

Boiler efficiency

Inefficient. Underused. Evaluate if your older process equipment matches your facility's current needs.

Each year, a typical boiler consumes in fuel many times its initial capital investment. An industrial boiler purchased for \$75,000 can easily use more than \$400,000 in fuel annually. A one percent increase in efficiency is worth \$4,000 in fuel savings. Improved boiler efficiency translates into substantial savings that can pay for a higher efficiency unit many times over.

Schwan Food Company boilers

Dave Bero, senior project engineer at The Schwan Food Company, a producer of frozen food and ice cream in Marshall, took a look at the gas bills of his company's two Minnesota plants. "One gas bill was twice as high as the other, but demand was less at that plant," said Bero. To account for the difference, Bero first ruled out the possibility of a bad gas meter. He installed a water flow meter to monitor the volume of water heated per day.

When Bero analyzed where steam was used in the plant, he discovered that demand was intermittent. In summer, demand totalled only a couple hours per day.

By establishing base load on weekends in the summer with zero production and zero hot water flow, Bero discovered that keeping the system at pressure around the clock resulted in a large base load (38 million BTU). He found that most of the wasted energy was from boiler blowdown (purges of hot water that eliminate mineral buildup in the system) and heat loss as steam lines cooled.

Conclusion: using the large central boiler was inefficient.



Paul Pagel, MnTAP certified energy manager, and MnTAP intern Ryan Schaefer look over Nordic Ware's underused boiler.

"We mothballed the large boiler. For heat, we put in two small, 50 horsepower boilers that produce steam at low pressure." Bero explained, "For winter heating, we'll run one of the 50s until it can't handle the load, then we'll fire up the second. In spring as temperatures warm, we'll turn off one boiler then the next."

The new central boiler system is now closed looped, using reverse osmosis (RO). This reduces blowdown purges from 500 to 800 gallons per day (gpd) down to about two gpd—dramatically reducing heat loss. Using RO also reduces the amount of boiler chemicals needed, saving Schwan about \$11,000 annually.

For the areas that needed steam in the summer, Bero installed electric steam generators at point of use. A direct contact water heater—99.7 percent efficient—was installed to provide hot water year round.

The changes will reduce Schwan's fuel use by \$160,000 per year. Eliminating the high pressure boiler reduced boiler maintenance burdens and decreased the company's insurance liability. Bero has implemented several other energy saving projects as well.

(continued)

where's your waste?

Summer of solutions



MnTAP intern Bethany Steichen researched how to reduce the volume of solid waste and waste that results in the emission of persistent bioaccumulative toxins for Redwood Area Hospital.

Not enough time or money to work on solving waste-related problems? A MnTAP student intern might be able to do the legwork you need to justify changes at your facility. MnTAP sponsors college students to work full time for the summer at Minnesota businesses to research solutions to its specific waste-related challenges, such as:

- Energy use
- Raw material use
- Defects
- Scrap
- Water use
- Wastewater
- Solid or hazardous waste
- Air emissions, VOCs, HAPs

Have an intern—hired by MnTAP—work on improving efficiency and reducing your facility's waste this summer. Contact Deb McKinley, intern program coordinator, at 612/624-4697.

More information online at mntap.umn.edu/intern. ■

(Boilers, continued from cover)

Nordic Ware space heaters

Nordic Ware, a cookware and bakeware manufacturer in St. Louis Park, wanted to determine if it was economical to increase use of an underused boiler in its main coating area to heat the building when there was no production. Only one million of the 3.7 million BTU/h capacity was being used. As part of a MnTAP intern project, the company investigated how to reduce the energy wasted annually by the underused boiler.

The intern got bids from vendors which indicated that plumbing and insulating new steam lines—to take better advantage of the boiler's capacity—was cost prohibitive compared to other options. The intern provided energy and cost analysis on the boiler and new equipment options.

"We decided to move ahead and eliminate the boiler. Most of the areas that were heated by the large boiler could be more efficiently heated by going to a smaller, low pressure steam boiler," said Bette Danielson, Nordic Ware's safety and environmental affairs manager. Payback on the new boiler is estimated to be only 4.6 months because of the natural gas savings. Plans also include gas unit heaters to minimally heat the building during off-production hours.

"The intern's investigation and calculations helped us evaluate our options and move ahead—confident of the economic savings down the road," Danielson commented.

If your facility has been in operation a long time, your system may be due for an update. A MnTAP technical specialist can assist with reducing process-related energy use. More information on boiler efficiency is in the online *Source*. ■

Boiler NESHAP

Boilers or process heaters located at a major source of hazardous air pollutants are required to meet the U.S. Environmental Protection Agency (EPA) National Emission Standard for Hazardous Air Pollutants (NESHAP). Existing sources must comply by September 13, 2007. The rule is intended to reduce emissions of metals, hydrogen chloride, particulate matter and sulfur dioxide.

The final rule provides flexibility for plant managers to meet the final emission limits by altering their work practices in ways that will reduce emissions, or they may install emission control devices such as fabric filters and scrubbers to chemically or physically remove air toxics from the boiler or process heater emission streams. Currently, the only pollution prevention option is a boiler upgrade.

For more information see this article online. ■

Prevent losses from spills

Don't cry over spilled milk—or other raw materials—figure out why it spilled then take steps to prevent future spills! Reducing spills can reduce raw material loss, cut waste disposal and cleanup labor costs, and minimize the potential for accidents and exposure to potentially hazardous chemicals.

Heavy savings

Hibbing Taconite Company, a producer of ore taconite pellets used for steel manufacturing, spilled approximately 25,000 tons of ore concentrate per year. Production engineers had made a number of changes to control mill spillage in order to reduce oil waste and maintenance downtime. Lacking time to research additional changes, they requested a **MnTAP intern** to help reduce contamination of the trunnion bearing lubrication oil.

The intern evaluated the spilled material and determined it contained more iron-rich concentrate than unconcentrated ore. Because the company learned that the spilled material had more value than previously thought, spill prevention gained greater priority.

The intern recommended several equipment and maintenance changes to reduce spills. After passing through a two-year downturn in the steel industry, Hibbing Taconite made changes on seven of its nine mills, with plans to modify the two other mills. The company reduced ore spills over 75 percent (19,000 tons), saving \$260,000 per year. Full implementation is planned to save \$330,000 annually. See <www.mntap.umn.edu/intern/projects/hibtac.htm> for the project summary.

Spill prevention tips

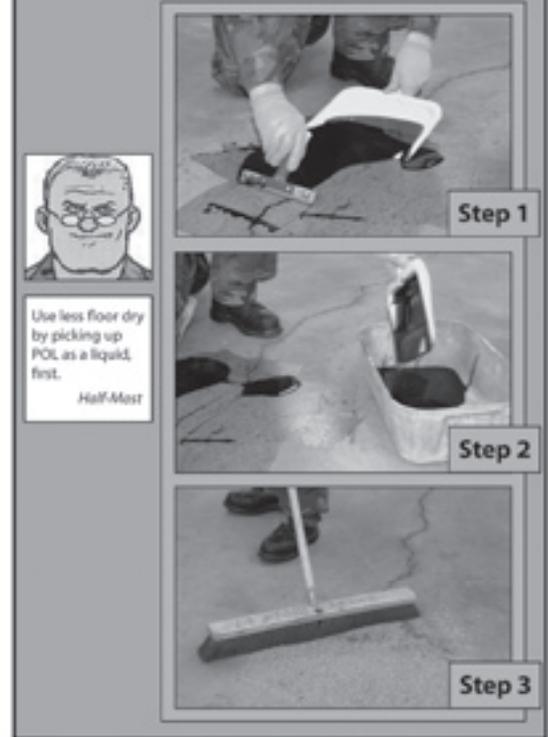
- Write procedures for all loading/unloading and transfer operations.
- Use spigots or pumps instead of pouring when dispensing. Avoid pouring from a bung opening.
- Minimize transfer from container to container.
- Use spouts and funnels when transferring liquids.
- Use drip pans under spouts to catch and contain drips.
- Tightly seal all bungs and lids (even for empty containers).
- Increase freeboard on tanks.
- Install overflow alarms for all tanks and vessels. Instruct operators to not bypass interlocks or alarms, or to alter set points without authorization.
- Properly designate tanks and vessels and use only for intended purposes.

Absorbent on the shop floor

The Minnesota Army National Guard sponsored a project for MnTAP to investigate waste reduction options for its facilities. Among the recommendations was implementing a spill cleanup plan which would recover spilled supplies, reduce granular absorbent use and reduce costs for handling absorbent waste.

Using a squeegee and a flexible, deep capacity dustpan, spilled liquid is first recovered for reuse or recycling. Then, rags or absorbent are used to clean up any remaining spill. The absor-

Oil Spill Cleanup



POL stands for petroleum, oils and liquids.

bent is visually evaluated to determine if it is fully saturated or can be reused for another spill.

Spill cleanup tips

- When spills occur, clean them up immediately.
- Recover excess product for reuse.
- Use dry or damp cleanup methods for spills or leaks (e.g., use a broom instead of a hose).
- Use high-pressure, low-volume cleaning systems.
- Install secondary containment areas.
- Ensure that spilled residues are managed properly. Refer to the product's MSDS for spill cleanup information.
- Document spills so you can take precautionary measures in the future. ■

Streater: liquid to powder

Streater, a manufacturer of store fixtures in Albert Lea, switched to using powder coating. But the 300-employee company needed to do a lot of research to justify the \$2.5 million system change.

"We took a little extra time and evaluated the change because of the large investment," said Bob Shellen, Streater's quality and environmental manager.

Streater had three liquid painting lines to coat product. The liquid coatings resulted in releases of 40 tons per year (tpy) of volatile organic compounds (VOCs).

"I was able to go to Paul Pagel (MnTAP coating specialist) with questions about cost analysis to prove that we could get this project off the ground and make it work," noted Shellen.

Pagel pointed Streater to several resources, such as the Powder Coating Institute software that helped with the cost calculations of converting liquid to powder coating lines. The company worked extensively with vendors to make the right choices for its operation. Streater also sent two staff to a 10-week powder coating class that MnTAP and the Twin Cities Chapter of Chemical Coaters Association International sponsored.

"I was one of the staff who attended the class," said Shellen. "I was able to learn the vocabulary associated with the technology and also how to evaluate the savings for our company."

After adding a powder coating line and taking out one of the two remaining liquid lines, in 2005 the company documented cutting VOC emissions approxi-



mately 40 percent to 23 tpy while maintaining production levels. The system's payback is ahead of schedule and Streater is considering replacing the remaining liquid line with another powder line in the next few years.

Streater thinks that the powder coating line is superior to the liquid line in many ways. Powder coating is a much cleaner and easier to manage technology. The company no longer has to deal with the VOC emissions that it did with the liquid line. And, powder paint has better overall transfer efficiency.

Because powder paint is 100 percent solids, Streater no longer loses a significant percent of the paint as the solvents flash away. Other than what ends up as scrap, the paint that Streater buys goes on the finished part.

In Streater's experience, powder coating lines are easier to start up. The company was able to start the new powder coating line at 7:00 in the morning and saw significant results the same day. The start up of the liquid line wasn't that easy.

"The powder coating technology is just superior," commented Shellen. "Our employees were a little nervous about the new technology. Since it is more high-tech, the operators were a little intimidated by the new system. Now they like it and they wouldn't want to go back to the old liquid one."

For more information on powder coating contact MnTAP's coating specialist Paul Pagel at 612/624-4638, visit <www.mntap.umn.edu/paint> or attend the Minnesota Paint and Powder Coating Expo (see next page). ■



Minnesota Paint and Powder Coating Expo

Learn about improving the efficiency of industrial finishing operations while maximizing investment returns by attending the Minnesota Paint and Powder Coating Expo 2006.

MnTAP and the Twin Cities Chapter of Chemical Coaters Association International (TC-CCAI) are hosting the 6th Minnesota Paint and Powder Coating Expo on Thursday, March 9, 2006, in White Bear Lake (near St. Paul).

The Expo will include a vendor show featuring over 60 companies, hands-on demonstrations and 10 technical seminars. Sessions include, *Selecting the Right Paint for the Job*, *Slow Your Rising Fuel Costs*, as well as *Steel Making and Defect Identification*. Attend the Expo to:

- Learn about new technology developments in metal finishing.
- Find the best coatings, equipment and techniques for your operation.

- Test the latest equipment in the demonstration areas.
- Refresh operator training and update operator knowledge.

Spray finishing as a video game?

The hands-on Virtual Reality Spray Finishing Demonstration is too cool to miss. Virtual reality spray painting is a tool to improve operator technique. Painters can be trained virtually with no mess, waste or reject parts. Participants sign up for one of six demonstration times.

Lean Manufacturing for the Finishing Industry

The TC-CCAI annual symposium *Lean Manufacturing for the Finishing Industry* is March 8 at the Expo location. This all-day interactive symposium will be presented by PDG Consultants, a consulting firm specializing in lean transformation using the tools of the Toyota Production System and Kaizen methodology.

For more information or to register for either of these two events visit <www.mntap.umn.edu/paintexpo>. ■

Hit by the new hazardous waste fees?

The Minnesota Pollution Control Agency (MPCA) recently revised its hazardous waste fee structure. While MPCA modeling indicated that the fee formula changes will give about 70 percent of all generators statewide a fee decrease, some businesses are seeing 1,000 percent increases in their fees.

See the MPCA fact sheet *Changes to the Hazardous Waste Annual Fee Formula Rules* for information on the fee structure.

If your company is being hit with an increase, now is a good time to call MnTAP to see if you can identify opportunities to reduce hazardous waste. ■



Listening for leaks

If the squeaky wheel gets the grease, does the hissing compressed air leak get fixed?

Not if you can't hear the leak. Compressed air leaks "hiss" at a high frequency that is generally above the threshold of human hearing.

MnTAP can help you hear your leaks.

Using an ultrasonic leak detector, a MnTAP technical specialist can walk through your facility and find compressed air and steam trap leaks. An ultrasonic leak detector translates high frequency "sound"—ultrasound—into lower frequency sounds that people can hear.

Compressed air

Some compressed air leaks are audible if they are the right size and flow. Others are obvious by the jet of air you feel. Or, you might notice that your compressor is cycling more often than it should be.

Leaks can cause a compressor to run excessively, hiking your energy bill even higher. A distribution system under 100 psi, running 40 hours per week, with the equivalent of a quarter-inch diameter leak will lose com-

pressed air at a rate of over 100 cubic feet per minute—costing over \$2,800 per year.

Running excessively to maintain system pressure, compressors wear out sooner. With less air reaching the tools, they are subject to additional wear, and production time slows. Some people compensate for leaks by increasing system pressure. This uses more energy and wears out the compressor faster.

Steam traps

MnTAP can also use the leak detector to see if your steam traps leak. If a trap is stuck open, steam is lost to the drain—wasting its heating value and wasting money on fuel. According to the U.S. Department of Energy, approximately 20 percent of the steam leaving a central boiler plant is lost via leaking traps in typical space heating systems unless a proactive assessment program is in place.

Call MnTAP to request a site visit to detect leaks in your compressed air system or steam traps. More information on energy savings for compressed air and steam can be found in this article in the online *Source*. ■

Energy training

Learn how to optimize your compressed air system—through more effective production and use—to achieve 15 to 25 percent cost savings. MnTAP is coordinating *Fundamentals of Compressed Air Systems*, a one-day energy best practices workshop geared to facility engineers, operators and maintenance staff.

Participants will be able to:

- Understand how compressed air systems work and the benefits of optimal compressed air system performance.
- Compute the current cost of your plant's compressed air system, measuring and creating a baseline of system performance.
- Identify steps for proper system operation, maintenance and point-of-use accountability.
- Take basic approaches for cutting costs.
- Determine the impact of different compressor control types.
- Tailor a compressed air system management action plan for your plant.

The first *Fundamentals of Compressed Air Systems* workshop will be held May 17 in St. Louis Park. A second workshop will be held in northern Minnesota. The workshops are cosponsored by the U.S. Department of Energy (DOE) and Xcel Energy.

Contact MnTAP to receive more information on these workshops or visit <www.mntap.umn.edu/energy> for more information. ■

materials exchange



A materials exchange program lists one company's unwanted material and makes it avail-

able for use by another company. The lists below are examples from the Minnesota Materials Exchange.

For more information, call MnTAP at 612/624-1300 or 800/247-0015. Or, visit <www.mnexchange.org>.

Materials available

Bags, plastic: 300 per week. Sizes up to 12 x 20 inches. Not sorted. Must pick up weekly. Free. Minnetonka. [17847]

Boxes, gaylord: 20 per month. Used for transporting produce. 100 stockpiled. Negotiable fee charged. Free to non-profits. St. Joseph. [18042]

Desks, metal: Two. 30 x 48 inch steel desk with chair. L-shaped, metal desk with wood grain top. Free to nonprofits. Apple Valley. [17974]

Digital photo tachometer: One. Power Instruments brand. Reads up to 30,000 RPM. Case, instructions and stickers. \$75. Plymouth. [17844]

Filing cabinets, lateral: Over 50. 5 shelves with front flip-up doors. Must pick up. Free. Minneapolis. [18019]

Medical exam table: One. LMF model 5140. Must pick up. Free. Minneapolis. [17910]

Office cubicle systems: 25. Walls and desktops. Must pick up. Free. Minneapolis. [18041]

Materials wanted

Bubble wrap: Any amount. Will pick up. Prefer free. Aitkin. [17857]

Building materials: Any amount. OSB, CDX sheathing, doors, windows, etc. Prefer free. Wadena. [17882]

Hanging file folders, legal: 250. Any color. Also clear tabs and labels. Prefer free. Chisago City. [17926]

Lockers, metal: 3 to 5. Full length doors. For personal protection equipment. Prefer free. Chatfield. [18024]

Lumber: Any amount. 3/4 inch. 7 to 10 x 17 to 24 inches. Prefer free. Le Roy. [18403]

Paint, interior and exterior: Any amount. Supplies also needed. For non-profit. Brooklyn Park. [17980]

Pallet racking: 35 uprights, 42 to 48 inch wide. 100 beams, 9 to 11 feet long. Will pay fee. Rochester. [18045]

Wrought iron scrap: Any amount. For reforging. Prefer free. Clear Lake. [17944]

Successful exchanges

- A circuit manufacturer gave 840 cardboard boxes and 16 pallets of corrugated pads to two manufacturing companies.
- A Minneapolis company donated \$3,000 worth of automotive finishing and flattening system kits to two schools.
- A Grandville company received over 1,500 pounds of powder paint from a Minneapolis manufacturer.
- A state department donated 60 office cubicle systems to various local businesses. ■

Uncommon connections

Through the Minnesota Materials Exchange program some very unlikely businesses find themselves making reuse connections.



Benny Machine Company, a precision machine shop, was having problems when it shipped aerospace parts in bubble wrap. "We needed a simple, fast and economical way to pack these parts that also protected them from shipping damage," explained President Jeff Benny.

By connecting with a knitting mill through the Materials Exchange, Benny's company now receives cardboard tubes that it cuts to length to fit its parts.

"The tubes are very strong and protect our parts very well," remarked Benny. His company saves about \$235 per month in shipping costs with this method. More importantly, the number of parts damaged during shipping is reduced, providing additional savings.

Benny Machine Company's clients can recycle the reused cardboard tubes, eliminating two cubic feet of bubble wrap per month from their dumpsters, and the landfill. ■

helping businesses implement industry-tailored solutions that maximize resource efficiency

mntap



The **Minnesota Technical Assistance Program** helps businesses and industries maximize resource efficiency, prevent pollution and reduce waste—which saves time and money. Located at the University of Minnesota, MnTAP provides free technical assistance tailored to individual businesses. By reducing waste and increasing efficiency, companies save on disposal and raw-material costs and make working conditions healthier and safer for employees.

MnTAP is funded primarily by a grant from the State of Minnesota to the University of Minnesota, School of Public Health, Division of Environmental Health Sciences.

The University of Minnesota is committed to the policy that all persons shall have equal access to its programs, facilities and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status or sexual orientation.

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calendar

Fundamentals of Compressed Air Systems February 21, Green Bay, WI, and February 22, Eau Claire, WI. Sponsored by U.S. Department of Energy and others, 262/376-2988.

Lean Manufacturing for the Finishing Industry March 8, White Bear Lake, MN. Sponsored by TC-CCAI, 612/624-1300.

Minnesota Paint and Powder Coating Expo March 9, White Bear Lake, MN. Sponsored by MnTAP and TC-CCAI, 612/624-1300.

Hennepin County Hazardous Generator Training March 17, Edina, MN, and April 21, Minnetonka, MN. Sponsored by Hennepin County Department of Environmental Services, 612/348-8100.

Healthcare Environmental Awareness and Resource Reduction Team (HEARRT) Meeting April 13, Minneapolis, MN. Sponsored by MnTAP and MPCA, 612/624-4635.

Nursing Practice Summit—Hidden Harm: Effects of the Workplace on Caregivers, Patients and Communities April 25, Oakdale, MN. Sponsored by Minnesota Nurses Association, 651/646-4807.

Minnesota Safety & Health Conference, May 10 - 11, Minneapolis, MN. Sponsored by the Minnesota Safety Council, 800/444-9150.

For more information and links to Web pages for these events, visit MnTAP's online calendar at <mntap.umn.edu/resources/cal.htm>.

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