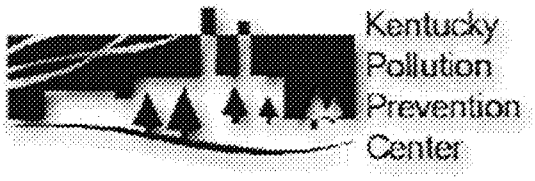
REVISED PROJECT PROPOSAL:
INSTALL CONDUCTIVITY-CONTROLS FOR RINSE SYSTEM ON LINE #3 RINSE SYSTEM, ELECTRO-SHIELD PLATING. INC.

February 1, 2002



Kentucky Pollution Prevention Center
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1.0 INTRODUCTION AND BACKGROUND

On May 8, 2001, the Kentucky Pollution Prevention Center (KPPC) performed a pollution prevention assessment at Electro-Shield Plating, Incorporated in Georgetown, Kentucky. Recommendations stemming from that assessment included utilization of conductivity-controlled rinsing on the zinc plating lines at the facility. The goals of this recommendation are to minimize: water usage and associated sewer disposal costs, the chemicals required for wastewater treatment, sludge generation and the zinc concentration in the effluent from the plant.

KPPC performed this assessment as part of the Center's Kentucky Metal Finishing Initiative (MFI), a program to work with Kentucky industries that conduct electroplating and surface finishing operations. The purpose of the MFI is to illustrate how pollution prevention (P2) can benefit companies through the implementation of P2 technologies. A similar, successful program was developed by the Waste Management and Research Center located at the University of Illinois.

It is well recognized within the P2 circle that a large majority of companies find it difficult to obtain approval to implement P2 projects. This is because these projects typically do not generate additional revenue. However, it has been shown many times in the past that P2 can reduce costs - an area that may not be as significant as increased revenue but can be equally valuable to the company.

In the past, companies have likely attended a multitude of workshops addressing P2 and the technologies available. They may also have attended vendor exhibits to view "hands on" what the equipment can do. Despite these proven technologies, only a handful of companies are implementing this P2 technology.

With the MFI, KPPC intends to show, in real dollars, how much money a company can save through P2. This initiative is a group effort involving KPPC technical staff, the company and the company's vendors. We are pleased that Electro-Shield Plating is taking part and offer the following project proposal as a further means for KPPC to partner with your organization in the goals of the Initiative – P2 technology implementation and monetary savings.

2.0 REVISED PROJECT PROPOSAL TO INSTALL CONDUCTIVITY CONTROLLED RINSE

Current Practice:

In KPPC's first project proposal, it was reported that Electro-Shield had 3 gallon per minute (GPM) flow restrictors on all rinses on all 5 lines (the actual flow, due to limited water pressure, is calculated to be approximately 2 GPM at each rinse stage, based upon an average of 1 million gallons plant-wide usage per month or 12 million gallons per year, with continuous operation for 5 days per week and 4 rinse stages on each of the 5 plating lines).

For the initial proposal, it was also assumed that the rinse rate is the same for manual barrel lines (lines 1 and 2), the automated barrel line (Line 3) and the automated rack lines (4 and 5). Since the first proposal, Electro-Shield installed a totalizer on Line 3 that indicated its water usage to be about 30 percent for the facility. On January 14, 2002, KPPC visited Electro-Shield to deliver the conductivity meters and determine the locations for installing them on Line 3. At this time, it was determined that Line 3 has 4-two rinse stages and 2-one rinse stages. KPPC did not realize that there were 2-one rinse stages on this line. This is a revised proposal for Line 3 using a 30 percent water usage and for purchasing an additional conductivity meter with two sensors.

For this revised proposal, the following information is still accurate. The total water and sewer costs are $108,000 annually (see Appendix A). The overwhelming majority of these costs are likely to be associated with rinsing. Total chemical costs for wastewater treatment are estimated by facility personnel to be about $280 per day, or $70,000 annually. Annual disposal costs for the 156 tons of sludge estimated by company personnel amount to $36,000. This gives a total cost for water usage at $214,000 annually.

Recommended Action:

The company should seek to minimize water usage by installation of conductivity-controlled water metering valves on all rinse stages (acid, caustic, zinc and chromate). It is recommended to first install these on the automated zinc barrel plating line (Line 3). If proven successful, systems should be installed on, at a minimum, the other two automated rack lines.

Operating/Maintenance Costs:

Some types of conductivity meters have a history of frequent fouling and require considerable maintenance. The recommended conductivity meters are of the newer toroidal, non-contact type. Periodic monitoring and measuring of conductivity readings should be taken by facility personnel. Periodic inspection and calibration should also be performed. Labor costs associated with these activities are estimated to be minimal.

Anticipated Savings:

Savings will be realized in lower water and sewer costs, a reduction in water treatment chemical usage and reduced sludge generation.

According to the totalizer installed on Line 3, this line water usage is 30 percent of the facility's water bill. The cost for rinse water for Line 3 would therefore be:

$$\$108,000 \times (.3) = \$32,400 \text{ annually}$$

It is estimated that a minimum of a 25% reduction in water use is achievable with implementation of this recommendation. This represents an annual savings (AS) of **$8,100** in water and sewer costs alone for this line.

The cost savings for wastewater treatment chemicals associated with Line 3 can be estimated by a similar calculation:

$$\$70,000 \times (.3) \times 0.25 = \mathbf{\$5,250} \text{ annually}$$

Estimating savings from decreased sludge generation requires one additional step. It is estimated that approximately 75% of the content of the sludge results from calcium and other ions precipitated from the city water used at the facility (the other 25% coming from metals associated with the product, such as zinc and iron). Therefore the estimated savings from reduced sludge disposal for Line #3 would be:

$$\$36,000 \times .30 \times 0.75 \times 0.25 = \mathbf{\$2,025} \text{ annually}$$

The total annual savings can therefore be estimated by adding the savings from water purchase and sewer disposal costs, wastewater treatment chemicals and reduced sludge disposal:

$$\$8,100 + \$5,250 + \$2,025 \approx \mathbf{\$15,375} \text{ annually}$$

Implementation Costs:

KPPC has purchased two conductivity meters ($2,200), 4 water solenoid valves ($400), and one totalizer ($500) for a total of about **$3,100.** Appendix B includes the cost estimate for this equipment. Installation of these components by facility maintenance personnel, along with associated piping and hardware, is estimated at **$400**. Additional costs for another conductivity meter and two solenoid valves is estimated at **$1,400.** Total implementation cost (IC) with the additional equipment is therefore estimated at:

$$\$3,100 + \$400 + \$1,400 = \mathbf{\$4,900}$$

Payback:

Payback is the time needed for an implementation to pay for itself through cost savings. It can be calculated as follows:

$$\mathbf{PB = \frac{IC}{AS - OC}}$$

where

PB = Payback Time (yr.)
AS= Annual Savings ($/yr.)
IC = Implementation Costs ($)
OC = Operating Cost ($), assumed to be zero for this recommendation

The estimated payback for installation of a water flow and conductivity measuring system on Line 3 is:

$ 4,900 / ($15,375/yr.) = 0.32 years ≈ **3.8 months**

Special Considerations:

The facility has been coming close to exceeding the pending zinc concentration limits on wastewater discharge. Company personnel stated that a likely reason is inadequate residence time for wastewater in the treatment area. Any reduction in water usage, and consequentially the wastewater generation rate, would increase the residence time in wastewater treatment and reduce concentration in the effluent discharge from the facility. These concentration parameters, especially for zinc, should be monitored closely before, during and after the project completion to insure compliance with existing and any upcoming effluent regulations.

3.0 REVISED PROPOSAL ACCEPTANCE SHEET

AGREEMENT BETWEEN ELECTRO-SHIELD PLATING, INCORPORATED AND THE KENTUCKY POLLUTION PREVENTION CENTER

Electro-Shield Plating, Incorporated agrees to:

- Install a conductivity-controlled rinse system on Line 3 (the automated barrel plating line) consisting of three conductivity meters, six water solenoid valves and a totalizer meter, along with any necessary piping and miscellaneous installation hardware, using personnel available at the facility, within two to three months of the signing of this agreement;
- Timely pay for any subcontracted work required for this system installation that facility personnel are not capable of performing;
- Assist with any required monitoring and measuring that may be necessary for successful completion of the project; and
- Reimburse KPPC for all purchase costs associated with the conductivity-controlled rinse system components (consisting of three conductivity meters, six water solenoid valves and a totalizer meter) after a 12-month trial period, if the installed system pays for itself (using the methods lined out in section 2.0 of this proposal) within that 12-month period.

The Kentucky Pollution Prevention Center agrees to:

- Pay for the conductivity-controlled rinse system components (consisting of three conductivity meters, six water solenoid valves and a totalizer meter) on Line 3 within one month after the signing of this agreement;
- Through on-site and off-site technical support (guidance and resource information) with an average maximum of 10 hours per week for the duration of the project, facilitate the installation of the system components and assist with any required monitoring and measuring that may be necessary for successful completion of the project;
- Issue a project report for technology transfer diffusion that summarizes the project results for the metal finishing sector after the 12-month trial period or when results are determined; and
- Remove or leave in place, at the discretion of and cost to Electro-Shield Plating, at the end of a 12-month trial period, any system components purchased by KPPC and installed on Line 3 as part of this revised proposal, if the installed system fails to pay for itself (using the methods lined out in section 2.0 of this proposal) within that 12-month period.

Miscellaneous Terms

- The parties agree the KPPC, the University of Louisville and their respective officers, directors and employees shall not be liable for damages, claims, costs, expenses or liabilities arising from the services or equipment being provided by KPPC pursuant to this Agreement, and
- The parties agree not to use the others name or the name of the University of Louisville without prior written consent.

Electro-Shield Plating, Inc.	Kentucky Pollution Prevention Center
Title	Title
Date	Date