Reducing Waste and Energy Consumption

Neil Evan Peterson
Minnesota Technical Assistance Program
Advisor: Paul Pagel

University of Minnesota
Company Overview

• MGK- Specialty manufacturer of insect control solutions

  ![MGK logo]

  Insect Control Solutions

• Strengths:
  – Pyrethrum refinery
  – Custom formulations and flexibility
  – Responsible solutions
Tank Cleaning

- With over 300 formulations, product changeover requires tank cleaning
- Cleaning ensures no contamination in next product
- Chlorinated rinse solvent used in tank cleaning procedure
Project Purpose

• Verify tank cleaning process and reduce solvent usage
• Lean out the process to help expand production
• Investigate energy efficiency improvements
  – Process manufacturing is very energy dependent
Cleaning Process

• Numerous process tanks with wide range of volumes
• Triple solvent rinse between incompatible products
• Automated rinse pump and valves system
Incentives to Change

- Process is time consuming
- Solvent purchase and disposal cost
- Future production growth = Optimize process
- Regulatory pressures
- Corporate sustainability goals
Cleaning Process Verification

- Quantitative: Target of <1,000 Parts Per Million (PPM) of the highest active ingredient of the previous product in the final rinse
- Qualitative: Final rinse must be visually clear
- Building a database to verify tank cleanliness
- Verify robust, repeatable cleaning procedure
Rinse Recommendation

• **Observation:**
  – <1,000 PPM target often met after second rinse

• **Suggested change:**
  – Products with <20% active ingredient level receive two rinses instead of three
    • 5% reduction in solvent usage for tank cleaning
    • $4,100/year in savings
Rinse Recommendation

• Observation:
  – The final rinse typically is the heaviest

• Suggested change:
  – Shorten final rinse cycle time
    • Estimated 10% reduction in solvent usage
    • $10,000/year in savings
Further Rinse Options

• Recycle solvent from third rinse
  – Potential of using 1/3 less solvent in each tank cleaning
  – $19,400/year in savings

• Install a check valve to reduce variance in rinse weights
  – Would help to standardize rinse process and improve monitoring of solvent usage
Energy Efficiency with EMS

• Energy Management Solutions (EMS)- Consulting firm contracted through City of Chaska Electric
• Worked with EMS to investigate energy savings opportunities around the facility
Air and Nitrogen Leaks

• Used ultrasonic instrument to locate leaks
• Suggested change: repair leaks and schedule routine system maintenance
  – $10,000/year in savings
  – 122,400 kWh
Variable Frequency Drives

- VFD on 50 hp cooling water pump
  - $12,200/year in savings, 135,000 kWh
- VFD on 5 hp exhaust fan
  - $2,000/year in savings, 23,000 kWh
- VFD on 7.5 hp HVAC supply fan
  - $1,800/year in savings, 20,000 kWh
Equipment Information Centralization

- Motor audit and list of make-up air units, HVAC units, and exhaust fans
  - All equipment info in one location
  - Reference for future replacement/upgrades
# Recommendations Summary

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Waste / energy 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>Double rinse when applicable</td>
<td>5% reduction in solvent</td>
<td>$250</td>
<td>$4,100</td>
<td>&lt;1 month</td>
<td>In progress</td>
</tr>
<tr>
<td>Shorten final rinse</td>
<td>10% reduction in solvent</td>
<td>$500</td>
<td>$10,000</td>
<td>&lt;1 month</td>
<td>In progress</td>
</tr>
<tr>
<td>Recycle final rinse</td>
<td>33% reduction in solvent</td>
<td>$0</td>
<td>$19,400</td>
<td>Immediate</td>
<td>In progress</td>
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<tr>
<td>Install check valve</td>
<td>N/A</td>
<td>$1,600</td>
<td>N/A</td>
<td>N/A</td>
<td>In progress</td>
</tr>
<tr>
<td>Repair air and N₂ leaks</td>
<td>122,400 kWh</td>
<td>$2,500</td>
<td>$10,100</td>
<td>4 months</td>
<td>In progress</td>
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<tr>
<td>Install VFDs</td>
<td>177,400 kWh</td>
<td>$7,600</td>
<td>$16,000</td>
<td>7 months</td>
<td>Under Review</td>
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</table>

>$50,000/year opportunity in savings
Personal Benefit

- Experience leading a team
- Data analysis
- Exposure to lean manufacturing
- Communicating with vendors and consultants
- Project startup and continuation
- Working with experienced professionals
Questions?

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