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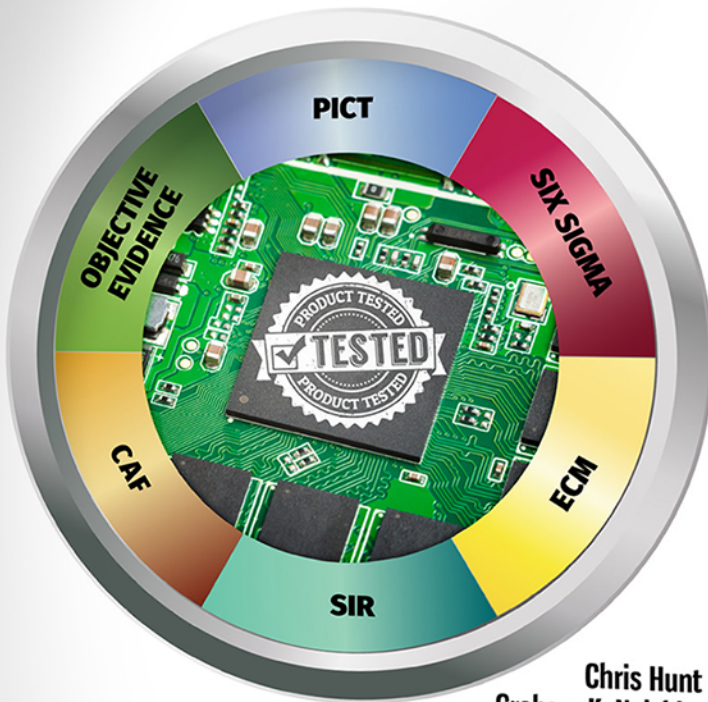
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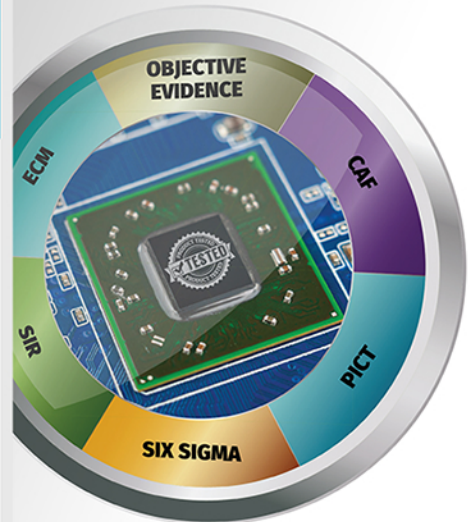
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## Attracting New Talent

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# Gen Z in Manufacturing

## Nolan's Notes

by Nolan Johnson, I-CONNECT007

I would imagine you've asked yourself, as I have a time or two: How do we attract new talent to our industry, fill our open positions, and preserve the deep, intuitive knowledge of our most veteran employees now on the verge of retirement? These are crucial questions, indeed, and to answer them, we must consider four perspectives: employers, early career workers, academic institutions, and students.

But where do you begin to address the problem? Are we seeking the right type of employee? Does manufacturing hold the attention and interest of the new generation, especially with competition from the programming giants? Are high schools adequately addressing the interests of students who enjoy hands-on, problem-solving type of work? Are college graduates prepared for the types of job opportunities in front of them? Do future employees have the soft skills to maintain their employment?

Let's start with secondary schools. It doesn't take long in a conversation for one person to say something to the effect of, "I wish schools still had shop classes. Those specific high school grads were my ideal new hires back in the day." While the industrial arts departments historically were great preparation for manufacturing jobs, those programs disappeared at most U.S. high schools as they made room for different types of pursuits. The gap, I've noticed, has been filled by more science and technology classes, and extracurricular options such as STEM-based robotics teams—where you tend to find students more interested in programming than CAM.

FIRST Robotics, which starts in grade school, for example, puts robot kits in front of students. By middle school, these students gain deeper familiarity with mechanical, electronic, programming, and testing disciplines. By high school, students are custom-building





robots, including the disciplines of mechanical design and fabrication (traditional metal work as well as CNC machining and 3D printing). They learn teamwork and skill building, all with the purpose of entering and winning a robotics competition.

In and of itself, this is not a bad thing. Today's STEM jobs are highly concentrated in programming, and we've steered many students in the right direction. But as we all know in this industry, you can't just leave it at that. Programming leads to manufacturing and students must be made aware of the promising and fulfilling careers in this field.

Yet, there are some high hurdles to overcome. According to a report from Deloitte<sup>1</sup>, surveys of Gen Z reveal that many still believe manufacturing to be dirty, dangerous, and monotonous work. They believe their career options are limited, and that flexibility in the work environment is not attainable. Now, in contract manufacturing, we know that's not the case, yet the misperception remains of steel smelters or auto assembly plants with fast-moving robot arms slinging welding equipment.

Gen Z-ers are strongly influenced by social media reports. If we want the new workforce to know that we're a clean and safe industry, we must tell those stories ourselves. Rather than wait for someone else to change public opinion, we must do the outreach.

We also learned from the Deloitte report that today's youth seek a greater purpose for themselves in the work they choose to do. They want to know that their effort makes a difference. If it doesn't, they won't stick around long enough to find out. You'll find that very sentiment in this issue's interviews with some Gen Zers working in manufacturing.

So, what are colleges and universities doing to address this mindset shift? We spoke with a professor from Minnesota State University about a unique program that takes "engineering students" and turns them into "student engineers." They're part of a novel program called Twin Cities Engineering, where students take

on capstone projects that mirror real-world engineering work. It seems that FIRST Robotics has followed Gen Z right into the university.

Finally, we get the perspective of employers. Schweitzer Engineering Laboratories is tackling the issue from two angles: a K-12 program that provides exposure to young students through efforts inside and outside the classroom, and an internship program with a high success rate of moving interns into full-time employees. We also visited IPS in Cedar City, Utah, where young engineers and student interns are getting practical, hands-on experience—a benefit to both the company and the young talent.

To attract new talent, we need to stop thinking like 20th century industrialists; kids born in this millennium are smart and determined to make their own difference. Those who take the manufacturing jobs seem to truly embrace what they're doing. They see the world through their own lens and will make modern manufacturing fit their world view. It's up to us to learn, understand, and encourage them on their journey.

Tara Dunn, director of educational programs at SMTA, said, "It's the EMS companies who need to step it up; the academic world is motivated to meet this need." To me, this is a message of encouragement and hope. We have opportunities to get involved with FIRST Robotics, build relationships with local school districts, participate in career-day activities, encourage school tours, connect with post-secondary institutions, and build our own pipeline for talent. Gen Z is waiting, and they're ready. **SMT007**

## References

1. "Competing for talent: Recasting perceptions of manufacturing," Deloitte Insights, March 2022.



Nolan Johnson is managing editor of *SMT007 Magazine*. Nolan brings 30 years of career experience focused almost entirely on electronics design and manufacturing. To contact Johnson, [click here](#).



# SEL's Intentional K-12 Outreach **Paying Off**

Feature Interview by Barry Matties

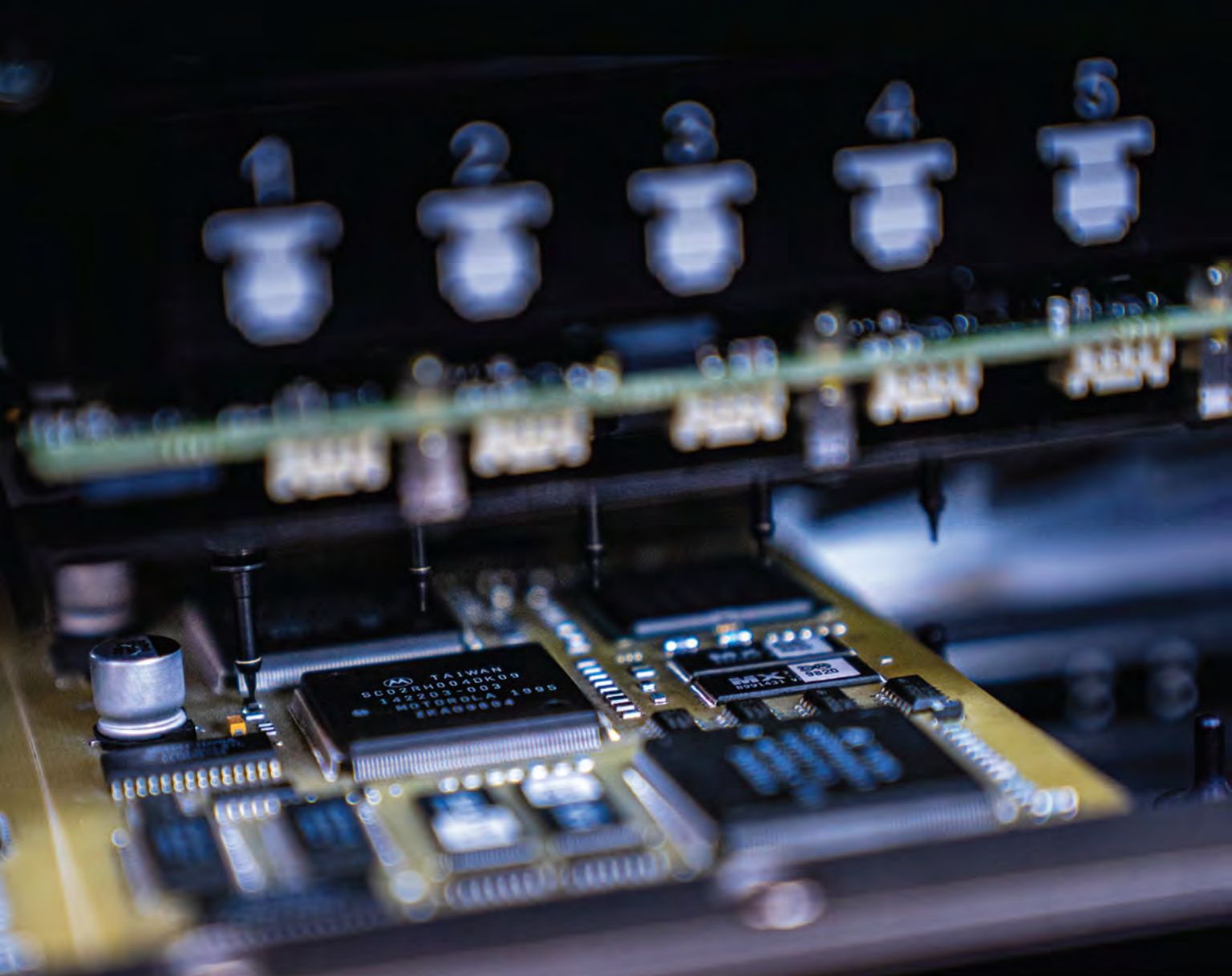
I-CONNECT007

There are negative stereotypes and a general lack of awareness about manufacturing and viable career paths among today's emerging workforce. To help change that perception and introduce young minds to modern manufacturing, Schweitzer Engineering Laboratories (SEL) hosts thousands of K-12 students to tour and experience its manufacturing facilities. The outreach goes beyond the students—this effort also raises awareness with

educators. In this interview, John Cassleman, program manager for SEL's K-12 outreach, says this effort is working and providing hope for the future.

**Barry Matties:** *John, how many students have taken part in SEL's K-12 outreach program and how does it work?*

**John Cassleman:** We've had 2,300 students participate over the past year (and even more when



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John Cassleman

you include educators), and it works through four core tracks. The first track involves a tour of our manufacturing operations, where students see our processes and machines, and meet the people working here, which I think is the most important part because you see all the different careers that manufacturing can offer.

The second track puts SEL engineers, technicians, and others into the classrooms, where they talk about their careers. We usually couple that with an activity, so the kids get a taste of what that career looks and feels like.

The next track is events, like our Getting Ready for Engineering and Technology (GREAT) Day, where we host students from around the region to learn from our professionals, see our manufacturing processes, and understand how engineering and manufacturing are connected. At this event, we host about 100 students from more than a dozen schools around the region.

The day looks like this: Students arrive at SEL by 8:30 a.m., where they're warmly greeted at

an opening session. From there, they attend breakout sessions that involve problem-solving activities. For example, it could be with our user experience group, where they learn about design and how to incorporate customer feedback. After the group activities, we take them to the manufacturing floor where we have set up displays that feature certain elements of the manufacturing process: cables, chassis of our relays, or some robotics. We also incorporate some design challenges, so the students take what they've learned and create some idea or a product. We conclude the event with lunch, where attendees are joined by SEL engineers and manufacturing experts. Students get to chat, ask questions, and show the engineers the work they've done throughout the day. This gives the engineers an opportunity to provide feedback as well. Everyone here is an employee-owner, and they volunteer their time to help. It's a full day, a lot of fun, and we all love it.

The fourth track is special projects, and I'm really excited about this one. For example, we recently partnered with a local high school robotics class, challenging them to solve a real problem: We asked them to figure out how to automate one of our manual processes. We just saw the CAD model the other day, and they will present a prototype of an automated solution to this pressing problem in a couple of months. These are high school kids doing this, and it doesn't get more authentic than that.

***Matties: Having the SEL employee-owners take part is what really makes this work.***

I agree. In addition to our K-12 program, we have a corporate giving program, and education is one of our three areas of focus for philanthropy. One of our favorite giving initiatives is our School Donation Program where we invite employee-owners to direct \$100 of SEL funds to a school of their choice. We just wrapped up this year's program and our employees directed more than \$600,000 to roughly 1,700 schools around the world.

**Matties:** *What is the benefit for SEL of this K-12 outreach program?*

It's about honoring our values. We don't just talk about values, we act on them, and we support our communities. We want young people to see this as a place where they want to work, whether that's assemblers, technicians, the CEO, whatever it may be.

**Matties:** *Have you seen that happen, where those who participate in the tracks then become employee-owners here?*

Yes, however, we're still gathering data on that. Occasionally, we'll hear that folks who participated in the past are now working here, but it can be such a long lead time from one of our events or programs to them coming to work for us.

**Nolan Johnson:** *How long has SEL been doing educational outreach programs?*

It started with SEL founder and president Dr. Schweitzer. He began welcoming visiting student groups for tours in the early days of the company. He has encouraged and supported learning and education in a wide variety of ways through the years, including donating equipment to colleges and universities, offering paid internships, supporting senior design projects, serving on advisory boards, and providing scholarship and mentorship opportunities.

**Matties:** *We often hear that it's not just negative stereotypes about manufacturing careers, but there's a lack of awareness. People don't know that manufacturing offers solid, viable careers. How receptive are schools when you take that message to them?*

Schools are quick to say yes to engineering activities and presentations, but it's taken more





work with manufacturing. STEM education is well known, and Career Technical Education (CTE) is gaining momentum and prominence, but to bridge the manufacturing gap, we are working to show students and schools that manufacturing is really about problem solving, rapid improvement, teamwork, and building things that people use every day.

As an example, at one local school, our university relations team hosted an “SEL Month.” We conducted a series of activities where students were assembling parts of our units and followed that up with mock interviews and support discussions about possible career pathways. However, it took time to build that long-term relationship to get to this level of event.

***Matties: Are other schools contacting you and requesting this type of connection for their schools?***

Yes, and that’s been driven by two things: the general momentum of STEM and CTE, and our outreach. When we share a successful story or a local school shares that successful story, we see more requests.

***Matties: At the K-12 level, you’re just introducing kids to possibilities because they’re not necessarily making a career choice right then and there. They also might have the perception that manufacturing is not only dirty, repetitive work, but it has limited advancement, and can be dangerous.***

I remember talking to one of our HR folks about that and her response was: Don’t tell kids that being an assembler is something that it’s not. Being an assembler can be repetitive, but there are people who really enjoy that facet of it. Other folks love problem solving or being someone who manages others. It’s more about

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educating them so they work in roles where they can excel and be excited.

**Matties:** *Your K-12 program currently has a geographic limitation of maybe a couple hours' drive from your facility. Have you discussed trying to take this program to a wider area?*

The desire is there to widen that circle, but with every mile, the scale adds hundreds or thousands of students in each community you include.

**Matties:** *Thinking specifically of your special project of tasking students with real world problems, it seems like that could be an outreach well beyond the geographic boundaries that you have in place.*

I'm glad you brought that up. We learned during the pandemic how many things can be done

virtually. We're also working to teach educational agencies in the state about the partnerships we can offer. So, we're not interacting directly with students in that way, but we certainly support an even broader area through expertise, networking, and connecting folks with experts.

**Matties:** *With that core mission to introduce young minds to the career paths in manufacturing, what advice do you have for other manufacturers in creating their own education outreach program?*

One way is to help others engage in this K-12 outreach. Starting at the baseline, you might ask if there's a parent you know with a connection to a school. You can use that to reach out directly to these schools, just to start the conversation. The big thing is applying some of the same principles that you utilize with your



customers, learning what they need, and how you can support what they're already doing. That builds a relationship. Once you learn what they need, you can support them in the most efficient and impactful way possible.

I also recommend working with local business chambers of commerce, other regional groups, and even the state superintendent's office to see what initiatives are underway. Maybe they have a science initiative that allows manufacturers to provide expert advice. CTE classes and programs are required to have technical advisory committees, so they need experts, and schools often don't have those contacts in the industry or know who to reach out to. I hear it's a constant problem: Schools say the industry doesn't respond to reach-outs, and the industry says schools don't reach out. To bridge that gap, find out what problems the schools are trying to solve and then marshal your resources to support them. You want to be the one that teachers and students get to know. It's exciting because there are so many different levels of involvement. We're very involved, but it doesn't take a lot to get started. Maybe begin by asking whether your employees could speak in classrooms or with career counselors.

**Matties:** *You mentioned this program is driven by a core value of benefiting the community, but it's also an investment for the future: While there's not an immediate new hire payback, it is rewarding to individuals who take part.*

Yes, 100%. As manufacturers, we are part of our communities; the employees have chil-

dren going to school in those communities. We are neighbors, so you're absolutely right, it will help the community at large. Maybe it's especially hard for us as manufacturers and engineering companies to see this. We depend on data; we rely on short feedback loops, and this is a thing where there's not a short feedback loop.

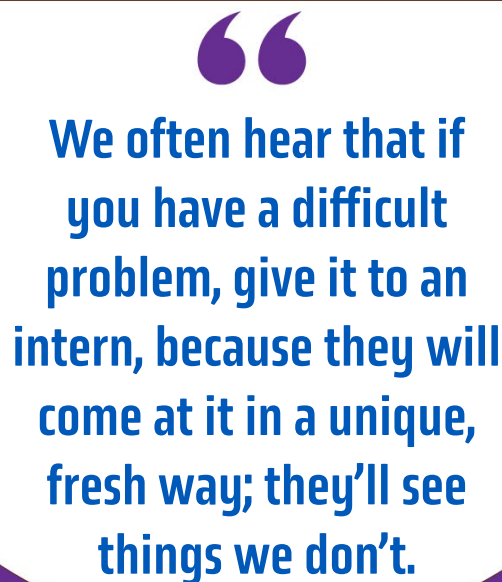
**Matties:** *Do you have any final thoughts you want to share with industry?*

I think that as adults and businesses, we often underestimate students. They can do difficult things, provided they're given the support and the expectation. That's a big reason why our internship program has been so successful. We often hear that if you have a difficult problem, give it to an intern, because they will come at it in a unique, fresh way; they'll see things we don't. They can be very creative problem solvers. So, don't shy away from giving them hard problems, whether it's part of an internship or a robotics project. I was blown away,

for example, with the students working on the automation project. They made a phenomenal, automated barrel feeder. They were incredible, but they needed the support. Students are hungry for authentic learning experiences, meeting real people, learning about real careers that are out there in their communities.

**Matties:** *John, your passion certainly comes through, and we appreciate your time today.*

Thank you so much for the opportunity. SMT007



**“**  
**We often hear that if you have a difficult problem, give it to an intern, because they will come at it in a unique, fresh way; they'll see things we don't.**  
**”**

# Advice From High School Students

Feature Video Interviews by Barry Matties

I-CONNECT007

At the annual NW Electronics Design and Manufacturing Expo (NEDME) on Oct. 18, hosted at Tektronix in Beaverton, Oregon, and sponsored by the Electronics Manufacturing Association and the Electronics Representatives Association, I met and interviewed

students from one of the area's FIRST Robotics teams.

The FIRST (For Inspiration and Recognition of Science and Technology) Robotics program initially caught my attention during an IPC APEX EXPO, when FIRST founder



Rae Wetzel and Logan King are members of Team 2898, The Flying Hedgehogs.



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Dean Kamen gave the keynote address. Kamen founded FIRST to develop students' interest in STEM, and since then, I have been interviewing and sharing stories of FIRST team members around the country.

At NEDME, I stopped by the exhibit for Team 2898, The Flying Hedgehogs, and learned about their mission to promote and gain support for their robotics team.

In this interview, team captain Rae Wetzel and her team member Logan King provide useful insight for anybody looking to hire the next generation. Please take a few minutes to watch this video and hear their particularly insightful advice about what skills are needed in the future workforce. **SMT007**

Learn more about the team here: [bpsrobotics](https://bpsrobotics.com).

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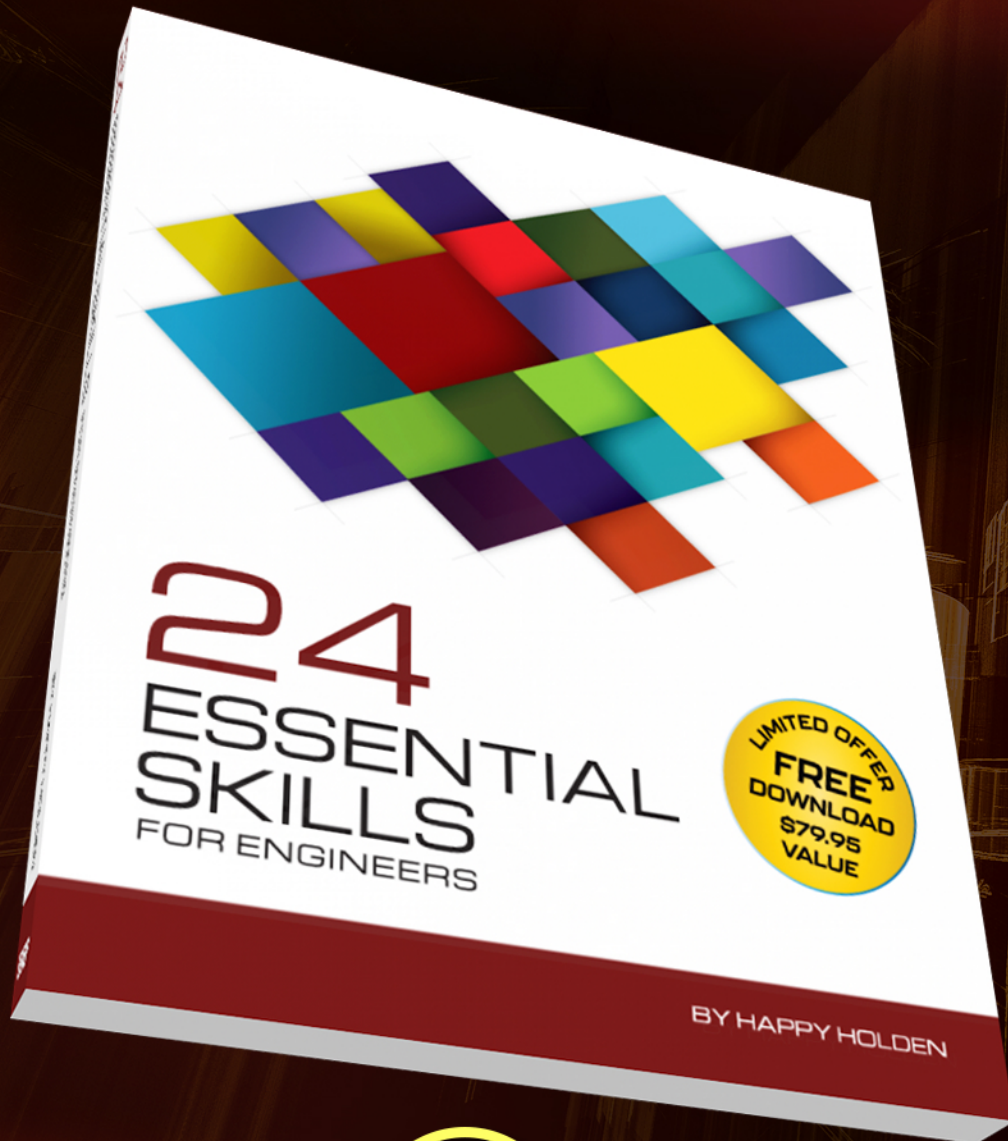
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# A Unique Engineering Space in **Mankato**

Feature Interview by Nolan Johnson

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Rob Sleezer is associate professor of integrated engineering at Minnesota State University, and lead for Twin Cities Engineering (TCE), a two-year engineering professional school with a non-traditional approach to the curriculum—and one that just might turn out more industry-savvy graduates than traditional programs.

***Rob, introduce us to Twin Cities Engineering. What do you do there?***

TCE is an extended campus of Minnesota State University, Mankato. We are a project-based program which exists in a space at a partner school. That means that we are not only one of the best engineering programs in the state, we are also the least expensive, which is really cool.

What “project-based” engineering means to us is our engineers do their pre-engineering at

some other place (anywhere). Some of them might even do it in Mankato. Regardless, they transfer to us because they’re moving from that space into our extended campus space. We’ve specifically partnered with Normandale Community College and Saint Paul College, where we have lab spaces. When a student engineer joins us as a first semester junior (J1), the first thing we do is put them on the equivalent of a capstone project. We then work to contextualize their design professional and technical learning to that project as best we can.

***That makes sense to integrate their experiences.***

In fact, we are the Department of Integrated Engineering. We integrate across multiple domains and disciplines, in terms of integration of concepts across the business side of things. These are all really important to us.

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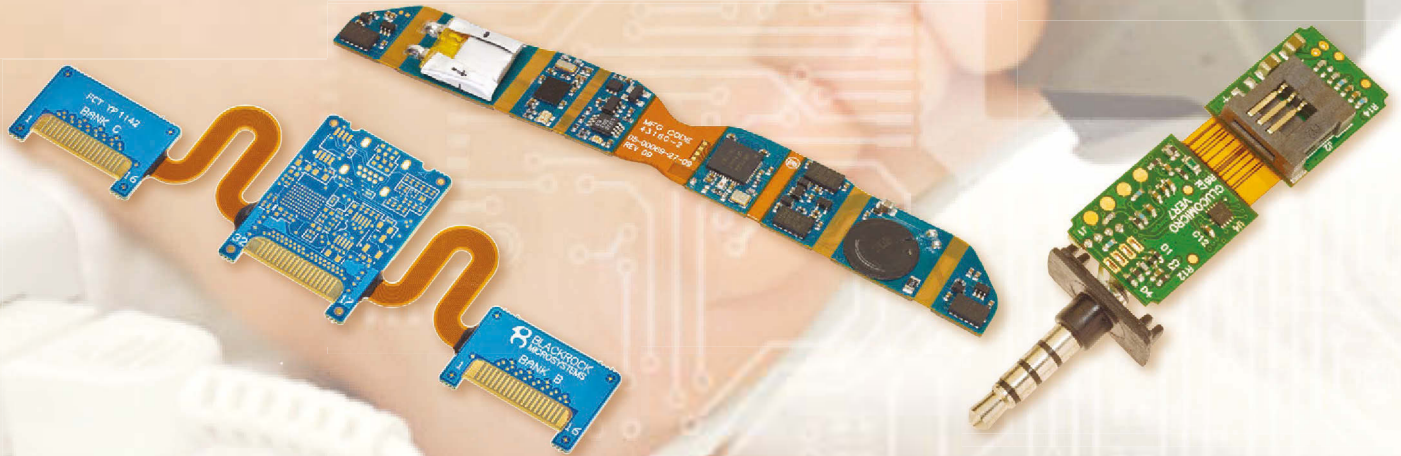
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Rob Sleezer

Additionally, what's really cool is that because I have teams that consist of both senior graduating engineers and first semester engineers, there's some mentorship. I have a corporate culture. In my program, admittedly, every year half of my "employees" quit by graduating.

As we discussed earlier, much of this is being addressed in this context. Maybe not perfectly, meaning we're constantly looking to improve, but we do things that make our student engineers question where they're going, what they're doing in terms of the design, and how the math and physics they're learning play into designing things to improve the world and improve the human condition.

***So, you're a professional school operating on community college campuses. Pre-engineering students apply and are accepted into that program from multiple locations. Is TCE a preferred program, or do students approach it as a Plan B when they don't make the cut at their university?***

We're seeing both. Once people find us and see what we do, they prefer us in many cases. We

see a lot of our student engineers coming from a spectrum of society. We have a lot of non-traditional students, especially veterans. Along with our traditional students, we serve them all in very well in different ways. It's interesting to see the interactions between the different groups in our student body. We accept a lot of people into our program who maybe started off thinking about other locations, then found us, and saw what we were about in the way we prepare engineers. We learn engineering by doing engineering.

You'll hear me use the term "student engineers." If you go to most schools, they will talk about their engineering students, not their student engineers. Think about the difference in that language. It's a very different level of power, dynamic, and expectation. I expect my student engineers to step up and make stuff. I expect them to do things. I don't expect them to solve a lot of book problems all the time. The faster I can get them applying that knowledge in a meaningful context, the better off we all are.

***How long has the TCE program been running, and how well is this program preparing student engineers for the real world? What are your findings there?***

I've had student graduates for about 10 years. We find they have been uniquely prepared. I like to talk about the "first email." Have you ever received one of those? It's three paragraphs and clearly took them four hours to write when it should have been two sentences in 10 seconds. My engineers get past that "first email," and even more, they get that first presentation and first weekly report. There's a huge cultural shift.

In our program, I wouldn't say that our students come out knowing exactly what industry is like. But they're 80% of the way there. In fact, we have two different scales for grading. One scale that applies to our first semester students and another scale that applies to everybody else. Well, you might say, that's not fair.



But companies do the same thing with their onboarding processes. There is a cognitive load associated with moving into the space and shifting your expectations and learning how to learn.

*You are mirroring the corporate environment to the best of your abilities. How sought after are your graduates?*

For a long time, I had one semiconductor company that just kept hiring all my graduates—every last one of them. All our engineers have training across both mechanical and electrical, among some other things. I could not produce an electrically concentrated graduate without them just being snapped up.

*Does that continue today?*

We still see hiring, but there are hiring managers who will never hire from us. They have decided that they need an electrical or mechanical engineer, and they will not look at anybody else—never mind the breadth of engineering that’s required to be successful in electronics.

So, when hiring managers come in and say they’re only interested in this one thing, and only interested in hiring from the biggest schools, we’re done. I don’t want to work with you anyway; you’re probably not an interesting place to work.

*Do potential employers help influence the curriculum?*

Absolutely. We do it in multiple ways. Every accredited program must have an advisory board; not all advisory boards are well listened to or well heard. We work hard to embrace the same continuous improvement cycle that we want our student engineers to embrace as they improve both their personal and project performance. In other words, we’re engineering our engineering program. We actively seek

out the voices that provide us strong feedback—both positive and negative. If you only hear good things, people aren’t looking at you close enough. I get excited when I hear, “Have you thought about this improvement?”

*When I hear “capstone” I usually think of one project encompassing the breadth and depth of what the student learned.*

Capstone projects set you up for success. Imagine what it would look like if you had multiple capstones throughout your course of study. But the idea is that the day my senior engineers start their project, before anything’s even happened, they’re already three weeks behind and \$5,000 over budget. They understand that they need to immediately reach out to the client. They may not have seen all the details from their predecessors, but now they work to find what matters to them. What’s fun is that we see more success in our projects than I think most programs see. It’s because of that culture.

*Are you working to expand this approach to technical education into other locations?*

Yes, absolutely. We’ve doubled our footprint recently. Previously, we were at Normandale Community College; we’re now also partnering with Saint Paul College. We have also spun





We have to engage our constituents in many ways, and that can be challenging. We want to meet the needs of those coming out of the community college, and we have an obligation to support the community college enrollment as an educational partner. It can be advantageous to the community college to have some upper division student engineers there supporting and mentoring students.

***What does a prospective employer need to know about hiring grads today?***

Prospective employers need to recognize passion. I'm continuing to hear this in my student engineers. They want to add meaningful value to the world; they see problems with the

world which are connecting to their motivation to solve problems. They're kind of interested in making you money; they recognize that it's a necessary thing for them to do. But when they have the choice between two places, one that gives them fulfillment, and one that's just a job, their deep passion speaks up.

They have grown up knowing how to sort through information quickly. The number of channels of information is just out of control. What people have traditionally done is sat and looked deeply at something and gathered a volume of information about the topic. For example, if the current generation can't find the information from one source quickly, they move through a series of sources. There can be some disadvantages to that approach, but some real advantages as well. Long term, they will need some support in developing some of that depth.

***Rob, I appreciate you taking the time to share your insight.***

Great talking with you, Nolan. **SMT007**

*See related interview with two student engineers, page 28.*

up with MinnPoly out of Minnesota State University, Mankato. The idea is to bring together the breadth and depth of the system so we can put those resources to bear with interesting problems and to train students.

If we think about the surface mount space, technicians and engineers are needed. We don't want to just be trade schools, and we don't just want to be four-year schools either. It could be that somebody who is starting at a trade school really fits better somewhere else in the organization, or maybe they started a job somewhere and need to get promoted but they can't write. We're thinking about how we partner to support the organization in meeting their workforce needs long term.

***We have such a need for engaged, technically competent, well-educated talent in our space. That's going to require—for lack of a better term—educational throughput. Sounds like you're making strides in this direction.***

Sort of, but I'd say that I am highly efficient for a small program. One of the challenges that my program has is scalability. It requires a lot of collaboration and thought logistics, if you will.

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# Twin Cities Engineering: ‘Student Engineers’

Feature Interview by Nolan Johnson

I-CONNECT007

At a recent conference, I met Benjamin Redlin and Joey Stam, student engineers in the Twin Cities Engineering program at Minnesota State. I asked them about their experiences and perspectives on moving into industry. What struck me was just how practical these two young men were in their thinking, and how practiced they are in their soft skills.

*Tell me about something you experienced in this program that was particularly impactful to you.*

*Benjamin Redlin:* I think it's the opportunities that I've been given. In a big university, you're a number to the professors; they don't know you by name. Here, the professors very much know you by name, so they give you opportunities. One of my professors, Jake Swanson, gave me an internship for particle dispersion in an outdoor environment, related to COVID particles. I did testing over the summer, and then I went to Spain and presented my results at the International Aerosol Conference. I would never have gotten the opportu-



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Joey Stam

nity, or even really known about aerosols if it hadn't been for that professor.

***What was most impactful for you so far?***

*Joey Stam:* This program has helped my confidence. Coming in, I was definitely the engineering stereotype, "Look at your own shoes, don't even look at the other person's shoes." But Jake Swanson offered me a position designing ventilation systems for buses. Through that, he mentored me into more of a leadership position, helping me gain a skill to lead teams. I've led two teams these past two semesters. The professors know us personally and figure out how and where to push you to get you to a certain point. Right now, Rob (Sleezer) is telling me to start thinking about my master's or PhD to get further into the research aspect of engineering. I'm working on a paper with Jake right now, which is super exciting. I talk about my research with my parents all the time, and they just get that glazed look on their faces. I didn't know what I was going to be interested in until I got to do it.

***At the end of this path, what do you really want to do in your career?***

*Stam:* I wouldn't be opposed to teaching. I like explaining things. I like that connection, especially on a smaller scale. I wouldn't want to be at a big university, maybe a research university instead. I like the research side and I've always been interested in that. But the communication with people one-on-one, and making that difference is definitely the draw.

*Redlin:* It changes day-to-day, honestly, but I think I really want to go into project management. There are some weeks where I think, "I can never manage people." But it's what I really want to do in the aerospace industry. A previous project I did was working with high-powered rocketry; that's something I've always loved doing and learning about.

***If you were talking to multiple companies in your field as a possible employer, what factors might influence you to go with one company over another?***

*Stam:* If it's engineering adjacent, I will love it, and I will gravitate toward it. For me, in that case, the biggest draw will be cultural fit. A smaller, closer-knit community. If I'm in a good environment, I will do well, not only in my work, but outside of work. Some people can do better just as a cog in the machine; I know that if I have those connections and support at work, as well as at home, life will go a lot easier and be a lot more fun.

*Redlin:* Community is a big one. I want to be in a community that's open minded and driven toward innovating or taking the next steps to make things better. That's my main draw. I don't want to be at a company that's set in stone. Innovation is something that I really want.

***What would you tell a mid- or late-career hiring manager to help them in connecting with new college grads?***

*Stam:* I think maybe just the sheer fear of coming out of college that the world is vastly dif-

ferent. Schools have become closed systems in general, as opposed to our program, which is more of a steppingstone in-between. A lot of students struggle going from purely academic to this, and might not know how to sell academic skills in a professional setting. We know what we know, but we don't know how to translate that to industry, to prove that we are competent enough to work there.

*Redlin:* Not knowing, that's kind of huge. Academia, in general, doesn't provide a lot of real-world learning opportunities. But I think programs like TCE teach you not only hard skills, but also soft skills, like talking with people, and how to do internships, handle interviews, etc.

*Right.* Thank you both for your time today. It was a pleasure talking to you.

*Redlin:* Thank you.

*Stam:* Thanks, Nolan. SMT007



Benjamin Redlin

## Cutting-edge Inspection Challenges

Koh Young's Brent Fischthal explains how UHDI and advanced packaging are challenging inspection systems.

***Advanced packaging seems to be accelerating the trend toward larger component packages. What are the new demands/challenges these packages put on inspection?***

*Brent Fischthal:* The shift toward larger components and advanced packaging brings a host of challenges that impact the industry. These challenges include complexity, density, package diversity, and inspection methodologies, all of which necessitate a more innovative approach.

First, the increased complexity associated with advanced packaging techniques introduces more intricate board designs with multiple chip types and miniaturized components. Furthermore, the drive toward higher density and smaller pitch, facilitated by advanced packaging solutions such as 2.5D and 3D packaging, places significant demands on inspec-

tion machines. For instance, inspection systems must reliably address challenges like 10 mm thin solder deposits, 50 mm component spacing, and highly-reflective components within densely populated areas, even where access might be limited.

Moreover, the proliferation of diverse advanced packaging methods, including fan-out wafer-level packaging (FOWLP), system-in-package (SiP), and chiplets, requires inspection machines to accommodate a wider variety of package types and configurations.

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# MilAero007 Highlights



## **CACI Successfully Completes Optical Communications Terminal Interoperability Testing for Space Development Agency's Transport Layer** ▶

CACI International Inc announced that it successfully completed Optical Communication Terminal (OCT) Interoperability Testing (OIT) of its CrossBeam® OCT for the Space Development Agency's (SDA) Tranche 1 data relay and tracking network. As part of this testing, CACI was the first SDA-compliant terminal to successfully establish a consistent data communication link with the reference modem.

## **Amitron Becomes MIL-SPEC Certified** ▶

Amitron, a leading U.S.-based manufacturer of printed circuit boards (PCB), brings an additional 80,000 square feet of manufacturing space into the overall MIL-SPEC ecosystem with high automation, and the latest equipment technology and processes for military and aerospace applications.

## **Historic Wind Tunnel Facility Testing NASA's Mars Ascent Vehicle Rocket** ▶

The MAV (Mars Ascent Vehicle) team recently completed wind tunnel testing at NASA's Marshall Space Flight Center in a facility that has been a critical part of NASA missions going all the way back to the Apollo program.

## **U.S. Army Awards Comtech \$48.6M for Next Generation EDIM SATCOM Solutions** ▶

Comtech announced the company was recently awarded a \$48.6 million contract to deliver Enterprise Digital Intermediate Fre-

quency Multi-Carrier (EDIM) modems in support of U.S. Army satellite communications (SATCOM) digitization and modernization programs.

## **Lockheed Martin Conducts First Flight In U-2 Avionics Tech Refresh** ▶

Lockheed Martin Skunk Works, in partnership with the U.S. Air Force, completed the first flight of the U-2 Dragon Lady's Avionics Tech Refresh (ATR) program. During this mission the aircraft successfully performed a low-altitude functional check flight to integrate new avionics, cabling and software.

## **Airbus Unveils PioneerLab as its New Twin-engine Flying Laboratory** ▶

During the German National Aviation Conference in Hamburg, Airbus Helicopters unveiled the PioneerLab, its new twin-engine technology demonstrator based on the H145 platform. It complements Airbus' range of Flight-Labs and focuses on testing technologies that reduce helicopter emissions, increase autonomy, and integrate bio-based materials.

## **Northrop Grumman to Develop New Guided Ammunition for U.S. Navy** ▶

The U.S. Navy has awarded Northrop Grumman Corporation a development contract for the company's newly designed 57mm guided high explosive ammunition. Designated for use with the Mk110 Naval Gun Mount, the company will test and mature the munition for qualification. The 57mm guided high explosive ammunition has the unique ability to continuously maneuver in-flight as it moves toward a designated target.



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# Inside the Minds of Gen Z

Feature Interview by the I-Connect007 Editorial Team

Gen Z employees definitely bring new skills and expectations to today's workforce. Manufacturers, take note: You have a generation of employees who are curious about the world, love to keep busy and engaged, and just need a better understanding of why manufacturing is cool. In this roundtable discussion, Dylan Nguyen, a recent high school graduate, and Paige Fiet, a recent university graduate, provide insight into what they're looking for in a career. It's an enlightening discussion.

**Barry Matties:** *Paige and Dylan, there are some general stereotypes or perceptions about manufacturing. The pandemic raised awareness that manufacturing matters, but we're still not attracting a younger workforce, unless they're building a Tesla car or a SpaceX rocket. What is your perception of that?*

**Dylan Nguyen:** I did FIRST Robotics in high

school, and I initially came into it with a CAD specialty. But as I progressed and started running the CNC machining, my focus shifted to manufacturing.

From my experience, manufacturing is definitely not the first thing that students think about, even those in a STEM field. It's a niche topic that isn't promoted as much as other fields, like software or computer-aided design. Only two people on my team were actively in the manufacturing group while the mechanical section comprised the rest of the team.

**Matties:** *You've now been introduced to the circuit board industry at IPC APEX EXPO, so what image comes to mind when you think of manufacturing?*

**Nguyen:** I immediately think of the inside of a shop—blue collar, lots of physical labor, and very difficult on the body.



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**Matties:** *Paige, you've chosen a career in circuit board manufacturing. How do you see manufacturing? How do Gen Z-ers see it, and why might you see it differently?*

**Paige Fiet:** Manufacturing has a reputation of being kind of dirty and gross. Like Dylan said, it's seen as hard labor. My dad is an engineer who has worked in manufacturing, and when I was a kid, I was able to run around the factory. I remember them getting their first robot arm and how excited he was that they would put in a robot. That was a big lead for me—whether consciously or subconsciously—into manufacturing.

**Matties:** *There are levels to manufacturing, even in circuit board fabrication, from the new \$100 million automated facility in Moscow, Idaho, to other shops with manual processes and no computer integration—the general stereotype of manufacturing. So, how can fabs attract a younger workforce?*

**Fiet:** The appeal comes from the technology. People my age want to work in design—sitting behind computers, coding, working with robots. I can see a younger generation joining if the machinery is there, but if it's all manual labor, there will be hesitancy.

**Nguyen:** Image is a big part of it, making it look cool. Are we showing off this technology? Are there things we wouldn't otherwise be able to experience in an office setting?

**Matties:** *An important aspect of a Gen Z-ers career choice seems to be having a higher purpose, a sense of mission, being good for the world and the environment. Does that ring true?*

**Nguyen:** Yes. We're in a time period with very lofty ideas: the space industry or solutions to environmental issues. These are big calls to action. How our career plays into that is important to us.

**Matties:** *Paige, you're building products for great technologies—rockets, pacemakers, EVs, and so on—but how does the typical operator get excited when they're just loading a piece of equipment or putting a board in a plating tank? Is that strong enough motivation?*

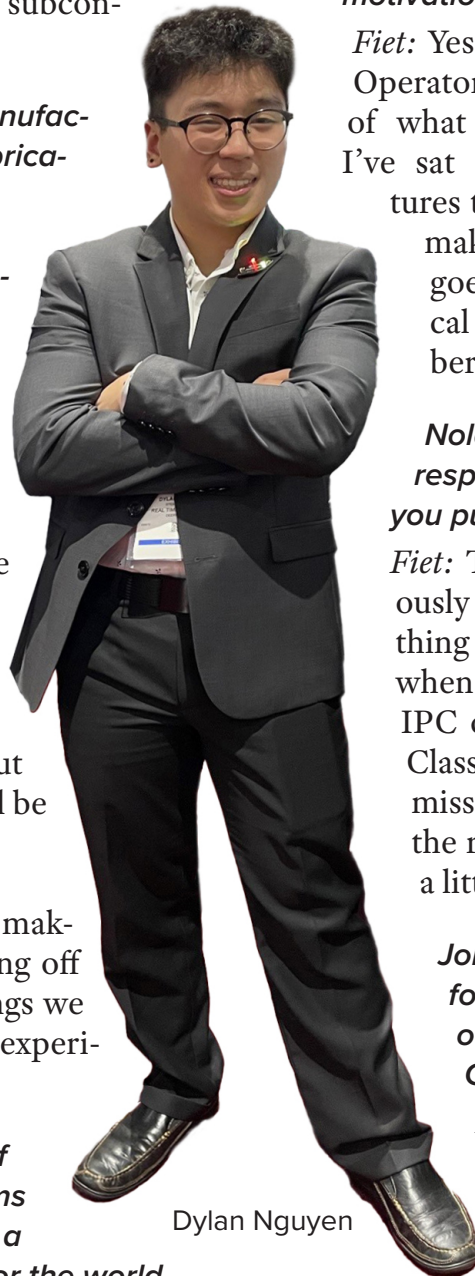
**Fiet:** Yes, if you make it strong enough. Operators deserve to be told the results of what they're doing. For example, I've sat in on trainings, showed pictures to the operators, and said, "We make this circuit board, and it goes into these high-quality medical devices that your family members might depend on someday."

**Nolan Johnson:** *What's the response from new hires when you put it in such terms?*

**Fiet:** They seem to take it more seriously when we connect it to something they use every day, especially when we're talking about different IPC classes. If I tell them that it's a Class A part for a missile, and that missile needs to work every time, the real weight of that sits with you a little bit differently.

**Johnson:** *In addition to working for a higher purpose and sense of belonging, what draws a Gen Z-er to even apply?*

**Fiet:** Right now, it's still somewhat accidental. When we get interested interns, often they think we're doing assembly operations rather than PCB manufacturing.



Dylan Nguyen

They think they'll be part of robots and automation, so it takes some conversation to understand what they will really be doing.

That's where this familiarity comes into it. If all your friends are working at Amazon or Tesla, you want to do that too, because it's cool. If you have familiarity with manufacturing, then it will seem cooler and it's easier to picture yourself doing it.

**Matties:** *Paige, what was appealing about circuit board fabrication as a career path?*

**Fiet:** Definitely the potential for growth. I watched some who were just a few years ahead of me, what they had accomplished in just a short amount of time and I knew I could do the same just as quickly.

**Johnson:** *As a student, I had both vocational skills and academic classes, but those educational opportunities are not so readily available nowadays. Dylan, how important is that exposure to the vocational arts early in your education and how might that influence one's choice?*

**Nguyen:** Being exposed to vocational options early on presents an alternative route. I didn't come into STEM and robotics initially thinking about anything related to manufacturing; but it was a great feeling when I saw people operating the actual machinery and fabricating all our components, and then to get behind the machine and run things myself. It was comparing the difference between being in a shop and sitting behind a computer; that was exactly the difference.

When I was working on CAD for the robotics team, I sat at the computer and worked for a couple hours; that was it. Once you send it



Paige Fiet

off, you don't see it again until it comes back machined and complete. I learned that I love being in that machining process because I'm making it happen. That exposure reveals alternate paths, but whether you take one of them is up to you.

**Johnson:** *So, you wouldn't have paid attention to that part of the process without firsthand exposure. Paige, what about you?*

**Fiet:** I definitely agree, and I've learned a lot from internships. In my first one, I worked with a circuit board designer, and I thought, "Wow, this is really boring. I couldn't do this for the rest of my life." My second internship was in a manufacturing environment, and I really liked it.

**Matties:** *Is there a particular type of person more suited for manufacturing? Thinking about vocational schools, what do those students look like? How do we find them?*

**Nguyen:** The "type" you're looking for is someone who likes high-energy, hands-on work. Things are happening a lot faster, and you need to be more active in your work. You can't make any mistakes, so you need a very specific attitude.



Dylan with Charlene Gunter du Plessis at IPC APEX EXPO 2023.

**Fiet:** When I'm helping with a job interview, I like to ask about hobbies and I find that people who work on things like cars or wood, anything with their hands, are more likely to succeed. My hobbies, for example, are hiking and woodworking.

**Matties:** *Recognizing that, how do we communicate with them, and tell an appealing story? When you're giving your attention to an outlet, such as traditional media or social media, where would a manufacturer's voice best be heard and resonate the most?*

**Fiet:** The Deloitte article<sup>1</sup> addressed the importance of making your brand well-known, so events like college fairs, and having as many people with a positive experience as possible, helps your voice be heard better.

**Andy Shaughnessy:** *In high school, did your counselors talk about careers in electronics? Was it even on their radar?*

**Fiet:** Not really. I would love counselors to at least pay some lip service to manufacturing because you can make decent money in this industry, and you don't need a crazy degree to do it.

**Matties:** *There are high school graduate level opportunities here that will give you a nice career. Companies advertising jobs in our publications are looking for sales reps, instructors, and technical support. What sort of language in an ad by a fabricator would be engaging to you?*

**Fiet:** I like "rapid career growth." So much R&D is done in manufacturing, something I didn't initially realize, so that would be another term that I would look for.

**Matties:** *Dylan, what's most important to you in a career path?*

**Nguyen:** Upward mobility and engaging work. I want to be constantly growing, and I want the work to be super engaging either physically or intellectually. I'd rather have that over a job that is highly repetitive.

**Matties:** *When you say "engaging," I think of Happy Holden. He's a problem solver: He loves designing experiments and figuring things out. Is that what you mean?*

**Nguyen:** Absolutely.

**Matties:** *Most circuit board shops don't have a lot of R&D; that typically comes from a captive facility or the supply base. Most circuit board shops also aren't Tier 1, capable of investing millions of dollars into R&D, so how important is R&D?*

**Fiet:** I guess I think of it as, "What's going on? Can we do this better? Can we get rid of this defect?"

**Matties:** *That's a good clarification. Right now, benchmarking and data opportunities exist in these board shops, but they aren't yet embracing it wholeheartedly. How important is Industry 4.0 in your career plans?*

**Fiet:** That comes along with how important it is to show that you're using automation. It's something you can see every day.



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**Matties:** I'd say Industry 4.0 is more about data collection and the drive to utilize data to improve process. Is that appealing to you?

**Fiet:** I think so; like what Dylan was saying about the fast-paced environment and getting your hands dirty—I want to be a part of that.

**Matties:** Now, if you joined a shop and were the youngest person there by 10 or 15 years, would that be more or less appealing to you?

**Fiet:** It's tricky because you wouldn't have friends your age who understand exactly what you're going through, but there are a lot of opportunities to learn from older generations and be mentored.

**Matties:** How important is a mentor in your work?

**Fiet:** It's critical because there's just so much knowledge to pass down regarding procedures and paperwork; there's just so much to take in.

**Matties:** There's a crisis in manufacturing, especially for the manufacturers that aren't the cool, hip, automated factories. They don't necessarily have resources to flip the switch and become automated. What advice can you give them?

**Fiet:** The more exposure you can get for your company, the more willing someone will be to try it out. Give tours and work in the community. Talk about the flexibility of work schedules. A lot of people want longer workdays with a shorter workweek. There's also an opportunity to discuss realigning the roles in the workforce to allow for more growth opportunities, both laterally and vertically.

**Matties:** Yes, flexibility in scheduling is more critical now. How did the pandemic change the way that Gen Z-ers look at work?

**Fiet:** It changed their perception that your job is not your whole life or the entire definition of who you are. We saw that we could have more time with our families and friends, and as individuals outside the workplace.

**Matties:** In the report<sup>1</sup>, a survey shows that 58% of those familiar with manufacturing believe these types of jobs have limited career prospects. However, when asked if they would opt for a manufacturing job with customized training, and a clear pathway for career progression, eight out of 10 responded, "Yes." So, how important is training?

**Fiet:** I see that as having a mentor for your first year or two on a job, but with balance. You need to do some work yourself, make some decisions on your own, but you want someone who is willing to show you the path and how things work.



Paige Fiet with her mentor, Chris Middlebrook.



**Matties:** *In one interview we did with a military lab-type facility that was located way out in the middle of nowhere, they said they have a hard time attracting candidates. Even though new hires work on really cool projects, they don't want to live so remotely. How important is location?*

**Fiet:** Funny enough, I moved from Michigan to northern Utah just to work at a circuit board manufacturer, so I may be a bit of an oddball there.

**Matties:** *So, it can happen if the environment is right. How important is culture and overall environment to you?*

**Fiet:** It's critical as well. You spend so much time at work, so it's important to like what you do, like the people around you, and feel like you're able to add to the community.

**Matties:** *We've learned that millennial and Gen Z workers are increasingly focused on the environmental implications of manufacturing, and they appreciate company awareness of these issues. How important is being "green" to you?*

**Fiet:** I recommend that companies be vocal about their corporate environmental policy, and that they're working to help preserve the world. We're worried about generations that come after us and after our kids. Will they be able to enjoy the parks and lakes and beauty that we're able to enjoy?

**Matties:** *So, is it important to be working at a clean company?*

**Fiet:** Maybe it's not the most important consideration, but it's in the top three or four.

**Matties:** *That's pretty high, though. What lessons do manufacturers need to learn from Gen Zers in today's world?*

**Fiet:** I'd say flexibility will become increasingly important; it was already going that way, but the pandemic accelerated it. Companies need to be reasonable with their employees. They need sick leave, and I love the idea of a shortened week because it allows people time to take care of their families and themselves and make sure they're healthy.

**Matties:** *When looking at what influences you, how important are television and news media? Where do you get your news from? What platform is the most important to Gen Z?*

**Fiet:** I definitely get my news online, but it's also too easy to spend too much time online.

**Matties:** *When we talk about manufacturers communicating with the next generation, does having an influencer who represents manufacturing sound like good advice?*

**Fiet:** Yes and no. I followed this girl who did "day in the life" videos and it was interesting to see what other people my age are doing for work. In manufacturing, obviously, you couldn't go into too many details, like "I'm designing the newest drill, and it does this" or watching civil engineers design new bridges, so it's an interesting question.





*Nguyen:* I think many of the decisions people in my generation make are to some degree influenced by social media. I think having a relatable influencer can be a powerful tool, if done well.

*Johnson:* Let's say that you go into work Monday morning and find out you've been assigned to put together a promotion program to attract new grads to your company. What do you lead with?

*Fiet:* I would probably start with career growth opportunities.

*Matties:* Regarding career growth, how important is it to move into a management position?

*Fiet:* The main reason I picked TTM was because of those management opportunities.

*Shaughnessy:* Paige, with the knowledge you've gained since starting your career, what do you wish you had known when you were in high school?

*Fiet:* Until I worked in manufacturing, I didn't realize how much of the world revolves around

it. For example, I wouldn't have a computer or drive a car if people didn't make them. I never really thought much about the things I use every day.

In the article<sup>1</sup>, it stated that many graduates didn't realize manufacturing offers opportunities to use their skills, and that resonated with me because I often hear people say they don't believe they'll get to use their engineering or technician skills in manufacturing.

*Matties:* Manufacturing has to be cool. If a Gen Z candidate knew they had an opportunity with a circuit board fabricator interested in transforming their company to use modern manufacturing, would

that be appealing?

*Fiet:* Maybe, if you could make the possibilities of programs clear enough, though it's hard to imagine that happening.

*Matties:* Maybe part of the message needs to be, "Don't sell what you are today, but rather what you'll be tomorrow," especially if you're not one of today's leading manufacturers. Don't mislead; be willing to back it up and show a clear path. You want to be genuine.

*Fiet:* That's a good point.

*Johnson:* Paige and Dylan, thank you so much. We really appreciate your insight and your willingness to talk to us.

*Fiet:* I've enjoyed it, thank you.

*Nguyen:* Thank you as well. I'm excited for what lies ahead. SMT007

## References

1. "Competing for talent: Recasting perceptions of manufacturing: Manufacturers continue to bridge the perception gap and enhance the workforce experience," Deloitte Insights, March 30 2022.



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# Citing Our Sources: Report from Deloitte

## Article by Nolan Johnson

A Deloitte article, “Competing for talent: Recasting perceptions of manufacturing,” published in March 2022, could easily serve as a comprehensive handbook for understanding how to connect with Gen Z career candidates.

Right out of the gate, authors Wellener, Reyes, Moutray, and Hardin write, “There is good news to report... compared to our 2017 study, significantly more respondents believe that manufacturing jobs are innovative, and respondents are likely to encourage their child to pursue a career in the industry,” (Table 1).

The authors continue, “the pandemic has led to a new awareness of the critical nature of manufacturing in the United States.” But they also strike a cautionary tone, warning that we are “at an inflection point and can use the increased public awareness of the industry to emphasize manufacturing’s career opportunities and benefits, particularly to the public familiar with the industry.” There is, as the authors demonstrate with the survey data, still a perception gap regarding manufacturing, which is increasingly becoming automated, high-tech, and requiring more complex skills.

Further along in the report, the authors identify three key factors perpetuating the misperceptions about manufacturing: limited public awareness; increased competition for talent; changing workforce expectations. The report then takes a deep dive into each of these key factors, comparing manufacturing to other industries. For manufacturing managers looking to hire, it will help to better understand the relative strengths of other industries competing for the same talent.

What stands out clearly for Gen Z talent is the sense of purpose they seek from their job. While compensation and benefits are factors, it becomes clear from the report that compensation may not be the major determining factor. Well-being, work/

**Table 1:** Perceptions to recasting manufacturing survey

Respondents	2017	2022	Change
Believe manufacturing jobs are creative and or innovative	39%	64%	+25
Manufacturing requires STEM skills to remain competitive	54%	64%	+10
Would encourage a child to pursue a career in manufacturing	27%	40%	+13

life balance, clear career paths, and a sense of purpose in making the world better are equally important. According to the report, companies adapted their organization and employee expectations in an effort to increase employee satisfaction and to reduce employee turnover.

The report shares that some interviewed company representatives see that “millennial and Generation Z workers are increasingly focused on climate issues and the environmental implications of manufacturing and appreciate company awareness of these issues.” Zero emissions, zero-waste, and other green-focused company initiatives are likely to be a factor in overall employee satisfaction going forward.

Strategies for making manufacturing more compelling as a career path are discussed in detail, following an Engage/Involve/Evolve model introduced by the authors.

In the process of compiling the content for this issue, we found our research aligning with the findings presented in this report. **SMT007**



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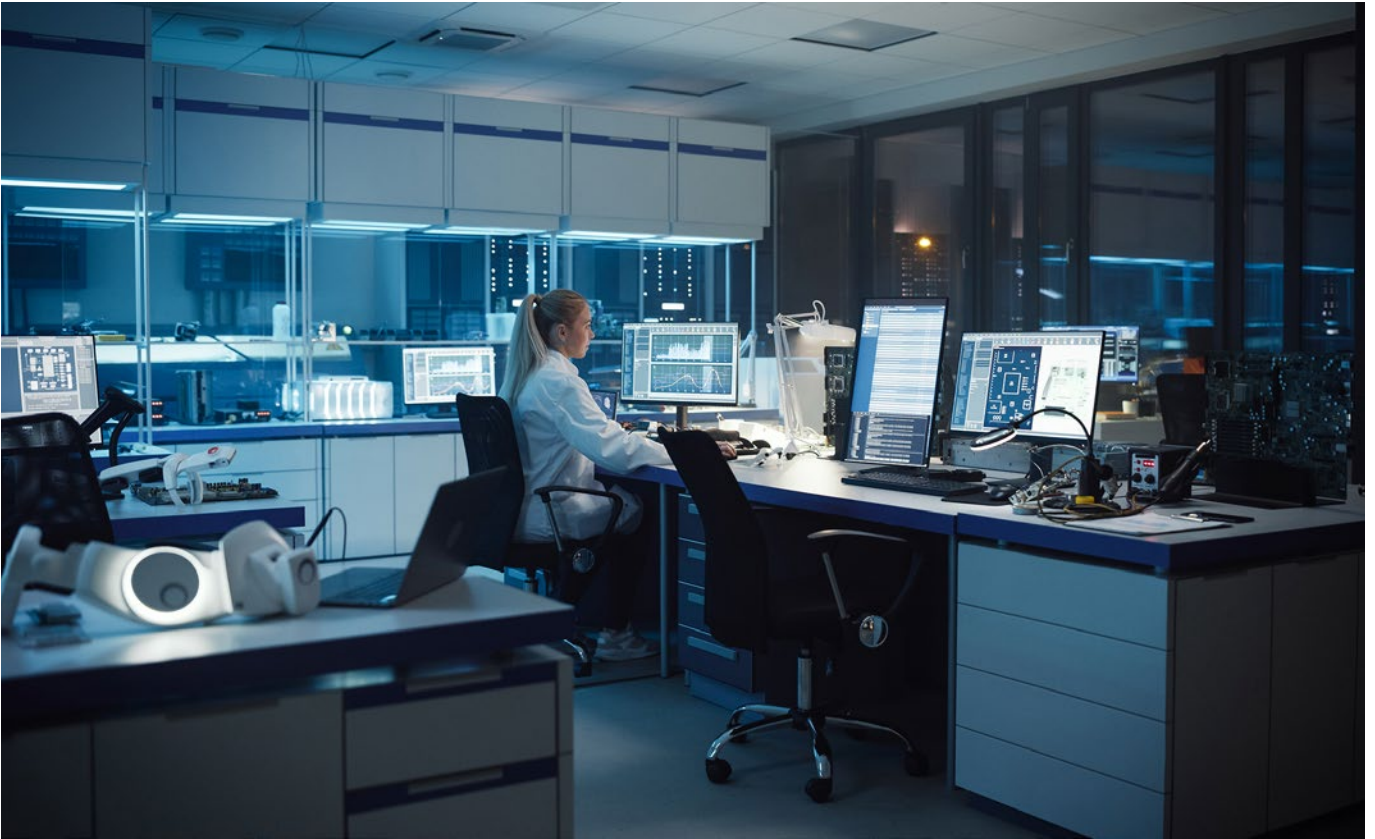
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# Hiring for Today's Manufacturing

Feature Interview by the I-Connect007 Editorial Team

When we talk to members of our industry, they frequently share that they're struggling to attract a new workforce for the next generation. Options in non-manufacturing careers are seemingly cleaner, with perhaps better pay and more flexible schedules. We're learning that the younger generation has some negative views of manufacturing as well as an unawareness of the opportunities. In this interview, Hannah Nelson, a validation engineer at Texas Instruments, shares what she's learned since graduating this past spring, what was important to her in a career, and tips for employers looking to hire members of Gen Z.

**Barry Matties:** *Hannah, what used to be your view of manufacturing, and is your view different now?*

**Hannah Nelson:** I used to think that manufacturing had super long hours, no flexibility, constant night shifts, and a boss that didn't really care about you. But now that I'm working in a manufacturing type role, I've realized that it really depends on the employer. Where I'm working now, I get those flexible hours and I get to be involved in the community. I feel like my work is both purposeful and challenging. Overall, it's a much different environment than I would have ever expected it to be.

**Matties:** *How did college prepare you for the realities of a career? Was there a gap between school and reality?*

What I've realized are the ways that school doesn't prepare you for the workforce. School hammers you constantly with assignments.



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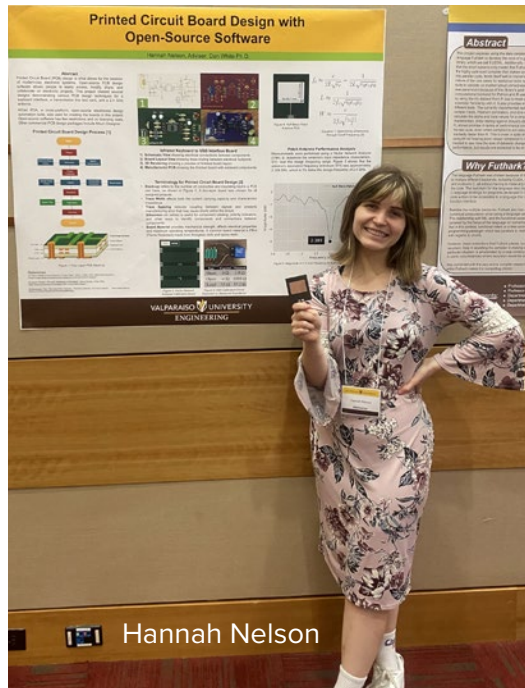
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You always have homework and tests. They don't really teach you about the work-life balance that you need to avoid burnout by the end of the term.

It seems like everyone nowadays is talking about work-life balance. Whenever we have multiple things going on at one time and it's overwhelming, my boss tells me, "Don't ever let your work overtake your personal life, because your career is not a sprint; it's a marathon."



Hannah Nelson

**Michelle Te:** *Is that work-life balance and flexibility something you discussed with your friends at school? How important was that?*

I believe those ideas formed when we were at school and what we saw on social media. We saw classmates with internships who said, "I like this about my internship, but I wish I could have had more flexibility to work from home or the opportunity to take a day off." For Gen Z, in general, those ideals are everywhere.

**Matties:** *So, when you were thinking about your career, what was most important to you?*

Looking back on my senior year, I wanted challenging, purposeful work, but also a nice salary. Now, the location matters—it's been hard being so far away from my family. If there had been more roles open near home, maybe I would have considered it. But I love my work; it's challenging and brings purpose.

**Matties:** *When you talk about "purpose," what do you mean? Is that a higher purpose for mankind or just for your well-being?*

For my generation, purposeful work is about our own well-being. We really care about that. Every day that you go to work, you feel like you're accomplishing something; it's for the

greater good, and you're helping people. At the same time, you can balance your work and home life.

**Matties:** *Was work-life balance discussed during your job interview? How was it brought up?*

I brought it up and asked several questions. If you want to make this job into a career, it's really important for my generation to ask those questions in the interview. If the interviewer doesn't immediately tell you about a typical

day for a validation engineer, you need to ask. Ask them: Do I have the flexibility to work from home? Will I be given PTO and retirement? You need to take initiative and ask whether that will be part of your work environment, especially if it's a core value for you.

**Matties:** *Have you heard the saying, "Leave your problems at the door?" Is that something employers have shifted away from?*

Yes, there's been a shift, especially at my workplace. My boss is awesome and he understands that you're human.

**Matties:** *Oftentimes, people think of manufacturing as the big robotic arms in automotive factories they see in commercials. In our industry, manufacturing is scaled down to, in some cases, manually lifting boards from one tank to the next. You're dealing with chemicals, odors, and protective gear. How important is the quality of environment for you?*

Safety matters, 100%. I don't want to be in a career where I feel like I'm in harm's way every single day that I'm working there. I know my employer is taking every necessary safety precaution because, again, your career is not a sprint; it's a marathon.



**Matties:** *Hannah, how important has it been to have a mentor in your new role?*

Mentorship is so important. The mentor for my current project is very experienced; he knows what he's doing. His help through this project has helped me understand what's going on and, therefore, I feel more confident. He walks me through, step by step, so I'm not missing something later. I feel more engaged in my company and more included on my team. I've just really enjoyed having a mentor.

**Nolan Johnson:** *What makes for a good mentor?*

I had a very bad experience with a mentor where I didn't feel as included. I want a mentor to explain something thoroughly when I don't understand, and not just leave it to me to figure out—especially when school is so different than the work environment. Learning electronics in school is so different than actually doing electronics in the industry. It's so important for a mentor to help close those gaps of knowledge.

A mentor should not make a new employee feel stupid when they don't know something; that's big for me because it's so discouraging. Part of a mentor's job should be to help the new employee acclimatize to the company, and inform them about work resource groups and people on their team who will answer questions and help with problems.

I also believe a mentor should be able to give constructive feedback. I like positive affirmations for what I'm doing well, but I also appreciate constructive feedback on where I can do better. New employees don't know everything, so that continuous feedback matters.

**Johnson:** *How did you assimilate into your new job? What can a Gen Z-er do to make themselves more comfortable in their new environment?*



That is such a great question because I feel like Gen Z wants everything handed to them. They want their employer to just give them everything they want, and they don't want to make an effort to reach for those opportunities. My employer gave me the opportunity to help with the community food bank, and work with and meet some people in our company, and I've taken advantage of that.

If I had just said, "No, you know what, I'm just going home, I don't want to do that," then I wouldn't have had the opportunity to meet new friends and meet my coworkers. It's so important to put yourself out there. Especially when you're an introvert, it's really hard to want to put yourself out there, to not be closed off; you want to sit in your bubble all day. But you need to go out and meet people. You need to set up one-on-

ones with managers on your team, meet your team, and just put yourself out there.

**Te:** *What advice do you have about establishing that trust with your employer, so they know that you are somebody who will live up to what they're asking of you?*

Trust needs to be earned. I have established that trust by coming into work every single day, asking my co-workers when I have a problem, and asking my boss when I don't understand something. When I'm working on a project, I try to figure out a solution to the problem. If it's been an hour or two, and I can't solve it, I take the next step to ask my boss. Now he knows I'm doing the work necessary to get the job done. Being accountable to your employer's expectations is beyond important, and that's given me the flexibility I have with my employer.

**Matties:** *What do you think makes a good leader?*

This definition has changed so much over the past couple of years, but I believe it's a person who truly cares about their team, listens to input, and will stand behind them when something is wrong. They take initiative—and the blame—when something happens on their team. They put their team above themselves.

**Matties:** *How important is it for companies to be engaged in continuous improvement, and have you been part of that process in your work so far?*

We have meetings where we all talk about how we can improve a program or some of our processes. As my team continues to improve, it makes me want to continue personal improvement. I feel more challenged, and important on the team, that I'm actually making a difference. That all contributes to that sense of purpose I was talking about earlier.

**Matties:** *Manufacturing is an old industry, and there's difficulty attracting Gen Z-ers, thus we don't have many young people working in this particular sector. What should companies do differently to communicate and be appealing to Gen Z?*

Internships would have been appealing to me. In high school and college, I didn't want to work for a retailer or a fast-food chain. I wanted something engineering- or manufacturing-related. As far as talking to Gen Z, the best ways are through social media, maybe LinkedIn, but definitely Instagram and TikTok. Another way might be advertising at high school sporting events, or being involved in their robotics teams.

**Matties:** *What about working with new technology? How important is that?*

It's so important. Some of these machines we use are becoming so outdated, and it makes the work harder than it should be. It's time-

consuming and not efficient. Projects take so much more time. On the other hand, it's important to realize that the latest technology, especially in the space that we're in, is extremely expensive. It's important to see the manufacturer's perspective as well, that investing in new equipment depends on the budget.

**Matties:** *Where do you get most of your news from?*

I get it from Instagram, and sometimes LinkedIn.

**Matties:** *Whose voice matters? Should it be an influencer?*

I think that voice should be from someone who is doing manufacturing work day-to-day. They can give the truest voice to the students about what it's like and what companies offer.

**Te:** *As we wrap up, how do you feel you've grown and changed just in the few months since you left college?*

I think the biggest change for me has been taking life slower and savoring every single moment of work and of my free time. In school, I was a go-go-go 100% type of person, but toward the end of my senior year, I realized how burned out I was. Now, I say it's okay to take things slower and just be present in my life. That has been the biggest change for me.

**Matties:** *Thank you for talking with us.*

This has been great. SMT007



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# Today's Manufacturing Jobs Require a New Skill Set

## Smart Factory Insights

Feature Column by Michael Ford, AEGIS SOFTWARE

Manufacturing encompasses a great number of roles, each requiring different strengths, skills, and personalities. Now, each of these roles is being transformed and elevated by computerization, software, and AI. It is natural then, that to attract people to take on these roles, we must include those who are strong in the application and use of modern software, and which complements their incumbent skills and experience.

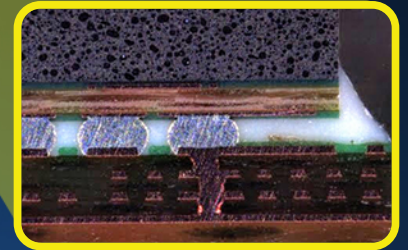
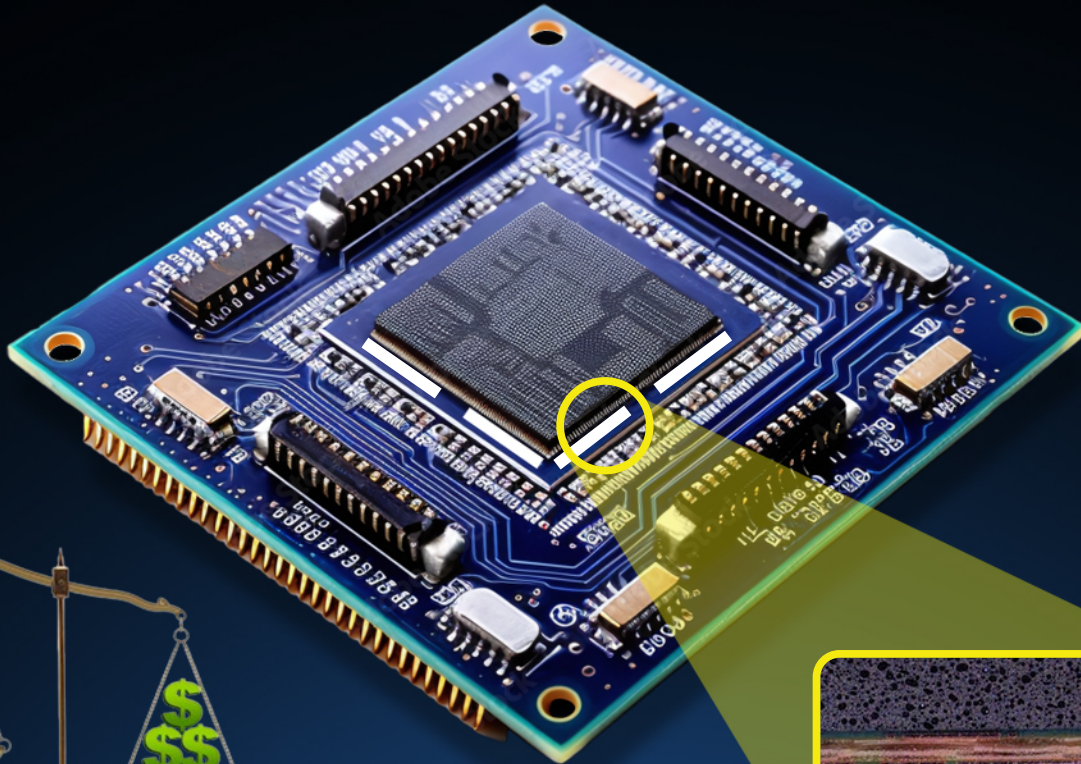
My own interest in manufacturing came from the excitement of seeing new and innovative consumer products, which as a student, I

knew I couldn't afford. Thus it was compelling to have the opportunity to be involved in how they were made—and perhaps pick up some staff discount. At the time, having only sufficient manual dexterity to handle a keyboard and mouse, the emergence of software development for manufacturing seemed to be the right place for me. In that role, I quickly realized the profound change that software would make in manufacturing as a microcosm of the world at large.

It's been as I predicted: Changes to the varied roles in manufacturing have been evolutionary,



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each on a journey, from the analog “people and machines” world to a digital world. While core manufacturing knowledge remains important, best practices around the ways that things are done have changed drastically. This has made roles in manufacturing far more enjoyable and fulfilling than ever before. Let’s look at some examples.

## Production Operators

Being a production operator once meant doing a series of repetitive operations, powered by muscle memory, and the mental ability to survive the tedium and monotony that high volume mass production entailed. As lot sizes reduced, changeovers in products became more frequent, requiring more thought and effort to avoid mistakes. Assembly work was both boring and stressful, something the human skill set can find impossible to perfect.

In the Smart factory, the assembly role has become a far more immersive experience and a key part of the engineering and manufacturing value chain. Interactive work instructions have made assembly operations, no matter how complex or changeable, more dynamic because of their easy-to-follow instruction and reference information. Using software, the composed operator environment fits exactly with the operations to be performed, eliminating the need for specialist, inflexible, product-centric skills. Feedback of completions, results, and interaction with engineering and managers elevates assembly operators into an active part of the manufacturing operation, with all the stress factors relieved or removed.

Manual assembly in the Smart factory need no longer be monotonous or boring. Operators are now flexible and dynamic enough to

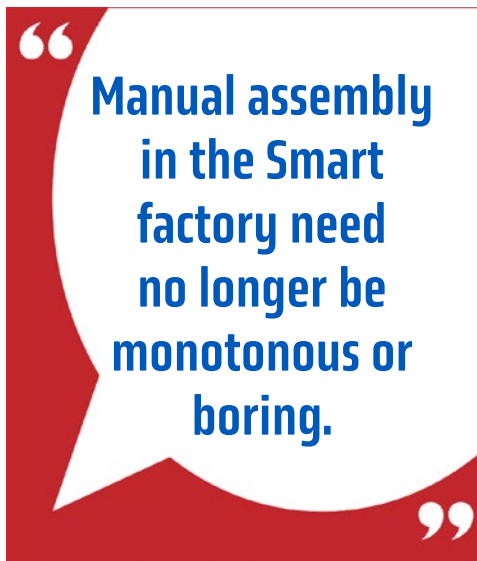
meet agile targets across a variety of tasks, and are the most flexible and reliable Smart asset in the factory.

## Production Engineering

Engineers who were entering the world of manufacturing also found themselves unexpectedly having monotonous work assignments. Within an operational factory, and with established production configurations and engineering practices, production engineers had little chance for creativity. The ongoing need to process design and bill of materials (BOM) data, re-engineer it to gain consistency and make sense, then split it out across the various processes within the designated configuration (creating all the different formats of data and work instructions, often using little more than magic markers to color

code prints), became overwhelming and frustrating. Even as their engineering degrees hung on the walls of their cubicles, they realized they had little time for the consideration of real engineering improvements, despite changing production requirements that addressed the need for agility.

Initial engineering software tools sought out to help process, mistake-proof, and merge product data from various sources, almost all of which came in the form of independently unstructured data. Engineering point-solutions reduced engineering lead times, the savings of which were quickly negated by the increase in product numbers and mix that needed to be processed. The potential for mistakes, both in the format and presentation of the source data, as well as forcing assumptions to be made without having complete information, did nothing to relieve the stress and burden on engineering, mak-



ing it impossible to give up the old practices of manual checks and balances that had been put into place.

In today's Smart factory, design data is available in an intelligent single-file standard format, such as IPC-2581, rather than as a copy of an output data stream to a plotter. The BOM data is available through software APIs, rather than as a translation of a format destined for a dot-matrix printer. The creation of the digital product model is now automated, ready for immediate application using composable interfaces for work instructions and machine data. Removing the potential for mistakes and eliminating needlessly repetitive workload allows engineers to embrace agility and make decisions dynamically to select the best configurations for the job based on live availability, capability, through-rates, and quality performance.

Manufacturing engineering now becomes dynamic and exciting, using software tools that allow creativity without the stresses and tedium of manual data manipulation and processing.

## Production Management

The production management effort once consisted predominantly of a series of meetings, each with a siloed group within manufacturing, including quality, materials, line supervision, and planning. Each group brought different, yet conflicting views and goals that confused and delayed management decisions that would directly affect overall factory performance. Ironically, the more information management sought out to make decisions, the more time lost by production operators because they had to record everything they did. This created a negative spiral of motivation all around.

In the modern, Smart factory, operational information comes automatically in two parts. Using software interfaces, the data collection from both machines and human operations improves timeliness, quality, detail, and consistency. The important, but often overlooked sec-



ond step, is the contextualization of that data to build a meaningful visibility of performance, based on the knowledge of the product and production configuration. The use of modern MES software tools constructs and brings this visibility consistently to all manufacturing groups, which are now all on the same page. Decision making is done rapidly and through teamwork, rather than arguments. Production management are now orchestrators of efficient, rapid transitions, aided by execution management software tools—a far more enjoyable and added-value role.

## Materials

Managing the flow of materials in production was once a near impossible mission. Creating kits of materials, often several work-orders in advance across every production configuration, was a lot of work, leading to stress caused by often missing or insufficient materials. With spoilage and attrition causing differences between ERP-based inventory stock levels and the physical stock, frequent unexpected short-cuts, planning changes, and un-kitting and re-kitting were necessary. Knowing that a single mistake in such an environment would likely have a catastrophic impact on product quality, as well as the cost to the business of excess material investment, meant that anyone with

a materials responsibility was continuously under extreme pressure.

In the modern, Smart factory, material consumption and spoilage are automatically monitored, and physical quantities are synchronized with ERP. Kits are no longer required, with automated “just in time” material selection, delivery, and setup verification at each stage of transport and use. Unexpected material shortages, logistics bottlenecks, lost components, and uneven work-load issues are avoided, allowing flexible, stress-free materials management that follows information generated dynamically to meet exact production needs. All this is driven, managed, and monitored by the modern MES solution.

## Quality Team

In many cases, the most stressful of all roles in manufacturing is as a member of the quality team. Defects disturb the production flow, creating unexpected work, and potentially delaying delivery. The goal of zero defects, solely through manual effort has always been elusive, with QA checks and controls, testing and inspection all detracting from added-value operations. This serves only to reduce the number of defects, not eliminate them.

In the Smart factory, the role of the quality team is elevated to focus on analysis of operational data captured automatically from assembly, inspection, and test equipment as well as manual operations. Exposed deviations and variation in manufacturing are the root causes of defects. Creativity to modify processes and put into place corrective and preventative action plans has now become a major part of the quality role. Avoidance of quality risk rep-

resents a far more positive and exciting contribution to manufacturing as compared to the triage of defective products.

## Summary

These examples are just a few illustrations of how manufacturing roles have evolved from being specialist, hands-on, repetitive, and often boring work within an inflexible organization, to being data-driven, creative, and dynamic. Similar transitions could be illustrated for other roles, including maintenance, IT, warehouse management, and the plethora of data collection and entry roles, which often go unfulfilled due to more pressing priorities. The use of software to automate routine work frees up human intelligence in the manufacturing organization, avoiding conflicts and establishing multi-discipline teamwork, all coordinated through the intelligence within software.

The use of software has become a natural ability for the next generation of the workforce, which complements existing manufacturing skills and experience, creating a  $1 + 1 = 3$  value. This represents the scope for intelligence, insight, and creativity for young people entering manufacturing today. The challenge, however, is for the existing production team to be open to, and in fact, drive this combination of know-how, enabled by using modern manufacturing software tools. **SMT007**

“  
**In many cases,  
the most stressful  
of all roles in  
manufacturing is  
as a member of  
the quality team.**”



**Michael Ford** is the senior director of emerging industry strategy for Aegis Software. To read past columns, [click here](#).





# Community

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# Building a Company Legacy Through Internship

Feature Interview by the I-Connect007 Editorial Team

Schweitzer Engineering Laboratories (SEL) has managed internship programs effectively since the company's inception. SEL's deep roots into the higher education institutions in eastern Washington and western Idaho come from years of collaboration; they demonstrate what can happen over time when an internship program is consistently managed in the manufacturing environment. It helps to keep in mind that educational institutions like to promote their programs by citing statistics, such as how many graduates have jobs waiting for them at graduation; programs like this one at SEL help create those statistics, but you need not be a large company to make a difference.

In this interview, we talk with Marisa Hemingway, university relations manager, and EMA Freiburger, who started her career as an intern at SEL and now directly manages the intern program. They are both involved with internships and are very committed to the success of the program.

**Nolan Johnson:** *SEL has run its internship program for quite some time now. Could you introduce us to the mission, scope, and role?*

**Marisa Hemingway:** SEL was founded by Dr. Ed Schweitzer, who was a faculty member prior to SEL and had a passion for education. So, we have had interns since the company was



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established. In fact, our “chief people officer” started as an intern 21 years ago.

The goal of our program is to provide meaningful work experiences in a professional and supportive environment for students as they prepare to launch their careers. We believe that our program is differentiated because our interns are solving real problems. Our CEO Dave Whitehead likes to say, “If you have a problem you can’t solve, give it to an intern.” It recognizes the fresh perspective they bring. They don’t know to be scared, they’re just thinking outside the box.

Our hope is these students will eventually work for us, but even if they don’t, we want to give them a really positive, first career experience that they can take with them.

**Johnson:** *How does the internship program affect the community in your region?*

**EMa Freiburger:** There are a few ways we have influence in the community. First, we offer internships for students ranging from high school to PhD-level education. Second, we encourage our interns to be engaged and involved in SEL; we treat them just as any other employee. They are invited to attend events, seek out opportunities, get involved with student and community groups, etc. Community is built into our intern programming. Third, we ensure they have a connection to peers who are going through similar stages of their career development.

We have interns all around the world: Mexico, Brazil, and across the United States. We strive to keep them connected to interns in Pullman, Washington, and Lewiston, Idaho, as well. I’ve heard senior management say that we are the number one consumer of electrical engineering grads from Washington State University.

**Hemingway:** We’re midway through career fair season and fall recruitment, so we’re recruiting a lot of interns at WSU and schools all over the country. We have more than 450 WSU alumni working at SEL right now.

**Barry Matties:** *If a company wants to do an internship program, what is the most effective way to promote it, and what’s the promise you’re making to the interns?*

**Hemingway:** The first place you start is reaching out to faculty in the region where you’re looking to recruit. We build relationships with faculty and the communities where we’re recruiting. That opens doors. We start with, “How can we support you?” But often that evolves into talking to students in the classroom and attending career fairs. We can sponsor senior design projects, of course, and eventually we might hire them as interns. Employees could sit on advisory boards as well, but it all starts with our relationship with faculty.

The promise that we make to interns is providing them with a meaningful professional experience in a supportive work environment.

**Johnson:** *Once interns reach out to you and express interest, what is the selection process?*

**Freiburger:** Our interns go through a hiring process like our full-time employees. Often, we’ve met them at career fairs, so we’ve had that first touchpoint. After they apply, we review their resumes, then set up phone interviews so we can understand what they want from an internship, and how the role they’ve applied to aligns with their goals. We navigate through to a final interview, so we can understand their technical knowledge: Are they a fit for this role? Then we make a final decision.





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*Hemingway:* The mentorship involvement starts as early as the student's application. Even if we don't offer an internship to a student, a recruiter calls with feedback on their resume and how the interview went. They can use that information to make improvements.

*Johnson: Do you hire interns on a rolling schedule, or is this just once a year?*

*Hemingway:* We are always hiring. Many of our interns are paying for their own education, and we always say that school comes first, so they may just work for 15–20 hours a week to help cover their costs. We think that once they get a taste for working at SEL and within a team, they'll want to keep working. Thus, we have interns who will stay for a whole year.

*Johnson: Do you first identify your project and then select an intern, or the other way around—choosing the interns and then finding a project for them?*

*Freiburger:* When we're looking at an intern position, a team already has work in mind. For the intern, the projects will be based on the internship assignment they accept, and those typically come from our initial conversations with the hiring team. What does the intern want to learn more about? What do we have that can help them learn more about that subject? Now, of course, there are some projects more determined by customer needs.

To Marisa's point, we promise our interns valuable, real-world experience, so they might get projects working with customer demands, both internal and external.



EMa Freiburger

*Matties: When an intern connects with a direct mentor, do they stick with that mentor exclusively?*

*Freiburger:* Interns receive direct mentorship and supervision through their supervisor as they work on setting objectives and goals. In addition, they can seek out any other mentor opportunity as well. They're plugged into a community of peer interns, and we have employees who have expressed interest in coaching, so we schedule programming events with those folks.

*Matties: Do you train your mentor volunteers on how to be good mentors?*

*Hemingway:* When we open an intern position, we work with that supervisor to develop a plan. We talk about the principles of our internship program, finding the right type of challenging work, providing mentorship, and being available for questions.

As EMa mentioned, we have some programming throughout the summer primarily intended for interns, but we invite our mentors, so that they can learn from their peers about mentorship. Our intern program has been around long enough that we have multiple generations of intern supervisors, and they know it's part of our culture to mentor. So, the new supervisors are learning from their supervisors.

*Matties: What is the most important skill or attribute a mentor needs to bring to the relationship?*

*Hemingway:* Honestly, it's caring about their intern as a person. At the end of the day, that is by far the most important attribute we're looking for. New intern mentors are learning, just like our interns. If they care about their intern as a person, everything else can be navigated, and they'll find their way.

**Matties:** Oftentimes, the image of internship is doing the work that the other people don't want to do.

**Hemingway:** In fact, our interns get some enviable projects, to be honest with you. They get the fun ones. EMA ran some stats, and it showed that 14% of our workforce started at SEL as an intern. So, it's a pretty significant part of our organization. In some divisions, like engineering, it's more like 30%, so that tells you how deeply it's embedded.



Marisa Hemingway

**Hemingway:** For interns who want to stay with SEL, we offer some internal networking and an internal intern career fair. Teams from all over the company talk to students who want to explore their options. As EMA mentioned, they're part of an intern community throughout their internship; we like to give them the opportunity to network beyond their immediate team.

**Matties:** How do you celebrate their success?

**Johnson:** As you get to the end of an intern's project, what do you expect or ask of the intern?

**Freiburger:** We have interns hired year-round in a variety of roles. They are constantly wrapping up a project with their project team, and then moving on to the next project. We debrief and talk about lessons learned, what went well, what didn't go well. As a supervisor, what could I have done better? What did I think that you as an intern could have done better? What were our wins and losses?

Then we ask, "Where do you want to go next? What project are we moving to, or is this the end of the internship?" Hopefully, by this time, they've already started to have conversations about where they want to go in a full-time capacity. What type of work are they hoping to get into? By that conversation, we hope to pair them with the appropriate teams, either internally or externally.

Maybe they figured out they don't want to be in the electrical or mechanical engineering industry. How can we find out what they want to do? If they're interested in staying at SEL full time, we can start that process. Sometimes that means interviewing with a brand-new team.

**Freiburger:** Historically, we've done an intern appreciation activity on National Intern Day. Because we are a global company, and we have global interns, now we hold an Intern Appreciation Week. We host activities and panels with leadership, and we flip the program. Instead of leadership fielding questions from interns, interns get asked questions by our leaders: What are you working on? The past couple of years, we've started celebrating their wins, and the impact that they're making with our company. We want to highlight that work across the organization. It's bigger than just the day-to-day wins.

SEL culture is good at naturally highlighting when things are going well. It might be a card or taking somebody out to coffee; we do it for interns as well. Often their supervisors will come to HR and say, "Hey, my intern just did this project. How can I make others know about it? Can you help me get the word out?" We take those opportunities to highlight it both in the newsletter and in person. It's important to say, "You're doing a great job and you're contributing to this."

**Johnson:** I'm sure that, occasionally, you have an intern who just doesn't work out. How do you handle that situation?

*Hemingway:* Sometimes, interns decide this just isn't quite what they're looking for. Other times, we have interns for whom continuing to work at SEL probably doesn't make sense. So, we go through a coaching process with them. We support their supervisor in performance conversations through feedback and coaching. If it continues to be a situation that isn't working out, we end the internship, but it's not without a lot of coaching and opportunity for interns to grow.

We extend a lot of grace to our interns because we're talking about students anywhere from 16- to 24-year-olds. For many of them, this is their first corporate environment. We go into it knowing that, no matter what, they will require coaching. We want to help them learn more than their trade or discipline; we want to assist with professionalism, conduct, and expectations for when you're working in a manufacturing environment.

*Johnson:* I presume that part of creating an ongoing relationship with faculty includes creating a feedback loop based on the intern and their experience. What's the mechanism for that feedback loop?

*Hemingway:* We do have a feedback loop. We have an exit interview process with our interns, and we ask them for feedback directly on their intern experience. Our university partners are on campus one to two times a year, meeting directly with faculty. During those conversations, they all share what students are saying about their internship at SEL. They give us all kinds of feedback, and that's incredibly helpful.

*Freiburger:* We have a lot of employees sitting on advisory boards. If we have concerns with

interns coming from a particular program—their technical abilities or professionalism are not meeting expectations—then advisory board members can share this information to help the school build better into its curriculum what's needed. I can't even think of the last time an intern didn't work out, particularly because we've established the partnership and the feedback loops with universities and advisory boards.

*Johnson:* Obviously, this is something that SEL is deeply committed to; it's in your com-

pany culture down to the DNA of the company. What advice would you give other companies that are looking to build an internship program?

*Hemingway:* Start simple. Don't make it any more complicated than it needs to be. It can start with a phone call or an email, connecting to a faculty member, letting them know what you want to do. It can start with matching one intern to one men-

tor. Let it grow from there. That would probably be my best advice.

*Johnson:* The internship program seems like it brings purpose and a sense of meaning to all the employees at SEL. Would you say that interns who become an SEL employee stay longer?

*Hemingway:* Our retention of employees who started as interns is measurably higher. We feel like we are good at providing careers over the long term, providing robust careers that keep our employees engaged over the long term.

*Matties:* This has been a great conversation. Thanks for sharing.

*Hemingway:* Thank you. SMT007





# Counterfeit Electronics & Materials Symposium

5-6 March 2024  
Coventry, United Kingdom



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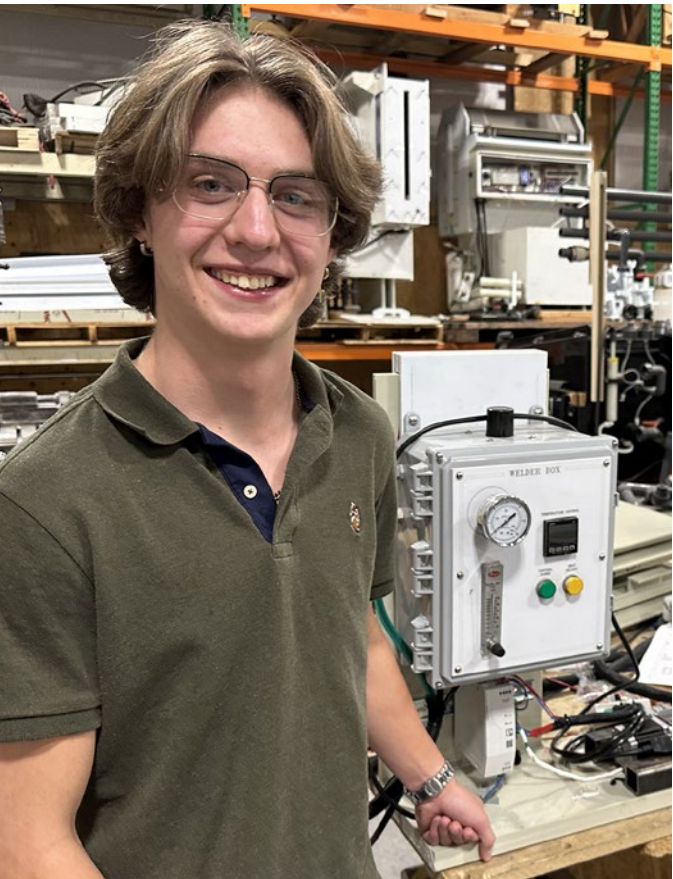
**Deadline:  
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Understanding the world of compromised (including counterfeit) technology-based products, including materials and components, and seeing example cases, root causes, responsibilities, strategies, and consequences are essential to understanding and mitigating the threat. We provide a platform to the developers of concepts, policies, and technologies that will thwart the abilities of counterfeiters and other bad actors to attack the supply chain. Contributing a presentation at this leading global event allows you to have your say in helping the industry and nations remain safe and secure.

This UK version of the long-running CALCE-SMTA symposium is the best place to share your experience, technology, advice, and information regarding the supply chain concerns of today while planning for a different business and technology environment in the future. The symposium will address the issues facing the industry, governments, and associations outside the United States, particularly in Europe. The nature of proposed solutions within Europe and global collaborations in monitoring, reporting, standards development, and adoption will particularly interest the symposium delegates. The scope of this event broadens and adapts to address the community's interests with an emphasis on technology and policy innovations.

[www.smta.org/anticounterfeit](http://www.smta.org/anticounterfeit)

The symposium is organized by SMTA in conjunction with the Center for Advanced Life Cycle Engineering (CALCE) and the Anti-Counterfeiting Forum at the Manufacturing Centre, Coventry, United Kingdom.



# Meet the New Workforce at IPS

Feature Article by Barry Matties

I-CONNECT007

As the workforce continues shifting to the next generation—with a noticeable lack of appeal toward manufacturing careers—it's even more important to share the voices of those who have chosen to work in manufacturing. We believe that raising awareness will inspire others to consider manufacturing as the strong and viable career path that it is.

I recently visited IPS in Cedar City, Utah, which has been manufacturing wet process equipment for printed circuit board fabrication for more than 30 years. While there, I conducted candid one-on-one interviews with several of the team members. They shared their views on manufacturing, their roles and challenges, their burgeoning passion for what

they do, and valuable advice for others looking at manufacturing as a career.

Something I found very interesting was IPS's long-term partnerships with the local high schools, trade schools, and colleges. Mike Brask, president of IPS, says this is not only good for the community, but part of his company's core values. He introduced me to several young employees, part of the next generation of manufacturing professionals poised to make their mark.

## Meet Caleb Aagard

Caleb Aagard is a local high school student and the youngest intern at IPS. Caleb found this opportunity at IPS through his high school's



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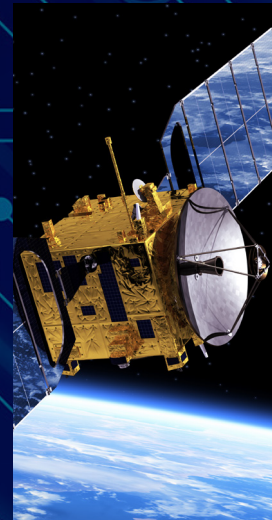
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IPS intern Caleb Aagard with his mentor Ben Herring, and IPS President Mike Brask.

CTE intern program and has taken full advantage of the experience, while sharing some concerns and advice for other high school students.

At just 16 years old, Caleb already has goals and a clear direction for his career. He was so well-spoken about his passion for learning about manufacturing, and his journey through it. Mike recognizes this and has given Caleb responsibility for important tasks. Caleb also

about the challenges of training and strategies to be successful.

It was easy to see how a career in manufacturing appeals to Caleb, especially when he started talking about the manufacturing tools he uses. He gave me a quick overview of a very cool project he's working on, and it was so encouraging to see his passion. I know you'll sense that right away. This is one video definitely worth watching.

has a direct mentor, but he quickly emphasizes that the entire IPS team has been helping him learn, including an allowance for mistakes. You'll see how, with the guidance of his mentors, he is learning from those mistakes.

His mentor, Ben Herring, told me that the mentorship program at IPS is not just important for high school students to gain real-world experience, but for everyone who works at IPS. Ben talks

**Related video: Meet Caleb Aagard and Ben Herring (runtime 08:05)**



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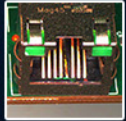
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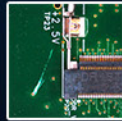


Connector Damaged

Through-Hole Technology



Pin Bent



Scratch

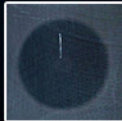
Box Build



Peel off

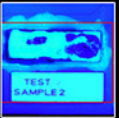


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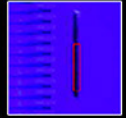


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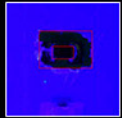
### Conformal Coating Inspection



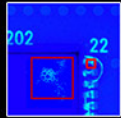
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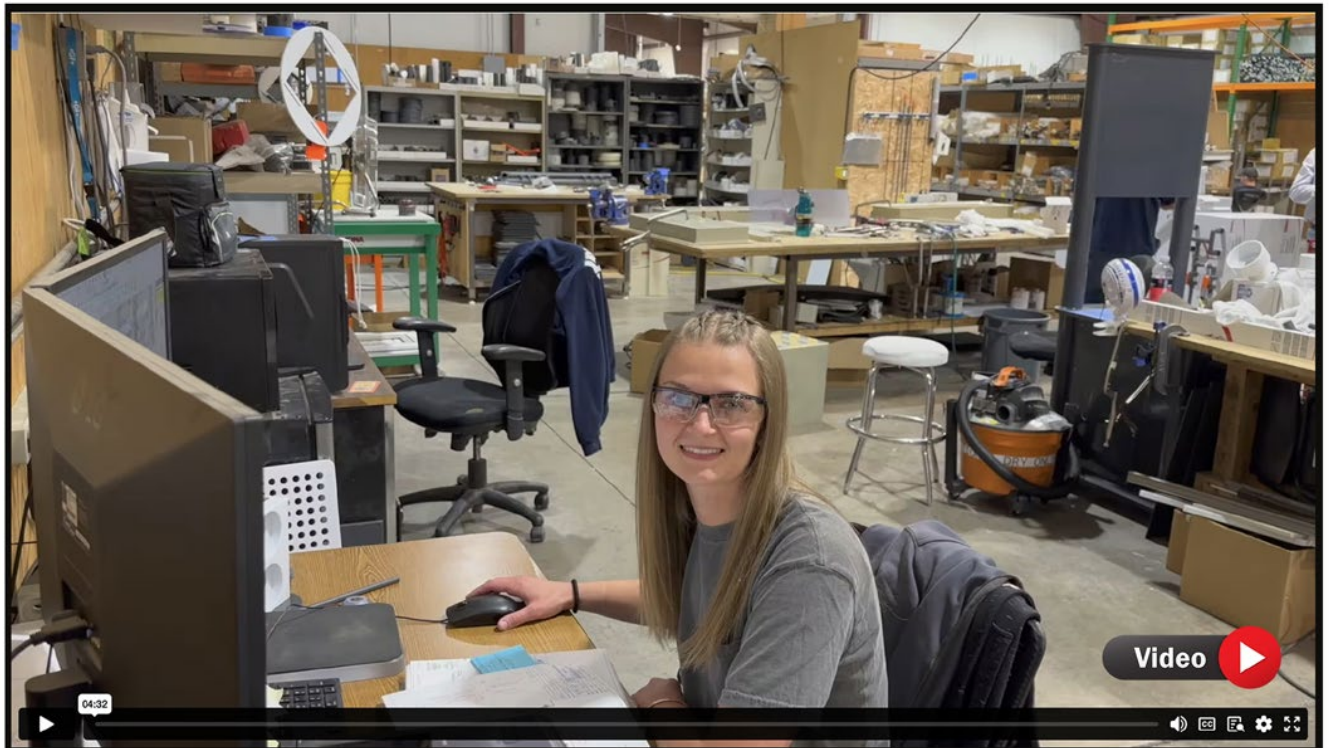
## Meet Emory Ward and Alvaro Serna

Speaking of mentorships, I also spoke with Emory Ward and her mentor, Alvaro Serna. Alvaro has been with IPS for nearly 26 years while Emory, who recently joined as a design engineer, has just completed her first design

for a piece of equipment. Emory graduated from Southern Utah University with a bachelor's degree in mechanical engineering and a minor in math.

Emory, who is part of this next generation, was very open about why she chose manufact-

Related video: Meet Emory Ward and Alvaro Serna (runtime 04:32)





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turing as a career, and what she loves about it. Mike Brask is a big believer in fostering growth and empowerment of the IPS team, and Emory shares a perfect example of this when she talks about—of all things—the location of her desk. She also talks about why having a mentor has been crucial to her success this early in her career.

Alvaro, her mentor, handles the special and custom projects at IPS. He's also trained and mentored many of his co-workers during his decades of service. Mike “accuses” Alvaro of being a bit too humble about his talent: “Alvaro is instrumental in the engineering and fabrication of custom products and has extreme talent in being able to see assemblies come together. He is a very strong mentor.”

I was so impressed with Emory's thoughts about why she chose manufacturing as a career, what she learned in school—and the ways it didn't prepare her for the real-world environment. After 26 years, Alvaro is so attuned to

not only what his company needs, but the ways he can contribute to both manufacturing and mentorship.

In our extensive conversations with Gen Z-ers, it is quite clear they consider having a mentor very important to their success, especially when onboarding with a new company. It's critical, they say, to have that connection with a mentor who provides both appreciation and constructive criticism.

To attract new talent to your company, your recruitment messages must promote this commitment to training and mentoring. During your interviews, share with the potential candidate a culture of training and support they can expect to be part of. Let them know about your “Alvaro.” **SMT007**

This article originally appeared in the October 2023 issue of *PCB007 Magazine*.

“Mike “accuses” Alvaro of being a bit too humble about his talent.”





# Problems solved!

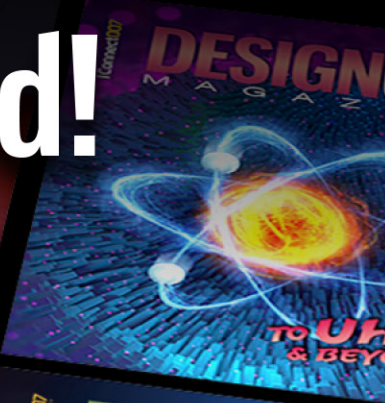


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ATTRACTING

# Truth Revealed, Balance Restored

## Maggie Benson's Journey

by Dr. Ronald C. Lasky, INDIUM CORPORATION

*Editor's note: Indium Corporation's Ron Lasky continues this series of columns about Maggie Benson, a fictional character, to demonstrate continuous improvement and education in SMT assembly.*

A meeting is transpiring at Ivy University, analyzing the cost of ownership calculations between Excel's component placement machines and Pinnacle's. In his analysis, Hal "Halitosis" Lindsey, the gruff salesperson from

Excel, has demonstrated how Excel machines have a lower cost of ownership. Ivy U. student Paul LaCroix agreed with this analysis, and then shared his explanation of how the more expensive Pinnacle machines have a better profitability potential.

Upon hearing this, Hal began fuming. Just when he thought he had the sale, this young kid was messing things up. Yet, it wasn't a surprise to him. "Professor Patty" had ruined his sales opportunities before, always with some "Ivory Tower" nonsense. Now, she was teaching kids like Paul this type of nonsensical analysis. But, he thought, it would be best to be quiet and listen to this kid before he said anything.

"Paul, can you explain to us your 'profitability potential' analysis?" Patty asked.

"Yes, Professor Patty," Paul responded. "After discussions with Sue March, Andy Connors, Dr. Maggie, and you, it has become clear to me that 'cost of ownership' is an ineffective metric. Benson Electronics is in business to make money. Right now, business is booming, and they need more production capability. So, with quite a bit of coaching, I developed a spreadsheet that calculated the profitability potential of each of the component placement machines. While it is true that the Excel machines cost less to own, the Pinnacle machines produce more profit as they produce more PCBs in a given time.



Hal Lindsey didn't make the impression he'd hoped to make.

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	Line with Excel	Line with Pinnacle
Sales Price/BD	\$ 50.00	\$ 50.00
BDs produced per year	120,000	158,400
Total Sales per Year	\$ 6,000,000.00	\$ 7,920,000.00
Machine Amortizaion	\$ 357,000.00	\$ 437,000.00
Labor	\$ 850,000.00	\$ 850,000.00
Components, PCBs, etc	\$ 4,366,000.00	\$ 5,763,120.00
Rent	\$ 100,000.00	\$ 100,000.00
Profit	\$ 327,000.00	\$ 769,880.00

Figure 1: The profitability potential calculations for Excel and Pinnacle placement machines.

“In the spreadsheet I developed (Figure 1), I calculated that the Pinnacle machines produce about 38,000 more PCBs per year than the Excel machines. This improved productivity would result in more than \$400,000 in extra profit. This calculation includes the higher cost of ownership of the Pinnacle machines,” Paul elaborated.

When he heard this, Hal’s face turned red, he started shaking, and he blurted out, “Coleman, this is just another one of your Ivory Tower tricks that you teach these kids. You should be banned from teaching. My Excel machines have the lowest cost of ownership, and that is clear to everyone. By the way, everyone is calling you Professor Patty. Since the last time I have seen you, you have really packed on the pounds, so they should call you ‘Professor Fatty’ instead.”

At this, Professor Patty Coleman’s face turned red, and she looked crestfallen.

Andy Connor was outraged. With his fist raised, ready to strike, he made a beeline for Hal. Maggie rushed over to stop Andy, more to protect Andy than Hal, as Andy might get expelled from Ivy U if he struck Hal. At the same time, Maggie appealed for calm and asked a 6-foot-5-inch grad student, Mike Maple, to escort Hal out of the building and off campus.

With Hal out of the room, calm was restored, and Maggie began to speak.

“Paul that was an exceptional analysis,” she said. “Profitability potential is clearly more important than cost of ownership. So, we will

buy the Pinnacle machines.”

Patty, still upset, but recovered enough to speak, turned to Paul and said, “I agree, and this is an excellent analysis. Do you think this analysis might also apply to consumables like solder paste?”

“Yes, Professor Patty,” Paul said. “Andy and Sue suggested as much. We found that a premium solder paste that has better response to pause and yield has much better profitability potential, even if it costs a few cents more per gram.”

Andy couldn’t hold back his thoughts about Hal. “I can see why they call him ‘Halitosis Hal,’” he said. “As I approached him, he gasped and his breath just about knocked me out.”

Everyone laughed but Patty. She just looked relieved that Hal was gone. **SMT007**

What is the profitability potential of your assembly equipment, solder paste, and other consumables? If you would like help calculating your profitability potential, contact Professor Lasky at [rlasky@indium.com](mailto:rlasky@indium.com).



**Ronald C. Lasky** is an instructional professor of engineering for the Thayer School of Engineering at Dartmouth College, and senior technologist at Indium Corporation. To read

past columns, [click here](#). Download Lasky’s book, *The Printed Circuit Assembler’s Guide to... Solder Defects*.



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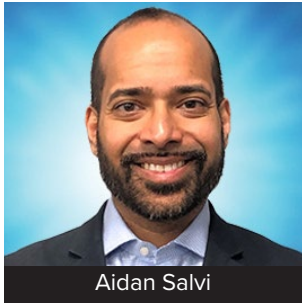
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Aidan Salvi

## Facing the Future: Looking Ahead at Factory 5.0

Last month, columnist Aidan Salvi addressed the business case for implementing Factory 4.0. In this month's column Salvi discusses Factory 5.0, the next evolutionary stage in the manufacturing industry. While Factory 4.0 was all about robotics, Factory 5.0 builds on the principles of Industry 4.0 by emphasizing human-centric collaboration, flexibility, and adaptability.

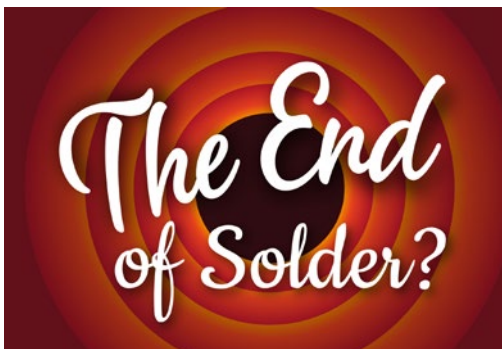
## The New Chapter: The Pros and Cons of Tribal Knowledge

Tribal knowledge is important and quite common in the electronics manufacturing industry—for good reason. Many engineers, technicians, and operators have formed their careers around building PCBs. Some even worked alongside the founding fathers of electronics. Newer, young minds stand on the shoulders of this knowledge base. As a process engineer, I work with operators who have been coating panels with solder mask longer than I've been alive. Some know the exact coating parameters required for the toughest of designs.



## Pivoting on Substrates

Oved Shapira spoke with Barry Matties and Nolan Johnson about how advanced packaging will influence the industry. He said it will shift everything, including design, fabrication, assembly techniques, and capital equipment development. Some of these shifts might be subtle, and others more seismic. Whatever the changes, Oved says it's coming.



## The End of Solder?

The practical question around CHIPS Act development and electronics assembly is, "Will this change how we do business?" Indium Corporation's Dr. Andy Mackie sat down with Nolan Johnson to share what he sees as emerging answers to that question from his perspective as an expert in electronics assembly and packaging, and as a participant in standards development through IPC, JEDEC, and SEMI.

## MacroFab Announces ITAR Compliance

MacroFab Inc., the operator of North America's largest technology platform for electronics manufacturing, is pleased to announce its recent ITAR registration from the Directorate of Defense Trade Controls (DDTC). This registration underscores MacroFab's commitment to meeting the evolving security needs of its clients, reinforcing its position in the manufacturing industry.

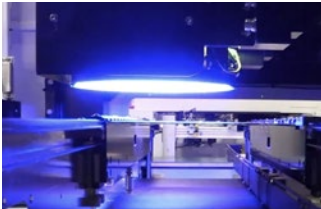
## PCB West: Coating Services at HZO

John Sandilands, director of sales at HZO, explains his company's approach to the coating process, and how it stands out for companies wanting to protect their electronics products from harsh conditions. The secret is in the process itself, John says.



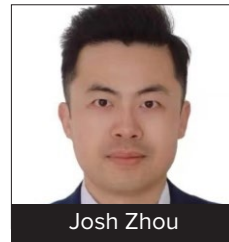
John Sandilands

## The Knowledge Base: The Role of Automated Inspection Systems



Mike Konrad invited three experts within the AOI space to answer 10 questions: Brian D'Amico, president of MIRTEC USA; Joel Scutchfield, general manager of SMT business operations and director of sales at Koh Young America, Inc.; and Arif Virani, COO of Darwin AI. In this insightful interview, we delve into the pivotal role of automated inspection systems in the electronics assembly industry.

## AIM Appoints Josh Zhou as Regional Sales Manager



Josh Zhou

AIM Solder, a leading global manufacturer of solder assembly materials for the electronics industry, is pleased to announce the appointment of

Josh Zhou to Regional Sales Manager for AIM Solder China.

## The Government Circuit: An 'Interesting' Year in Washington and Brussels

In Washington, D.C., Brussels, and worldwide, it has been an "interesting" year in the halls of government, and the IPC Government Relations team is gearing up for a busy winter season of advocacy on the electronics industry's behalf. So far this year, we have seen a series of policy developments that IPC and its members and allies have been urging for years.

## Real Time with... SMTAI 2023: Leo Lambert: EPTAC on the Move

Leo Lambert, vice president and technical advisor at EPTAC, shares with Nolan Johnson the current trends and emerging needs in certification training. Like so many things in our industry at the moment, training is changing. Not only is the curriculum changing, but how we teach it is evolving rapidly. Lambert discusses how EPTAC is meeting these new needs.



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## Senior Sales Representative Ventec Central Europe

**Location: Kirchheimbolanden, Germany/Remote**

We are looking for a self-motivated Senior Sales Representative—Ventec Central Europe, ideally with experience in the PCB industry. This position requires significant selling experience (15+ years) in the electronics and PCB industries. Candidates must possess a proven & consistent history of proactive sales growth with OEM customers. Most notably, they must be able to connect with OEM contacts that have decision-making capabilities.

### Key Responsibilities

- Promote, sell, and close business for all Ventec product lines with focus on key OEM and PCB manufacturing customers.
- Track projects and submit monthly updates to management.
- Coordinate cross-functional resources when applicable.
- Assist in coordination and set-up of relevant trade show events.
- Assist in strategic planning initiatives.
- Assist in market and customer intelligence gathering.
- Recommend pricing strategies.

### Job Requirements

- Entrepreneurial spirit, positive, high energy, and desire to win.
- Proactive and self-motivated work strategy to develop and win business for all business units.
- Excellent written and oral communication skills in German and English
- Excellent computer skills (Microsoft Office, especially Excel).
- Proven track record securing new business at OEM accounts.

Please apply in the strictest confidence, enclosing your CV, to: [accountingde@ventec-europe.com](mailto:accountingde@ventec-europe.com)

[apply now](#)

# Career Opportunities



## Technical Support Engineer USA Region

ViTrox aims to be the world's most trusted technology company in providing innovative, advanced, and cost-effective automated Machine Vision Inspection Solutions for the semiconductor and electronics packaging industries. Located in Hayward, California, ViTrox Americas Inc. is actively looking for talent to join our expanding team.

### Key Responsibilities:

- Delivering excellent and creative problem-solving skills for servicing, maintaining, machine buy-off, and troubleshooting advanced vision inspection machines at customer sites. Providing remote customer support to minimize machine downtime.
- Cultivating strong customer relationships and ensuring comprehensive customer service to drive repeat orders and support business development in machine evaluation.
- Proactively understanding customer needs and feedback to drive continuous improvement in existing technologies and new product development.

### Qualifications & Requirements:

- A recognized diploma/advanced diploma/degree in Science and Engineering, preferably in Electrical & Electronics/Computer Science/Computer Studies or equivalent.
- 3+ years of relevant experience in servicing automated inspection equipment (SPI, AOI, and AXI).
- Strong communication and troubleshooting skills.
- Willingness to travel extensively across the USA.
- Positive attitude and flexibility to accommodate conference calls with headquarters.
- Applicants from the USA and Canada are welcome to apply.
- Training will be provided at our headquarters in Penang, Malaysia.

apply now



## Rewarding Careers

Take advantage of the opportunities we are offering for careers with a growing test engineering firm. We currently have several openings at every stage of our operation.

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

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

## Associate Electronics Technician/ Engineer (ATE-MD)

TTCI is adding electronics technician/engineer to our team for production test support.

- Candidates would operate the test systems and inspect circuit card assemblies (CCA) and will work under the direction of engineering staff, following established procedures to accomplish assigned tasks.
- Test, troubleshoot, repair, and modify developmental and production electronics.
- Working knowledge of theories of electronics, electrical circuitry, engineering mathematics, electronic and electrical testing desired.
- Advancement opportunities available.
- Must be a US citizen or resident.

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# Career Opportunities



## Europe Technical Sales Engineer

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

### PRIMARY FUNCTION:

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

### ESSENTIAL DUTIES:

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

### QUALIFICATIONS / SKILLS:

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

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

[apply now](#)



## IPC Instructor Longmont, CO

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

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

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

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

### Benefits:

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

**Schedule:** Monday thru Friday, 8–5

**Experience:** Electronics Manufacturing: 5+ years (Required)

**License/Certification:** IPC Certification—Preferred, Not Required

**Willingness to travel:** 25% (Required)

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# Career Opportunities

## Prototron Circuits

### Sales Representatives

Prototron Circuits, a market-leading, quick-turn PCB manufacturer located in Tucson, AZ, is looking for sales representatives for the Utah/Colorado, and Northern California territories. With 35+ years of experience, our PCB manufacturing capabilities reach far beyond that of your typical fabricator.

#### Reasons you should work with Prototron:

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

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

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### Regional Manager Southwest Region

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

#### DETAILS OF FUNCTION:

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

#### QUALIFICATIONS:

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

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

fernando\_rueda@kyzen.com

apply now

# Career Opportunities



## Technical Marketing Engineer

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

### Requirements:

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

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

Send Resumes to: [resumes@ema-eda.com](mailto:resumes@ema-eda.com)

[apply now](#)



MACHINES FOR PRINTED CIRCUIT BOARDS

## Field Service Engineer

**Location: West Coast, Midwest**

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

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

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

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

Valid driver's license is required, as well as a passport for travel.

**Must be able to travel extensively.**

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# Career Opportunities



## Technical Service & Applications Engineer

### Full-Time – Flexible Location

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

#### Responsibilities

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

#### Skills and Qualifications

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

#### Benefits

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

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

- Engineering
- Quality
- Various Manufacturing

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

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

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

For additional information please visit our website at [www.arlonemd.com](http://www.arlonemd.com)

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# Career Opportunities

## INSULECTRO

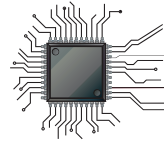


## Are You Our Next Superstar?!

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

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

[apply now](#)



## MivaTek

Global

## Field Service Technician

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

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

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

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

### More About Us

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

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# Career Opportunities



**eptac**  
TRAIN. WORK SMARTER. SUCCEED.

## Become a Certified IPC Master Instructor

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

### Qualifications and skills

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

### Benefits

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

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

## CAD/CAM Engineer

### Summary of Functions

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

### Essential Duties and Responsibilities

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

### Organizational Relationship

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

### Qualifications

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

### Physical Demands

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

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# Career Opportunities



**APCT**  
Passion | Commitment | Trust

## APCT, Printed Circuit Board Solutions: Opportunities Await

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

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

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

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

[apply now](#)



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

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## **ON DEMAND!** Free 12-part Webinar Series

### **Smarter Manufacturing Enabled with Inspection Data**

with expert Ivan Aduna

A smart factory is created from many parts, and inspection systems will play a critical role for process optimization in the next industrial revolution. Accurate, reliable 3D measurement-based data is essential, and a key element for a true smart factory. In this 12-part webinar series, viewers will learn about secure data collection, AI-powered solutions to manage and analyze data, and how to leverage the IPC CFX-QPL to succeed in the transformation to Industry 4.0.



## I-007eBooks



### **Process Control**

by Chris Hunt and Graham K. Naisbitt, GEN3

In this book, the authors examine the role of SEC test and how it is used in maintaining process control and support for objective evidence (OE.) Issues, including solution choices, solution sensitivities, and test duration are explored.



### **The Companion Guide to... SMT Inspection: Today, Tomorrow, and Beyond**

Advances in artificial intelligence have been limited exclusively to the human world until now, but there are far-reaching applications within the manufacturing sector, too. In this guide book, learn how equipment providers like Koh Young are enabling the Smart Factory of the Future by adopting AI to generate “knowledge” from “experience.”



### **Solder Defects**

by Christopher Nash and Dr. Ronald C. Lasky, Indium Corporation

This book is specifically dedicated to educating the printed circuit board assembly sector and serves as a valuable resource for people seeking the most relevant information available.



### **The Evolving PCB NPI Process**

by Mark Laing and Jeremy Schitter, Siemens Digital Industries Software

In this book, the authors look at how market changes in the past 15 years, plus the slow-down of production and delivery of materials and components in recent years, have affected the process for new product introduction (NPI) in the global marketplace. As a result, we feel that PCB production companies need to adapt and take a new direction to navigate and thrive in an uncertain and rapidly evolving future.



### **PODCAST! On the Line with...**

...is available now on Spotify. In this podcast, we speak with industry experts to get the latest insights and perspectives on the most relevant topics in the electronics industry today. The first series of *On the Line with...* features conversations on sustainability.

**Our library is open 24/7/365. Visit us at: [I-007eBooks.com](http://I-007eBooks.com)**

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**COVER: SHELLY STEIN**

**COVER IMAGE:**

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**SMT007**  
MAGAZINE

SMT007 MAGAZINE®

is published by IPC Publishing Group, Inc.,

3000 Lakeside Dr., Suite 105N, Bannockburn, IL 60015

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November 2023, Volume 38, Number 11

SMT007 MAGAZINE is published monthly,

by IPC Publishing Group, Inc., dba I-Connect007.

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