Energy Efficiency and Waste Reduction at Plastech Corporation

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Company Background

- Custom plastic injection molding plant
- 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
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

1. Raw Plastic Pellets
2. Mixing
3. Molded into Parts
4. Sprues, Rejects, Excess Material
5. Reground
6. Thrown Out

Sub-steps:
- Dyes or Additive
- Finished Product
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 Contaminates
  • $3,600

• Stream Separation
  • Up to 104,000 lbs/yr (50%), $3,000
  • Quincy Recycle
  • Padnos
  • Sattler Plastics Company
## Benefits Table – Material Efficiency

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

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<tr>
<td><strong>Electrical Energy Reduction Options</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watt Wattcher 2000</td>
<td>556,000 kWh</td>
<td>$5,100</td>
<td>$40,700</td>
<td>2 months</td>
<td>Implemented</td>
</tr>
<tr>
<td>Fix Leaks/Prevention Program</td>
<td>441,000 kWh</td>
<td>$500-$3,000 (Ultrasonic Acoustic Detector)</td>
<td>$23,200</td>
<td>1-2 months</td>
<td>In Progress</td>
</tr>
<tr>
<td>Central Grinding</td>
<td>692,000 kWh</td>
<td>$33,900</td>
<td>$20,600</td>
<td>1.7 years</td>
<td>Recommended</td>
</tr>
<tr>
<td>Switch to Electric Devices</td>
<td>21,560 kWh (1 screwdriver, 1 impact wrench)</td>
<td>$520</td>
<td>$1100</td>
<td>2 months</td>
<td>Recommended</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>1,711,000 kWh</td>
<td>$40,000-$42,500</td>
<td>$85,600</td>
<td>6 months</td>
<td></td>
</tr>
</tbody>
</table>
Findings – Assembly Assessment

Upstairs Assembly Area

Downstairs Assembly Area

Scale: 72"

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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
## Benefits Table – Process Efficiency

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<td>Assembly Process Efficiency Improvement Options</td>
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<tr>
<td>Move Process A</td>
<td>2,400 Gallons of Propane Gas, Labor Efficiency</td>
<td>N/A</td>
<td>$2,800 (Gas), $25,000 (Labor)</td>
<td>Immediate</td>
<td>Recommended</td>
</tr>
<tr>
<td>Move Process B</td>
<td>60 Gallons of Propane Gas, Labor Efficiency</td>
<td>N/A</td>
<td>$70 (Gas), $320 (Labor)</td>
<td>Immediate</td>
<td>Implemented</td>
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<tr>
<td>Move Process C</td>
<td>150 Gallons of Propane Gas, Labor Efficiency</td>
<td>N/A</td>
<td>$170 (Gas) $790 (Labor)</td>
<td>Immediate</td>
<td>Recommended</td>
</tr>
<tr>
<td>Process D New Equipment</td>
<td>22-35% Assembly Time (Labor Efficiency)</td>
<td>$8,900</td>
<td>$5,500-8,700</td>
<td>1-2 years</td>
<td>Recommended</td>
</tr>
<tr>
<td>Totals</td>
<td>2,600 Gallons Propane 22-35% Efficiency</td>
<td>$8,900</td>
<td>$34,600-$37,900</td>
<td>3-4 months</td>
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In Conclusion
## Total Benefits from Recommendations

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<td>Material Efficiency</td>
<td>109,400 lbs (one time only)</td>
<td>$17,600</td>
<td>$32,700</td>
<td>7 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Up to 131,000 lbs/yr</td>
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<td>Energy Efficiency</td>
<td>1,711,000 kWh</td>
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<tr>
<td>Totals</td>
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<td></td>
<td>$66,500-$69,000</td>
<td>$153,000-$156,000</td>
<td>6 months</td>
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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?