Computerizing Lab Control Records & Activities

By Tom Luteran

Everyone is aware of the importance of plating solution chemistry control, but are you really benefiting from the data you are producing and storing? Do you keep your chemical concentrations neatly organized in a series of notebooks, only to be opened the next time a titration is completed, or when some quality assurance inspector comes knocking? Welcome to the next generation of plating lab data analysis and storage. Computerization has become a part of almost every aspect of human life—and now it has entered the plating lab.

Getting Started

First, it is important to assess your company's capabilities and record-keeping needs. Does your company have just a few process tanks, or a number of process lines? Are there people in your organization that are proficient with computer spreadsheets or databases? With these questions in mind, some different computerization options exist.

Spreadsheet Programs

Spreadsheet programs can handle basic data storage needs and produce graphs to visually express the data. With minimal effort, formulae can be entered into the cells of the spreadsheet that can calculate tank concentrations and create tank additions. If your plant has numerous plating tanks with various chemical recipes, spreadsheet data management may not be the best fit. It may be too cumbersome to set up all the tank component spreadsheet data and graphs for every process solution.

Database Programs

Databases are another type of computer program that can be used to manage data in the plating lab. Forms or templates allow for easy data entry and organization; formulae can be used to calculate concentrations; and reports and tank addition orders can be generated as needed. The data can be sorted by criteria that can be very useful to the lab technician. To graphically represent your data, it may be necessary to export the data to a spreadsheet program. The graphs or charts must be designed and formatted for each tank, which may not be practical for some facilities. A drawback to using a database is that this method of storage must be designed and programmed for your particular facility. Unless the internal resources exist to develop the database for your particular application, you may need to hire a person proficient at database programming, which could be costly. Custom-designed applications can carry a large price tag, depending on the complexity of the data. Additionally, as you add, change or remove processes from the shop, changes to the database may also be necessary and will increase the cost.

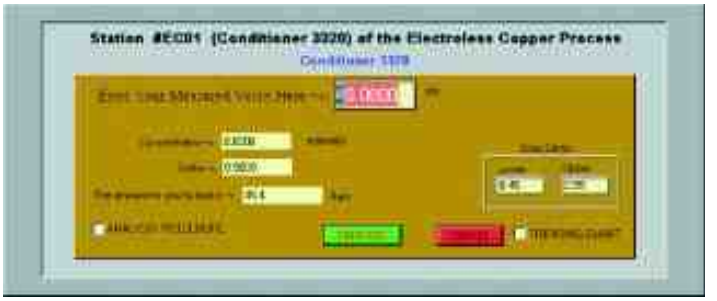

Fig. 1—Example of a typical concentration and addition calculation screen.

Packaged Programs

After looking at different types of lab data computerization options, is there a better way to address your lab data storage needs? The answer may be a packaged plating lab computer program specifically designed for electroplating lab data storage and manipulation. Plating lab programs can be useful tools that have many outstanding features and extras that combine the best aspects of both spreadsheets and database programs. For example, one useful aspect in packaged plating lab software is a feature that schedules titration events and reminds lab analysts when a titration is necessary for a particular plating solution. The software has the capability to track either the run time or the A-hr of each process to schedule an analysis. This timing feature can help to ensure that the analysis of the tank is not overlooked, especially in facilities where numerous tanks of various chemistries are involved.

Another useful feature of some programs is the ability to calculate the concentrations of the plating bath components (see Fig.1). During the initial setup of the facility data, equations are entered into the program corresponding to the plating solutions being analyzed. This feature eliminates the need to look up or memorize the titration factors or equations to be able to calculate concentrations. Similarly, add calculations can also be set up to automatically calculate the necessary chemical additions based on a preset target concentration.

The lab technician then has the ability to print an add slip that contains the chemical addition information, the tank number, the department number, and any other information pertinent to the addition event.

Another valuable feature included in some programs is a unique number assigned to each add slip that creates a paper trail to verify additions.

Some lab software programs also have a feature that allows the analyst to easily retrieve new solution makeups or recipes that have been entered into the program.

For example, instead of looking up the concentration for the bath makeup, then multiplying that concentration (in oz/gal) by the tank volume in gallons and then dividing

the results by 16 to get the lbs of chemical, an analyst using a lab program can simply click on a command to print the new makeup that lists all the necessary chemical amounts. As an added benefit of computer-generated add slips and solution makeups, the opportunity to incorrectly issue an addition to the wrong tank is practically eliminated, as long as the information was correctly entered during the setup stage. With handwritten add slips, the potential for writing down incorrect information always exists. A distraction or momentary memory lapse while writing out a tank addition slip could account for an incorrect add to a tank, which could result in the destruction of the plating bath or even injure the employee making the add.

Some Options

Options exist in some software that provide makeup instructions for employees making additions. Statements such as "make sure to add the sulfuric acid to the water slowly" or "make sure to use the required personal protective equipment when making the addition" can be printed, along with the add amounts, to remind employees of pertinent information.

Without computerization, titration analysis or testing data can be manually entered into logbooks. With some plating lab software, however, the data can automatically be logged and tracked by tank, and even graphically represented. The ability to view a graph of the concentration of a component in the plating bath gives the analyst a powerful tool in the plating lab (see Fig. 2).

Trends can be identified with respect to the solution chemistry. Let's say, for example, the analyst has noticed that a plating solution concentration viewed graphically has been falling consistently over time. The problem should be addressed. Do more anodes need to be added to the tank, or is there a leak in the tank that has been affecting the concentration? If the concentration of the component is increasing, is it time to remove some anodes or adjust the automatic chemical feeder? Answers to these types of questions can streamline the facility's operations, resulting in noticeable cost savings.

The ability to view the chemical components graphically, quickly, and with no extra effort, is an advantage to any plating shop that electronically manages its data. Many customers and quality assurance inspectors also find value in the computerization of the lab data. Quality assurance and lab personnel that manage their lab data electronically can easily see from the graphs that the plating solutions their parts are being processed in are under control, and do not appear above or below the upper and lower concentration limits.

Fig. 2—Example of a graphic representation of a plating bath component.

Other Features

An additional feature built into some plating software packages includes the ability to use statistical process control functions on the data that has been accumulated. Values such as averages and CPK indexes are automatically calculated and provide useful information. This allows the lab technician to manage the plating chemistry of the facility based on factual information, and to optimize the conditions necessary based on the data in order to consistently plate high-quality parts in the most economic manner.

Some programs enable the user to enter out-of-spec statements that describe situations or causes relating to why a component is out of parameter. Pareto charts based on the out-of-spec statements are sometimes built into the lab software programs and allow the analyst to identify recurring problems and subsequently take the appropriate corrective action.

Some Drawbacks

Although many benefits exist in the packaged plating lab software programs, some inherent drawbacks exist. Plating facility personnel manage their laboratory data differently from city to city and state to state. Plating lab managers have their own unique system based on past history, tradition and convenience. Packaged software programs were designed by others who have incorporated their own unique way of managing their lab data that may not completely conform to the routine currently used in another facility. To overcome this shortcoming, good lab software programs have the ability to export data to spreadsheets or database programs. Once the data has been exported, it can be manipulated in any desired format and can possibly be tied into other programs, such as your facility's inventory system.

One very important feature to look for before purchasing a plating lab computer program is the customer service and support supplied by the software company. The ability to discuss problems with the computer programmer is a tremendous benefit to the lab technician. Some lab software companies will even pool suggestions from users of the program and implement periodic upgrades to the software. This accumulation of suggestions and subsequent upgrades creates an evolving type of software that is consistently being improved.

Computerization options exist from spreadsheets to packaged electroplating lab software programs. Selecting a computer program to manage and make the best use of the data generated by the plating lab does not have to be a difficult task. The company's needs, size and customer requirements are a few of the factors that should be considered and evaluated before proceeding with this endeavor. P&SF

About the Author

Tom Luteran is technical director for Erie Plating Company, 656 W. 12th St., Erie, PA 16501-1509. He provides technical support for the electroplating lines, new processes and technology, and environmental issues. He holds a BS in environmental science and engineering from Penn State University-the Behrend College, and an MS in environmental studies from Gannon University.