Industrial Water Efficiency

Solutions that benefit businesses, communities and our future workforce

June 29, 2020
Minnesota Technical Assistance Program

Strengthening Minnesota businesses by improving efficiency while saving money through energy, water, and waste prevention.
MnTAP

- Established in 1984
- University of Minnesota, SPH
  - Outreach and assistance unit
  - Grant and partner funded
- Confidential, No Cost Engineering Assistance for Minnesota Businesses
- Site Assessments, Interns, Teams
- http://www.mntap.umn.edu
Industrial Water Efficiency Project Partnership

- Groundwater availability and community water efficiency research
- Financial support
- Goal of preserving our water resources, promoting conservation and sustainable consumption

- Technical staff and intern resources
- 35+ years of experience
- Mission to help industries in MN find cost-effective solutions for water and energy conservation
Overview

• Understanding Motivations and barriers to industrial water efficiency
  • What have we learned?
  • How can we use that knowledge to provide better assistance?

• Finding water efficiency opportunities
  • Where do we look?
  • Using a 4-part approach to technical assistance

• Inspiring future workers, businesses and communities
  • Set interns up for success
  • Give businesses a game-plan to implement and sustain efficiency
  • Share findings with communities for replication
Understand motivations and barriers

- Corporate goals, sustainability, stewardship: 46%
- Process improvements, cost savings, efficiency: 35%
- Supply, disposal regulations: 19%
- Lack of time, labor resources: 40%
- Project costs, ability to justify capital ROI: 57%
- Technical complications: 3%
Water: a limited resource with real costs

• Water costs industry **THREE** times
• Incoming supply cost
• Processing cost
  • Purification
  • Heating/Cooling
  • Pumping
  • Treatment
• Discharge
Water use in the workplace

Washing and rinsing
Water use in the work place - 1

Product transport
Product processing
Product ingredient
Process sanitation
Water use in the work place - 2

Evaporative cooling

Heating
Water use in the work place - 3

Water treatment and purification
Landscape irrigation, as well as other domestic uses

Photo credit: Alliance for Water Efficiency www.allianceforwaterefficiency.org/
MnTAP’s 4-part strategy

Process for Technical Assistance

**Map**
- Measure
- Value
- Plan

**Maintain**
- Inspect
- Repair
- Prevent
- Repeat

**Manage**
- HP-LF
- High Eff.
- Automate

**Modify**
- Reduce
- Reuse
- Recycle
Identify and validate opportunities

Determine major components of the water balance—measure what’s happening

- Water data from site contacts
- Meter readings
- Physical measurements to fill in the gaps
Maintenance

Leak identification and repair
Management

No water cleanup
Management of Water Use

Pressure (heat), not volume
Management example:
Tuning flow rates

Do valves need to be fully open?
Closed-loop tank cleaning opportunity

- **Challenges**
  - Hot water cleaning needed for sanitation
  - Need to monitor temperature for compliance
  - Need to fill tank to probe level (T)

- **Improvements**
  - *Modify* temperature probe location
  - Recirculation loop reads temperature
  - Minimize fill volume needed
  - Automate process to not overfill
Map Water Use – Aveda in Blaine, MN

• **Motivation**
  • 22 million gpy water use
  • 25% used in cleaning
  • Reduce water use and costs

• **Approach**
  • Analyzing water meters
  • Observe CIPs and manual sanitization
  • Flow rate measurements
  • Talking with workers
  • SAP reports

Manage/Modify - increase water efficiency

- From water map, 15% usage in Sanitation room
  - 4 operations
  - Manual and automated

- Changes in two operations
  - High efficiency spray nozzle
  - High efficiency spray ball

- Savings
  - 1.4 million gpy (40% of area use)
  - 7,300 therms
  - 56,000 kWh
  - $20,000/yr (<1yr ROI)
# Strategies for Water Efficiency

## Process for Technical Assistance

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Providing technical assistance

MnTAP staff
- site assessments
  - Half-day to a full-day
    - (can do multiple visits)

MnTAP Intern Projects
  - 3 month project
    - Full-time, 40 hrs/week
Technical assistance - *simple process summary*

• Map and diagram water use as best as possible
• Collaborate with the facility team to prioritize opportunities
• Identify solutions that fit multiple categories (the 4 Ms)
  • This is key for businesses that may lack commitment!
• Give them a game-plan
  • Estimate cost/resource savings
  • Note where more process analysis is needed
  • Outline plans for implementation
## The results: Cost-effective solutions that benefit all

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<th>Businesses</th>
<th>Communities</th>
<th>Student interns</th>
</tr>
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<tr>
<td>• Increase operational efficiency</td>
<td>• Reduce demand on water resources</td>
<td>• Real-world experience managing their own projects</td>
</tr>
<tr>
<td>• Minimize water usage (among other resources)</td>
<td>• Increased economic value for local businesses</td>
<td>• Opportunity to provide legitimate recommendations that yield measurable results</td>
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<td>• Build confidence in continuous improvement and environmental solutions</td>
<td>• Opportunity to make progress on community-wide water conservation goals</td>
<td>• Enter the workforce with a problem-solving, can-do mindset, that they can bring to whatever career they choose!</td>
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Number of locations

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<tr>
<th>Metric</th>
<th>Recommended</th>
<th>Implemented</th>
</tr>
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<tr>
<td>Number of Companies Assisted</td>
<td>1,488</td>
<td></td>
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<tr>
<td>Water Reduction (gal)</td>
<td>641,000,000</td>
<td>183,700,000</td>
</tr>
<tr>
<td>Electric Energy Reduction (kWh)</td>
<td>37,400,000</td>
<td>18,300,000</td>
</tr>
<tr>
<td>Waste Reduction (lbs)</td>
<td>15,300,000</td>
<td>3,600,000</td>
</tr>
<tr>
<td>Gas Energy Reduction (therms)</td>
<td>1,600,000</td>
<td>620,000</td>
</tr>
<tr>
<td>Cost Savings</td>
<td>11,500,000</td>
<td>5,600,000</td>
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2020 MnTAP Intern Virtual Symposium
Wednesday, August 19th, 2020

Register at: https://form.jotform.com/71426420284956

Featured projects:

Abbott – Little Canada
Albert Lea Wastewater Treatment Plant
August Schell Brewing – New Ulm
Bosch Automotive – New Ulm
LCCMR wastewater nutrient projects 1 and 2
LifeCore Biomedical – Chaska
MN Dept. of Admin Facilities – St. Paul
MN Specialty Yeast – Hutchinson
MnTAP/MCES water data – Minneapolis
Old Dutch Foods – Roseville
Otsego Wastewater Treatment Plant
Pearson’s Candy Co. - St. Paul
Post Consumer Brands – Northfield
Ruse-Oleum – Brooklyn Park
Sappi Paper Mill – Cloquet
St. Croix Forge – Forest Lake
University of Minnesota Physicians

University of Minnesota
Thank you!

Matt Domski  
Waste Prevention Specialist  
MnTAP  
mdomski@umn.edu  
612.624.5119

Brian M. Davis, Ph.D., P.G., P.E.  
Senior Engineer – Water Supply Planning  
Metropolitan Council  
brian.davis@metc.state.mn.us  
651.602.1519
Water Efficiency Resources

• MnTAP Water Resources
  • http://www.mntap.umn.edu/greenbusiness/water.html

• Reports and Publications
  • http://www.mntap.umn.edu/greenbusiness/water/119-WaterConservation.htm

• Industrial water use tips newsletters
  • http://www.mntap.umn.edu/greenbusiness/water/water_projects.html

• MnTAP Intern Current Projects and Past Summaries
  • http://www.mntap.umn.edu/interns/currentprojects/
  • http://www.mntap.umn.edu/intern/pastproj.htm
  • http://www.mntap.umn.edu/resources/solutions.html