MINNESOTA TECHNICAL ASSISTANCE PROGRAM

Case Study

UNIVERSITY OF MINNESOTA

Soak step reduces solvent waste from cleaning paint straining equipment

Crenlo, Inc. of Rochester, Minnesota, manufactures cabs for agricultural and construction equipment, electronic cabinets and enclosures, and NEMA electrical enclosures.

Prior to the changes:

- High fees associated with disposal of flammable solvent containing Toulene, MEK, and other similar products
- Large amounts of solvent were being wasted

Change:

- Equipment was soaked in solvent prior to spray rinsing

Savings:

- Solvent waste reduction of 55% annually
- $2,000 annual reduction in solvent disposal fees.

Background

Crenlo, Inc. manufactures metal products from steel and aluminum. Finished products are coated with baked enamel paint, and most paint colors are prepared on-site. Paint from any prepared batch may be stored for future use before it is completely consumed. Therefore, the paint is remixed and strained to remove solids larger than roughly 90 mesh screen size before delivery to the spray booths.

Before the change over, the straining equipment was cleaned using fresh solvent sprayed from a hose fitted with a nozzle. The strainer consisted of a dairy funnel draped with a double layer of nylon tricot fabric. The fabric was held onto the funnel with masking tape and replaced weekly. Annual cleaning of the straining equipment produced about 14,000 gallons of waste costing at least $16,000 per year. The cleanup solvent is a recycled blend that is distilled off-site and returned to Crenlo for reuse.

Waste Reduction Technique

An Environmental Protection Agency (EPA) funded waste assessment[1] identified the cleaning of the paint straining equipment as a major source of solvent waste at Crenlo (27 % of the plant total). One idea to reduce this waste was to search for other materials that would clean easier than the nylon. This search led to the fabrication of a new straining funnel made from brass screen soldered to a steel rim. Tests eventually showed that the brass screen funnel was no easier to clean than the nylon. However, because of the permanent solder construction of the brass screen funnel, the operators decided to soak the screen with other equipment in a solvent filled drum before rinsing it with a clean solvent spray.

This soak procedure allows dirty solvent to remove, or at least thin, the paint coating the brass screen making it easier to rinse off any remaining paint. With the new brass screen funnel and the soak procedure, spray cleaning times were reduced from 30 seconds to approximately 10 seconds, with a corresponding decrease in solvent waste. The equipment soak tank was changed more often but this increase in waste was not quantified. A significant reason for introducing the soak procedure was that it added flexibility. Instead of cleaning the straining fabric immediately, before the paint dried, the soak procedure allowed for cleaning the brass screen funnel as time allowed.

Implementation Problems

Brass Screen Repairs

Soaking the brass screen funnel with paint mixing equipment, like drum mixers and dip sticks, occasionally caused tears in the brass screen. Depending on the general screen condition, repairs could be made in a few hours to a few days for minor problems, or up to a month or more to construct a new funnel. Because of the length of time needed to make a new funnel, it was quicker to revert to the old funnel design to meet immediate needs rather than submit a rush order to maintenance. It then became difficult to justify the time to order repairs or a new brass screen funnel as long as current paint needs were being met. Reverting to the old funnel also eliminated the possibility of paint line down time. The solution to the tearing problem was to purchase an eight gallon, Justrite® wash tank and a stand from Lab Safety Supply, Inc. in which to separately soak the funnel. The solvent in this tank is changed weekly, creating a new 350-gallon per year waste stream.

Funnel Availability

Fabricating the brass screen funnel required shaping the wire cloth, soldering the seam and soldering the rim to the funnel. Since the paint vault operators could no longer fabricate their own funnels when needed (for example, in

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case of a bad tear or the build up of paint resulting in slow filtering) there was the tendency to revert to the nylon funnel design when there was a problem. Thus, for the same reasons as in problem one, it occasionally took four to six weeks before a new brass screen funnel was made and brought into service. Once it was clear that the soak procedure and not the filter material (nylon or brass) was responsible for the waste reduction, vault operators determined that a large hose clamp could be used to attach the nylon fabric to the original funnel instead of masking tape. This change gave vault operators control over fabricating the straining funnel and also allowed the nylon straining fabric to be soaked. Thus, the soak procedure became fully implemented and used to clean the nylon fabric and the brass screen funnel.

Economic Benefit

Another waste reduction technique (changing nozzle size) that reduced the funnel wash waste from 14,000 gallons per year to 3,000 gallons per year was implemented before the soak procedure came fully on-line. The soak procedure reduced the spray rinsing waste further by about 70 % or 2,000 gallons per year, but created a new soak waste of approximately 300 gallons per year. The net waste reduction of 1,700 gallons per year should save Crenlo $2,000 per year. (Note: If the soak procedure had been implemented first, it is believed the net waste reduction would have been 9,500 gallons per year.)

There was no capital investment. Supplies consisted of a wash tank and stand which cost $110. The time required by Crenlo personnel to develop and implement the soak procedure initially, and the time later required to modify the strainer design was minimal. Tests for evaluating the soak procedure required two to four hours. Therefore, total labor cost is estimated at less than $150. Total implementation cost was less than $250.

Application to Other Companies

Presoaking or any other form of multi-stage cleaning can significantly reduce wastes associated with cleaning dirty parts or equipment. Dirty solvent (or other cleaner) removes most of the soil, while clean solvent brings the parts to specification. Multi-stage cleaning can be accomplished with immersion, sprays, or a combination of both. Ideally, the “clean” (second stage) solvent will be reused directly as dirty (first stage) solvent after it picks up too much soil.

In addition, this case study illustrates that it may take a few attempts to achieve a workable waste reduction solution. Thus, it is worthwhile to focus attention on a problem that will involve many people in generating ideas for waste reduction. It is also worthwhile to try potential solutions that have low-cost implementation requirements. Trying low-cost ideas helps people to understand the waste reduction process better, and may generate new ideas that lead to a workable, cost-effective solution.

[1] *The waste assessment and labor for soak testing was funded entirely by a Resource Conservation and Recovery Act (RCRA) Integrated Training and Technical Assistance (RITTA) grant awarded to the Minnesota Pollution Control Agency (MPCA) by the U.S. EPA in 1988. MnTAP was a subcontractor to the MPCA on this project. Equipment, space, and part of the total staff time were provided by Crenlo, Inc.*