WATER CONSERVATION BULLETIN 10

ELECTROPLATING & METAL FINISHING

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Businesses and institutions continuously explore areas for operational cost control. Water and sewer costs are not fixed - controlling them is essential to the bottom line. Through the development of water conservation programs, all facilities have the potential to reduce consumption without jeopardizing operations. Water-saving measures need not be expensive or complex to be effective. The strategies are simple, the technologies familiar and use reductions significant.

Gaining a true understanding of how and where water is used is the first step in operating a water-efficient facility. This can be done by conducting a water audit - a systematic engineering review of facility water use. A successful demand management program should include a thorough review of water use, implementation of water conservation measures and the education of employees regarding the value of water.

A continuing program of process improvement, equipment inspection and rigorous maintenance is necessary to operate efficiently.

Research shows that an average of 80% of water consumption in electroplating and finishing plants is used for production and cooling and 20% for sanitary purposes. Potential water savings for both large and small facilities range from 13% to over 70% of total use. The average payback period for these measures is 18 months.

For your free Water Audit Guide, sample audit, and Conservation Strategies brochure call 617-242-SAVE.

A facility water audit

Identifying areas where water is wasted or where water could be reused is the key to knowing where the greatest savings can be obtained.

• Identify all points where water is used and determine the quantity used at each point, including rinsing flows and makeup rates. It is important to calculate actual use.

• Identify leaks through a leak detection survey and schedule their repair.

• Determine the quality and quantity of each continuous discharge. Investigate options for reuse.

• Read meters monthly to monitor the success of water conservation efforts. Compare usage to that in the same period from previous years.

Cooling and heating

• Install closed-loop cooling systems with cooling towers. Single-pass non-contact cooling is wasteful and expensive.

FACT: The Raytheon Company in Waltham, Massachusetts eliminated single-pass cooling by recirculating water in 5 cooling towers, saving over 20 million gallons of water per year (mgy).

• Consider glycol cooling towers or ozone treatment instead of traditional chemical methods. These technologies reduce water loss from frequent blowdown during operation and eliminate the need for costly chemical treatment systems. Blowdown rates should be adjusted to maintain total dissolved solids of 2,000 parts per million or less.

• Capture and reuse steam condensate as boiler feed or cooling tower makeup.

• If isolated cooling units are necessary, connect them to a recirculating chilled water loop rather than using a single-pass connection. A small cooling unit with a single pass connection requiring one-half gallon per minute uses up to 263,000 gallons per year.

• Investigate the use of air-cooled rather than water-cooled technologies whenever possible.

• Install temperature regulator valves on compressor cooling lines to reduce unnecessary flows. A temperature regulator valve can reduce water flow by 50% and enhance compressor performance through consistent water flow and temperature.

• Connect equipment to a closed-loop system instead of using municipal water.

FACT: The Raytheon Company modified the supply lines for a solder stripper and two etchers and tied them into an existing cooling tower. This change saves an estimated 1.35 mgy.

Specialized processes and equipment

Through additional treatment and filtration, process water can be reused for boiler or cooling tower makeup, quench tank makeup and some process use.

Convert single-rinse plating tanks to a two-step cascading rinse system. The first tank removes the majority of the contaminants while the second tank remains relatively clean. This measure can reduce the flow by 75%.

FACT: A local manufacturer invested $750 to repipe its single-rinse tanks and is saving 1.7 mgy.

• Use conductivity meters to control process plating lines. (Remember that conductivity meters require maintenance to ensure continued accuracy.)

FACT: A water audit for a large plating facility recommended the installation of conductivity meters on 16 single rinse tanks to control the chemical content of the water. This measure is estimated to save over 11 mgy.

• Reduce water consumption and waste discharge by reusing process water.

FACT: A metals finisher can reuse water from the chrome treatment process for rinse cycles in the cadmium-zinc process and the copper-nickel-chrome process. One company implemented this reuse process and estimates savings of 1 mgy.

Restrooms

• Repair leaking toilets, pipes and faucets. One leaky toilet can waste more than 50 gallons of water a day. A dripping faucet can waste 75-1,000 gallons a week.

• Install aerators, and spring-loaded valves, timers or sensors on all faucets. Reduce aerator capacity where appropriate.

• Replace worn-out fixtures with water-saving models.

• Install code-conforming 1.6 gallon per flush ultra-low-flow toilets to reduce toilet water use by 50% or more.

• Reduce the water used in toilet flushing by:

-installing toilet tank displacement devices (weighted bottles or dams).

-retrofitting flushometer valves with a water-saving diaphragm to save one gallon per flush. (Most flushometers use 5 gallons per flush).

The Massachusetts Plumbing Code currently requires the use of 1.6 gallon per flush, two-piece tank-type and floor-mounted flushometer toilets and 1 gallon per flush urinals in all new or replacement installations. A code requiring 1.6 gallon per flush, one-piece tank-type and wall-mounted flushometers is scheduled to take effect in the near future.

• Select a toilet model for your facility based on its discharge curves and drainline carry performance. Toilet specifications are available from the manufacturer.

• If automatic sensors are used in public toilets, adjust them so that the beam is triggered by movement over the toilet bowl and not within the stall to avoid unnecessary flushing.

Building maintenance

• Check the plumbing system for leaks and turn off any unnecessary flows. A pencil-sized steady flow wastes about 1,000 gallons of water per week.

• Instruct cleanup crews to use less water for mopping facility floors and cleaning equipment.

• Replace high-volume hoses with low-volume, high-pressure cleaning systems.

• Install pressure reduction valves where pressure is higher than 50-60 pounds per square inch (psi).

• Equip all hoses with shut-off nozzles.

• Sweep or shovel solid materials from the floor - do not hose.

• Inventory all cleaning chemicals. Determine their water-use efficiency and that they are being used correctly.

Outdoor conservation

• Water only when needed. One inch of water per week (rain or supplemental watering) is plenty to sustain established lawns and landscaping.

• Water in the early morning or evening to reduce the amount of water lost through evaporation.

• Minimize turf areas - grass needs more water than groundcovers or hardy shrubs. Call 617-242-SAVE for a list of low-water-use plantings.

• Install timers and either tensiometers or rainfall sensors on irrigation systems. Reduce water pressure to the level recommended by the manufacturer (generally 15-20 psi). Higher pressure does not contribute to useful coverage, but causes excessive drift. Reducing pressure from 60 psi will reduce the flow rate from 4 gpm to 2.3 gpm.

• Install a drip irrigation system *-it could save 30%-70% of the water used by an overhead sprinkler system.*

• Sweep - never hose - walks, driveways, loading docks and parking lots.

CASE STUDY: TEXAS INSTRUMENTS INC.

Texas Instruments is supplied primarily with municipal water and also utilizes on-site wells. Total water use in 1980 was 2.7 million gallons per day. In 1989, total water use had dropped to 1.3 million gallons per day. This reduction in water consumption was achieved as square footage on the site increased.

The most effective water conservation measure implemented has been the recirculation of cooling water. In every building accessible to a cooling tower, each machine that requires cooling water is tied into the closed-loop system.

The lead frame plating division treats well water by reverse osmosis before using it in the process stream. Over 50% of the water used in the plating line is reused by sending it through reverse osmosis a second time. Plating lines in this division have three strands. Solenoid valves are used to prevent water flow in all three strands when only one or two strands are in use. Without the valves, water would run continuously in each strand, regardless of whether or not a particular strand was being used.

Another plating division has made a number of simple changes which reduce consumption by over 40%, even as production increased. These measures included adjusting nozzles to distribute water more efficiently, replacing stationary rinse systems with a counterflow system and dragout tank, installing flow restrictors where applicable, putting timers on rinse controllers and training operators about careful water use.

For further water conservation information, please call:

617-242-SAVE

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