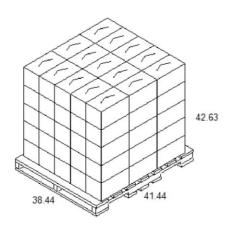


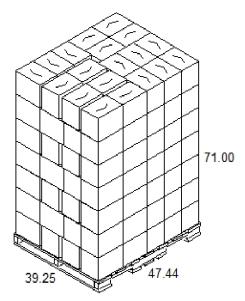
Case & Pallet Rates

Pallet Patterns

Ideal

Rate Killer

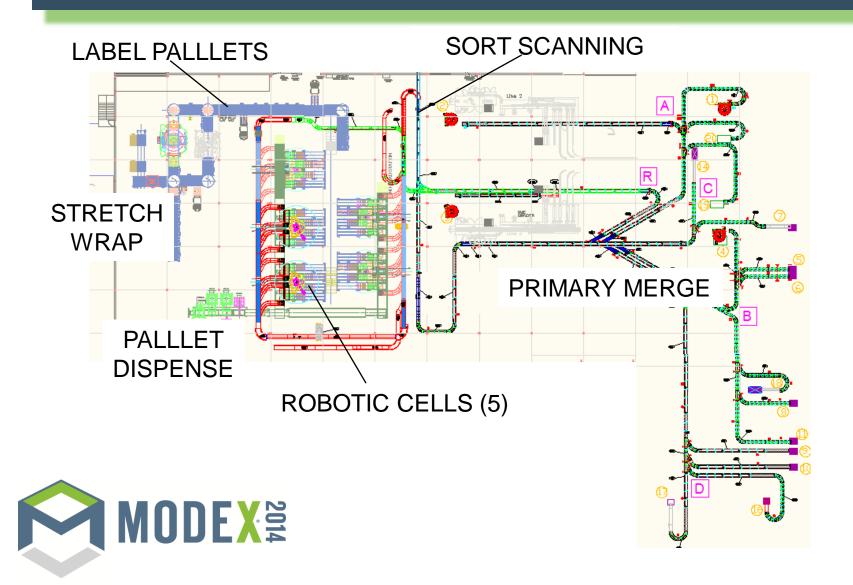


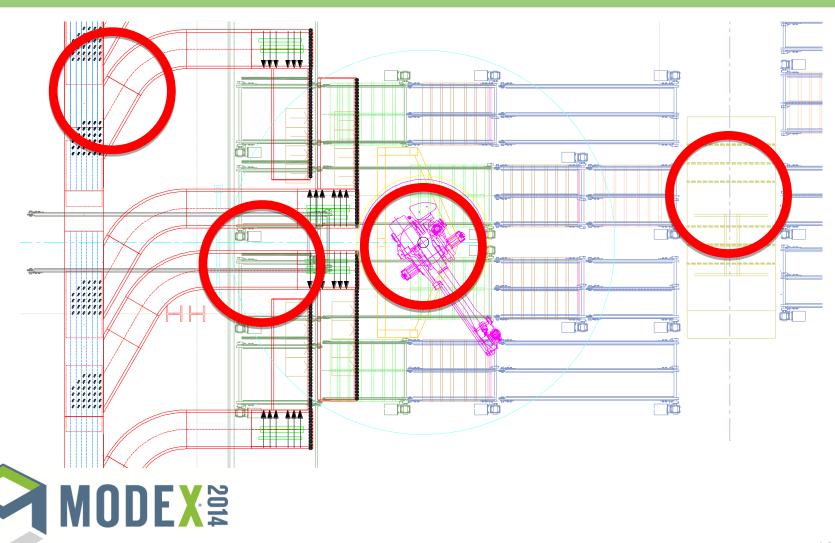


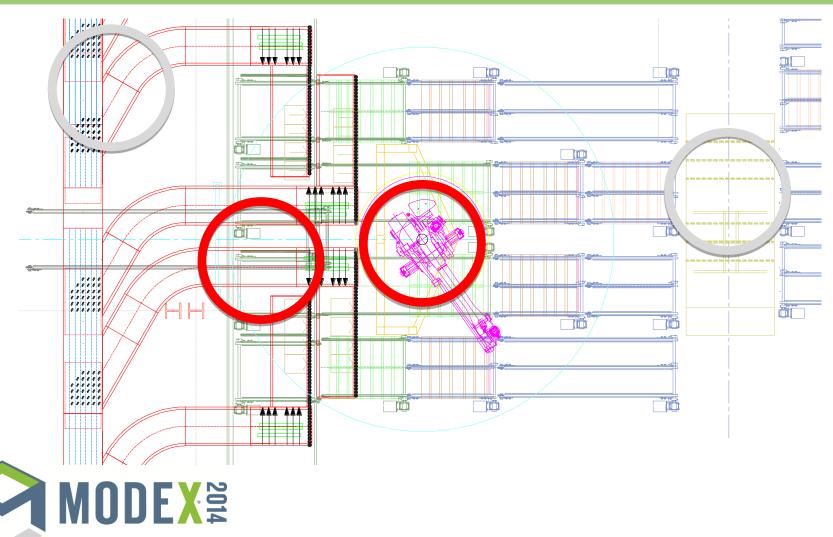


Lance Palletizing Rates								
SKU#	Line	Case Rate (cpm)			Pal/Hr	Dunnage		
		Typical	Peak	Design	(Design)	Pad	Slip	Tier
1	Α	7	0	0	0.0		Χ	1
2	Α	2	0	0	0.0		Х	
3	Α	3	0	0	0.0	Х		
1	Α	0	14	16.8	11.2		Х	1
4	В	13	13	15.6	7.0	Х		
5	С	9	0	0	0.0	Χ		
6	D	0	7	8.4	0.0	Χ		4
7	Е	13	13	15.6	7.0	Χ		
8	F	9	0	0	0.0	Χ		
6	G	0	7	8.4	0.0	Χ		4
9	Α	2	0	0	0.0	Χ		2
10	Α	2	0	0	0.0	Х		1
11	Α	9	0	0	0.0	Х		
12	Α	0	16	19.2	15.0		Х	
13	Η	9	9	10.8	9.8		Х	
14		3.5	4.5	5.4	4.9		Х	
15	J	3.5	4.5	5.4	4.9		Х	
16	K	3	0	0	0.0		Х	
17	L	4.5	4.5	5.4	3.4	Χ		1
18	М	4.5	9	10.8	6.8	Χ		1
19	Ν	13	13	15.6	10.6	Х		
20	0	13	13	15.6	10.6	Χ		
21	Р	0	7	8.4	6.3	Χ		1
22	Q	12	12	14.4	9.0	Χ		
23	R	4	4	4.8	3.6	Χ		
24	Hand	N/A	N/A	N/A	N/A			
TOTAL		139	151	181	110			
SKU		20	16					

System Concept Layout

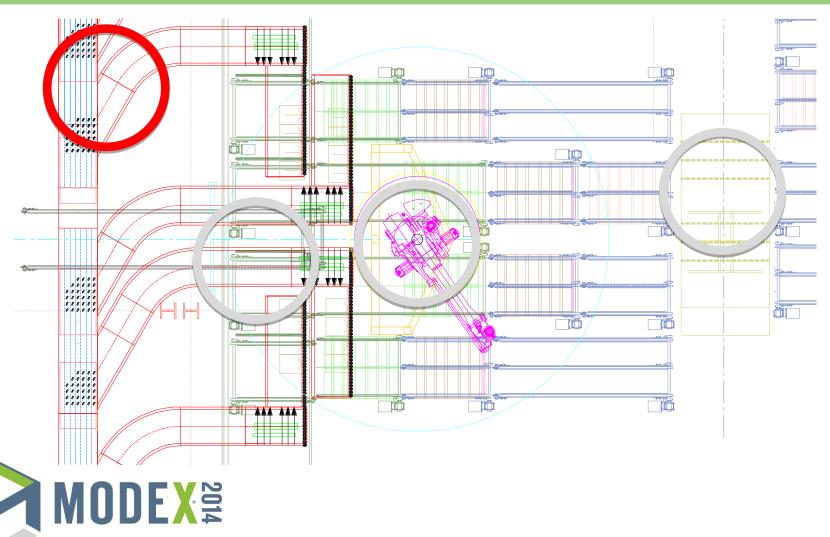


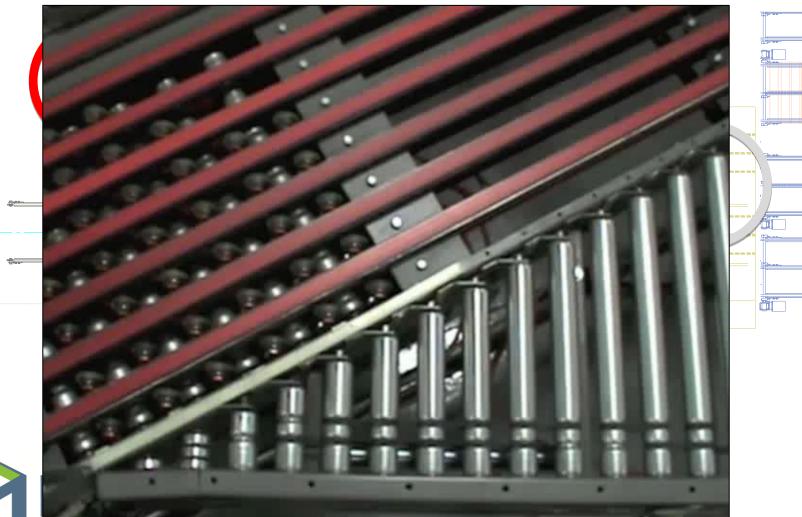






















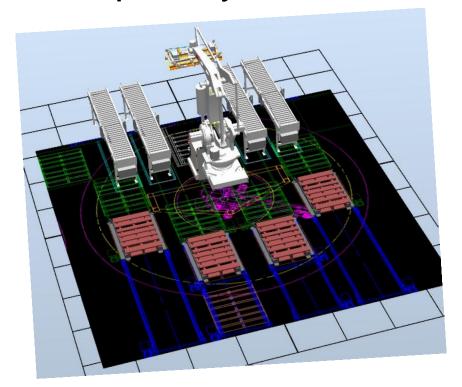
Risk Mitigation

- Robot Simulation
- Primary Merge Simulation
- Evaluate Randomness of SKU Delivery
- Robot Case Queue Length
- Case Sortation Logic
- Case Recirculation Viability



Robot Simulation

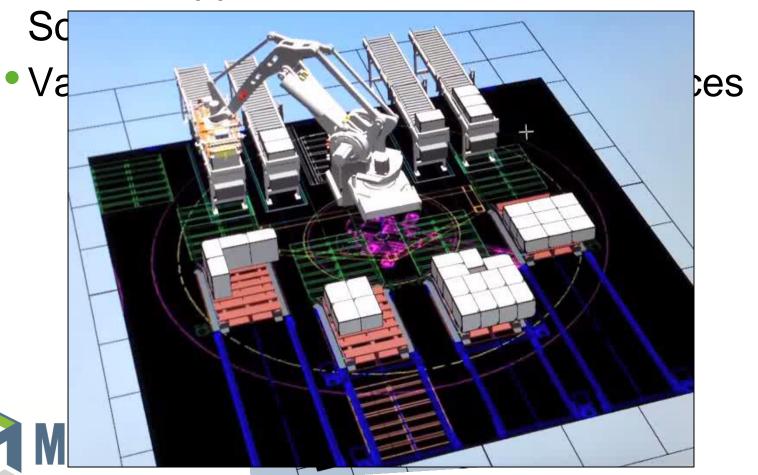
- Robot Suppliers Simulate via Internal Software
- Validate Rate Capability and Clearances





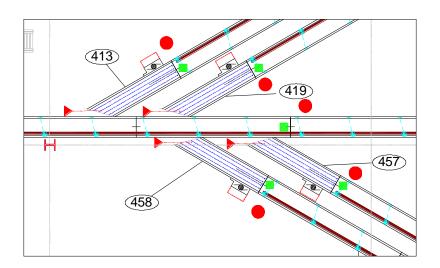
Robot Simulation

Robot Suppliers Simulate via Internal



Primary Merge Simulation

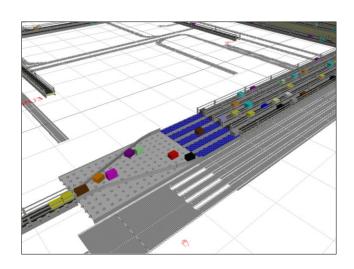
Concept



- Throughput Challenges
- SKU Clustering

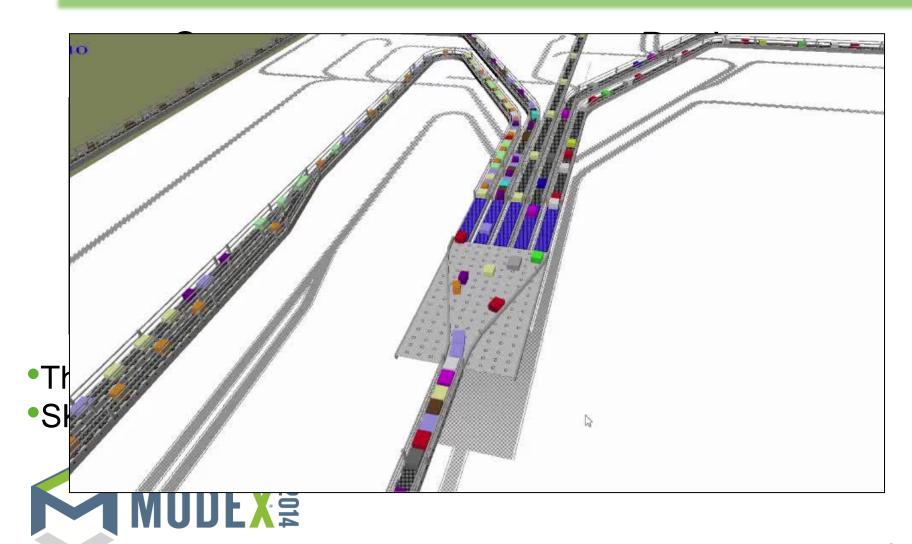


Design



- Perpetual Merge
- •180 cpm Throughput
- Achieved SKU Dispersal

Primary Merge Simulation



Robot Cell Simulation



Validated:

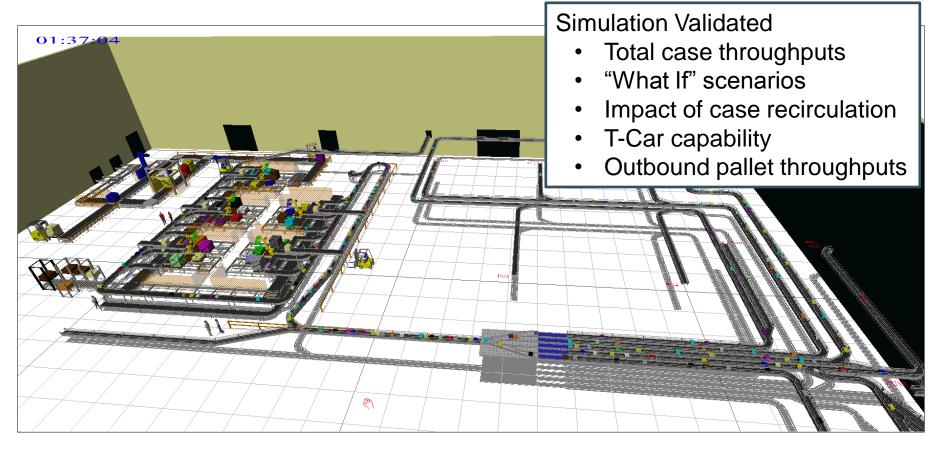
- Case infeed queue length
- Sortation logic
- SKU randomness



Robot Cell Simulation



Total System Simulation

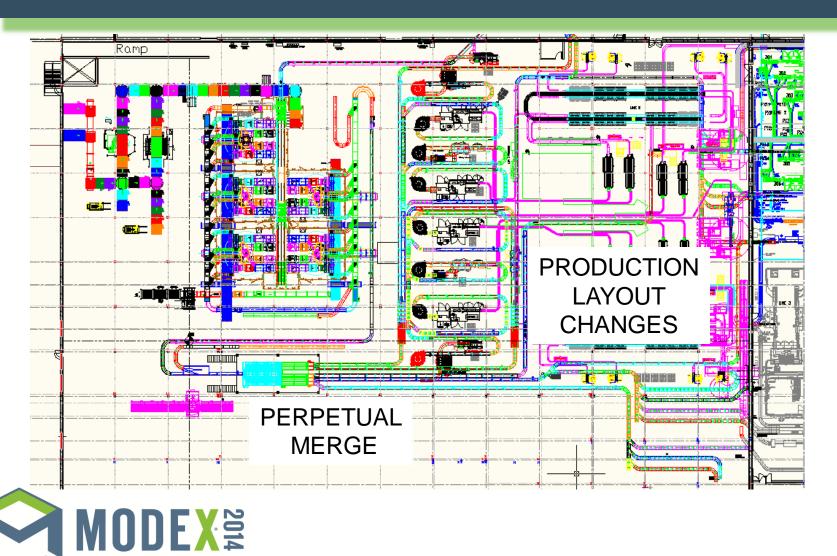




Total System Simulation



System Final Layout





Palletizing Robot

- (5) ABB IRB-660
 - (4) vacuum EOAT
 - (1) clamp EOAT
 - Special robot base
 - RobotWare & Robot Studio Software





Clamp EOAT: one robot for open-top cases.

Case Scanning at Sort Induct

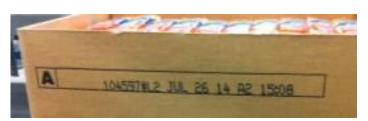
Induction speed 300 fpm +



- Pre-Inked Bar-Codes (bar-code scanner)
- Ink Jet Printed Character Labels (camera)







Automatic Pallet Dispensing



- Eliminates all empty pallet handling
- Eliminates slip sheet handling
- Replenish 15 pallets at once
- Handle 3 pallet types simultaneously



Automatic Transport Loads to Wrap





- Automatic transfer car (T-Car) retrieves pallet load from robot cells
- Pallet loads automatically delivered to labeling and stretch wrapping



Automatic Transport Loads to Wrap





System CapEx Summary

Lance Auto-Palletizing System Summary

(5) ABB IRB660 Robots

3000' Case Conveyor

280' Turbo Narrow Belt Sorter

(1) Dual-Load Pallet T-Car

450' Pallet Roller Conveyor

440' Pallet Chain Conveyor

ITW Octopus Stretch Wrapper

Pallet Dispenser (3-magazine)

Atronix WCS

TOTAL CapEx: \$5.9 MM



Results

- 80% Labor Reduction (\$1.3mm annual savings)
- Freed Space for Production Expansion
- Mitigate Accident Risk
- Eliminate Paperwork & Administrative Labor
- Provided Palletizing Redundancy
- Increased Supply Chain Data Accuracy/Visibility



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