Process Engineering: Paint Transfer & Energy Efficiency Nordic Ware, St. Louis Park

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Company Background

- Leading manufacturer of kitchenware products since 1946

- Cookware manufacturer
  - Metal fabrication
  - Coatings applications
  - Plastics molding

- Wide range of products including castings, formed and molded products

https://www.nordicware.com/

Project Overview

- Opportunities to increase transfer efficiencies of the spray painting
- Process improvement through the coating line
- Optimize the washer processes
- Conserve energy while increasing the production throughput

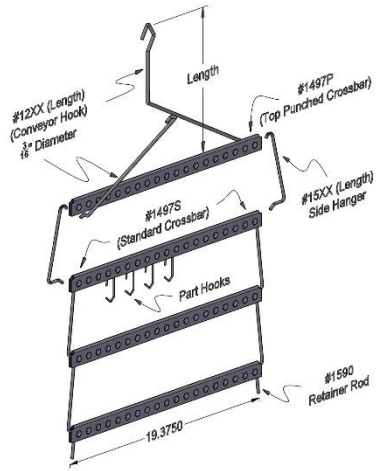
Coating Applications

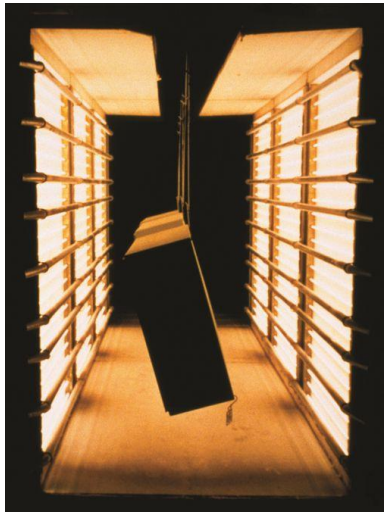
Analysis

- Transfer efficiency in coating lines
  - Surface area, coating thickness, paint used
- Process in coating applications
  - Working of compliant spray guns and delivery of the coating.
  - Belt speed, rotating speed and air pressure related to output.
- Opportunity to improve
  - Chain on edge without spinning
  - Electrostatic spray guns
  - Overhead line

Findings

- Transfer efficiency for grills: 42.3%
- Transfer efficiency without rotation: 53%
- New fixture for better coverage
- Present line with infrared (IR) partial bake and existing oven
- Overhead line with IR cure





Recommendation

Overhead line with electrostatic spray and IR cure

- Load up to 6 parts on a fixture
- Fewer touches and smaller system footprint

Recommendations – Potential Annual Savings

Recommendation	Paint Reduction	VOC Reduction	Labor Reduction	Increase in Production	Savings	Investment	Payback Period	Status
Overhead Line with IR Oven	3,300 gallons	6.80 tons	75%	200%	**$370,600**	$475,000	**1.3 years**	Recommended
IR Bake and Existing Oven	2,500 gallons	5.11 tons	37.5%	-	$189,000	$420,000	2.3 years	Needs further analysis
Without Rotation	1,700 gallons	3.54 tons	-	-	$56,900	-	Immediate	Needs further analysis

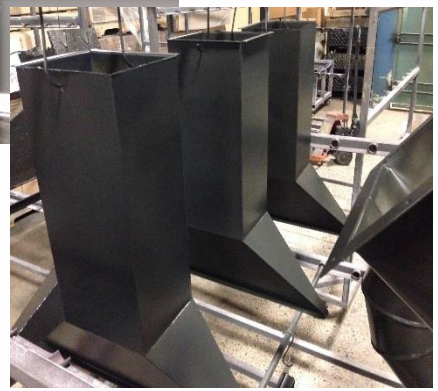
Washer
Analysis

- Working process
  - Wash (1), rinse (2&3) and dryer, air knife
  - Belt speed, water consumption
- Optimize the washing process
  - Foam in the rinse tank
  - High water use
- Opportunity to improve
  - Eliminate foam
  - Efficient use of air knife
  - Upgrade spray nozzles

Findings

- Foam formation in stage 2 due to soft water
- Initial washer settings
- 6 GPM with present nozzles

Washer 1 & 2	Air Knife	Rinse Pressure (psi)		Water used (GPM)		
		Top	Bottom	D.I	Soft	City
Initial	12 inches	15	15	11	16	-



Recommendations

- Pressure of the nozzles in stage 2 & 3
- Air knife height adjustment - 4 inches
- Conductivity of the deionized (DI) tank
- City water usage in stage 2
- Low volume high pressure nozzles - 0.3 GPM
- Standard work procedure

Recommendations – Potential Annual Savings

Washer 1 & 2	Air Knife	Rinse Pressure (psi)		Water used (GPM)		
		Top	Bottom	DI	Soft	City
Present	4	10	8	4	-	3

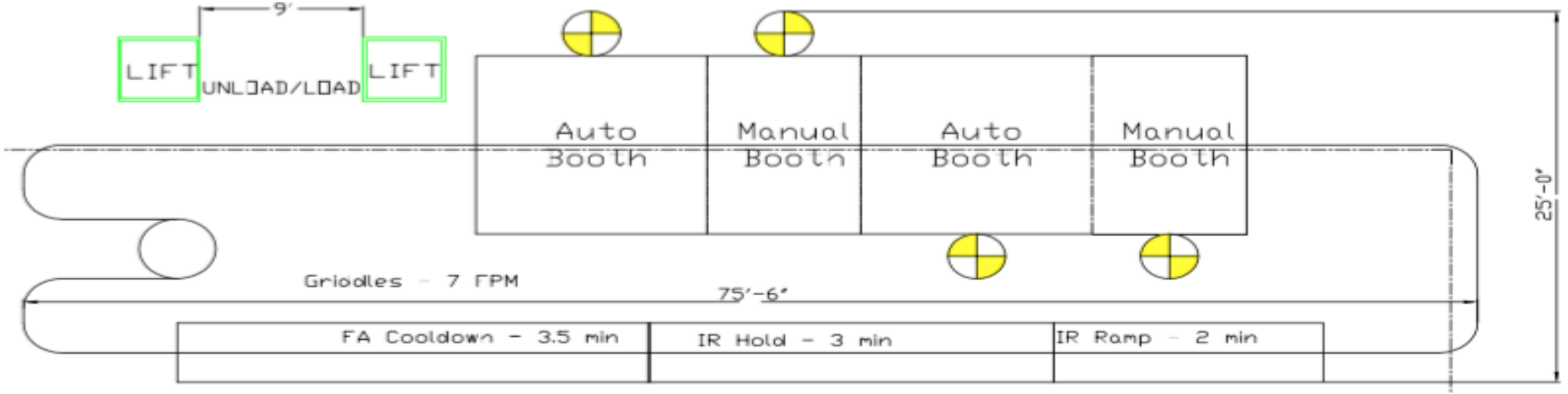
Optimize Washer	Reduction	Savings	Status
Water & Sewer (Based on 2015)	9,093,000 gallons	$57,400	Implemented
Softener Salt	28.5 tons	$7,800	Implemented
DI Recharge	9 tanks	$21,200	Implemented
Total		**$86,400**	

Summary – Potential Annual Savings

Recommendation	Reduction	Savings	Status
Implement Overhead Line with IR Oven	3,300 gallons of paint 6.80 tons of VOC 75% Labor	$370,600	Recommended
Optimize Washer Operation	9,093,000 gallons of water 28.5 tons of salt 9 DI tanks	$86,400	Implemented
Standard Work	Defects in working process	-	In Process
Total Savings		**$457,000**	-

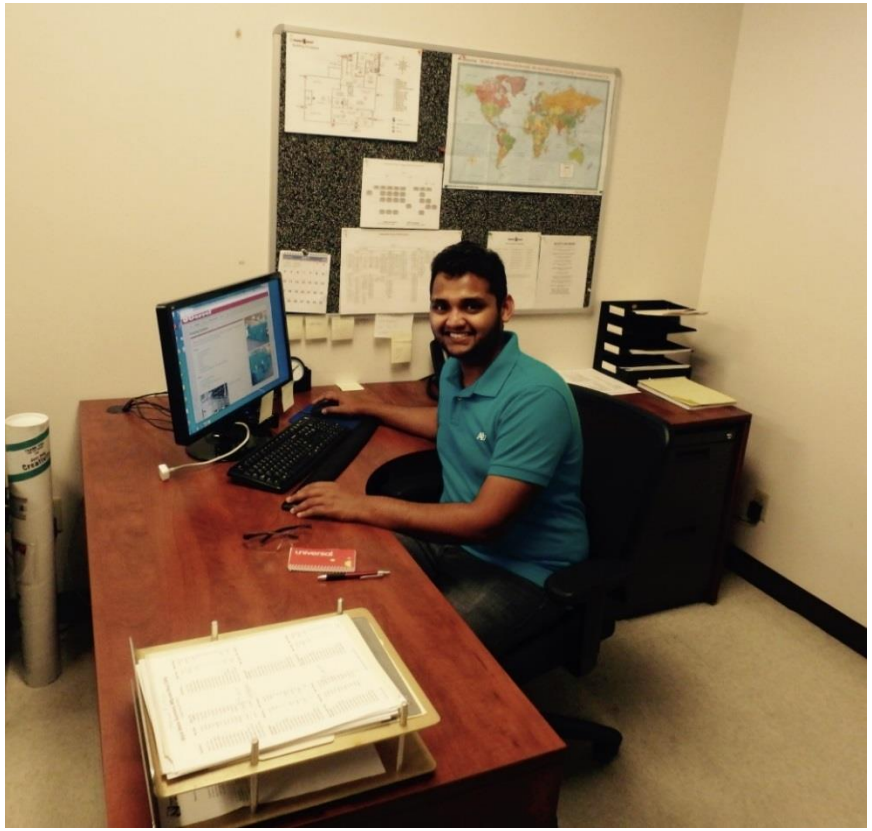
Next Steps

- Planning and implementation of the new coating line
- Standard work procedure for coating processes
- Automation of the washer process
- Evaluating the throughput based on the standard work for the washer



Personal Benefits

- Industrial experience
- Professional exposure
- Manufacturing principles
- New contacts in the industry
- Ability to approach a problem



Thank you …

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This project was sponsored in part by CCAI