



## Growing Pains

**N**ow that things have been going well in our industry for a couple of years, all of those plans for expansion that were put off are coming out of the closet. Whether the project is as simple as a new machine, or as ambitious as a new building, many of the companies in our industry are expanding. Our industry is currently in a technological growth spurt. Advances in via formation, plating and coating technology, imaging quality and hole metalization have prompted a tremendous amount of investment in capital expansion. This column was born from my experiences during the last few months. We just finished relocating our lab to a new, larger facility and had to start the expansion process from scratch. I can honestly say that the tension endured over the last twelve weeks has ranked a minimum 8.5 on the Richter "stress" scale (the ramifications of the Richter scale are well known to us here in California).

### **Plan, Plan and Plan Again**

Expansion requires planning; the plan is the most important part of the expansion process. You will probably get tired of hearing your contractors say, "That's not in the plan." I know I did! The major components of change are easy to visualize, but it's the little things that will make or break your expansion project.

Our plan started with graph paper and cutouts representing pieces of equipment. The next step was to hire an architect to put our ideas, dreams and scribbles onto paper in the form of a blueprint. When choosing an architect, try to pick one that has previously designed buildings for others in the industry—or at least buildings for heavy manufacturing. The special needs that you have

for manufacturing may not be translated adequately by an architect who typically designs supermarkets or Discovery Zones.

All of the attributes of your expansion need to be thoroughly documented in the plan. Electrical, drainage and plumbing issues are typically the largest considerations during expansion. The location of light switches, electrical outlets, air supplies, air conditioner controllers, doors and cabinetry, although seemingly minor, need to be carefully evaluated. Once the general location of fixtures is decided upon, you must consider the size, height, color and style of fixtures. There is no surprise like having an electrical outlet in the middle of a cabinet or a thermostat placed behind a piece of equipment.

### **Get Your Employees Involved**

One thing I feel strongly about is that the employees need to be involved in the planning process. All of our employees got a chance to review their new work area and offer input. I can honestly say that without their suggestions, I would have been less than satisfied with the

final result. A storage rack here, an electrical outlet there and a machine placement THIS way, made the difference between whether the work area we built was user-friendly or operator-dysfunctional. The time savings from improving the flow of work through an area can easily justify any downside resulting from employee involvement. Another benefit to this approach is that the employees now feel like important participants in the expansion process. This can also improve employee morale and productivity.

### **It's Never Big Enough**

You've got the design of the new and improved area on the plan and it looks good. All of the blue lines appear to be in sync with each other. Yet when you finally move in, you realize that your technicians and operators don't have any extra elbow room. It is important that your design includes extra space for setup, breakdown and storage of your product. Future growth is always an issue. This unknown (or partially known) future can be as simple as adding a new machine, or as painful as finding that you need a new tank, cleaner or whiz-bang addition which was forgotten or somehow now deemed necessary. Every shop I have been to has faced this problem in one form or another.

### **The Little Things**

As others before me have attested, it's the little things that kill you. Here are some little things I ran into from which I barely managed to avoid an unceremonious "death." I'm sure you will have no problem coming up with "little" things of your own.

Air conditioning distribution should be planned to account for the heat



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generated by machinery in the expanded area. If you leave it to the architect, he will assign “standard” area values that are not based on removing extra heat generated by equipment.

Humidity control is another problem area. There are special ducting, electrical and plumbing requirements that need to be put into the plan whenever humidity control is called for. Believe me, adding humidity control after the fact is no picnic!

Plan your computer and phone wiring well. It is much easier to install low voltage wiring during construction than after ceiling, insulation and equipment clutter the expanded space.

#### ***A Few Remarks on Construction***

- “Never do today what can be put off until tomorrow” seems to be the motto in construction. Regardless of the deadline you give, the vast majority of the work will be accomplished during the last two weeks before you are scheduled to move in.

- Local government regulations will put a serious damper on your social life.
- If it’s not well defined on the plan, you will get the cheapest lighting, electrical and bathroom fixtures available.
- Common sense is seldom common.
- Murphy must have been a contractor before writing his laws.

Now I don’t mean to get down on contractors per se. I am speaking more to personal expectations rather than actual performance. I had a great general contractor, some very good sub-contractors and a few sub-contractors whom I will refrain from categorizing in this column. From what I have heard via the grapevine, my experiences are not as uncommon as I would like to believe.

#### ***The Finished Product***

Looking back at the construction of our building, I find that the general sequence of events and inspections which occurred to construct a finished building reminds me of the manufactur-

ing and inspection sequence required to build a printed board. “How so?” you may wonder. Well, I’m glad you asked.

When the blueprint is received by the general contractor (PWB manufacturer), the construction on the project (PWB) begins. Raw materials are gathered and the individual construction processes are “sub-contracted” out to different “trades” on the manufacturing floor. The “trades” must work in a specific order because the work they do depends on the work already done. Building inspections are scheduled between critical construction operations. When the construction project is deemed finished, final electrical and building inspections are required prior to occupancy (component assembly and quality control).

That bit of prose aside, there’s nothing like walking through the completed expansion project. It makes all of the weeks of agony seem far in the distant past. Whenever your next expansion may be, hard work and thorough planning will give you the satisfaction of a job well done.