

APRIL 2023

I-Connect007
GOOD FOR THE INDUSTRY

PCB007

MAGAZINE



ONBOARDING: READY, SET, GO!

Choose wisely.

With today's material performance requirements, it's more important than ever to understand and choose your materials wisely.



Download Now

I.007e
Books

Distinctly different.

Our books are written by recognized industry experts. At around 8,000 words, they are unique in that they are able to be incredibly focused on a specific slice of technology.

“I-007ebooks are like water in the desert ...it’s up to you to drink it in order to survive!”



Stephen V. Chavez
PCEA Chairman, MIT, CID+

[VISIT OUR LIBRARY](#)



PCB007

MAGAZINE

Onboarding: Ready, Set, Go!

Today's labor shortage means hiring managers are considering revamping their onboarding processes to avoid staff turnover. In this issue, our contributors provide a set of best practices for successful, swift onboarding of new hires, and methodologies for turning new employees into happy, long-term staff.

10 **FEATURE INTERVIEWS**
Onboarding Takes Training, Technique, and Trust
with Frank Lorentz



18 **FEATURE COLUMNS**
Effective Strategies for New Hires
by Hannah Nelson



24 **The Secret to Successful Onboarding**
with John Izzo



30 **Rethink Your Onboarding Strategy**
by John W. Mitchell

48 **Onboarding 101**
with Mike Hoyt



40 **Solving Your Talent Problem**
by Dan Beaulieu

52 **A Texas Trade School Links Young Students and Employers**
with Elvia Quintanilla



44 **Preparing Employees for the Long Haul**
by Todd Kolmodin



64 **Interviewing? Delve into Company Culture**
with Brian Wallace



58 **Engaging the Next Generation**
by Christopher Bonsell



WORLD-CLASS SUPPLIERS

Insulectro, the largest distributor in North America of materials used in the manufacture of printed circuit boards and printed electronics, salutes our premier suppliers.

CALL 949.587.3200 FOR MORE INFORMATION



Because Reliability Matters

THE NEW IS550H

FEATURES

HIGH OPERATING TEMPERATURE
Continuous Operating Temperature up to 175°C

HALOGEN FREE

CAF RESISTANCE
≥1000hrs @ 1500V

HIGH THERMAL RELIABILITY
Pass -40°C to +175°C, 2000 cycles

MARKETS

AUTOMOTIVE & TRANSPORTATION

AEROSPACE & DEFENSE



The Material for e-mobility that is suitable to use for those applications requiring high voltage, high power and high thermal stability.

✉ info@isola-group.com

☎ 800-537-7656

🌐 isola-group.com

isola®

EMD ELECTRONICS

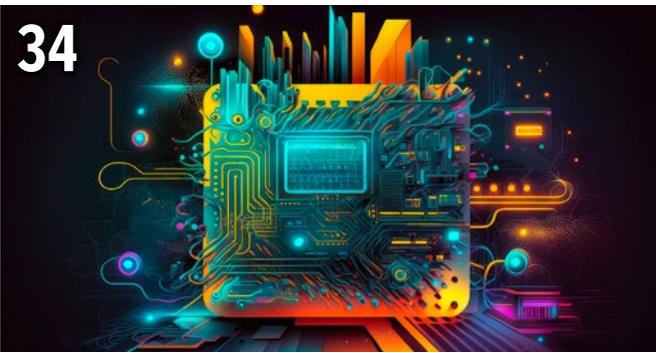
Ormet® Sintering Paste: Fewer Multiple Lamination Cycles

Ormet® Transient Liquid Phase Sintering (TLPS) via fill pastes enable anywhere and any-layer vias in high-performance complex printed circuit boards without any need for copper plating. TLPS-filled z-axis interconnect layers can be fabricated in parallel with individual x-y trace layers, or PCB sub-constructions of multiple layers with installed PTH and laminated in a single cycle.



PCB007

M A G A Z I N E



SHORTS

22 The Importance of Matching Business and Personal Goals

38 Schweitzer: Essential Onboarding, and Quickly

51 The Issues With Talent



62 Dan's Biz Bookshelf: Hiring the Crazy and Obnoxious

68 Crab Shells Could Help Power the Next Generation of Rechargeable Batteries



79 Infographic: You know you're working for a great company when...

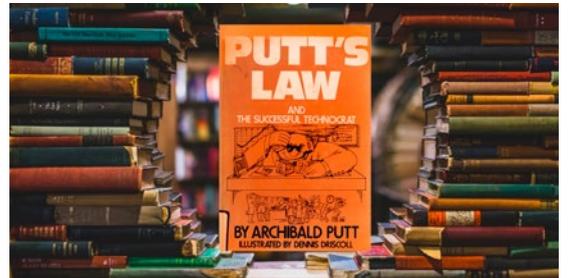
COLUMNS

8 **A Strong Start**
by Andy Shaughnessy



34 **Lead-free and the Fabrication Challenge, Part 1**
by Mike Carano

70 **Putt's Law and the Successful Technocrat**
by Happy Holden



78 **PCBAA's New Representation**
with David Schild



DEPARTMENTS

83 Career Opportunities

92 Educational Resources

93 Advertiser Index & Masthead



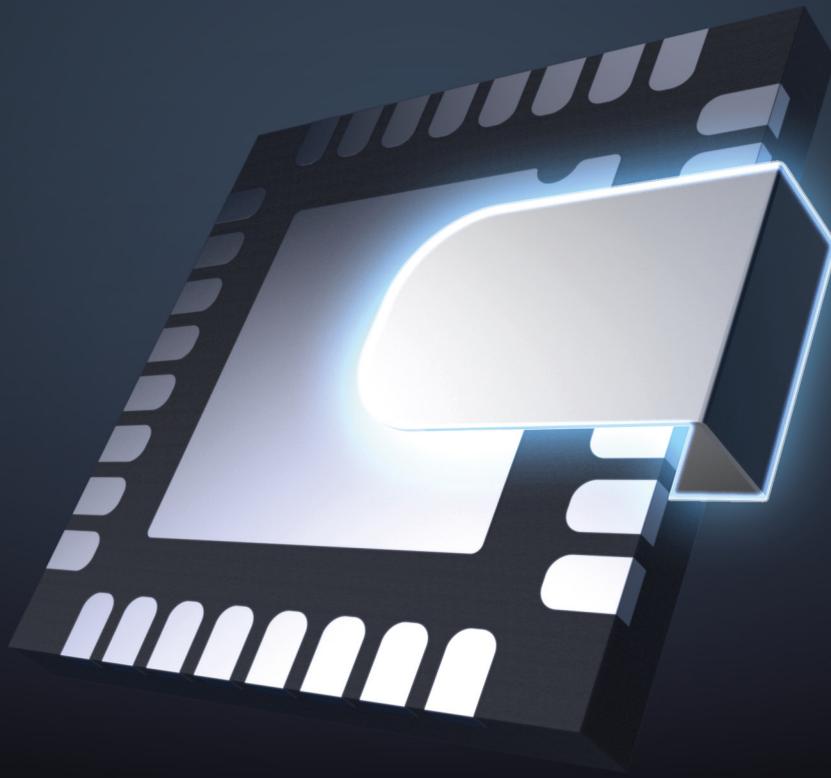
HIGHLIGHTS

28 MilAero007

80 Top Ten from PCB007



Sustainable tin protection in sync with your environmental goals



Our green high-speed tin processes and post-treatments for lead frames and connectors – From matt over semi bright to bright tin deposits

We're committed to fostering more sustainability throughout the working world. That's why we developed advanced and environmentally friendly tin plating processes and post-treatments that provide optimal protection and coverage while being completely free of BPA, NPE, PFAs, or any other critical substances. They are all critical additive-free with no oil out, offer excellent coverage over the entire current density, and have very low whisker propensity. Aside from protection, they ensure improved solderability with no-reflow discoloration while mitigating corrosion whiskers and minimizing rejects due to water stains. Our sustainable tin plating solutions are ideal for all types of lead frames and connectors and apply to all modern plating tools.

To find out more about our pure green tin plating processes, scan the QR-code to the right.



A Strong Start

The Shaughnessy Report

by Andy Shaughnessy, I-CONNECT007

In your current job, what was the onboarding process like? If you've been with the same company for decades, you likely didn't see much of an onboarding process at all.

If you're lucky, your boss took you out to lunch on the first day. Were you assigned a mentor? Were you welcomed with open arms into your new work family, or were you basically tossed in the pond and told to sink or swim?

The "sink or swim" approach was the rule, not the exception—for most companies, across all industries—because there were always more job-hunters than there were open positions; skilled, degreed, management, you name it, and there was someone

to fill it. Hiring managers always had a stack of resumés they could pick through.

But that all changed a few years ago when our Baby Boomer brethren started retiring, with some pulling the pin early because of COVID concerns. This was followed by the start of the "Great Resignation" in November 2021, when 4.5 million working-age adults just bailed out of the workforce. Recently, hiring has outpaced quitting, but we're still down a few million American workers compared to pre-COVID numbers.

As a result, many companies in our industry are revamping their onboarding processes. They want their new hires to stay for a long time, mostly because they can't afford to



keep playing musical chairs with employees. Staff turnover is costly, so when you hire new employees, you don't want them leaving nine months later.

The average cost of finding and hiring a new employee is \$4,400, according to recent research by the Society for Human Resource Management. That's an average across all industries; in some electronics companies, when you calculate the cost of recruiting, hiring, process training, safety training, benefits, insurance, and other overhead, that cost is easily in the five figures. Again, this wasn't a concern when HR had a stack of resumés for each position at the company.

So, what's the secret to converting a new hire into a long-term employee? As Ventec's Frank Lorentz has found, satisfied employees are more likely to stay with the company for many years. He goes out of his way to regularly visit with employees, especially new hires. He stays in constant contact with them, especially during their first year. He also assigns them a mentor, and lets them know that it's okay to fail, because failure is a great teacher. New hires never have to wonder what's going on or who to talk to when they have questions.

"Keep your employees happy." It sounds like a cliché, but it seems to be working. The employees that Frank has onboarded are still working there years later. What I really liked was when he pointed out that onboarding starts in the first hour of the employee's first day.

With that in mind, this issue offers multiple contributors who provide a set of best practices for successful, swift onboarding of new hires, and methodologies for turning new employees into productive, long-term staff. As I've mentioned, Frank Lorentz walks us through his onboarding process in detail, and he explains why it's so important to foster a two-way atmosphere of trust with each employee. We also have feature interviews with corporate advisor John Izzo, IPC training advisor Michael Hoyt, Texas trade school owner Elvia Quintanilla, and HR consultant Brian Wallace.

We have feature articles by Hannah Nelson, IPC's John Mitchell, Dan Beaulieu, Todd Kolmodin, Chris Bonsell, and an interview with Anaya Vardya, as well as columns by Michael Carano, Happy Holden, and David Schild. Each brings a different perspective about onboarding and how and why it's important.

This issue is packed with information that managers can take advantage of right away. If you're hiring—and I bet you are—you want the new hires to stay with the company for years, not months. Check it out. **PCB007**



Andy Shaughnessy is managing editor of *Design007 Magazine* and co-managing editor for *PCB007 Magazine*. He has been covering PCB design for 20 years. He can be reached by [clicking here](#).

jobCONNECT007

Companies seeking talent with circuit board industry experience post their jobs with us.

jobconnect007.com



Onboarding Takes Training, Technique, and Trust

Feature Interview by the I-Connect007 Editorial Team

Many companies in our industry are trying to hire new career-minded, long-term employees, but the hiring process is costly, especially if you hire someone who doesn't work out. How do you ensure that your new hire stays on and becomes a happy, longtime employee?

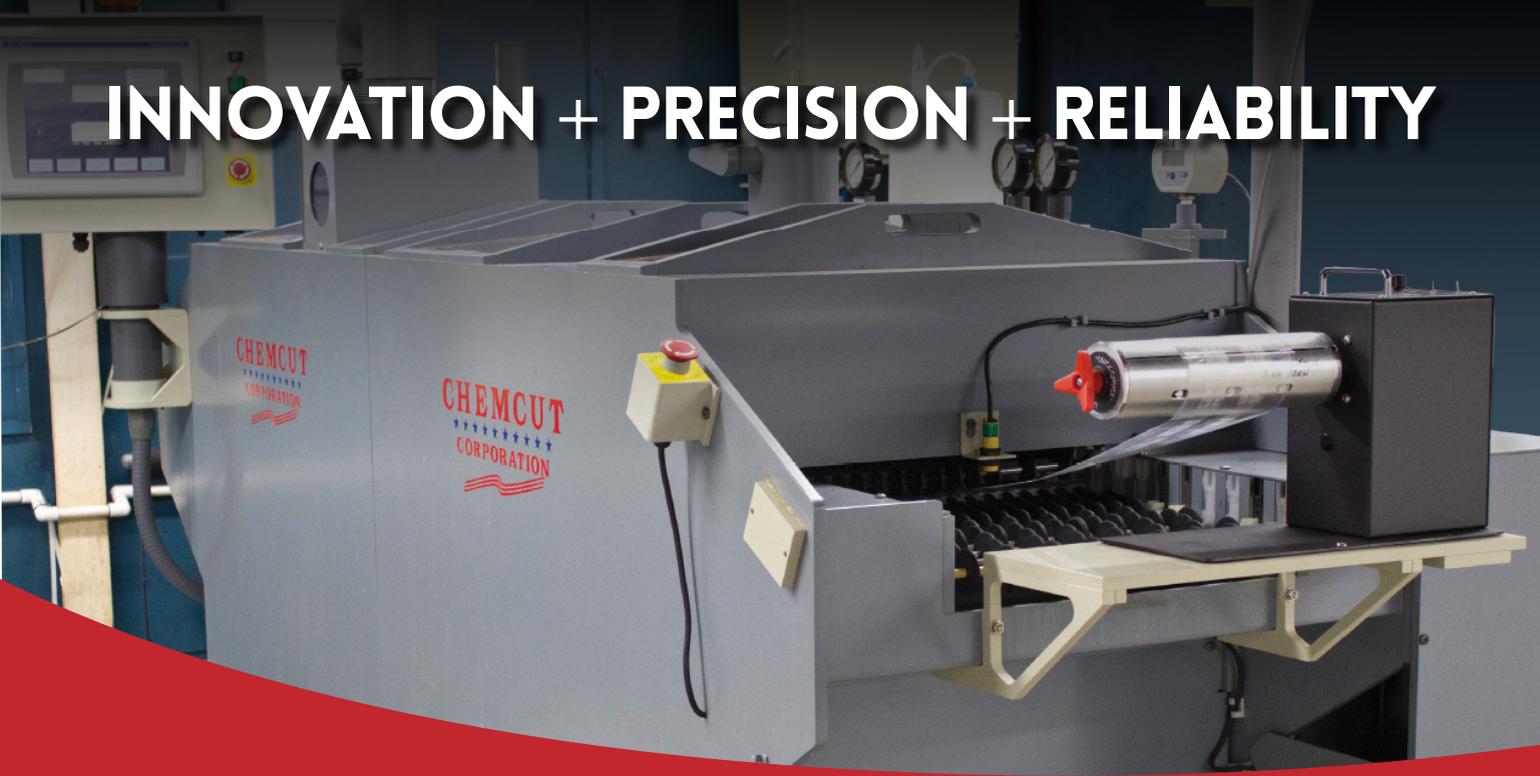
We recently spoke with Ventec's Frank Lorentz about his company's onboarding processes. Frank is the general manager of Ventec's customer and technical service, warehouse, and quick-turn facility in Germany, and he's made a career out of logistics. He walks us through his exhaustive onboarding process, which includes letting new hires make mistakes so that they can learn from them. He also discusses why company culture matters, the need for trust between managers and staff, and why managers must remember that they're dealing with human beings, not machines.

Barry Matties: Frank, let's start with an overview of your onboarding process.

We have different grades of onboarding. If it's a shop floor person or a supply chain manager, for example, it's a little bit different. It doesn't matter if you work on the shop floor or in the office, you have to understand the ERP system. Therefore, we have a really detailed checklist, and this is point one. We get straight to work on the first day new employees come in. After a tour of our facility to meet the entire team, they get their checklist, and start with the training.

Everybody is assigned a mentor, an experienced employee who has been with us for a while. Then you're put to work immediately and, during that time, you get a deep understanding of our processes, which is the most

INNOVATION + PRECISION + RELIABILITY



IN-HOUSE CUSTOMER LAB

Available to assist every Chemcut customer with:

- R & D process development
- Producing an initial prototype
- Small pilot production runs
- Feasibility studies
- Producing scale-up data
- Operator training and education



Contact Chris



To learn more about our lab, contact Christopher Bonsell
at sales@chemcut.net

www.chemcut.net



CHEMCUT

BOUNDLESS INNOVATION | UNBEATABLE PRECISION

important thing. It goes without saying that you must know how to correctly use the ERP system and the tools required for your job, but understanding all our processes is the most important thing. That's the secret.

How does Ventec Germany operate? We use an efficient and effective job-card system, so it's essential to know where job cards originate from and what purpose they have. What happens with a job card when you are working on the shop floor, in the office, or once you've added your information to it? First, you must understand the whole process to work effectively within our system. This is the basis of everything. If you understand the process, then you are free to work within that process, because you get everyone's full trust and you are allowed to make mistakes.

It may sound a little bit strange, but this can't be learned from a book. I always say that you must learn by doing. If you begin working on a job card, for example, and you make a mistake, there is a mentor supporting and backing you up to correct that error. It won't impact the customer, but you get the training and experience about why the mistake happened in the first place. We can correct it and avoid it in the future, which is the most valuable way to learn. This is how we work with our new employees.

Andy Shaughnessy: *We're all trained to not make mistakes, but sometimes it's the only way to learn to do it the right way.*

Yes. Make the mistake once and you'll never do it again. You have a mentor beside you so it won't impact the customer, and that's extremely important, of course.

Matties: *How are you training your mentors? Is it a formal program?*

It's really built from their experience. Our employees go through the same training process, and therefore can become mentors given their experience. It's really a nice thing for the mentor; it's a sign of trust when I say, "You can be a mentor, because you know everything about this process. Please train this new colleague." It's different learning from your peers as opposed to your supervisor or boss. I want our team to fully understand our processes, because it also gives everyone the opportunity to be creative within the system. The team provides me with more input and feedback than I could ever give. The world is changing every day, so we use the brains of our employees in every part of the company.

Shaughnessy: *What sort of metrics do you have for measuring the effectiveness of your hiring?*

There are formal metrics but another key "secret" to onboarding is a more personal approach. We do that in intervals. In their first week new employees usually won't see me much at all. After their first week, I'll ask them, "How are you feeling at the company? Are you okay?" If people don't feel like it's going well, they won't do a good job. This negative feeling may stem from their health or it could be something else. I ask them, "Is everything okay? Do you have all the tools you need? Is your computer working? Do you have business cards?" Really, it's often the small things that make your life easier, not the big ones. I run an open-door policy where anyone can come and see me at any time, but within our onboarding process we do schedule formal chats after two, four, and eight weeks. During those meetings I may be told, "Yes, I understand it," or "No, I didn't understand that, and I need more training sessions." This is critical, because it's built from the bottom up, one point to another, and everyone



“

The team provides me with more input and feedback than I could ever give.

”

must really understand how we work together. This gets monitored for every single person by the mentor, the manager of the department, and by me.

Shaughnessy: It sounds like you're talking about the culture, and making sure that they fit in.

Bringing someone into the culture of the company is one of the hardest things you can do. For example, we acquired part of Holders Technology in October 2021. All of a sudden, we had two completely different cultures coming together. The Holders culture was not better or worse than ours; it was just different. It was a top-down culture, where the boss speaks and everybody follows. This is in stark contrast to the culture at Ventec, where we have a bottom-up culture. At first it was very strange for me when I worked in my usual way. I would say things like, "We have something that needs to be done. Could you please organize this?" The Holders employees expected very clear instructions on how to go about it, so my type of instruction didn't work for them. This was a very interesting example of merging two company cultures, because you have to understand why people work the way they do. My managers must show and live that.

Shaughnessy: How do you get the new people to accept this kind of change?

This is one of the easiest parts. Every single day, I go to every employee at our facility, from the cleaning staff to the supply chain manager or the plant manager, and ask, "Hey, are you okay? Is your machine running? Is everything fine?" You get to hear directly what's going on, something like, "Oh, I'm waiting for my new saw blades." They see that I value their input.

Matties: They see that you hear them and act on it.

Yes, that I actually listen and will do something about it. They see that they are listened



Frank Lorentz

to, trusted, and given feedback. That's very important to me.

Matties: When you're bringing new people on board, how do they react to that sort of environment?

It's interesting. I've had 99% of employees tell me they never experienced a company like ours. They are not referring to the job they have to do, but the way it's managed.

Matties: Because a new employee might be a little reserved about sharing their ideas with the boss, right?

Yes. In Germany, if we met on the street, I would never say, "Hi Andy." I would say, "Mr. Shaughnessy," and you would say, "Mr. Lorentz." This is the usual way, particularly when it's a superior. But at Ventec from day one, I'm Frank. Yes, I'm the general manager, but they learn that we are a team. Everybody is working in the same company in different departments with different responsibil-

ities and different salaries based on things like training education and experience, but no one is better or worse than any other team member. Everyone has a crucial role to play within the whole system, from the cleaning staff—without whom the building would be dirty—to the executives who ensure we work together within the global Ventec structure.

Matties: *How long do you think it typically takes somebody to come on board and become integrated as a happy, long-term employee?*

At least half a year. If they're not happy with us and how we work within half a year, then it's the wrong person. However, I tell my managers, "Don't explain our culture; live it, and show them. Be open-minded.

Let them make mistakes. Don't shout at them." You can't tell people, "We're all in the same boat," and then act differently.

Matties: *In this onboarding process, as they go through the six months process, how do you create a space where people want to stay and be a long-term employee? A large problem in our industry right now is people coming in, then a year or two later they're on to the next job.*

That would be a problem, but luckily we don't have that here. We just don't have that fluctuation. We have many employees who have been with the company for 25 years plus, and they wouldn't stay that long if they were not happy with the job or company.

It's not only all about the job; it's about people and their lives outside of work. For example, I might notice someone's a bit down so I'll ask them, "Hey, you're looking a little bit sad. What's wrong with you?" Or they may approach me directly. If I'm told what the

problem may be and I can help in any way, I will. None of us can perform well at work when we are distracted by problems at home. This is more than just a 9-to-5 job. We look to help and support our people and the team, and this binds the people to our company.

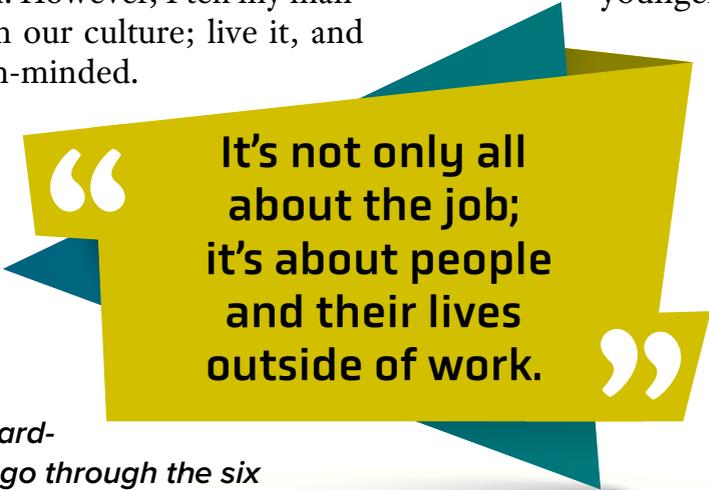
Matties: *There's a generational shift right now, a difference in a new employee vs. somebody with a 25-year work ethic or work experience. What's your approach? Is it different for the new generation?*

Of course, when somebody has been with the company for more than 25 years, they have a comfortable and familiar routine and the younger generations see that if they are doing a good job, they can work here for the long term. We are not just hiring and firing; you have a safe job and a safe salary at the end of each month.

Shaughnessy: *Sometimes you end up learning from the new hires. Can you give us an example?*

Let's say a 20-year-old has been here for six months, and they tell me, "To be honest, sorry boss, but you did things that way 20 years ago." Then they show me their smartphones, electronic processes and how this could all work better, more efficiently, and faster. They have grown up with and use all this new media stuff and they know it much better than the oldies. So, when they know they can bring in their new ideas, they feel welcome and can see that they can contribute directly to the success of the company with their ideas.

Shaughnessy: *How long have most of the employees been at Ventec?*



“ It's not only all about the job; it's about people and their lives outside of work. ”



AUCTION

Equipment Location: 📍 Herbecke 12 58579 Schalksmühle, Germany

Facility Closure of Pristine European PCB Producer

Multilayer Prototype & Production • Immaculate Facility • Owner Retiring

Over 300 Lots Available!

Equipment Available in All Categories:

- Drilling & Fabrication
- Multilayer-Press
- Wet Process & Plating
- Hot Air Levelling
- Artwork Generation
- Photo-Yellow Room
- LPI Coating
- Legend Printing
- Testing & Quality Assurance
- Air Compressors



Inspection/Preview Available By Appointment Only; Contact to Schedule
Scott Lonkart: +1 203-257-2184 • slonkart@thebranfordgroup.com

EQUIPMENT BY:

Lenz • Schmid • Laif
ATG • Orbotech
ICT Intercircuit • Cemco
Polla e Masa • Mass



THURSDAY
MAY
25th
11am (CEST)

The Branford **Maynards**
GROUP SINCE 1902



<< SCAN ME

For Catalog & Auction Details

WWW.THEBRANFORDGROUP.COM

+1(203) 488-7020 | TheBranfordGroup.com | service@thebranfordgroup.com

The plant that Barry visited is just five years old, and the employees have been here an average of three-and-a-half to five years. That's the average. In our older facilities, as I said, we have many employees who have been with the company for more than 25 years.

Shaughnessy: Is it getting harder for you to find employees? Do you have open positions?

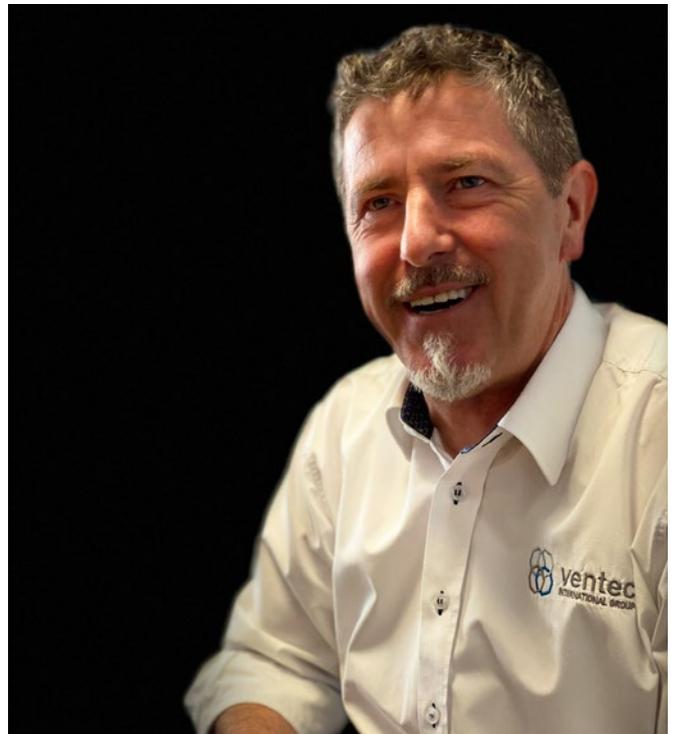
We do have some open positions. It's interesting how I hire people; I don't use headhunters or anything like that. There is always somebody saying, "A friend of mine is looking for a new job. Can I ask them?" A lot of hiring is done by word of mouth and recommendation, and the people I've hired are still here.

Dan Feinberg: What happens when an employee doesn't respond to the training? How do you coach for performance?

If they are having trouble doing their job, then you can work together with them to empower them to make improvements. But if they don't want to do the job, it's the wrong person. You can teach anyone, but if somebody doesn't want to do the job in the first place, then we are not the right company for them.

Matties: How important is it for your team to understand your customers?

It's extremely important, but it's not always easy because we live in Germany and we have, in general, a German culture, yet we work with Italian, Spanish, and French customers, as well as Italian and Spanish colleagues. They all bring different perspectives to the processes. We have experienced customer service staff who know how to manage all of that. It only works with experience. To Germans, the due date is the due date, so if, let's say, a customer from a more culturally relaxed country tells you, "I'll pay three weeks late," you may not be happy. But if you see that they paid three weeks late and always make the payment, then the trust is there.



Matties: You've mentioned trust a lot and that's key. The new employee has to trust you and you have to trust the new employee.

Yes, from the very first hour of the first day. Of course, sometimes I'm wrong. It happens, but I still would go that way because the burden is less than the contribution.

Matties: What advice would you give to a new employee, and to hiring managers?

Generally, for new hires, be true to yourself, sincere, and honest. You can hide your personality for a few weeks, maybe, but in a stressful situation, personalities tend to come out, and then it's too late. Be honest and do your job.

For managers who are onboarding new hires, expectations must be very open and clear, because new people will remember the first thing you say to them. Be very clear about what you want. Many people have reminded me, "Frank, do you remember the first hour when you told me what to do? Look at how far I've come right now." They remember that, so be very clear with them. Communicate clearly, even if it may hurt the first time. Tell them exactly how hard the job is.

Shaughnessy: *You talk about this as a combination of logistics, process, and humanity. I guess anyone can do the job and follow a process, but are the new hires a good fit? Are they happy?*

Yes, and I'm such a nice guy. I don't get paid to be nice; at the end of the day, you have a line and you have a result. But my experience has been, if you give the people a hard life, you get just what you're paying for. On the other hand, by being nice I get back two or three times what you could ever expect. That's my experience.

Matties: *How important is it to have documented process steps in the onboarding process?*

We document everything, not only for our AS 9100 compliance but also for good business practice anyway. It is nice for new hires to know, "This is what I said. I expect that you will learn these topics, you can tell me if you didn't understand, and I'll train you." Then you can give the people a little bit of confidence.

Matties: *There are processes that get written then just wind up on the shelf somewhere; they don't come back out as living documents.*

When documenting new things, I start with work and adjust all of that until it's fine, and then I document what we could have done better. Remember, we don't work for processes; the processes work for us. They must give us, in the end, a result.

Shaughnessy: *You said that you get better results by being friendlier than tough. You get a better ROI just by being nice to people.*

A coach of mine once said, "Two guys are in a 100-yard dash. One has a pot of gold at the finish line and the other one has a hellhound chasing him. Who would be faster?" At first, you would think the man being chased by the hellhound. But in the end, the winner is the guy who wants to take the gold, because he's motivated. Here, the gold is not always money; it's also, "Good job."

Shaughnessy: *This has been great. We can tell that you love your job.*

You can't light a fire that doesn't burn within you.

Matties: *That's right. Frank, so nice to speak with you again.*

Thank you very much. PCB007



Effective Strategies for New Hires

The New Chapter

Feature Column by Hannah Nelson, VALPARAISO UNIVERSITY

How do we retain the best talent with an ever-changing workforce? Employees seem to be switching companies almost as soon as they are hired, which leaves many employers struggling to retain a qualified workforce.

I believe the answer lies in a stronger onboarding process that showcases a positive work environment and fosters growth among new hires. Here are four ways that companies can do that.

1. Start Onboarding Before Work Starts

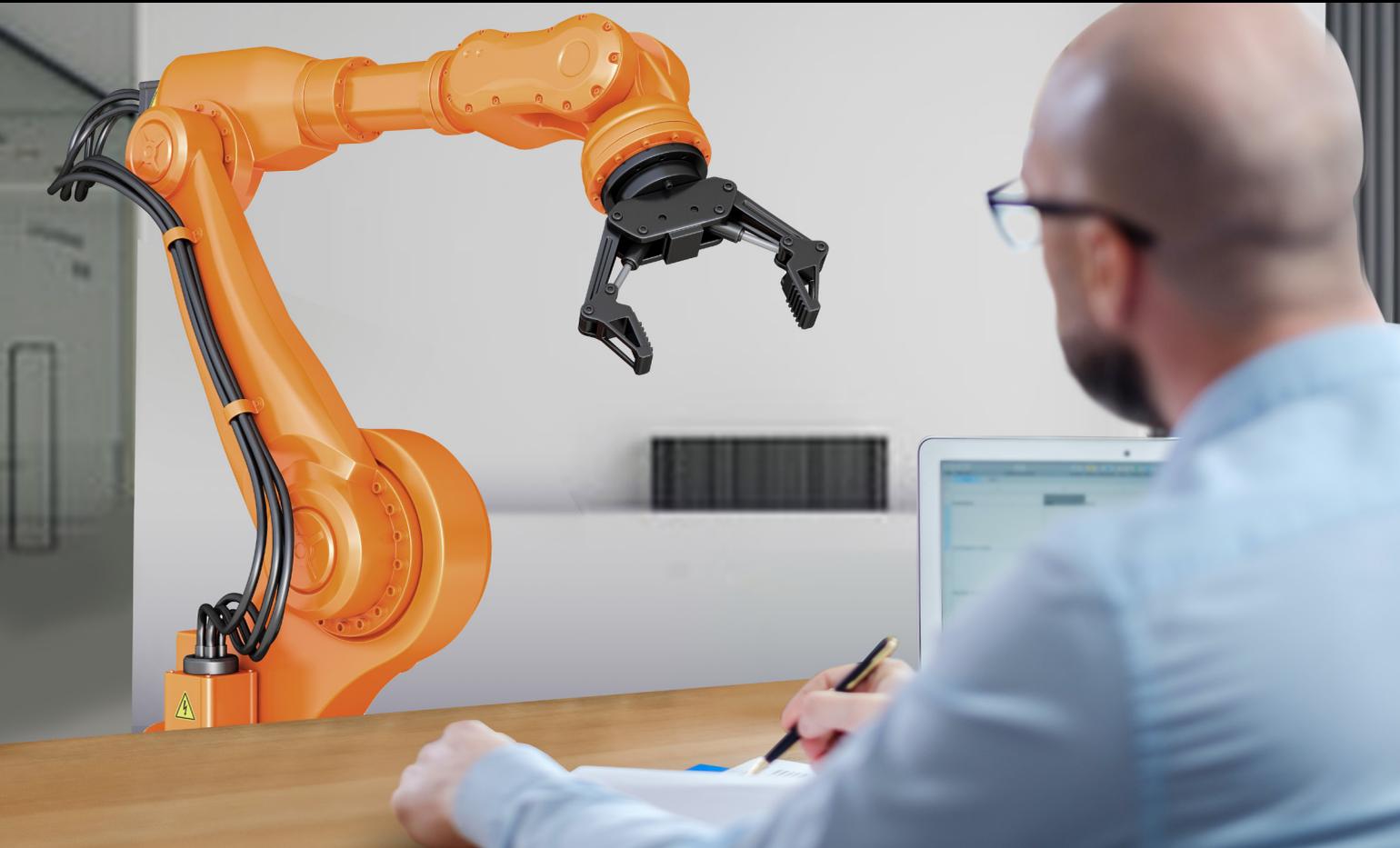
Think back to when you were hired for your first job, maybe in high school. You know the day, time, and place you started your first day on the job, and that's it. You were incredibly nervous because you didn't know how the first day would go.

This is how many new hires feel about starting their first day in a professional setting. I felt anxious about my first internship, but my manager stayed in touch with me from the moment I was hired. He quickly introduced himself, asked if I had any questions, and sent regular emails until I started work. On the first day of work, I met my team and was told who to contact if I had questions about certain areas of my project. I felt incredibly welcomed on the team and motivated to start my first project.

The same cannot be said with my second internship, however. This time, I didn't know who my manager was until the week before I started. I didn't know where to go or whom within the company to contact if I had questions. I felt lost and did not feel welcomed on the team. I felt discouraged throughout the entire



How to interview a robot



It's important to know in the interview if the job-seeking robot:

- Fits into your culture
- Works well with others
- Avoids unscheduled breaks
- Is willing to work overtime
- Has all the latest anti-virus vaccines
- Avoids foul computer language

Technica and our Automation Partners have the knowledge and experience to provide a solution for your PCB or substrate manufacturing facility.

For over 35 years we've been connecting our customers with the right solutions. We'll be happy to show you how to properly interview a robot!

TALK TO TECHNICA FOR YOUR AUTOMATION SOLUTIONS



TECHNICA, U.S.A.

technica.com | 800-909-8697



summer internship and did not want to continue working on this team.

Overall, it's better to start earlier than later when it comes to the onboarding process. Being hired for a new job is exciting and nerve-racking. The earlier the company starts the onboarding process, the better equipped the employee will be. This can be done through one-on-one meetings, emails, or even a team call to meet your new hire. From my experience, some best practices for hiring include having the manager contact the employee as early as possible, letting the employee know what the first day or first week of work will look like for them, and having programs in place to keep strong back-and-forth communication between managers and their new hires.

2. Set Clear Goals and Expectations

As a former intern and incoming new employee, I have learned that setting clear goals and expectations allows the employee to succeed long-term and lets the employer understand the capabilities of the employee. In my previous summer internships, when clear goals were laid out, I understood where I needed to be and what I was expected to do. This motivated me to accomplish the goals set before me. I even wanted to exceed expectations and learn more than was required.

In my first internship, these goals were discussed in one-on-one meetings with my supervisor, who provided feedback on my progress. Positive and constructive criticism helped me see areas where I needed to improve and grow into a stronger employee. By meeting company expectations, I felt wanted, as though I belonged in the job.

In my second internship, the goals were initially made clear so that I understood the job

at hand, but my employer's expectations didn't follow through in subsequent conversations. I met one-on-one with my supervisor only twice that summer with very little feedback.

I feel that feedback is so crucial because it reassures new employees that they are meeting company expectations. Without set expectations and goals, new hires may feel like the days drag on and they may even want to quit the job within the first few months.

3. Know What Makes or Breaks Mentorship

Many companies provide mentorship programs. Mentors help new hires acclimate to the company by providing them with guidance and support. They can help new employees feel valued and motivated, which may lead to greater productivity.

I've had both good and bad mentors. Some truly wanted to help me acclimate to the company's culture, while others didn't even seem to want to be my mentor. They made me feel like I was wasting their time, which ultimately held me back. The mentors who truly wanted to make a difference in my internship experience helped me feel valued—both as an employee and a person. These mentors provided professional advice and I was more motivated to work.

4. Consider Growth Opportunities

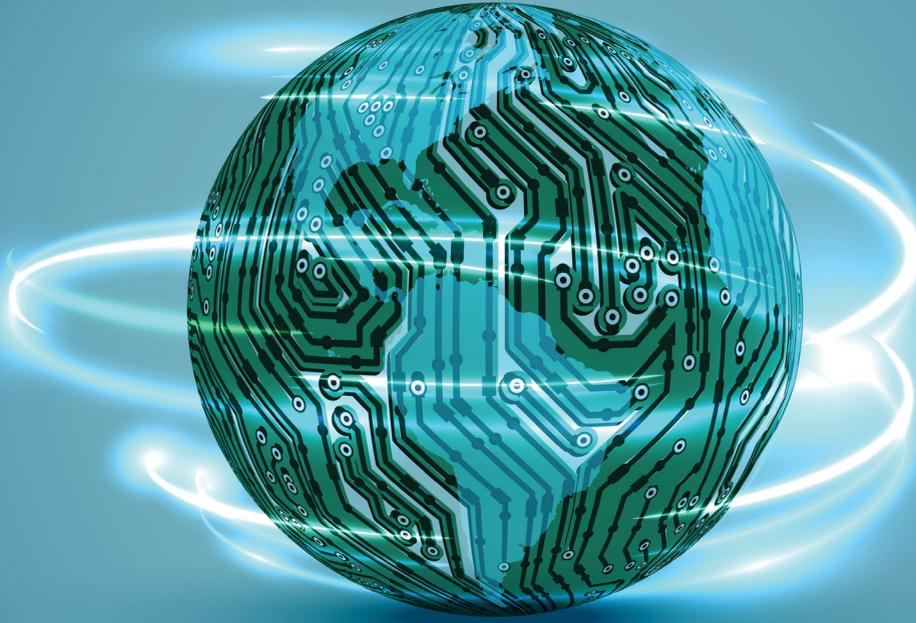
Growth and development opportunities help employees feel invested in their role and lead to successes at the company. New employees want to know when there is room to grow within the company. Providing professional development opportunities—such as mentorship programs, leadership development, and



“ The earlier the company starts the onboarding process, the better equipped the employee will be. ”



Changing the World One Connection at a Time



By consolidating your spend into our own sourcing program, we can leverage our total volumes to get you the best pricing. Our staff can open the doors to Asia-based factory solutions not previously available to your purchasing team.



**World-class
PCB partners**



**Top tier
quality systems**



**Ambitious information
systems plan**

[LEARN MORE](#)

Linkage
Technologies

 info@linkage-tech.com
 linkage-tech.com

additional training—can help new employees grow and feel invested in their role.

Another excellent option is to provide regular check-ins with employees. They allow the employer and the employee to identify and discuss growth, as well as support and potential issues. They also build a strong employee-employer relationship.

Conclusion

Employee retention is a critical factor in any company's success. A positive onboarding experience can be a significant contributor to that success. By starting the onboarding process early, setting clear goals and expectations, providing effective mentorship, and offering

growth opportunities, employers can create a welcoming and supportive environment for new hires. It can help new employees feel valued and motivated, which can lead to greater productivity and job satisfaction, as well as higher retention rates. Companies that prioritize the onboarding process are likely to see better employee engagement and, perhaps, an improvement to their bottom line. **PCB007**



Hannah Nelson is a student at Valparaiso University, part of the IPC Emerging Engineer Program, and a former IPC Student Board Member. To read past columns, [click here](#).

The Importance of Matching Business and Personal Goals

by Barry Matties

Joey Sanchez is senior director of ecosystems at The Ion, a business enterprise center owned and managed by Rice University.

What advice would you give to an organization that wants to keep new employees for the long term? What's their best approach?

My advice is to understand each person. People have drivers, as well as likes and dislikes. Your interview questions are half the battle. Ask prospective employees how their business interests and personal interests mix and mingle. I recommend asking what they want to get out of life first. Then you can match your business objectives and goals to their life goals, which leads to a long-lasting employee or teammate. But if you have a fractured understanding of their personal life goals, then you'll never discover their true role on your team. It's too difficult



Joey Sanchez

to mend those two objectives together. It doesn't work.

I'm fortunate to manage a small team. We talk about personal goals first, and then we cover the day's business objectives.

If I'm looking for a job, what should I be looking for in a company? Who you work for is an important choice.

Absolutely. When you're looking for a company, you have to look at yourself to see what you want and what you need. If you don't know your own purpose in life—what you want to do primarily—then there's no possibility of happiness in a company. Absolutely none. You're kind of swimming in the middle of an ocean. You will never be satisfied in a company if you don't know what you want first.

But if you know what you want, then you can find the right match in a company.

The important thing then is to find a company that understands your purpose. Yet, there are many companies that don't really understand their own purpose other than their quarterly P&L statements.

You nailed it. Every company has a mission, vision, a value statement, and sometimes a purpose statement. If it doesn't have those, that's a big red flag. If it does, and you don't align with it, then that's the first gate you must walk through. They can offer you all the money in the world and provide a great office environment, but the company's vision and mission must align with your personal goals and objectives. That's the starting point.

New issue available now!



[DOWNLOAD THIS ISSUE](#)

IPC Community is an exciting, new, quarterly publication with a strong editorial focus on members' success.



The Secret to Successful Onboarding



Feature Interview by Barry Matties

I-CONNECT007

John Izzo is a celebrated author, activist, and public speaker who advises companies worldwide on corporate sustainability, social responsibility, leading with purpose, and employee engagement. In this interview with Barry Matties, John offers some suggestions for a better onboarding process, and he answers some of the tough questions that companies are facing regarding employee retention.

John, thank you for speaking with me. Many companies are hiring someone only to have them leave a year later. What advice would you give for onboarding in today's market?

To some extent, if you hire good people, you're always taking a chance they will go elsewhere,

so that's a part of the game. Today's team members seem to have more desire for variety and movement than in previous generations.

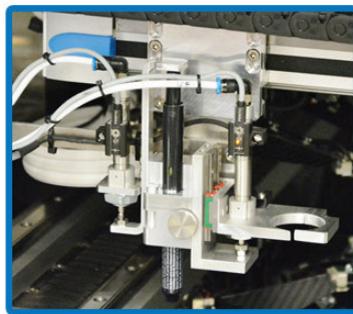
First, you must make that onboarding experience positive, a time when they are welcomed deeply. This builds community. We know that two of the biggest factors in someone staying at a job are their relationship with their immediate supervisor and whether they build social networks at work. It's very hard to leave a group of people you like and have become friends with; most people leave their boss, not their job. Now they may leave for a much higher pay, but we can't always control that.

So, what can we control? We do things that help them build solid relationships, creating

Unrivaled Test Speed with Full Automation



Introducing the newly designed atg A9a with 8 test probes and a new high speed “lights out” automation for unrivaled throughput.



Highlights:

- Small footprint (6 square meters)
- Dual shuttle pick & place automation
- High accuracy combined with high test speed
- Pen or label marking option

[Watch video](#)

[Get more info](#)

atg Luther & Maelzer GmbH
Zum Schlag 3 • 97877 Wertheim • Germany
Phone +49-9342-291-0 • Fax +49-9342-395 10
sales@atg-lm.com • www.atg-lm.com



friendships that work. In this hybrid/virtual world, we have to work even harder to make sure people have the type of contact that builds those relationships.

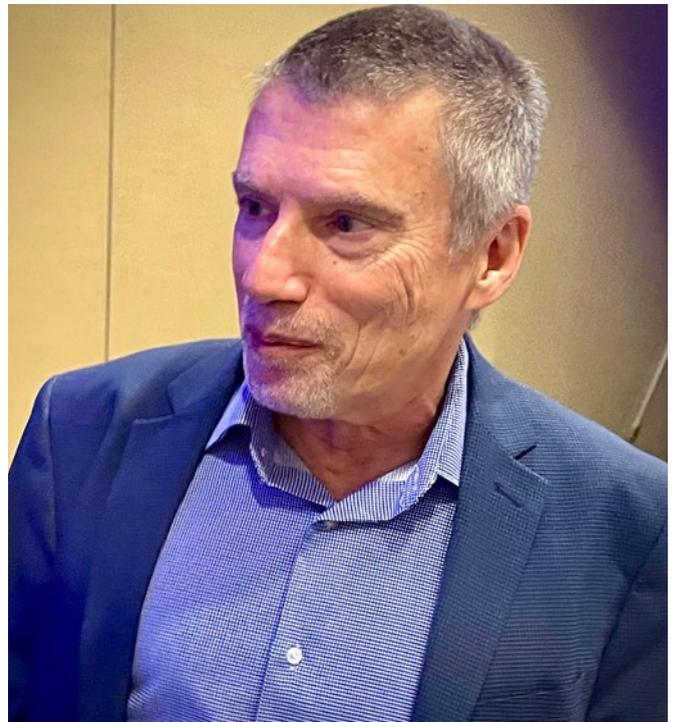
Next, we must make sure that every leader in the organization is leading in a way that people won't want to leave. If you have leaders who are not good leaders of people, you have to know. I always say to coach them up or coach them to another assignment because the leader is even more important now in keeping people.

The other thing is that many younger employees are thinking immediately at a faster pace about the next thing, so you have to make sure it's clear to them what the opportunities are and the process to get to those opportunities, because they want to be very active. They don't want to just sit around and wait and hope that two years down the road you notice them. Find out what their career goals are and help them see a path to whatever that goal is in your organization. I think those are some of the most important things.

I know this is a big question, but how does someone become a better leader, role model, or ambassador to a new employee?

There are three things that come to mind. First, make sure you get to know who this person is. There's some really fascinating research that one of the best predictors of someone being engaged at work is feeling that their leader knows them as a human being, and studies

“ Find out what their career goals are and help them see a path to whatever that goal is in your organization. ”



John Izzo

show that more and more people want to bring their whole self to work: their hobbies, family, dreams, hopes—the things they love about themselves and the world. Take the time to really get to know who they are, and stay connected.

Second, get to know their purpose. What gets them up in the morning? Where does meaning come from in their work? This helps you recognize what they value when you see them living the thing that gets them up in the morning. No matter what their job is, everyone has a purpose, something that gives them meaning.

Finally, get to know what their goals are. Tell them, “I know you may not be here for a lifetime but how can I help you achieve your lifetime goals while you're here?” That means being a mentor and getting an interest in what they're trying to achieve.

Great advice John. Thank you so much. I really appreciate your words today.

You're welcome. Thank you. PCB007

Congress Needs to Support American Made Printed Circuit Boards



OUR FOCUS

TO CREATE A MORE RESILIENT AND SECURE SUPPLY CHAIN, WE NEED TO BRING PCB MANUFACTURING BACK TO AMERICA. PASSING H.R.7677, THE SUPPORTING AMERICAN PRINTED CIRCUIT BOARDS ACT, WILL REINVIGORATE OUR INDUSTRY AND MAKE US MORE COMPETITIVE.

PCBAA advocates, educates, and champions legislation and policies that support this critical American industry.

JOIN US TODAY

PCBAA.ORG





MilAero007 Highlights



IPC Welcomes U.S. Presidential Determination Prioritizing Domestic Development of Printed Circuit Boards and IC Substrates ▶

IPC, the global association representing the electronics manufacturing industry, welcomes the action of U.S. President Joe Biden today in issuing a “presidential determination” that prioritizes the domestic development of printed circuit boards (PCBs) and advanced packaging, including IC substrates, under Title III of the Defense Production Act (DPA).

PCBAA Applauds Presidential Action to Invest in Critical American Microelectronics ▶

The recent partnership announced by the U.S. and Canada is a welcome acknowledgement of the urgent need to support the American printed circuit board industry. The Presidential determination of printed circuit boards as essential to national defense under section 303 of the Defense Production Act is welcome news, and achieves a 2023 goal of the Printed Circuit Board Association of America (PCBAA).

NextFlex Launches \$9.4M Hybrid Electronics Funding Opportunity ▶

NextFlex, America’s Flexible Hybrid Electronics (FHE) Manufacturing Institute, released Project Call 8.0 (PC 8.0), the latest call for proposals that seek to fund projects that further the development and adoption of FHE while addressing key challenges in advanced manufacturing that support Department of Defense priorities. The total PC 8.0 project value is expected to exceed \$9.4M (project value/investment fig-

ures include cost-sharing), bringing the total anticipated investment in advancing FHE since NextFlex’s formation to \$134M.

NASA, SpaceX Dragon to Deliver Heart Studies, More to Space Station ▶

NASA has another cargo shipment en route to the International Space Station following a successful Falcon 9 launch of SpaceX’s 27th resupply mission for the agency. The first Cardinal Heart investigation conducted aboard the space station showed that four weeks of micro-gravity exposure can cause significant changes in heart cell function and gene expression.

NASA Awards Advance 3D Printing, Quantum Tech for Climate Research ▶

New technology is a key to helping NASA advance its long-term exploration goals for the benefit of all. To support its effort, the agency announced Thursday it will create two new institutes to develop technology in critical areas for engineering and climate research.

Boeing’s New Military Satellite Integrates Anti-Jam Payload for Enhanced Battlefield Communication ▶

Boeing unveiled its Protected Wideband Satellite (PWS) design featuring Boeing’s Protected Tactical SATCOM Prototype (PTS-P) payload hosted aboard the U.S. Space Force’s Wideband Global SATCOM (WGS)-11 spacecraft. “The joint force is relying on us to deploy capabilities that enable secure communications in a prolific jamming environment,” said Charlotte Gerhart, Space Systems Command’s Tactical SATCOM division chief at the U.S. Space Force.

The RF Specialists

- ISO 9001:2015 Certified
- AS 9100 Rev D Certified
- MIL-PRF-31032-C Qualified
- MIL-PRF-55110 Qualified
- ITAR Registered



Prototron Circuits
America's Board Source

Serving the industry for over 35 years

 prototron.com

 (520) 745-8515

Rethink Your Onboarding Strategy

One World, One Industry

Feature Column by Dr. John W. Mitchell, IPC PRESIDENT AND CEO

Those of us working in the electronics industry are painfully aware of workforce challenges we have faced since, well, forever. These challenges are so large and so varied that to have a meaningful discussion I'll break them down into key components.

At a high level, the problem involves both finding and keeping people. An important aspect of keeping people revolves around onboarding. To me, onboarding includes all the efforts you take in selecting candidates and then preparing newly hired employees to successfully perform their job.

Unfortunately, this is what the onboarding process too often looks like: You extend the offer and it's accepted. An employee's first day at work likely includes attending company orientation, collecting pay-related informa-

tion, reviewing and signing them up for benefits, handing them off to their assigned team, introducing them to their supervisor, showing them their desk or office, providing them log-in information, sharing your employee manual, perhaps inviting them to a meeting or two, assigning them a mentor or asking them to shadow someone who can teach them the ropes, and, finally, sharing some internal training PowerPoints or videos. You should have a fully functioning employee in just weeks, right? Not so fast.

This long process is not ideal. But when I mention this to colleagues in the industry, they say, "John, this has been working for us for years. Why should we bother changing now?"

First, competition for talent is incredibly strong. We have to do better if we are to hire the



BURKLE

NORTH AMERICA, INC.

LAMINATION SYSTEMS FOR PRINTED CIRCUIT BOARDS

STATE-OF-THE-ART SOLUTIONS FOR THE PCB INDUSTRY
INCORPORATING THE LATEST TECHNOLOGY.



Solutions for the PCB Industry

High quality and well proven presses and handling equipment

INNOVATIVE POWER **4U**

burkleamerica.com



Contact:
Kyle Lindersmith
+1 (336) 660-2701



talent we need. Second, just because it is the way it has always been done, doesn't mean that our competition is standing still. (Your competition includes more than just other electronics companies, by the way.) Third, employees' expectations are high. More employees, both new and existing, say that they are willing to change employers, jobs, and even careers to be more fulfilled at work.

Think about when you purchase a new \$500,000 piece of equipment. You make sure delivery is on track. You may oversee the installation, ensure that those working with the equipment understand its purpose, and plan for its successful deployment.

You need to approach your employees in the same way. They are your most valuable resource. How do you onboard your most precious asset, your newest team member? In my research on onboarding practices, I learned several ways to onboard successfully.

Before their first day, let the HR department handle all their forms (i.e., payroll and insurance) online. New employees can review and submit these forms at their leisure, perhaps adding references if needed. On the HR front, this helps change their "to-do's" to much easier "to reviews."

Ask supervisors to reach out to new employees before they arrive for their first day of work. They can email them a welcome message or advise them on any particulars of the first day, such as dress code. They can invite them to lunch with the team, review upcoming team activities, or send them a first-day schedule. They can provide them contact information should any concerns arise upon arriving at the company. When new employees know what to expect, they come to work feeling more comfortable and confident.

The team can reach out to new employees as well, but less formally. For example, they may contact them via LinkedIn to greet and share their enthusiasm for them joining the team.

Once training begins, you may want to consider:

- Outsourcing general industry training. Tying up your valuable resources in training that covers more than what is unique to your company is a waste. Most likely, most of your uniqueness probably isn't that unique. Check out education.ipc.org if you need help on this front.
- Focusing on the quality of training. Be sure the training is not just "a talking head" or some PowerPoint deck. Learning is the goal, not boredom or just passing the time. Your training should use various modalities of learning so that information is retained.
- Balancing training with integrating new staff to the team and including them in meetings. All activities need to take place.
- Ensuring that real interaction happens between the supervisor and the employee's mentor. Yes, you're busy, but the path to not being busy is having team members who can do aspects of your job better than you.

These are just a few ideas. Hopefully, you get the idea that there are better ways to onboard. There are real benefits to onboarding better, including higher retention, as well as greater job satisfaction and trust. If your organization needs help on this front, feel free to reach out to me. **PCB007**

*Editor's Note: If you'd like to learn more about innovating the ways you hire, develop, and retain talent, John provides insights in his soon-to-be-released book, *Fire Your Hiring Habits*. Proceeds from the book help fund the electronics industry workforce through the IPC Education Foundation. More information can be found on Amazon.com or BarnesandNoble.com.*



Dr. John W. Mitchell is president and CEO of IPC. To read past columns, [click here](#).



ELECTRA

electrapolymers.com

30 YEARS in the USA

Soldermask for the Digital Era

Lead-free and the Fabrication Challenge, Part 1

Trouble in Your Tank

by Michael Carano, IPC CONSULTANT

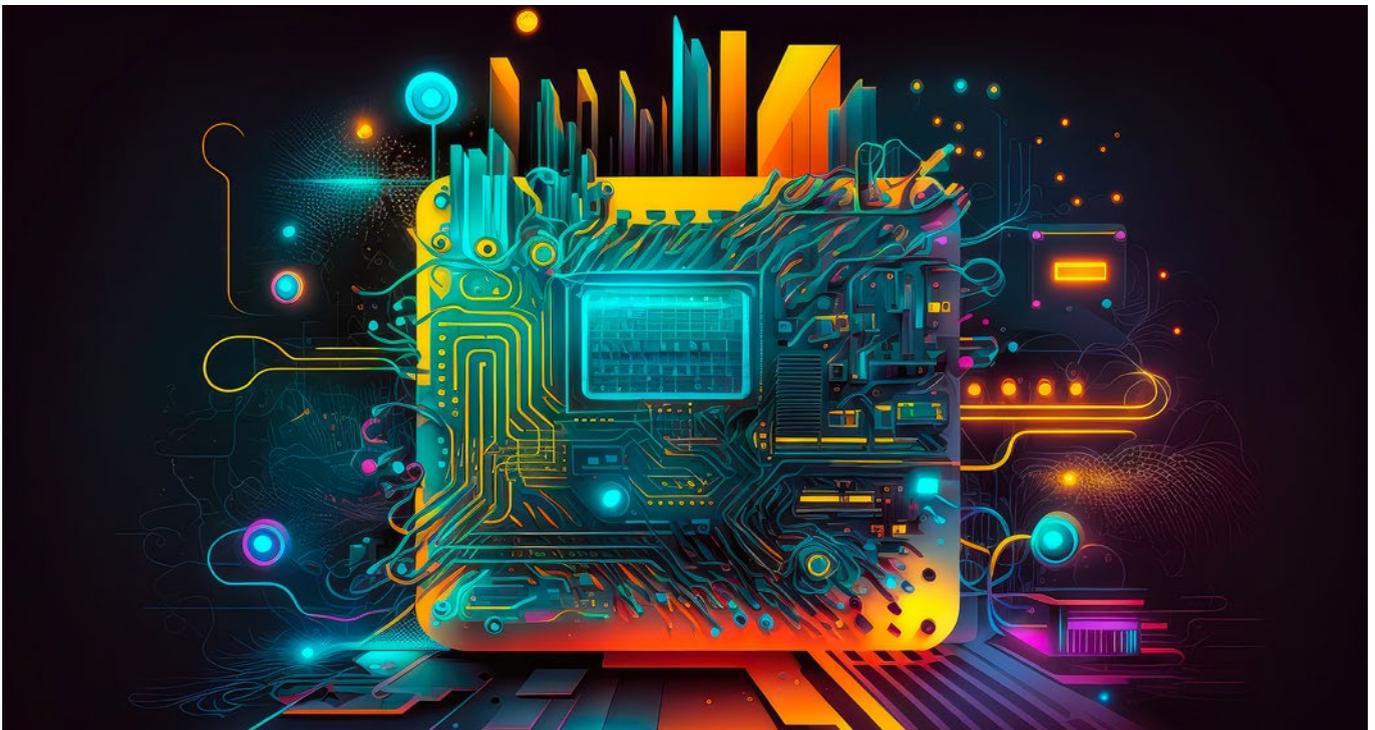
A thick, high layer-count multilayer is one of the hardest printed circuit boards to adapt to lead-free assembly processes. The reason: Multilayers often have through-hole and hand-soldered components and require two or more reflow cycles. The higher reflow temperatures and slower wetting of lead-free solders place an enormous strain on the laminate and copper-plated hole barrel. In many cases, the boards cannot be assembled reliably, even with newer, higher thermal performance FR-4 materials.

One solution to this problem is to redesign the multilayer using current design rules and newer innovative fabrication technologies. Microvias offer a significant opportunity to

reduce the layers and thicknesses of multilayers at a reasonable cost—all while improving electrical performance and density.

Consider blind vias, which are surface phenomena. To get maximum benefit from them, layer assignment for signal, ground, and power must be reviewed, and alternative constructions should be considered. Reducing the number of through-holes helps increase routing density and lower layer usage. You can achieve higher connector density and improve electrical performance by replacing through-hole connectors with surface-mount connectors.

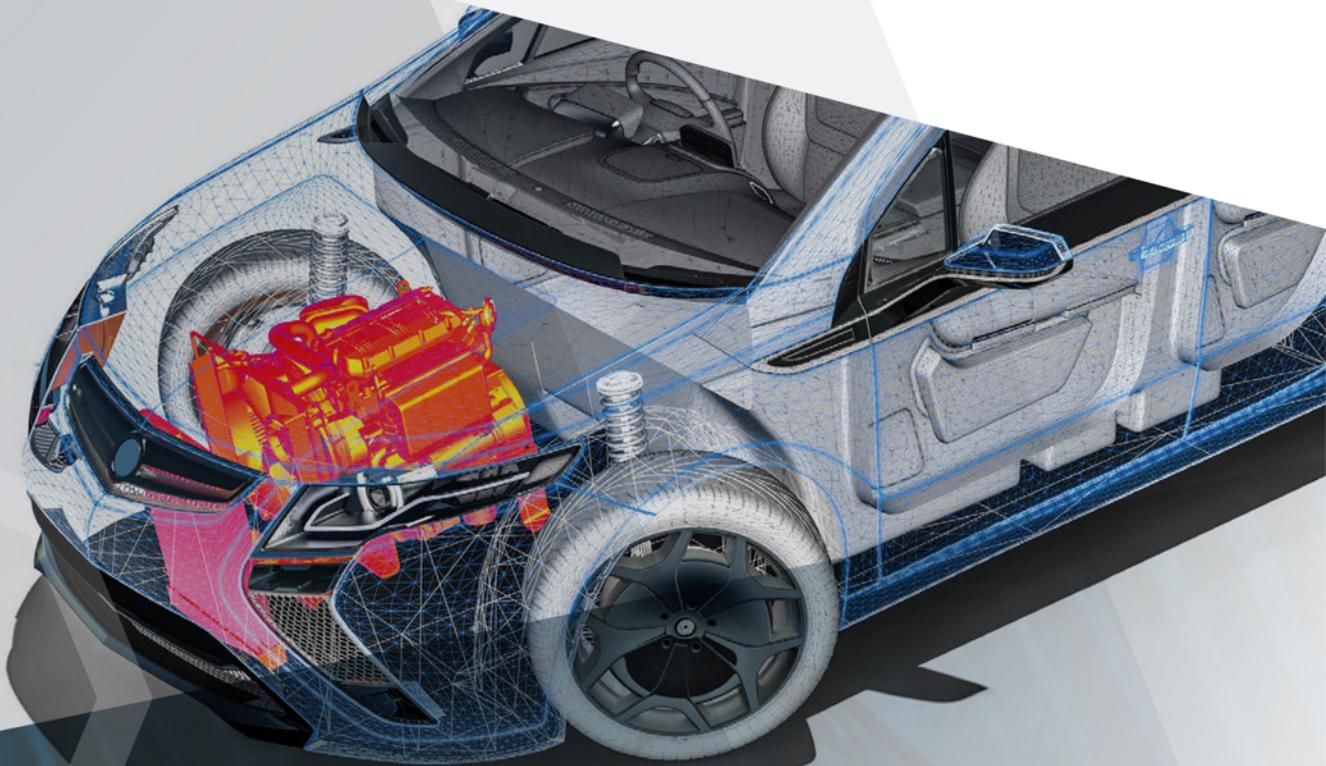
These new multilayers are not only thinner, cheaper, and easier to design, but are less





ventec
INTERNATIONAL GROUP
騰輝電子

autolam: Base-Material Solutions for Automotive Electronics



autolam 

Automotive electronics technologies are evolving at an increasing rate. Paying attention to the properties of materials at the substrate level is the first step towards achieving the most stringent performance targets of today's automotive manufacturers. autolam offers the solutions demanded by the diverse and unique requirements of automotive applications today and in the future.



ventecclaminates.com

costly and suitable for lead-free assembly. I will discuss this and several enabling technologies, including laser-drilled microvias and new SMT connectors, in future columns.

The Issue

Tin/lead (Sn/Pb) alloys have been used for many years in the assembly of printed circuits. Eutectic Sn/Pb has a melting point of 183°C, and temperatures during assembly commonly reach 230°C. The primary alternatives to Sn/Pb are tin/silver/copper alloys. These alloys have melting points near 217°C, with typical peak assembly temperatures reaching 255°C to 260°C. This increase in assembly temperature, coupled with the possibility of multiple exposures to these temperatures, requires the base materials to have improved thermal stability.

Several technical papers have illustrated important data on the effect of lead-free assembly on base materials^{1,2}. While there are many important properties to consider, there are a few that deserve special attention in light of current trends and the need for improved thermal performance. These include glass transition temperature (T_g), coefficient of thermal expansion (CTEs), and decomposition temperature (T_d).

As the temperatures which printed circuits are exposed to increase, as in lead-free assembly processes, the T_d of the material becomes a much more critical property to understand³. The T_d is a measure of actual chemical and physical degradation of the resin system. This test uses thermogravimetric analysis, which measures the mass of a sample versus temperature. The T_d is reported as the temperature at which 5% of the mass of the sample is lost to

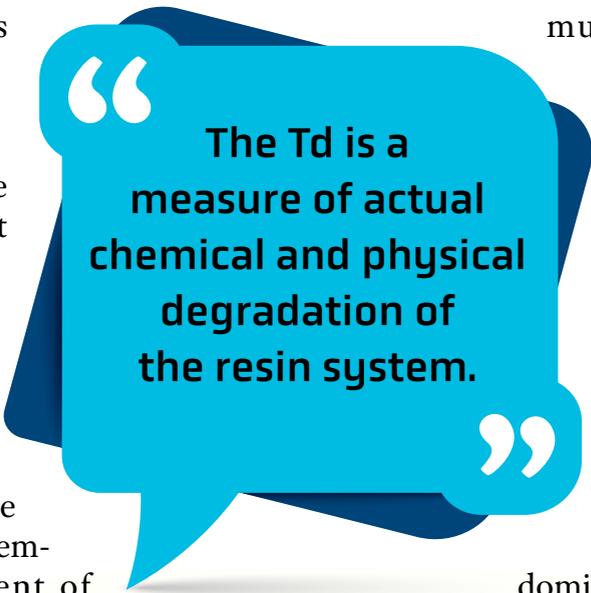
decomposition. Experience shows that the T_d is a critical property, and appears to be at least as important, if not more important, than the glass transition temperature when planning for lead-free assembly conversion. While the definition of the T_d uses a weight loss value of 5%, it is very important to understand the point at which 2-3% weight loss occurs, or where the onset of decomposition begins. In examining soldering reflow profiles, traditional Sn/Pb assembly processes can reach peak temperatures of 210°C to 245°C, with 230°C a very common value. In this range, most FR-4s do not exhibit significant levels of decomposition. However, if you examine the temperature range where lead-free assembly processes are operating, you can see that the traditional FR-4 materials exhibit a 2-3% weight loss. Severe levels of degradation can result from

multiple exposures to these temperatures. This problem increases when there are 20-plus layers, resulting in thicker boards, and many are power or ground planes.

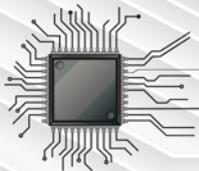
There are two primary failure mechanisms for printed wiring boards. Failures are mainly due to thermal or mechanical excursions. Plated through-hole (PTH) failures are the pre-

dominant source of PCB failures

in service and predicting them is the primary goal of PCB testing at elevated temperatures. PTH reliability testing should simulate the thermal excursions of a PTH throughout its life. Generally, the most severe thermal cycles are experienced during assembly and rework. With that said, the materials that make up the board construction are thus critical to PTH reliability. As more boards are subjected to the higher temperatures required for lead-free assembly, layer counts, T_g, and T_d must be considered.



“ The T_d is a measure of actual chemical and physical degradation of the resin system. ”



MivaTek

Global

2400NG - Dual Tray DI

High Throughput ● Automation Ready



Ready for your future



Sub 25-micron features with traditional PCB processing

Compliant with Miva's technology advances

Features

- NextGen Light Engine Feature Sizes: 6, 15, 30 Micron
- Quad-wave LED DLP: 360, 375, 390, and 405nm
- Worldwide DART™ DLP Patents Issued & Pending
- Panel Sizes: 24" x 30" (up to 42" x 60")
- Low Operating Costs, Flexible US Based Tech Support
- Automation compatible with third party sources
- Over 60 Machines in North America

Applications

- PCB: IL, OL, SM, Legend
- Micro-electronics: Features Down to 1 micron
- Chemical Milling
- Electroforming
- Glass Tooling

The glass transition temperatures range from 125°C to 170°C (and somewhat higher for select resin materials). These temperature ranges may not be sufficient for most high temperature and harsh environment applications. Epoxy-based materials with Tg greater than 170°C, and polyimide resins with higher Tg (over 200°C), are indicated for long-term thermal resistance, especially in harsh use environments. These materials are effective for PTH life and high-performance multilayer PCBs with high layer counts. There are significant consequences for high layer count multilayers. This and the move to microvias will be discussed in next month's column. **PCB007**

References

1. "Different Curing System Can Improve Laminate Performance," by Christos Chrisafides, The Board Authority-Live, June 2004.
2. "How to Get Started in HDI With Microvias," by Happy Holden, *CircuiTree*, November 2003.
3. "Advantages of BGA for Backplane Connectors", by Jim Nadolny, DesignCon 2002, TecForum HP-TF4, pp.5.



Michael Carano brings over 40 years of electronics industry experience with special expertise in manufacturing, performance chemicals, metals, semiconductors, medical devices, and advanced packaging. To read past columns, [click here](#).

Schweitzer: Essential Onboarding, and Quickly

Interview by Nolan Johnson

Schweitzer Engineering Laboratories understands the value of a strong onboarding program. Frank Harrill and Jessi Hall explain the reasons behind the company's intent to internalize new staff as quickly as possible. When it comes to onboarding, time is of the essence.

You're investing in equipment and facilities. That means you need to be investing in staff, operators, and engineers. How extensive or formalized have you made the onboarding and skill-building processes at Schweitzer for the manufacturing floor staff?



Frank Harrill: We're a 100% employee-owned company driven by innovation and digital technology. Lifelong learning and training is an essential component of SEL and always has been.

We use a blend of informal and formal training, formal educational opportunities and benefits, and a culture of learning. It's incredibly important. We empower our manufacturing floor staff to make constant improvements and innovate in the spirit of world class manufacturing, which requires education throughout the arc of their employment at SEL.

Is there a formalized training department?

Jessi Hall: Yes, we do have one. We have training throughout the company with a corporate-wide learning and development team; they focus on onboarding topics and helping our staff understand our culture. Additionally, we have some training in manufacturing that's developed by our training team, but we also rely on our supervisors and leaders to act as mentors, to teach new people. Most folks who come into the manufacturing environment have never been in one before, so we focus on creating good processes. We have found that's the best way to ensure quality: have robust processes in place and give people the opportunity to learn and grow.



One of my favorite programs is our apprenticeship program. This allows our assemblers to have a six-month internship where they learn about a new skill. They might be working in our process engineering team and learning about soldering, or they might be learning to be a machinist, or maybe they're learning about becoming an accountant. This is a formal program that is consistently in process and is a great benefit not just for our employees, but for our company overall—most employees that participate in an apprenticeship are hired into the groups that they apprentice with.

You're committed to investing in the people just as much as the equipment.

Hall: That's the most important part, the people.

HIGH RELIABILITY FORUM

October 17–19, 2023

Hilton Baltimore BWI Airport
Linthicum (Baltimore), MD

**SAVE
THE
DATE**

**IPC's
High Reliability
Forum is back
in-person for
the first time
since 2019!**

IPC's High Reliability Forum Technical Conference focuses on **Class 3 electronics for mil-aero, automotive, and long-life applications** that are subjected to harsh use environments. Subject matter experts will facilitate true problem solving and cooperation to share best practices across applications focused on exceptional reliability requirements.

For more information visit: ipc.org/event/high-reliability-forum

Solving Your Talent Problem

It's Only Common Sense

Feature Column by Dan Beaulieu, DB MANAGEMENT

Some of you will not like this column, but it needs to be said. With all due respect, listen up, and read this with an open mind.

I've been talking to company owners over the past six months, and they all say essentially the same thing: "People just don't want to work anymore." The reasons for this vary. Workers are spoiled and lazy because "the government gave them too much money," or "their generation was raised badly," or "they're spoiled and expect too much."

Sound familiar? If you've said these things yourself, please don't feel like I am picking on you. No, I am hearing these things from everyone I talk to—and it's a problem. This problem is only going to get worse if we don't start having a little more respect for those we are trying to hire.

There's a real irony in some people saying the government paid these "spoiled" folks "too much," as the people claiming that were likely first in line for the hundreds of thou-

sands (if not millions) of dollars the government handed out in PPP money. That money was just another form of government welfare, by the way.

When you get right down to it, all of us, in one way or another, are on welfare. Even the old guy who holds up a "Stop Government Entitlement" sign while sitting in his government-bought electric scooter. Personally, I love my old man government insurance—aka Medicare. Yes, even with my six-figure income, I too am on welfare.

Now that I have your attention, this is what I want you to ask yourself:

1. Is my company a good place to work?
Why?
2. Would I like to work here today?
Not 30 or 40 years ago when some of us started—but today?
3. Why would I want to work here?



Revolutionizing PCB Manufacturing Processes with Innovative, Automated and Quality Equipment & Advanced Materials

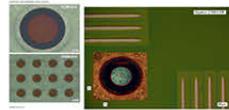
MACHVISION

Automated Final Inspection and AOI



BGA Missing Legend Soldermask breakage Pinhole Defect Under SM Soldermask Peeling

PrintProcess



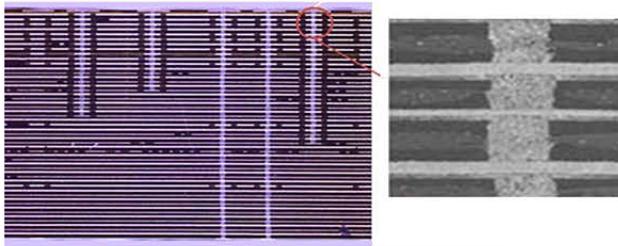
APOLLON A11
 Direct Imaging
 for Soldermask



RIVOLINO-5
 RivetBonding
 Equipment

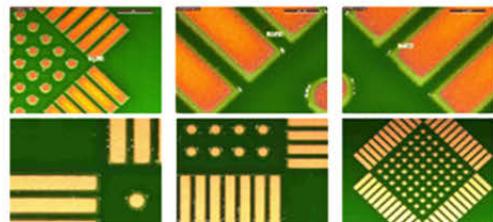
TATSUTA

Sintering
 & Conductive Pastes



AGFA

InkJettable Soldermask, Etch Resist
 & Plating Resist



If you're having trouble attracting and retaining good people, there's a reason for that. Discovering that reason will require some honest reflection and serious introspection on your part. If you want to solve your talent problem, you must be honest with yourself about what your company is bringing to the table. People want to work at a company that gives them a way forward and up the ladder. They want to feel supported, that their work truly matters, and to be seen as human beings. Who wouldn't?

Figuring out what's keeping good people away from your company means asking yourself tough questions in each of these areas:

Career Trajectory Questions

1. When we hire someone, do we show them the future?
2. Do we show them a career path, including where they can be in three, five, or 10 years?
3. Have we developed career plans, and do we put new hires on a planned career path?
4. Do we indicate the kind of money they can make going forward?

Learning/Development Questions

1. Have we developed comprehensive orientation plans?
2. Have we developed thorough and thoughtful training programs where new hires learn not only about their immediate jobs, but are also shown the bigger picture?
3. Do we assign each new hire a mentor, someone to take them under their wing and show them the ropes?

Job Satisfaction Questions

1. Do we give them examples of the important work we are doing here, including examples of where and how our products are being used to change the world?
2. Have we considered that the people we are hiring truly matter, that they are

important and are, in many cases, the breadwinner for their families? Do our policies, compensation, and benefits packages reflect this?

Let's take a step back and ask, if nothing else, one simple question: Have your new hires been invited to spend some time with you, the owner or president, so that they can get to know you, and you them. Think of the power of that simple act. John Endee, the owner of Photocircuits, used to meet with every single new hire, no matter their position. He would spend three consecutive Wednesday afternoons with them, telling them his personal story and the story of Photocircuits, so that by the end of these sessions, they knew what the company was all about. They understood the company's values, ethics, and business strategies, and they knew—this is the really important thing—they knew that they were a part of something important, and that they, personally, were an important part of that work at a great company in a great industry. They knew they mattered, that they had value and were valued. Photocircuits at that time had 400 employees.

All I'm asking is that you think about this issue. It's not about money. I know that we all have limits on what we can pay; that's a fact of life when running a business. But showing people their future; demonstrating to them that they are now a part of something important, something that matters; and that they matter—that's critical.

Asking yourself these questions and acting on the answers with honesty and sincerity will go a long way toward solving your employee hiring and retention problems.

It's only common sense. PCB007



Dan Beaulieu is president of D.B. Management Group. This column originally appeared Feb. 13, 2023 on PCB007.com. To read past columns, [click here](#).

As PCBAA grows, your impact in Washington grows



27

States

15,000+

Employees

\$15 billion+

to the US Economy

HELP US RESTORE OUR MARKET SHARE



2002: 26%



2022: 4%

PCBAA advocates, educates, and champions legislation and policies that support this critical American industry.

JOIN US TODAY

PCBAA.ORG



Preparing Employees for the Long Haul

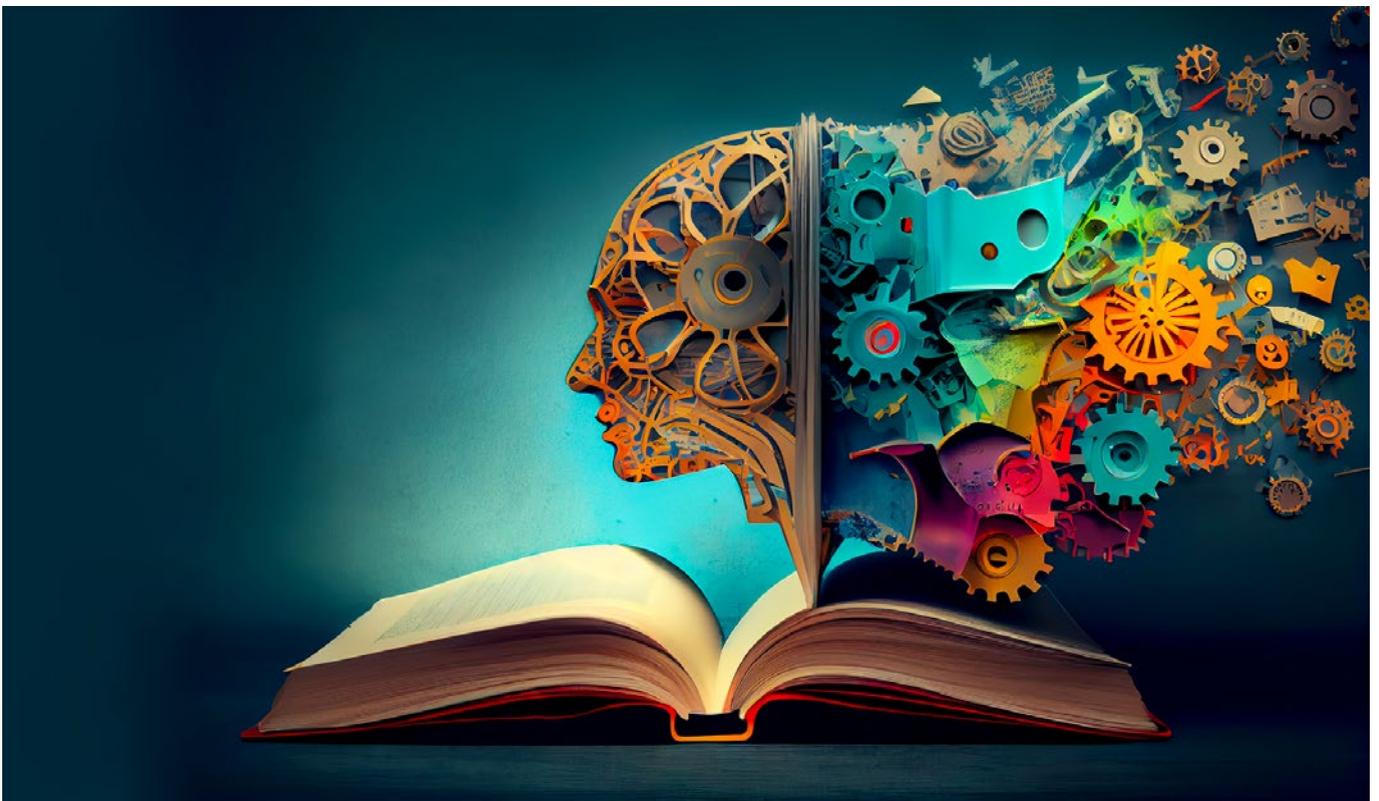
Testing Todd

Feature Column by Todd Kolmodin, GARDIEN SERVICES USA

Rebuilding our workforce after the COVID-19 pandemic has been a challenge. Nationwide, we downsized to combat market conditions and ultimately lost good employees due to either the virus or them finding new work elsewhere. That has left some rather large gaps in our manufacturing workforce. Human resource departments are scrambling to find new employees, while the manufacturing base struggles to educate and bring new employees up to speed. If not handled correctly, this scenario could create even greater problems for manufacturers.

While automating menial or repetitive tasks is one way to quickly fill the gaps at low- or entry-level positions in the workforce, filling more complex roles can be more challenging, and is where many companies fall short.

Companies find new candidates, send them into the workplace jungle, and assign them a supervisor who instructs them on their tasks or duties. Realistically, new employees are often overwhelmed and may struggle to master the assigned tasks. In many cases, the supervisor is also over-tasked with other duties and responsibilities and cannot provide the over-



M A D E I N T H E U . S . A .



For more than 25 years, IPS has been your solution for the most state-of-the-art process equipment. All our systems are designed, tested and manufactured right here in America ...and we wouldn't have it any other way!



U.S. Coast to Coast • Parts and Service Fast
ips-vcm.com • sales@ips-vcm.com • 435-586-1188

the-shoulder experience that is required for good oversight.

Employees learn in different ways. Some of them are visual learners, grasping new tasks and instructions on the fly, while others need to read instructions and commit them to memory. This is why long-term success for employees relies on a robust training system that connects to different types of learners.

Those involved in quality management systems will see that this is nothing new. They know that having a truly functional training system is essential to guaranteeing the long-term success of employees. An effective training system must do more than just satisfy a requirement.

Developing strong, documented processes is a must. They must be “ready for pickup” by new employees so that they can learn and understand the process in which they will be involved. Furthermore, the work instructions associated with the tasks must be mature and bulletproof.

The overall training process can break down when a supervisor, who may not be well versed in the process, assigns another employee the task of showing the ropes to new hires. In my experience, this is not a good practice. This is when missed steps or manufacturing-floor “voodoo” may come into play, setting up the new employee to fail or become the fall guy.

Here are some tips that can help you achieve long-term success in filling either vacant or new positions as workforce conditions improve.

- Document your processes and, at a minimum, review them annually.
- Designate trainers for each department and, if necessary, for each task level.
- Train the trainers. Make sure they know the process inside out. Be sure to document employees’ knowledge.

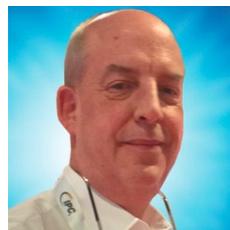
- Train new employees; don’t just show them the ropes. As I mentioned, effective training that utilizes different ways of learning will ensure long-term success of new employees. Document their knowledge level and then review (and document) it again 60 to 90 days after hiring as a way to validate their progress. Finally, discuss with them any concerns you may have.

- Review an employee’s knowledge retention at least annually. This ensures that no irregular habits have been introduced into the process and that employees are progressing well. Perhaps they have mastered the tasks and are ready for a new challenge. You can backfill their current position and move them into a more challenging role in the company.

“ An effective training system must do more than just satisfy a requirement. ”

Summary

The post-pandemic years have been challenging. Effectively rebuilding the workforce for the long haul requires some fundamental steps, such as training new employees and reviewing their knowledge over time. Whether this is new to you or just a review of standard practice, I hope you now have some tools to help your organization grow effectively as you face challenges ahead. **PCB007**



Todd Kolmodin is VP of quality for Gardien Services USA and an expert in electrical test and reliability issues. To read past columns, [click here](#).

INSULECTRO



WORLD-CLASS SUPPLIERS

Insulectro, the largest distributor in North America of materials used in the manufacture of printed circuit boards and printed electronics, salutes our premier suppliers.

CALL 949.587.3200 FOR MORE INFORMATION



Denkai America

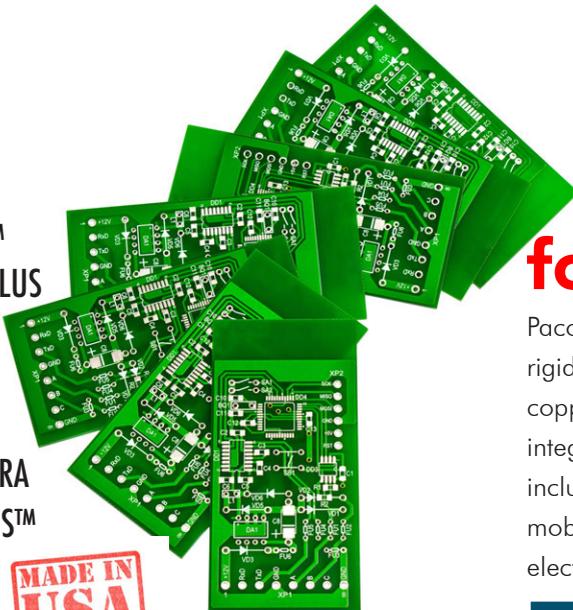


Denkai America is a leader in the manufacture of high-quality electrodeposited copper foils for printed circuit board (PCB), industrial, and energy.

With the strength of domestic manufacturing, and backed by a global presence, Denkai America delivers both conventional cladding and application specific copper foils required by technology leading companies.



- PACOTHANE®
- PACOPADS®
- TRIPAK®
- PACOGARD®
- PACO • CLUTCH™
- PACOTHANE® PLUS
- PACO • VIA
- THERMOPADSTM™
- THERMOFILM™
- PACOFLEX™ ULTRA
- PQP QUICK PRESS™



Lamination Assist for Flex & Rigid PCBs

Pacothane services the worldwide PCB market, which includes rigid multilayer, rigid/flex, cover-layer flex, flexible multilayer, copper and unclad Laminates. These circuit boards are integrated into a wide variety of applications and markets that include telecom, data communications, high-speed computing, mobile devices, military, smart cards, medical and effectively all electronic products.

American-made. Worldwide leader.

INSULECTRO

20362 Windrow Drive, Lake Forest CA 92630 • 949.587.3200 • insulectro.com

Onboarding 101

With
Mike Hoyt



Feature Interview by Andy Shaughnessy
I-CONNECT007

You've decided to revamp your process for onboarding new hires, but where do you start? How do you create a thorough onboarding system that allows each new hire to become a happy, long-term employee?

I asked Mike Hoyt, IPC's training advisor, to discuss the organization's onboarding program, the hiring issues facing companies in the PCB space, and the best way to get aboard a new onboarding process.

IPC has been involved in onboarding for some time now. Tell us about IPC's onboarding program.

Multiple companies within the electronics industry reached out to IPC for help regarding the training of their incoming, unskilled

workforce. At that time, so much of the training focus was around IPC standards and certification, and there wasn't much training available that taught the essentials that every operator, technician, and engineer needed to know before they started working on the line.

So, with the help of training experts in the industry, IPC developed multiple online training courses for both operators and engineers that could be offered on day one of a new hire's employment and could get them to proficiency faster. These training courses require no prior knowledge or experience.

So far, we have received excellent feedback from companies who onboard their new hires with our workforce training courses. We now hear that new hires get to proficiency faster than before and, in some cases, are cutting in

WORLD-CLASS SUPPLIERS

Insulectro, the largest distributor in North America of materials used in the manufacture of printed circuit boards and printed electronics, salutes our premier suppliers.

CALL 949.587.3200 FOR MORE INFORMATION



REVOLUTIONARY LAMINATING & BONDING TECHNOLOGY

X-PRESS



RFX



230N

InduBond® has long been respected for tight accuracy in registration, its lamination presses, automation (automatic loading/unloading), and its eco-friendly best practices.

InduBond® X-PRESS lamination presses utilize a different way of producing the heat required for lamination using standard pressing methods.

The innovation of this technology is that it produces heat on the laminated material, and only the laminated material, of each layer of the press pack at the same time, at the same temperature level, without any thermal conduction.

X-PRESS - Inductive heating is the revolutionary new way of PCB laminates

RFX - High-precision (<10 microns) layer-to-layer registration

230N - Next-generation inductive bonding machine



Proven Performance Partner with InduBond® Presses!
COPPER-ALUMINUM-COPPER & COPPER-STEEL-COPPER
Contact us for more information.

half the time it takes to get to proficiency. We have also been told that students who complete this workforce training do much better when it's time to certify to IPC standards.

When companies ask for help with onboarding, what are the typical challenges they need help with?

I can easily think of two challenges. First, there is concern about investing in the training of individuals who might not stick around. Unfortunately, not investing in the training of these people provides negative consequences as well. Recently, IPC created a subscription model with unlimited access to our onboarding courses and many other tracks. We have been told that this helps to mitigate the effects of potential turnover because you can train as many people as you like and not have to worry about dollars lost if someone leaves.

Another challenge is the loss in production when you take your best workers and ask them to train/supervise the new hires. That is another reason why we have received positive feedback from the online workforce training courses—it allows the individuals to complete the training in a self-paced format without the direct involvement of your skilled workers. Once the online course is completed, the skilled workers can focus their valuable time on the hands-on portion of learning and spend less time away from production.

How should a company get started creating an onboarding program?

Once the hiring process is complete, you need to designate someone who will oversee the onboarding process. This person will assign the training and monitor the progress. You

also need to map out the steps and the amount of time needed to train. In the world of learning, you need a good balance of instruction and practice. Our suggested course of action is to start with self-paced learning online, followed by hands-on application. You also need to invest in the right tools. As they say, “Work smarter, not harder.”

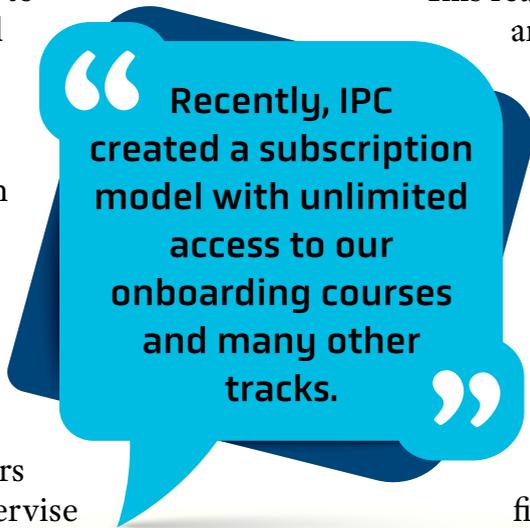
How long does the onboarding process last? In some companies, it seems to wind down after a few months, but in others, onboarding takes place throughout the first year or longer.

This really depends on each company and the types of products being built. Based on the many conversations I have had with companies in the electronics and wire harness industry, most onboarding training lasts about three to six months. The indicator is usually when these new hires move on to learn the IPC standards and subsequently get certified. Certification to IPC standards is not part of the onboarding process, since it is not the starting point for training, nor is it always offered to every employee.

What metrics should you use to measure an onboarding program's effectiveness?

Here are some measurable data points that every training program should keep track of. Let's start with the time it takes to get that person working on the production line and the amount of time that you have your skilled workers involved. You can usually assign a dollar amount to these hours, based on the wages paid and the money generated from production. The longer the onboarding takes, the more costly it is to your business.

You can also look at the cost of rework and



repair. We believe that to build better electronics, you need people who are better trained. There is a direct impact in training the right way and building your product the right way. The efficacy of your training program will be evident in the expenses incurred for rework.

What are the biggest hurdles that companies face in turning new hires into long-term employees?

Competition is a big deal. It is not uncommon for employees to leave a company when they can make more money at a neighboring business that pays them more. If you want to develop long-term employees, you need to give them a decent wage and a visible career pathway. Create a culture of learning too. This can be a competitive differentiator. I read a Forbes article¹ recently stating that “76% of employees are more likely to stay with a company that offers continuous training.”

What advice would you offer managers who are setting up a company's onboarding program?

To get started, visit education.ipc.org and take an online demo of these onboarding courses. You can book a free consultation with an IPC learning advisor to see which training solutions or courses are the best fit for their company. Our consultations are not sales calls. Our IPC learning advisors will listen and learn about what you want to accomplish and offer real solutions that work.

Thanks for your time, Mike.

Thank you, Andy. PCB007

References

1. “Why Learning and Development is Now a Competitive Differentiator,” by Mark C. Pena, Forbes.com.

The Issues With Talent

by Barry Matties

Anaya Vardya, CEO of American Standards Circuits, shares a few thoughts on keeping his facility fully staffed and the value of a strong workforce.

What keeps you awake at night? What has your attention these days?

Honestly, it's being able to hire people, as well as a focus on supporting our existing customers and gaining new customers at the same time.

What new employment roles are emerging in circuit board fabrication?

Ultimately, we'll upgrade operators to be technicians over time, especially as the complexity of the products go up. That creates paths for growth in the facility.

That's something we need the workforce to know: There are good, viable, rewarding careers in manufacturing.

That's a valid point. One challenge is that we're looking for employees with zero experience. They don't know, for sure, that this is what they're looking for. We really should be pushing careers, though.



Anaya Vardya



image: texastechtrade.com

Texas Trade School **Links** Students With Employers

Feature Interview by Barry Matties
I-CONNECT007

Elvia Quintanilla heads the Texas Technical Trade School, a state-funded training and work program that is a win-win-win for everyone—students, area employers, and the industry. It’s tax-funded, meaning it’s free for all those involved. Elvia enjoys going to work every day, and she wants to spread the news about how she’s giving students the same opportunities she had.

Elvia, I understand that you are heading a trade school that you founded. Is that right?

Yes. I started a Texas trade school in July 2020, when COVID started. I had been in the industry for 10 years after starting as a 23-year-old single mom working at a trade school. I had seen an opportunity in trades like electronics and HVAC. I loved the industry. I never thought about leaving my trade school and

had even become an assistant director over 10 years.

But with COVID, it all shifted, and I decided to resign. I didn’t have the same vision for helping people anymore. It was like a heartbreak. So, I started my own school. Because I had already been running another one, I thought, “Look, I’ll do it and I’ll succeed, because I am passionate about what I do and I really want to help people the right way. Or, I don’t make it and I’ll just go back to working at another school.” But here I am, two years later, and we’ve trained almost 80 students in one year. This month marks our first full year of training.

Please tell us a little bit about your program and what students are getting out of it.

The Texas Technical Trade School is a training provider for the state of Texas. Our pro-



pluritec®

MACHINES FOR PRINTED CIRCUIT BOARDS

INTRODUCING XCUT - NEXT GENERATION X-RAY TOOLING AND PANEL PREP

**Dramatically reduce process time from lamination to drilling
from hours to minutes while reducing 80% of the labor**



**Let Pluritec share 30 years of
X-ray experience to reduce time-to-market
and lower costs simultaneously.**

**Automating these steps into one setup
lets you “load panels and walk away”:**

- X-ray drill/rout optimization
- X-ray sub-lam optimization
- Saw-cut lamination flash
- Bevel panel edges
- Spot-face/routout tooling holes
- Post-etch tooling
- Panel thickness measuring
- X-ray QR reading of cores
- Mechanical or laser panel marking
- Automated X-ray CMM

Learn more at pluritec.com 



Elvia Quintanilla

gram falls under the Texas Workforce Commission. It's a hands-on electrical technician program designed for kids who don't want to, don't have the money to, or who don't have the opportunity to go to college. They take a 200-hour class taught by a state-certified electrical engineer. They learn how to read schematics and blueprints. They learn how to work with fluorescent lighting, ceiling fans, and fluorescent breaker boxes in both commercial and residential. Now, we're working with others in electronics to see how we can add more soldering and specified schematics to help train the next generation in this high-demand trade.

My expertise is in education. I help kids in low-income areas find grants in high-demand trades and get them into fields that will get them a job and out of poverty. That's my main purpose—to actually help kids go to school without any out-of-pocket expenses and get a job straight out of school. We create opportunities.

You're here at the SMTA Houston Expo. What do you hope to get out of it?

Through some networking at Cup of Joey, I met Adrian from Alert Tech SMT, who told

me about the SMTA Expo and encouraged me to bring my students. So, I decided to make it mandatory for my students to attend. I said, "Hey guys, this Expo will tie into your job-placement hours. Let's go." I met Marge Laney, the founder and CEO of Alert Tech SMT, and she invited my students for a tour. She also wants to see how we can partner and establish an internship program. It's beautiful because we just created an opportunity for students in less than a week. That's what happens when people with purpose make things happen.

There is a lot of support for young people coming into this industry, but there's concern that they have a different approach to work these days, including the idea that they don't want to work hard. What do you think about how young people view their careers?

We mainly work with young adults, ages 17 to 24. Employers tell me all the time that young people don't look them in the eye, that they keep their heads down, and don't shake hands. They're right; I do see that. Unfortunately, since we went into a lockdown, a lot of kids have become socially awkward. They don't even see how nervous they are until they go to an internship or an interview. At our school, we try to help calm their nerves by telling them to be easy on themselves, that they're young, and going to an interview, they may mess up, but that employers understand they're nervous because they're inexperienced at this. What I see is that students often feel overwhelmed by the amount of information, and then they shut down and don't want to look for jobs at all. What looks like laziness is really procrastination because they feel frozen by their anxiety.

To help ease students' nerves, we tell employers to just say to them, "It's okay, just tell me what you can do and then we'll go from there." These younger people just want to feel part of a company and be change agents. They want to feel included.

THE NEXT BIG THING IS HERE

Taiyo's ink jet solder mask is the ultimate innovation in solder mask application by eliminating waste and increasing productivity. Remove the mess of traditional lacquer applications and apply coverage only where needed. Enjoy less handling, zero developing, and improve registration yields. Created for both rigid and flex printed circuit boards.



BY TAIYO

- 👤 IJSR-4000 JM Series JM02DG & JM03G
- 👤 Superior adhesion to laminate with dual cure (UV/Thermal) Process
- 👤 Precision additive process. ZERO waste!

Clean. Coat. Cure.

Contact your local sales representative today!

Visit www.taiyo-america.com for more information.



Follow us on social media



Are your students career-minded or job-minded? There's a big difference.

We ask them that question during admissions. We say, "If you want a career, you've come into the right school. If you want a job, go to a restaurant. A job is temporary; a career is something that you build throughout life. You never stop learning and creating. The more you put into a career, the more you get out of it." So yes, a career is very different than a job.

We let kids know that it's okay to start work in a restaurant, because they may need that job. But we tell them not to stay there, that education is important, and that in five years they may not be able to afford everyday expenses anymore. We say, "You're going to be an adult, and you need to start either a certificate-based program or get a degree. It's important that you look into a high-demand trade or industry."

One concern is that young people today stay with a position only one, maybe two years. High turnover is a very expensive proposition. What advice do you give employers on attaining long-term employment?

That is the beautiful thing about the work we do. State-certified programs like ours are great because we provide training and work experience programs for students entering high-demand professions. The state of Texas funds this, so students go to school debt-free. Likewise, employers save money by hiring our good talent, our students. They try out students for 300 hours, at no cost, to see if they're a good match. Either way, students gain a few weeks of work experience.

It's a win for everyone—the state, the high-demand trade or industry, the employer, the student—and we're helping to do that. We encourage more employers to talk to us, because we have these great programs that

help them save money. Small businesses are suffering from a lack of great employees. Employers in the industry should reach out to us. This is all free. They'll save money and get long-term results.

It's all free in the state of Texas?

Yes. There are programs in other states, but I'm only knowledgeable about our program.

Are you sharing your ideas and networking with other programs like we've been learning about here?

No, but I'm trying to. Others should know about our Texas law that was passed years ago. I love this industry and my business. We help young people get careers and help employers and our industry grow.

I was given an opportunity when I was young, that's how I learned about this field, and that's how I fell in love with it. Now I have my business and I advocate for what we're doing. Everybody wins. It's state-funded, so why not utilize our tax dollars and grow the economy? That's what we need to do.



What advice would you give to a young person today?

First, find out what you like to do as a hobby. It may lead you to what you'll like in a job. Then, look into that industry. Ask yourself, "In five years, will this pay well? Will the industry grow or decline by then? How much money should I invest in my education?" Life is short. Do something that you love to do, so that doing your job feels amazing every day. I love what I do. It does feel amazing to me.

I can tell. Thank you.

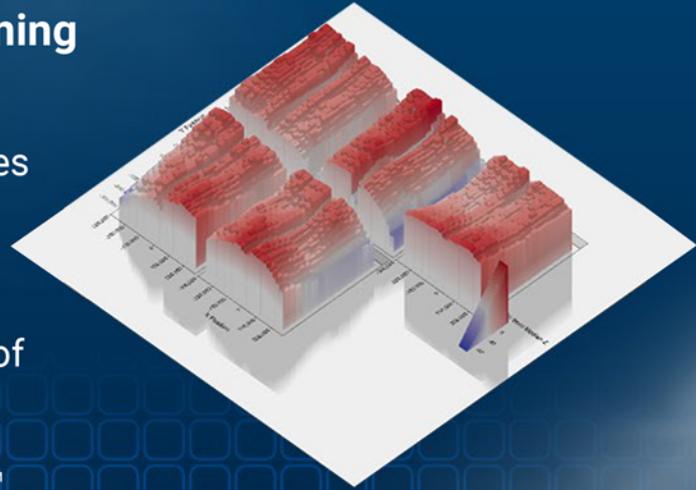
Of course, thank you. **PCB007**

CapStone™ Laser Drill + SPOT ON™ Feature Upgrade

What if the industry's highest performing flex laser via drill could now:

- Improve yield by reducing via quality issues
- Assure system readiness by monitoring critical beam metrics
- Reduce downtime through early warning of
- spot quality deviation

Now it can. Introducing the new CapStone™ Laser Drill + SPOT ON™ feature upgrade.



Discover how SPOT ON™ feature upgrade improves yield and uptime.



Engaging the Next Generation

The Chemical Connection

Feature Column by Christopher Bonsell, CHEMCUT

If you work for a company that employs the younger generations, you may have a lot of questions. I often hear there is a major disconnect between the young workforce (comprising Millennials and Gen Zers) and the established workforce made up of Baby Boomers and Gen Xers. If you are among the more seasoned crowd, it may be useful to gain some insights into the perspective of younger generations. The better you understand how they think and what they need, the more likely you can keep them happy in their jobs.

I personally fall between Millennial and Gen Z. On top of that, I graduated college and entered the workforce at the beginning of the infamous COVID-19 pandemic. Through my own experience, as well as through those of friends and family, I have noticed some themes

that I believe can help employers better understand younger generations and their view of the workplace.

Generational Differences

Before we dive into how best to meet their needs, we must consider basic driving forces that create differences among generations. In short, each generation has a unique worldview. Technology, economy, and world events always have an invisible hand in culture. If you compare the technology and economy of 30 years ago to today, you would undoubtedly find significant differences. With different economic and technological factors, each generation faces a set of challenges.

Currently, the younger workforce is going through a turbulent period. They are at the



UcamX Pro+

The only CAM seat
with a missile launcher



- YELO Automatic DfM Adjuster
- Tombstone and Solder Escape Prevention
- Secure Etch Compensation with Horns
- Parallel Processing, 64 bit

stage of life where they are trying to find a place to call home, start a family, and build a career. They are scrambling to make ends meet and plan for the future—obstacles that can seem daunting to overcome. Feeling discontented can potentially lead to life-changing choices, such as relocation or finding new jobs. Such decisions are often viewed as necessary to obtain a stable and happier future.

When I ask people who are my age why they change or want to change their career, most of them say they do not feel valued by their company. If employers want to retain good employees of younger generations, it's important that they make them feel valued. Based on my experience and those of people I know, here are some ideas on how you can make young people feel more valued in the workplace.

Be a True Family

This goal may sound cliché, because almost every company likes to call itself a family, but few companies actually do it. Being a business family means that your employees feel a sense of connection and interest in each other that goes beyond the workplace. If you are going to work a job for most of your life, it may as well be in the company of people who care about you.

In the early stages of joining a new company, it is very easy for an employee to feel alienated. It is bound to happen to some extent because they are unfamiliar with the company's culture and people. But remember that first impressions matter. If there is no effort to mitigate this feeling of alienation, it will stick with them and serve as a voice of doubt in any relationship they form. So, when you hire new people, try your best to make them feel

included. Get to know them. They will appreciate it, and you will be glad that you did it.

Keep Them Busy

Would you be surprised to hear that your younger workers want to work? What I often hear from friends entering the workforce after college is that they are not given enough work. If they are given work, it tends to be tasks that they can finish within an hour. After that task, they must chase down their boss and ask for another one—and the cycle repeats.

Once you work for a company long enough, you may be able to distinguish between what absolutely needs to get done and what you can do when times are slow. But as a new employee, you can't do that so easily.

When young employees start a job, their ambitions are through the roof. They want their work to make a difference in the company. This ambition dwindles and goes to waste if they are not met with similar energy and given enough work.

To harness all their ambition, be strategic and provide a structured work plan for people who are onboarding. Provide them with projects, not tasks. By starting them on a project that touches multiple aspects of their job, they will quickly and intuitively learn how to best maneuver through their job responsibilities. By engaging them in projects instead of individual tasks, you are inadvertently giving a series of challenging and interconnected tasks. Because projects take time and effort, new hires will keep busy with more meaningful work—from the start.

Positive Reinforcement and Feedback

Doing a job without feedback can be nerve-racking. Young new hires often stress to me that they do not receive feedback. It is not that



“ If employers want to retain good employees of younger generations, it's important that they make them feel valued. ”



Carrier Supported Copper Foils

Providing the highest quality Copper Foils to the PCB industry.

Our commitment to continual innovation ensures cost-effective alternative to traditional products on the market today.

ACF2

Single-sided
Copper-Aluminum Layer

ACF3

Double-sided
Copper-Aluminum-Copper Layer

ACF2-STEEL

Single-sided
Copper-Steel Layer

ACF3-STEEL

Double-sided
Copper-Steel-Copper Layer

ACF-SCREEN

Copper Foil with Poly Carrier



High Quality Electro-Deposited Copper Foils

Global company with a prestigious reputation for its manufacturing of high quality Electro-Deposited Copper Foils for the electronics industry.

TZA	Low Profile, Zinc and Arsenic Free
TWLS	Low Loss Foil with Zinc, HTE Grade 3
BF-TZA	Ultra Low Loss Foil, Zinc and Arsenic Free
BF-NN/BF-NN-HT	Super Flat Profile Copper Foil for Reduced Signal Loss
BF-ANP	Almost No Profile Foil
BF-HFI-LP2	HVLP, Zinc Free
DTH-NF/DTH-ANP	Ultrathin/Very Smooth Carrier Supported Copper Foil
DTH-N-TZA	Flex Copper Foil, Very Low Profile, Zinc and Arsenic Free
BF-TZA-FX	Flex Copper Foil, Very Low Profile, Zinc and Arsenic Free
TZA-FX	VLP Foil, Zinc and Arsenic Free

they want praise for what they are doing, but they worry that they are not doing a good job. When it comes to performance, silence gives young people the impression that they are not doing their job well or sufficiently. I believe that most people would prefer complete transparency—open expression of both the good and the bad. If someone is doing their job well, you should let them know so they can continue doing it. Likewise, if someone is not doing well, then they may want to know so they learn from you how to fix it. Transparency may be difficult for a manager and new employee alike, but if done tactfully, the result creates a better workplace. When done right, helpful feedback will help make new employees feel less paranoid about what their supervisors or co-workers think of them.

Conclusion

A successful onboarding process should make new employees feel comfortable and welcomed in the company. However, because each generation is different, there is no one-size-fits-all process. If you can successfully consider factors such as the needs and goals of younger generations, as well as implement solutions to address them, you will effectively bring new, young employees into your company family. **PCB007**



Christopher Bonsell is a chemical process engineer at Chemcut. To read past columns, [click here](#).

Dan's Biz Bookshelf

Hiring the Crazy and Obnoxious

Book review by Dan Beaulieu

Before you can onboard, you have to hire, and Nolan Bushnell, the co-author of *Finding the Next Steve Jobs: How to Find, Hire, Keep and Nurture Creative Talent*, should know how to hire “the next Steve Jobs”—he hired the original Steve Jobs. As founder and owner of Atari, Bushnell hired Jobs at the company many years ago. He saw something in the shaggy-haired, bare-footed young man that made him take a chance. He even gave him permission to sleep in the office so that he could work late and fall asleep there without bothering to make the commute home.

Since he was literally inventing a new industry, Bushnell was not just looking to hire people. He was not just looking for the right talent. He was looking for genius and, to his credit, he found it in the young Steve Jobs.

Here are just a few of the things he addresses in his book:

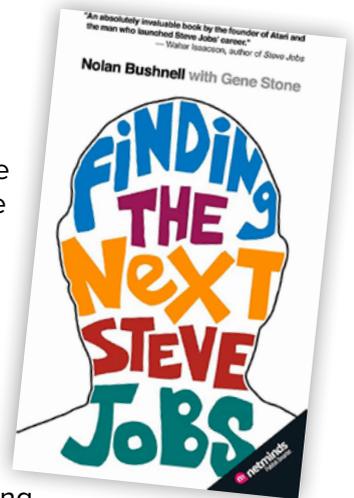
- How to attract creative people
- The importance of hiring the crazy and obnoxious
- Leveling the hierarchy to take your company from vertical to horizontal

- Allowing your creative people to fail with the understanding that the more creative, the more failure
- Learning creative speak

One part of the book that I enjoyed (maybe because I have been saying it for years) is when the authors say you should look at a job candidate's hobbies. They write:

“One of the best ways to uncover the creative passion of a potential job candidate is to ask about their hobbies, particularly ones that are difficult, complex, or somewhat time-consuming. Hobbies are not just a sign of passion and creativity. When you have a hobby, you are constantly expanding your knowledge.”

Dan Beaulieu is president of D.B. Management Group, and an I-Connect007 columnist. To read past columns, [click here](#).





WORLD-CLASS TOOLS

Insulectro, the largest distributor in North America of materials used in the manufacture of printed circuit boards and printed electronics, provides game-changing precision cutting tools to our customers.

CALL 949.587.3200 FOR MORE INFORMATION

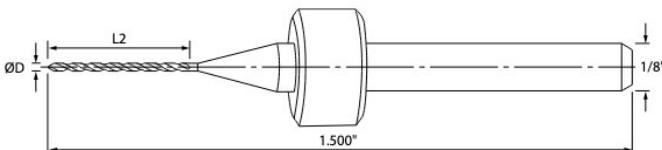


PRINTED CIRCUIT BOARD CUTTING TOOL SOLUTIONS

Kyocera designs and manufactures tight tolerance precision carbide cutting tools for PCB applications. Products include drills, routers, end mills, and specialized cutting tools ranging from: 0.05mm to 6.70mm diameters (0.0020" - 0.2638").

Drills, End Mills, Routers, Specialty Tools

Kyocera's renowned array of drills, routers, end mills, and specialty tools offer many benefits and advantages to customers for all their drilling and routing needs. Kyocera's tool reliability and design flexibility are key strengths of their products, along with a complete R&D facility in the US, new tool manufacturing capability, and local technical resources, all available to support customer needs.



4 Facet Point Geometry

REPOINTING will be a new service offered by Insulectro through Kyocera. The company has recently invested in automated, state-of-the-art equipment and all repointing will be done in Southern California.



Interviewing? Delve into Company Culture

Feature Interview by Barry Matties

I-CONNECT007

Barry Matties recently sat down with Brian Wallace, consultant and owner of HR Strategies Now in Cyprus, Texas, to discuss the challenges of hiring, onboarding, and customer experience. The consulting company helps small business owners attract, engage, and retain high-quality talent.

One of the biggest problems in industry is finding, onboarding, and keeping great talent. What strategy advice do you give clients?

It's multifaceted. The key is to understand your employees. Make sure that your offerings align with their interests, and that you're hiring them for the right reasons in the first place. If you've got a mismatch between who you're looking

for and the employees you're actually bringing into the organization, it's going to cause a disconnect or challenges down the road. Make sure that you've got the right setup in the first place.

Second, you must create a great culture. Culture is one of those nebulous concepts for many companies, but basically it's the underlying manner in which they get things done in their organization.

There are some key elements to highly effective cultures that drive employee engagement, including having robust communication practices and a high level of trust. Once you have the culture set up, then it's a matter of creating alignment within the organization and

Excellon

*Manufacturers of precision Micro-Machining
Solutions for over 50 Years*



COBRA II Hybrid Laser

*UV and CO2 lasers
Blind via, flex cutting, cavities*



HS-4L

*Low-cost, 4-station precision drilling
or routing system with large panel option*



HS-1L DS

*Single-station, dual spindle high-speed
drilling/routing with Intelli-Drill Vision*



136L

*High-Speed, precise accuracy
drilling/routing with Intelli-Drill Vision*



154L

*Large panel size precision drilling/routing
Single station with vision options*



HS-2L

*High-speed, 2-station drill or router
w/populated board routing option*

**Move into the future with the latest innovations
in Fabrication Technology from the Industry Leader!**

www.excellon.com

ensuring that your employees understand very clearly, from top to bottom, what the organization is all about and where it needs to go. Then, you need to define the requirements and over-all day-by-day activities—including planning, production and service—that will help grow the business.

If I'm an employee looking for a job right now, I would look at a company's culture because that's going to determine my job satisfaction. That's number one. Number two is salary, because I obviously have to take care of my responsibilities. I'd look for growth opportunity within the business. I'd also look at the general purpose of the business and whether it aligns with mine.

You're looking at the hiring process. We always say that if you have to fire somebody, your hiring process failed, right?

Yes, sometimes. There are the two critical pieces of the human resources equation that you absolutely have to get right, because they're filled with legal risk. They can cause a whole lot of gain or frustration. But if you have a robust hiring practice, then you're absolutely right, the chances of having to fire that person in the future is going to be minimized. Unfortunately, there will always be circumstances in which you'll need to release somebody in order to protect the organization.

What about people who don't want long commutes or any commute?

That's becoming a big issue in our society at this point. It's a significant mismatch or disconnect in expectations between what an employee wants vs. what an employer is capable of offering.

Are you seeing more businesses offering paid courses for professional development or technical skills?

They can go in a number of different directions with this. Some companies are saying, "We



Brian Wallace

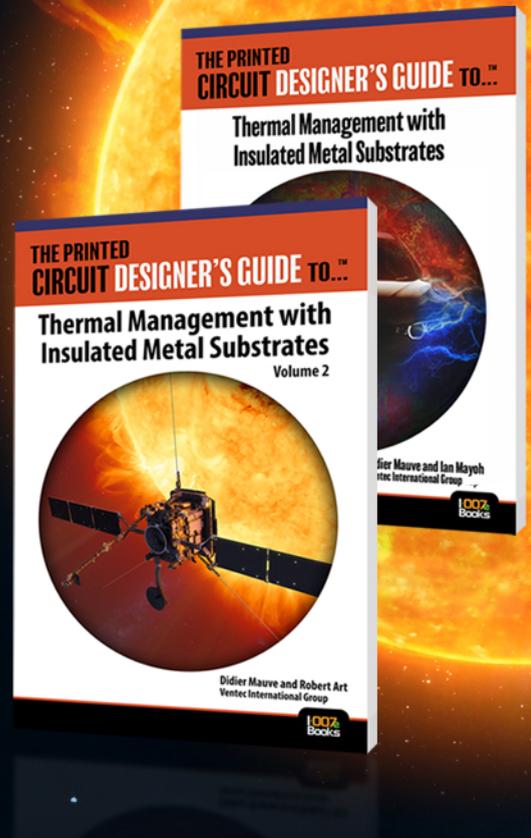
want to fully support you. We want to grow your career and will pay for all your education." Some cut back on that version. Other companies may provide services through Skillsoft, for example, which is an online learning platform that has learning programs targeted to specific careers. The great thing about education today is that it comes in so many different forms. It's just a matter of somebody putting a plan together and making sure that development processes work effectively.

What role will automation or robots play in HR?

It will be interesting. We're on the precipice of some incredible and wild scenarios within society as a result of this. The way that people interact with and use technology will change dramatically.

Companies need to think about how they put structure around using AI to further their business. How will AI make us more productive? How will it enable us to serve our customers more effectively? You have other risk factors as well, so you must make sure you have in place a robust plan on how to handle situations.

Companionship at its Best



This must-read sequel to Ventec's book series on Thermal Management describes the applications, IMS products and support services to help you understand and overcome thermal management challenges.



Download Now

I-007eBooks

Automation aside, are you seeing general shifts in education or skill sets for employees?

The shift in the use of technology and how people are interfacing with that technology has already started.

Business growth is a whole process, and everything is getting compressed into shorter timeframes. It used to take 50 years to find solutions to grow a company; it will soon take five years. That creates a whole different dynamic. People within a company have to understand how to learn quickly, fail quickly, and work together more effectively. They have to develop new skill sets. There is going to be a continual retooling of the skills required to make a job happen.

How does a potential employee assess a company's culture?

The key is to ask questions when you're in an interview. Take time to prepare for your interview and come up with five or six ques-

tions on company culture. For example, how do employees collaborate? How is performance managed? What's really important to the organization? Is it profit? Purpose? How does leadership react when situations go right or wrong? How do communication practices occur within the business? What's the tone of the organization?

Any final thoughts or advice?

Recognize that we are still in an adventurous time. There are many different influences pushing and pulling people, and all business owners are struggling to figure out where we go from here. Keep positive. Focus on your culture because that's going to be the number-one determination of success. And treat your employees right.

Great. Thank you very much.

Thank you. **PCB007**

Crab Shells Could Help Power The Next Generation Of Rechargeable Batteries

Anybody who has ever enjoyed fresh crab legs or lobster tails can attest to how difficult it is to get through their tough shells. But instead of just throwing them away, researchers are “upcycling” these shells into porous, carbon-filled materials with a wide variety of uses. Now, a team reporting in ACS Omega has used this “crab carbon” to create anode materials for sodium-ion batteries.

Previously, researchers created a biodegradable zinc-ion battery using the chitin in crab shells. But these wastes could alternatively be turned into “hard carbon,” a material that has been explored as a possible anode for sodium-ion batteries. Though chemically similar to lithium, sodium ions are larger. When hard carbon is

combined with metallic semiconductor materials, such as the transition metal dichalcogenides (TMDs), the material can become a feasible battery anode. So, Yun Chen, Yue Zhao, Hongbin Liu and Tingli Ma

wanted to explore how two different TMDs—tin sulfide and iron sulfide—could be combined with hard carbon made from crab shells to make a viable sodium-ion battery anode.

To make their “crab carbon,” the researchers heated crab shells to temperatures exceeding 1000° F. They then added the carbon to a solution of either tin sulfide (SnS₂)

or iron sulfide (FeS₂), then dried them to form anodes. The researchers say that this work could provide a route to upcycle other wastes and help develop more sustainable battery technologies.





edu.ipc.org/pcb-design



PCB DESIGN COURSES

DRIVE QUALITY AND INNOVATION

Introduction to PCB Design II

Two upcoming classes:

3/14 to 5/4

Design for Radio Frequency

Upcoming classes:

3/13 to 4/19

Advanced Design Concepts

Upcoming classes:

3/13 to 5/3

PCB Troubleshooting & Defect Analysis

Upcoming class:

4/3 to 4/26

Rigid-Flex Boards

Upcoming class:

6/5 to 7/12

Design for Mil-Aero

Upcoming class:

6/5 to 7/12

New PCB Assembly Process & Quality Courses

- **BTC Package & Assembly: Materials, Process and Reliability**
Jennie Hwang | 4/4 to 4/20
- **Lead-free Reliability for Harsh Environment Electronics**
Jennie Hwang | 5/16 to 5/18
- **Top Lead-free Production Defects and Issues, Causes, Remedies and Prevention**
Jennie Hwang | 7/11 to 7/20

Learn more about our [PCB Design Courses](http://edu.ipc.org/pcb-design).

Putt's Law and the Successful Technocrat

Happy's Tech Talk #18

by Happy Holden, I-CONNECT007

Editor's note: This column is a combination of direct quotes from the book author and Happy's own comments. Anything in quotation marks comes from the book's author, Archibald Putt.

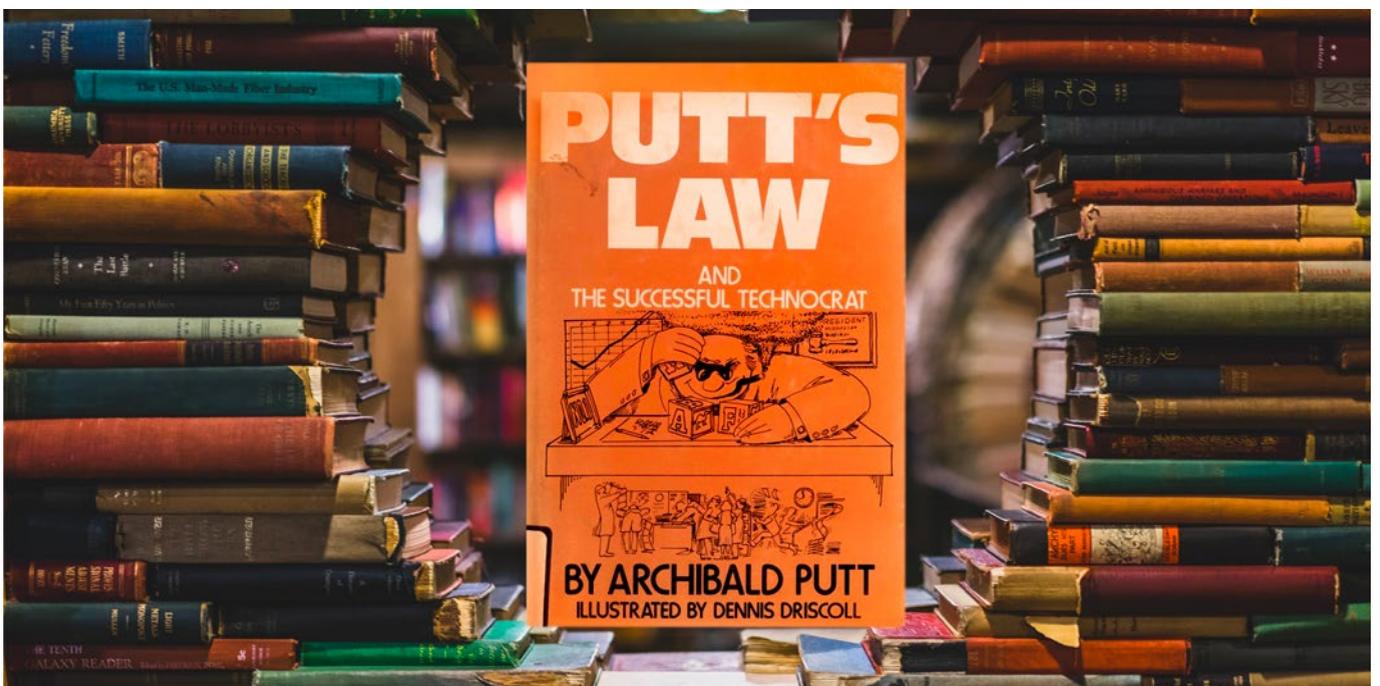
I have read very few humorous technical columns in my career, but the one exception is an 11-part series, "The Successful Technocrat"¹ by Archibald Putt, which was featured in *Research & Development Journal* in 1976 and 1977. The author later published a book, *Putt's Law and the Successful Technocrat*², and years later, I tried to buy it—only to have to wait eight years to get it. In the meantime, I have saved copies of the articles and sent them to friends.

A Must-Read for Engineers and Technologists

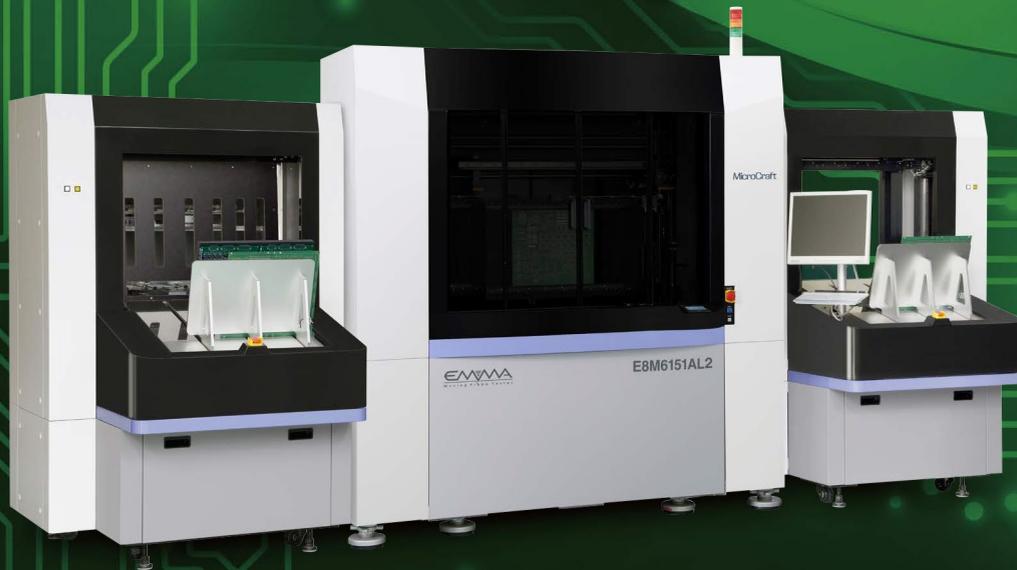
It is a shame that I never discovered who Archibald Putt (his pseudonym) was, but I suspect he was an engineer or scientist at IBM. What I like about his style is that he uses equations and Boolean logic to emphasize his points. Hopefully this will induce you to find and read this gem of a book. In this column, I will summarize each of the chapters.

Chapter 1: Putt's Law

"Beginning a disquisition on the vagaries of upward mobility through the ranks of your fellow workers in today's R&D community—how to do it and what to do when you get there."



Fully Automated Unattended Operation



EMMA
Moving Probe Tester

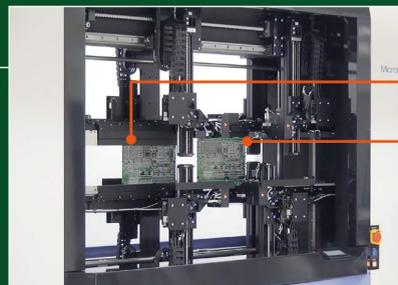
10,000
Test Points/mins.

Load up to
200 pcs

E8M6151AL2

Increased Throughput

Transfer speed reduced by **37%**

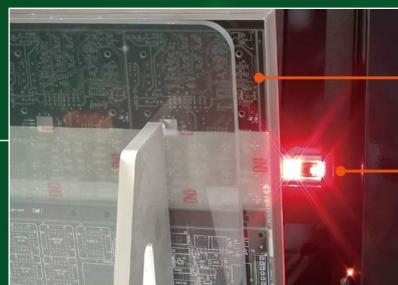


Ready for next test

Being tested

Built-in Scanner for Seamless Job Changeover

Improved Efficiency for
high-mix boards



Boards stacked
vertically for easy
operator access

Bar & QR
Code Reader



USA MicroCraft, Inc.

1247 N Tustin Ave, Anaheim, CA 92807
TEL (714) 482-2550

www.usamicrocraft.com
sales@usamicrocraft.com

Visit Our Website

Watch Video

The Peter Principle² states that without an adequate competence criterion for technical managers, there is no way to determine when a person has reached his level of incompetence. Thus, a clever and ambitious individual may be promoted from one level of incompetence to another. He will ultimately perform incompetently in the highest level of the hierarchy, just as he did in numerous lower levels.

The lack of an adequate competence criterion, combined with the frequent practice of creative incompetence in technical hierarchies, results in a competence inversion with the most competent people remaining near the bottom, while persons of lesser talent rise to the top.

It also provides the basis for Putt's Law, which can be stated in an intuitive and non-mathematical form as follows: "Two types of people dominate technology: those who understand what they do not manage and those who manage what they do not understand."

As in any hierarchy, most people in technology neither understand nor manage much of anything. This, however, does not create an exception to Putt's Law, because such persons clearly do not dominate the hierarchy. While this was not previously stated as a basic law,

the success of every technocrat depends on his ability to deal with, and benefit from, the consequences of Putt's Law.

Chapter 2: Three Laws of Crises

"Our expert on the hierarchical intricacies of the R&D world discusses the hazards of excessive perfection and promulgates a trio of governing conditions for building your own crises."

The First Law of Crises addresses the importance of "rocking the boat," or having some imperfections or crises on the projects of a technical hierarchy. The First Law of Crises follows rather logically from these observations and may be stated formally as follows: "Technological hierarchies abhor perfection."

The Second Law of Crises addresses how to fix the incompetence level. What is the right amount of incompetence, or the right number of crises, to introduce into a given job? A partial answer: "The maximum rate of promotion is achieved at a level of crises only slightly less than that which will result in dismissal."

Thus, the best strategy to begin a new assignment is with a level of crises as low as possible. The level should then be increased gradually until the desired promotion occurs. The opti-

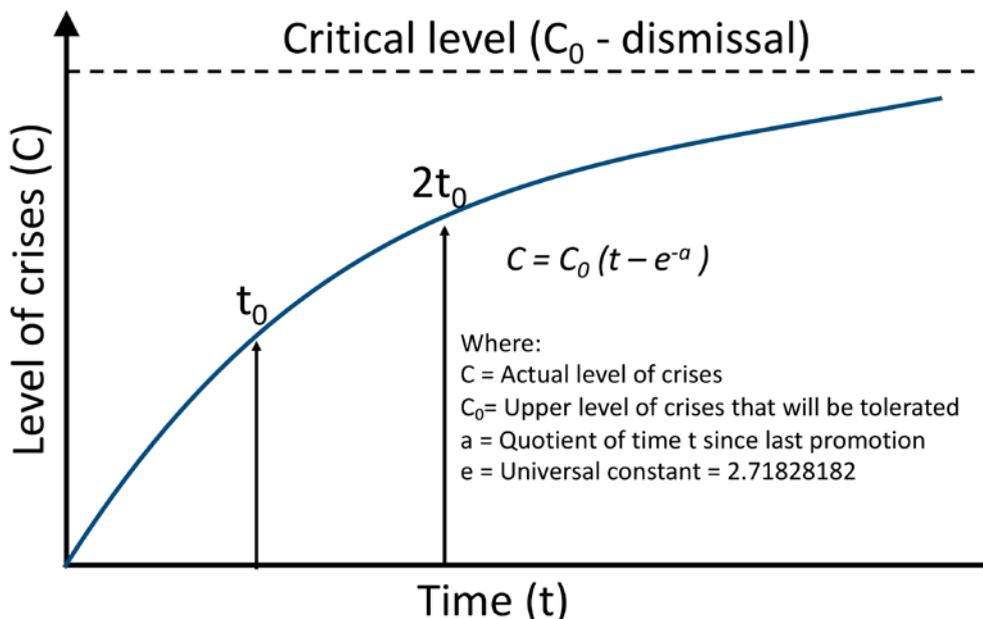


Figure 1: The Third Law of Crises.

imum timing for this, as defined by the Third Law of Crises, can be stated in mathematical form as (see Figure 1).

“One third of a maximum tolerable level should be reached as soon as the next promotion can reasonably be expected.” This time is given as t in the figure. The time, $2t$, is also of interest. because a person by then will have waited twice as long as expected for a promotion. Furthermore, the optimum level of crises will have reached two-thirds of the maximum permitted level.

Chapter 3: The Law of Failure

“In the R&D world, it’s “to the loser belongs the spoils” (if you play your cards right). Our expert on getting ahead tells how, when failure strikes, you can salvage your career.”

Early laws of Putt speak of rising to the level of incompetence, but what about those who are incompetent? Is there hope for these people? For most of them, the answer is yes. There is hope of promotion, even for the truly incompetent. However, a good appreciation is needed for the Law of Failure: “Technology abhors little failures, but rewards big ones.”

The ambitious technocrat following the Law of Failure must be aware of the corollary to the law: “If you must fail, fail big.” An important refinement to this corollary is knowing the optimum timing for big failures, but the curve can be illustrative. Curve A is the optimum strategy for introducing crises. Curve B shows what to do if you find yourself unavoidably too far above curve A. You must increase the crisis level to get above the zone of minor failure into the zone of major failure, where you will be safe (Figure 2).

Chapter 4: The S-Curve Law

“Having told how to manage projects to best advantage (yours), Putt now discloses the secret of selecting the best project (for you) and how to foresee the best time to get out of it.”

How do you select the right project? Remember, all progress in technology follows an

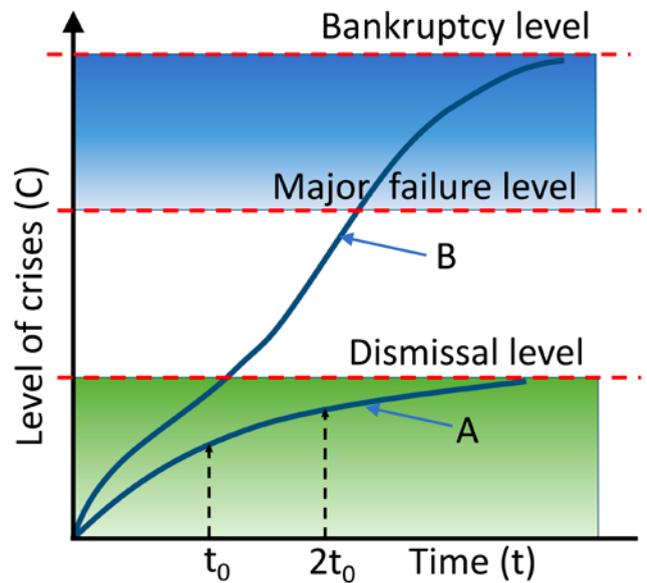


Figure 2: The Law of Failure.

S-curve. You must get your promotion before the actual progress of the project deviates from the optimistic corporate projection.

Following the initial success of the project, progress usually continues at a rapid rate, leading to an overly optimistic, corporate, straight-line projection (Figure 3). Then a gradual leveling out occurs. This causes great trauma in the marketing and financial sectors of the company. This also results in increased pressure on

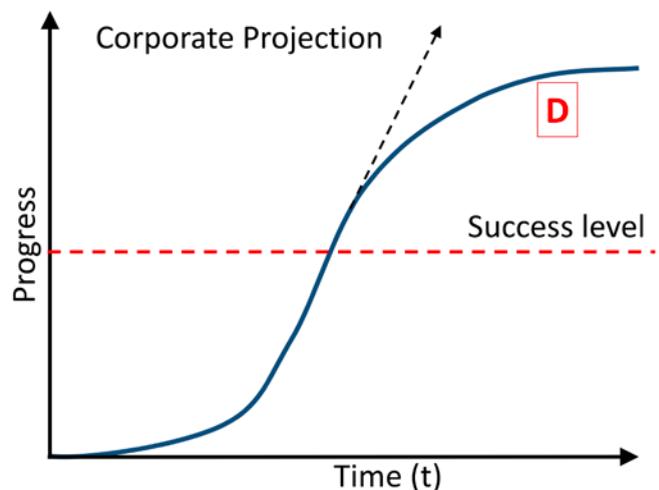


Figure 3: The S-curve Law.

the technical groups because it is their job to solve problems and get technical progress back onto optimistic, straight-line projections.

There is great temptation to remain with a project long after the point of success has been reached. This is technically referred to as “basking in the glory.” It is, however, an ill-advised luxury. For once the rate of progress begins to level out at a certain point, it may be too late to avoid the recriminations associated with failing to meet straight-line projections.

Chapter 5: Laws Governing Values

“Your hierarchical position can be enhanced if you draw on the abilities of others, but only if they are of equal or higher rank.” Putt provides the postulational principles to prove it.

The importance of factors in evaluating good ideas is stressed in the Law of Governing the Value of Ideas: “The value of an idea is measured less by its content than by the structure of the hierarchy in which it is pronounced.”

Putt also provides a ranking of technical articles and ideas that led to the Law of Governing the Value of Technical Publications: “The value of a technical article when first published is proportional to the sum of the prestige of its authors, but its ultimate value is proportional to the sum of titles subsequently referenced to it.”

Chapter 6: Three Laws of Advice

“Some readers may be familiar with the First Law of Advice, but the Second and Third Laws of Advice are neither so well-known nor so obvious.” Our expert provides two illustrative examples to show how they work.

First Law of Advice: “The correct advice to give is the advice that is desired.”

Second Law of Advice: “The desired advice is revealed by the structure of the hierarchy, not by the structure of technology.”

Third Law of Advice: “Simple advice is the best advice.”

Putt provides a simple story of a petroleum company executive in the 1920s which successfully marketed a “funny colored” gasoline through the use of a consultant. This brings us to Chapter 7.

Chapter 7: The Consultant’s Law

“If you’ve ever dreamed of becoming a consultant, read this advice from our expert on the hierarchiology of technology.” Two examples illustrate how the Consultant’s Law works and why you can’t ignore it.

“A successful consultant never gives as much information to his clients as he gets in return.”

The value V_c to a customer of a discussion with a consultant (V_o) is equal to the information given (I_g) times the price per unit (P_u) that the customer is willing to pay for the information. Stated mathematically, this becomes:

$$V_c = P_u \times I_g$$

Assuming the customer pays a fee (F) equal to the value of the advice he receives (an interesting even if naïve assumption), then $F = (P_u \times I_g)$ and the value of the discussion to the consultant becomes:

$$V_o = (P_u \times I_r)$$

This equation states that the value to a consultant of each discussion is proportional to the information he receives and completely independent of any information he may give in return. The failure of most technical consultants can be traced directly to their mistaken presumption that the function of a consultant is to give information and advice. In reality, a consultant’s job is just the reverse.

Chapter 8: Laws of Survival

“Our expert has already told us the ploys for getting ahead in the hierarchy of technology, but you can’t get ahead if you’ve been kicked off the team. Here’s how to make sure you are not.”

As described in the law governing advancement and survival in technology: “Advance-

The most complete event coverage the industry has ever seen.



Congratulations Dieter Bergman IPC Fellowship Award Winners!

- Curtis Grosskopf
- Nick Koop
- Thomas Marktscheffel

Read about the award winners



IPC APEX EXPO 2023 was our best show ever in 10 years. One noticeable difference was the incredible "quality" visitors who were very interested in the location. The show was also a perfect opportunity to meet existing customers face-to-face, which hasn't been so easy over the past few years.

Shawn DuBravac
Executive Director
BlackBerry

Shawn DuBravac: What's New in Tech

Article by Pete Starkey • I-CONNECT007

During an exclusive packed keynote luncheon with the members of IPC APEX EXPO 2023, IPC's Chief Executive Officer Shawn DuBravac gave a big, bold address titled "What's New in Tech: The Future of Electronics" with an emphasis on IPC's presence in the industry and the challenges ahead.

DuBravac delivered his presentation in an engaging style, with lots of humor and interesting statistics. He also mentioned the importance of balancing sales and marketing efforts.



A Conversation With "The Space Gal"

Michelle Te and Dyan Nguyen

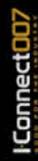
Michelle Te: Emily, thank you for joining us today. I understand you didn't have a traditional path into science. How did you get into a STEM field?

Dyan Nguyen: Well, I grew up in West Virginia, and I am the first person in my family to go to college. I was very interested in science, but I didn't have any role models. I decided to go to college and major in aerospace. I had a rocket club in high school, and I worked his job in how my...



REALTIME with... APEX EXPO 2023 SHOW & TELL MAGAZINE

- 6 Another Undergarmentable Year by Michelle Te
- 10 Advancing in a New Era by John Haddock
- 14 Real Time with... IPC APEX EXPO Video Showcase Sponsors
- 22 Real Time with... Video Listing Showcase Hall of Fame Awards Interview by Praty Galdman
- 25 IPC Raymond E. Pritchard Hall of Fame Awards Interview by Praty Galdman
- 28 Carry McQuinn: Aiming for the Stars
- 29 Teresa Kauer: Onward and Upward by Christopher Bonnett
- 34 A Promising Future for Automation by Philipp Hildner
- 36 A Week-long Industry Extravaganza by Philipp Hildner
- 38 Emily Calandretto: A Discussion of Space Exploration Interview by Michelle Te and Dyan Nguyen
- 41 A Conversation With "The Space Gal" Interview by Michelle Te and Dyan Nguyen
- 51 Best Technical Papers and Top Honors Interview by Michelle Te and Dyan Nguyen
- 52 Lotban Hennrich, PhD: Shedding Light on Reliability Risks
- 54 Patrick Spachbrugger: Demystifying Laser Technology
- 56 Derek Lovoy: Toward a More Sustainable Industry Interview by Barry Mattier
- 60 Meet Henry Crandall: New IPC Student Board Member Interview by Barry Mattier



REALTIME with... APEX EXPO 2023 SHOW & TELL MAGAZINE



- Interviews
 - Photo galleries
 - Awards coverage
 - Commentary
- [Download Now](#)

ment demands risk but survival is achieved through risk reduction.”

First Law of Survival:

“To get along, go along.”

Second Law of Survival:

“To protect your position, fire the fastest rising employees first.”

Chapter 9: Five Laws of Decision-making

Our intrepid explorer of the technological hierarchy looks at the complex process of making up the corporate mind. He finds, and sets down here, five rules that should be invaluable to the upward-oriented technologist.

First Law of Decision-making:

“Managers make decisions.”

Second Law of Decision-making:

“Any decision is better than no decision.”

Third Law of Decision-making:

“A decision is judged by the conviction with which it is uttered.”

Fourth Law of Decision-making:

“Technical analyses have no value above the mid-management level.”

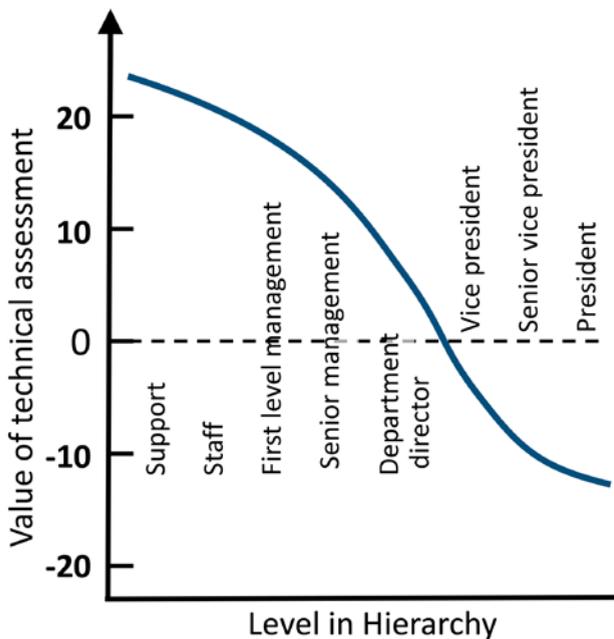


Figure 4: Five Laws of Decision-making.

Fifth Law of Decision-making:

“Decisions are justified by benefits to the organization. Decisions are made by considering benefits to the decision-makers.”

Chapter 10: Laws of Reward and Punishment

“If your organization is in a state of malevolent stagnation, as defined here by our hierarchologist, there’s little hope.” But you should at least read his remarks to find out how you got there.

The Law of Failure clearly reveals:

“Failure to fail fully is a fool’s folly.”

The A-B-C-D reward system (Figure 5) exists in technical hierarchies:

- **A for Innovative:** “Reward big failures and successes. Punish small failures.”
- **B for Aggressive:** “Although logical, the outcome of a project cannot be determined before its completion and those punished too often cease to try. All hierarchies experience *hierarchiological aging*, which moves B to C.”

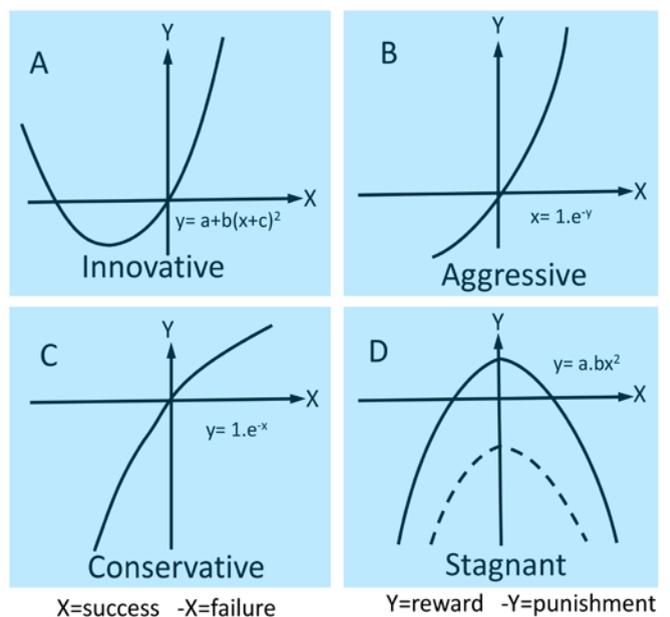


Figure 5: The four Reward-Punishment Systems.

- **C for Conservative:** “Heavy penalties, given for a small failure, engenders a sense of resentment toward those who succeed.”
- **D for Stagnant:** “Repeated punishment for small failures eventually leads employees to refuse to accept any risk at all. The organization succumbs to the Law of Stagnation: Organizational stagnation occurs when the punishment for success is as large as for failure.”

In advanced cases of hierarchiological aging and organizational stagnation, no decisions are made that are not fully specified. Any attempt to deviate from the status quo is resisted. This is the familiar condition of most government bureaucracies, the military, and educational institutions, where no one “rocks the boat” to minimize the pain.

Chapter 11: Law of the Estimated Fact

“Beware of giving a ballpark estimate. If it’s credible, it will be accepted and disseminated as fact.” Rowe’s Law continues advice for the professional initiated by Archibald Putt.

First Law: “Any estimate within the realm of credibility, given by anyone considered an expert, will immediately be accepted by the received and promulgated as a fact.”

Second Law: “When the source of an estimate is identified as an authority for the estimate, his conclusions, not his estimation parameters, are propagated.”

Third Law: “Regardless of the path followed from the expert to highest-level recipient, that person will only accept what he wants to hear.”

Conclusion

Over the 46 years since the initial publication of Putt’s work, he has appeared in many blogs and other references. One is from David Bruggeman, “Part Dilbert, Part Dale Carnegie—one for fun.”⁴ He said that, while not

the same as the Peter Principle³, “in a hierarchy, every employee tends to rise to his level of incompetence.”

Putt is arguing that there is an incompetence inversion in technical organizations. Those in managerial positions lack the technical knowledge to understand what they manage, and employees are, essentially, smarter than the managers. This perspective is reflected in the rest of his writings.

Unlike Dilbert, he was not a syndicated journalist or popularized like the Peter Principle. But among us few, he is still revered for his insightfulness and prose. **PCB007**

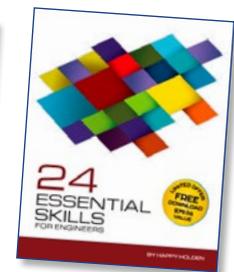
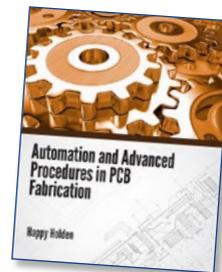
References

1. “The Successful Technocrat,” by Archibald Putt, *Research and Development Journal*, January 1976 to December 1977.
2. *Putt’s Law and the Successful Technocrat*, by Archibald Putt, Wiley-IEEE Press, April 2006.
3. “The Peter Principle: What It Is and How to Overcome It,” by Adam Hayes, March 20, 2021, Investopedia.com.
4. “Part Dilbert, Part Dale Carnegie—one for fun,” by David Bruggeman, *Science and Public Policy*, Vol.31, Feb.2007.



Happy Holden has worked in printed circuit technology since 1970 with Hewlett-Packard, NanYa Westwood, Merix, Foxconn, and Gentex. He is currently a contributing technical editor with

I-Connect007, and the author of *Automation and Advanced Procedures in PCB Fabrication*, and *24 Essential Skills for Engineers*. To read past columns, [click here](#).



PCBAA's New Representation

American Made Advocacy

Q&A With David Schild, PCBAA

After several years of work, the CHIPS Act has been signed and funds are beginning to be disbursed. What does this mean for the microelectronics industry?

The CHIPS Act is a great start toward making our supply chains more secure and resilient, but simply building more semiconductors in the United States isn't the end of the story. Printed circuit boards and IC substrates need the same level of attention that chips are getting. Over the last 25 years, we've fallen from 30% of the world's supply of PCBs made here in the United States to just 4% today. Reshoring every layer of the technology stack should be the next priority for policymakers.

We're starting to hear senior officials such as Commerce Secretary Gina Raimondo refer to a microelectronics "ecosystem." Why is that term so important?

Because chips don't float. Dozens and sometimes hundreds of electronic components are needed to make modern technologies function. Also, it's not enough to make the next generation of semiconductors here in America if we don't address the rest of the stack. It goes beyond just having factories in the United States. It's imperative that America invent the PCBs and substrates of the future, and very often R&D is co-located with production. An ecosystem approach is the only way to achieve the economic and national security goals we all share.

You've recently joined PCBAA as its executive director. How does that organization fit into this discussion?



David Schild

PCBAA is focused on a three-pronged mission to educate, advocate, and legislate for our industry. We represent the manufacturers, assemblers, and critical suppliers in this space, and we're signing up new members every month. If you're concerned about our industry's challenges and want to level the playing field, we need you on our growing team.

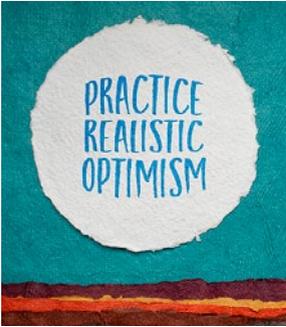
What's next for industry efforts to secure the supply chain?

The 118th Congress has an opportunity to "finish the job" when it comes to investments in American microelectronics manufacturing. Building on the success of CHIPS, our industry is advocating for legislation that would fund industry growth directly and incentivize the purchase of American PCBs via significant tax credits. PCB007

You know you're working for a great company when...



Source: I-Connect007



A Goal of Higher Technology

Like many circuit board shops, Sunstone found itself climbing out of the deep well created by shutdowns during the pandemic. But 2022 was a good year, and Vice President Matt Stevenson greets 2023 with optimism. What's on his mind? He's looking closely at automation, price adjustments, a plating line, and the ongoing struggles with staffing.

IPC SummerCom: Helping the Electronics Manufacturing Industry Build Electronics Better

Hundreds of experts from around the world will discuss electronics manufacturing standards in more than 80 meetings May 13–18 at IPC SummerCom in Milwaukee. Facilitated by representatives from OEMs, PCB manufacturers, EMS providers, design firms, and other organizations, IPC standards development committees establish benchmarks for excellence in electronics manufacturing.



HKPCA Returns to Shenzhen in May and December 2023



The International Electronics Circuit Exhibition (Shenzhen), (“HKPCA Show”), one of the world’s largest and most

influential PCB and electronic assembly exhibitions, will host two events this year, on May 24–26 and December 6–8, 2023 at the Shenzhen World Exhibition & Convention Center (Bao’an).



Circuit Technology Center Announces New Series of CircuitMedic Circuit Frames

Circuit Technology Center announces the release of a new series of CircuitMedic brand Circuit Frames. Circuit Frames contain replacement circuit patterns, lands, SMT pads, BGA pads, and gold edge contacts used for the repair of damaged printed circuit boards. The new designs include the most popular patterns grouped into finely curated assortments, ensuring maximum usage and reduced waste.

Arlon EMC Receives IPC-4101 QPL Recertification

IPC Validation Services tested and found Arlon's 33N, 35N, and 85N laminate systems in conformance to the requirements of IPC-4101 Specification Sheets 40 and 41. Additionally, Arlon's polyimide low flow prepreg systems, 37N and 38N, were validated to Specification Sheet 42.

CMK Hits the Gas on Automotive PCBs



Mike Meyers

Guest Editor Kelly Dack recently spoke with Mike Meyer, senior business development manager for CMK Americas, which specializes in manufacturing PCBs for the automotive sector. In this interview, they discuss CMK's latest developments, trends in the global automotive market, and why they plan to expand their facility in Thailand.

The Chemical Connection: Chemical Control for Wet Processes

As I've mentioned in previous columns, etching can be the most complex process in the wet processing stages because there are many factors that contribute to your etch rate. Without keeping these contributing factors steady, your etch rate will vary and, therefore, so will your product quality. If you are looking to implement an automated approach to maintaining your etch chemistry, here are the basic concepts you will need to understand.



Fabrication Technologies/ IGM Solutions Earns IPC J-STD-001 and IPC-A-610 QML Requalification

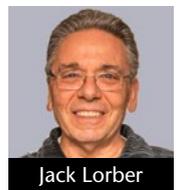
IPC's Validation Services Program has awarded an IPC J-STD-001 and IPC-A-610 Qualified Manufacturers Listing (QML) requalification to Fabrication Technologies Inc./IGM Solutions, Inc. FabTech-IGM, Libertyville, Illinois, a vertical integrated contract manufacturer of electronic parts and high-level assembly of printed circuit boards for the gaming, heavy equipment, medical device, electronics and financial services industries.

The Doctor's In: Everything You Need to Know About Getting a PhD

When it comes to advanced degrees, the PhD is often a misunderstood and undervalued option. In a world where MBA programs have strong name recognition, and master's degrees can seem relatively easy to obtain, the PhD is frequently overlooked. In fact, many people couldn't even tell you what the initials stand for. (Hint: It's Doctor of Philosophy.)

Prototron Circuits Signs Jack Lorber to Represent Them in the Northeast

Dave Ryder, president of Prototron Circuits of Tucson, Arizona, has recently signed Jack Lorber of Sourcing Specialist to represent his company in the Northeast.



Jack Lorber

For the latest news and information, visit PCB007.com

Career Opportunities



Find industry-experienced candidates at jobConnect007.

For just \$750, your 200-word, full-column ad will appear in the Career Opportunities section of all three of our monthly magazines, reaching circuit board designers, fabricators, assemblers, OEMs, suppliers and the academic community.

In addition, your ad will:

- be featured in at least one of our newsletters
- appear on our jobConnect007.com board, which is promoted in every newsletter
- appear in our monthly [Careers Guide](#), emailed to 26,000 potential candidates

Potential candidates can click on your ad and submit a resume directly to the email address you provide, or be directed to the URL of your choice.

No contract required. Just send over your copy and company logo and we'll do the rest!

Contact barb@iconnect007.com to get your ad posted today!

+1 916.365.1727

I-Connect007
GOOD FOR THE INDUSTRY



Career Opportunities



Production Manager

Sunstone Circuits, a leading provider and manufacturer of custom printed circuit boards (PCBs) located in Mulino, Oregon (20 miles south of Portland), is searching for an experienced and talented manager to lead our Production team.

Responsibilities

Directing and coordinating activities of the manufacturing department in processing materials and products by performing the duties personally or through subordinate supervisors.

Sunstone is a fast-paced, custom electronics manufacturing environment that requires a "hands on" approach, extreme customer focus, and sense of urgency to ensure all products manufactured are built to quality standards and on-time product delivery. Successful candidate will perform these duties in conjunction with department leads, partners and suppliers.

Qualifications

Bachelor's degree (B.A.) from four-year college or university; or five to six years related manufacturing management experience and/or training; or equivalent combination of education and experience.

Competitive salary, bonus program, benefits, and robust wellness package. Offer of employment will be contingent upon passing drug screen, background check, and reference check.

Email resume to jobs@sunstone.com

apply now



THERMAL SYSTEMS

Sales Engineer SMT North Mexico

Rehm Thermal Systems, a leading German manufacturer of reflow soldering systems with convection or condensation and drying and coating systems, has produced energy-efficient manufacturing equipment for the electronics and photovoltaics industry since 1990. We also offer tailor-made applications related to the soldering, coating and hardening of modules.

Responsibilities:

- This position is responsible for expanding our customer network and maintaining existing customer relationships in the Northeast Mexico region. The Sales Engineer would work closely with the German headquarters and the General Manager Rehm Mexico to implement the sales strategy.
- A candidate's proximity to Monterrey, Mexico, is a plus.

Qualifications:

- An Engineering degree or comparable qualification with a strong technical background is required.
- Sales-oriented attitude, good communication skills and willingness to travel frequently within Mexico is essential.

We offer innovative products, a great dynamic work environment and exciting training opportunities in our German headquarters.

To learn more about Rehm Group please visit our website at www.rehm-group.com.

Please send resumes to: Mr. Luis Garcia at luis.garcia@rehm-group.com.

apply now

Career Opportunities



Sr. Test Engineer (STE-MD)

The Test Connection, Inc. is a test engineering firm. We are family owned and operated with solid growth goals and strategies. We have an established workforce with seasoned professionals who are committed to meeting the demands of high-quality, low-cost and fast delivery.

TTCI is an Equal Opportunity Employer. We offer careers that include skills-based compensation. We are always looking for talented, experienced test engineers, test technicians, quote technicians, electronics interns, and front office staff to further our customer-oriented mission.

- Candidate would specialize in the development of in-circuit test (ICT) sets for Keysight 3070 (formerly Agilent & HP), Teradyne/GenRad, and Flying Probe test systems.
- Strong candidates will have more than five years of experience with in-circuit test equipment. Some experience with flying probe test equipment is preferred. A candidate would develop, and debug on our test systems and install in-circuit test sets remotely online or at customer's manufacturing locations nationwide.
- Proficient working knowledge of Flash/ISP programming, MAC Address and Boundary Scan required. The candidate would also help support production testing implementing Engineering Change Orders and program enhancements, library model generation, perform testing and failure analysis of assembled boards, and other related tasks. An understanding of stand-alone boundary scan and flying probe desired.
- Some travel required. Positions are available in the Hunt Valley, Md., office.

Contact us today to learn about the rewarding careers we are offering. Please email resumes with a short message describing your relevant experience and any questions to careers@ttci.com. Please, no phone calls.

[apply now](#)



Europe Technical Sales Engineer

Taiyo is the world leader in solder mask products and inkjet technology, offering specialty dielectric inks and via filling inks for use with microvia and build-up technologies, as well as thermal-cure and UV-cure solder masks and inkjet and packaging inks.

PRIMARY FUNCTION:

1. To promote, demonstrate, sell, and service Taiyo's products
2. Assist colleagues with quotes for new customers from a technical perspective
3. Serve as primary technical point of contact to customers providing both pre- and post-sales advice
4. Interact regularly with other Taiyo team members, such as: Product design, development, production, purchasing, quality, and senior company managers from Taiyo group of companies

ESSENTIAL DUTIES:

1. Maintain existing business and pursue new business to meet the sales goals
2. Build strong relationships with existing and new customers
3. Troubleshoot customer problems
4. Provide consultative sales solutions to customers technical issues
5. Write monthly reports
6. Conduct technical audits
7. Conduct product evaluations

QUALIFICATIONS / SKILLS:

1. College degree preferred, with solid knowledge of chemistry
2. Five years' technical sales experience, preferably in the PCB industry
3. Computer knowledge
4. Sales skills
5. Good interpersonal relationship skills
6. Bilingual (German/English) preferred

To apply, email: BobW@Taiyo-america.com with a subject line of "Application for Technical Sales Engineer".

[apply now](#)

Career Opportunities



BLACKFOX

Premier Training & Certification

IPC Instructor Longmont, CO

This position is responsible for delivering effective electronics manufacturing training, including IPC certification, to adult students from the electronics manufacturing industry. IPC Instructors primarily train and certify operators, inspectors, engineers, and other trainers to one of six IPC certification programs: IPC-A-600, IPC-A-610, IPC/WHMA-A-620, IPC J-STD-001, IPC 7711/7721, and IPC-6012.

IPC instructors will primarily conduct training at our public training center in Longmont, Colo., or will travel directly to the customer's facility. It is highly preferred that the candidate be willing to travel 25–50% of the time. Several IPC certification courses can be taught remotely and require no travel or in-person training.

Required: A minimum of 5 years' experience in electronics manufacturing and familiarity with IPC standards. Candidate with current IPC CIS or CIT Trainer Specialist certifications are highly preferred.

Salary: Starting at \$30 per hour depending on experience

Benefits:

- 401k and 401k matching
- Dental and Vision Insurance
- Employee Assistance Program
- Flexible Spending Account
- Health Insurance
- Health Savings Account
- Life Insurance
- Paid Time Off

Schedule: Monday thru Friday, 8–5

Experience: Electronics Manufacturing: 5+ years (Required)

License/Certification: IPC Certification—Preferred, Not Required

Willingness to travel: 25% (Required)

apply now

**Prototron
Circuits**

Sales Representatives

Prototron Circuits, a market-leading, quick-turn PCB manufacturer located in Tucson, AZ, is looking for sales representatives for the Southeastern U.S. territory. With 35+ years of experience, our PCB manufacturing capabilities reach far beyond that of your typical fabricator.

Reasons you should work with Prototron:

- Solid reputation for on-time delivery (98+% on-time)
- Capacity for growth
- Excellent quality
- Production quality quick-turn services in as little as 24 hours
- 5-day standard lead time
- RF/microwave and special materials
- AS9100D
- MIL-PRF- 31032
- ITAR
- Global sourcing option (Taiwan)
- Engineering consultation, impedance modeling
- Completely customer focused team

Interested? Please contact
Russ Adams at (206) 351-0281
or russa@prototron.com.

apply now

Career Opportunities



Regional Manager Mid-Atlantic Region

General Summary: Manages sales of the company's products and services, Electronics and Industrial, within the Mid-Atlantic Region. Reports directly to Americas Manager. Collaborates with the Americas Manager to ensure consistent, profitable growth in sales revenues through positive planning, deployment and management of sales reps. Identifies objectives, strategies and action plans to improve short- and long-term sales and earnings for all product lines.

DETAILS OF FUNCTION:

- Develops and maintains strategic partner relationships
- Manages and develops sales reps:
 - Reviews progress of sales performance
 - Provides quarterly results assessments of sales reps' performance
 - Works with sales reps to identify and contact decision-makers
 - Setting growth targets for sales reps
 - Educates sales reps by conducting programs/ seminars in the needed areas of knowledge
- Collects customer feedback and market research (products and competitors)
- Coordinates with other company departments to provide superior customer service

QUALIFICATIONS:

- 5-7+ years of related experience in the manufacturing sector or equivalent combination of formal education and experience
- Excellent oral and written communication skills
- Business-to-business sales experience a plus
- Good working knowledge of Microsoft Office Suite and common smart phone apps
- Valid driver's license
- 75-80% regional travel required

To apply, please submit a COVER LETTER and RESUME to: Fernando Rueda, Americas Manager

fernando_rueda@kyzen.com

apply now



Technical Marketing Engineer

EMA Design Automation, a leader in product development solutions, is in search of a detail-oriented individual who can apply their knowledge of electrical design and CAD software to assist marketing in the creation of videos, training materials, blog posts, and more. This Technical Marketing Engineer role is ideal for analytical problem-solvers who enjoy educating and teaching others.

Requirements:

- Bachelor's degree in electrical engineering or related field with a basic understanding of engineering theories and terminology required
- Basic knowledge of schematic design, PCB design, and simulation with experience in OrCAD or Allegro preferred
- Candidates must possess excellent writing skills with an understanding of sentence structure and grammar
- Basic knowledge of video editing and experience using Camtasia or Adobe Premiere Pro is preferred but not required
- Must be able to collaborate well with others and have excellent written and verbal communication skills for this remote position

EMA Design Automation is a small, family-owned company that fosters a flexible, collaborative environment and promotes professional growth.

Send Resumes to: resumes@ema-eda.com

apply now

Career Opportunities



MACHINES FOR PRINTED CIRCUIT BOARDS

Field Service Engineer Location: West Coast, Midwest

Pluritec North America, Ltd., an innovative leader in drilling, routing, and automated inspection in the printed circuit board industry, is seeking a full-time field service engineer.

This individual will support service for North America in printed circuit board drill/routing and X-ray inspection equipment.

Duties included: Installation, training, maintenance, and repair. Must be able to troubleshoot electrical and mechanical issues in the field as well as calibrate products, perform modifications and retrofits. Diagnose effectively with customer via telephone support. Assist in optimization of machine operations.

A technical degree is preferred, along with strong verbal and written communication skills. Read and interpret schematics, collect data, write technical reports.

Valid driver's license is required, as well as a passport, and major credit card for travel.

Must be able to travel extensively.

[apply now](#)



ventec
INTERNATIONAL GROUP
騰輝電子

European Product Manager Taiyo Inks, Germany

We are looking for a European product manager to serve as the primary point of contact for product technical sales activities specifically for Taiyo Inks in Europe.

Duties include:

- Business development & sales growth in Europe
- Subject matter expert for Taiyo ink solutions
- Frequent travel to targeted strategic customers/OEMs in Europe
- Technical support to customers to solve application issues
- Liaising with operational and supply chain teams to support customer service

Skills and abilities required:

- Extensive sales, product management, product application experience
- European citizenship (or authorization to work in Europe/Germany)
- Fluency in English language (spoken & written)
- Good written & verbal communications skills
- Printed circuit board industry experience an advantage
- Ability to work well both independently and as part of a team
- Good user knowledge of common Microsoft Office programs
- Full driving license essential

What's on offer:

- Salary & sales commission--competitive and commensurate with experience
- Pension and health insurance following satisfactory probation
- Company car or car allowance

This is a fantastic opportunity to become part of a successful brand and leading team with excellent benefits. Please forward your resume to jobs@ventec-europe.com.

[apply now](#)

Career Opportunities



Technical Service & Applications Engineer Full-Time — Midwest (WI, IL, MI)

Koh Young Technology, founded in 2002 in Seoul, South Korea, is the world leader in 3D measurement-based inspection technology for electronics manufacturing. Located in Duluth, GA, Koh Young America has been serving its partners since 2010 and is expanding the team with an Applications Engineer to provide helpdesk support by delivering guidance on operation, maintenance, and programming remotely or on-site.

Responsibilities

- Provide support, preventive and corrective maintenance, process audits, and related services
- Train users on proper operation, maintenance, programming, and best practices
- Recommend and oversee operational, process, or other performance improvements
- Effectively troubleshoot and resolve machine, system, and process issues

Skills and Qualifications

- Bachelor's in a technical discipline, relevant Associate's, or equivalent vocational or military training
- Knowledge of electronics manufacturing, robotics, PCB assembly, and/or AI; 2-4 years of experience
- SPI/AOI programming, operation, and maintenance experience preferred
- 75% domestic and international travel (valid U.S. or Canadian passport, required)
- Able to work effectively and independently with minimal supervision
- Able to readily understand and interpret detailed documents, drawings, and specifications

Benefits

- Health/Dental/Vision/Life Insurance with no employee premium (including dependent coverage)
- 401K retirement plan
- Generous PTO and paid holidays

apply now



Arlon EMD, located in Rancho Cucamonga, California, is currently interviewing candidates for open positions in:

- Engineering
- Quality
- Various Manufacturing

All interested candidates should contact Arlon's HR department at 909-987-9533 or email resumes to careers.ranch@arlonemd.com.

Arlon is a major manufacturer of specialty high-performance laminate and prepreg materials for use in a wide variety of printed circuit board applications. Arlon specializes in thermoset resin technology, including polyimide, high Tg multifunctional epoxy, and low loss thermoset laminate and prepreg systems. These resin systems are available on a variety of substrates, including woven glass and non-woven aramid. Typical applications for these materials include advanced commercial and military electronics such as avionics, semiconductor testing, heat sink bonding, High Density Interconnect (HDI) and microvia PCBs (i.e., in mobile communication products).

Our facility employs state of the art production equipment engineered to provide cost-effective and flexible manufacturing capacity, allowing us to respond quickly to customer requirements while meeting the most stringent quality and tolerance demands. Our manufacturing site is ISO 9001: 2015 registered, and through rigorous quality control practices and commitment to continual improvement, we are dedicated to meeting and exceeding our customers' requirements.

For additional information, please visit our website at www.arlonemd.com

apply now

Career Opportunities

INSULECTRO

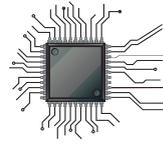


Are You Our Next Superstar?!

Insulectro, the largest national distributor of printed circuit board materials, is looking to add superstars to our dynamic technical and sales teams. We are always looking for good talent to enhance our service level to our customers and drive our purpose to enable our customers to build better boards faster. Our nationwide network provides many opportunities for a rewarding career within our company.

We are looking for talent with solid background in the PCB or PE industry and proven sales experience with a drive and attitude that match our company culture. This is a great opportunity to join an industry leader in the PCB and PE world and work with a terrific team driven to be vital in the design and manufacture of future circuits.

apply now



MivaTek

Global

Field Service Technician

MivaTek Global is focused on providing a quality customer service experience to our current and future customers in the printed circuit board and microelectronic industries. We are looking for bright and talented people who share that mindset and are energized by hard work who are looking to be part of our continued growth.

Do you enjoy diagnosing machines and processes to determine how to solve our customers' challenges? Your 5 years working with direct imaging machinery, capital equipment, or PCBs will be leveraged as you support our customers in the field and from your home office. Each day is different, you may be:

- Installing a direct imaging machine
- Diagnosing customer issues from both your home office and customer site
- Upgrading a used machine
- Performing preventive maintenance
- Providing virtual and on-site training
- Updating documentation

Do you have 3 years' experience working with direct imaging or capital equipment? Enjoy travel? Want to make a difference to our customers? Send your resume to N.Hogan@MivaTek.Global for consideration.

More About Us

MivaTek Global is a distributor of Miva Technologies' imaging systems. We currently have 55 installations in the Americas and have machine installations in China, Singapore, Korea, and India.

apply now

Career Opportunities



eptac
TRAIN. WORK SMARTER. SUCCEED.

Become a Certified IPC Master Instructor

Opportunities are available in Canada, New England, California, and Chicago. If you love teaching people, choosing the classes and times you want to work, and basically being your own boss, this may be the career for you. EPTAC Corporation is the leading provider of electronics training and IPC certification and we are looking for instructors that have a passion for working with people to develop their skills and knowledge. If you have a background in electronics manufacturing and enthusiasm for education, drop us a line or send us your resume. We would love to chat with you. Ability to travel required. IPC-7711/7721 or IPC-A-620 CIT certification a big plus.

Qualifications and skills

- A love of teaching and enthusiasm to help others learn
- Background in electronics manufacturing
- Soldering and/or electronics/cable assembly experience
- IPC certification a plus, but will certify the right candidate

Benefits

- Ability to operate from home. No required in-office schedule
- Flexible schedule. Control your own schedule
- IRA retirement matching contributions after one year of service
- Training and certifications provided and maintained by EPTAC

[apply now](#)



American Standard Circuits
Creative Innovations In Flex, Digital & Microwave Circuits

CAD/CAM Engineer

The CAD/CAM Engineer is responsible for reviewing customer supplied data and drawings, performing design rule checks and creation of manufacturing data, programs and tools required for the manufacture of PCB.

ESSENTIAL DUTIES AND RESPONSIBILITIES

- Import Customer data into various CAM systems.
- Perform design rule checks and edit data to comply with manufacturing guidelines.
- Create array configurations, route, and test programs, penalization and output data for production use.
- Work with process engineers to evaluate and provide strategy for advanced processing as needed.
- Itemize and correspond to design Issues with customers.
- Other duties as assigned.

ORGANIZATIONAL RELATIONSHIP

Reports to the engineering manager. Coordinates activities with all departments, especially manufacturing.

QUALIFICATIONS

- A college degree or 5 years' experience is required.
- Good communication skills and the ability to work well with people is essential.
- Printed circuit board manufacturing knowledge.
- Experience using Orbotech/Genflex CAM tooling software.

PHYSICAL DEMANDS

Ability to communicate orally with management and other co-workers is crucial. Regular use of the phone and e-mail for communication is essential. Sitting for extended periods is common. Hearing and vision within normal ranges is helpful for normal conversations, to receive ordinary information and to prepare documents.

[apply now](#)

Career Opportunities



APCT, Printed Circuit Board Solutions: Opportunities Await

APCT, a leading manufacturer of printed circuit boards, has experienced rapid growth over the past year and has multiple opportunities for highly skilled individuals looking to join a progressive and growing company. APCT is always eager to speak with professionals who understand the value of hard work, quality craftsmanship, and being part of a culture that not only serves the customer but one another.

APCT currently has opportunities in Santa Clara, CA; Orange County, CA; Anaheim, CA; Wallingford, CT; and Austin, TX. Positions available range from manufacturing to quality control, sales, and finance.

We invite you to read about APCT at APCT.com and encourage you to understand our core values of passion, commitment, and trust. If you can embrace these principles and what they entail, then you may be a great match to join our team! Peruse the opportunities by clicking the link below.

Thank you, and we look forward to hearing from you soon.

[apply now](#)



YOUR
JOB
AD
HERE

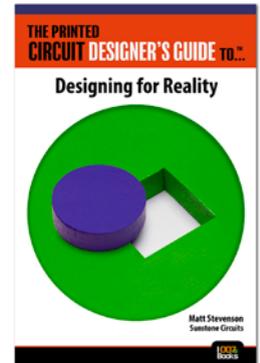
For information, please contact:
BARB HOCKADAY
barb@iconnect007.com
+1 916.365.1727 (PACIFIC)

I-Connect007
GOOD FOR THE INDUSTRY

I-007eBooks The Printed Circuit Designer's Guide to...

Designing for Reality by Matt Stevenson, Sunstone Circuits

Based on the wisdom of 50 years of PCB manufacturing at Sunstone Circuits, this book is a must-have reference for designers seeking to understand the PCB manufacturing process as it relates to their design. Designing for manufacturability requires understanding the production process fundamentals and factors within the process that often lead to variations in manufacturability, reliability, and cost of the board. Speaking of making better decisions, [read it now!](#)



Thermal Management with Insulated Metal Substrates, Vol. 2

by Didier Mauve and Robert Art, Ventec International Group

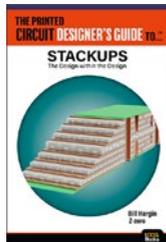
This book covers the latest developments in the field of thermal management, particularly in insulated metal substrates, using state-of-the-art products as examples and focusing on specific solutions and enhanced properties of IMS. [Add this essential book to your library.](#)



High Performance Materials

by Michael Gay, Isola

This book provides the reader with a clearer picture of what to know when selecting which material is most desirable for their upcoming products and a solid base for making material selection decisions. [Get your copy now!](#)



Stackups: The Design within the Design

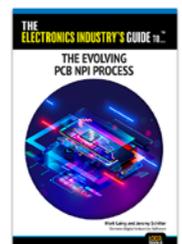
by Bill Hargin, Z-zero

Finally, a book about stackups! From material selection and understanding laminate data-sheets, to impedance planning, glass weave skew and rigid-flex materials, topic expert Bill Hargin has written a unique book on PCB stackups. [Get yours now!](#)

THE ELECTRONICS INDUSTRY'S GUIDE TO... The Evolving PCB NPI Process

by Mark Laing and Jeremy Schitter, Siemens Digital Industries Software

The authors of this book take a look at how market changes in the past 15 years, coupled with the current slowdown of production and delivery of materials and components, has affected the process for new product introduction (NPI) in the global marketplace. As a result, companies may need to adapt and take a new direction to navigate and thrive in an uncertain and rapidly evolving future. Learn how to streamline the NPI process and better manage the supply chain. [Get it Now!](#)



Our library is open 24/7/365. Visit us at: I-007eBooks.com

PUBLISHER: **BARRY MATTIES**
barry@iconnect007.com

MANAGING EDITOR: **NOLAN JOHNSON**
(503) 597-8037; nolan@iconnect007.com

EDITOR | COLUMNIST COORDINATOR: **MICHELLE TE**
michelle@iconnect007.com

CONTRIBUTING EDITOR: **PATRICIA GOLDMAN**
(724) 299-8633; patty@iconnect007.com

TECHNICAL EDITOR: **PETE STARKEY**
+44 (0) 1455 293333; pete@iconnect007.com

CONTRIBUTING TECHNICAL EDITOR: **DAN FEINBERG**
baer@iconnect007.com

CONTRIBUTING TECHNICAL EDITOR: **HAPPY HOLDEN**
(616) 741-9213; happy@iconnect007.com

SALES MANAGER: **BARB HOCKADAY**
(916) 365-1727; barb@iconnect007.com

ADVERTISING SALES: **TAMARA SITES**
tamara@iconnect007.com

MARKETING SERVICES: **TOBEY MARSICOVETERE**
(916) 266-9160; tobey@iconnect007.com

ART DIRECTOR/PRODUCTION MGR.: **SHELLY STEIN**
shelly@iconnect007.com

MAGAZINE LAYOUT: **RON MEOGROSSI**

AD DESIGN: **SHELLY STEIN, MIKE RADOGNA,**
TOBEY MARSICOVETERE

CREATIVE TECHNOLOGIST: **BRYSON MATTIES**

COVER: **SHELLY STEIN**

COVER IMAGE: **ADOBE STOCK © ONCHIRA**

PCB007

MAGAZINE

PCB007 MAGAZINE®

is published by IPC Publishing Group, Inc.
3000 Lakeside Dr., Suite 105N, Bannockburn, IL 60015

© 2023 IPC Publishing Group, Inc. does not assume and hereby disclaims any liability to any person for loss or damage caused by errors or omissions in the material contained within this publication, regardless of whether such errors or omissions are caused accidentally, from negligence or any other cause.

April 2023, Volume 13, Number 4
PCB007 MAGAZINE is published monthly
by IPC Publishing Group., Inc., dba I-Connect007

ADVERTISER INDEX

all4-PCB.....	41
atg Luther & Maelzer GmbH.....	25
Atotech.....	7
Branford.....	15
Burkle North America.....	31
Chemcut.....	11
Electra Polymers.....	33
Excellon.....	65
I-007e Books.....	2, 3, 67
IPC.....	39, 69
IPC Community.....	23
IPS.....	45
Insulectro.....	5, 47, 49, 63
Linkage Technologies.....	21
Matrix.....	61
MicroCraft.....	71
MivaTek Global.....	37
MKS ESI.....	57
PCBAA.....	27, 43
Pluritec.....	53
Prototron Circuits.....	29
Show & Tell Magazine.....	75
Taiyo America.....	55
Technica USA.....	19
Ucamco.....	59
Ventec International Group.....	35

Problems solved!



[SUBSCRIBE NOW](#)