



SERFILCO® CASE HISTORY

PRINTED CIRCUIT BOARD

Circuit Systems, Inc. improves quality and efficiency using SERFILCO pumps and filtration equipment

Particulate contamination is perhaps the most common problem faced by manufacturers of printed circuit boards. Preventing such contaminants from reaching the circuit boards running through its automatic plating lines receives major emphasis at Circuit Systems, Inc., Elk Grove Village, Illinois. Circuit Systems is a major job shop producing single-sided, double-sided and multi-layer circuit boards for use by some of the nation's largest manufacturers in automotive, communications, computer and robotics applications.

To achieve its goal of maximum cleanliness, the firm installed SERFILCO Guardian® and Space-Saver® filtration systems on its 39-station lines which include 10 copper plating and 2 tin/lead plating stations, plus microetch tanks, and a series of cleaning and rinsing tanks. To assure compatibility with the chemicals used in the line, all of the tanks are lined with PVC.

The plating lines run 24 hours a day, six days a week. Each of the 1800-gallon copper tanks has two 5200 GPH Guardian systems with a SERFILCO Dri-Stop 3 pressure switch to protect pumps from dry run. In addition, a Ser-Ductor® system consisting of twenty ¾" eductors significantly increases agitation. The filtration systems each provide 5.7 tank turnovers per hour of filtration and, using the Ser-Ductor nozzles to discharge the solution, an agitation rate of 28 turnovers is achieved. Polypropylene filter cartridges of 5-micron assure maximum entrapment of particulate.



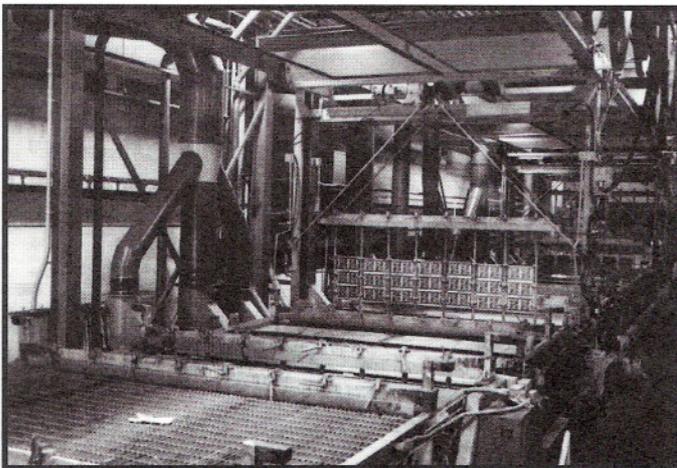
Two 5200 GPH Guardian filtration systems at each station assure a high turnover rate. Each filter chamber uses 5-micron filter cartridges to provide optimum surface for adsorbing particles.

Each of the two filter chambers provides a surface area of 84 sq. feet, for a total of 168 sq. feet. This compares to approximately 25 sq. feet for a similarly sized bag type filter. Filters are changed only as needed, based on pressure readings. For Circuit Systems, this works out to a change about once every four weeks, when system differential pressure reaches 25 PSI.

Opting for polypropylene cartridges with their significantly increased surface area vs. bag filters lessened the possibility of the filter system blinding prematurely (a tendency of bag filters). Blinding increases system pressure, reduces flow and results in increased particle contamination in the solution. The larger surface area and filtering capability of the cartridges also made higher flow rates possible, as shown by the high number of turnovers so vital to efficient filtration.

Polypropylene magnetic-coupled pumps are used to drive the filtration systems. This does away with the possibility of seal leakage and fugitive emissions. Since there is no shaft connecting pump and motor, no seal is required.

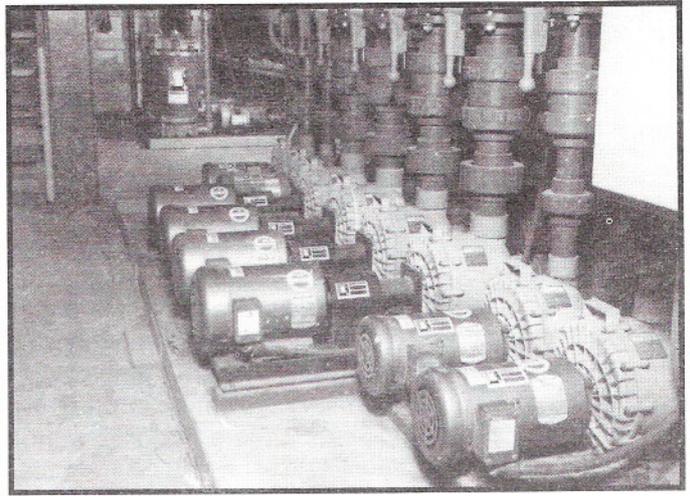
Using a Ser-Ductor system instead of air, provides superior agitation. By using the clean, filtered solution from the tank to agitate, oils and airborne particulate, common with air agitation, are not introduced to the solution. In addition, each Ser-Ductor nozzle circulates another four gallons for each gallon delivered to it. That translates into



Automatic hoists on 39-station plating line cycle circuit boards through sequence. Filtration system is behind left side of line.

15,000 GPH agitation from every 50 GPM delivered to the Ser-Ductor nozzle. As additional benefits, the Ser-Ductor system minimizes heat loss due to increased evaporation, eliminates temperature stratification, and eliminates misting and fumes, all of which are associated with air agitation. It also minimizes bath breakdown due to oxidation caused by air agitation and eliminates the possibility of air bubbles entering the pump suction where they might cause pump cavitation and produce roughness on the parts being plated.

The tin/lead tanks are serviced by two 2900 GPH Guardian systems which are powered by ¾-HP magnetic coupled pumps. Tank agitation is provided by a Ser-Ductor system using 14 eductors powered by a 5-HP pump, resulting in an agitation rate of 16 tank turns per hour. The increased agitation permits plating at higher amps per square foot (ASF), which results in faster plating and lower energy consumption.



SERFILCO Series 'S' pumps are used to pump rinse solution to the treatment facility. Guardian systems can be seen in the background.



Space-Saver filters with self-priming pumps provide recirculation and removal of particulate for microetch station.

Three robotic hoists service each line, automatically moving the boards through the production sequence. From the loading station, circuit boards go through a soak clean and counterflow rinse before the microetch tank. This is followed by a second counterflow rinse and sulfuric acid bath before the boards enter the copper tank. Next comes another counterflow rinse and sulfuric acid bath, followed by tin treatment. Then the boards undergo a final counterflow rinse and drying before they are unloaded. Total time for the production sequence is approximately 64 minutes. The chemicals in the line are changed bi-weekly, while copper nuggets are replenished as needed and tin anodes are checked twice a week.

To assure maximum cleanliness of the rinse tanks, three gallons per minute are added, with the overflow going to waste treatment, where the solution is clarified, equalized and moved into holding tanks. Eight SERFILCO Series 'S' self-priming pumps are used to move the rinse waters to the treatment facility. The resulting sludge goes through filter presses and is dried to remove moisture and reduce sludge volume.

Since the start-up of the new plating lines, contamination and rejects due to continuity problems on the circuit boards have ceased to be problems at Circuit Systems, Inc. Leo Tarnawa, Circuit Systems' facilities manager, proudly points to the fact that the installation of both plating lines was completely handled in-house. Says Mr. Tarnawa, "With this new setup, we are getting more even plating with far fewer rejects, due to the increased flow and improved filtration."

Charles Remied, SERFILCO'S Midwest Regional Manager, provided technical assistance in the selection of filters and pumps for the new plating lines.



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