Company Overview

- TEL FSI, INC
- Chaska, MN
- Semiconductor Production Equipment: Surface Preparation Systems
- Products Include: ORION, ZETA, ANTARES

ORION: Single Wafer Cleaning System

ANTARES: Single Wafer Cryokinetic Cleaning System
Company Overview (cont’d)

ORION: Single Wafer Cleaning System

ORION™-hp
SINGLE WAFER CLEANING SYSTEM

Minnesota Technical Assistance Program
www.mntap.umn.edu
Motivations for Change

Water and Energy Reductions

• Corporate Goals
• Financial Savings
• SAC Unit Reductions
Approach: Water

- Map out facility use
- Identify opportunities for reduction
- Justify with cost-savings analysis
Process Investigation

- Water Use Data
- R&D Lab Use Estimations
- Discussion with employees
- Plumbing Investigation
DI Water

- Deionized (DI or Ultra Pure Water)
- No contaminants
- High resistivity
- Used in Process Lab and Production
DI Bypass

- Constant Flow to Prevent Fouling and Bacterial Growth
DI Bypass (cont’d)

• Opportunities
  – Some lines sent to drain
  – Treated water unfit to reclaim

• Solutions
  – Re-plumb bypass lines
  – Specially treat water before reclaiming
RO-Reject

- Reverse Osmosis Treatment Rejects 25% of water
- High in TDS

Reverse Osmosis Treatment Apparatus
http://www.pure-pro.com/images/industrial-ro15000.jpg
RO-Reject (cont’d)

• Opportunities
  – Wasted water
  – Repurpose? Reuse? Concentrate?

• Ideas
  – Use in water tower, irrigation
  – Increase RO efficiency

• Conclusion
  – No feasible solutions at this time
Approach: Energy

• Identify energy intensive systems
• Identify opportunities for reduction
• Justify with cost-savings analysis
• Research other potential opportunities
Compressed Air

- Used for:
  - Pneumatic Valves
  - Aspiration & Sump
  - N2 Substitute in Production
  - Air guns
- 4 Compressors
- 6% of Total Energy Costs
Compressed Air (cont’d)

• Opportunities
  – Leaks
  – High System Pressure

• Solutions
  – Leak detection
  – Pressure reduction
Roof-Top Units (RTUs)

• Consider replacements
• Newer models not much more efficient
• Conclusion: Retro-fit not recommended

http://www.drakemech.com/commercial/roof_top_heating_and_cooling_units/
Renewable Energy

• Possible installation of
  – Wind
  – Solar
  – Geothermal

• Conclusion
  – Geothermal
  – Maybe Solar
## Suggested Actions

<table>
<thead>
<tr>
<th>Action</th>
<th>Water Savings</th>
<th>Payback (years)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reclaim DI Bypass</td>
<td>14 – 23 %</td>
<td>0.1 - 0.3</td>
<td>Under Review</td>
</tr>
<tr>
<td>Treat &amp; Reclaim Contaminated DI</td>
<td>12 – 24 %</td>
<td>0.5 – 1.2</td>
<td>Recommended</td>
</tr>
<tr>
<td>Repair Compressed Air Leaks</td>
<td>30 – 50 %</td>
<td>1.5 – 3.5 %</td>
<td>Under Review</td>
</tr>
<tr>
<td>Reduce System Pressure</td>
<td>5%</td>
<td>0.3%</td>
<td>Recommended</td>
</tr>
</tbody>
</table>
Personal Benefits

- Learned about:
  - Semiconductor Industry
  - Various Systems (water treatment, compressed air, etc.)
  - Workplace
- Project management skills
- Made an impact!
Questions?