Part II

A Look at the Buying

By John

How to find a supplier

PCB equipment buying brings to mind the statement of economist Adam Smith: "The real price of everything is the toil and trouble of acquiring it." This eighteenth-century economist's idea captures the complicated and intriguing process of buying PCB equipment in our high-tech twentieth-century world.

This article is the second of a three-part series that examines the equipment buying process. The first article, which appeared in the December issue of *PC FAB,* presented a general overview of the procedure involved in buying equipment. In this article we will address the task of selecting a supplier. In the third article, which will appear in a future issue, we will explore some of the problems involved with the PCB industry's relatively recent interest in equipment reliability and offer some ideas on how the supplier and user can work together to see that reasonable reliability targets are achieved.

THE CHOICE OF SUPPLIERS

It was not many years ago that PCB equipment suppliers were few in number, and PCB manufacturers had to design and build in-house much of the highly specialized equipment they used. Today, PCB manufacturers depend largely on outside companies to meet such needs. With some equipment, there is little or no choice of suppliers. For the most part, however, there is a substantial number of suppliers from which to choose.

Some of these suppliers are large multinational corporations with multifaceted offerings, supplying the PCB industry with interlinking equipment **and chemicals. others are small and** independent, lacking some of the functions the big suppliers offer.

There are now as many offshore PCB equipment suppliers as there are domestic. A tour of almost any PCB plant today will reveal machinery from various countries harmonizing with astonishing success. This multinational equipment is very complicated, and is likely to become even more so as PCB manufacturing becomes increasingly sophisticated.

ASSESSING SOURCES OF INFORMATION

Perhaps the best place to begin the examination is not with the supplier, but with the user's in-house staff involved in choosing the supplier. The staff members participating in this process vary from company to company and even from plant to plant within a given company. Most companies, however, have an established system for performing this function, and there is a pattern that usually gives the appropriate level of engineering management the final decision. At most large corporations, it's the manufacturing or process engineering managers who make the final choice. Of course, this decision is made with the help of a large number of people (such as equipment and safety engineers). Each of these people has their own ideas about how to choose the supplier. For some, it's primarily a matter of who makes the "superior" machine, without much regard to cost. Others are more likely to thoroughly examine a combination of equipment reliability, capital costs and other factors, such as function, product quality, material cost, and chemical usage.

Upper management places even more emphasis on cost, because it is their function to put all capital expenditures into a big picture. They must incorporate into their assessment plant growth speculation or plant modifications that employees outside of this segment may not know about.

PCB Equipment Process

T. Fisher

that's right for you.

In making the decision on which supplier is most appropriate, management sometimes leans heavily on its own knowledge and experience. This is gleaned from many hours of observation and discussion with other people in the industry, conferences and seminars, visits to supplier plants, and the constant reading of periodicals. Sometimes management relies more heavily on the engineers' advice concerning which supplier is the best choice. Other times they depend more on purchasing agents, who are likely to travel more than management and often have exclusive first-hand insights about suppliers.

Management's first step in the selection process is to assess the people providing information on the many equipment suppliers out there. This step often consists of nothing more than a gut feeling based on accumulated knowledge and wisdom concerning the talents of the people supplying the information. But the personal chemistry between management and its information source can play a rather involved and delicate role. The personality politics of the situation can even color management's vision rather substantially, making the assessment difficult. Nevertheless, this very subjective process of evaluating your coworkers and others in the industry must be dealt with, and the wise manager downplays personality and personal chemistry while seeking the individual with the broadest knowledge of the product and the process technology.

THE NEED FOR EQUIPMENT

Selecting a supplier is not an isolated event in the equipment buying process; it is intricately connected with examination of plant needs and the availability of equipment that meets those needs. To evaluate suppliers, you first need to ascertain your equipment needs and determine which suppliers can fulfill them.

This examination, as explained in this first article of this series, is an orchestrated team effort involving large numbers of people inside and outside the PCB plant. Sometimes this team evaluation is simple because only one or two suppliers have a particular machine or series of machines that harmonize with the existing equipment. However, even when only two companies are being investigated as potential suppliers for a given piece of equipment, things can become very complex—especially if you're considering an expensive buy.

Ideas concerning equipment can be suggested by the suppliers themselves; they knows what their design engineers are doing and what they are considering for the future. But more important than these helpful suggestions from suppliers are the appropriate in-house definitions of the factory's needs. These definitions are a product of educated guesswork concerning the industry's direction. We all have the ambiguous task of figuring out our present needs in relation to our future needs. This is a difficult task because the PCB industry is constantly changing and becoming increasingly complex with each generation of new product that comes onto the market. PCB equipment that is hot today may be obsolete tomorrow. The computer industry is probably still in its infancy, and it is difficult to predict what will happen to this market and, consequently, its factory segment.

EVALUATING SUPPLIER SELECTION CRITERIA

After the decision has been made to buy a given piece of equipment, certain criteria must be considered in choosing the supplier. Information on

An equipment supplier evaluation checklist.

- Is the supplier financially stable? (Does a financial analysis produce favorable results?)
- Has the company been responsive to your needs **in the past?**
- Is the supplier currently capable of designing and building your planned equipment, or are they speculating?
- Does their company possess expertise? (For example, how many engineers and service personnel are there?)
- Has the company experienced high engineering and service personnel turnover rates?
- Does the supplier commit to difficult schedules without demonstrating the required resources?
  Do they attempt to negotiate unfairly?
- What is their track record on delivery times?
- Are they willing to commit to late penalties?
- What is their policy on late payments?
- What is their company's history on complete specification fulfillment?
- Are they willing to meet new reliability standards?
- Do they offer service?
- How good is their warranty? (It should include 12 months parts and labor at a minimum.)
- Do they have a history of supplying proper documentation on time?
- Have there been price increases?
- Does the supplier have a history of labor difficulties?
- Is there an adequate source for their raw materials?
- Is the company offshore or domestic? Is this an advantage or a disadvantage?
- Through an initial design process, do they offer any suggestions for improvement?
- Does the company do in-depth research regarding its product?
- Is the supplier's representative knowledgeable?

the various suppliers' product lines is the easiest to come by. But just because a company exists, is capable of providing the equipment you need at a reasonable price, and has been highly regarded in the industry for a long time doesn't mean it's the right choice for you. Management changes, production changes—even the financial stability of a solid company can change. You don't want to be in the middle of a major purchase and discover that your supplier is going under. It is very important to run a series of checks on any supplier you are considering. **Know their financial** capability, their current capacity and desire to produce reliable equipment, their ability to be responsive to your needs, their integrity and level of responsibility, and their past on-time delivery history. The sidebar provides a checklist of things to consider when selecting a supplier.

But you can't just size up the company; you must also conduct an extensive evaluation of the supplier's product as well, In many ways suppliers' products *are* their company. However, evaluating the company and evaluating the product are two separate considerations. Some important considerations in determining the quality of the supplier's product are listed in the other sidebar.

CHANGING SUPPLIERS

Sometimes it is necessary to terminate the services of one supplier and find another. Regardless of the validity of this rather drastic move, in-house resistance frequently occurs. Some of that resistance is the understandable desire to maintain the familiar. However, much of this negative reaction is due to the enormous amount of work and high cost that can be incurred when changing suppliers.

This move can create a need to redesign support systems (such as pipes, tanks, or exhausts), and can necessitate expensive and time-consuming special training. In addition, the new supplier's equipment may have different dimensions requiring a different amount of floor space. It may be necessary to move large amounts of neighboring equipment or even to add more buildings to accommodate the new machinery. In some cases, making the change can create more havoc and incur more costs than it's worth.

The constant threat of encountering extraordinary problems when changing suppliers makes it very difficult for new suppliers to get a chance. To counteract this situation, first-time suppliers often try to put together highly attractive packages. Such offers can be very desirable if all the variables add up just right. It is more likely, however, that the motive for making the change is that the quality and reliability of the new supplier's equipment is simply much greater

An equipment evaluation checklist.

- Is there a product that far exceeds others on the market?
- Is the best available product too expensive for your specific need?
- Is the equipment flexible, especially with respect to future line changes?
- Will the components enable you to meet your reliability targets?
- Is the design documentation available to the user?
- How accurate is the machinery with respect to your needs?
- Does the machine appear capable of running 24 hours a day, seven days a week?
- Is there adequate accessibility for repairs?
- Has the machine been human-engineered? Is it ergonomically sound?
- Can several machines do what this one machine does? (It's better to distribute the potential of down time if the cost factor is favorable.)
- Are spare parts readily available (seven days a week), and are they priced within reason?
- Is it necessary to conduct expensive training with the operators?
- Does the machinery coordinate or have commonality with sister plants in its production capabilities?
- Does the equipment cause any potentially expensive pollution problems?
- If timing of delivery is crucial, is alternate equipment available on a more immediate basis?
- Will the machine be used for a short or a long time?
- Does the equipment satisfy your plant's future computer-integrated manufacturing (CIM) requirements?

than that of any equipment the plant has had in the past,

In some cases, it could be detrimental not to make the change if another supplier can deliver better results at a reasonable price, It sometimes makes sense to change if improved results are achieved-even when the cost is higher than what you would normally encounter, This is particularly true if the new supplier's tool can increase the quality of your product, Product quality is the primary consideration, and quality can be an added value that proves to be worth every penny of its production cost,

THE UNFORGIVABLE

Late equipment delivery is an understandable and even forgivable occurrence under certain circumstances, Late equipment delivery without fair warning, however, is unforgivable. Plant operation is obviously dependent on machinery any equipment that is ordered must be introduced at the appropriate time, If fair warning has been given, backup plans or even makeshift strategies can be initiated to accommodate the situation. If, however, a piece of machinery is planned to arrive on the production line at a given time and misses the deadline, the entire factory's production can be thrown askew and revenues lost. If your supplier consistently fails to keep you abreast of delivery changes, it is time to find a new one,

Another unforgivable "sin" is failure of the finished product to do what it's supposed to do, Some companies promise more than they can deliver to secure an order. This can cause tremendous problems, including down time costs for the buyer.

Another form of equipment failure occurs when the machine, after being delivered, installed, and debugged, does not live up to the supplier's claim that it will push the limits of technology. Such cutting-edge equipment has no track record, When the new, innovative machine falls short of expectations, it is frequently seen as a business risk for which the supplier cannot be held solely responsible.

Often, the risk involved with this type of equipment is openly (and sometimes contractually) shared by the supplier and the user. When a failure of this sort occurs, both parties then work together to redesign the equipment so that it can meet initial expectations. However, if the machine is not innovative and fails to meet expectations, then the supplier simply has failed to fulfill his responsibility. At that point a new supplier should be considered.

COMMON MISTAKES

Making a mistake in choosing a particular PCB equipment supplier creates a difficult (and often expensive) situation. Perhaps the most common error made by engineering managers in this decision process is that of being overly optimistic regarding the supplier and his abilities. A close second is failure of the buyer to observe the design-and-build schedule with sufficient care, which results insubstantially late equipment delivery, Also, many