

Arrow Tank heats up



Arrow Tank and Engineering Co., Cambridge, uses heat treating—an energy intense process—to stress relieve the metal tanks and vessels it fabricates. The company manufactures propane transport truck tanks, fire suppression vessels and custom pressure vessels for the air, chemical, food, gas, pharmaceutical, refinery and water treatment industries. To reduce operating costs and streamline production, Arrow Tank designed and installed a computer controlled and monitored natural gas heat-treatment furnace.

“Previously the only furnace available for heat treating large vessels was in Duluth,” said Joe Stitz, heat treatment manager at Arrow Tank. “We decided to build our own furnace to eliminate loading, unloading and shipping costs, and to eliminate the problem of coordinating our production schedule with an outside heat-treat facility.”

Design for heating efficiency

Arrow Tank designed its furnace and had it in service a year later. “By designing and building our own furnace we saved money over purchasing one, and we were able to include all of the features that we needed and wanted,” said Stitz.

While designing the furnace, Arrow Tank asked its natural gas utility—CenterPoint Energy Minnegasco—for help making the furnace energy efficient.

“They were a great help providing the natural gas to our site and assisting us with qualifying for conservation

rebates by adding efficiency features such as extra insulation and a high efficiency burner system,” said Stitz.

The heat-treatment furnace has 32 burners for a total heating capacity of 32 million British thermal units (Btus) per hour. It can handle loads up to 18-foot diameter by 73 feet. It heats to a maximum of 1,750° F, with a temperature uniformity of +/- 25° F. Because of its size, the furnace is housed in its own building.

Rebates and savings

“When we designed the furnace we knew that we wanted it to be state-of-the-art. Qualifying for an energy rebate was also a big incentive to include energy efficiency in our system,” said Stitz.

In four years, the extra insulation and burner control system paid for themselves in energy savings. Arrow Tank also saves money from reduced operating costs, eliminated shipping of parts to an off-site furnace and improved turnaround and delivery time. Approximately 50 percent of the furnace’s heat-treating jobs are from outside companies, producing additional income for Arrow Tank. ■

Save a watt, save a lot

Calculators

The following tools are available through the online *Source*.

Lighting savings

Use the online savings calculator developed by Downtown-Anywhere to see how much money your company can save by using more-efficient lighting.

Energy efficiency

Energy efficiency does more for your company than just save you money. You may be eligible for competitive offers from electricity, gas or oil suppliers.

Use the Business Analyzer, developed by Energy Guide, to conduct a self-guided, energy-efficiency analysis of your business.

Pollution calculator

Burning fossil fuels such as coal, natural gas or oil is often required to generate electricity. Burning these fuels produces air pollutants associated with smog.

Learn how much pollution is produced by the electricity used at your facility by using the online pollution calculator developed by the Environmental Law & Policy Center. ■

Lighting accounts for an estimated 20 percent of all electricity use in the U.S. Of this 20 percent, 80 percent is consumed by industries, businesses, offices and warehouses. In a typical 50,000 square foot commercial building, about \$45,000 is spent annually on energy for lighting. Reducing the amount of energy used for lighting at your facility may save you money.

Turning off lights when they are not needed is one easy, free strategy to cut your company's energy use and lower the electric bill. But, it is not the only strategy. Use the ideas outlined below to help reduce the amount of energy used for lighting at your company.

Efficient lighting

Switching from T12 tri-phosphor lamps to T10 or T8 lamps will increase your energy efficiency. T10 lamps will operate on most ballasts designed for T12 lamps and require less energy to produce an equal amount of light. T8 lamps also fit most T12 ballasts and require less energy than T10 lamps. New T5 lamps are now available and use less energy than T8 lamps, but they require a smaller ballast be installed.

Light levels

Reduce excess lighting. Remove two lamps from standard four-lamp fluorescent fixtures to reduce light levels and energy use. If light levels are



too low, install a reflector above the remaining lamps to regain 20 to 30 percent of the lost light.

Task lighting

Use small light fixtures over task areas that require additional light. Lighting an entire room to the level needed for some task areas consumes unneeded electricity.

Lighting controls

Occupancy sensors and time clocks that control lighting keep lights off when they are not needed. Another simple way to keep lights off in unused areas is to put stickers on light switches reminding workers to turn off the lights.

For more information about reducing the amount of energy used for lighting at your facility, see this article in the online *Source* available at <mntap.umn.edu/source>, and visit MnTAP's energy Web page, <mntap.umn.edu/energy>. ■

Start your engines

When Michael Waltrip won his second Daytona 500 title in February, he and his crew depended on his car's motor to run efficiently. An efficient motor helped him run at maximum speed with minimal pit stops.

You may not be racing towards a checkered flag, but having efficient motors is still important to keep your operation running at peak performance.

When to buy

Implement a motor replacement policy to replace older, rewind motors. New, energy-efficient motors will increase efficiency, reduce downtime, lower operating temperatures and cut operating, production and maintenance costs.

For new installations and major modifications buy new, energy-efficient motors and consider premium efficiency motors where feasible. Replace any motor when the repair costs will exceed 60 percent of the cost of a new motor. And, consider replacing motors in applications that run less than 40 percent of full load. For additional guidelines on when to repair and replace failed motors, see MnTAP's fact sheet, *Motor Energy-Saving Tips* [#123], available online at <mntap.umn.edu>.

What to look for

Find the motor with the highest efficiency rating that meets your needs. Greater motor efficiency—

the ratio of mechanical power output to electrical power input—usually results in lower energy costs and extended motor life. After 10 years of use, a motor's operating cost can exceed its purchase cost more than 20 times.

Size new or replacement motors to run in the 65 to 100 percent load range for a given application. One method for estimating the percent load is to measure the peak amperage (amp) draw of a motor during use and divide by the full load amp rating, found on the nameplate. For highly variable loads, consider using adjustable speed drives. Match motors to specific applications so that they operate near optimum-efficiency.

Additional resources about energy-efficient motors can be found in this article in the online *Source* available at <mntap.umn.edu/source>, and on MnTAP's energy Web page, <mntap.umn.edu/energy>. ■



Clean Air Minnesota

Ground level ozone—formed when volatile organic compounds (VOCs) interact with nitrogen oxides (NOx) in sunlight—is increasing and deteriorating Minnesota's air quality. Pollutants from automobiles, cleaning chemicals, paint, power plants, printing presses, small engines and solvents help form ground level ozone.

Clean Air Minnesota is working to reduce emissions and record real improvements. To help reduce ground level ozone, Clean Air Minnesota suggests businesses:

- Use low or no VOC products
- Implement strategies to reduce NOx and VOCs
- Conserve energy and use renewable sources of energy

For more information about Clean Air Minnesota, contact the Minnesota Environmental Initiative at 612/334-3388. Or, visit <www.mn-ei.org/air>. ■

Energy in the air

At many facilities, producing compressed air uses 30 percent of the plant's total electricity. Over the life of a compressor, energy costs will be five to 10 times the compressor's purchase cost. To produce one horsepower (hp) of air force, an air compressor needs seven to eight horsepower of electricity. Considering electric costs, ensuring that air compressors run as efficiently as possible is a good idea.

Leaks

All compressed air systems have leaks. Keep leaks to a minimum by correcting them as soon as they are found. Annually test your system during periods of non-production to determine its overall leak rate. Generally, leak rates below five percent of total compressed

air use are considered acceptable.

Compressed-air system leaks can be costly—an 1/8 inch diameter hole in a 100 pounds-per-square-inch gauged system can cost you \$1,240 per year in wasted energy.

Heat recovery

Eighty percent of the energy going into an air compressor is converted to heat. You can use this heat to supplement space or water heating requirements. For air-cooled compressors, use duct work to divert the hot discharge air into heated areas. Include a bypass to outside for when the heat is not needed. This can save you about 50,000 Btus per hour per 100 cubic feet per minute of compressor capacity.

Inappropriate use

Look for inappropriate uses of compressed air at your facility. Instead of using compressed air, use air conditioning or fans to cool electrical cabinets; use blowers to agitate, cool, mix and inflate packaging; and use low-pressure air for blow guns and air lances. Disconnect the compressed air source from any unused equipment.

For more information about maximizing the energy efficiency of your air compressors, see this article in the online *Source* available at <mntap.umn.edu/source>, and visit MnTAP's energy Web page, <mntap.umn.edu/energy>. ■



Prepared for takeoff

Business at Northstar Aerospace, Duluth, had taken off. Providing machined metal parts for small airplane manufacturing companies, the company outgrew its original facility. At its new facility, Northstar installed fully automated, computerized numeric-control equipment. The new equipment required increased air compressor capacity.

To help find the right compressor and maintain energy efficiency, Northstar contacted its energy utility. Minnesota Power energy consultant Matt Haley worked with Northstar.

"With the help of Minnesota Power and Matt we were able to develop models for the new building. This helped us find the most efficient system," said John Eagleton, president of Northstar.

Speed control

The company installed a 100 hp air compressor with a variable-speed drive. The variable-speed drive allows the compressor to vary its energy draw according to demand.

Northstar will save approximately 201,480 kilowatt hours (kWh) of electric energy annually and about \$9,300 per year in energy costs with the new compressor compared to a standard compressor without a variable-speed drive.

Rebate

"The new compressor cost \$20,000, but we qualified for a rebate and got \$10,000 back from Minnesota Power. It was a no-brainer to install the new compressor," said Eagleton. ■

Know what you pay for

When Accounts Payable cuts the check to your electric utility, does your company really know what it is paying for? Take a look at your electric bill. It may be your most difficult bill to understand. But, understanding how your electric utility charges you may help you uncover a better deal.

The charges can usually be broken down into two major types—energy and demand. The energy portion is the quantity, kilowatt hours, of electricity supplied. Demand is the maximum rate at which you use electricity. Rate schedules, how your utility charges you, also impact how much you pay for your electricity.

Energy

Energy is usually the most straightforward charge on your electric bill. The longer a piece of equipment runs, the more energy it uses. To help keep your energy costs in check, track how much energy your equipment uses. To calculate a motor's monthly energy use, multiply its horsepower by the standard conversion factor 0.746 and by run time, then divide by the motor's efficiency, found on its face plate.

$$\text{Monthly kWh} = \frac{\text{hp} \times 0.746 \times \text{run time}}{\text{motor efficiency (\%)}}$$

Demand

The electric company's meters record your greatest power demand in 15- or 30-minute intervals and your demand charge is based on the maximum demand during peak hours each month. Changing the time of day that you run equipment to off-peak hours can help cut demand costs. Off-peak hours are typically from 6:00 p.m. to 7:00 a.m., but vary from utility to utility. Refer to your utility company's rate structure for how it defines off-peak hours.

Rate schedules

You may find substantial savings on your electric bill by selecting a rate schedule that best fits the pattern of electricity use at your facility. For example, if you are on a time-of-use rate schedule and you run many of your operations during off-peak hours, you

will pay less for the same amount of electricity than if you ran all of your operations during peak hours.

Rate schedules are much like long-distance telephone plans. You get the same service, but the plan you are signed up for dictates how much you are charged. Be an informed consumer, ask your utility what rate schedules are available and pick the one that best meets your needs. Most electric utilities will allow you to change your rate schedule free of charge.

For more information about understanding your electric bill, see this article in the online *Source* available at <mntap.umn.edu/source>. Or, contact your electric company. ■



Money saving tips

- Buy high-efficiency, correctly-sized motors.
- Sequence the start-up of motors at your facility to stagger peak demand.
- Use standby generators to reduce peak demand.
- Shift operations to off-peak times.
- If planning a facility shutdown, schedule it during the hottest months of the year.
- Change rate schedules.
- Install high-efficiency lighting.
- Turn off lights, heat and air conditioning in unused areas of the facility.
- Turn off office equipment when not in use.
- Perform efficiency tests on major power-consuming equipment to identify maintenance needs.
- Weather-strip around doors and windows.

For more money saving ideas see this article in the online *Source* available at <mntap.umn.edu/source>. ■

where's your waste?

Summer of solutions

Come and hear the MnTAP interns present the results of the following projects to maximize resource efficiency, prevent pollution and reduce costs. Presentations are August 21, 9:00 to 11:30 a.m. at the University of Minnesota. Call MnTAP for reservations.

Crenlo, Rochester, evaluate pre-paint cleaning process for opportunities to conserve water and chemicals, investigate spray booth filter use to reduce cost and solid waste and investigate reducing cooling water use.

Greif, Rosemount, review scrap-generating processes in the tubing department, including density of plain paper

rolls, setup procedures and cutting-operations to reduce scrap.

Intermet, Minneapolis, reduce water and wastewater, and cut energy use on the compressors, motors and evaporator.

Lou-Rich Inc., Albert Lea, evaluate pre-paint cleaning process for opportunities to conserve water and chemicals, identify other processes with large or variable water use and investigate reduction options in those processes.

Malt-O-Meal, Northfield, decrease volume of off-specification product by evaluating options for one production line for cooked and milled products.



Tiro Industries, Fridley, reduce water and wastewater to eliminate a Service Availability Charge (SAC).

Have an intern work on reducing your waste in the summer of 2004—provided at **no charge** from MnTAP. Contact Deb McKinley, intern program coordinator, at 612/624-4697. ■

15 seconds of fame

Running hot and cold



Honeywell Solid State Electronics Center, Plymouth—a Governor's Awards for Excellence in Waste and Pollution Prevention winner—uses energy for heating and cooling water in its processes.

"A lot of energy was being used to heat well water and to cool process water," said Frank

Fachman, principle plant engineer at Honeywell.

Heat exchanger

Because it seemed natural to let the two systems help each other, Honeywell installed two heat exchangers, Fachman said. The heat exchangers take the heat from Honeywell's cooling water system and the cold from the

well water and transfers energy—making the hot water cooler and the cold water warmer.

Costs and savings

Including installation, the system cost under \$40,000.

"The first year's savings was \$30,000 in energy costs. In addition we received a one-time rebate from Excel Energy for \$14,000. The payback was 11 months," said Fachman.

In two years the system saved Honeywell \$56,000 in energy costs. "Due to the fact that Honeywell's process cooling water use has increased significantly this year, we expect to save at least \$45,000 per year in the future. Of course the savings will also increase as energy costs rise," said Fachman. ■

materials exchange



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

it available 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

Calcium carbonate: 3,000 cubic yards. Mixed in soil slurry with lithium. Free. Minnetonka. [14500]

Desks, metal: Four. Black. Free. St. Paul. [14485]

Drums, plastic: 100 per month. 55-gallon. Closed top. Blue. Free. Lakeville. [14476]

Flooring, maple: 25,000 square feet. 2.25 inch wide, 25 and 32 inch long pieces. Tongue and groove. Fee charged. Minneapolis. [14503]

Light bulbs: 12. 1,500 watt, mogul base. Used to light football field. Fee charged. Perham. [14513]

Packing peanuts: One 55-gallon bag per week. White and green. Free. Kasson. [14420]

Super sacks: 550 per month. 4 x 4 x 7 feet. Food grade. Draw string top and bottom. Used once. No plastic liner. Free. Lakeville. [14407]

Tractor rubber tracks: One per week. 30 inches x 12 to 15 feet. From Quadtrack farm tractors. Reinforced with cable. Free. Faribault. [14422]

Materials wanted

Bubble wrap: 1,000 cubic yards. Medium or large sized bubbles. Prefer free. Rochester. [14531]

Chairs, conference: 10 to 30. St. Paul. [14448]

Drums, plastic: 1,000. Open top or with bung holes. Rochester. [14446]

Forklift or pallet jack: One. Gilbert. [14321]

Tin, corrugated: Any amount. From roofs or other sources. Will dismantle if local. Maple Lake. [14281]

Totes, plastic: Any amount. 250- to 300-gallon. Department of Transportation (DOT) classified single-use. Held non-hazardous material only. To hold paint for recycling. Owatonna. [14461]

Tubes, cardboard: Any amount. Thin. Duluth. [11838]

Wax scrap: Any amount. Any color. Duluth. [11837]

Successful exchanges

- A plastics manufacturer receives 400 cardboard tubes quarterly from a printing operation.
- An airport donated approximately 1,000 pounds of construction supplies to various nonprofit organizations.
- A bike rack manufacturer receives two truckloads of bubble wrap per month from a printing company.
- A paint formulator donated 255 gallons of paint to an educational organization.
- A farm community received \$10,000 worth of building materials and office equipment and supplies from a manufacturing facility that closed.
- A transportation department gave a video wall to a fire department. ■

Hennepin County VSQG collection

The Hennepin County Very Small Quantity Generator (VSQG) Collection Pilot Program has been discontinued. The three Twin Cities metro area VSQG programs listed below may accept VSQG waste from Hennepin County businesses.

Dakota County Business Hazardous Waste Collection Program

Dave Magnuson
952/891-7551

Special Waste Disposal Inc.

Jim Ciolkosz
612/285-9865

Xcel Energy—VSQG Hazardous Waste Collection Program

Jill Macioch
612/630-4516

For links to their Web pages, see this article in the online *Source* available at <mntap.umn.edu/source>. ■

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 by a grant from the Minnesota Office of Environmental Assistance to the University of Minnesota, School of Public Health, Division of Environmental and Occupational Health.

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, religion, color, sex, national origin, handicap, age, veteran status or sexual orientation.

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calendar

Wastewater Treatment Technology Seminar *August 19-21, Grand Rapids, MN.* Sponsored by the Minnesota Pollution Control Agency, 651/296-6300 or 800/657-3864.

MnTAP Intern Presentations *August 21, Minneapolis, MN.* Sponsored by MnTAP, 612/624-1300 or 800/247-0015.

Vehicle Maintenance Environmental Compliance and Pollution Prevention *September 4, Faribault, MN.* Sponsored by the Southeast Minnesota Water Resources Board, 507/457-6483.

Steam Best Practices *September 9, Minneapolis, MN.* Sponsored by the Department of Commerce and the Department of Energy, 651/297-5648.

Pollution Prevention Week *September 15-21.* Sponsored by the National Pollution Prevention Roundtable, 202/299-9701.

Principles of Occupational Safety and Health *September 22-25, St. Paul, MN.* Sponsored by the Minnesota Safety Council, 651/291-9150 or 800/444-9150.

Hazardous Waste Management: The Complete Course *September 24-25, Minneapolis, MN.* Sponsored by the Environmental Resource Center, 800/537-2372.

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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McNamara Alumni Center • UNIVERSITY OF MINNESOTA
200 Oak Street SE • Suite 350 • Minneapolis, MN • 55455-2008

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