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MAY 2017

Grow Your Own Training Programs p.18

Keeping an Eye on the Next Generation—A Look into Indium's Internship Program p.26

The Challenge of Filling Positions in the PCB Assembly Industry p.38

Much More!

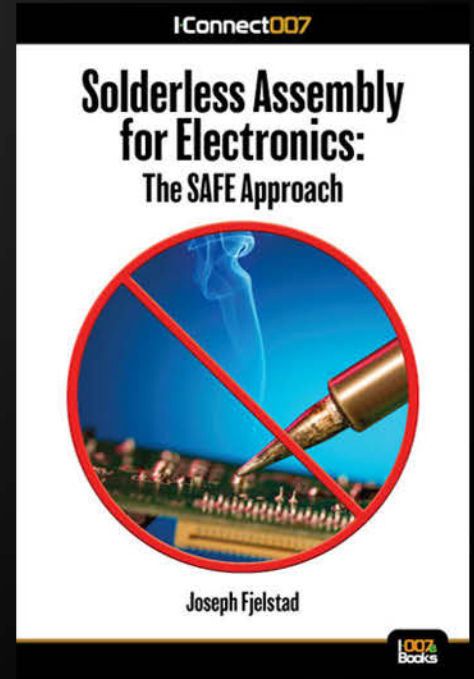
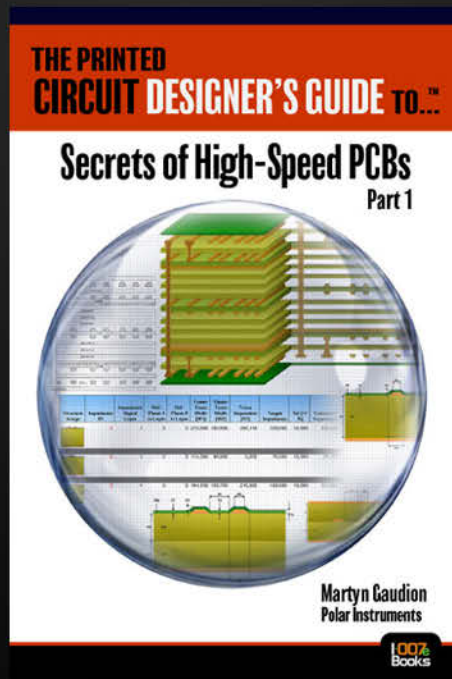
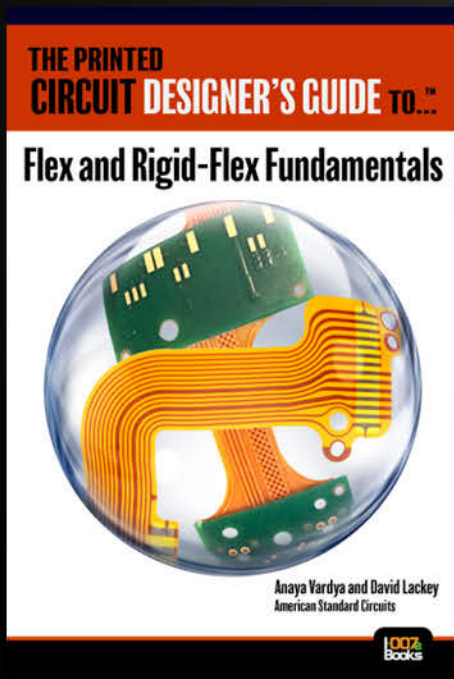
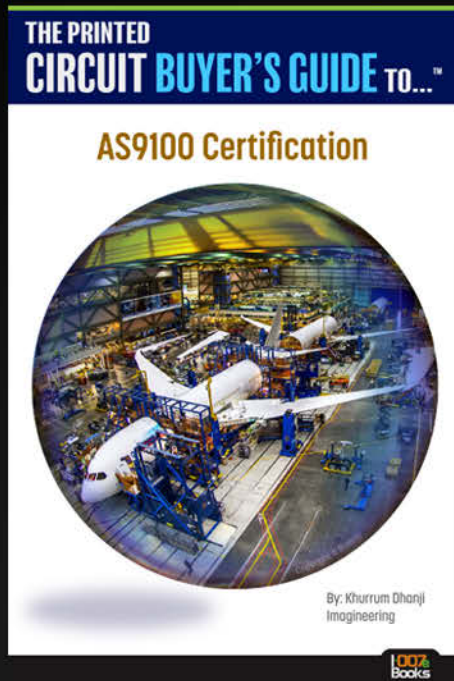


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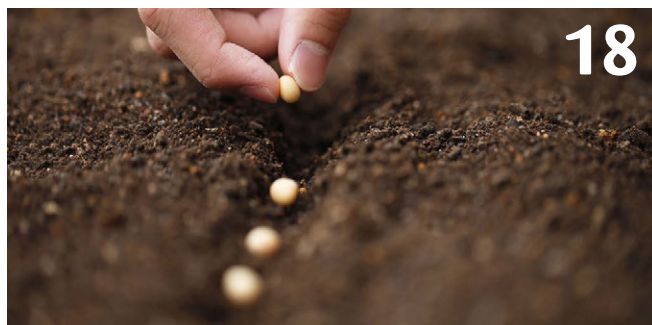


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Help Wanted

This month, *SMT Magazine* explores the challenge of finding the right talent in the electronics manufacturing industry.



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Finding, Nurturing, and Growing the Right Talent

by Stephen Las Marias

I-CONNECT007

When I was in my senior year of high school in the Philippines, I wasn't sure what courses to take in college. One day, when my friends and I were discussing the issue, one of them said his uncle worked at one of the biggest telecom companies in the country, and that he would be able to help us secure a job once we graduated should we take a career path called electronics and communications engineering (ECE). There were no "career talks" in our school, so most of us weren't really aware of the courses to take for whatever career choices we might have. We also didn't (and still don't) have STEM programs, so that's another issue. Therefore, we had no clue

what to do after high school. Even my parents weren't aware of my plans for college then.

In the end, a friend and I took up the path that our other friend suggested. (He, on the other hand, took math, and is now an educator of teachers who teach math—we're not sure what happened to his uncle.) Between the two of us who took the similar path, I became the engineer, while my other friend switched to industrial engineering (our joke is that he isn't an engineer because industrial engineering doesn't have a licensure exam). Over the course of my studies, I came to love my work. Although I did my on-the-job training in a telecommuni-



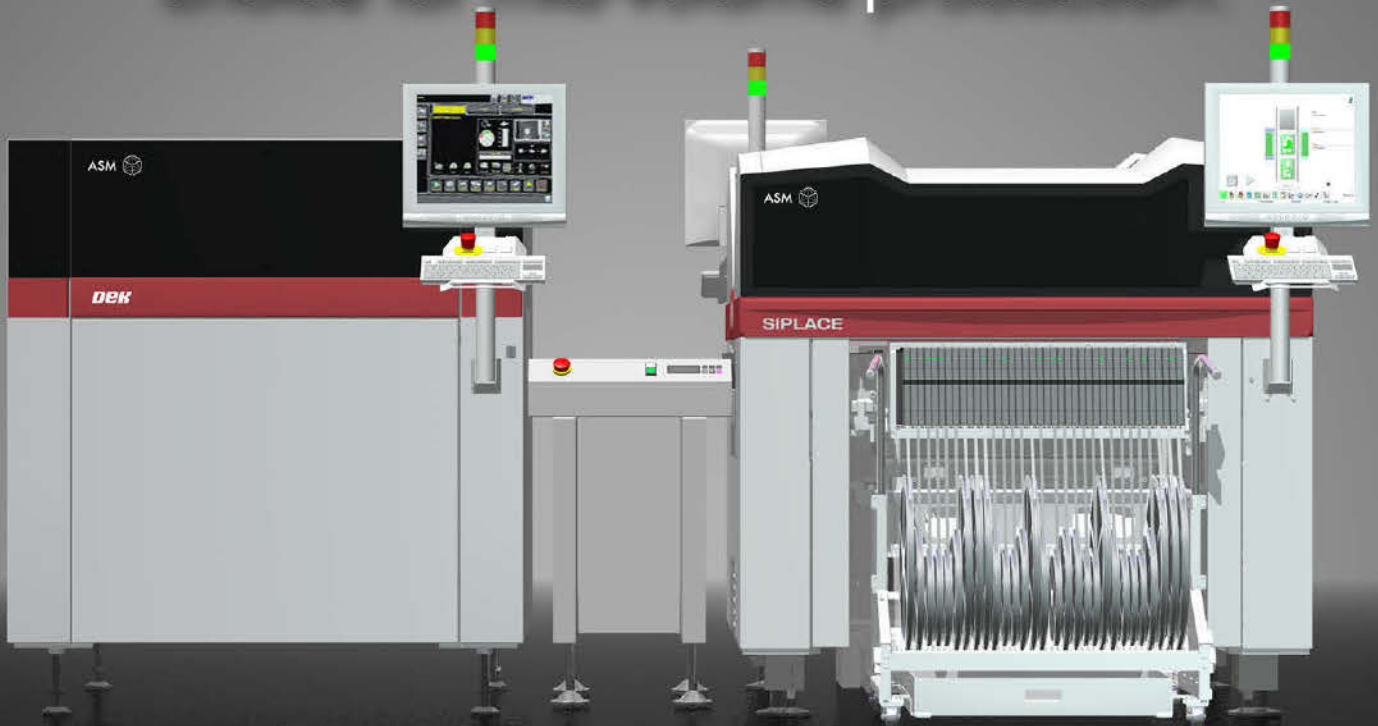


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cations company, I eventually focused on the electronics side of my studies.

When I got my license as an ECE, I found out the following: (1) there were already a lot of ECEs in my batch that year, so the job competition in the electronics assembly/manufacturing field would be intense—my lack of prior experience would be an issue; (2) I would have had to work in the provinces, where the science and technology parks are located; and, (3) since the jobs are only in the provinces, the pay would be low. The “provincial rate” is already low as it is, but couple that with the job competition, plus the tax bracket I would be in because I was single, and I could not imagine how I would be able to survive should I take that job and commute two to three hours every day.

On top of that, I was fresh out of college; I would be competing against those who were already experienced in the job. So, either I would have a hard time trying to find something, or I would need to just bite the bullet and agree to whatever offer I got just to gain experience, with the goal of moving up or to another company. These were the career challenges I faced

upon finishing my studies and getting my engineering license.

I’m retelling this story because the theme for this month’s issue focuses on hiring and employment in our industry. But my story belongs to the one side of the topic—the employee/job-hunter/student; on the other side sits the employer. I believe there are students now who aren’t sure about what to do with their lives, career-wise, after high school, while those who are well on their way through college may be taking law, or medicine, or finance and banking, or any other course out there—except manufacturing-related courses. This is one of the critical issues facing our industry right now: the lack of new talent needed to continue growing the industry.

On the other hand, from an employer perspective, finding these talents are among their key challenges right now. This is according to our recent survey on hiring, the respondents of which included executives in the PCB design, fabrication and assembly/EMS industries, suppliers to the said industries, and OEMs. According to 93% of the respondents, the overwhelming concern is finding qualified candidates. Indeed, there is a shortage of qualified people to

The Greatest Challenges When Hiring New Employees

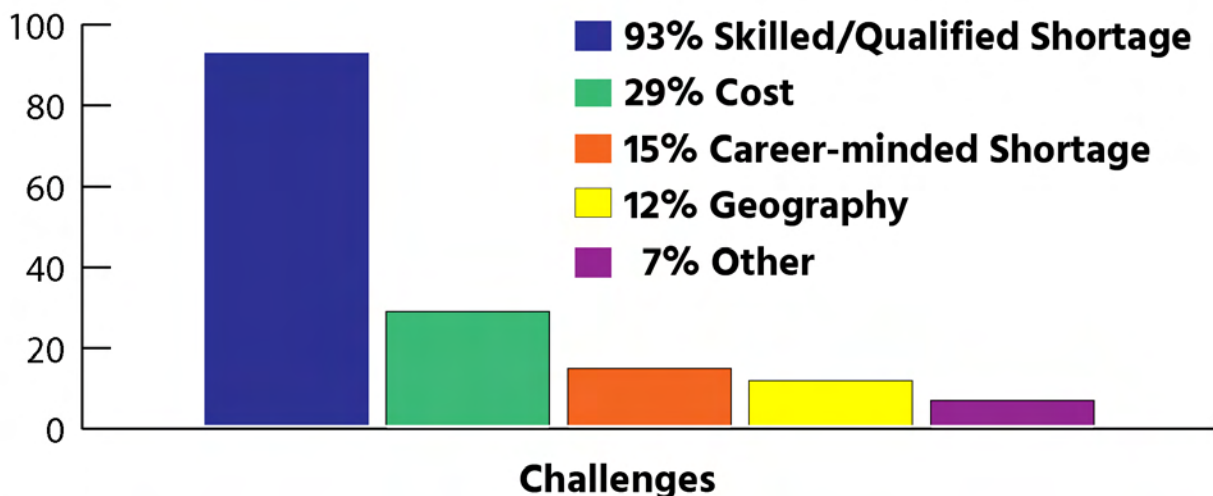


Figure 1: A majority of the respondents say finding skilled and qualified candidates is the greatest challenge when it comes to hiring. (SOURCE: I-Connect007 Research)

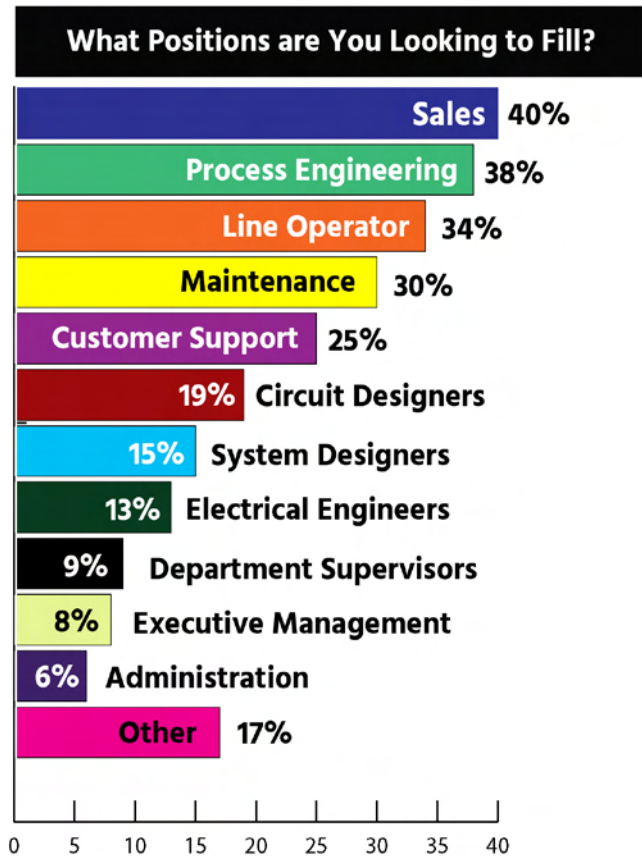


Figure 2: Positions to be filled. Most companies are looking to fill technical and operational positions. (SOURCE: I-Connect007 Research)

help our industry expand. Respondents' comments included the following: there is no pool of experienced operators; there is difficulty finding seasoned engineers; and there are challenges to finding the right people that fit.

And our industry is definitely looking to hire new employees right now—reflecting a bullish outlook for the PCB design, fab and assembly industries. According to our survey results, 55% of the respondents are looking to hire this year. The bulk of the new hires is in technical and operational areas such as line operators and process engineers. Most companies are also looking to fill their sales and customer support positions. Hiring is expected to occur during the first half of the year.

But then again, this scenario points back to the fact that there is a gap between the needs of our industry and the availability of talent.

So the question is, how do we address the issues of hiring, training, and of course retaining talent?

This month's issue of *SMT Magazine* features articles, case studies and interviews that will tell you how companies such as Indium, MC Assembly, Saline Electronics, TeligentEMS, Tramoto Circuits, and Blackfox Training Institute are addressing the issue regarding finding the right talent. You'll learn how they are closely collaborating with educational institutions to make sure there are students who are pursuing careers in manufacturing, and that graduates entering the workforce are capable and qualified for their manufacturing jobs. We'll also see how their internship, apprenticeship and onboarding programs will help train, nurture, and eventually grow their new recruits to become valued members of their companies.

While my career took a different turn (for which I have no regrets whatsoever), it would have helped me during my studies to have had programs or initiatives involving the industry designed to equipped us with the specific skillsets companies were looking for, to help new graduates better compete with the rest of the workforce. Of course, on-the-job training is one those programs, but industry and academia shouldn't stop at that. There should be more opportunities for learning that involve real-world manufacturing scenarios to empower students—the future engineers—with the capabilities and mindset needed for the technology manufacturing industry, as well as helping develop in them a culture aimed at making them a better fit for a manufacturing career.

I hope you enjoy this month's issue of *SMT Magazine*. Next month, we will focus on the latest technology developments happening in the test and inspection front, and how these new advanced systems are helping increase yields. **SMT**



Stephen Las Marias is managing editor of *SMT Magazine*. He has been a technology editor for more than 12 years covering electronics, components, and industrial automation systems.



Do Acquisitions Bear Fruit?

A Pragmatic Perspective

by Dr. Jennie S. Hwang
H-TECHNOLOGIES GROUP

Recently, I was interviewed in my capacity as a tenured corporate director of public companies by *Corporate Board Member* magazine of New York Stock Exchange's Governance Services, on the following subject: "Does M&A Bear Fruit?" Therefore, I took the opportunity to sit back and reflect on my hands-on experience as well as observations on mergers and acquisitions in the corporate world. In this article, instead of covering both M and A, I am jotting down my thoughts in summation on the acquisitions part of M&A.

Globalization has propelled acquisitions, and acquisition activities have fueled globalization. For the last two decades, a plethora of megadeals and various sizes of acquisitions have been transacted; some are deemed fabulously successful, but a significant share of deals are subpar, at best, to the desired results—if not a total disappointment.

Acquisition is an effective tool for a company's growth as a part of corporate growth strategy; and it is one of the top fiduciary duties of a company board's governance oversight. It is highly recognized that it could be faster and/or more economical to buy something than grow it organically. However, statistically, the acquisition failure rate is quite high.

The often targeted "synergy" has been an overstated reason for acquisition. Achieving synergy is easier said than done. As Warren Buffett puts it in Berkshire Hathaway's 2017 Annual Report, "...As is in marriage, business acquisitions often deliver surprises after the I do's." Therefore, how to maximize payoff and mitigate potential failure should be on the mind of every business decision maker.

To deliberate the plausible questions before initiating an acquisition should be a prerequisite. Questions include: What are the essential elements an acquisition needs to have in order to be successful in the long term? What questions should directors ask management to ensure a deal is a good decision? How



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does a board ensure management's proposal is aligned with company strategy? Can this acquisition change the company's growth trajectory? Can the resources of the acquired company (or assets) substantially improve the product/service in ways that customers would pay more for (profit margin increase)? What are common pitfalls in initiating and executing an acquisition?

When considering an acquisition, the intent, thus the approach, can be divergent, ranging from the long-term sustainability to the short-term gain. The preparation also varies with the company's historical track record—companies that have “routinely” conducted acquisitions with all lessons learned vs. companies that have not.

Long-term goals are the differentiating essence in this process, meaning beyond a CEO's tenure with the company. Some acquisitions that are carried out are intended to boost immediate earnings per share (EPS) without having the well-thought-out study and more importantly, the necessary knowledge about future potentials of the acquired entity vis-a-vis anticipated market, technology, and competitiveness.

As an acquisition moves through the four main phases—target selection, pricing evaluation/negotiation, due diligence, and integration, the following top five essential elements are to be brought to the center stage:

- Articulation of the sound purpose with clarity
- Value determination by calculating the impact on profits from the acquisition vs. weighted-average cost of capital along with other metrics
- Validation of assumptions
- Ability to pull the plug in due diligence
- CEO's broad vision, holistic knowledge and well-rounded ability

Prior to pursuing an acquisition strategy, it is desirable to position the company to aspire to the culture of long-term growth. When there is a proposed acquisition target on the table, the board and management need to:

- Ensure the understanding of the fundamental reason for this acquisition and how and why it is aligned with strategy (even revisiting the current strategy, is it valid and effective?)
- Have a deeper deliberation on the reason and the purpose of an acquisition
- Ask how to avoid, “It looks good, but not really.”
- Define when/who/what: timing, resource capability, what-to-do after transaction (a plan)
- Verify the perception of fit: comprehensive plan, rationale and narrative to be understood
- Deliberate on how to avoid common pitfalls

The top common pitfalls that are likely encountered in an acquisition endeavor, which could exert deleterious effects on the company's long-term performance include:

- Overpaying
- Overleveraging
- Company (asset) purchased for the wrong purpose
- Company (asset) purchased for the wrong reason
- New businesses integrated into misfit business models

When the acquired entity is bought at too high a price, everything else becomes less important and it can hardly be a good investment.

In order to eschew the common pitfalls, what questions should be asked and answered to ensure a deal is a good decision? Below are some examples of questions to be addressed:

- Is this for cost-saving (in fixed cost, in scale or for cross-selling)?
- Is this for footprint expansion (strategic geographic locales)?
- Is this for gaining a greater market share to achieve greater efficiency (improved market reach and industry visibility)?



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- Is this for securing current leading position (command a price premium or better technology or better manufacturing)?
- Is this for diversification of business portfolio (a new way to do business)?
- Is this for re-positioning in the industry's value chain?
- Is this a defense against commoditization?
- Is this for "not missing out on the next big thing"?
- Does the acquisition alter or change business model? If so, what are the tactics?
- Is this to aim at a jump-start transformative growth and change the growth trajectory (buying innovations)?
- Is this for a new business model as platforms for transformative growth? If so, is the autonomy in order?
- What are behind those numbers including today's anticipated market, technology, manufacturing, customers, etc.?
- What other synergies will be obtainable after the acquisition?
- Does a bolt-on acquisition or platform acquisition make more strategic sense under the company's specific environment?

The last phase of acquisition involves the nuts and bolts of integration. The success of acquisitions depends on how well the management can integrate the acquired entity into the company while maintaining the efficiency of day-to-day operations during and after the acquisition. To foresee how integration will play out, we must be able to describe exactly what we are buying. Albert Einstein speaks of it this way: "You do not really understand something unless you can explain it to your grandmother."

This also brings up another question: Can a company synergistically and advantageously integrate an acquired entity into the parent company if the company has not been able to demonstrate the ability for organic growth?

The ultimate success of a public company is typically measured by shareholder long-term returns and the value creation for all stakeholders.

The board of directors should be prudent when considering potential transactions, as acquisitions do not guarantee increased shareholder returns. An owner-oriented culture certainly adds additional value to executing acquisitions.

Needless to say, there have been innumerable success stories in elevating a company's top-line and bottom-line in a timely manner, thus the long-term shareholder returns, through well-thought-out and adroitly executed acquisitions. It is all up to the company! **SMT**

Appearance

Dr. Jennie Hwang will present a lecture on "Assembly Integrity and Reliability" at the SMT Hybrid Packaging International Conference on May 17, 2017 in Nuremberg, Germany.

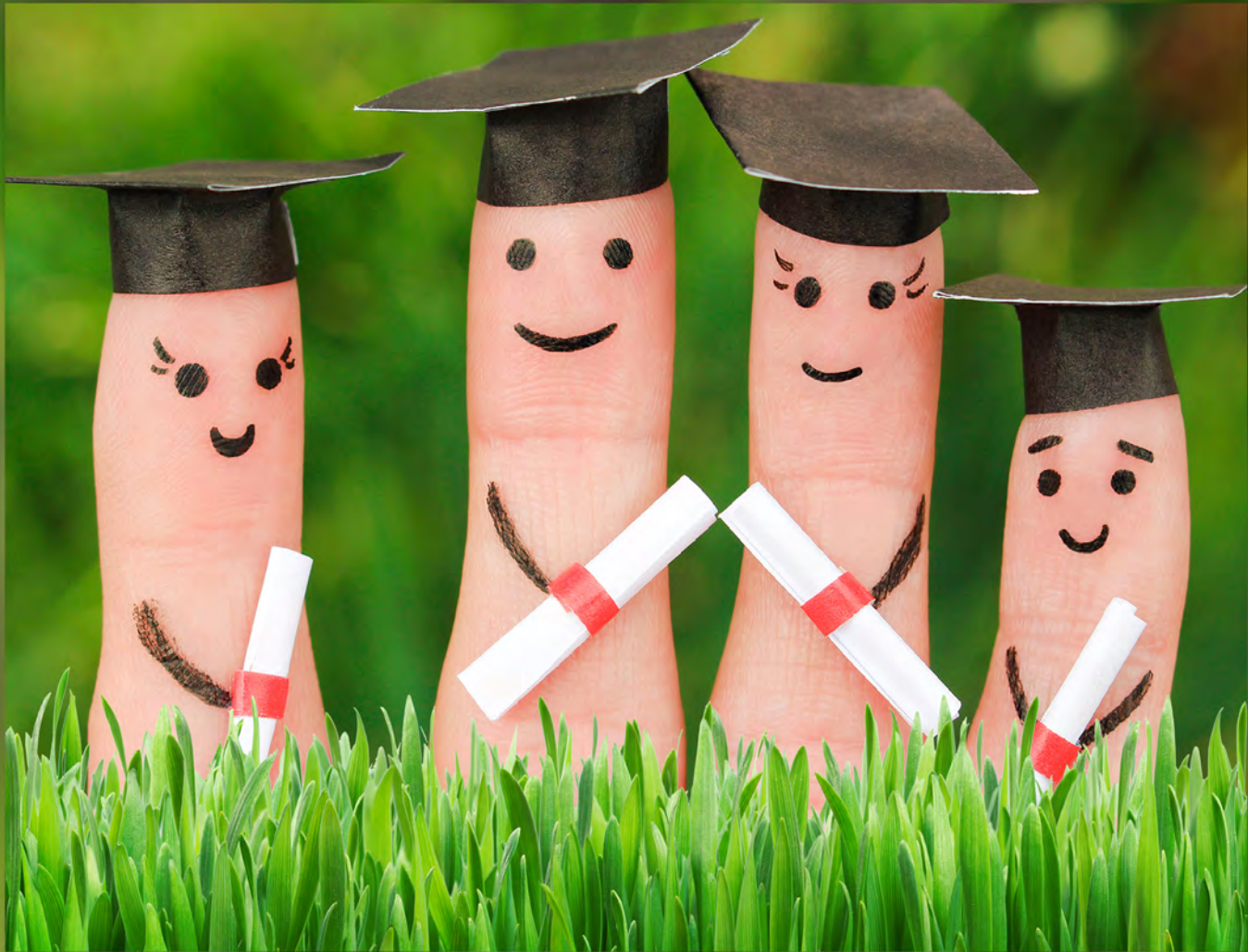



Dr. Jennie Hwang, an international businesswoman and speaker, and business and technology advisor, is a pioneer and long-standing contributor to SMT manufacturing since its inception as well as to the lead-free electronics implementation. Among her many awards and honors, she is inducted to the International Hall of Fame-Women in Technology, elected to the National Academy of Engineering, named an R&D-Stars-to-Watch and YWCA Achievement Award. Having held senior executive positions with Lockheed Martin Corp., Sherwin Williams Co., SCM Corp, IEM Corp., she is currently CEO of H-Technologies Group, providing business, technology and manufacturing solutions. She serves as Chairman of Assessment Board of DoD Army Research Laboratory, Commerce Department's Export Council, National Materials and Manufacturing Board, various national panels/committees, international leadership

positions, and the board of Fortune-500 NYSE companies and civic and university boards. She is the author of 475+ publications and several books, and a speaker and author on trade, business, education, and social issues. Her formal education includes four academic degrees as well as Harvard Business School Executive Program and Columbia University Corporate Governance Program. For more information, please visit, www.JennieHwang.com.

Help Wanted Section

Grow Your Team



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Grow Your Own Training Programs

by Davina McDonnell
SALINE ELECTRONICS

Introduction

With more than 3,000,000 baby boomers retiring, or getting ready to do so, the manufacturing industry is bleeding out—losing talented, skilled, and experienced workers. Without a transfusion of new, even semi-skilled talent, many manufacturing companies are at a loss on how to best recruit the future work force.

Saline Lectronics, an electronics manufacturing services provider in southeastern Michigan, like many other manufacturers in the U.S., has struggled with finding the right skilled production workers to fill open positions. I checked in with several Saline Lectronics employees to find out their take on the state of the situation and included their impressions in this article.

The Current Situation

According to a study published by Deloitte, and the Manufacturing Institute on the manufacturing skills gap, “Six out of 10 manufacturing positions remain unfilled due to the talent shortage.” In other words, the current pool of

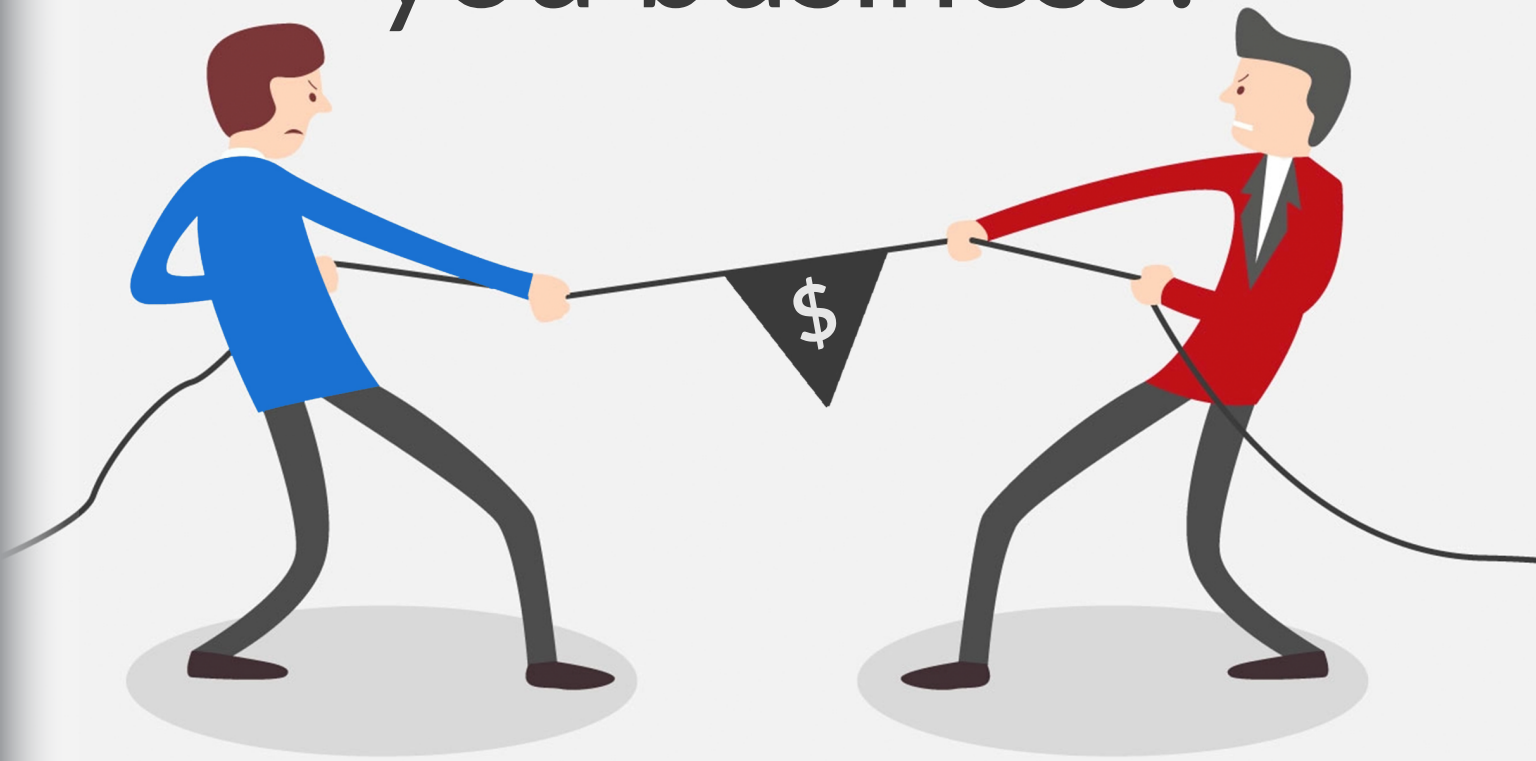
workers lacks the necessary skills and industry experience to fill the open demand.

For years, the younger generations have been discouraged by manufacturing careers. Negative connotations about manufacturing jobs as dirty, repetitive, and boring have plagued the industry for the last 20 years. Manufacturing lacks the sex appeal that jobs in tech use to entice potential employees. Ironically, many of the tech companies create products that require some type of manufacturing, either domestically or abroad.

In the same manufacturing skills gap study, only 37% of respondents said that they would actively encourage their children to pursue a career in manufacturing. However, parents who actually work in the manufacturing industry are twice more likely to encourage their children to look into these careers. The people with first-hand experience and an accurate perception of American manufacturing today understand the exponential potential to a varied career in the industry.

Due to this great shortage of skilled workers and the lackluster image of the industry, manufacturing companies have had to re-evaluate

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and re-design their HR strategies to recruit, hire and train new employees.

In previous years, Lectronics leveraged a strong relationship with the local ITT Technical Institute to identify and recruit candidates with technical schooling and skills. Unfortunately, due to government funding shortages, since 2016 ITT Tech has closed over five campuses in Michigan.

"It's been extremely difficult to find trained technicians for test or hand solder," commented Amie Duffy, HR specialist. "Since ITT Tech closed, it's really impacted our funnel of skilled candidates."

While working to establish new relationships with local community colleges, Lectronics' HR strategy for 2017 blends a "grow your own" approach with heavy investment in new hire training and development. Additionally, the HR team actively reaches out to current employees to see if their communities, or alumni associations, might reveal hidden pools of untapped talent.

For manufacturing roles, community colleges tend to be a better resource than four-year universities for qualified applicants.

"Our industry is fast-paced and constantly advancing technology. If you're out of it for two or three years than you're missing a whole lot. People coming out of community college are far more connected to what we need," said Jeff Riedel, Lean Champion.

According to Lectronics' HR Manager, Shelly Phelps, the company has a successful program that allows the organization to hire and train employees without previous manufacturing work or skills. If candidates have the basic education requirement of an Associate's degree, then the organization will train them for specific openings.

For skilled production work, like hand soldering, Lectronics relies on a newly developed training program for candidates without any experience. During the interview process, applicants are required to provide a skills sample, to see how they perform with a soldering iron or other technical piece of equipment. It's essentially a test to see if they're a good fit for the full onboarding and training program.

"We've started looking for candidates with transferrable skills. Even if they don't have di-



Figure 1: Saline Lectronics' technicians working on a lean assembly flow line.

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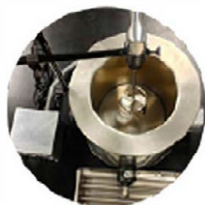
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Figure 2: Patrick Reardon, selective solder production specialist, oversees a panel of printed circuit board assemblies during the selective soldering process.

rect experience in manufacturing, someone who likes to work with their hands could be a good fit for a mechanical assembly position,” said Duffy.

During the interview process, Lectronics’ HR team isn’t solely focused on the applicant’s skills and experience. Personality and professional demeanor play a major role as the organization favors team-oriented and workable characteristics. HR typically recommends hiring people who are warm and friendly, and positively impact the company’s culture and work morale.

Surprisingly, Lectronics hasn’t had as much difficulty filling openings on the front side of manufacturing—such as customer service, purchasing, accounting or quoting roles. It’s the positions that require a more technical skill set that remain open and unfilled longer. In fact, most of technical production positions get filled by internal promotions rather than new hires.

“We grow our own. It’s our goal to identify what an employee wants in their personal ca-

reer development; then, we give them an opportunity to pursue that avenue while providing the support and training to ensure that they stay,” said Phelps.

Lectronics always posts open positions internally first, so naturally, many openings are filled from within. While internal promotions have a dramatic, positive impact on the work culture, the internal shuffle can sometimes be difficult to manage. Phelps likens it to a double-edged sword, in filling one position with an internal candidate, another one has unexpectedly opened up from that employee’s departure. Managing that transition, and ensuring that it goes smoothly, requires a lot of HR’s time and support.

Lectronics’ “grow your own” strategy has been incredibly successful over the last couple of years. In fact, a few employees that started at Lectronics in temporary positions have made successful transitions to managerial roles and plan to further develop careers within manufacturing.

Here are their stories:

A Geographer in Electronics Manufacturing

With a B.S. degree in Cultural Geography, Luke Timassey never anticipated he would develop his early career at an electronics manufacturing company, but that's exactly where he's currently flourishing.

When he finished school and moved back to Michigan, Timassey was introduced to Lectronics through friends who worked at the organization. They spoke very highly of their work experience, and in August 2014, he applied through a temp agency to an open SMT technician position on the night shift.

"I thought the SMT tech position would be a good starting point," explained Timassey. "I figured I would slowly work my way up—little by little."

After spending a few months as an SMT Technician, Timassey quickly transitioned to the day shift, and was promoted to training specialist for the SMT Department. His expedient growth trajectory felt a bit overwhelming at times, but he expressed incredible support and encouragement from his managers.

After about six months, Timassey was looking for more of a daily challenge and applied for an internal posting that piqued his interest, documentation specialist. He interviewed and was immediately awarded the job. To help ease the transition, Timassey stayed in SMT to appropriately train his replacement before moving over to the new documentation group.

Now, as documentation specialist, Timassey is responsible for creating and processing necessary production documents such as work instructions and assembly drawings. He feels that he still has a lot to learn within the documentation group and is eager to expand his responsibilities.

"I plan to continue to work on my resume and grow within Saline Lectronics," said Timassey.

Testing a Temporary Plan

Originally referred through a temp agency, Alex Johnson started at Lectronics as an AOI Operator. He had no plans to stay on long-term and simply needed a job.

With a Bachelor of Science in Chemistry, Johnson's analytical mind and clear problem-

solving work approach enabled him to quickly climb the ranks. Within one month, Johnson was promoted to AOI programmer. Shortly thereafter, an associate engineering position opened up, and his manager at the time, Jason Sciberras, recommended Johnson for the position.

"Jason wanted me to grow internally," commented Johnson. "It made me feel confident in myself and my abilities. It was exactly what I needed to keep me at Lectronics."

Even without prior industry experience Johnson flourished within the engineering group. He believes his production perspective from actually working on the floor allowed him to better understand the appropriate type of support manufacturing needs from engineering.

.....

“Even without prior industry experience Johnson flourished within the engineering group.”

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Johnson's excellent work in engineering was noticed and appreciated by upper management, and he was internally recruited for the process engineering position that he's currently doing.

"Process engineering lets me do more of what I enjoy," said Johnson. "I take a close look at a specific processes and make tooling to help that process flow better. Streamlining the process in conformal coating is quite satisfying."

While a far cry from chemistry reagents and lab work, Johnson enjoys exploring the electronics assembly field and finds the work intellectually satisfying. He even likens it to the scientific process—collecting samples and data and making decisions based on that empirical information.

The Importance of Asking Questions

Neena Vemuri takes great pride in her engineering mindset. With an education background in interdisciplinary engineering and CAD drafting, she's always been drawn to work that requires thorough examination and questioning.

After struggling to find the right job fit for a few months, she got involved with a Michigan employment agency to find work. When she initially interviewed at Lectronics in December 2014 for a stockroom specialist position, the hiring manager was so impressed by her that he recommended her for an entirely different position, documentation assistant, where he thought her skills would be better served.

She used the documentation role as an opportunity to get her foot in the door, and to absorb everything she possibly could about printed circuit board assembly. Within six months, Vemuri applied for an internal process engineering role as that work appealed to her longer term career goals.

In process engineering, Vemuri managed the processes for hand solder, repair, stockroom and quality. Within this role, she also successfully completed training to be an IPC 610 certified trainer, where she had the added responsibility to train new employees.

“I like training. I get to meet new people and understand them better.”

“I like training. I get to meet new people and understand them better,” said Vemuri.

Vemuri recently transitioned to quality manager in February 2017; in fact, she put herself forward for a position that wasn’t even posted. In hopes of moving into the quality department, she sent a passionate email to HR and the VP of Quality about why she wanted to be in that group—specifically, where she would like to make improvements, and why she would be so successful in that group.

“I’m always full of ideas,” commented Vemuri. “People at Lectronics have been great about noticing and appreciating good ideas. These promotions from within are great for morale; instead of hiring someone from the outside with a specific piece of paper, it’s better that we give an internal employee a chance—someone

with a background at the organization.”

Vemuri admits that she never envisioned being a manager so quickly at Lectronics. The pride in her voice is apparent when she talks about her goals for the group she now manages. She’s extremely grateful for the internal support system, specifically from the HR team and her direct manager, Scott Sober.

“Scott likes to give high fives,” explained Vemuri. “He’s great about giving constant feedback. He’ll tell me that I am doing well at the things that I know, and for the things that I don’t know, he’s willing to offer guidance and support to help me learn. I don’t have to pretend that I know something that I don’t.”

While the investment is higher, and the risk can be greater, hiring and onboarding green employees typically pays off; these workers tend to be more committed to the organization overall. As seen in the three narratives above, these employees are grateful for the chances they’ve been afforded, the training that the organization has invested in them, and the support and encouragement they receive from Lectronics’ leadership team. It’s apparent that each of them are eager to keep expanding their careers in manufacturing.

For other manufacturers that may be feeling discouraged by the talent gap, consider re-evaluating recruiting, hiring and onboarding strategies for new employees. Until improvements can be made within high schools, community colleges and four-year universities to offer technical training, initiate a new HR strategy for potential employees without previous work experience or manufacturing skills. Instead of evaluating a candidate’s skills on paper, look for positive characteristics that fit well within the specific organization. Develop a training program that grooms the next generation of skilled manufacturing workers—specifically for your manufacturing floor. **SMT**



Davina McDonnell is the director of marketing at Saline Lectronics.

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Conference | June 7-8
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CONFERENCE OVERVIEW

Starting in 2017 the scope of the conference will be broadened to include the physical design aspects relating to electronics component, product and system reliability, involving such topics as thermal and mechanical design, design for manufacturability, test and signal integrity.

SESSION TOPICS

Solder R&D and Applications
Solder Joint Reliability
Future Trends and Technologies
Contamination and Cleanliness Testing
Failure Modes and Mitigation
Reliability
Defect Detection
Bottom Termination Component Design Panel

KEYNOTE PRESENTATIONS

Nanotechnology in Electronics Packaging
Interconnect, and Assembly: Hype or Reality?
Chuck Bauer, Ph.D., TechLead Corporation

The Importance of Design to Improve
Manufacturing Process Yield and Reliability
Jasbir Bath, Koki Solder

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Keeping an Eye on the Next Generation

A Look into Indium's Internship Program

by **Rick Short**

INDIUM CORPORATION

Mark Reece is the perfect example of why Indium Corporation invests in student programs.

In 2015, while employed part-time at a local furniture warehouse and working toward a bachelor's degree in electrical engineering technology, Reece was selected to participate in Indium's Summer College Internship Program. During his time as an engineering intern, Reece excelled and gained recognition for his exceptional work in advancing key projects.

"Mark was the ideal intern," said Dawn Roller, director of HQ Services. "His work ethic was outstanding, his personality was a perfect fit for our company culture, and his work exceeded our expectations."

Two years later, Reece is now a manufacturing support engineer with the company, and he has some words of advice for organizations that want to get more out of their internship programs: "Don't assign menial tasks. Give your interns real projects with firm deadlines. Take the reins off and let your interns become full members of your team and you might be pleasantly surprised."

While Indium performs traditional recruiting efforts to attract industry professionals, as a global electronics materials manufacturer and supplier, we also recognize the importance of targeting the next generation of talent. That is why we have tasked Jim McCoy, talent acquisition coordinator, with developing, managing, and administering talent acquisition strategies and programs.



Figure 1: Mark Reece started as a college intern in 2015 and is now a full-time manufacturing support engineer with Indium Corporation. In addition to traditional recruiting efforts, Indium with students to identify the next generation of talent.

"We see students as incredible assets," said McCoy. "The science, technology, engineering, and math field is constantly evolving. Pairing students and young professionals with the seasoned industry experts at Indium enables us to stay in tune with the cutting edge of academia, while leveraging the extensive technical knowledge we've built as a company."

Not Your Average Interns

Indium's Summer College Internship Program provides 10 college students with a 10-week full-time paid internship. Applicants are subjected to a rigorous application and interview process for this highly competitive program. In 2017, there were more than 300 total applications.

"We know that our former interns speak highly of the program. As we've developed this program over the past few years, and because word of mouth, we've seen a huge increase in interest. I think the program is so competitive because the students know they will gain really valuable experience," McCoy said.

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Qualified students must demonstrate that they have the knowledge, maturity, and attitude to perform as meaningful members of internal corporate teams. McCoy said this program has been a valuable tool in identifying whether or not a student can fulfill the company's expectations. "We are testing the capabilities and skills of what we hope will be our future employees. We use these internships as part of our critical talent acquisition process—that's why we seek the best of the best."

Not Your Average Internship

After final selection, interns are put to work to complete projects and initiatives that support or achieve business goals and objectives. This includes everything from participating in an R&D project to implementing a new process or system.

Roller has led the initiative to transform Indium internships into a formalized program. "While the goal of our internship program has always been to identify potential employment candidates who are an ideal fit for Indium," Roller said, "it is equally important that the program serve as a mechanism to advance departmental goals."

"They're completing real projects that ei-



Figure 2: Dawn Roller and Jim McCoy speak during an intern event. Interns deliver presentations on their work periodically throughout their 10-week program. This gives the interns, supervisors, and management an opportunity to evaluate the experience and ensure that projects are on-track to achieve specific business goals.



Figure 3: As part of their program, Indium Corporation interns participate in community and volunteer opportunities.

ther we needed to achieve and couldn't spare the manpower, or that needed a single person's undivided attention," McCoy added.

During their 10-week experience, students also participate in at least 10 hours of professional development. This includes workshops and presentations on topics such as managing intellectual property, networking and communications skills, personal brand building, social media skills for business, and résumé development. The students are also expected to become Indium ambassadors by authoring blogs about their experiences and to contribute community service within the community.

"We're looking for individuals who fit into our company's culture to make sure they are a good fit, right from the start," McCoy explained. "When we go out and perform community service or interact during a professional development activity, we get a glimpse into whether or not we're a good match for each other."

At the conclusion of the program, students walk away with real-world experience and a portfolio of projects. Others come away from the program with much more. Over the past two years, five former interns have also gained full-time employment, with six others joining part-time as they continue to pursue their degrees. But McCoy and Roller agree that Indium sees an even bigger return.

"When you think of an internship, you may only think of it as a one-sided relationship –

one in which the intern reaps all the benefits,” begins Roller. “But, what we have learned over several years of informal internships, and in just three years as a formal program, is that we gain a lot through these experiences.”

“This program keeps us on our toes,” finished McCoy. “As supervisors and mentors, we’re required to evaluate ourselves. Are we being good leaders? Do we need to refresh our communication skills? Should we go back and revisit the basics? What types of professional development courses do we want to seek?”

Not Your Average Recruitment Strategy

The internship program isn’t the only tool in Indium’s next generation recruitment strategy. We participated in more than 30 recruitment events in 2016. These included career and job fairs; presentations; workshops; and science, technology, engineering, and math (STEM) events.

“It is incredibly important that we are active in the STEM community,” McCoy said. “This is our best way to interact with the next generation, as well as to get to understand what future employees expect from us as a company.”

Each year, local students and educators from grade school through college are encouraged to participate in facility tours and job shadowing. Several Indium employees even serve as stu-



Figure 5: Indium Corporation 2016 Summer College Internship Program students and supervisors.

dent mentors, providing guidance on everything from college applications to potential career paths. We’ve also established connections with military veterans groups.

The company has started to garner recognition for our exceptional recruitment activities. In 2016, the New York Association of Training & Employment Professionals presented Indium with a Business Leadership Award for outstanding workforce development advocacy. Indium also earned an Outstanding Business Partner Award for its exemplary dedication to the advancement of STEM students.

Not Your Average Outcomes

Some may be wondering why Indium invests so much time and effort into its early recruitment programs—especially those responsible for budgeting. If so, you may also be asking yourself, “Why dedicate hours to providing professional development to a group of temporary student interns? Why open your doors to kids, some of whom haven’t even entered high school?”

“The short answer is, it makes us better,” Roller said.

Indium benefits from developing a bright and promising pipeline of future employees, creating lasting business and community partnerships, and further developing current employees’ skills.



Figure 4: Indium Corporation supports STEM and student programs with activities such as presentations, tours, program support, mentoring, job shadowing, and more.

"Students need an opportunity to put their skills and interests to a real-world test," Roller explained. "Employers need the opportunity to engage, evaluate, and identify future potential employees. As a high school senior, my guidance counselor and business teachers encouraged me to apply for a part-time clerical position at Indium to gain real-world experience that would help me evaluate a career in business. I'm now in my 30th year at Indium, and it all started with a willing employer giving an ambitious student an opportunity to observe, learn, and do."

"My internship experience was an ideal way to transition from academia to implementing my skills in the professional field," Reece concluded. "And I think my work was really beneficial to Indium." **SMT**



Rick Short is the director of marketing communications at Indium Corporation.

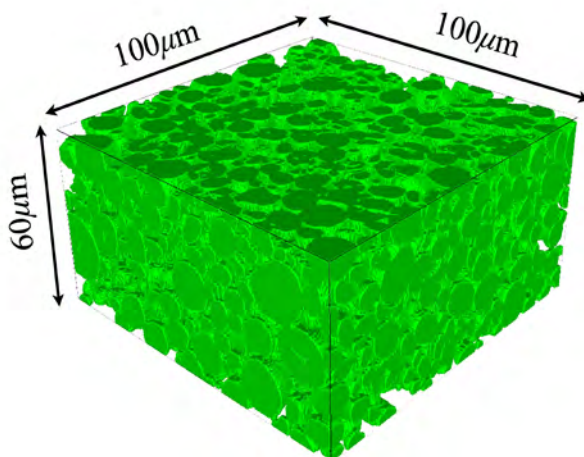
'Data-Driven' Design Could Lead to Improved Lithium-Ion Batteries

Purdue University is working with MIT and Stanford University in a project funded by the Toyota Research Institute to improve rechargeable lithium-ion batteries and accelerate their integration into electric and hybrid vehicles.

Purdue's part of the four-year effort is to better understand the fundamental science governing how a battery's internal architecture impacts energy storage, recharging speed and reliability, according to Edwin García, a Purdue professor of materials engineering.

Advanced multi-scale modeling and simulations will be used to guide experiments aimed at improving the design of electrodes called cathodes and anodes, which contain particles made of emerging materials such as lithium iron phosphate or lithium cobalt oxide.

While the Purdue researchers will focus on theory, they will collaborate with their Stanford and MIT counterparts to guide the design of experiments based on insights from modeling. Data from the experiments will then, in turn, be used for input and validation to refine modeling, with the ultimate goal of solving key limitations in to-



day's rechargeable batteries.

"This work is data-driven, and we want to learn how the nano-scale structure affects a material's macro-scale behavior and overall battery performance," García said. "We will use data to come up with better models and to better understand the basic science of materials at the atomic scale."

The porous electrodes must contain just the right density and design of particles for optimal performance and diffusion of lithium ions, which are contained in an electrolyte liquid or gel.

The three universities are sharing \$10 million as part of a \$35 million initiative by Toyota. The project began in early April.

Researchers will observe the changing microscopic details of the particles as a battery charges and discharges.

The project will involve two Purdue graduate students. "They will be directly involved with experimentalists at Stanford and MIT, actually influencing the design of the experiments, and for modeling students that's very unusual," García said. "That's a huge gain intellectually for the students."



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If It's My Data, I Can Do What I Want, Right?

by Michael Ford

MENTOR GRAPHICS CORPORATION

The trend today for consumers is clearly moving away from mass-produced goods to personalized goods made in a mass-produced way. The sheer number of variants and options in current products is testament to the expectations that modern consumers have. This applies to software as well as hardware, as “users” expect many options to tweak how applications look and operate. Often however, the available options or configuration doesn't go far enough. Opening systems up for direct data access risks reliability and security as customers of sophisticated manufacturing systems want to integrate and customize their solutions by going directly to system databases. Hearing from suppliers that certain data is not available for external use is not well received. The risk versus flexibility argument needs to be resolved, with a fresh approach.

A couple of years ago, I spec'd a new car, something reliable to get me to the airport on

time, every time, and something that I could enjoy. Having chosen the model, there were the options to choose from, which together created literally millions of different specification combinations. Being from a tech background, I was tempted by a few of the cleverer yet reasonably priced features on offer. Here is where I then learned that even the best-in-class automotive manufacturers in Europe don't have a truly Lean business. It took many weeks for my car to be scheduled into production, and a few more after that to be delivered. Sure, the final assembly line itself is Lean; we know the suppliers of the electronic sub-assemblies are Leaner than ever before, but the customer ordering process is anything but Lean. Here is where the waste is cleverly hidden, having customers on the hook for payment, paying for the impression of Lean. How many people choose instead to go for an alternative simpler and quicker process? Many, I suspect.



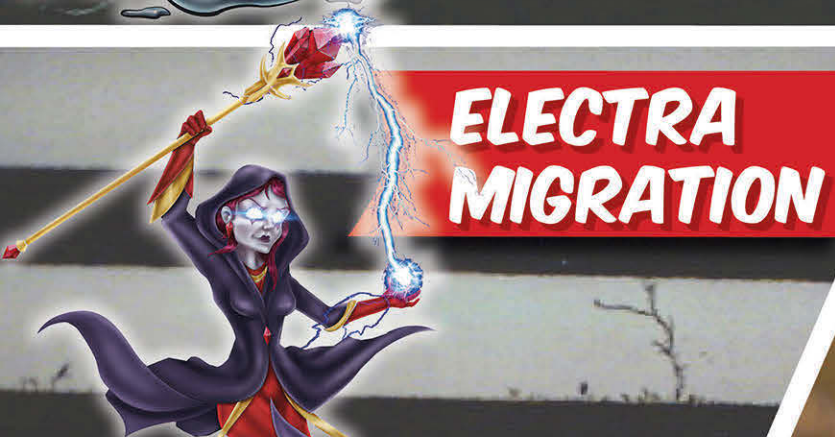
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A few weeks of life with my new car, with no major disappointments, though one thing did start to get annoying. Equipped with the latest LED technology headlights, brake-lights, and turn-signals, most other lights in the car utilized the old technology, heating up a thin brittle piece of wire until it is white hot within a vacuum inside a glass bubble. Fire and gasoline: a great combination. The waste of energy, the massive localized heat produced all around the car, just did not appeal to the engineer in me. A quick look on some Chinese websites revealed some amazing new LED technology to replace pretty much every old-school bulb in the car, without a significant cost. Now, with my car more fresh-looking and energy efficient, I wonder why car makers choose to save a few cents, if anything, to make my car look as though it was lit with feeble little wicks from lanterns dating back to the early part of the last century rather than going for a modern look. I was tinkering with options that were not a part of the car makers' option list.

“I was tinkering with options that were not a part of the car makers' option list.”

Replacing some internal bulbs in a car is one thing. I also read in forums that some owners of cars similar to mine were also changing the vehicle operating software. While some of these changes seem minor, such as to make the car default, to not cutting the engine when waiting at traffic signals, which seems (in my mind) to save a tiny amount of fuel compared to the wear and potential damage to the engine and related equipment. It opens up a couple of tricky issues. First of all, how do we know that the modified software is legitimate, that it is based on the latest official version from the car maker, and that it will work perfectly, given the plethora of connected software-driven devices in the car? What is the motivation of the person providing this

fix? Have they introduced a “back door” into the software with some ulterior and potentially deadly motive? The car manufacturer will surely cancel any warranty on finding out that such changes have been made, as the car maker can no longer be responsible for the behavior of the vehicle. Servicing and support costs, the fixing issues within the warranty period of cars could get prohibitively expensive very quickly, plus of course, the potential liability in the case of a serious accident. Then there is the insurance company, who most likely will feel the same way as the manufacturer, especially where cars today provide more and more aids through hardware / software technology. And that people are very likely to take for granted, after a very short time, their ability to decouple their thoughts from the actual driving. This whole area is an absolute minefield.

The risks associated with changing the software of a car are not too dissimilar to changing or hacking software on the shop-floor. Looking around a system database, there are many files, often with what may seem like meaningful file names, some which are human readable, such as in XML format. It can even be seen when these files are updated. This apparent simplicity however is just the “tip of the iceberg” of the layers of data storage and management within a manufacturing system. Most files within the system structure contain more data than is immediately obvious, with data fields that have inter-dependencies with other files. An XML file may sound quite standard these days, but the content itself is not standardized in any way. Take for example the import of design data. There may be a file created that appears to contain a list of reference designators, including such things as XY position, etc. The file is likely to contain additional data, such as fiducial information, and also links to dependent information such as internal part numbers; material shape codes; vendor profiles; approved vendor lists; MSD profiles; etc., and in fact, potentially any information that could be needed to generate optimized machine programs. The file may appear to be the converted contents from design, but may in fact be a critical intermediate file in the engineering process of the information. Reading the data is not so simple, as not

all records may be equally valid, with logical deletion being a common part of such formats. Changing, adding, or deleting records within the file is extremely likely to create corruption in the system as dependent links are not established correctly, or are broken.

In the early days of manufacturing and engineering systems in general, certain files, whether from solution providers or machine vendors, were shared with customers based on their demand. While this did make systems more flexible for the customer resolving immediate issues, it brought the risk that the operation could become unstable, as customers occasionally made mistakes with the reading, creation, or update of the files, causing data integrity issues, which lead to many bizarre and often urgent support issues, for which the system supplier faced additional support costs. This is one of the prime reasons that machine vendors and software providers usually charge for official supported interfaces, which have defined scopes and limitations. This is a technology issue, and also a business issue. No software supplier can accept changes introduced that may break the system which are not under their control.

In the light of the new IoT philosophies that are rapidly becoming the expectation, this problem of flexibility versus risk is resolved on the lower level, as IoT establishes the transfer and availability of data everywhere without the need for hacking into internal system database structures. This is a very good thing, as systems themselves can become more managed and secure. On higher levels however, risk can be expanded by at least an order of magnitude. The introduction of IoT technology is regarded by most already as a given, the only questions are how and when. Expected issues therefore need to be dealt with, two of which are:

1. Extent of IoT data exchange: If we pursue the course of the past in terms of data sharing, IoT data would be made up from simple messages, mainly as outputs, that would replace the vast array of made-to-order customer interfaces of all kinds that currently exist. Hardly a technical issue and it makes business sense, as long as a reasonable data standard definition, such as OML (Open Manufacturing Language)

is used. The lesson learned, however from the past, is that information requirements from different customers in different situations varies considerably, and, it evolves. Looking at just one set of requirements, even for a major connected application, is not likely to reflect even a significant portion of the ultimate IoT data needs. Even with the ability of the IoT data exchange language such as OML being able to support the vast majority of requirements, each machine vendor, system provider, or local develop-

“ Looking at just one set of requirements, even for a major connected application, is not likely to reflect even a significant portion of the ultimate IoT data needs. ”

er has to decide what data they want to share, and to what extent their solutions should interact on the IoT level. Whatever the data transport mechanism chosen, failure to disclose the extent of the IoT support to customers will result in disappointment where key expectations are not met, leading back to the situation where customized solutions are needed. Data output is just the start of the problem. When considering the data input aspect of IoT, that is the collection of data from other processes and/or site solutions, this becomes a far more complex issue as system or process operation may be asked to change, depending on the input data. This should be managed in a safe, efficient, and secure way an area, which is quite new for most machines and most software solutions such as ERP, traditional MES, etc. In this respect, apart from the output of a standard set of legacy data, we are at the start of understanding how IoT can and will impact our machine and system operations.

2. Security of IoT data: While data integrity within a stand-alone system can be managed and confirmed, once the data is sent out-

side, there will be additional security issues to manage. Of course, the IoT data transfer itself can easily be secured in a variety of different ways, many of which are available as part of the data exchange technology, and are proven. The more important factor in a controlled environment such as the factory, however, is what happens to the data once it is received by the intended party and is once more “open.” Few individual IoT messages in themselves will carry much importance. Together however, a great deal of information about the operation and products that are made can be gained. Information about performance of competitor systems may also now become freely available. Restrictions such as ITAR also still apply, so routing and utilization of information needs to be carefully managed, especially where data is stored in a cloud, which may physically reside across many different systems, and across continents. Though potentially more widespread with IoT, these issues are still similar to legacy issues of today. Once again, the real threat comes when we start to think about the true nature of IoT, where commands or requests may come in to processes and systems from outside, albeit over a secure interface, intended to control and manage the operation in a better way, which could also have been created by systems or flows that have been compromised.

It is like the “back door” that may have been introduced into your car’s software through an innocent looking update. We hear already about cases where hackers have managed to get live access to a car as it is driving; to open windows,

turn on lights, activate emergency braking, etc. The risk in this case is easy to understand. The same risks, however, are there in manufacturing with IoT in the future. With machines, processes and systems now becoming dynamic, receiving live external communication that modifies their behaviour from outside, we face the same kinds of security concerns, except that with billions of IoT transactions potentially per day in a factory, it is going to be hard to track. The continued and professional management of IoT standards, as well as systems that adopt them, and environments that facilitate them, is critical. The IoT-based application layer is now more exposed and available to a wider range of solution providers as well as machine vendors, and so is the layer in which most risk will be faced. Many of these applications will be made by customer IT teams, bringing us back full circle to our original problem of data and system integrity issues where customers need to gain additional connectivity, flexibility, and control. The knowledge and understanding of IoT-related IT skills should grow alongside the technology, or all IoT solutions must be provided by trusted suppliers. Nothing in this regard has really changed, but the stakes are now far higher. It is time to take this seriously. **SMT**



Michael Ford is senior marketing development manager with Mentor Graphics Corporation Valor division. To read past columns, or to contact the author, [click here](#).

I-Connect007 Survey: Help Wanted!

Source: I-Connect007 Research

In our recent survey on hiring, majority of the the respondents or 55% said they are planning to hire this year—which we take as an optimistic sign that our industry plans to expand in 2017. This chart shows which quarters this year these companies are planning to hire.





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The CHALLENGE of Filling PCB Assembly Positions

by John Talbot
TRAMONTO CIRCUITS

It is not a secret that U.S. manufacturers have a difficult time filling open positions. It has been reported for several years and the topic comes up frequently. There are many opinions why this is so. The main topic reported is that manufacturers cannot find workers with the necessary skills to fill the openings. If we look specifically at the PCB assembly industry, the rhetoric is similar. There are more openings than people to fill them. The discussions reveal that lower wages, lack of skills, and sometimes the reported low unemployment rate in the United States is part of the problem.

Larger companies, it seems, have an easier time filling positions than smaller companies because of their ability to pay higher wages; however, they suffer the same difficulties with lack of skills and loyalty. It was reported in a book titled “Men Without Work,” by Nicholas Eberstadt, that 8–10 million working-age (25–54) U.S. males have disappeared from the workforce and many, if not most, have given up looking for work. That may be a factor. Whatever the reason, employers find it challenging to fill open positions, which makes it difficult to grow and keep up with their customer’s demands. Business owners, however, are accus-

tomed to challenges and need to find ways to adjust to the current employment situation.

Does anybody want to work in manufacturing anymore?

There have been articles written that suggest that people don't choose manufacturing as a career anymore because of the pressure to go to college and get a "real" job. High schools across the U.S. have stopped offering shop classes that

exposed our younger generations to vocations that are challenging, skillful, lucrative and fulfilling. Instead their interest lies in what percentage of students are accepted to colleges or universities.

This stigma, that manufacturing is not good enough to make a career of, or glamorous enough to tell your neighbors about may have some effect on the current situation.

Then there are those that think that the U.S. cannot compete with the cheap labor of Mexico or China. Whatever the reasons, there are fewer young adults interested in manufacturing than there were 20 years ago. Never mind the fact that everything we use during our daily lives has been manufactured in one way or another.





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Let's examine a few ways that innovative employers have combatted the challenge.

Where do we find candidates?

In a review of traditional methods of finding candidates, we would surely include help-wanted ads online at Monster.com, Indeed.com, Craigslist.com, etc. We must consider staffing agencies that specialize in manufacturing jobs as well. And less relevant in our electronically connected world, the local newspapers.

These tried and true methods that have been trusted in the past surely must be the only way to communicate with interested applicants, right? Well if you're one of those that have been actively searching for qualified candidates you've already realized that this isn't working well.

The online sites are an easy way to get a job opening posted and hope that somebody reads it is qualified and interested. However, the results are less than exceptional for the printed circuit assembly industry and the manufacturing industry in its entirety.

The staffing agencies don't fare much better. Anybody who has discussed their difficulties with an agency representative has heard that they have the same issues. Or they will tell you

that they have many qualified candidates, but after filling out their necessary paperwork and agreeing to an "onsite review" of your workplace you don't hear from them again. And why not? If it's difficult to find employees for the manufacturers it stands to reason that it is hard for the agencies as well. It may be time to step out of the box.

Skills or culture: Which is most important?

Jobs in the PCB assembly industry are unarguably skilled positions. Whether they will hand solder all day or program pick and place equipment for automated soldering, their skills are vital. The components that we ask them to solder get smaller every year, and it is not unusual these days to be asked to inspect, re-work and solder components that are .040" x .020" and smaller. They must be steady handed and as familiar with a microscope as they are with their solder iron and tweezers.

However, we also want candidates to fit into the company culture. It's important for all employees to be comfortable and happy working together. The culture of the company takes a long time to be established and one cannot put a value on that. Any company that survives for



Figure 1: It's important for all employees to be comfortable and happy working together.

an extended amount of time does so because of its employees.

Thankfully for those of us in the PCB assembly industry, we have the IPC standards to guide our way. The IPC has a time-tested training procedure that works individually or on entire teams. This affords us a positive benefit of not having to find candidates with both the skills and character to fit the position.

So, do we hire skills? Or do we hire culture? If the candidate has both, then this is not a question. However, if we can interview candidates that are interested in the position, but don't have the skills as well as those that are skilled, we've increased the number of candidates that we can review. We also have the confidence that these candidates can be trained sufficiently to fill the position. This method requires us to understand that the candidate will not be valuable the day they start. Training takes time and of course a lot of practice. It requires a big commitment for the company and the employee to agree to employment without skills.

Once you've found them, how do you hire them?

Once you've found a worthy candidate, you've got to make them an offer that will result in a positive reaction. Some companies don't struggle with this part of the hiring procedure. The smaller companies though, do. There's a lot to consider. For instance, if you've found a skilled person that fits well into the culture, you must be able to offer them a package that is a step up from their current position if you hope to convince them of a change.

If you've chosen an un-skilled person you must balance the cost of training with the cost of normal employment and still make it lucrative for both. It's a difficult position to be in for the smaller companies, but a necessary one. We've already acknowledged that our companies would not be successful if not for our employees. That includes our newest employees.

Training: Pros & Cons

If your company must consider a training program, and I suggest every company does, you will have concerns that must be reviewed, discussed and agreed to internally. Any training

program will be costly and time consuming. It will require either sending the employee offsite for a week or more, or if you're committed to the process you may have an IPC certified trainer on your team. In which case, it will require two of your employees be out for at least one week.

There are positives and negatives to consider with both options. If you choose to send the employee away to get the training you will endure the costs each time and experience inconsistency because the trainers are different each time. If you choose to have someone internally qualified as a trainer then the costs will be less, but you'll also lose one of your top employees for an entire week for training. However, each employee will be trained consistently and with a slant toward the way your company wants things done. It helps to not have to unlearn practices learned from an outside trainer.

Also, you will undoubtedly consider the ramifications of a training program. How many of these people will take advantage of our generosity and then leave our company for a higher wage? How many will appreciate the amount of time and effort we've invested and stay long term? What will the return of investment be to the company? These are all valid questions and unfortunately cannot be answered accurately until time has passed. Some company-trained employees will leave—count on it! Some will also stay and become valuable and trusted employees that you can depend on for a long time.

The Nurturing Process: Gen X, Gen Y and Millennials

Every company has a diverse group of employees. A common topic discussed these days is how to cater to your Gen X, Y and millennial employees. Their motivations for work are not the same. The Gen X employees learned early in their careers that work is necessary to live. Gen Y employees feel that there must be a work/life balance and millennials feel that work should enhance their life.

I won't get into a discussion of management techniques for success; that is for another article. However, it's easy to see that all employees cannot be managed the same way. In general, it may be easiest to recognize the differ-

ent style of employees that exist during lunch or break times. Some will eat lunch with others and spend time talking about the day's happenings. Others will eat alone and maybe read the news or catch up on the local sports teams. And others still will be alone, but look as comfortable as if they are at home. They may have their feet up on a desk, checking their Facebook page or playing online games. The point is that they are all different and require different things to feel comfortable at work.

Retaining Your Team

That brings us to the topic of how to retain our team of employees. With a diverse group of employees, presumably all on the same page while working, all require different things to feel satisfied in their work. Some will need higher wages—increases that prove to them that they are valued. Others will require positive feedback to feel their value. And others will want some freedom in the form of time off, whether paid or not, without negative consequences. These are issues that we all face once they are recognized. In our current environment, it doesn't make it easy for the employer to retain good employees.

Time honored tactics of a budget for each department to dole out as they see fit or a standard percentage raise for everyone will not work the way it used to. Our methods of acknowledgment must be adjusted for the current times. Companies invest a lot of time and effort put-

ting together a good team. We must invest the same time and effort to retain them. It's easy to be complacent once you have the team assembled and working smoothly. However, if we cannot retain them the effort has been wasted.

Conclusion

With the many complications our country is going through currently, the task of filling manufacturing positions seems inconsequential. As a company owner or manager though, it is a daunting task. As with running a business, finding, training and retaining good employees is a constant effort. We cannot simply sit back and wait for the perfect employee to show up at our door, no matter how many ads we've placed. Also, we cannot expect good employees to simply stay loyal to our company forever unless they've got a good reason to. In good hiring times or bad, finding, training and retaining good or better yet, great employees requires a constant effort. One that will prove worthwhile in the long run. **SMT**

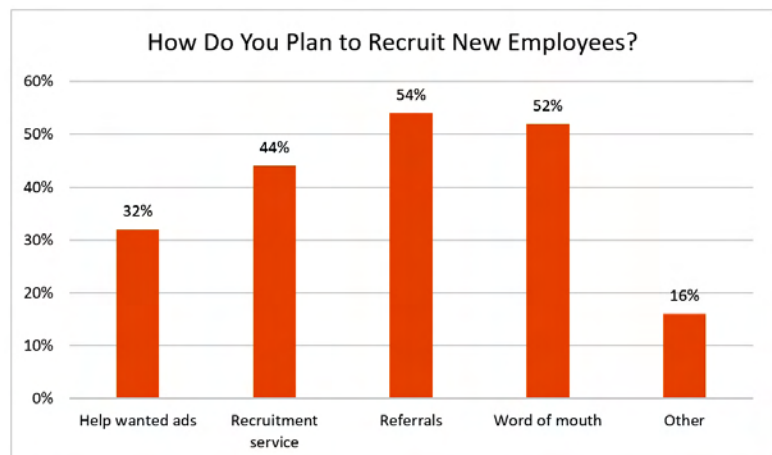


John Talbot is the president of Tramonto Circuits, which designs, manufactures and supplies flexible circuits and printed circuit boards for customers around the world.

I-Connect007 Survey: Help Wanted!

Source: I-Connect007 Research

According to our recent survey on hiring, the greatest challenge that companies in our industry face when hiring was "finding qualified candidates"; 93% of respondents cited this as a critical issue. To recruit new employees, companies are using multiple methods as shown in this chart.



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Curtiss-Wright Selects Zentech for Sensitive U.S. DoD Aerospace & Defense Programs

Curtiss-Wright's Defense Solutions division has expanded its secure manufacturing capabilities for sensitive U.S. DoD aerospace and defense programs by contracting with Zentech Manufacturing.

Paul Rooke Joins Plexus' Board of Directors

Plexus Corp.'s Board of Directors has increased its size to 10 directors and has elected Paul A. Rooke to fill the new seat, effective immediately.

Sanmina Adds High Speed Flex and Rigid Flex Circuit Assembly for Aerospace Applications

Sanmina Corporation today announced that its Backplane and Cable Division has developed new flex and rigid-flex circuit assembly capabilities for military and aerospace electronics equipment.

Plexus Brings Innovation to Realization with Collaborative PlexWheel Project

Plexus has launched PlexWheel, a joint project between Plexus and Malaysia's Tunku Abdul Rahman (TAR) University College.

MC Assembly Names New VP of Supply Chain Management

EMS firm MC Assembly has hired veteran supply chain professional Richard Kelly as the company's new vice president of supply chain. Kelly will be responsible for providing leadership in expanding MC Assembly's network of partners and improving supply chain tools to increase value to customers.

Celestica Unveils New Silicon Valley Customer Experience Center

Celestica Inc. today announced the opening of its Silicon Valley Customer Experience Center. Celestica's Customer Experience Center showcases the company's world-class capabilities and hardware solutions that enable its customers' success.

Congressman McCaul Discusses U.S. Policy Priorities with VirTex Staff

VirTex executives and staff held a town hall discussion with Congressman Michael McCaul (R-TX-10) on the federal policy issues facing the advanced manufacturing industry.

Vexos' LaGrange, Ohio Facility Receives UL Certification

Vexos' manufacturing facility in LaGrange, Ohio, is now certified under UL Certification ZPV12. With this UL certification, and its FDA registration, the facility can build the most complex or the simplest products, under the strict processes of its rigorous quality systems.

Curtiss-Wright Surface Tech Division Expands Capabilities

Curtiss-Wright's Surface Technologies (CWST) division's IMR Test Labs facility in Ithaca, New York has completed an expansion in their Nadcap accredited Fatigue Testing Laboratory, which doubles their prior capacity, and enables high temperature fatigue testing up to 1800° F.

NEO Tech Expands Production in Agave Site with Second Facility

NEO Tech announces that it is adding its second Agave manufacturing site located in Juarez, Mexico. The new building has an area of 190,000 square feet and will be operational by June 2017.

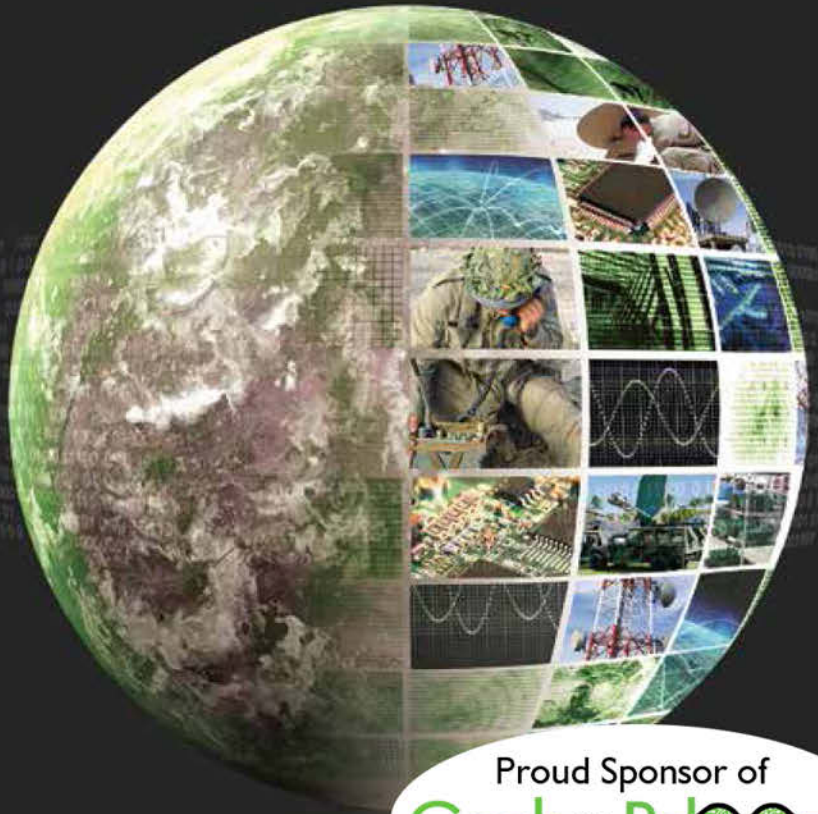


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Manufacturing Through the Eyes of Human Resources, Recruitment and New Hire Training



by Brian Kingston
MC ASSEMBLY

Perhaps more important than the technology and tools a manufacturing company has are its people. People are what make a company truly great and the process of recruiting talented, skilled, dedicated employees and training them properly for success is an important aspect of any manufacturing company.

At MC Assembly, we are very involved in the local community and make an emphasis on volunteering and helping the local Careeronestop, American Job Center or what we locally call CareerSource Brevard. This active involvement allows us to network with other professionals and meet a local candidate pool that one will not be able to find on job boards or through a recruiting agency. We also participate in internship programs in hopes the intern will succeed and we will be able to hire them full time.

Some other ways we find candidates include employee referral programs, partnering with the local community, participating in job fairs, and working with and volunteering at the local

high school and vocational school. Community outreach initiatives are also very important when finding new candidates.

In today's market, it's not only about what the candidate can contribute to the company, but what can the company contribute to the candidate: "Do you allow room for advancement?" "How is your on-the-job training program?" "Do you have tuition reimbursement?" "Do you contribute or volunteer with a cause the candidate is passionate about?" All these methods are very important in finding people.

Right now, one of the biggest challenges facing manufacturing companies is recruiting millennial talent. There is an outdated mentality that with manufacturing, you do not have autonomy, that it's challenging work and there's no opportunity for individualism or advancement. At MC Assembly, we counter that by giving employees an opportunity to voice their thoughts and take ownership over their work, by voicing how they think things should or shouldn't be done. It really gives us an upper hand honing in on our manufacturing process and making it the best we can. It's critical for our future that we be

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Figure 1: Brian Kingston, Tina Berger and Ken Lawrence.

.....
able to bring in younger talent. We've also introduced a lot of incentives like tuition reimbursement and on the job training that can help us attract and retain that talent.

The use of social media sounds cliché but in manufacturing it is critical to reach millennial talent. Recent statistics show that over 85% of millennials have smartphones and touch them more than 45 times per day. Five out of six mil-

lennials connect with companies via social media networks. If your company is not active and does not invest in social media today, you are simply not visible to this generation and missing out on this talent pipeline.

Another challenge facing many manufacturing companies today is finding candidates with the right skill sets to fill specific jobs. There is a real gap of skilled manufacturing talent, largely because many schools have not been teaching manufacturing skills for nearly two decades.

About 20 years ago, many high schools just stopped teaching manufacturing-related skills. There was no more wood shop, no more automotive, no more welding or electronics classes. Students were convinced that they needed to go to college for advanced degrees and manufacturing was no longer seen as an option anymore. This all happened around the time of the dotcom boom. The new trend started to shift towards internet and computer-related jobs and teaching.

Today, we find ourselves with a serious skill gap; in some places, finding skilled soldering and SMT operators can present a real challenge. Overall, manufacturing finds some of the larg-



Figure 2: Workforce diversity at MC Assembly.



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Figure 3: New hire training sessions.

est gaps in welding, CNC machining and electronics.

According to Deloitte and The Manufacturing Institute, over the next 10 years we will need to fill 3.5 million manufacturing jobs—the current skills gap will result in 2 million of those jobs going unfilled.

Recently, we have seen a huge push to start teaching manufacturing at the high school level again with a dedicated focus on STEM. Seeing this need, MC Assembly has participated in a local effort called Advancing in Manufacturing (AIM), created by CareerSource Brevard. Funded by a two-year DOL National Emergency Grant, the program is making efforts to expand training and early education opportunities in the Brevard area to address immediate employment skills needs and build a pipeline of talent for the future.

At the same time, we have developed a robust new hire training program. On the first day, we start new hires with a safety and quality training. This allows employees to learn safety tips, who to call, where to go and how to work in a safe way. It also stresses the most important aspect to our business, that quality as our number one priority. This happens well before an employee walks on to the production floor and works on our customers' products. On-the-job training follows the safety and quality training. New hires are identified on the production floor with a different colored smock and are assigned a mentor.

Once the supervisor and mentor believe the OTJ training is complete and the employee is ready to be on their own our quality manager will assess their skill and what they learned and confirm the employees is ready to perform the job on their own. This process is very involved and usually takes 1-2 weeks, this helps new hire get up to speed quickly and have the confidence they are able to complete their assigned tasks.

The skills we look for are “soft skills,” which are essential. Every resume you look at will tell you whether a candidate qualifies for the job based on their work skills, work experience and education. The one variable that cannot be determined from reading a resume are the soft skills. Communication, problem solving, adaptability, teamwork, self-motivation and emotional intelligence are just as important, if not more, then the technical skills to do the job. The six soft skills are hard to identify in an interview setting, behavior based interview questions are asked to help identify these skills in the candidate. I believe you hire character and train skill. **SMT**



Brian Kingston is director of human resources at MC Assembly and responsible for implementing human resources strategies, culture and managing the company's human resources initiatives.

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RTW IPC APEX EXPO: The Power of Synergies with MacDermid Enthone and Alpha Assembly Solutions

Don Cullen, global director of marketing communications with MacDermid Enthone, and Tom Hunsinger, VP global marketing with Alpha Assembly Solutions explain the structure of MacDermid Performance Solutions, which combines the former MacDermid, Enthone and Alpha Assembly Materials businesses to provide PCB and EMS industries with enhanced innovation and service throughout the supply chain, with unified sales strategies and improved processes.

RTW IPC APEX EXPO: Nordson Highlights Improvements in Dispensing and Conformal Coating Systems

Roberta J. Foster-Smith, global marketing communications manager for Nordson ASYMTEK, discusses the continued improvements in Nordson's dispensing and conformal coating equipment, especially when it comes to automation, precision and consistency in delivering ever-finer deposits to meet industry demands and customer needs.

Alpha Papers Investigate High-Reliability Solder Alloys

During SMTA International, Morgana Ribas, manager of Metals Technology Group at Alpha Assembly Solutions, presented a pair of papers that focus on the company's reliability testing of solder alloys. I-Connect007 Managing Editor Andy Shaughnessy sat down with Morgana to discuss these papers, and some of the surprising results that the testing yielded.

Lenthor Engineering Invests in Testing with CyberOptics SPI System

Lenthor Engineering recently installed a new CyberOptics SE500 solder paste inspection system.

Electrolube Solves Unusual Underwater LED Application

Electrolube was recently approached by a company in Australia for assistance with a particularly unusual application: protection for an underwater LED lighting unit.

P4Q USA Installs Third ACE Selective Soldering System in New Mexico

The KISS-101 selective soldering system has been installed at P4Q USA Inc.'s Albuquerque, New Mexico facility. It is the third selective soldering machine P4Q USA has ordered from ACE Production Technologies.

AIM Provides IPC-A-610 Training to Sony Employees in Nuevo Laredo, Mexico

AIM Solder is pleased to announce that it recently provided IPC-A-610 training to Sony employees in Nuevo Laredo, Tamaulipas, Mexico.

Mycronic Receives Another Order for Replacement Mask Writer

Mycronic AB has received yet another order for a mask writer, replacing an older system for manufacturing of display photomasks. The system is scheduled to be delivered to a customer in Asia during the first half of 2018.

Goepel Extends Support for Embedded JTAG Solutions Technology

Goepel electronic is extending support for embedded JTAG solutions technology for the SPEA4060 flying probe testers.

Rehm Expands Technology Center with New Solder Paste and Coating Inspection Systems

Two new inspection systems from Pemtron's TROI series are now in use at the Rehm Technology Center in Blaubeuren.



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Blackfox Program Trains Vets for Manufacturing Jobs

by **Andy Shaughnessy**
I-CONNECT007

It's harder than ever for managers in the PCB manufacturing industry to find qualified staff, with some reporting that positions are remaining open for months at a time. On the other hand, there are thousands of soldiers, sailors, airmen and marines transitioning out of the service each year and seeking good jobs. Al Dill, president of Blackfox, joined me at IPC APEX EXPO to discuss a program that offers manufacturing training to veterans, starting while they're still in the service.

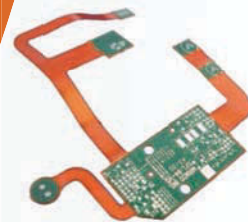
Andy Shaughnessy: *Al, why won't you start off by giving us some background on the company.*

Allen Dill: First of all, we're celebrating 21 years in business, so we're excited about that. Blackfox is headquartered in Colorado, and we have a fa-

cility in Colorado, a facility in Tempe, Arizona, one in Guadalajara, Mexico and one in Penang, Malaysia. Blackfox offers all of the six primary IPC certifications, both for specialists and for instructors. That's been our core business since day one. Blackfox is different in the sense that we are very close to our customer base. We take care of our customers as all companies should, and that has led us to developing another complimentary program to service our employers even better by helping them with the need for skilled labor today.

In Colorado, unemployment rates are below 3% right now, so it's almost impossible to find skilled labor. We work with a lot of STEM programs, going back into high school, K-12 and informing the students of the opportunities in manufacturing. It's not your grandfather's manufacturing today; it's a very clean environment with lots of opportunity, so we're getting the word out there in schools. We have immediate

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needs for skilled individuals, particularly in our industry, which are mostly aerospace and defense companies.

We have worked in conjunction with a lot of our employers and customers to understand the skill requirements for their type of business, and we've developed, in collaboration with our employers and clients, the general curriculum required for a successful transition into aerospace manufacturing. But the issue there is again finding those that are either underemployed or unemployed to fill the need. We have tapped into a very strong resource in



Allen Dill

our transitioning military veterans. In Colorado alone, we have four military bases that have roughly 600 veterans transitioning into civilian life each month.

Blackfox is working with our state employment agencies, through our workforce centers and veterans services, and introducing transitioning veterans to this program while they're still in the military. All of our veterans have a timeframe that is given to them for the smooth transition into civilian life while they're still paid by the military. They are able to look for the standard education opportunities and employment opportunities while they're still in the service. We're going upstream, talking to veterans at these bases about the program that we're offering. This program is typically sponsored through training grants, so typically there's no expense for our veterans coming into this program and there's no expense for our employers that consider hiring our graduates.

We develop a very comprehensive, compressed five-week program that introduces vet-

erans and civilians to this industry. We expose them to the industry and make sure it's something they're interested in. We don't want to place anyone in the industry who doesn't feel comfortable in it. We make sure they have the interest, the dexterity, and the aptitude for electronic manufacturing before we ask them to invest their time and for us to invest any of our time into this program. Once they go through that and they feel like it's something they'd like to pursue, then they start to program with Blackfox.

Clearly we're doing this in Longmont,

Colorado, and we're expanding a second office in Colorado Springs, which is close to the military bases, so we don't have the logistic issue with transporting them for five weeks from Colorado Springs to Longmont, which is a couple hours of commuting. We're setting up a new office there, but the program in general is a five-week program, 200 hours, and it's an advanced manufacturing certification. It's an accredited program and it'll dovetail into future education that most of our employers offer, and they can pursue a four-year degree in advanced manufacturing if they wish. But they're prepared to at least be successful when they move into our employer company. Most of our employers offer an on-the-job training or an internship that this program dovetails into nicely as well.

There's no cost to the employer. There's no cost to the veteran. Blackfox does this not as a huge profit venture for us. We do because it's the right thing to do for the veterans. In a nutshell, that's our program. During the five-week program timeline, we set aside a couple of days

towards the end for employers to come in and actually interview with our graduates and essentially offer jobs to our graduates. By the time they graduate, they can transition almost immediately into an employer's internship or on-the-job training program and get paid during this whole timeframe. So far we have trained over 200 veterans in the last three or four years of the program. A lot of our graduates have gone to Lockheed Martin and they're working in the space division. I just heard today that one of our veterans who graduated three years ago and worked in assembly at Lockheed Martin was just promoted to a production planner.

Shaughnessy: *Wow, that's great.*

Dill: It's a really great success story, but I've been told that Lockheed Martin is experiencing about a 92% retention rate with our graduates, so that means our screening processes in the front end and the communication with our students are at least positioning them for a longer-term career path. In a nutshell, that's our program.

Shaughnessy: *You may have seen our hiring survey last month. Over half of the respondents said that they're hiring. A lot of managers here at APEX say they can't find enough qualified people. Are you seeing this?*

Dill: Absolutely. We have employers contacting us every day who have heard about the program, looking in some desperation for a solution. Our STEM programs are helping, but that's more of a futuristic solution. We need something more immediate to help fill some of these gaps. It's a real challenge, definitely. We hear it all over the nation, wherever we travel.

Shaughnessy: *I heard one company promises new engineers a Tesla. It's almost full employment, I guess.*

Dill: We've heard of folks who are maybe in their graduate year of tech school or university being offered such wages that some will just leave school and start working right away as opposed to finishing their degree programs. There's so much demand out there.

It's tough, but the main thing we're trying to get across to students, to their parents, and to those who aren't familiar with this industry, is that it is a very clean industry. There are all kinds of opportunities in advanced manufacturing, and not just electronics, but machining and other types of advanced manufacturing. It's a huge opportunity and unfortunately a lot of our younger folks haven't been exposed to that yet.

“ In my generation, we grew up being exposed, even during middle school and high school, to some of the trade skills that are needed out there, and exposed to manufacturing, which a lot of our younger folks haven't experienced yet. ”

In my generation, we grew up being exposed, even during middle school and high school, to some of the trade skills that are needed out there, and exposed to manufacturing, which a lot of our younger folks haven't experienced yet. So we're trying to get to their parents and to them to let them know that there are opportunities. You don't need to go into retail and fast food and these other jobs.

That's a longer-term solution. We need to work with our military veterans to make sure they're aware of the opportunities. They deserve it. They served our great nation, and we do all we can at Blackfox to help promote that. With the new administration promoting more manufacturing in the US, the demand will be even higher!

Shaughnessy: *That sounds like a really beneficial program, Allen. Best of luck going forward.*

Dill: Thanks, Andy. **SMT**



Enhancing Recruitment Efforts with Public-Private Partnerships

by Susan Mucha

POWELL-MUCHA CONSULTING INC.

After nearly two decades of the dominance of the service economy, manufacturers in all industries have a challenge: recruiting and training the next generation of manufacturing employees. TeligentEMS, an EMS provider in Havana, Florida, has been addressing that challenge through collaborative efforts with educational institutions, other businesses and regional support networks.

"There are few skilled workers to hire so we've had to develop options for recruiting, training and retaining workers who are completely new to manufacturing," said Dale Starke, TeligentEMS' director of manufacturing.

Fortunately, Tallahassee has support resources in this area.

"About eight years ago, the president of Tallahassee Community College (TCC) called me and asked me to tell him my problems and how they could help. I was very forthcoming and TCC has been expanding its program to

meet our needs ever since. TCC has changed presidents since then, but the interest in supporting the manufacturing sector continues," said Chris Eldred, TeligentEMS' president and CEO.

As a community college, TCC provides multiple educational paths. Students can work toward an Associate of Arts or Associate of Science degree, a credential or simply retrain to acquire new skills.

"Our goal at TCC is to provide programs, credentials and degrees that help students get a job with family-sustaining wages. We are a demand-driven institution and we try to nimbly adjust our programs to support the needs of our region. We have a very strong commitment to workforce training and we listen to the needs expressed by our manufacturing community," said Jim Murdaugh, TCC's president.

The result of that initial dialog and collaboration with other electronics manufacturers in the area was the development of a Production Technician Certification program at Tallahassee Community College that includes IPC J-Std



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and IPC-A-610 workmanship standards training along with other key skills training.

TCC has recently purchased an SMT line and is now working with the company on a syllabus and courseware for a program that will train SMT production associates in a one-month period. In the interim, they are offering an introductory one-week program.

TCC also has computer-numerically controlled (CNC) machines and has set up a CNC training class. This is beneficial to the EMS provider because its electromechanical assembly operations require some CNC equipment use.

The company's commitment is that they will interview all students who complete TCC's electronics manufacturing-related programs if they choose to apply for a job.

"In terms of career options, manufacturers provide transformational jobs for people who don't necessarily learn well out of a book. And just as we fill a gap by providing career options for people who like to learn and advance by doing, TCC fills a gap by attracting and offering

hands-on training to people who are looking for a career with advancement potential that doesn't require a four-year or even a two-year degree," Eldred added.

Graduates of the TCC programs are also computer-literate, a skill that has become critical in manufacturing. There is a PC in front of most production associates at this EMS provider. The company has developed a proprietary suite of tools known as Possible-X, which is predominately focused on supporting materials availability and specificity, real-time shop floor control, and documentation control. Possible-X's production dashboard, known as p-Dash was designed to ensure production associates had the information necessary to do their jobs in a user-friendly format. Associates must log in using their ID number. They utilize the system to clock in and out, plus access all documentation related to their jobs, which is typically displayed at workstation monitors. p-Dash also facilitates movement of cross-trained associates among different work areas as demand varies, since documentation access is linked to work order. This ability to keep everyone fully loaded in a facility where different production areas may have varying demand improves efficiency and ensures competitive cost. The system's log-in access requirement supports both intellectual property protection and ITAR compliance.

p-Dash also lets associates open support tickets, which text a message to an engineer whenever a production issue arises that the associate needs help with. This helps ensure that issues that could impact product quality are corrected immediately by a team member appropriately trained to address the issue.

TCC represents just one tool in the company's toolbox. A local staffing agency is used to help recruit and screen production applicants, as well. And a robust onboarding process helps ensure new employees have support as they learn new skills.

"We use Predictive Index (PI) testing in our initial screening activity. The staffing agency administers the test. We are specifically looking for people who pay attention to detail. We analyze the results and place the applicants in production work cells we think are best suited to their skills. We reassign if further anal-



Figure 1: TeligentEMS' real-time systems drive a need for computer literacy at all employee levels.

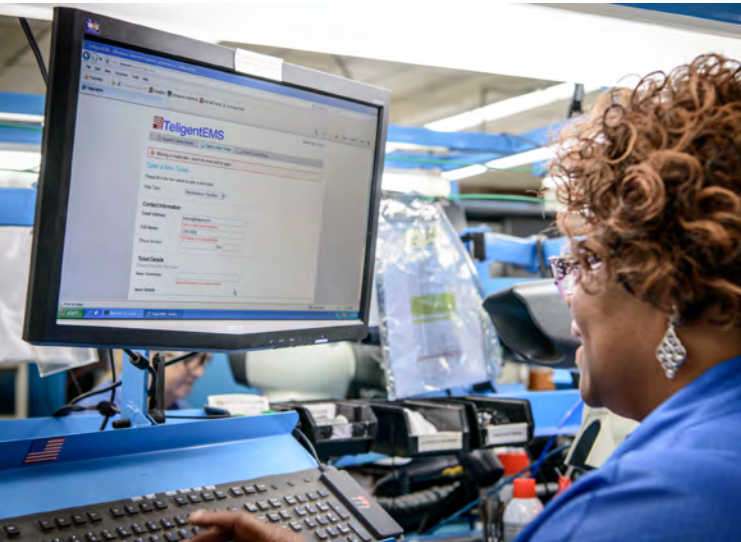


Figure 2: TeligentEMS can summon engineering support via an online request system which then texts an engineer.

ysis finds they are better suited for tasks in a different work cell because we want to give every associate the best opportunity to succeed. Entry-level production associates typically start as temporary hires through the staffing agency. We hire them as full-time employees once they and we are both sure it is a good fit,” said Constance McFatter, TeligentEMS’ human resources manager.

The company’s onboarding process includes basic training in OSHA-required practices such as handling lead solder safely, workplace safety training, ITAR and ESD protection. New employees work on a buddy system with an employee mentor who has been trained to appropriately coach new employees.

“One of the challenges for new employees is that they often have no familiarity with a manufacturing environment. Our employee mentors help bridge that gap by coaching them in language they can understand instead of confusing them with acronyms and technical concepts that they are still trying to learn. A new employee stays in the buddy system until they fully understand the functions they are expected to perform,” said McFatter.

Solderers and SMT operators go through classroom training at TCC that covers J-STD, IPC Class 2, IPC-A-610 and repair operations. The rest of the training is done on-the-job by internal resources. There are defined skills competencies for each work cell and typically three-to-four pay grade levels in each work cell.

“We are strong believers in the use of Lean practices on the manufacturing floor and having a workforce that can shift among work cells as demand shifts is a core part of our manufacturing philosophy and competitive edge. To that end, we cross-train production associates



Figure 3: Associates in the SMT area are cross-trained for multiple jobs, adding variety to their workday.

and have systems in place such as p-Dash to ensure they have access to the information they need to do multiple jobs. Our goal is to have 40% of our associates cross-trained,” said Starke.

A key benefit of the production associate skills certification system is many paths to advancement. Production associates have the ability to advance to higher levels in a single work cell by completing training and passing a competency test and can also advance by mastering skills in other work cells to become a multifunctional production associate.

However, the advancement opportunities don’t stop there. Each work cell has lead operators, who are essentially first line supervisors.

“We offer soft skills training in leadership interpersonal skills and stress management as part of our group lead training activities. We also allow people who decide they have grown tired of being a lead to migrate to other positions on the floor. This ability to change career path helps with retention plus ensures continuing availability of lead positions,” said McFatter.

Another popular benefit is a modified workweek. SMT and selective solder work cell employees have the choice of a 4/10 or 3/12 workweek. The 4/10 workweek is four ten-hour days, Monday through Thursday, on first or second shift. The 3/12 workweek is three twelve-hour days, Friday through Sunday, on first or second

One Employee’s Story

Bethany Rinehart is a TeligentEMS SMT operator who discovered manufacturing through the Tallahassee Community College (TCC).

“I was working in a dead-end restaurant job with no chance of career advancement. My employer hired people with the skills they need for higher level jobs instead of training and promoting from within. I decided I needed to look for a career where I could grow and get promoted. As a single mom, I couldn’t afford to spend two years in college. So, I looked at TCC because they offered shorter-length programs,” Rinehart said.

TCC’s Manufacturing Center had a one-week class designed to introduce people to SMT production.

“The TCC program was one week, and they told me they would be able to immediately introduce me to an employer interested in hiring me. I took a week of vacation and completed the program, and then I was hired by TeligentEMS. That process really fit what I was looking for,” she added.

Rinehart had some familiarity with soldering because both her father and fiancé had done soldering in support of their hobbies. But for the most part, manufacturing was a new frontier for her.



Bethany Rinehart

“When things get fast-paced, working in an SMT area is a lot like working in a restaurant kitchen. SMT operators rotate among offline setup, SMT production and automated optical inspection (AOI). I like that variety. Initially, there was a lot to learn both in terms of the equipment and things like ESD protection,” Rinehart said.

But the real benefit was quality of life.

“This job is much less stressful than working in a restaurant and less physically demanding. We all get old. When I worked at the restaurant I came home exhausted and fell into bed. Now I’m working while my daughter is in school and I come home and still have the energy to be awake and play with her. The 10-hour, four-day workweek is also nice because I get a three-day weekend. And I like the predictable schedule instead of the variable shifts found in the hospitality industry,” she said.

Benefits and advancement were also a consideration.

“The restaurant didn’t offer health insurance and I couldn’t afford Affordable Care Act (ACA) insurance premiums. Now I’m able to afford health insurance for my family through TeligentEMS’ plan. I can see a path for advancement here. This is a company I can grow in.”



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ond shift. Employees on the 3/12 workweek are paid for 40 hours, which gives them a four-hour bonus.

"No one wants to initially work the weekend shift, but once they try it is almost impossible to get them off because they end up with more free time thanks to the longer days and four-hour bonus. At this point it is limited to two work cells, but we may expand it over time," said Starke.

The company is also looking at adding internships later in the year.

"We see paid internships as a good way to supplement our team while helping engineering students get some real-world manufacturing engineering experience. This year we are looking at adding an engineering and quoting intern and will likely collaborate with Florida State University (FSU) to find them," said Eldred.

Company executives also try to give back some experience to the educational and business community. Eldred serves on a Gap Committee at FSU that provides funding to start-up businesses that have R&D that could turn into intellectual property. Ken Gamber, Teligen-EMS' engineering manager serves on an advisory committee for FSU's College of Engineer-

ing. McFatter participates in a manufacturing and construction focus group sponsored by Career Source Capital Region that is discussing regional workforce educational needs and strategies for attracting employees that may want more flexible working options.

"We are fortunate to be located in a region that is rich with educational resources and political leadership that recognizes the benefits of economic diversity. As a manufacturer, having support infrastructure that starts the conversation by asking, 'how can we better help you succeed,' is the single biggest competitive advantage I can think of. And, the end result of that type of collaboration is a win for us, a win for employees who want to reach their full potential and a huge win for the community overall," said Eldred. **SMT**



Susan Mucha is president of Powell-Mucha Consulting Inc. She can be reached [here](#).

Real Time with...IPC: Alpha Highlights Solder Reclaim Technology

Mitch Holtzer, director of Americas Reclaim Business for Alpha Assembly Solutions, discusses the company's reclamation technology, where it takes solder dross, used solder paste, and solder paste debris and converts them into reusable soldering materials. He also talks about how solder reclamation can help sustainability efforts, and how it helps customers when it comes to their waste materials, such as the dross from their wave soldering machine as well as the debris associated with printing solder pastes.

[Watch the Interview Here](#)





2017 Programs

May 10

Wisdom Wednesday
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Webinar

May 16–18

SMT Hybrid Packaging 2017
System Integration in Micro Electronics
IPC Hand Soldering Competition
Nuremberg, Germany

Exhibition

June 5

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Environmental Product Requirements
Silicon Valley, CA, USA

Conference

June 7

Wisdom Wednesday
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Webinar

June 7

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Environmental Product Requirements
Chicago, IL, USA

Conference

June 9

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Conference

June 27–28

IPC Reliability Forum:
Emerging Technologies
Dusseldorf, Germany

Conference

July 26–27

IPC Technical Education
Best Practices in Design
Chicago, IL, USA

Workshop

September 17–21

IPC Fall Committee Meetings
Held in conjunction with SMTA International
Rosemont, IL, USA

Meeting

October 3–4

IPC & WHMA Wire Harness
Manufacturing Conference
Paris, France

Conference

October 3–4

IPC Technical Education
Paris, France

Workshop

October 10

IMPACT Europe
Brussels, Belgium

Meeting

October 17–19

IPC Flexible Circuits-HDI Forum
Tutorials and Technical Conference
Minneapolis, MN, USA

Conference

November 8

IPC Technical Education
held in conjunction with PCB Carolina
Raleigh, NC, USA

Workshop

November 14–17

IPC Committee Meetings
held in conjunction with productronica
Munich, Germany

Meeting

November 14–17

IPC Hand Soldering Championship
held in conjunction with productronica
Munich, Germany

Competition

December 6–8

HKPCA International Printed Circuit
& APEX South China Fair
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Conference
and Exhibition



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Electronics Industry News

Market Highlights



Average Contract Price of 4GB DDR4 DRAM Modules to Climb 12.5% Entering 2017

DRAMeXchange, a division of TrendForce, reports the general price increase in the PC DRAM market is growing larger than anticipated as the already tight supply situation is compounded by quality problems with products made on the leading-edge processes.

Worldwide Spending on Cognitive and AI Systems to Hit \$12.5B in 2017

A new update to the Worldwide Semiannual Cognitive Artificial Intelligence Systems Spending Guide from International Data Corporation (IDC) forecasts worldwide revenues for cognitive and artificial intelligence (AI) systems will reach \$12.5 billion in 2017, an increase of 59.3% over 2016.

China's IC Industry to Embark on a Major Recruitment Drive This Year

TrendForce's latest analysis on China's semiconductor sector reveals that the country's domestic IC manufacturers are affecting the movement of industry talents worldwide as they continue to aggressively headhunt for senior managers and engineers.

Global IT Robotic Automation Market: Improved Efficiency Encouraging Adoption

A recent report by Transparency Market Research observes that the IT robotic automation technology is in nascent stage and highly consolidated, with a few players holding control over the global market. According to the report, the global IT robotic automation market will have an opportunity worth \$4.98 billion by 2020.

Increasing Demand for Consumer Electronics to Boost Global Flexible PCB Demand

According to a new study by Transparency Market Research, the global flexible PCB market is expected to increase to \$33.39 billion by 2025, up from \$13.51 billion in 2016.

Technological Advancements in the Defense Markets

According to a research published by Global Market Insights, the defense market size is anticipated to exceed \$10.5 billion by 2023, growing at a CAGR of 6.1% from 2016 to 2023. The growth can be attributed to innovations and advancements made in defense technology.

U.S. Companies Still Hold Largest Share of Fabless Company IC Sales

Fabless IC suppliers represented 30% of the world's IC sales in 2016, up from only 18% in 2006, according to IC Insights' latest McClean Report.

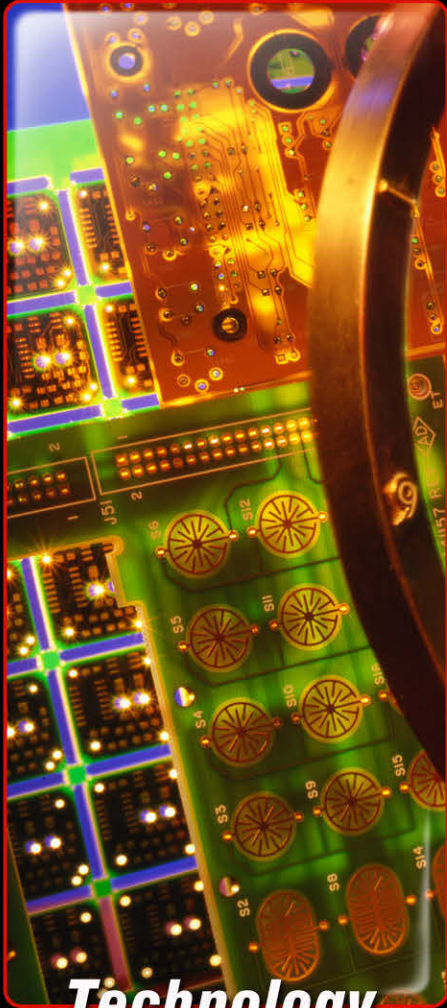
Semiconductor Industry Sets Out Research Needed to Advance Emerging Technologies

A coalition of leaders from the global tech, defense, and aerospace industries, led by the Semiconductor Industry Association (SIA) and Semiconductor Research Corporation (SRC), has released a report identifying the key areas of scientific research needed to advance innovation in semiconductor technology and fulfill the promise of emerging technologies such as artificial intelligence, the Internet of Things (IoT), and supercomputing.

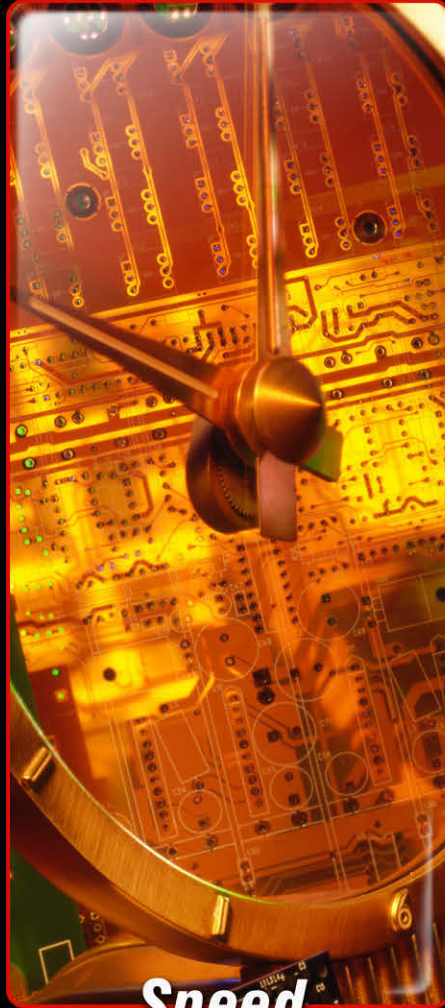


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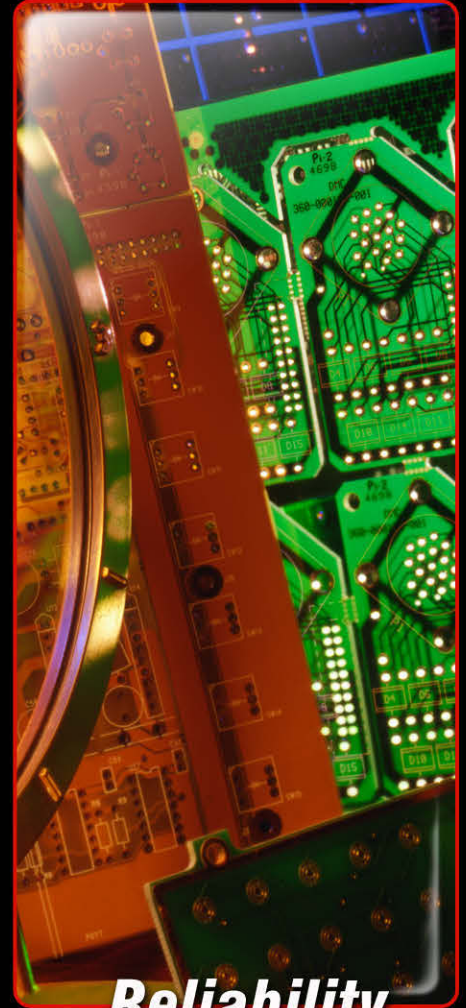
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Hiring, Training and Retaining Millennials

by **Davina McDonnell**

SALINE LECTRONICS

Shelly Phelps is the human resource manager at Saline Lectronics, where she manages recruitment strategies, disciplinary actions, and employee relations. Her role at the company also includes providing redirection for possible resolutions during communication breakdowns, interpersonal employee conflicts, and coaching opportunities with the management team.

In this interview, she discusses the greatest challenges when dealing with millennials, and how she thinks management and training should evolve for a more effective onboarding of this new generation of manufacturing workforce.

Davina McDonnell: *What are some of your greatest challenges when managing and leading millennials?*

Shelly Phelps: A few challenges I have noticed when dealing with the millennial generation are high expectations, low patience, and struggle when technology is limited or restricted. This generation grew up with rapid change of

computer access and all forms of technology. They prefer and expect rapid change when processes do not work. They have little tolerance and patience for changes that are delayed for long durations. They would prefer to streamline and speed up the process of learning their job and don't seem to embrace putting your time in for "moving up the ladder." Most millennial employees have significant difficulty in going for long periods of time being disconnected from their cell phones. A majority of the violations of our cell phone policy are from the millennial generation, although not all.

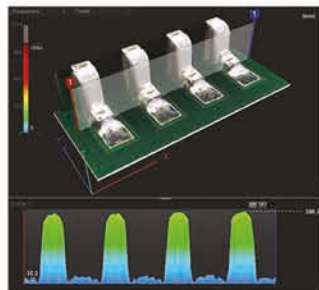
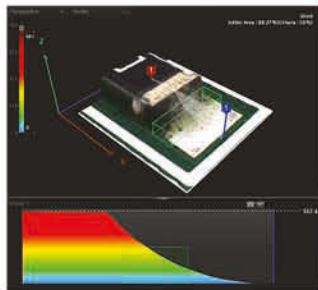
McDonnell: *With the increasing number of millennials joining the manufacturing industry, how do you see the evolution of the way you manage and/or train your team?*

Phelps: I see that millennials like a challenge, especially if you engage them in a specific goal or improving tasks. They like to take ownership in the process. They like to be engaged, and they get bored easily. The hands-on training seems to work well for millennials, if sufficient time





"RLC Electronic Systems is a full-service company specializing in the design and manufacture of high-quality electronic products. We continue to invest in the latest equipment and technology in order to meet and exceed our customer's high manufacturing standards. Our MIRTEC MV-6 OMNI 3D AOI system has increased quality and productivity throughout all phases of our production process. The system notifies our AOI technicians of any errors detected during inspection providing a high level of confidence in our PCB manufacturing process allowing us to create superior electronic solutions for our customers while maintaining a competitive pricing advantage." - Matt Giuliano, Production Manager



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Shelly Phelps

is allowed. However, the written trainings seem to pose an issue. Reading multiple documents posted on the company server, without any way to verify if they understand them, seems to leave major gaps. We have revised some of our training methods to accommodate this.

McDonnell: *Some analysts say that millennials have a difficult time being loyal to one company for very long. Do you find that to be true?*

Phelps: Actually, the loyalty issue is not isolated to the millennials. I am seeing that the lack of loyalty is not generation specific. The days where employees stay at one company for many years seem to be fading due to competitive wages and finding many other opportunities where skills can be transferred to other jobs.

McDonnell: *Do you think companies need to have a new set of engagement policies to accommodate the millennial generation?*

Phelps: Absolutely, we do need to find new and innovative engagement policies for millennials. This generation is not in favor of sitting around a table and discussing change. They would be more interested in “working meetings” where the task is in front of them and they are actively collaborating and making changes at the same time.

McDonnell: *What unique challenges do you find in training or managing millennials?*

Phelps: The most unique challenge is finding ways to constantly motivate millennials. It appears their motivation and drive seems to fade quickly. It is difficult to get them engaged and maintain full engagement. Because this generation is tech savvy, training documents where millennials need to spend a great deal of time reading on a computer or in printed format doesn't seem to be effective with retaining information. However, if we had a training program that included an app on their cell phones with some interactive questions to ensure understanding, I believe we would see a drastic improvement with effectiveness in training.

McDonnell: *How do you inspire millennials to strive more and perform better?*

Phelps: I encourage millennials to present their ideas to their leads or management. They will be the upcoming experts and we need to listen to their fresh new ideas that promote change for improvements to stay competitive. I also impress upon them that there are always opportunities to grow and look for them. I encourage them to speak up with sharing their thoughts and ideas. I inspire millennials to work with other teams and learn as much as they can because you never know where all the accumulation of knowledge will take them. No one can ever take away what they have learned.

McDonnell: *What advantages are you finding that millennials bring to the table?*

Phelps: Millennials are tech-savvy and grew up when technology exploded with fast-paced

changes, which in our industry is a huge plus. They can help us stay innovative with new ideas that the older generation never thought possible. They are more open-minded to possibilities. They embrace change, and therefore, they look for fast and constant improvements. They seem more willing to work in groups and communicate constantly. They want to be challenged and are not willing to settle for the adage “that’s how we have always done it.” They want to be engaged with process improvements and implement them quickly, which will help us stay competitive.

McDonnell: *The older generation will eventually vacate many leadership positions. Do you think millennials have the patience and perseverance to become leaders?*

Phelps: Yes, there are coaching opportunities available to show them the benefits of patience to persevere in the long run. Strategies can be taught to create understanding with the rationale behind the decision-making process. If we implement succession planning now, they will be ready and we could increase their patience and perseverance to become great and successful leaders. They prefer less aggressive leader-

ship styles and embrace more of the coaching leadership types.

McDonnell: *How do you attract millennials to join the company?*

Phelps: We actually do not target millennials specifically. However, they do seem to gravitate to our manufacturing facility. We offer opportunities for those who are unsure or sure of their career paths with entry level positions and opportunities to grow with the company. This grow your own approach has worked quite well for a lot of our employees – especially for those millennials who are willing to learn about PCBA manufacturing and work hard.

McDonnell: *Thank you very much, Shelly.*

Phelps: Thank you. **SMT**



Davina McDonnell is the director of marketing at Saline Electronics. To read past columns, or to contact her, [click here](#).

SMT Xtra Discusses Expansion Plans in the U.S.

During the IPC APEX EXPO 2017 event in San Diego, California, SMT Xtra’s Alexandra Stovin, marketing and public relations manager, and Paul Pittman, sales manager for the United States and Canada, speaks with Pete Starkey, technical editor at I-Connect007, about their company’s expansion plans in the U.S. and the benefits they offer their customers.

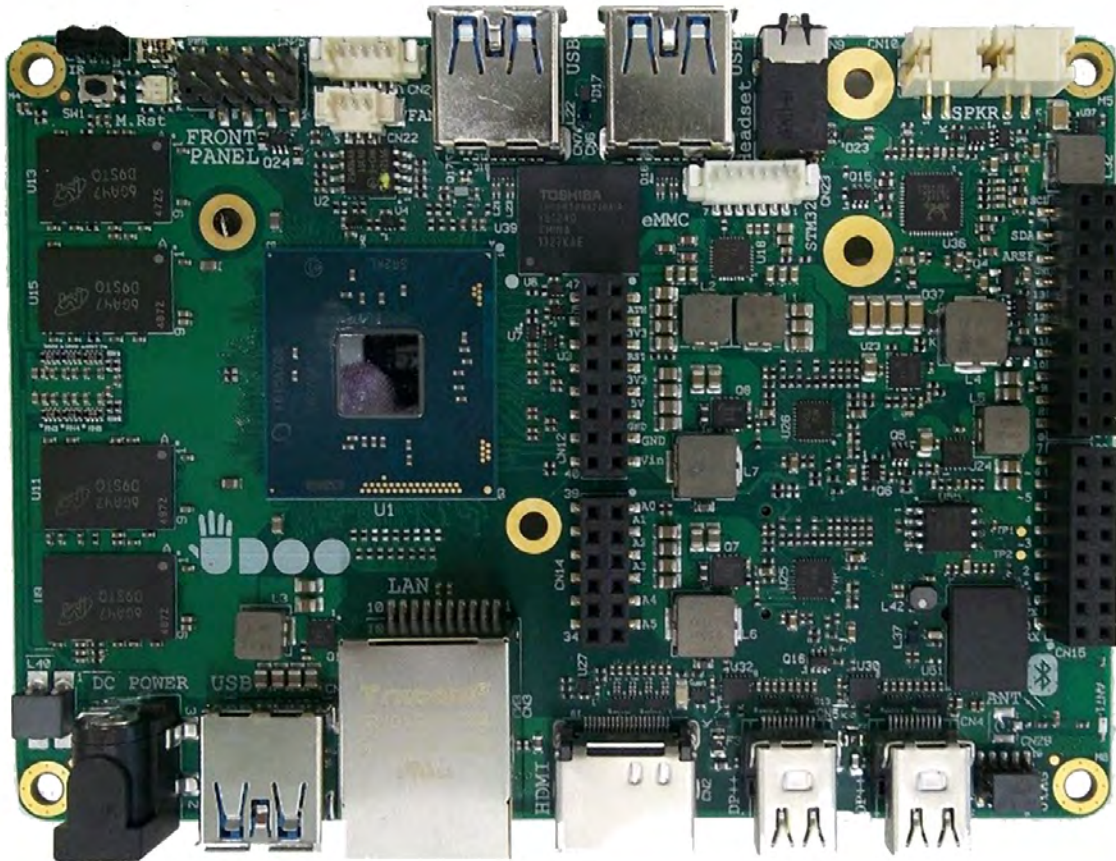
With offices and factories in the UK, Hungary, Spain, China, and now the United States, SMT Xtra has an established reputation within Europe as one of the top providers of SMT equipment with one of the largest available stock lists. Founded by its Directors Susan and Sean Cassidy, the company is celebrating its 10 years in the industry this year.



The company recently expanded into the United States. According to Pittman, the one big advantage to being inside the US is offering the same great prices they offer in the UK, while saving customers the transatlantic shipping time. “When we ship and I hold it in stock inside the U.S., duty claims don’t have to be done by companies, something which we do in-house,” he added.

And Pittman is bullish of the SMT industry in the U.S. right now. “I would say it is going to grow more in strength right now in the U.S., in my personal opinion.”

[Read The Full Interview Here](#)



Tape and Reel Solder Preforms: A Success Story for the UD00 X86 SECO Board

by **Donato Casati**, ALPHA ASSEMBLY SOLUTIONS,
and **Alessandro Severi**, PSM – SECO

SECO's latest product innovation, UD00 X86, is a real computer with an integrated Arduino 101 compatible board that is capable of running games and videos in 4K. In short, a board destined to revolutionize the technology available to product designers seeking to strengthen the connections between computers and daily life. The UD00 X86 is 10x more powerful than the Raspberry Pi 3, which is the world's most commonly used single board computer. Additionally, the UD00 X86 is compatible with all major operating systems (Android, Linux and Windows), which allows this small board to be used with all types of software, and in the most diverse operating environments.

Through a community of developers and managers who collaborate online to widen its potential applications, the technology of the

UD00 X86 is paving the way for new developments in software connected to household sensors, such as switching off lights for example.

The success of the UD00 X86 is impressive, but so is SECO's ability to develop this game-changing product with low-cost technology for mass appeal and affordability.

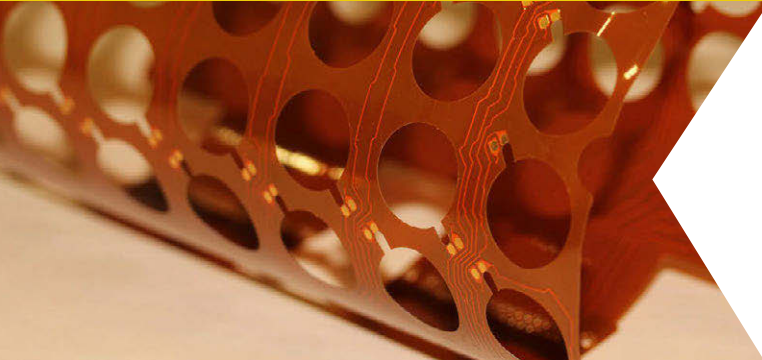
The Design Manufacturing Process

In designing the hardware of this board, aimed at a huge audience of electronics enthusiasts, SECO had some major challenges to address:

- to simplify the process in order to substantially reduce costs
- to guarantee the superior mechanical strength of the product and all of its soldered joints
- to guarantee the product's electric and electrochemical reliability

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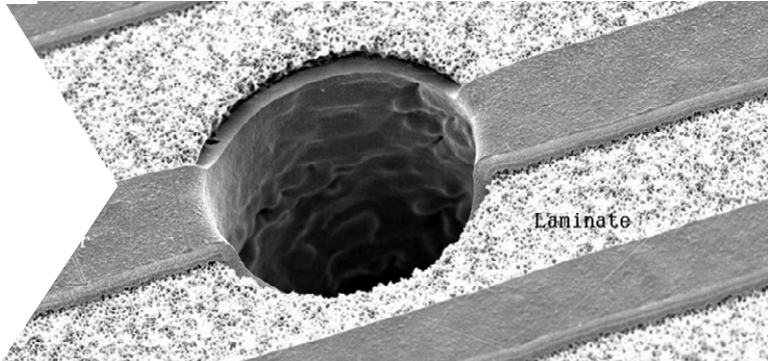
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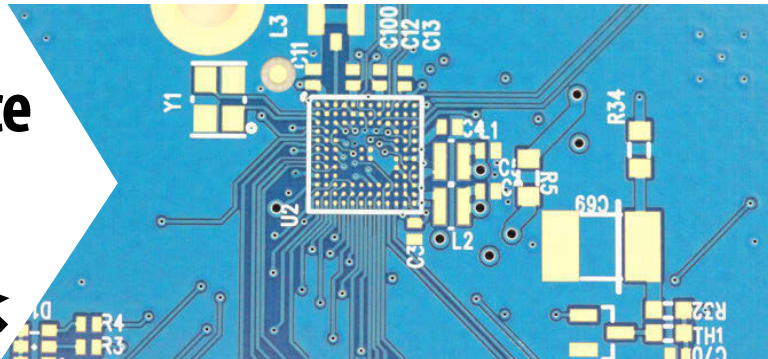
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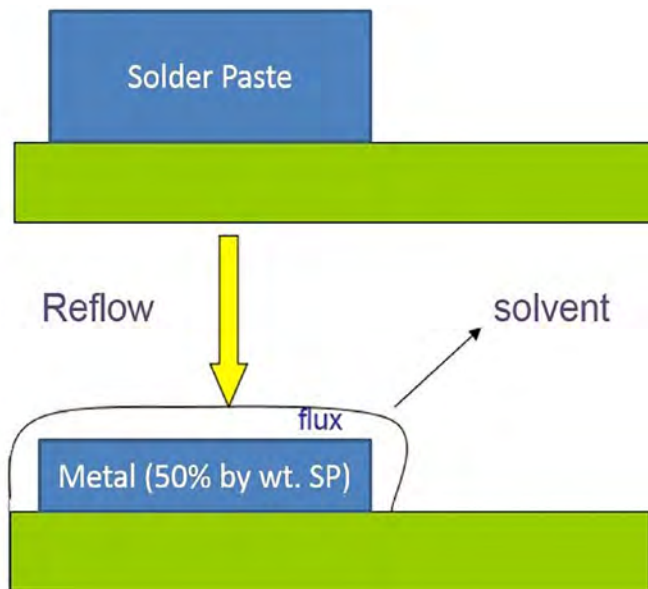


Diagram 1: The solder paste's 50% metal content refers to the weight of the metal.

The board has three connectors, with 12 PTH pins, which would conventionally be wave soldered or selectively soldered. To simplify the process, the decision made was to remove a step of the process to achieve cost reduction benefits. Initially, the focus was on eliminating the wave process, and replacing it with pin-in-paste soldering technology. This possibility was investigated and successfully trialed, but it did not entirely solve the other two major challenges mentioned above. First, the strength of the solder joint could not be improved because the maximum quantity of paste applicable with the pin-in-paste technique would not be sufficient to fill the hole in compliance with the IPC-610 Class II standard. Secondly, the pin-in-paste solution deposits a considerably higher quantity of flux than required, which creates potential risks to electrical reliability. In fact, considering that solder paste has a 50% metal content, it is often forgotten that this percentage refers to weight, but the situation is completely different for volume, as visually represented in the following diagram.

Ultimately, the solution proposed by Alpha engineers, in collaboration with the SECO team, was to implement solder preform technology. Solder preforms are small shapes of sol-

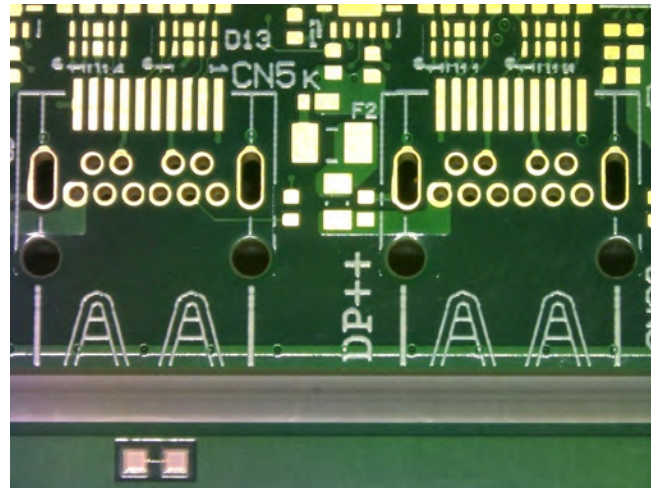


Figure 1: Connectors shown on UDOO X86 PCB.

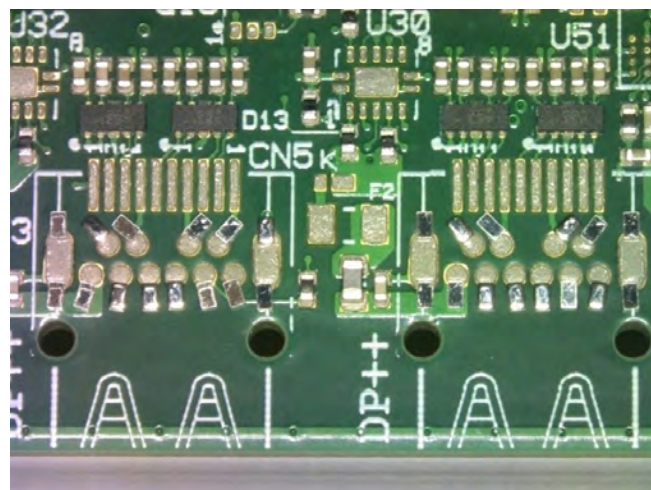


Figure 2: PCB after screen-printing process.

der alloy that are designed to add solder volume and improve reliability where conventional soldering methods fail to give satisfactory results. The solder preforms used for the UDOO X86 board were Alpha Tape and Reel 0402H size preforms that could be easily placed on the board using a standard pick-and-place machine common to all SMT lines.

A detail of the board layout can be seen in Figure 1, which highlights the two connectors.

In addition to 10 SMT pads, there are 14 classic holes for wave or selective soldering. Figures 2 and 3 show the appearance of the board

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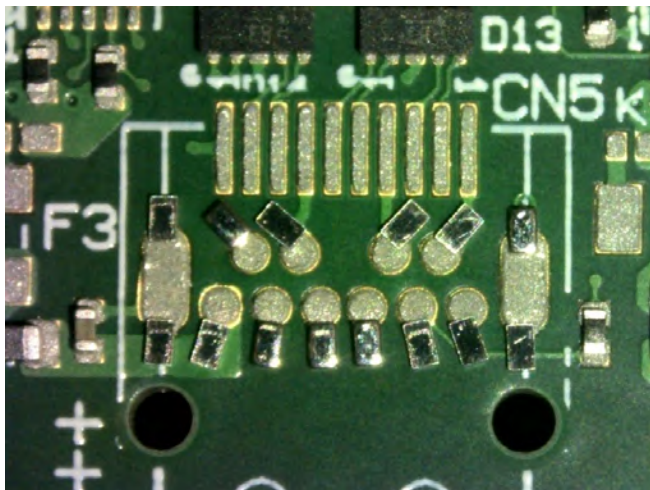
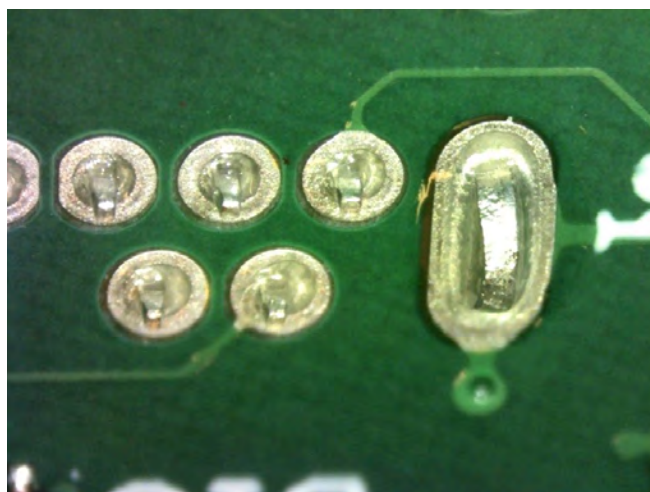
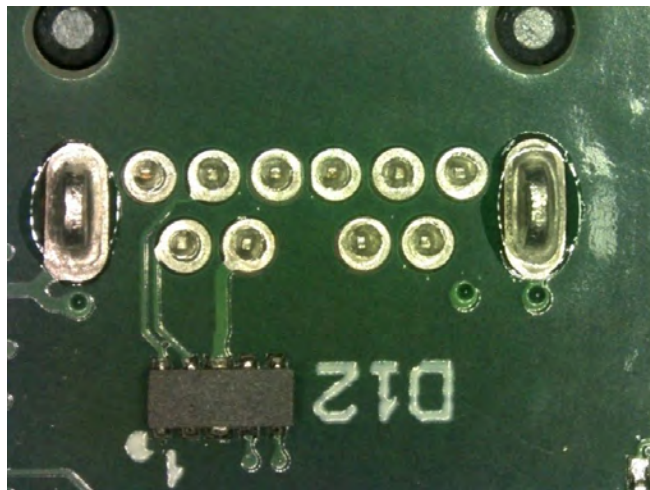


Figure 3: Preforms shown in position.



Figures 5 and 6: Bottom side of PCB after reflow showing no residual flux.

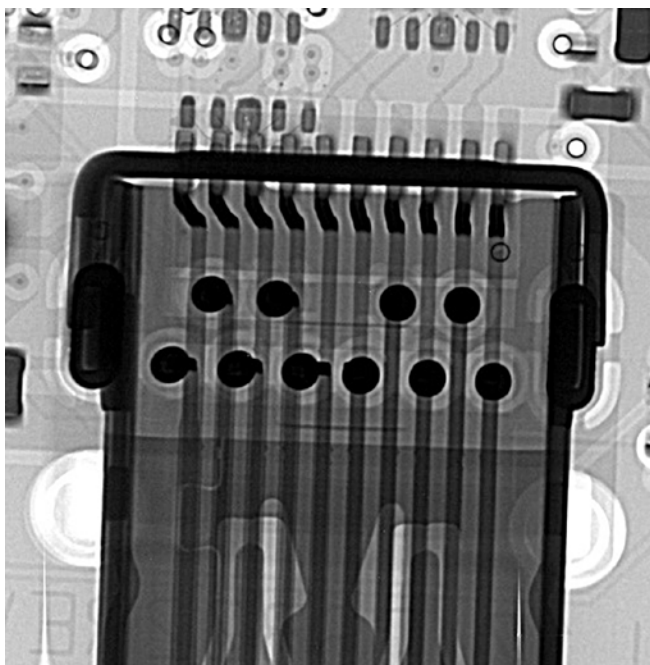


Figure 4: X-ray of PCB after reflow.

after the screen-printing process and the positioning of the preforms.

As Figures 2 and 3 suggest, the preforms must be in contact with the paste for two essential reasons: (1) they must be held in position; and (2) they must be reflowed using the flux contained in the solder paste, which is more than sufficient. Additionally, it is not absolutely necessary for the preforms to be immersed com-

pletely in the paste. In fact, as seen in Figures 2 and 3, only a minimum of 20% of the preform must sit in the paste deposit. During the reflow process, the molten alloy of the preforms is entirely drawn into the hole. It has also been proven that there is no risk of short circuit, even though the preforms are so close to each other. See X-ray in Figure 4.

Figures 5 and 6 show the other side of the board after the reflow process. It is evident that the hole has been completely filled. Furthermore, it is clear that there is no residual flux on the board, which would require washing or cleaning.

The Alpha solder preforms allowed SECO to simplify the assembly process, reduce costs,

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and increase reliability by achieving the following:

1. Elimination of the wave soldering process: Where the maximum component reflow temperature will allow it, as in the case of the UDOO X86 PCB, printing a small deposit of paste and placing a preforms can be a solution for eliminating a wave soldering process. This will reduce costs associated with equipment, masking, handling, electric utilities, washing and rework. By overprinting enough solder paste and placing a preform around the plated through hole to overcome the challenge of creating a volumetrically adequate joint, 100% hole-fill was achieved while generating an upper and lower solder fillet.

2. Increase the quantity of metal alloy for greater solder joint strength: The use of solder preforms allowed SECO to increase the volume of solder on the joints of surface mount components on the UDOO X86 board and eliminate voids; resulting in increased me-

chanical strength, where soldered joints exceeded IPC standards in first pass yields.

3. Guarantee electrical reliability: By reducing the amount of flux on the UDOO X86 board, the need for solvent cleaning was eliminated. This translates directly into cost savings in terms of cleaning materials and labor. More importantly, because residues present on circuit boards can cause current leakage, the reduction of flux helped to assure electrical reliability. **SMT**

Alessandro Severi is the PCBA factory leader at PSM s.r.l., the manufacturing unit of SECO. (No photo available)



Donato Casati is the sales manager for Italy and associated territories at Alpha Assembly Solutions.

Successful, Long-Term Growth at Prime Technological Services

Prime Technological Services is an electronics contract manufacturer who's been around for about 27 years. The company began principally with NPI work and prototyping, and has evolved over its nearly three-decade history to provide a full suite of services, excluding original design services. The company does a fair amount of DFM and design for test, reliability testing and failure mode analysis work, as well as box build or complete product manufacture for clients.

Prime has been featured on Inc. 5000 for four years in a row—quite a feat for a North American EMS company based out of Suwanee, Georgia. At the recent IPC APEX EXPO, I-Connect007 Publisher Barry Matties sat down with Prime CEO Greg Chesnutt to glean how they continue to find success and have been able to maintain such an impressive growth rate over the last four years in this industry.



According to Chesnutt, their strategy for this growth was to build the platform in terms of capital equipment, and have an excellent information architecture. "Culturally, sometimes when you're running a business, if you want something to become a reality in the business, the first important step is to believe in it, and the second most important step is to talk about it a lot," Chestnutt said. "So, we engaged our workforce. We engaged our market. We engaged the influencers in the business, which are probably no different for us than for any other Tier 3 North American EMS company, the distribution and design community. We told them we wanted to grow. More importantly, we backed up the desire with deliberate investment that was demonstrative of our intent to go try to make it happen. I know there's not a lot of secret sauce in that, but that's just what we did."

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Each SMTA Certification course is a three day course on topics in SMT Processes or Lean Six Sigma Green Belt. The program concludes with an open and closed book examination (SMT Processes) and open book exam (Lean Six Sigma Green Belt). This challenging examination requires both written answers and calculations with the intent to enable the attendee to establish competitive credentials as “Certified” by the SMTA in SMT Processes or Lean Six Sigma Green Belt.

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September 19-21 - Rosemont, IL

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November 14-16 - Dallas, TX

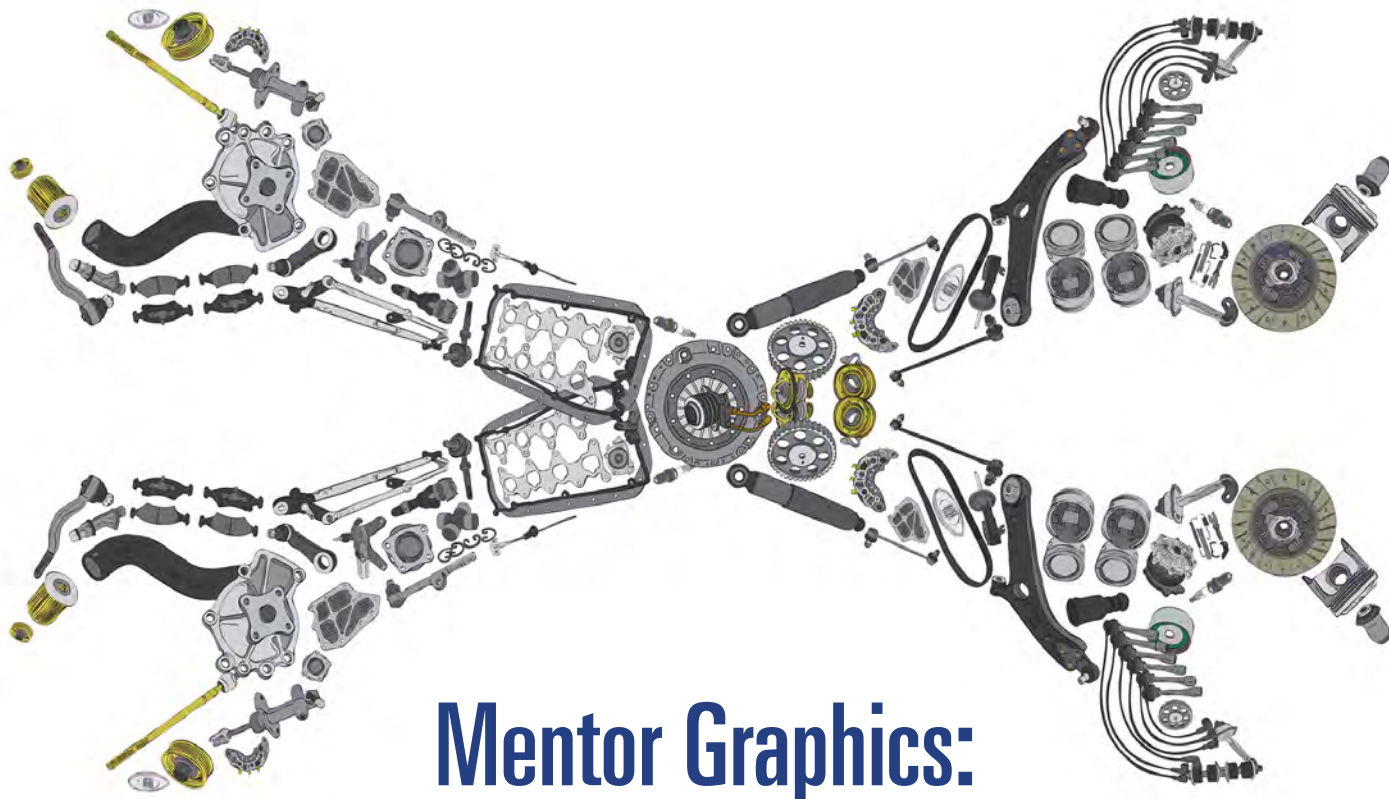
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Mentor Graphics:

Connecting the Manufacturing Environment

by **Stephen Las Marias**
I-CONNECT007

Oren Manor serves as the director of business development for Mentor Graphics Valor Division. His responsibilities include business ownership of Valor's engineering and pre-production tools as well as partnerships and OEM engagements. In this interview with *SMT Magazine*, Manor discusses the latest updates in their Open Manufacturing Language (OML) community, their case study regarding Phoenix Contact's implementation of their IoT solution in its facilities, and what's new in ODB++.

Stephen Las Marias: *Oren, please tell us briefly about Mentor Graphics and your role in the company.*

Oren Manor: Mentor Graphics is a rather large company, doing everything from IC design to PCB layout, and cabling system design into manufacturing, which is the Valor division. I'm responsible for all our partnerships in the Valor Division, managing business development with

our OEM partners, the machine vendors, and all other partnerships, whether it's for programming or for data connectivity.

I've been involved with OML because it requires cooperation from the machine vendors. I've been involved heavily in trying to evangelize and convince some of the machine vendors here that OML is the future and for the last 18 months, I've been promoting OML as a standard for the industry.

Las Marias: *What challenges are you seeing here at IPC APEX EXPO?*

Manor: Getting the data is a challenge. Everybody has it. There are a lot of proprietary interfaces here. If you walk through this floor, you will see hundreds of different proprietary interfaces where the protocols are different—one machine communicates to you via TCP/IP, one communicates over some kind of file-based protocol, or one has a database—and the data is different. I count in seconds, you count in minutes; I don't give you this data, you give that the data—it's a mess.

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Oren Manor

Then OML tries to consolidate the data to say, “Here are the events coming from a machine.” This is all the data that the machine needs to provide and there’s an SDK that explains how to do the communication over the network, which is reliable, secure, and efficient. OML makes some sense out of this mess of proprietary interfaces to promote a single language.

OML will greatly benefit all our competitors, so it will benefit every company out there that has some kind of traceability or MES solution—whether it is Aegis, iTac, Cogiscan, even SAP and the ERP vendors. They will all benefit since the ERP system cannot really access real-time data from the shop floor because it’s all proprietary, and SAP doesn’t develop drivers for all of these machines. OML acquires the data in real-time and is applied to real-world manufacturing shop-floor processes – it’s straightforward.

We’ve been getting a lot of traction with OML. We have more than 400 people in our OML community now and we have about 50 development partners. We see a lot of good momentum. I’m not sure that the industry can generate its own standard. This industry is known for de facto standards, and a good exam-

ple is ODB++, which is a de facto standard. It’s the best way to send data from design to manufacturing. The copyright is owned by Mentor, but the ODB++ specification is completely free. Anybody can get it and anybody can develop an ODB++ reader. That’s why most of the machines here know how to read ODB++ data. Just because the OML is pioneered and driven by Mentor, it doesn’t mean it cannot be absorbed by the industry.

Las Marias: *OML is open for everyone.*

Manor: Open for everybody. Anybody can go to the OML community website and get the OML specification. All we’re retaining is the copyright ownership, so we have the right to make changes, but anybody can use it free of charge, royalty-free, no licensing, and they don’t need to use any Mentor tool. In many cases, users have a flow that is completely comprised of non-Mentor applications. You don’t need to use any Mentor tool or Mentor software with it; you can use it in any kind of environment and I think that’s why the big EMS companies like OML so much. It allows them to get the data and use it in their home-grown systems. Because they’ve developed a lot of applications over the years, you can’t just strip them away now. OML allows them to use the data with their existing MES applications developed in-house and grown over the years.

Las Marias: *How has the OML community grown over this past year?*

Manor: Tremendously. We only started it about a year ago. It’s grown rapidly. We get very good, positive reactions from both the machine vendors as well as EMS vendors. Also now, with the fact that the CFX (Connected Factory Exchange), the standard developed by IPC, is in limbo at the moment, I think it’s hard to get consensus from the machine vendors, the EMS, and the OEMs about how to do this. Everybody has their own approach. It’s going to be challenging for IPC to get everybody here to agree.

Now, of course, we fully support and are part of IPC, but I’m not sure it’s straightforward to promote the CFX as an industry consortium.

It might be better if we just try to promote the OML as a given. OML is already on the table and available to everyone. You can adopt it now rather than wait three years for all these guys to agree on something—who knows if the end compromise is worthwhile?

We're engaged, we're working with some leading companies to enhance where we have limitations or where we need some additional information. We're getting good traction and good feedback from a lot of industry players.

Las Marias: *The Industry 4.0 and IoT are among the major discussions last year. Do you think everyone really knows what that is about?*

Manor: Probably not. At the end of the day, a lot of people want to buy an Industry 4.0 application or smart factory solution. It's challenging for companies to understand what to really do from a practical perspective and how to make it efficient. On the other hand, smart manufacturing does have some concepts and talks about Lean solutions; it talks about having very good data, and making real-time decisions.

The Industry 4.0 discussion provides two topics which are good to talk about: data and connectivity. How do I get data? How do I really read and collect real-time information? And the whole idea about big data analytics...once you collect the data, you have a significant amount of data—even if you're a small, two-, three-line EMS. If you collect all of the traceability and quality data from all of your machines, you need a big data solution. A traditional SQL database is not going to be able to hold that data, so you immediately fall into this big data segment and you need a solution for big data.

You will now understand that you need to solve your data collection problem. You need real-time data, but you can't trust the data fed by operators or collected manually. If you really want to know what's happening on the shop floor, you need to collect the data from the machine and you need a solution for the data captured if you want to do some analytics. People now are looking for these two applications because they understand that this is going to get them into this smart manufacturing domain.

Las Marias: *Exactly. And the solutions are available now, right?*

Manor: The solutions are available, but I think that if you go to most manufacturing shop floors around the world, this is not implemented. While it's available, the implementation is challenging and I would say that probably 80% of the shop floors around the world don't really have this kind of data collection. Most people still use traditional SQL databases; we see the volumes of data and that need to be constantly archived. You have to constantly flesh out data.

“ If you want to run quick analysis reports, you can only do it for one or two months of manufacturing. ”

If you want to run quick analysis reports, you can only do it for one or two months of manufacturing. It would be much better if you could run this analysis over two years of manufacturing—but the data chunks are just too big. So you need to implement a big data solution. And I think that the majority, or 90% of companies, don't really have a big data solution for their PCB assembly. That's something that companies are starting to understand and are starting to shop around for.

Las Marias: *Why do you think the implementation is very challenging for them right now?*

Manor: Because of the proprietary connections. At the end of the day, to get the data from all of these machines, you need a lot of drivers, you need to support all of these proprietary interfaces, and that's a challenge. If you have a mixed vendor environment—with different vendors for AOI and SPI and reflow and printers and pick and place and ICT—you can count 20 different drivers. Now, if you have even a mid-sized IT

organization, for you to develop all of these drivers is a challenge.

The second thing we see is that the data is not 100% accurate. Let's say you have a driver, but you're missing a couple of events; you're 95% there. You don't trust it anymore. I go to factories and they say, "Yeah, we collect all the data," but then I see somebody counting reels. So I ask him, "If you're getting all of the data, why are you counting the reels?" "Uh, we have some glitches. We don't trust it 100%." We'll be in heaven when I don't see anybody counting reels anymore, because the machine knows exactly how many components are on that reel. It knows how many were there, it knows how many were placed, and how many were dropped, so there's no mystery.

.....

“ It knows how many were there, it knows how many were placed, and how many were dropped, so there's no mystery. ”

.....

Now, if you tap into the data and collect all of it, you should know exactly how many components are there at the end of the shift. Still, people are counting because they don't fully trust their data collection systems because of the complexity. I think that's the main challenge.

Las Marias: And how is Mentor addressing those challenges for your customers?

Manor: Mentor's been developing these interfaces for about 15 years. We really have the knowledge of writing all of these interfaces, collecting all of the data, and testing it to know that we're 100% bulletproof. We've looked at all of the extreme use cases, we've looked at all of the scenarios, and we know that we're not missing any data. We released a device, the Mentor IoT Manufacturing solution, which aims to bridge this issue. It's not about selling a whole

EMS system, but selling an application to collect data in real-time.

Let's say you have a PC that's collecting data but is running some additional applications. Suddenly they're taking all of the CPU power and you don't have any more power. The idea with this box is that it's completely dedicated to data collection, so it's not going to miss any data.

Also, if there is an IT issue and the server is down, it has data retention capabilities of up to 72 hours where it will store the data locally. Then, once IT fixes the server and the server is back up, IT restores connection and the server can communicate to the box and say, "I've been out for 20 hours. What did I miss?" "Here's the data."

Our philosophy here is when you want to do traceability, you can have zero data loss because, otherwise, what's the point in implementing traceability where you have hours during the day or during the week where you didn't collect any data? Now you have to do the recall, but you don't really know which boards you've got to recall. It's only effective if you have zero data loss and that's why we've put all of this effort around this dedicated IoT box, which ensures and protects the data we collect.

Las Marias: Phoenix Contact recently implemented your IoT solution to their processing line. Can you tell me a little bit about that?

Manor: Yeah. Phoenix Contact is definitely a big player and a big promoter of Industry 4.0 in electronics manufacturing. They have a very sophisticated factory in North Germany. They've been using some of our solutions for a couple of years but they've migrated to this IoT environment because they do a lot of custom development. For their custom applications, the IoT box together with OML was very compelling to them to get all the data from their machines. Phoenix Contact then uses OML to get the data to their applications, which their internal IT organization manages.

They wanted the traceability data, the quality data, the material data, but they wanted to be able to customize things, so this a perfect solution for them. What was appealing for them is

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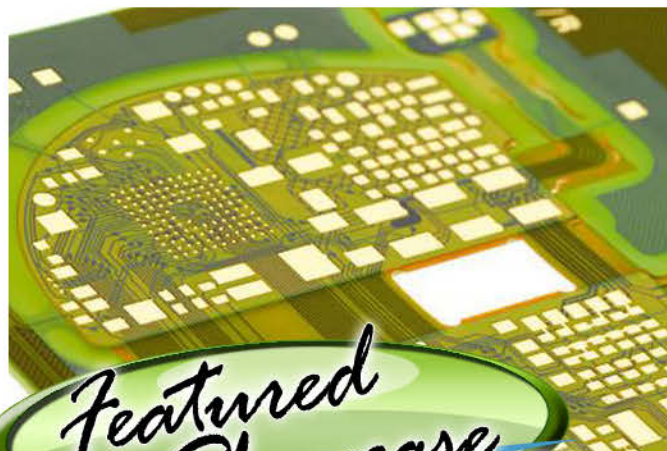
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the plug-and-play approach of the Mentor IoT Manufacturing technology. You take the box, you connect it to the machine, you identify it immediately, and it hooks up. It's a very easy deployment solution and also, from an IT perspective, you can monitor all of the boxes, so you know that all of the boxes are connected.

In the past, somebody could come and stop the connection to the machine and play around with it. Now, IT immediately sees that there is no more connection on the box and they can call the guy in the shop-floor and say: 'What's going on? Why did you remove the box?' This really allows IT to control of the data collection, and for the site manager, when he gets his OEE (overall equipment efficiency) numbers, he knows that this method is bulletproof and correct because this is an independent box which is collecting the data. It's always connected and we really know the OEE.

For the management of Phoenix Contact, this was very appealing in their desire to access very accurate OEE numbers so they can decide when they need more lines to extend their capacity.

Las Marias: Do these IoT boxes accommodate both new and legacy equipment?

Manor: Yes. The idea is that we support all of the big players in this industry, all of the leading pick-and-place machines and AOI machines, and we can really put a box next to every machine. The box is versatile; if it's an intelligent machine, users can connect via TCP/IP and an Ethernet cable to acquire the data. If it's an older machine, the customer can connect to a sensor, to scanners, to the light tower, and collect data from the peripherals around the machine to have the full picture. This is also something that Phoenix liked about it because not all lines are state-of-the-art. Everybody has older lines, legacy machines, but they still want to collect the data. The box is dynamic enough to work with both the high-end machines and the latest machines, but also older machines which need more legacy kind of interfaces.

Las Marias: Would you consider the IoT box a one-size-fits-all approach?

Manor: No. We're going to have different boxes. We're going to have a box for the manual assembly stations. Definitely when it's a manual process, it needs to be a little bit different than where there's a machine. You might need a display or you might need some peripheral equipment to input data, so we're going to see more of that. We're going to be focused on the post-SMT stages, the manual assembly, the boxing, the shipping, and the cabling, because our customers, at the end of the day, build an end-product. Whether it's an automotive infotainment system, whether it's some kind of aerospace equipment, whether it's a consumer electronic, it has a screen, it has a PCB inside, it has cabling, it has plastics inside, and that's what they want to build.

Customers are not interested in a solution which is very narrow and just answers their need on the PCB assembly. They're going to look for a box which can accommodate all of the different processes and that's where we're going with this. We're also going to see more promotion of industry-wide protocols like OPC, which is very popular in the CNC plastics/metal. We're going to see these kinds of protocols drifting into PCB assembly, to merge and converge all of the different segments into one standard.

Las Marias: Like an end-to-end solution.

Manor: Exactly.

Las Marias: Oren, how do you see this year progressing in terms of Industry 4.0 or IoT?

Manor: We're going to see more and more automation and robotics. We already know that the robots are being used in the final assembly, but they're going to start moving more into the traditional SMT area. So I expect we'll see more use of robotics for automation, for mountain feeders on wheels, wheels on feeders, feeders on carriages, and carriages into machines.

Currently, where we see a lot of human beings, we're going to see less people and more robots. Definitely, I think this is a big trend, and the trend of more automation, especially in America with reshoring and this whole discussion about bringing manufacturing back to this

country. You cannot do it with the same level of human intervention, as you're doing it in low-cost territories.

As you're bringing manufacturing back from Asia over here, you're going to have to really automate and use increasingly more sophisticated systems, robotics, data collection analytics, to manufacture in America with better quality, but also with less people involved in the process. I think we're going to see this developing very nicely, allowing companies to really look at the cost structure and saying, 'Okay, maybe we can really build this in the United States if we can be more efficient, use less people, be quicker from design to manufacturing, be closer to our customers and also closer to where we design products and have less shipping costs and be easier for us to make revisions and design spins.' I think we're going to see this reshoring initiative drive automation.

Las Marias: *What's the next technology development at Mentor?*

Manor: I think the other thing to add is big data. We collect all the data; although that's nice, the value is in the applications. We see the value being mostly in material. The ability to be dynamic about material replenishment, knowing how to send the material in time, managing the material, having the ability to be Lean in your material in the warehouse, kit just before you're going to use this, and to refrain from unnecessary changeovers and unnecessary kitting.

The other thing is how to use all the data in an application. Unfortunately, you cannot go out there and buy a big data solution from the big guys like SAP HANA, Azure or HADOOP. There are a lot of solutions out there which are big data, but they're not tailored to the PCB assembly, and I think it will take any EMS or large OEM two to three years to customize that kind of system specifically for the PCB assembly area. Anybody who has a big data solution specifically for PCB assembly, like the one we've been developing for the last couple of years, is going to get some traction because people are going to want to do something with all of this data.

We're going to be promoting our big data business analytics solution. This applies not

only to data we collect, but also to data coming from other sources, so the customer can collect it from processes with his own IT equipment and push it into our solution. Some of it might come from our IoT box, some of it might come from third parties, but at the end of the day, this is a centralized, multi-site, enterprise-wide solution that really gives the customer insight into manufacturing.

Las Marias: *Oren, can you talk about the developments happening in ODB++?*

Manor: Sure. ODB++ was pioneered by Valor about 15 years ago. When we started doing DFM checks, we didn't have good enough data to do that. We needed very accurate component shapes and we had to know where the components were so we could check whether things could really be built. Back then, everybody was sending Gerber data, which was just not intelligent enough. That's why we developed ODB++ as an intelligent data format stemming from design, layout systems, and into manufacturing.

“Back then, everybody was sending Gerber data, which was just not intelligent enough.”

Today, all of the layout systems out there, whether it's Cadence Allegro, Zuken, Mentor, Altium, they all export an ODB++ file which then can be sent to manufacturing, whether you're EMS or an OEM. It's a very intelligent file in the sense that it has all of the data inside, so the manufacturer can easily build the model and manufacture this PCB without asking a lot of questions.

This is really a way to reduce a lot of innovations between manufacturing and design questions, and making this design-to-manufacturing flow much more efficient and much leaner. We've done a lot of additions into ODB++

over the last couple of years. One of the biggest things that we've added is the whole support for flexible and rigid-flex PCBs. A lot of work has been done in these kinds of multi-layered, multi-stack-up PCBs, which are being used in cellphones and wearables. Now, ODB can nicely represent them.

We will continue to enhance the data model so customers can pass all of the data around PCBs into manufacturing to minimize and make this design-to-manufacturing flow as lean and as quick as possible.

Las Marias: *So, it is indeed like a de facto standard, right? Everyone is already using it.*

Manor: Everybody has been using it, most of these machine vendors out here, their applications can read it. We provide a free viewer, and there could be somebody developing a non-Mentor layout system, sending it to an EMS which is using non-Mentor applications for manufacturing, and they could be using ODB++. We believe that ODB++ is best because we try to make use of all of the data and all of the intelligence in the format. There's nothing prohibiting any of the other vendors here to use of ODB++.

.....

“There's nothing prohibiting any of the other vendors here to use of ODB++.”

.....

We do help any vendor which comes to us and says, “I have a question. I have an issue. I want to support ODB++.” It's completely open. While we do own the copyright and maintain the specification, we're trying to really do what is the best of the industry.

Las Marias: *Oren, is there anything that we haven't talked about that you think we should be talking about?*

Manor: That's a good question. One thing that would be good to talk about is this whole notion of planning. I think all of the major machine vendors here sell a very accurate, flexible, and fast machine. The machine is great, comes with amazing specs, but then the manufacturer only gets like a 60% OEE. He goes to the machine vendor and says, ‘Why am I getting this OEE?’ The reason usually is the high-mix environment. We're seeing more and more high-mix, even segments which were traditionally high-volume, low-mix are starting to move to a higher mix, lower volume, and lower lot size.

We even talked about lot size where this guy's making just one PCB of each product. Maybe it's a high-end missile, maybe it's a satellite, or maybe it's just that the product is so customized that every product is slightly different. Then the PCB has to be different and you're making all of these revisions. At the end of the day, your lot size is one and then it's all about planning. It's all about making sure that you plan properly – we're seeing more and more customers understand that planning today is just not good enough.

They plan with white boards, they plan with Excel files, and it's impossible for somebody to take all of these considerations into account. You need to think about your resources, how many operators you have and how many stencils you have. You have to think about materials. Do I have enough material? You have to think about the calendar. When is my shift? When is my shift ending? You have to think about open profiles. I mean, you don't want to put a board with a low profile after a warm profile because you have to let the oven cool and that can take a couple of hours. There are a lot of considerations, and without a tool that takes that all into account, simulates that, and builds a good plan, it's impossible to really get good utilization from the machines.

Now, we see a couple of vendors here on the floor having and promoting a grouping and planning solution. We're also promoting a planning solution, and we've really been investing in this solution for the last couple of years to simulate all of the different factors in the production floor to create a feasible plan--not theoretical, but a really optimized plan. It

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must take into consideration everything around the number of people I have today, the machines' availability, the shift, the material, everything around jigs and stencil because, just as an example, maybe the most efficient thing would be manufacturing the same product on two different lines. But if I only have one stencil, I cannot do that.

Maybe it would be best for me to work in a third shift, but I don't have enough manual operators and I can't train them. The machines are there and it's easy to take them and understand them, but there are a lot of other things which are very finite in the factory for the next 24 hours. I can't really impact too much of the factory in the next shift. Now it is, 'How do I model that and how do I assimilate that in order to get the best plan for the next shift, and so on?' That's what we're putting an effort on smart manufacturing and Industry 4.0, and also a deeper look into planning.

Las Marias: *Is it already available?*

Manor: It's already available. It's called Valor Production Plan. It's available today and it's really, in my opinion, the leading solution of its kind. A lot of solutions out there can do infinite planning, but that's good only for longer term



when you can influence your resources. I think we're the only vendor who can really do finite planning and take into consideration all of the restrictions that we have at this point.

It's definitely a part of our MSS portfolio for the shop floor and it's something where we're seeing a lot of advantages and a lot of traction

with our big customers, which might have their own MES solution. They've done that so they're not really shopping for an MES solution today, but planning is not something that they understand and it's really too complex to be an Excel file, honestly.

Las Marias: *Are you seeing interest in this solution?*

Manor: Very much. A lot of interest and a lot of demand and a lot of need in the industry for something like this, both from the machine vendors, the end customers, the ERP guys. Everybody understands that today, they cannot really do this.

Las Marias: *I see. Oren, thank you very much for your time.*

Manor: Thank you very much for having me.
SMT

Real Time with.IPC: Ray Prasad Discusses Revised IPC-7530 Reflow Profile Guidelines

IPC Hall of Famer Ray Prasad, chairman of the IPC-7530 committee, provides I-Connect007 Guest Editor Joe Fjelstad an overview of the newly revised IPC-7530, which provides users with guidelines on how to successfully profile and characterize PCB assemblies with high levels of efficiency.

[Watch the Interview Here](#)



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Zentech Manufacturing is Hiring!

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Established in 1998, Zentech holds an ultimate set of certifications relating to the manufacture of mission-critical printed circuit card assemblies, including ISO:9001, AS9100, DD2345, ISO 13485, maintains an IPC 610 Trusted Source QML status, J-STD 001 with Space Certification and is ITAR registered.

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Arlon EMD located in Rancho Cucamonga, California is currently interviewing candidates for manufacturing and management positions. All interested candidates should contact Arlon's HR department at 909-987-9533 or fax resumes to 866-812-5847.

Arlon is a major manufacturer of specialty high performance laminate and prepreg materials for use in a wide variety of PCB (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 PCB's (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: 2008 registered, and through rigorous quality control practices and commitment to continual improvement, we are dedicated to meeting and exceeding our customer's requirements.

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Candor is an advanced printed circuit board manufacturer with a unique manufacturing process. We can genuinely stand out among conventional board shops due to our unique Simplified Process.

Join the Candor team, targeting rapid high quality prototype PCB manufacturing.

We are looking for industry experienced sales reps to manage current customers and find new leads in the USA. Candor is in a unique position to hire onto our team using a very generous sliding commission rate. Contact Sunny Patel for details.

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PROCESS ENGINEER

Responsible for developing and optimizing Lenthor's manufacturing processes from start up to implementation, reducing cost, improving sustainability and continuous improvement.

Duties include but are not limited to:

- Participate in the evaluation of processes, new equipment, facility improvements and procedures.
- Improve process capability, yields, costs and production volume while maintaining safety and improving quality standards.
- Assist in employee training and certification.
- Work with customers in developing cost effective production processes.
- Engage suppliers in quality improvements and process control issues as required.
- Generate process control plan for manufacturing processes and identify opportunities for capability or process improvement.
- Participate in FMEA activities as required.
- Create detailed plans for IQ, OQ, PQ and maintain validated states as required.
- Participate in existing change control mechanisms such as ECO's and PCR's.
- Perform defect reduction analysis and activities.
- Participate in technology roadmap planning.
- Participate in new materials, processing or other developments as required.

Experience & Education:

- BS degree in Engineering
- 2-5 years of proven work experience
- Excellent technical skills

Competitive salaries based on experience, comprehensive health benefits package, 401(k) and Quarterly Gain Sharing bonus available to eligible employees.

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SALES ACCOUNT MANAGER

This is a direct sales position responsible for creating and growing a base of customers. The account manager is in charge of finding and qualifying customers while promoting Lenthor's capabilities to the customer through telephone calls, customer visits and use of electronic communications. Experience with military and medical PWB/PWA a definite plus. Each account manager is responsible for meeting a dollar level of sales per month and is compensated with salary and a sales commission plan.

Duties include:

- Marketing research to identify target customers.
- Initial customer contact (cold calling).
- Identifying the person(s) responsible for purchasing flexible circuits.
- Exploring the customer's needs that fit our capabilities in terms of:
 - Market and Product
 - Circuit Types Used
 - Quantity and Delivery Requirements
 - Competitive Influences
 - Philosophies and Finance
 - Quoting and Closing Orders
 - Bonding
- Submitting quotes and sales orders.
- Providing ongoing service to the customer.
- Problem solving
- Developing customer information profiles.
- Developing long-term customer strategies to increase business.
- Participate in quality/production meetings.
- Assist in customer quality surveys.
- Knowledgeably respond to non-routine or critical conditions and situations.

Competitive salaries based on experience, comprehensive health benefits package and 401(k) Plan.

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Outside Sales/ Key Account Managers

Job Description NCAB Group USA is looking to add to our existing outside sales team in various U.S. locations; Ontario, California and Itasca, Illinois. We are looking for sales professionals with at least 5 years of Printed Circuit Board experience and/or Semiconductor experience and knowledge. This is a sales position that requires the ability to convert those cold calls into high-value customer meetings.

What are we looking for?

- A "hunter" mentality
- The ability to create solid customer relationships
- A desire to excel and not settle for mediocrity
- 5+ years of experience in the Printed Circuit Board or Semiconductor industry
- An excellent ability to present your product and do the "deep dive" during your customer visit by asking the open-ended questions and identifying your customer's pain points
- The energy to sell—from prospecting to cold calls to getting the "wins"
- Knowledge of "SPIN" selling
- A college degree
- An enjoyment to travel both domestically and globally
- Must be a U.S. citizen with a valid U.S. Passport

What's next? Interested?
Then send your resume to:

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Visit us at www.NCABGroup.com



Looking for an energetic
OUTSIDE SALES REPRESENTATIVE.
Entry levels are welcomed.

Job Description: Grow business by setting up meetings with customers and handling presentations, selling products, and meeting customer needs. Required to meet customers face to face on weekly basis.

Territory: All states including parts of Canada.

Skills/Qualifications: Great Communication Skills, Customer Hospitality, Meeting Sales Goals, Closing Skills, Territory/Account Management, Prospecting Skills, Negotiation, Travel Scheduling, Computer and network skills (Intermediate level), Self-Confidence, Presentation Skills, Client Relationships, Motivation for Sales, Motivation to Learn, Loyalty to Company, Respect to Customer and Team Member, Patience, Due Obligation.

Plus Aspects:

- Bachelor or higher degree
- Experience as Outside sales
- Knowledge in Print Circuit Board
- MicroCraft offers:
- Domestic Travel Allowance
- International Travel Allowance
- 401(k) with Company Match
- 90% coverage on health insurance and dental insurance for the employee
- Life, AD&D, Short Term and Long Term Disability for the employee
- PTO and Holidays
- Work environment/Helpful coworkers
- The opportunities to expand your knowledge

Salary: \$40,000 to \$75,000 or more. Your salary depends on your sales performance. This figure includes sales commission.

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Contact: Kohei Maekawa

HELP WANTED ADS



Business Development Manager

The Business Development Manager role will be a blend of key account management and strategic business development. The candidate must be able to articulate successful experience in both areas: key account management and strategic business development. This person will grow existing accounts and participate in new product development through market analysis to identify new customers.

Essential Duties and Responsibilities:

- Identify significant business opportunities and increase revenue
- Create business and product development plans
- Lead new product development team and define new products
- Release new products to the target market
- Provide technical training and support for new business
- Interface with end-users
- Establish pricing strategy for new products
- Understand competitive pricing and provide detailed competitive analysis
- Knowledge of end equipment and solutions for high reliability market
- Frequent worldwide travel

Required Qualifications:

- BA (Scientific Studies) or equivalent; industry experience; background in chemistry and PWB product marketing
- A combination of 10 years' sales, product marketing, product management, or business development
- US citizenship and fluency in English
- Working knowledge of PWB and IC development
- Strong communication and customer skills
- Must be able to work independently with limited supervision
- Excellent interpersonal communication and organizational skills

Preferred Experience:

- Multicultural experience in Germany or Japan
- German and Japanese languages
- Marketing experience

[Click here for more details](#)



Flexible Circuits • Heaters • Assemblies

HELP WANTED

In order to support its continued growth and leadership position, All Flex Flexible Circuits and Heaters is seeking a TECHNICAL APPLICATION SALES ENGINEER for our inside sales team. Candidates are to have 5+ years in the PCB industry including a minimum of 2 years with flexible circuitry and/or flexible heaters. Experience in component assembly and flexible heater design is a plus.

The position involves providing extremely high responsiveness and follow-up to assigned accounts and new prospect inquiries. Although primarily an inside sales service provider, the individual must also be able to travel several times per year to support tradeshow and in-person customer support. The position provides technical application knowledge to assist customers in the design and use of flexible circuits, heaters, and assemblies, a key service that All Flex provides.

Background to include:

- Success in a team environment
- Managing large customers – ideally in medical, military, aerospace, and industrial markets
- Proficiency in Microsoft Office Suite with good typing/keyboard skills
- Attention to detail
- Good organization skills in handling multiple activities at the same time
- Professional telephone and e-mail communication skills
- Experience working trade shows
- Good listening and customer management abilities

This position is located in Northfield, MN.

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Want to work for a globally successful and growing company and help drive that success? As a US-based key member of the global OEM Marketing Team, your focus will be on IMS (Insulated Metal Substrates) materials that deliver exceptional thermal performance, reliability and quality, particularly demanded by automotive and other LED lighting and DC power conversion applications. Combining your strong technical PCB manufacturing and design knowledge with commercial acumen, you will offer OEM customers (buyers, designers, reliability engineers and the people that liaise directly with the PCB manufacturers) advice and solutions for optimum performance, quality and cost.

Skills and abilities required for the role:

- Technical background in PCB Manufacturing/Design.
- Solid understanding of IMS Materials.
- Sales knowledge and skills.
- Excellent oral and written communication skills in English.
- Experience in making compelling presentations to small and large audiences.
- Proven relationship building skills with partners and virtual teams.

This is a fantastic opportunity to become part of a successful brand and leading team with excellent benefits.

Please forward your resume to:

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mention «OEM Account Manager USA»
in the subject line.



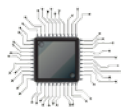
The Future in Focus

Field Application Engineer

SAKI America, manufacturer of automated optical, solder paste, and X-ray inspection and measurement systems for the electronics industry, seeks a Field Application Engineer, based in its Fremont, California headquarters. Responsibilities include communicating with customers, sales representatives, and pertinent Saki personnel to understand the customers' applications, assist in equipment selection, perform equipment installation, and provide assembly process assistance, training, support, maintenance, troubleshooting, and services for Saki's products and technologies, at SAKI America's headquarters, regional offices, and customer sites. Perform product and process demonstrations and presentations to customers, agents, and colleagues, assist with trade show activities, and work with factory and development teams to communicate new product ideas and customer suggestions/requests.

Job requirements: two-year technical degree (four-year preferred) or equivalent experience. 3-5 years combined experience in customer and technical support with 5-7 years in SMT manufacturing process with SPI and AOI understanding. The ideal candidate will have experience running and programming SPI and AOI systems. Competencies should include excellent verbal and written communication skills, a working knowledge of computer-based business applications, understanding SPC collection and use in a manufacturing environment, problem-solving skills, use of tools such as 6-sigma, and electronics/electromechanical troubleshooting capability. The position requires up to 75% travel (3 weeks/month).

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MivaTek

Global

Application/SalesEngineer

Positions available East, Midwest and Western United States. Position will focus on supporting sales and applications development for Miva Technologies DLP direct imaging system with the PCB and micro-electronics markets. Experience with photoresist and imaging preferred but not required.

Send resume and contact information for both positions to Brendan Hogan.

Service Technician

Positions available for Eastern and Western United States. Service Technicians will support our rapidly expanding installed base of Miva Technologies DLP imaging systems as well as other systems sold by the company.

[Click here to apply](#)

TOP TEN



Recent Highlights from SMT007

1 **Managing Millennials: Lean Champion Jeff Riedel Emphasizes the Importance of Mentoring**

Our next manager to highlight is Jeff Riedel, the Lean Champion at Saline Electronics. Jeff talks about the unique challenges of dealing with and training millennials, the advantages that they bring to the table, and strategies to help develop them into effective leaders as the older generation leaves the workforce.



I am sure he had a little something to do with the spirit of camaraderie and cooperation that is the hallmark of the IPC we know today.

3 **Successful, Long-Term Growth at Prime Technological Services**

Publisher Barry Matties sat down with Prime Technological Services CEO Greg Chesnutt at IPC APEX EXPO, to glean how they continue to find success and have been able to maintain such an impressive growth rate over the last four years.



2 **Ray Pritchard Looks Back at IPC's Beginning and His Role in Getting it Started**

I have known Ray Pritchard for a long time—as long as I've been involved with IPC, in fact. He directed the organization for 35 years before turning over the reins. One could say he grew up with the organization—or vice versa. Ray was always a bundle of energy and still is, still joking and warm, a great people person, and



4 **RTW IPC APEX EXPO: Ray Prasad Discusses Revised IPC-7530 Reflow Profile Guidelines**

IPC Hall of Famer Ray Prasad, chairman of the IPC-7530 committee, provides an overview of the newly revised IPC-7530, which provides users with guidelines on how to successfully profile and characterize PCB assemblies with high levels of efficiency.



5 ITL Group Links with King's College London on Cancer Imaging Project

ITL Group has partnered up with King's College London (KCL) to develop a ground-breaking cancer imaging project.



6 IMI Acquires 80% of STI Enterprises

EMS firm Integrated Micro-Electronics Inc., through its subsidiary Integrated Micro-Electronics UK Ltd, has acquired an 80% stake in UK-based STI Enterprises Ltd.



7 MC Assembly Adds Fully Automated Conformal Coating System

EMS firm MC Assembly has added a fully automated conformal coating system to its PCBA production capabilities, creating a more standardized and efficient method of conformal coating.



8 GPC Electronics Enhances Inspection Capabilities

The installations of new AOI equipment in GPC Electronics' Australian, New Zealand and Chinese factories, provided the company faster and more reliable inspection capabilities.



9 SmtXtra Celebrates 10th Anniversary as a Global Supplier to the Electronics Industry

SmtXtra is celebrating its 10th anniversary. The event will be honored with more than 30 of SmtXtra's customers flying in to the UK from across the globe, to join in the two-day celebrations.



10 Jabil's Dan Gamota Receives NextFlex Fellow Award

Dan Gamota, vice president of the Hardware Innovation Group at Jabil Circuit Inc., was hand-selected by the NextFlex leadership team to receive the inaugural NextFlex Fellow Award. Gamota was among only seven people to receive this NextFlex award, which recognizes individuals who have made remarkable contributions to accelerating the FHE industry growth: foundational technologies, manufacturing platforms and workforce development.



SMT007.com for the latest SMT news and information—anywhere, anytime.



Events

For IPC's Calendar of Events, click [here](#).

For the SMTA Calendar of Events, click [here](#).

For the iNEMI Calendar, click [here](#).

For a complete listing, check out SMT Magazine's full events calendar [here](#).

IMPACT Washington D.C. 2017

May 1–3, 2017
Washington D.C., USA

MEMS & Sensors Technical Congress

May 10–11, 2017
Stanford, California, USA

Thailand PCB Expo 2017

May 11–13, 2017
Bangkok, Thailand

SMT Hybrid Packaging

May 16–18, 2017
Nuremberg, Germany

Contamination, Cleaning and Coating Conference

May 22–24, 2017
Amsterdam, Netherlands

International Conference on Soldering and Reliability

June 6–8, 2017
Markham, Ontario, Canada

JPCA Show 2017

June 7–9, 2017
Tokyo, Japan

IPC Reliability Forum: Emerging Technologies

June 27–28, 2017
Düsseldorf, Germany

Symposium on Counterfeit Parts and Materials 2017

June 27–29, 2017
College Park, Maryland, USA

SMTA International 2017 Conference and Exhibition

September 17–21, 2017
Rosemont, Illinois, USA

electronicAsia

October 13–16, 2017
Hong Kong

productronica 2017

November 14–17, 2017
Munich, Germany



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

SALES MANAGER: **BARB HOCKADAY**
(916) 608-0660; barb@iconnect007.com

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

EDITORIAL:
MANAGING EDITOR: **STEPHEN LAS MARIAS**
+63 906 479 5392; stephen@iconnect007.com

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

COVER: **SHELLY STEIN**

COVER IMAGE: **VICTORIA M, ADOBE STOCK**

EDITORIAL ADVISORY BOARD:

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MAGAZINE PRODUCTION CREW:

PRODUCTION MANAGER: **SHELLY STEIN** shelly@iconnect007.com
MAGAZINE LAYOUT: **RON MEOGROSSI**
AD DESIGN: **SHELLY STEIN, MIKE RADOGNA**
INNOVATIVE TECHNOLOGY: **BRYSON MATTIES**



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Coming Soon to *SMT Magazine:*

JUNE:

Inspection

Featuring the latest advancements in inspection technologies.

JULY:

Military/ Aerospace Industry

A look into technology trends and manufacturing challenges for the military and aerospace markets.

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EDITORIAL CONTACT

Stephen Las Marias

stephen@icconnect007.com

+63 906-479-5392 GMT+8

SALES CONTACT

Barb Hockaday

barb@icconnect007.com

+1 916 365-1727 GMT-7



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