Energy Efficiency and Waste Reduction at Plastech Corporation Emily Daniel MnTAP Advisor: Michelle Gage On-Site Supervisors: Jerry Miller, Doug Hoffbeck

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Company Background

PLASTECH CORPORATION



- Founded in 1956 and acquired by Dennis Frandsen in 1963
 - 44 Injection Molding Machines
 - Business to Business Operation, 24/7
- Manufacture, assemble, and deliver parts both state and nationwide



Reasonings For MnTAP Assistance

- Material Waste Reduction
 - Excess, Contaminate, and Scrap
- Energy Efficiency
 - Motor Idle, Compressed Air
- Assembly Assessment
 - Tools, Processes, Space
- Determine benefits to Plastech



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Material Waste Reduction



Approach

- Quantify excess material and scrap plastic generated from defects or rejects that is not already reused
 - Understanding the material cycle
 - Scrap tracking
 - Collection period
- Research alternatives for disposal of material
 - Resale and External Recycling







Material Cycle





Findings – Material Efficiency



- Excess Materials
- Contaminated Materials
 - Scrap Collection
 - Regrind vs Purgings
- Mixed Materials vs Stream Separation



Solutions & Savings

- Resale of Excess
 - \$13,500
- Resale of Contaminate
 - \$3,600
- Stream Separation
 - Up to 104,000 lbs/yr (50%), \$3,000
 - Quincy Recycle
 - Padnos
 - Sattler Plastics Company





Benefits Table – Material Efficiency

	Recommendation	Waste Reduced (per year)	Implementation Cost	Net Savings (per year)	Payback Period	Status
Waste Reduction Options	Resale of PP	30,000 lbs Polypropylene (1 Time Only)	N/A	\$6,600 + \$1,900	Immediate	Implemented
	Resale of Contaminate	44,090 lbs Contaminated Material (1 Time Only)	N/A	\$1,760 + \$1,900	Immediate	In Progress
	Resale of TPO 1	29,500 lbs TPO Black (1TO)	N/A	\$3,900 + \$1,900	Immediate	In Progress
	Resale of TPO 2	5,800 lbs TPO White (1TO)	N/A	\$640 + \$350	Immediate	In Progress
	Central Grinding	27,200 lbs Contaminated Material/yr	\$17,600	\$10,800	1.7 years	Recommended
	Stream Separation	Up to 104,000 lbs Thrown Material/yr (with minimal hassle)	N/A	Up to \$3,000	Immediate	Recommended
Totals		109,400 lbs (one time only) Up to 131,000 lbs/yr	\$17,600	\$32,700	8 months	



Energy Efficiency



Approach

- Investigate energy consumption throughout the production floor
 - Motor idle time
 - Compressed air usage
 - Assembly assessment



Findings – Motor Idle Time

• Grinders

- Current Process: Let it run till it's done
- 1.25 million kWh/yr
- 44% from 5 grinders
- Presses
 - Variable and Dependent Process
 - Opportunities for Check System and Standardization



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Energy Savings with the Watt Wattcher 2000



- 431,000 kWh/yr, \$31,600
- 125,000 kWh/yr, \$9,000





Central Grinding vs Watt Wattcher 2000

- One Employee, One Room, One Job
 - 27,200 lbs of material/yr (\$25,000)
 - 658,000-692,000 kWh/yr (\$48,000-\$50,500)
 - Noise Reduction
 - Clean Production Floor
- Watt Wattcher 2000
 - 35 units
 - 692,000 kWh/yr
 - Payback of 9 months





Findings – Compressed Air

- 44 leaks tagged and recorded
 - 214 CFM
 - Housings, hose cracks, broken equipment
 - 441,000 kWh/yr (\$23,200)
- 95% of tools in production and assembly pneumatic
- Custom Tools Created in House





Solutions

- Work Order for Maintenance
 - Fix current tagged leaks
- Leak Prevention Program
 - Prevent future leaks
 - Catch leaks faster
 - Reduce demand on compressors
- Replace Pneumatic Tools with Electric
 - Limitations





Benefits Table – Energy Efficiency

	Recommendation	Energy Reduced (per year)	Implementation Cost	Net Savings (per year)	Payback Period	Status
Electrical Energy Reduction Options	Watt Wattcher 2000	556,000 kWh	\$5,100	\$40,700	2 months	Implemented
	Fix Leaks/Prevention Program	441,000 kWh	\$500-\$3,000 (Ultrasonic Acoustic Detector)	\$23,200	1-2 months	In Progress
	Central Grinding	692,000 kWh	\$33,900	\$20,600	1.7 years	Recommended
	Switch to Electric Devices	21,560 kWh (1 screwdriver, 1 impact wrench)	\$520	\$1100	2 months	Recommended
Totals		1,711,000 kWh	\$40,000-\$42,500	\$85,600	6 months	



Findings – Assembly Assessment

× Tinning & Break Room Cutting -Staging Staging Staging Staging Staging Staging Staging Staging Chrome Stairs Down Room Stagin Staging Maintenance Shop Office Maintenance Staging Shop Fire Office and QA QA Lab Storage Space Lab

Upstairs Assembly Area

Downstairs Assembly Area





Assembly Processes

- Process A
 - Assembly
 - Warehouse
 - Shipping
 - 1 Forklift Driver



Processes B & C

- <20 parts per tote
- 1-3 totes per hour
- Assembly Upstairs
- Material Downstairs

Solutions – Process A, B, C

Move Process A to New Location

- Eliminate forklift use and traffic
 - 2,400 Gallons of Propane/yr (\$2,800/yr)
- Employee available to be trained in new location
 - \$25,000/yr saved

Move Processes B and C Downstairs

- Reduce Forklift Use
 - 200 Gallons of Propane/yr
- Labor Efficiencies
 - \$1,350/yr saved



Process D

Initial State

- Average cycle takes 5 6 minutes
- Ranges from 3 5 different parts
- Requires physically taxing movements from operators
- Small group of capable operators within Assembly

Solution

- New Equipment and Packaging
- 22-35% Labor Efficiency
- \$5,500-\$8,700/yr

Current Layout and Flow





Benefits Table – Process Efficiency

	Recommendation	Reductions (per year)	Implementation Cost	Net Savings (per year)	Payback Period	Status
Assembly Process Efficiency Improvement Options	Move Process A	2,400 Gallons of Propane Gas, Labor Efficiency	N/A	\$2,800 (Gas), \$25,000 (Labor)	Immediate	Recommended
	Move Process B	60 Gallons of Propane Gas, Labor Efficiency	N/A	\$70 (Gas), \$320 (Labor)	Immediate	Implemented
	Move Process C	150 Gallons of Propane Gas, Labor Efficiency	N/A	\$170 (Gas) \$790 (Labor)	Immediate	Recommended
	Process D New Equipment	22-35% Assembly Time (Labor Efficiency)	\$8,900	\$5,500-8,700	1-2 years	Recommended
Totals		2,600 Gallons Propane 22-35% Efficiency	\$8,900	\$34,600-\$37,900	3-4 months	



In Conclusion



Total Benefits from Recommendations

Totals	Recommendation	Reductions (per year)	Implementation Cost	Net Savings (per year)	Payback Period
	Material Efficiency	109,400 lbs (one time only) Up to 131,000 lbs/yr	\$17,600	\$32,700	7 months
	Energy Efficiency	1,711,000 kWh	\$40,000-\$42,500	\$85,600	6 months
	Process Efficiency	2,600 Gallons Propane 22-35% Efficiency	\$8,900	\$34,600-\$37,900	3-4 months
Totals			\$66,500-\$69,000	\$153,000-\$156,000	6 months



Personal Gains

- How to fill a space with sticky notes
 - Collect, organize, and analyze data
 - Concise information
- Confidence in abilities
- Importance of collaboration and individual responsibilities
- Every moment is a learning opportunity





Questions?



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