Maryland Eastern Shore Microwave Company Invests in World-Class Plating

By Al Knezevich, K&L Microwave, Inc., Director, Quality Assurance



Brian Scott, plating supervisor, pointing to an electroless nickel tank with a view of plating lines 2 and 3.

Editors Note – This article was conceived and developed by Mr. Don Berry, previous Editor of *Plating & Surface Finishing*.

K&L Microwave, Inc. background

K&L Microwave designs, manufactures and markets RF and microwave filters and integrated assemblies. The company has been in business for over 30 years, with its roots serving military applications. Over the past decade, K&L has branched out to serve the telecommunications market, while maintaining strong ties with military customers. The explosion of the telecom market in the 1990s influenced K&L to outsource various parts of its business, including a portion of machining and plating which historically was all handled internally.

In the early 1970s, in-house plating at K&L began as a very small shop performing prototype work and an occasional production job. Later, in 1985, a new plating shop was built to support the variety of plating requirements. This system supported cleaning, copper flash/plating, electrolysis nickel plating and silver plating, along with a very small amount of gold flash and gold plate. Base metals included aluminum, cold rolled steel, stainless steel, brass, Kovar and others. As business began expanding into the commercial market, K&L added two 350-gallon silver tanks for large filter aluminum housings and covers with sizes ranging up to $36^{\circ} \times 12^{\circ} \times 6^{\circ}$.

The in-house machine shop continued to expand with the addition of programmable CNC vertical and horizontal milling machines. The plating shop continued to support internal needs within the confines of the same plating room. This was accomplished by adding process tanks until there was no available room for additional tanks. Lack of space led to the continuous changing-out of tanks from one type of chemical one day to another the next.

As production volume increased, wastewater treatment capacity topped out at 30,000 gallons of water daily, all of which was being discharged into the local POTW. K&L has a wastewater treatment permit from the city of Salisbury, Maryland. To handle the large volume, K&L began outsourcing plating requirements to plating companies in other parts of Maryland and Virginia.

A strategic decision: invest or outsource

One of K&L's strengths over its competitors is its ability to turn around samples and pre-production volume quickly, as a result of the vertical integration of its machine shop and plating shop. K&L has one of the largest machine shops on the Eastern Shore of Maryland, even though it is captive within the company.

Like many companies, K&L found itself in a position to either invest in a new plating shop or outsource this function like its competitors. For the analysis, K&L hired John Marsh of Saguna Corp. as a design consultant. Although K&L employees were experienced and knowledgeable of each plating process, a void of formal historical data was apparent. Processes were viewed as an art rather than a science.

A major effort began in January 2000 to gather data on every process, including classifying the shapes and sizes of the large variety of parts processed by the plating shop at K&L. John Marsh soon realized that K&L had one of the most complex plating operations he had ever seen. It was the product of years of homegrown experimentation. After six months of study, design work began. The objective was to make a decision on whether to shut down the facility or invest in all new equipment. If the decision was to invest, what volume level should the design encompass? K&L decided to outsource all high volume production and to make the objective of the inhouse capacity to support quick turnaround for sampling and production. The military business is typically low volume/high mix production, while large volume commercial business was being won on fast sampling and quick production startups.

System design

The design began with right-sizing the operation. K&L did not want to expand capacity, yet did want to improve performance, efficiencies and costs. In the present configuration, tanks are laid out in three continuous flow lines. Line #1 is the prep line for all aluminum parts. Line #3 is the prep line for all other metals, e.g., stainless steel, brass, Kovar, etc. Once the parts are cleaned, they are processed in the nickel tanks at the end of each prep line and then sent back down the center (line #2) through the silver-plating process. Drag-out tanks, rinse tanks and spray-rinse tanks were increased in numbers. A hoist system was installed, which uses racks in place of individual hooks. The old system consisted of about 20% plating racks, while 80% utilized hooks. The new shop has reversed this with most parts now mounted on racks. Custom-designed anodes have been developed for reducing the amount of silver consumed via selective plating.

Tanks are designed with all pumps, heaters, filters and electrical connections on the rear of the tanks outside the vapor stream. The nickel tanks are heated via steam for maximum efficiency and minimum cost. They are connected to a chiller for cooling, as are the new Dynapower rectifiers. K&L is experimenting with a process of pulse modulation and anode positioning for selectively plating parts. All plumbing from each tank is easily accessible from the back. Tanks can be emptied via a master plumbing system into holding tanks and filled from the back-side walkway without interfering with or shutting down production flow.



View of the valves for the filter and resin columns that treat rinse water and send it back to production. This is a closed-loop rinse water system.



Tank set up showing cyanide detectors insuring a safe environment.



Part of the wastewater treatment system showing an evaporator that heats waste solution and condenses the water vapor to be used back into the production process.

A new exhaust system was designed for each tank to pull vapor from three of their four sides and within the tank itself. Two large variable-speed blowers are roofmounted, with active makeup air system ductwork directly above each tank. The makeup air system and exhaust system are balanced and adjustable. This allows the heating and air conditioning system to be at minimum capacity for the comfort of the employees. A central set of three large electrical panels is operated via computer touch screen. All electronic and electrical functions are controlled from the one panel, resulting in a balanced air flow. The shop is so clean that a PC is permanently based within the shop for use by the platers.

The clean design does not stop at the plating function. K&L has achieved ISO 14001 certification and is committed to being an environmentally-friendly community member. The wastewater treatment system is no longer discharging any waste from the plating system. It is a completely closed loop system. The plating and wastewater treatment systems are monitored via a new chemistry lab.

Further benefits

- As a result of improved through-put and changing market conditions, K&L sends out virtually no plating any longer, reducing costs and improving delivery.
- Improved control of processes results in superior quality.

- Lower unit costs due to efficient plating operation as well as innovations developed by the plating team results in a more competitive market position with increased new business.
- A new team spirit and pride developed among those working in and around the plating operation.
- The plating shop also began implementing lean manufacturing principles through learning the five S's of workplace organization and standardization. This was followed by continuous-flow manufacturing principles and eliminating waste in the value stream.
- Learning new computer skills created key employee development within the group.
- Process control charts and graphs are analyzed and executed.
- Safety and security equipment and procedures are understood and put into effect.

World-class plating

K&L is proud of the work completed over the past few years resulting in a world-class plating operation. The plating team led by its supervisor, Brian Scott, continues to drive continuous improvement within its operation with a variety of innovations. K&L Microwave's shop is beginning to be a benchmark facility. *P&SF*



Cleveland Convention Center Cleveland, Ohio August 13–16, 2007 www.sur-fin.net

Plan now to exhibit at SUR/FIN 2007—

the only comprehensive industry event of the year serving the plating industry. Over 1200 visitors attended SUR/FIN 2006 where they viewed not only the 170 booths, but participated in an unparalleled technical conference. The 2007 event in Cleveland promises to be even better.

Why Cleveland?

Because Ohio is part of the largest region for all surface finishers. According to the leading publications serving the metal finishing industry, this region accounts for over 5,400 readers. Further, the latest SFMRB report shows that 18% of surface finishing plants are located in the East Central region that includes Ohio, Indiana, Michigan and Kentucky.

The SUR/FIN staff continues to add more services and programs to make your exhibit experience the best it can be. We've listened to our exhibitors' comments and suggestions and have made the appropriate changes to make this an event to which you'll keep coming back.

SUR/FIN 2007 will be a world-class eventdon't miss out.

Contact Cheryl Clark today at 202-457-8404 or at cclark@nasf.org for further information.