Company Background

- Formed in 2005
- Headquartered in Illinois
- Operating businesses: paper, packaging, forest products and related industries
- Fridley site – industrial corrugated packaging
  - Been in operation since 1960
  - 142 employees
Process Description

Corrugator → Converter
Project Overview

Wastewater
- 3rd largest water user in Fridley
- 10 million gallons of water consumed per year
- Goal: reduce water consumption

Paper waste
- 14.5% of total paper consumption
- Goal: reduce the waste to 12.5%
Approach

1) Identified the main sources of waste
   • Reviewed the wastewater and paper waste reports
   • Conducted material balance

2) Evaluated the feasible solutions
   • Conducted experiment
   • Talked to operators and vendors

3) Performed the cost analysis
Water Consumption in Corrugator

Overview
- Main source (93%): cooling panel
  - Radiant shield to avoid failure in glue distribution
  - 18,000 gallons daily
  - Annual cost of $39,000

Figure 3: Cross-sectional Area of Single Facer

P = preheater roll
HB = heated belt
UB = unheated belt
C = corrugating roll
G = glue roll
M = metering roll
Experimental Result

- Conducted the flow reduction experiment
  - Cooling water flow rate varied with city water pressure
  - Glue roll temperature was measured to be $T = 107.5 \pm 0.6^\circ F$

Figure 4: Flow Reduction Result
Primary Recommendation

Reduction in cooling water flow rate
• 380 gal/hr at fully open (0°) to 150 gal/hr at partially open (70°)
• Total rate of 300 gal/hr for two pasers

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Annual reduction</th>
<th>Total cost</th>
<th>Annual savings</th>
<th>Payback period</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Reduction and Pressure Regulator</td>
<td>2.2 million gallons</td>
<td>$300</td>
<td>$18,000</td>
<td>1 Week</td>
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# Recommendation Table

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</tr>
<tr>
<td>Float Switch</td>
<td>500,000 gallons</td>
<td>$450</td>
<td>$4,400</td>
<td>1 Month</td>
<td>Recommended</td>
</tr>
<tr>
<td>Valve Repair</td>
<td>250,000 gallons</td>
<td>$110</td>
<td>$1,400</td>
<td>1 Month</td>
<td>Implemented</td>
</tr>
</tbody>
</table>
Anecdote

- Worked in a learning and challenging environment
  - Gained knowledge about corrugated packaging industry and different machinery
  - Applied what learned in school
  - Practiced communication and collaboration
- Gained feedback for personal growth and development