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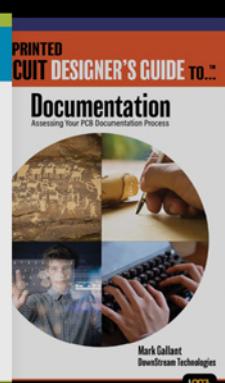
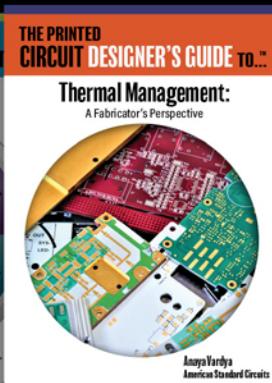
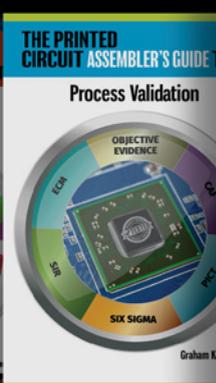
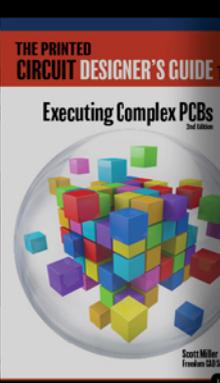
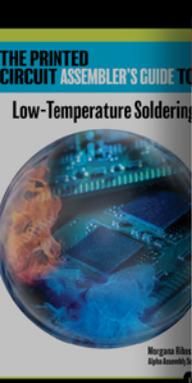
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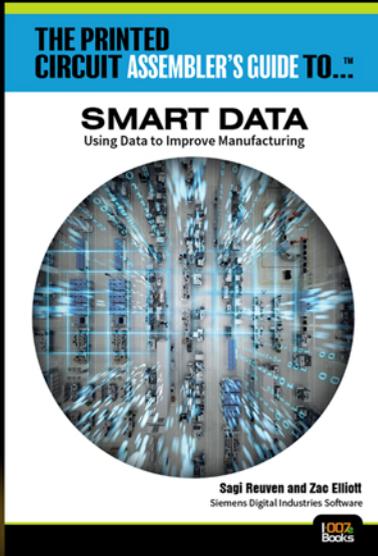
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IPC APEX EXPO 2021 & CES 2021

Imagine, if you will, an IPC APEX EXPO without a physical venue. Join your colleagues as we all journey into “The Virtual Zone.” We also include highlights from the recent virtual edition of the CES 2021 show.

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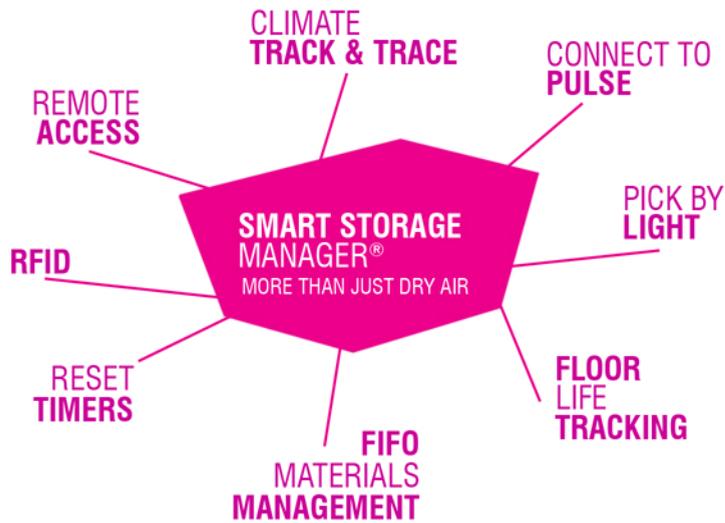


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IPC APEX EXPO and CES: The Virtual Zone

Nolan's Notes

by Nolan Johnson, I-CONNECT007

I don't typically watch a lot of TV, though I watch a bit more nowadays, thanks to COVID-19 restrictions. As we start the new year, I've been reflecting on my viewing habits and what I select to watch. I like to be entertained, but at the same time, I like to be educated. I mean, sure, I watch a couple rowdy comedy series (in particular, one British, one Canadian), and a period drama series with a strong foundation in the historical events of their day. Science fiction is fun, but only when the writers get the science right, of course. Under lockdown, though, I've found myself gravitating to British programming. "The Great British Bake Off" and "The Repair Shop," for exam-

ple, deliver quiet-yet-compelling personal interest stories mixed with how-it's-made techniques and just a hint of tension—soothing, really. Plus, I learn something I can apply. If you read my recent column in which I confess my lack of talent as a baker, "Bake-Off" teaches me quite a bit. For a mix of excitement and laughs, however, I often turn to Jeremy Clarkson, James May and Richard Hammond, on either BBC's "Top Gear" or Amazon's "The Grand Tour."

I had the pleasant surprise recently, after digging deep in the categories on Amazon Prime, to stumble across a three-episode 2015 BBC production titled "Building Cars: Secrets



of the Assembly Line” that was by James May. The teaser shows video of an assembly line for the Mini, with a voiceover inviting us to “journey into the secret world of the car factory.” What? James May, Minis, and factories? How could I possibly turn that down?

The miniseries is a lot of fun to watch—at least, it was for me—but it got serious for a few moments there, as well. Just past the halfway point (episode 2, starting at about 43 minutes elapsed), May takes us on a six-minute side-trip to a UK Toyota factory to learn about ... get this, Kaizen!

I-Connect007 is exploring continuous improvement in 2021, but that doesn’t automatically mean automation or Industry 4.0 hot topics. Instead, we’ve been having a conversation about how to make processes smarter, so that automation is not just faster, but even more effective. That’s what’s so interesting about May’s Toyota Kaizen segment: the examples are not automation, so much as optimization. In one example, the Kaizen of a worker’s task of applying stickers to the vehicle resulted in 0.6 seconds per sticker saved. No big deal until we factor in that each vehicle gets 96 of these stickers. That sums up to 57.6 seconds. Multiply that by the 1,000 vehicle per day production, and that rolls up to 16 hours per day (two full-time employees worth of effort) saved on the manufacturing floor.

I don’t need to tell you that these principles are valuable to the ongoing success of your business, but I will ask if you’re taking real steps to implement the principles. Take optimized processes, automate them, and now the efficiencies will emerge in the form of higher output, lower costs, and higher quality. The digital future’s success depends upon smart processes, not just automated ones.

In this issue, we showcase two key trade shows: a preview of IPC APEX EXPO 2021 and reports on the recent CES 2021 show. While I could wax on about IPC APEX EXPO (believe me, there is much to talk about) you’ll want to focus on our published content, where

the commentary is much more effective than mine at previewing IPC APEX EXPO for you: Dr John Mitchell, Alicia Balonek, Matt Kelly, Chris Jorgensen, Eric Camden, Gene Weiner, and more. In the spirit of optimizing your time, I encourage you to turn directly to the APEX coverage for the details. I will say, though, IPC APEX EXPO looks to be one of the more interesting and forward-looking events in some time. The Factory of the Future initiative will not only be present at the virtual show, but also influences the technical programs (read the interview with Kelly and Jorgensen to see what I mean).

We also bring you highlights from CES 2021. Traditionally, two of the I-Connect007 editorial staff travels to Las Vegas to cover this candy-land of consumer electronics—and some of the primary output of our emerging digital manufacturing ecosystem. This year, as you would expect, we covered the CES news from our home offices. The benefit to a virtual CES, however, is that we were able to send twice as many staffers to cover the show. As a result, this year you’ll be able to enjoy the show perspective from Dan Feinberg, Happy Holden, Pete Starkey, and yours truly. Some of our reporting will be here in the magazine, with more content available only on our website newsfeeds; check both locations to get all the CES-related news.

We’re sure you have your own stories and experiences in continuous improvement, and we’d love to hear about them. We’re inviting our readers to share with us your $X = X_c - 1$ victories with the industry. Get in touch and we’ll be delighted to help share your lessons learned with the industry. **SMT007**



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](#).

Join Us for IPC APEX EXPO: *Virtually*

One World, One Industry

Feature Column by Dr. John Mitchell, IPC—ASSOCIATION CONNECTING ELECTRONICS INDUSTRIES

As many of you know, IPC APEX EXPO will be held virtually March 8–12, 2021. We look forward to producing APEX EXPO every year, and 2021 will be no different. It is our signature event, and we are committed to providing the cutting-edge content and networking opportunities that attendees have come to expect over the past 20-plus years. This year, we will just do it from a digital platform.

In person or online, our goal is to maintain IPC APEX EXPO's position as the premier event for the electronics industry by providing far-reaching insights and ideas. The challenge we face to provide a premier networking event is also an opportunity for growth. While we pride ourselves on the networking experience our in-person event provides to our attendees, we believe that the virtual setting allows us to achieve that same goal: to offer connections, new knowledge, and important opportunities to our audience.

Because companies will not have to pay for employee travel, we hope to increase our global audience by going deeper into organizations, offering our cutting-edge content to more people. This gives us the unique opportunity to meet and connect with a broader audience while increasing our reach in the industry.

IPC APEX EXPO will still be the place to connect and collaborate as the digital platform will allow attendees to easily navigate more than 100 technical conference sessions and application-focused professional development courses as well as view product demonstrations, schedule one-on-one meetings with exhibitors, and experience other offerings within the online exhibition.

This year, IPC will bring experts together to help companies transform and modernize as we look toward the future of electronics manufacturing. Our Technical Conference reflects

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- **PCB Fabrication and Materials:**

Sessions on microvia reliability, PCB design, PCB reliability and PCB advancements.

- **Quality, Reliability, Test, and Inspection:**

Covering automotive electronics, electronics materials, assembly, coating, and assembly design.

- **Technical Sessions:** Will include opportunities to ask questions live at the scheduled time, and content from the sessions will be available on demand for 90 days following the event.

This year's virtual professional development program includes something for everyone.

This year's virtual professional development program includes something for everyone. Whether it's advanced classes exploring the details and depth of specific topics, or informative classes catering to engineers ready to improve their careers, we've got courses for every role and experience level.

In terms of a virtual exhibition experience, GoExpo's virtual event space and setup allows you to learn, connect, and collaborate as if you were there in person. Thanks to this year's all-virtual format, it's easier than ever to attend IPC APEX EXPO, which means incredible opportunities to meet with and learn from industry insiders across the globe.

Within GoExpo, you can:

- Create your personal profile
- Log into the event
- Search for friends, peers, and exhibitors
- Request to connect one-on-one

As IPC APEX EXPO 2021 goes virtual, face-to-face standards development meetings scheduled for March 2021 will also be moving to a virtual environment. Each IPC staff liaison will work with committee leaders to select a time for their meeting. Following the Summer-Com 2020 model, the meetings will be spread over a few weeks, so as not to conflict with the technical conference sessions. We will start posting meetings this month.

While we won't be able to meet each other in-person this year, I hope you will take advantage of the opportunities to network virtually and participate in live Q&As with speakers and instructors during professional development courses and the Technical Conference. I hope you'll spend some time talking to IPC Hall of Famers and Emerging Engineers and interact with new and experienced managers at the Managers Forum. I encourage you to test your knowledge at our virtual trivia event.

Your involvement in IPC APEX EXPO is directly responsible for the show's success. We appreciate your flexibility, dedication, and input as we move from an in-person event to one that offers a vibrant virtual program.

I hope that you'll join us March 8-12 for what promises to be an exciting virtual event. For information on how to take advantage of all that IPC APEX EXPO has to offer, visit www.ipcapexexpo.org. SMT007



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

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Ebullient Trade Events Going Virtual

SMT Prospects & Perspectives

Feature Column by Dr. Jennie S. Hwang, CEO, H-TECHNOLOGIES GROUP

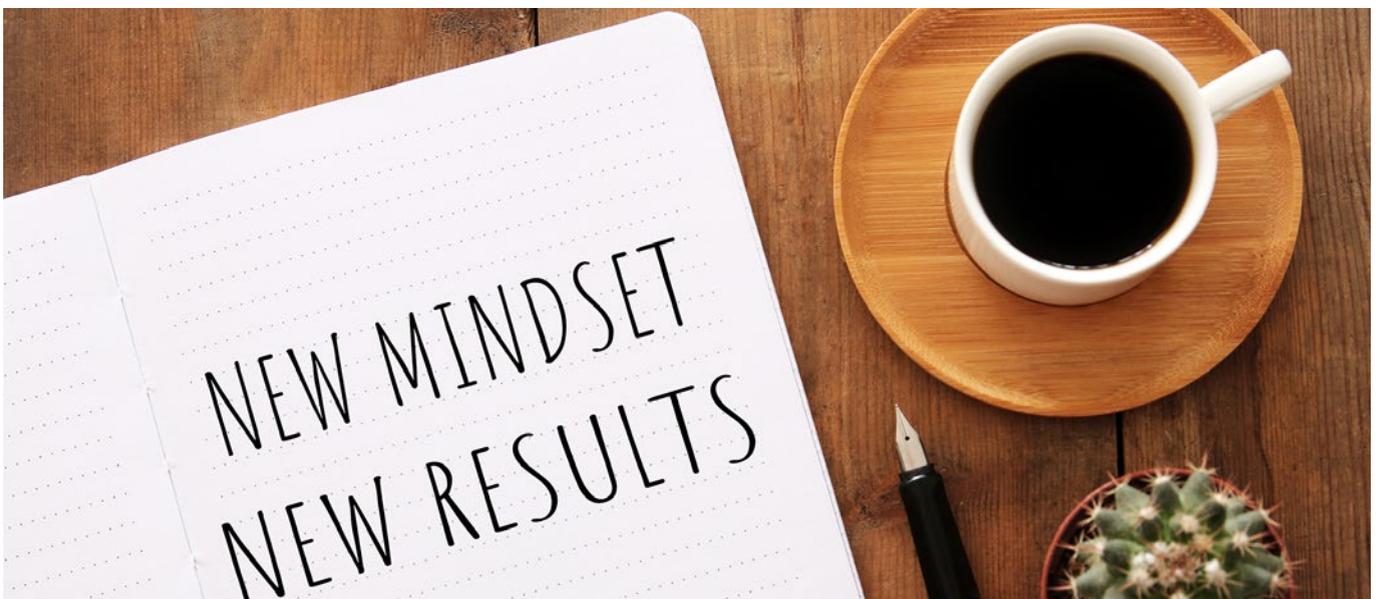
In the first quarter of recent years, we have looked to two information-rich events in the electronics industry arena—IPC APEX EXPO and CES (formerly Consumer Electronics Show)—to learn, observe, contribute, and enjoy. I have attended and participated in both events for several years, something I have relished.

This year, both events will be unprecedentedly different as they go virtual. We have been on this virtual platform for the past 10 months, and by now, perhaps we are all “trained” to conduct business virtually. IPC officials have indicated that IPC is committed to providing a digital platform that will allow the attendees to easily navigate more than 100 technical conference sessions and to view product demonstrations, as well as to advance by attending professional development courses.

As stated in the CES official site, CES is owned and produced by the Consumer Technology Association (CTA), and is the most influential tech event in the world. It is the proving ground for breakthrough technologies and global innovators. This is where the world’s biggest brands do business and meet new partners, and the sharpest innovators hit the stage. CES features every aspect of the tech sector.

Indeed, CES has been the venue for leading electronics companies to showcase their cutting-edge products and services, as well as a platform for business leaders and innovators to share their vision and views on prevailing issues.

Certainly, there is nothing short of innovation in products and of inspiring and informative presentations and speeches. I recall that



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my very first in-person speech by Bill Gates (then CEO of Microsoft) was at CES. Without exception, I have been dazzled every year by the extent and the breadth of new products and lively demonstrations. The exciting products displayed at the show are mind-boggling in terms of the ingenuity, creativity, innovation, and the phenomenal functionalities of end-use products.

Without exception, I have been dazzled every year by the extent and the breadth of new products and lively demonstrations.

IPC APEX EXPO, on the other hand, focuses on the packaging and assembly of the electronic circuit board that is the critical “brain” behind the electronic products that are used across all industry sectors, be it consumer, industrial, commercial, military, telecommunication, computing, or medical and health care sectors. The IPC APEX EXPO conference and exposition address real-world problems related to printed circuit boards.

According to the IPC APEX EXPO 2021 website:

- Attendees at all career stages can expect to access new material- and process-related research and best practices
- Learn more about trending materials, applications and processes to prepare for the Factory of the Future
- Interface with the collection of top suppliers
- Learn from new product demos
- Learn technical advances in technical sessions and professional development courses
- Network with colleagues

Over the years, countless professionals, engineers, managers and business-decision makers have unequivocally benefited by attending and participating in the IPC APEX EXPO. At IPC APEX EXPO 2021, there will be a comprehensive slate of professional development course offerings, ranging from circuit design and component technologies to PCB fabrication/materials and assembly processes to quality/test/inspection and reliability. Here, I would like to introduce two professional development courses I will be presenting that focus on preventing production defects and enhancing product reliability.

First Course: Preventing Manufacturing Defects and Product Failure

This course focuses on preventing the most prevailing production defects and product reliability issues that affect yield, cost and performance through an understanding of potential causes and plausible solutions. I will provide a holistic overview of product reliability, including the roles of materials, processes, testing/service conditions, and crucial principles behind the product reliability.

I will discuss two selected areas related to product failure:

- Intermetallics
- Tin whiskers

and five selected defects:

- PCB pad cratering vs. pad lifting
- BGA head-on-pillow
- Open or insufficient solder joints
- Copper dissolution issue
- Lead-free through-hole barrel filling

Specific defects associated with the reliability of BTC, PoP and BGA assembly will be highlighted. The role of intermetallics at-interface and in-bulk, and the difference between SnPb and Pb-free solder joint in terms of intermetallic compounds, will be concisely summarized.

From practical perspectives, tin whiskers with emphasis on risk mitigation through

understanding the factors that affect tin whisker growth and its testing challenges will be outlined. The practical tin whisker criteria for reliability implications in the lead-free environment and the relative effectiveness of mitigating measures will be ranked.

Second Course: Reliability of Electronics— Role of Intermetallic Compounds

As intermetallic compounds (IMCs) play an increasingly critical role in the performance and reliability of solder interconnections in the chip level, package level and board level of lead-free electronics, the second course expands the content coverage on the role of intermetallic compounds in the reliability of electronic products.

This course covers the relevant and important aspects of intermetallic compounds ranging from scientific fundamentals to practical application scenarios. I will examine IMCs before solder joint formation, during solder joint formation and after solder joint formation in storage and during service. Intermetallics at interface and in-bulk, as well as the role of PCB surface finish/component coating in relation to intermetallics, in turn, to reliability will be discussed. The difference between SnPb and Pb-free solder joints in terms of intermetallic compounds, which affects production-floor phenomena and the actual field failure, will be outlined. The course will also address the relevant aspects of newer lead-free alloys that were recently introduced to the market.

The virtual setting of the APEX EXPO 2021 will be unique. However, it is the intent to make my courses interactive and lively. More importantly, attendees are encouraged to bring their own issues relevant to the topics for deliberation; questions and comments are warmly welcomed.

On a lighter note, in this virtual environment, one unintended “fringe benefit” is that the sore feet caused by walking for many hours a day on the expansive and enticing show floor will be spared, while we still can see, learn,

observe the exhibits, and interact with the exhibitors on the show floor through the virtual platform.

As I sifted through my previous writings related to IPC APEX EXPO, I want to share what I wrote in March 2001:

“Reflections from APEX 2001, “... As I strolled on the exhibit floor, Siemens proudly and confidently demonstrated their newest equipment that offers the capability and precision in handling 0201 components. With the robust market demand in wireless products, this is indeed the year to actually implement the ‘tiny’ 0201s—be prepared... Another real progress is the keen interest in the alloy selection, technology and applications of lead-free systems as vividly demonstrated across the industry. Actual operation of lead-free assembly production finally extends to the U.S. from the foreign market. A slow yet steady progress in this area is expected... There were many other examples on the show floor that are evidence of the continued technology advancement. At APEX my time ran out unnoticeably and I wish I could have spent more time on the floor...”

It’s been 20 years since that column, and the “tiny” passive components such as 0201 and 01005 have been implemented successfully and continue the path on miniaturization, integration and embedded system. Lead-free alloys, having gone through converging to SAC alloy and then diverging to application-specific alloys, continue to advance and evolve.

This year, without reservation, I expect a variety of new products and frontier technologies to be exhibited; and I look forward to an exuberant, invigorating and enriching experience at IPC APEX EXPO and CES. (Note: This column was written just before CES, scheduled for Jan. 11–14.)

IPC APEX EXPO Presentations

- “*Preventing Manufacturing Defects and Product Failure*,” by Dr. Jennie S. Hwang, 9 a.m.-noon CST March 8.
- “*Reliability of Electronics—Role of Intermetallic Compounds*,” by Dr. Jennie S. Hwang, 2-5 p.m. CST March 8. **SMT007**



Dr. Jennie S. Hwang—an international businesswoman and speaker and a business and technology advisor—is a pioneer and long-standing leader to SMT manufacturing since its inception as well as to the development and implementation of lead-free electronics technology. Among her many awards and honors, she was inducted to the International Hall of Fame—Women in Technology, elected to the National Academy of Engineering, named an R&D Star to Watch, and received a YWCA Achievement Award.

Having held senior executive positions with Lockheed Martin Corp., Sherwin Williams Co., and SCM Corp., she was the CEO of International Electronic Materials Corp. and is currently CEO of H-Technologies Group, providing business, technology, and manufacturing solutions. She has served on the board of Fortune-500 NYSE companies and civic and university boards; the Commerce Department’s Export Council; the National Materials and Manufacturing Board; the NIST Assessment Board; as the chairman of the Assessment Board of DoD Army Research Laboratory and the chairman of the Assessment Board of Army Engineering Centers; and various national panels/committees and international leadership positions. She is the author of 600+ publications and several books and is a speaker and author on trade, business, education, and social issues. Her formal education includes four academic degrees, as well as the Harvard Business School Executive Program and Columbia University Corporate Governance Program. For more information, visit JennieHwang.com. To read past columns or contact Hwang, [click here](#).

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Although the setting will be unique, we are committed to providing you with the cutting-edge content you have come to expect from IPC APEX EXPO. The event’s digital platform will allow you to easily navigate more than 100 technical conference sessions and application-focused professional development courses as well as view product demonstrations, schedule one-on-one meetings with exhibitors and experience other offerings within the online exhibition.

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Tech Program Preview

Feature Interview by Nolan Johnson

I-CONNECT007

Nolan Johnson speaks with IPC's Matt Kelly and Chris Jorgensen about what can be expected from the IPC APEX EXPO 2021 technical conference, which is centered around smart manufacturing, Factory of the Future, emerging technologies, and driving the electronics manufacturing industry forward.

Nolan Johnson: Gentlemen, thanks for joining me to discuss IPC APEX EXPO 2021. I've heard that this is arguably the best technical program ever at APEX EXPO. Why would that be?

Matt Kelly: One of the main reasons we're really excited about this year's conference is the fact that we're doing something that is pushing the envelope and driving the industry forward, and we're talking about a lot of new subjects. We're moving beyond our core technologies

well known to the industry. Not that we're not interested in them, we're absolutely interested and they're very important to our industry, but much of it is quite mature. This year's conference is building upon that core technology—PCB fabrication, for example, quality, reliability, assembly, and test—but we're really focusing in on new "Factory of the Future" type of topics.

Johnson: It seems like there is quite an extensive lineup of papers and presentations that talk to core technologies but others that add some new capabilities for some new conversations as well.

Chris Jorgensen: I think we have a great mix of topics, including some things we've talked about at past events, but what's really exciting, especially about the Factory of the Future track, is that the attendees are going to see real-world examples of what's happening. These



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aren't presentations about pie-in-the-sky or what-if sorts of concepts.

Our speakers will show attendees the capabilities that are available to them now so the electronics industry can begin to prepare for moving into Factory of the Future implementation.

Johnson: For the prospective attendee, what are some of the key topics that I can expect to find in the technical papers and presentations?

Kelly: We have three different tracks. We have Factory of the Future, which is our primary showcase track. Next, we have our PCB fabrication and materials track, and third is our quality, reliability, assembly, and test track. Within Factory of the Future, you're going to see topics that span actual implementation on the shop floor. There are presentations, for example, from the Manufacturing Technology Center, or MTC, out of England. They'll be talking about their vision, their journey to enabling smart factory for electronics manufacturing, with topics like augmented and mixed reality within electronics manufacturing, and the role of automation and robotics. The content just from MTC alone is very strong.

We also have PSMA, the Power Sources Manufacturers Association, which we have partnered with in 2020, talking about powering the Internet of Things, mobile smart technologies within the industry, and, my favorite, energy storage and energy harvesting within sensors.

We then move into data analytics, which is very close to the work we've been doing with our CFX initiative. Here, we're focused on collecting data and making sense of it, so we have folks from Arch Systems, ASM, and Flex, for example, talking about predictive features of



Matt Kelly

data for placement feeder maintenance. We have a second data analytics and mining session where we've invited different OEMs and an MES provider. We have presentations from Honeywell FM&T, IBM, and Critical Manufacturing, an MES provider. In this session, we'll be talking about mining and refining dark data, modern MES solutions, and building the case for an electronics supply chain blockchain. It goes on and on and on; there's a lot of new content here. I'm not even half-

way through the list. Chris, could you talk a little bit about cybersecurity and traceability?

Jorgensen: Cybersecurity is of major importance right now to our industry. We have built two very solid sessions on cybersecurity that will provide an understanding of cybersecurity risks, how to assess cybersecurity preparedness, as well as regulatory issues that affect our industry, such as CMMC. These speakers bring decades of knowledge about cybersecurity for electronics manufacture, so all of these talks will be direct fits for our attendees.

We'll also have a session on best practices for traceability, which will be led by the chairs of an IPC task group that oversees IPC-1782, our traceability standard. This session will provide a framework for how any company in the supply chain can assess their existing traceability capabilities and make plans to improve them to meet internal and external expectations, as well as the immediate and long-term benefits of adopting the traceability best practices.

We also have a session on digital twin, which is based on IPC-2551, the first industry standard we know of on digital twin for the electronics manufacturing industry. This session will provide an overview of the IPC Digital Twin and how to assess your company's dig-

ital twin readiness, followed by deeper dives into the use of digital twin data to enhance and improve design and manufacture, as well as how to utilize data in the field from digital twin products.

We're excited about all three of these sessions.

Johnson: Right. You have standards like CFX, IPC-2591, etc., and this begs the question for a virtual IPC APEX EXPO 2021: How are you handling the committee meetings?

Jorgensen: The standards committee meetings are a key element of every IPC APEX EXPO, so we will have meetings again this year—with a twist.

Being apart for this year's event is not ideal, but it gave us the opportunity to think outside the box a little bit when scheduling our meetings. Our committee meetings always run concurrent with the technical program at the event. This means committee members often must miss technical programming and our technical program attendees often will miss committee meetings they would want to attend.

This year, we will hold our IPC APEX EXPO committee meetings before and after the week of the technical conference. As with past in-person APEX EXPO meetings, they will be open to anyone who wants to listen in on what a specific group or groups are working on and, if interested, get involved with those groups. We're already hearing positive responses to this approach from our committee chairs and members, so we anticipate event attendees will also be happy with this move.

We will post the full meeting schedule and a mechanism for getting meeting invitations on the IPC APEX EXPO [website](#) very soon. Check out the list of meetings. If you see topics of interest, request the meeting invitations,



Chris Jorgensen

and help to shape our industry standards.

Johnson: Matt, IPC has been collaborating even more closely than in the past with several industry organizations. Can you tell us about this?

Kelly: One thing that IPC has done in 2020 is to reconnect in some cases—and then strengthen in others—our collaboration with other industry groups. This is so that IPC can make sure that we're working

directly with these groups to ensure that new information, new research, and new development efforts reflect state-of-the-art advancements and critical issues as best as possible. We've recently engaged with MTC, PSMA, and AIAG and continue our longstanding relationships with iNEMI, HDP, and Navy Defense Base as well.

iNEMI, for example, will be discussing 5G high-frequency challenges and opportunities. HDP is reporting on latest 2019 and 2020 project updates. Topics include evaluating solder joint fatigue performance as a function of PCB thickness, accelerated thermal cycling, and photonic soldering rework. From the Navy DoD workgroup, we've got a session on the defense PCB industrial base and their technology roadmap—things like quilted circuit board assemblies and high-density interconnect development. When you look at the IPC APEX EXPO program, we have a very nice collection of other industry groups presenting their work.

Jorgensen: Another group we have partnered with for the last couple of years is the Advanced Functional Fabrics of America—or AFFOA. They and their members have been engaged in our e-textiles standards activities for the past several years, and as that relationship has grown, so has our work together. We

approached AFFOA last year to gage their interest in putting together a technical session on e-textiles. The interest in this among their members was so high, we wound up with two technical sessions out of it.

These two e-textiles sessions provide a solid opportunity to learn about e-textiles technologies and applications. There will be presentations on textile capacitive touch sensing, power harvesting for e-textiles, wireless wearables, and then functional fibers and fabrics that are used to construct these products.

You wouldn't expect to see two technology tracks on e-textiles during IPC APEX EXPO, but because this is a growing technology area and deals with electronics manufacture, we feel these sessions are a perfect fit within the technical conference. This is a way for anybody in the industry, whether you work in automotive, aerospace, consumer products, soft or stretchable electronics, to learn about these technologies.

Johnson: What do you have planned for the other two technical conference tracks?

Kelly: As we mentioned earlier, the core of our technology focus remains very strong, and we've compiled really good content within the PCB Fabrication and Materials track and the Quality, Reliability, Assembly, Test and Inspection track.

We have a variety of topics included in the PCB Fabrication track such as microvia design and material reliability improvements, 3D embedded modules, additive build-up processing, mixed VIPPO structures, and measuring high speed/high frequency signal integrity characteristics, to name a few.

For the Quality, Reliability, Assembly, Test and Inspection track we have a nice mix of content including topics such as AI-assisted quality inspection using edge computing, thermal interface material advancements, flex PCBA design, conformal coating evaluation, and RF plasma cleaning.

Automotive electronics is obviously a very important area now with rapidly emerging requirements to operate in extreme conditions. As such, we've built a dedicated session on automotive electronics advancements resulting from our engagement with AIAG and with IPC members working in the automotive sector. In this session, we'll be addressing topics like improvement of automotive designs through proper material choices, technology verification for reliable smart surfaces, and reliability of solder alloys for harsh environments.

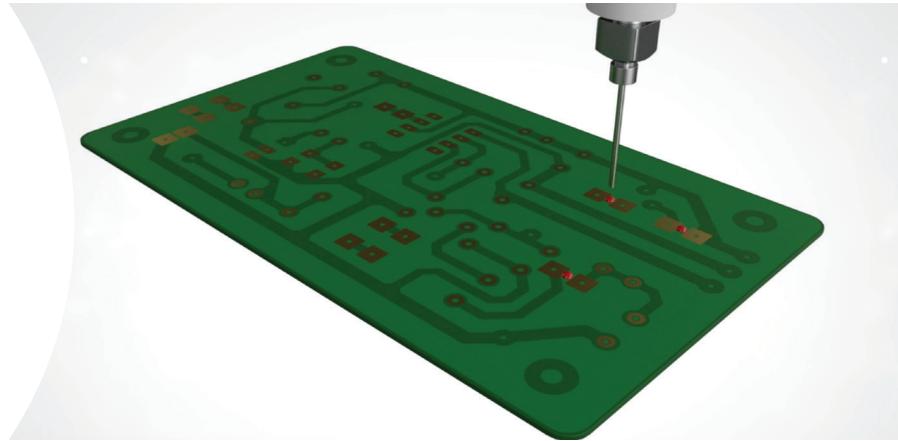
One thing that I think readers will note is there's less content being offered on conventional assembly process technologies. The main reason is we had overwhelming demand for new technology content. We turned away over a third of abstracts this year for the technical conference. This stat alone shows the strong demand for new Factory of the Future topics and PCB board fabrication advancements—specifically, microvia and other HDI technologies.

Johnson: That seems to be the focus for those in assembly and EMS, for sure.

Kelly: Again, I want to stress, as a reader looks at this program, it's not that we're not interested in assembly processes, it was just the overwhelming demand for these new technologies and that's very exciting.

Johnson: Let's circle back to the Factory of the Future. You have quite a lot going on there. There's the ongoing work with IPC-2591, Connected Factory Exchange, which is the backbone for Factory of the Future, plus you'll be showcasing the Factory of the Future. What can I expect to see when I visit the showcase during APEX EXPO?

Kelly: What you can expect for IPC APEX EXPO 2021 Factory of the Future is a solid and well-rounded grouping of topics that we've explained. We put so much emphasis

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on Factory of the Future because, strategically for IPC, it is the framework that defines our overall roadmap moving forward. It has been designed to drive the industry forward, to modernize, and to help build electronics better. Everything that we're doing now within IPC is wrapped around this concept of advancing the industry.

We're structuring our program to foster industry-wide awareness, collaboration, and implementation. What better way to do this than at an industry conference like IPC APEX EXPO? We're building upon 20+ years of mature conventional technologies and now we're adding in a very strong focus on emerging and disruptive technologies; IPC's Factory of the Future vision and mission.

Johnson: Be a bit of a futurist for me for a moment. What do you want Factory of the Future to look like in 2022 and beyond? What's out there in the planning stages for our shared readers and participants?

Kelly: If I'm peering into my crystal ball, and Chris has heard me talk about this for a long time now, it is really all about implementation. The concepts, the ideas, the promise of these technologies and ways of working, they've been out there for quite some time but what's

different is we're at the cusp of a lot of these maturing to a point where we can actually use them to deliver real business value. Looking past this year, 2021, and into 2022 and '23, what I would like to see is more actual implementation across IPC's membership and across the electronics industry, so that in 2022, we have even more companies reporting back, "These are the types of problems that were out there in my factory and my supply chain and here's how I was able to solve them using this new way of working."

If you think about what has been done for the last 20 years, there's been so much content published on solder joint metallurgy, interconnect failure mechanisms, electronic assembly materials, and SMT assembly processes—all of these studies using different techniques (like design of experiments, statistical analysis, and gap analysis, for example) to solve problems and make improvements. I'd like to see the industry take those concepts and methods and apply them now to modern business needs and applications like electrical-mechanical co-design, real-time statistical process control, supply chain data mining and insights, high-mix low-volume optimization, NPI cycle time reduction, six sigma quality delivery, high product mix yield improvements, all of these types of things. That's what I hope for in the next couple of years: more implementation and more case study examples of all of this technology and new ways of work at play.

Johnson: I get to talk to a lot of people in the industry, and I run into the occasional cynic who will say that all of this is just about convincing industry participants to buy new equipment. But if someone really listens to what we're talking about here today, that's not the case at all.

Kelly: No. I'm an engineer; first and foremost, we go back to basics. These things have to create value. In engineering and in the produc-

tion world, that means agile supply chain management, faster NPI cycles, highest quality, product reliability, first pass yields, maximum productivity, lower costs, faster response time, ability to debug problems faster, crisis management, and reduction of scrap. I could go on and on; there's a very long list. What I see different is problems still exist today, and they will exist tomorrow, but IPC's Factory of the Future approach will allow us to solve those problems faster, more accurately, timelier, provide better business insights, and make better decisions. I think the challenge with Factory of the Future overall is that it is not just one thing. If this is going to work, a whole bunch of things must come together all at the same time. We need the industry to collaboratively move forward together.

Johnson: Is there an opportunity for IPC members to get involved in furthering this program, and how can they do that?

Kelly: Absolutely. First and foremost, they can contact me directly as IPC's chief technologist. We have an open-door policy. There are a lot of committees where we're forming new standards and guidelines. If there are new tracks and new areas of technology that we are not looking at, let us know. There's no shortage of ways to get involved. I'll also bring in our IPC Emerging Engineers program. A lot of youth coming into this industry have new skills from school, new aspects of what's important to them in design, materials, and process, and we are working to ensure next generation talent is a part of this transformation as well.

Jorgensen: One of the most fantastic things about IPC is that we're a solutions organization. When industry comes to IPC with a problem or with a question, we work together with industry to resolve it. I have a couple of good examples of that.

About a year and a half ago, Dave Bergman was approached at a conference by someone

who said we need a standard on digital twin. There seems to be a lot of confusion in industry about digital twin, what it is, its importance to industry and how to implement it. We took that problem to some of our committee members, and within a month, we had a task group; a year later, we have a published international standard for digital twin.

Another example would be when NEC approached us at IPC APEX EXPO last year with a need for an industry standard for cybersecurity for electronics manufacturers. Much like the digital twin standard, we went from concept to a formed task group in a few months, and that group is now working on the standard, with a goal to publish later this year.

These ideas don't just lead to standards which sit on a shelf somewhere. IPC works with industry to develop full-scale solutions for implementation of these standards.

Just look at where IPC-CFX is now. The need for that standard came during IPC APEX EXPO in Las Vegas in 2016 to address concerns with multiple messaging platforms for assembly line equipment. From that meeting, industry not only solved the issue with equipment messaging, but we now have a tangible solution for EMS and OEM companies of any size to meet their Factory of the Future objectives.

In fact, we're seeing so much activity in this area, we have developed support services for industry, ranging from on-demand education and engineering support to an online equipment self-validation system and an IPC-CFX Qualified Products List (QPL) for EMS and OEM companies to use for making equipment purchases for their IPC-CFX lines.

Johnson: What is the one thing you want to ensure happens with the virtual format of IPC APEX EXPO 2021 to measure your success?

Jorgensen: I think the measurement of success is going to be in the content. We have been left



with a situation, as many other organizations have over the last year in dealing with COVID-19, but that hasn't stopped us in any way from putting together a really strong technical program. In fact, hearing early comments from people who have viewed the program—that this is one of the strongest that we have had in some time—is really positive.

The event is obviously going to be different from the standpoint that people won't be in person. We won't have the handshakes and the hellos in the hallway. But if you want to get a really strong sense of what's happening in the industry across all the topic areas that Matt and I discussed, you'll have it with the technical conference.

An added benefit compared with in-person events is that if you have to decide between two presentations or sessions that are running simultaneously during the conference, you won't miss out on any of the content. Registrants will be able to access their technical sessions on-demand following the conference.

Kelly: Well said, Chris. I fully agree, and it's why we spent so much time on the content. We realized that people are going to be sitting at their desks, probably at home, and the measure's going to be whether they are interested in tuning into that particular topic. If it's good and new and relevant to them, then they're going to tune in. In person, we'd have every-

one's time sequestered for the week in San Diego where we get their full attention; now, there's going to be a lot of distractions. We ultimately have to draw them into the content, so I fully agree with Chris.

Also, as IPC's new chief technologist and new to IPC, I'm really excited about how much IPC is investing in the future. I want people to walk away from this conference realizing that we're very serious about IPC being the go-to association to help companies transform and modernize. This goes beyond the conference and this is not going to stop. The programming that we have at IPC APEX EXPO will be an example of that, but it will also come through in the work that Chris and the team does with the standards organization as well.

Jorgensen: There's definitely more to come.

Kelly: This is the beginning.

Jorgensen: This is not a "Factory of the Future buzz word thing" that we wanted to do just this year for IPC APEX EXPO. As Matt said, Factory of the Future thinking and modernization is going to shape pretty much everything IPC does moving forward.

Johnson: Extremely informative and insightful. Thank you. The technical conference looks to be living up to its hype! **SMT007**

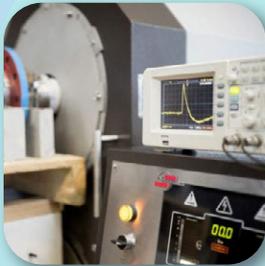


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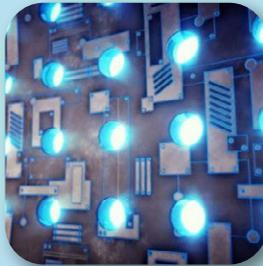
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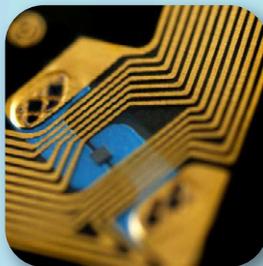
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Schedule at a Glance

As of January 2021:

Monday, March 8

- 8:45–8:50 a.m. Welcome Message
- 9 a.m. –Noon EMS Management Meeting
- 9 a.m. –Noon Managers Forum: Managing Challenges in Periods of Transition—*Presented by the Raymond E. Pritchard Hall of Fame Council*
- 9 a.m. –Noon Professional Development Courses
- 12:30–1:30 p.m. Keynote Presentation by *John Mitchell, President and CEO, IPC*
- 1:30–5 p.m. EMS Management Meeting
- 1:30–5 p.m. Managers Forum: Managing Challenges in Periods of Transition—*Presented by the Raymond E. Pritchard Hall of Fame Council*
- 2–5 p.m. Professional Development Courses

Tuesday, March 9

- 8:45–8:50 a.m. Welcome Message
- 9 a.m. –Noon Professional Development Courses
- 9 a.m. –Noon Exhibitor New Product Presentations
- 12:30–1:30 p.m. IPC Annual Meeting and Awards Ceremony
- 12:30–1:30 p.m. A Virtual Escape Experience
- 2–5 p.m. Professional Development Courses
- 2–5 p.m. Exhibitor New Product Presentations

Wednesday, March 10

- 7:55–8 a.m. Welcome Message
- 8–8:45 a.m. Keynote Presentation by *Travis Hessman, Editor-in-Chief, IndustryWeek*

- 10 a.m. –Noon Technical Conference Sessions
- 11 a.m. –Noon Forgotten Tribal Knowledge with IPC Hall of Fame and Emerging Engineers
- 12:30–1:30 p.m. IPC Emerging Engineers Roundtable
- 12:30 –1:30 p.m. Exhibitor New Product Presentations
- 12:30–1:30 p.m. Live Q&A with *Travis Hessman, Editor-in-Chief, IndustryWeek*
- 1:30–3 p.m. Technical Conference Sessions
- 1:30–5 p.m. Exhibitor New Product Presentations
- 3:30–5 p.m. Technical Conference Sessions

Thursday, March 11

- 8:10–8:15 a.m. Welcome Message
- 8:15–9 a.m. Keynote Presentation by *Shawn DuBravac, Chief Economist, IPC*
- 9 a.m. –Noon Professional Development Courses
- 9 a.m. –Noon Exhibitor New Products Presentations
- 10–11:30 a.m. Technical Conference Sessions
- 12:30–1:15 p.m. IPC Education Foundation: Looking Ahead
- 12:30–1:30 p.m. Trivia Networking and Name That Tune
- 1:30–3 p.m. Technical Conference Sessions
- 1:30–5 p.m. Exhibitor New Product Presentations
- 2–5 p.m. Professional Development Courses
- 3:30–5 p.m. Technical Conference Sessions

Friday, March 12

- 9–9:45 a.m. IPC at a Glance (Standards, Education, Advocacy, Solutions and Industry Intelligence)
- 10–10:30 a.m. Exhibitor New Product Presentations
- 10:30 a.m. –Noon Technical Conference Sessions
- Noon–12:15 p.m. Closing Remarks

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Making the Most of a Virtual Event

Feature Interview by Nolan Johnson I-CONNECT007

Nolan Johnson speaks with Alicia Balonek, senior director of tradeshow and events at IPC, about how both attendees and exhibitors can best prepare for this year's virtual IPC APEX EXPO and breaks down some of the events you can look forward to at this year's show.

Nolan Johnson: Hi, Alicia. IPC APEX EXPO is going to be different for 2021. Those of us who are regulars know how to get around in a physical venue and how to make the most out of being all together in one place. But this won't be exactly the same. Could you walk us through some of the most effective strategies for making the most out of the virtual event for IPC APEX EXPO?

Alicia Balonek: Sure. I'd be glad to help out our future attendees. We're actually working with two different platforms, but from the attendee side and the exhibitor side, it will be seamless. The first platform is the platform that we've been using for years: our agenda planner or online exhibit hall. Once someone registers for the event, they will automatically receive a link to register to this platform to set up their attendee profile. That is the platform they will use to connect with exhibitors and other attendees, as well as setting up their planner and their schedule for the week and which events they'll be attending. There's also a feature for exhibitors which allows them to upload product images, videos, presentations, press releases and company descriptions. They can select what their product categories are, and it also gives them the opportunity to schedule appointments as



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well with attendees and even other exhibitors, if they want to.

The most important part of both of these features is to turn on the networking capabilities so other attendees and exhibitors can connect with each other. Since there are so many variables and features with this program, we are actually in the process of creating customized videos—one specific for attendees, and one specific for exhibitors—which will be available on our website weeks before the virtual event, to show people how to use this platform and how to get the most out of it.

Johnson: That is something that, to my knowledge, is unique when it comes to doing virtual events. I don't think I've ever seen anybody give advanced tutorials on how to use the environment.

Balonek: That's the point (laughs)! We want to make sure that people have a successful experience with IPC APEX EXPO. The more that we can do ahead of time to help people with their experience, then that's what we want to do to make sure that everyone comes away with everything possible on how to connect, how to find products and services that they're looking for, and how to find any education that they need, as well.

Johnson: Will there be links to access this information?

Balonek: Yes. In fact, the agenda planner is live now.

Johnson: Great. When will this be turned on for the public?

Balonek: It is turned on right now, but the key is you have to register for the event in order to access the information. If an attendee is not sure whether they want to register for a paid option at this time, they can register for Event Essentials, there's no charge for that, and it will

allow access into this platform. Additionally, our eBrochure is due to come out any day now and will be available by the time this interview goes to print.

Johnson: If I register with an Event Essentials package as my choice, what is available to me?

Balonek: The Event Essentials includes three keynote presentations. One will be given by IPC's president and CEO, John Mitchell, and another keynote is by IPC's chief economist, Shawn DuBravac. Our third keynote, Travis Hessman, editor-in-chief of IndustryWeek, will speak about Factory of the Future. All three keynotes are included in the Event Essentials package, as well as exhibitor product demonstrations and other presentations that are focused on IPC. These presentations include IPC-at-a-Glance, which will cover: Standards, Education, Advocacy, Solutions and Industry Intelligence, Forgotten Tribal Knowledge (featuring IPC's Emerging Engineers and IPC Hall of Fame Recipients), and a presentation on IPC's Education Foundation, just to name a few. These presentations will also be available for 90 days after the event.

Johnson: If I were to take a step up from Event Essentials, Alicia, what would be in my registration?

Balonek: We have several options available depending on your budget. We're offering a one-day conference package, which offers access to the technical conference sessions for the day of the attendee's choice. There's also the full conference, which will give someone access to all 70 technical conference sessions with on-demand access for 90 days after the event. And then—the cream of the crop package—the All-Access Package, which includes all 70 technical conference sessions, as well as all 29 half-day professional development courses also with access for 90 days after the event. Something new this year, which has never been done

before, for the All-Access Package, all the professional development courses can be accessed for 90 days after the event. Normally for an in-person event, due to scheduling, a person would be limited to attend only five professional development courses. With the virtual event, and with the All-Access Package, registrants can access all 29 courses.

Johnson: That's a huge benefit.

Balonek: We believe so, and especially with in-person events being on hold for most of this year, we think it's very important to be able to provide our members with the training and education that they need in order to succeed. We're very excited about this package and we hope many people take advantage of it.

Johnson: That's a great point. You get 90 days of access to the material which cultivates the potential for a very immersive educational experience. It's a great way to get a lot of value out of this; go deep and wide in the content that's available.

Balonek: Another benefit to this is that people can learn on-demand. It doesn't have to be during normal work hours, because it's all accessible for 90 days; they can learn at their own pace when time permits, in the evenings, on the weekends or whatever works best for them. There's plenty of time to get through all of this content.

As an exclusive benefit for IPC members, we are offering two special, brand new, registration packages. We have a Basic Package which allows up to 100 employees from the same company to gain access to the full conference and 100 professional development courses.

Again, that's live and on-demand for the 90 days that it will be accessible. Then we have a Premier Package which allows an unlimited number of employees from the same organization to attend the conference and up to 200 professional development courses. This is a way for some of the larger companies to be able to send quite a few people to the event so we can help train and educate their employees on the latest and greatest technology and solutions that are available.

Johnson: It's going to be exciting to see how all of this works over the course of IPC APEX EXPO, and to learn exactly what the results are from all of this innovation. I have to say, the setup for this event looks to be perhaps the most innovative and thorough that I've seen. I'm really excited to see what your results are.

Balonek: We are too. I mean, we have a very dedicated team and we've been working very hard at this. We want our exhibitors to have a positive experience, and we also want our attendees to have a positive experience and get them information that they desperately need to help them succeed.

Johnson: You mentioned earlier, as people get registered, to make sure that they turn on the right settings so as to be visible for networking.

Balonek: Yes, and that would be for the agenda planner, attendees and exhibitors need to "opt-in" to the appointment calendar which allows exhibitors and attendees to schedule appointments with each other.

Johnson: It sounds like a good idea to make some appointments early on with exhibitors to



With the virtual event, and with the All-Access Package, registrants can access all 29 courses.

cover material. Would you recommend that as a good strategy for this virtual approach?

Balonek: Oh, definitely! And the planner does also have that capability. The planner will also match attendees with exhibitors based on the demographics for each. Even the week of the live event, if an attendee attends a certain technical conference session, it will match exhibitors that have complimentary products and services based on the subject matter and the content of that particular session. The same goes for the Professional Development courses.

Johnson: Now that's interesting! You're helping me focus in on exactly who I should talk to, based on my technical program interests. You're creating a more focused agenda just for me. I may know some of these companies, but other companies may be new to me.

Balonek: Exactly. Also, if you're interested in a product, or looking at launching a new initiative within your company and you're not familiar with what companies offer products and services around that particular topic, with this feature they'll be right in front of you. We'll highlight that for the attendees, which we think is a really cool feature.

Johnson: Interestingly enough, you're driving that exhibitor connection from the technical programs. A great way of connecting attendees with new exhibitors is for the attendees to get very involved in the technical programs.

Balonek: Exactly. Similar to show floor traffic and just the casual passer-by stops by a booth, this is a virtual way of doing that now.

Johnson: That's exactly what I'm picking up on as we talk about this. Networking is an important part of going to a show, what with your peers, vendors, potential customers, IPC staffers, and the like. We always come back from the shows having met somebody new as a colleague or a customer. How do you see that happening in the virtual event?

Balonek: We have a few events planned, which we participated in as a team and we had a lot of fun with them. We are planning on doing a virtual escape room, which attendees can join as a team. We also have a "name that tune" trivia event, and I don't mind saying that, when our team tested the game, I won.

Johnson: I bet that was a lot of fun.

Balonek: Yes. It definitely is a lot of fun! And it's moderated by a DJ. He did a great job engaging people and trying to get the conversation going. All the conversations are done via the chat feature, which was fun as well.

Then, for those who want more of a subject matter type educational format, we are creating an event with IPC's Emerging Engineers and our Hall of Fame members. We're calling this event "Forgotten Tribal Knowledge." We did a smaller version of this at one of our other events last year. There's so much information which we can build on, as far as transferring information from one generation to another, so this session strives to pass along working knowledge that is not found in textbooks or in training materials. We feel that is a great way to get people engaged with the industry and also with different representatives from the industry.





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Johnson: Connecting experience to the younger professionals is so important.

Balonek: I think it goes both ways. They can definitely learn from each other. Also, Forgotten Tribal Knowledge is one of the events included in Event Essentials as well. So that event is free and available for everyone to attend.

Johnson: What's your vision for the serendipitous bumping into somebody, having a conversation, waiting in line for snacks in the exhibit hall or in a hallway? Do you see a way to incorporate that sort of very traditional organically occurring networking in the virtual environment?

Balonek: Well, a lot of it is going to be on both the attendees and exhibitors to reach out to one another. That's why it's critical that they work with the online agenda planner to connect with each other. We are trying to, like I said, match people up with each other. All the conference technical sessions will have live Q&A, so there's also an opportunity for people to get to know each other through the Q&A. For our keynote speaker, Travis Hessman, there will be a live one-hour Q&A with event participants later in the day, in addition to his 45-minute keynote presentation. So, it would be nice if they can build upon the questions that are asked and connect with each other after the event. If attendees allow us to share their information with exhibitors, we send the attendee list to the exhibitors so they can reach out to them before and after the event.

Johnson: I have heard on several occasions people comment that the virtual approach will allow for a much more global reach for IPC APEX EXPO. Do you see that unfolding?

Balonek: Yes, I do. And not only a global reach, but I also see this as a potential for people who aren't normally able to attend the event to participate this year in some capacity. Even though all the events will take place in central time zone, again since everything is on-demand, they are able to access this virtually on-demand wherever they are for 90 days after the event. We often hear from some companies that they can only send so many people to the event, but they would like to send more. This is the opportunity for more people to attend now, because you don't have the travel related expenses of hotel, airfare, meals, etc. And as I mentioned earlier, we have a one-day conference option. We also have a single session pass option if people just want to attend one or two sessions, they have the opportunity to do that as well. I definitely see our reach with the younger engineers who may not have the authorization to travel or the budget to travel as well as expanding our reach around the globe for people to participate.

Johnson: Now, it's tricky to be an exhibitor in a virtual environment, in that all of our normal ways of operating as an exhibitor change, and we interact with our booth visitors in a very different way. You've already alluded to making appointments and scheduling through the planner. As an exhibitor, what sort of support can I expect to receive in this environment?

Balonek: We're working on a video to show them how to make the most out of their exhibitor profile and virtual experience. This is a platform we've been using for years, but some exhibitors don't take full advantage of every feature available, while some do. So,

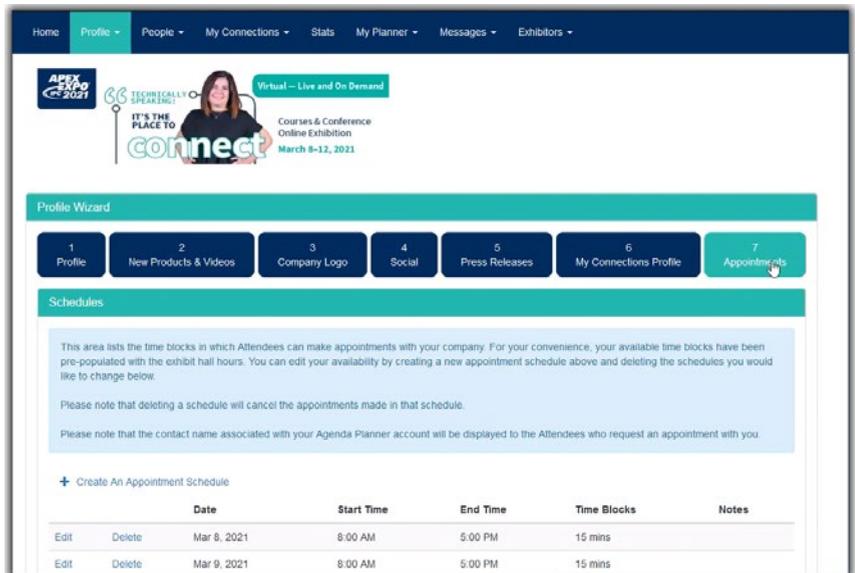


we're creating a video to show them what they can do to utilize every single feature that's available to them. Talking about the traditional virtual booth, based on my own experience with the events that IPC participated in the last few months, and also feedback from our exhibitors, the current model, in my opinion, is not working. I think a lot of organizations are trying to take that brick-and-mortar exhibit hall and just plop it into a virtual environment.

I don't see people just hopping in a booth to ask, "Oh, what's this company do? What's that company do?" We wanted to provide more value to our exhibitors, for brand recognition. So, we decided, during select times throughout the week, we are giving exhibitors the opportunity to post a commercial. It will be a two- to three-minute commercial on their products and services. And they're strategically placed before certain events throughout the week, to give them the largest audience of viewers and there are several time slots available.

We're also giving exhibitors the opportunity to present a product demonstration. These products demonstrations will be recorded and will also be available on-demand for 90 days after the event. Then already we've talked about the matchmaking tool. In the conversations we've had with exhibitors regarding these features that we're providing, they have been very well received because these opportunities give them the exposure to the attendees they're looking for and provide real ROI. With a virtual booth, exhibitors are waiting for the attendees to come to them whereas with our approach, we're putting exhibitors in front of the audience for them.

Johnson: Yes, I've been attending CES as we have this conversation. CES is a massive show.



I think there were 200,000 attendees last year and exhibitors in the thousands. Once you get into a virtual environment it feels like you're looking through a long paper tube. The sensation is very much that of tunnel vision. Go to a very large show like CES, and your vision doesn't expand, doesn't open up. As attendees, we know we're missing 99.5% of what's going on at the show just because it's not immersive. I think what you're doing makes a lot of sense.

Balonek: Yes. I really feel for exhibitors. I know how important trade shows are to them. Every year we survey our attendees and ask for the top three reasons they attend APEX EXPO. Consistently year after year, the number one reason is exposure to new products and services so for our virtual event it's important that we continue to highlight new products and services which is a feature provided through our online platform. Exhibitors have the ability to upload their new products and services along with press releases and video demonstrations. And IPC will continue to highlight and promote exhibitor new products as we do every year.

Johnson: Alicia, what isn't going to happen? If I should be prepared for something to not to be available, what should that be?



Johnson: Yes, that makes a lot of sense. Typically, the committee meetings help drive attendance to the show, and the show drives the opportunity to get involved with the committee meetings. They feed off of each other, but they also compete for the same amount of the very precious three- or four-days' time.

Balonek: Exactly. We always hear there is too much to do and not enough time, which is a good thing. The committee awards will not be taking place either virtually, these individuals work so hard and we feel that they deserve the recognition in front of their peers and it's best to celebrate their accomplishments when we're able to reconvene in person.

Balonek: Obviously, since we're not in person, we will not be having the show floor reception and other various reception type events, like the ice cream social on the show floor, the Women in Electronics Reception or the Newcomers Reception. Those events will not be taking place. Also, the standards committee meetings will not be taking place during the live event. Those meetings will be held in the same capacity as our summer committee meetings, and the IPC committee staff liaisons are communicating with their various groups to schedule those meetings. We'll also have a dedicated website for the committee meetings so the participants know when they will be taking place after the event. We just didn't want to dilute the audience, there's so much content that we're trying to deliver this year. For the committee meetings and the conference to compete for people's time, we thought that this is a year to at least separate them so people can participate in both programs, because they're both very important to IPC.

Johnson: Is there a plan to have awards announced and then do a ceremony later? Is that how that's going to work?

Balonek: For the IPC recognition awards, like the Hall of Fame, the Corporate Recognition, the President's Award, the Dieter Bergman IPC Fellowship Award, and the Rising Star Award, those will be presented during the IPC annual meeting. The committee awards will be presented at a later date, most likely during the fall committee meetings.

Johnson: Great. Thanks for taking the time to speak with us today, Alicia. **SMT007**

Links

- Click [here](#) to access the Agenda Planner. A badge number from registration is required to sign in and create a profile.
- Click [here](#) to access the IPC APEX EXPO brochure.



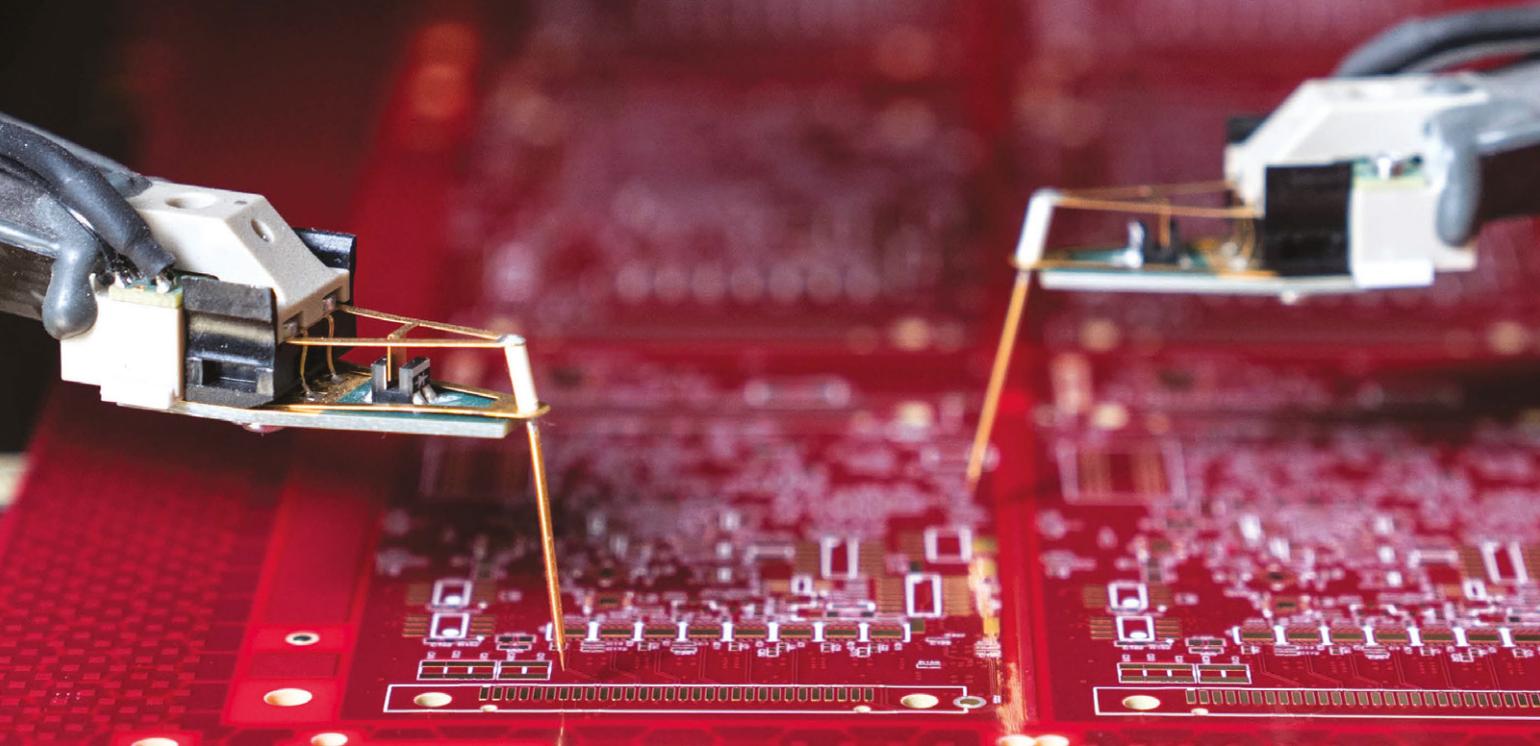
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Managers Forum

Feature Interview by Nolan Johnson I-CONNECT007

Nolan Johnson gets a preview from Gene Weiner about what he has planned for the Hall of Fame Council's biggest IPC APEX EXPO Managers Forum in years. With a lineup of speakers from throughout the supply chain, and spanning many different-sized companies, it is set to be an insightful and beneficial discussion for those in attendance.

Nolan Johnson: Gene, let's talk about the Managers Forum.

Gene Weiner: I've done an executive level every few years. This is the biggest, and probably the broadest, one that I've done since we had the meeting in Los Angeles in 2007.

Johnson: Tell me more!

Weiner: The intent this year is to cover the entire market based on the crisis we've had: the shortages, the COVID-19 complexities, the smaller companies not having the staff or the wherewithal to know where to go or how to react to what's next. How do they build their own factory of the future while they're trying to get the supply chains filled and deal with the shortages? How do they work with their customers who were also scrambling and changing supply chains? So, I thought we'd start at the top and work down, starting with the OEMs who have managed the crisis: General Dynamics or Northrup Grumman. Everyone knows they're legitimate, good, wonderful companies. We asked them to talk on these points:

- How did you deal with this?
- What can we expect from you?
- What can you teach your supply chain?



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Gene Weiner

Then we go down to the next step. And I kept hearing, “We’re small. What can we do?” Our goal became aiming it at companies under \$100 million in sales. After the IPC introduced its education programs, I ran into Norman Weiss, who founded a small EMS company, connected with German Robotics, and founded the German Industry 4.0 Campus for upskilling workers in our industry.

We said, “That takes care of the EMS guys. Now, what do they do?” Well, they’ve got to work with their fabricators. How are they going to do that? That led us to the presidents of two fabricators: Anaya Vardya [American Standard Circuits] and Brad Bourne [FTG]. Anaya is the author of all of these online books and does a great job working with new suppliers, testing new stuff, educating their customers. When you educate your customer, you’re doing a service and you create value. At the same time, Brad agreed to sit on the panel comprised of companies representing the entire supply chain.

Then we asked, “What about your suppliers?” Well, who is one of the largest suppliers in the world—supplying larger and smaller companies—and doing leading edge stuff? Atotech. They do over \$1.1 billion from metal finishing, semiconductors, and printed circuits—everything from equipment to specialty chemicals. How venturesome are they? Just look at Whelen Engineering and GreenSource Fabrication, and we see what they’ve done. Then he [Alex Stepinski, GreenSource] actually bought the company that supplied his wet processing equipment, improved it and took it international.

Johnson: Right, AWP.

Weiner: Yes, AWP. Then Alex came up with this waste treatment process which eliminates hazardous waste, among other things. His customers started asking for help designing a green-field factory for re-shoring. Alex made that a business. Next thing you know, he’s got SEL and Vicor as customers—and all three parties agreed to present. They’ll talk about why they’re doing it, how they’re doing it, and what they expect from it. They’ll discuss the planning process and how they choose their location, which will be Andover, Massachusetts, and Moscow, Idaho.

Then, we needed a materials expert on the panel. I contacted Jonathan Rowntree, group vice president of Rogers. He said, “Sure, I’d be happy to sit on the panel.”

I think we’ve put together the most complete program covering education, materials, specialty chemicals, fabrication, new re-shoring facilities, and so on. We’ve got EMS for the small guy, AI, factory of the future, and the OEM view. What more can you do in a day?

Johnson: That many topics requires two hands worth of fingers to count them off (laughs). That’s very comprehensive and the topics are very timely. I’m curious, is this year’s program intentionally put together to draw a

wider audience to the forum than would be typical?

Weiner: Absolutely. Printed circuit fabrication is what, 8% or 9% of the IPC now? The IPC has grown, I've grown, the industry has grown. I hope I've grown, but not just here (points to his stomach and laughs).

Johnson: Who should attend, Gene?

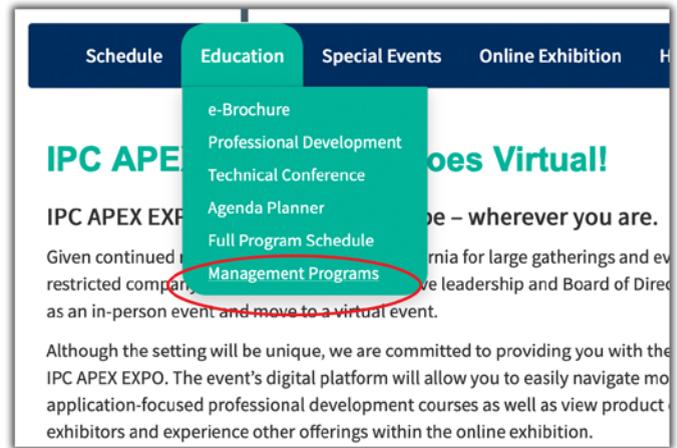
Weiner: Every new manager or manager dealing with the issues and crises of the day, just trying to move forward. I would say middle- to upper-level management, and those aspiring to become managers who want to know how to solve problems. It's a broad range.

Johnson: Equally EMS, fabrication, and suppliers.

Weiner: Yes, equipment and material suppliers both. It's a connected chain. If you're going to benefit the industry, you have to go top to bottom, or bottom to top. If you miss a link, you break the chain and you really don't accomplish the goal.

Johnson: This certainly covers the whole chain.

Weiner: I have fun doing this. I like dealing with people. The terrible part of this is I've had to do



it all by computer, phone and internet instead of over a beer or a lunch and a factory tour. Hopefully, that will end soon.

Johnson: Despite all the obstacles you've faced, this certainly is a very topical, strong program. Gene, for those who are following along here and realize that they can take advantage of the managers forum this year, where should they go to register or sign up? How do they do that?

Weiner: Go to ipcapexexpo.org and select "Management Programs" under the "Education" tab, or just type "IPC APEX EXPO 2021" in the search bar.

Johnson: There you are. Anything else that we should know?

Weiner: I hope that all those involved in electronics manufacturing and packaging including government officials that are concerned about the industry's viability, take advantage of this. They should because it supports the program and training the millions of workers that the IPC promised to Washington, and the only way it can succeed is if people take advantage of it by signing up for the event and participating in it.

Johnson: Great, Gene. I think that's a great way to wrap it up. Thanks so much!

Weiner: You're welcome, Nolan. SMT007



Managers Forum Schedule

Presented by the Raymond E. Pritchard Hall of Fame Council

March 8, 2021 – Central Time (–6 GMT)

Theme: Managing Challenges in Periods of Transition

Delegates: Members of Management in Electronic Manufacturing

TIME	MIN	SPEAKER	SESSION
8:45–9 a.m.	15	John Mitchell , IPC President and CEO	Welcome to all IPC Monday meeting attendees
9:03 a.m.	2	Gene Weiner , IPC Ambassador	Call to Order
9:05 a.m.	30	Chris Mitchell , IPC VP Government Relations	Seizing the Moment: Catalyzing Government Support for Industrial Base Resiliency, Security, and Innovation
9:35 a.m.	30	<i>Joint Keynote</i> Jeanie Wade , Vice President Operations, Northrop Grumman—Joint Meeting Keynote	Lessons Learned in Times of Crisis (OEM View)
10:05 a.m.	75	Mark Wolfe , EMS Chairman, moderator Panel of 5 composed of EMS, component, fabricator, material, and OEM executives Brad Bourne , CEO/president of FTG (Firan Tech): Fabricator Jonathan Roundtree , Group VP Rogers Corp.: Material Supplier David Patterson , Cirtronics Jeanie Wade , Northrop Grumman: OEM	EMS/HoF joint panel: Lessons Learned in Times of Crisis
11:20 a.m.	10	Break	
11:30 a.m.	40	Harald Ahnert , president, Atotech Group	Technical Support and Product Development in the Post-pandemic World

TIME	MIN	SPEAKER	SESSION
12:10 p.m.		Lunch	
12:30 p.m.	60	John Mitchell , IPC President and CEO	Regular IPC APEX EXPO programming: Keynote
1:30 p.m.	40	Anaya Vardya , president/CEO, American Standard Circuits	Going Forward: Evaluating and Validating New Products, Processes and Equipment for PCB Fabrication
2:10 p.m.	40	Norman Weiss , CEO, GermanRobotics, and Sebastian Schaal , founder, Luminovo GmbH	Transitioning to Factory 4.0—How AI Can Help Small EMS and Fabricator Companies Make the Move Affordably
2:50 p.m.	40	Katherine Ducharme , director of Procurement Management, General Dynamics Mission Systems; Cheryl Van Dyke , senior manager Supply Chain Management, General Dynamics Mission Systems	Managing the Supply Chain During Periods of Uncertainty
3:30 p.m.		Break	
3:45 p.m.	10	Alex Stepinski , founder/VP, GreenSource Fabrication, founder/managing director GreenSource Engineering	A Case Study: From Inventor to Contractor Through Several Steps of Vertical integration
	15	Diane Donnermeyer , supply chain manager, and Jessi Hall , senior director for Vertical Integration, Schweitzer Engineering Laboratories (SEL)	Vertical Integration: Why and How We Decided to Build a New PCB Factory in Moscow (Idaho)
4:15 p.m.	15	Jeff LeBlanc , director of Plating Fabrication, Vicor Corporation	Vertical Integration From Boards to Chips
4:30 p.m.	30	Joe O'Neil , CEO, Green Circuits, IPC Board of Directors (12+ years)	The Uncertainties We Can Expect From the Unexpected and the Resulting Challenges and Changes
5 p.m.		Gene Weiner	Wrap-up

Here We Go (Virtual) Again

Quest for Reliability

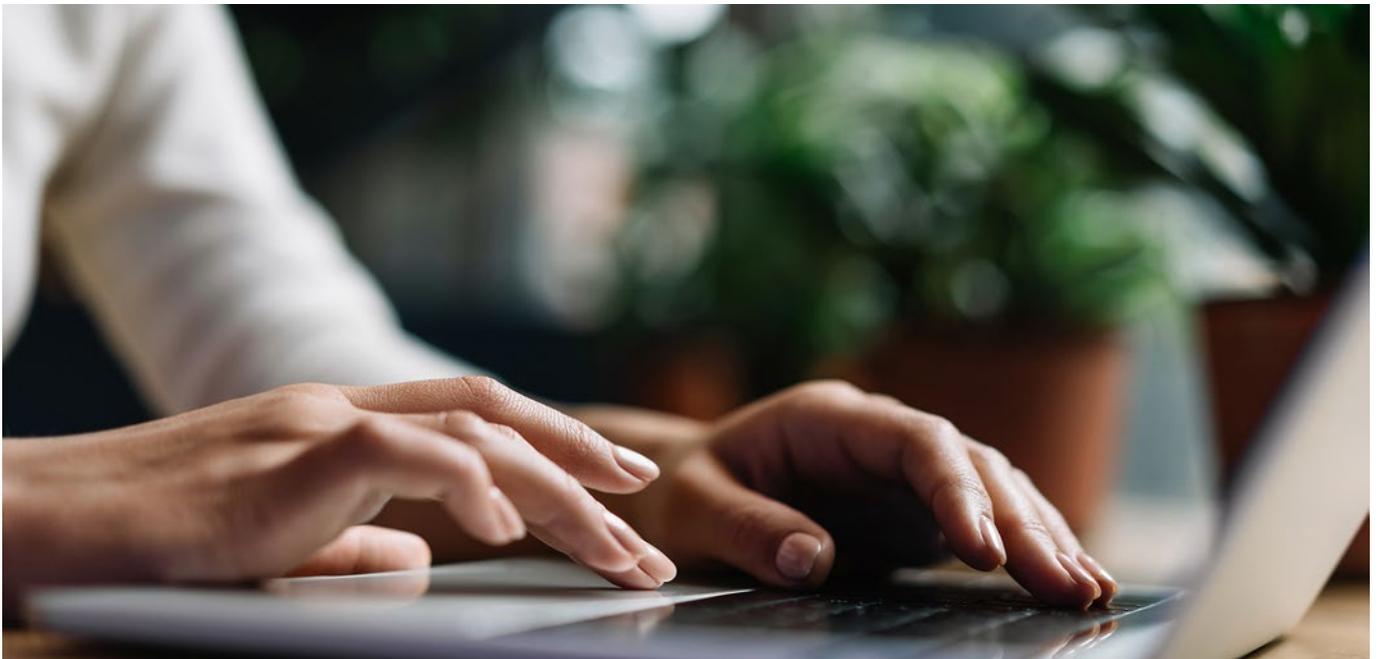
Feature Column by Eric Camden, FORESITE INC.

It seems Santa was unable to bring me the one thing I asked for this Christmas: in-person conferences. Maybe what I really wanted was just for safe travels again, but the conference thing kind of rolls up under that umbrella. IPC APEX EXPO was the last conference I attended in person in 2020. I know asking to have it in person again is a lot to ask for (and we will get there), but for now, IPC APEX EXPO 2021 is going virtual.

For some reason, during most of 2020 I wasn't the least bit interested in virtual conferences. I've sat in on many webinars over the years and didn't think twice about the format, but conferences seem a lot different. How can I see the latest and greatest equipment? I remember, years ago, being in awe as I watched a pick-and-place

machine placing 01005s by the thousands; sitting in meeting rooms discussing acceptance criteria; and learning about other companies' test results looking into failure analysis. How can all of that be recreated over a Zoom call? As you well know by now, it can't; but we can work with it this time around and hopefully we will all be back together for SMTAI in the fall. I'm buying the first round up in Minnesota come November.

So how does the virtual IPC APEX EXPO tie in with reliability? It does by recommending we all get registered and sign up for the same technical sessions and professional development courses that you would if we were meeting in-person. One good thing about data is it stays the same no matter how it is presented.





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Look at the IPC APEX EXPO 2021 website and you will see every aspect of PCBA manufacturing being covered by an industry expert. Review your process and see where you could make improvements, and then sign up for a related class. Everyone knows that it is quicker and cheaper to learn from someone else's experience, and a conference like this is full of people who have experience with failure. That is a very valuable resource because they tend to write papers about what happened and how they fixed it.

One good thing about data is it stays the same no matter how it is presented.

There is no shortage of material combinations when you consider all the options, but in general, I would say the vast majority are pulling from a smaller pool. That increases the likelihood that someone will be discussing some way to improve your current process and quite possibly without adding any cost (outside the registration fee). This all speaks to the topic of reliability because with all the transferrable knowledge available you can take something you learn, apply it to your process, and see immediate results. It might not be some gigantic revelation that saves the product, but even minor tweaks to a process that is currently acceptable can further improve reliability—even for your product that “hasn't ever had a problem,” but especially for those that “have always done it this way” and don't see the failure coming.

At the risk of sounding like a commercial for IPC, I just wanted to highlight some of the seminars I see as having tremendous potential for value. Keep in mind the differences between Professional Development courses and Technical Conference Sessions, and how each are beneficial.

Professional Development

These courses are very in-depth, and last three to six hours. They are presented by well-known experts on the topic at hand and offer experience you never had an opportunity with. There are also options within the PD courses based on your level of experience. Some of these range from a thorough explanation of some of the basics of manufacturing up to the advanced level with detailed content and high-level discussion.

Technical Sessions

The tech sessions will normally have three speakers addressing the same topic from different angles. They don't always go in depth, like the PD courses do, but there is almost always an opportunity after the sessions to communicate directly with the author for more information. In fact, this year there will still be live Q&A for all tech sessions. This gives you the chance to ask questions in real time with the presenter instead of trying to remember everything and follow up from an on-demand webinar situation. The schedule is packed so you will need to schedule your time wisely to take in everything you would like to. The “hallways” between session rooms are a lot shorter this year so it will be easier to go from one to the next. Based on what we see here in the lab, I would suggest PD courses that look at assembly challenges with bottom-terminated components, or BTCs. Even after about a decade we see many assembly issues related to BTCs. If you look for presentations on these components you're likely to find just about as many as you would have found on transitioning to lead-free a week before July 2006.

On the other side of the assembly coin is a class on the topic of design for reliability. I have often thought that every designer should have hands on experience with assembling the hardware. When designers and assemblers work together with shared experience there should be fewer assembly challenges, which

in turn, creates a more reliable product. I recommend the course on creating objective evidence related to J-STD-001 Section 8. This relatively new section of J-STD-001 is a hot topic within the industry because it essentially removes the acceptance criteria of ROSE testing for any new product. We get a lot of questions about this here as cleanliness testing is a big part of what we do. The course instructor is Doug Pauls, who, along with the help of an experienced and knowledgeable group of experts, wrote the section. If you have any questions, this course is a great opportunity to better explain the why and how related to those changes within the J-STD-001.

There is simply no shortage of topics when it comes to the tech sessions. You can learn about everything from raw components, printed circuit boards, and solder paste/flux all the way up to final packaging. With these being 90 minutes in length you have a chance to take in many topics and speakers in a short period of time.

IPC Task Group

There will still be IPC Task Group meetings but instead of packing 25 meetings into three days they will all take place virtually during March. While I would still prefer to take breaks from the meetings on that big veranda overlooking the San Diego Bay, the format this year

will allow you more time to get involved in different types of groups. I have discussed these in the past as a great way to get involved with shaping guidance documents from the IPC that may directly impact your business. Group members have extensive experience with the document subject material and with each revision there is discussion about requirements, and a determination on whether the revision needs to be adjusted to reflect changes in the industry. If you are interested in joining one of these task groups simply reach out to the IPC and they can get you added.

My point is that while going virtual won't be the same as being in San Diego this year, there are still so many opportunities to learn information that can increase reliability in your assembly. The internet will never replace seeing everyone in person, shaking hands, drinking adequate coffee for six hours, and hoping the next class has a cookie break, but we will just have to double up in Minnesota. Remember, I'm buying the first round. **SMT007**



Eric Camden is a lead investigator at Foresite Inc. To read past columns or contact Camden, [click here](#).

A dark blue textured background advertisement for JobCONNECT007. The text 'jobCONNECT007' is prominently displayed in white and yellow. Below it, the text 'Companies seeking talent with circuit board industry experience post their jobs with us.' is written in white. A large magnifying glass icon is on the right side. The website 'jobconnect007.com' is at the bottom right.

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Membership Benefits

Feature Interview by Nolan Johnson

I-CONNECT007

Brian Knier, IPC vice president of marketing, sales and membership, took time out from preparing for IPC APEX EXPO to discuss the value of becoming an IPC member. IPC recently announced [changes to the membership pricing structure](#), which made this conversation quite timely.

Nolan Johnson: Why become a member?

Brian Knier: IPC is a member-driven organization going back to our beginning in 1957. We currently serve more than 3,000 member companies worldwide representing the entire electronics manufacturing supply chain. Our mission is dedicated to furthering the competitive excellence and financial success of our members. Membership dues also support the work IPC pursues on behalf of its members and the industry.

As an IPC member, companies receive numerous benefits and savings on IPC products and services. But, more importantly, an IPC membership helps companies manufacture their products at the highest level of quality and have a noticeable impact on their bottom line. In fact, 72% of current members say IPC has increased their quality, and 60% of companies who use IPC products and services estimate that they've experienced an annual economic impact of savings from tens to hundreds of thousands of dollars. *



Brian Knier

We updated our membership structure in 2021 to a company-based model. Member dues are now based on annual company revenue or type of organization. The new structure provides a single dues payment to cover all locations and employees.

Johnson: What are some of the key benefits of membership?

Knier: Key member benefits include:

- Complimentary copies of all new and updated versions of IPC standards within 90 days of release
- Discounts on products and services including IPC standards, education, training, events, certification, industry intelligence, and sponsorships
- Access to hundreds of technical papers, industry reports and documents, and webinars via the IPC website
- A complimentary listing on IPC Global Marketplace to advertise your business

IPC also has an affiliation with the Wiring Harness Manufacturers Association (WHMA) and companies receive membership to both associations with their dues payment. Visit ipc.org/membership for more information on IPC member benefits.

Johnson: How does being a member help the industry?

Knier: Membership dues help support strategic activities IPC pursues on behalf of our members and the industry. The IPC Board of Directors and strategic committees, comprised of industry supply chain executives and representatives, identify important issues to advance



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the industry. IPC also actively gathers feedback from members on key industry issues and priorities.

Further, IPC membership drives quality, reliability, and consistency through:

- **Standards:** Company operations benefit from the widespread adoption and implementation of IPC's extensive collection of industry standards and guidelines.
- **Education and training:** IPC has invested heavily in training and education to position the industry for future growth and to address the global electronics manufacturing skills gap. An IPC membership increases a company's ability to build and support a high-performing workforce.
- **Advocacy:** IPC membership provides critical support to IPC's advocacy initiatives around the world. An investment in an IPC membership is an investment in providing a strong and unified voice for the global electronics industry.
- **Solutions:** As an electronics manufacturing industry innovator for more than 60 years, IPC (through membership and staff) supports and provides research on, and solutions to, many industry challenges and opportunities. Companies should view it as the consulting partner they need to stay on top of trends, solve process issues, and keep an eye on the future.
- **Industry intelligence:** IPC is the industry's trusted source for industry intelligence and comprehensive market data in areas such as workforce development, environmental concerns, health, safety, technology and innovation, and economics. With unique data sources from around the world, IPC's research reports, studies and analyses provide insights that cannot be obtained anywhere else.

Johnson: What are some examples of resources available to members?

Knier: IPC's website is a great place to find special resources that are available to members. A few examples include access to hundreds of technical papers and documents, recordings of past webinars, support from our technical staff on questions related to IPC standards, support from our government relations team on policy and regulatory issues, and industry special reports and updates.

Johnson: Does membership enhance my participation in standards and committee activities?

Knier: We encourage our members to participate in IPC standards committees in areas relevant to their business segment and provide input on these critical industry publications. Committee participation takes place in meetings, by teleconference, or by email. Distance shouldn't deter those interested in IPC standards development from joining a committee. IPC welcomes global input.

Committee members sharpen their presentation and negotiation skills by participating in the committee process. Individuals personally benefit from developing a network of industry peers. As an added benefit, IPC members are also eligible to serve as committee chairs.

Johnson: Does membership enhance my experience at conferences and shows such as IPC APEX EXPO?

Knier: Yes. IPC members receive discounts on IPC events and the opportunity to participate in members-only events or activities. In addition, IPC members who sponsor or exhibit at IPC APEX EXPO as well as IPC conferences throughout the year receive discounted rates. **SMT007**

**Source: TechValidate survey of 303 users of IPC. Sample comprises Large Enterprise, Medium Enterprise, S&P 500, Global 500, Fortune 500, and Small Business electronics industry organizations.*

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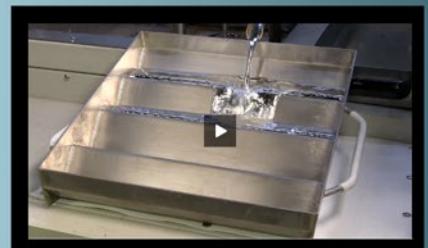
– Felix Valenzuela, Director of Engineering, Molex



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Supplier Highlights



VEXOS Selects MIRTEC as 3D AOI ‘Partner of Choice’ ▶

MIRTEC is pleased to announce that VEXOS has selected MIRTEC as their 3D AOI ‘Partner of Choice’ based on key performance indicators.

CyberOptics Receives Orders Valued at \$4.2 Million for 3D MX3000 Systems ▶

CyberOptics Corporation has announced that it recently received orders valued at \$4.2 million for its 3D MX3000 memory module inspection systems for multiple subcontractors of a large memory manufacturer.

Dymax Partners with Electronic Assembly Products, Ltd. ▶

Dymax, leading manufacturer of rapid light-curing materials and equipment, adds a new channel partner, Electronic Assembly Products, Ltd. to its extensive North American distribution network.

Count On Tools Enters 30th Year in Business ▶

Count On Tools, Inc. (COT), a leading provider of precision components and SMT spare parts, is pleased to announce that the company will celebrate its 30th anniversary this year.

TRI Launches New High-Reliability 3D AOI Solution ▶

Test Research, Inc. (TRI), a leading test and inspection systems provider for the electronics manufacturing industry, is pleased to announce the release of the high-reliability TR77000QM SII 3D AOI.

TAKAYA Appoints Technica USA Rep for NW, Rocky Mountain States ▶

TEXMAC, the exclusive authorized distributor of TAKAYA flying probe test systems in North America, announces the appointment of Technica USA, based in San Jose, Calif., to represent TAKAYA systems in the Pacific Northwest and the Rocky Mountain states. Since 1985, Technica USA has been providing the fast paced, ever-changing electronics manufacturing marketplace with highest quality products.

EVS Introduces New Large Pot Solder Recovery System with Sealed Cabinet ▶

EVS International, the leader in solder recovery, is pleased to introduce the new EVS18KLF Solder Recovery System. The EVS 18KLF has a larger 18kilo/40lbs pot, allowing customers to recover more dross and producing a faster ROI.

NovaCentrix Hires PIT Equipment Services for East Coast Sales of PulseForge Tools ▶

NovaCentrix, the industry’s leading provider of photonic curing tools, high-intensity, pulsed-light soldering solutions, and conductive inks enabling the development and production of next-generation printed electronic devices, has announced the appointment of Don Denison as their manufacturers’ representative.

Austin American Technology Marks 35 Years in Electronics Cleaning ▶

Austin American Technology is pleased to announce the company’s 35th anniversary. The company first began as a provider of SMT rework systems and process engineering testing services.

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Strengthen Your Design Transfer Process with **Agile NPI**

Operational Excellence

by Alfred Macha, AMT PARTNERS

Finalizing design engineering development is a significant milestone in the product development lifecycle but transitioning the design to manufacturing is the most critical phase of the project. The expectations to meet a compressed product launch schedule puts extreme pressure on the new production introduction process of manufacturers. Projects often fail at this critical juncture.

A recent survey of 120 industry leading manufacturing professionals conducted by Winsuttle ^[1], a leading software data management provider, found:

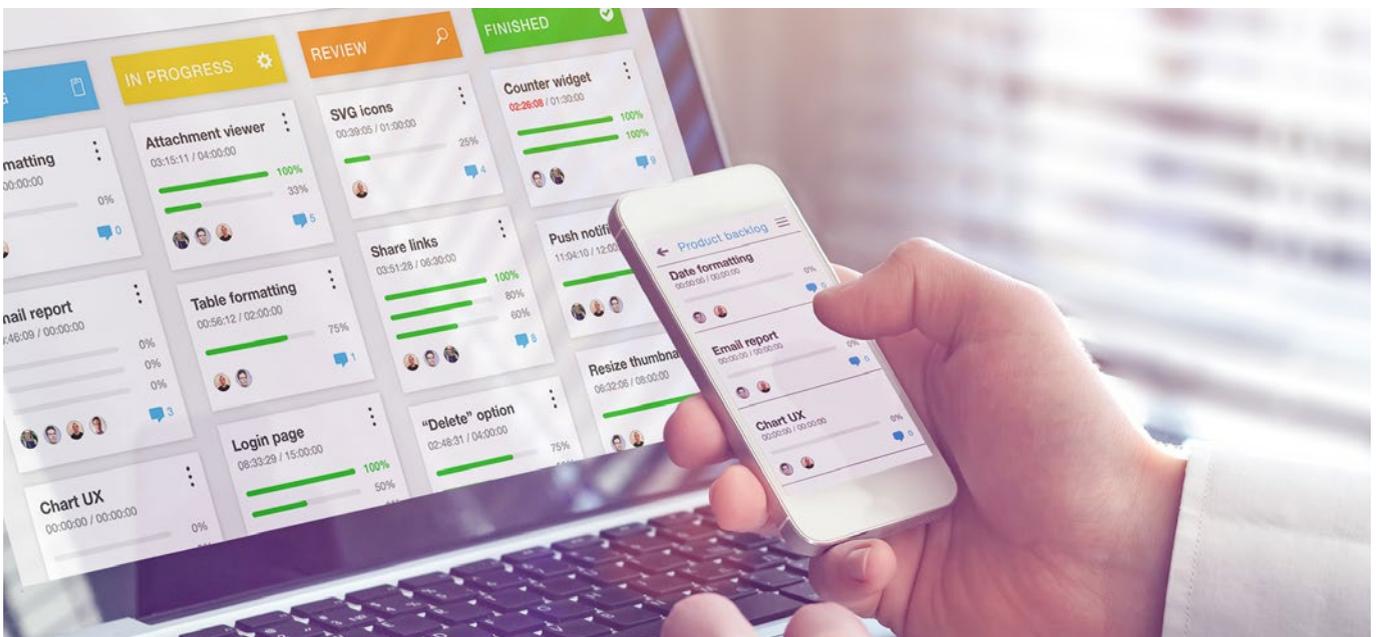
- 75% of respondents are under pressure to get products to market faster
- 51% of respondents are still using manual process for their design transfer and new production introduction processes

- 60% of respondents said their launch processes were too slow
- 45% of projects that complete new product introduction end up with cost overruns

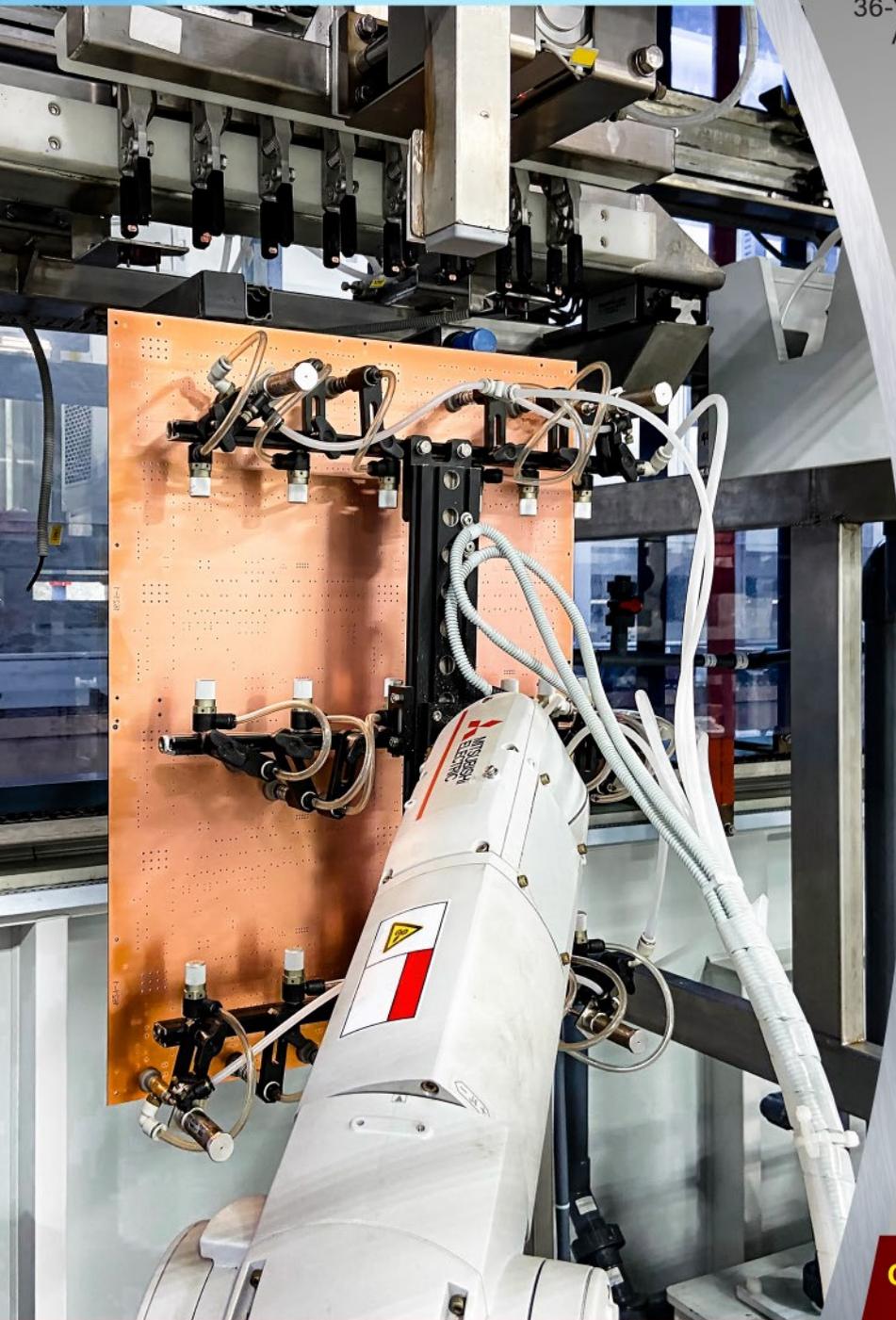
This points out that most companies struggle with their NPI processes.

Addressing NPI Shortcomings

First, understand the root cause of why companies struggle with schedule delays and cost overruns. The probable cause will lead to the complexity of NPI processes. The complexity consists of the various reviews, documentation verification, and rigidity of controls put in place with the purpose of achieving a perfect new product introduction transition. However, the disconnect that exists is that the over controls limit the effectiveness of NPI processes—



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by the nature of NPI—fluidity and flexibility are necessary to optimize the design transfer process to manufacturing via the NPI process.

Understanding the Objectives of NPI

The objective is to have an effective transition from product design to serial manufacturing where product quality consistency is achieved in the manufacturing environment. The traditional approach to accomplish this has been to use a Waterfall development process. The Waterfall model requires design phases to follow a sequential order, where the project development team only moves to the next phase of development or testing if the previous step is completed successfully. The inherent consequence of the waterfall is that it has rigid design gate reviews where there is no room for design optimization and flexibility. The adverse impacts consist of making assumptions that a completed phase design review has satisfactorily met customer expectations where, in reality, the sequential design reviews only confirm that a controlled design review workflow is being followed. At the end of a traditional NPI process, the project documentation will show that a robust workflow was followed during the process—however, there will be minimal interactions with the customer where optimization efforts were not considered during the NPI process. The concept of fluidity and flexibility must be considered as part of the NPI process to achieve customer satisfaction excellence. This can be achieved by applying the concept of Agile methodologies into the NPI process.

The Agile Methodology

Agile methodology is a practice that helps continuous iteration of development and testing in the product development process. In this model, development and testing activities are concurrent, unlike the Waterfall model. This process allows more communication between customers, engineers, managers, and testers. This concept is widely used in

software development and has established organizations that have created standards and proven methods for agile development. One of these methods is known as the Agile manifesto [2]. There are 12 key principles that govern agile development:

- Our highest priority is to satisfy the customer through early and continuous delivery of valuable software
- Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage
- Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale
- Businesspeople and developers must work together daily throughout the project
- Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done
- The most efficient and effective method of conveying information to and within a development team is face-to-face conversation
- Working software is the primary measure of progress
- Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely
- Continuous attention to technical excellence and good design enhances agility
- Simplicity—the art of maximizing the amount of work not done—is essential
- The best architectures, requirements, and designs emerge from self-organizing teams
- At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly

These principles are software development centric, but they can be applied to most new product introduction processes in manufacturing environments.

Requirement	Recommended Method	Expected Benefits
Daily scrum	Establish a daily 30-minute meeting to review task progress and priorities for the next five days. Reprioritize resources and tasks as needed.	Create a dynamic environment to adjust resources to focus on "value add" tasks that will accelerate progress.
Customer Engagement	Involve the customer in scrum meetings. Alignment and transparency are paramount for the success of NPI.	Make the customer part of the solution. The objective is continuous collaboration with the customer to assure expectations are met frequently.
Minimize Formal Design Reviews	Design reviews are a mechanism to lock down decisions and prevent further churn. In theory, design reviews are a formidable phase gate approval process and are a conduit for a robust QMS. However, in practice, design reviews can slow down NPI and create constraints for optimization. Minimize the number of formal design reviews during the NPI process.	Use the scrum environment to have frequent and informal design transfer reviews and make frequent changes to achieve optimal results. Formal design reviews should be limited to the end of the NPI process once customer expectations have been met.
Smart ECOs	Engineering change orders are great mechanisms to document changes to drive consensus and notification when changes are made. A pitfall that occurs often is driving multiple ECOs during the NPI process. Each ECO requires a great deal of effort and approval. Only issue an ECO at the end of the NPI process before serial manufacturing is approved to start.	Limiting the number of ECOs until a formal change has consensus by the team and customer will minimize the administrative burden in the NPI process. ECOs can slow down development when not used carefully.
Process Validation	Make process validation the cornerstone of your NPI process. Prepare a robust process validation plan to assure IQ, OQ and PQ stages have been completed thoroughly. The success of the design transfer to manufacturing relies on good process definition, well defined work methods, equipment testing, verification and validation of initial pilot builds.	Process validation is used in the life science industry as a fundamental process to achieve operational success in manufacturing. Guidance can be obtained via this link: fda.gov/media/71021/download

Table 1: A practical guide on setting an Agile NPI framework.

Creating an Agile Mindset for NPI in a Manufacturing Environment

The biggest challenge non-software companies face in leveraging an Agile mindset in their NPI process is weighing risk with cost.

Because of the high capital cost to launching engineered and manufactured products, it is not feasible to launch Rev A of a product and iterate further on the design over time like it is with Agile software development. These iterations might cause rework in the factory or supply chain that can result in a cost-prohibitive financial situation that no longer supports the original business case. Companies focused on driving top-line business growth through innovation and NPI can benefit greatly when leveraging the positives of Agile principles into their process of building real products.

The easiest area to apply Agile principles to is the concept phase. It is imperative to develop prototypes and proof of concepts that get shared internally and, more importantly, externally with the target consumer. Gaining a full understanding of the end user's emotional

response to a future product is paramount during the design engineering development phase. Also, these agile principles can be continued during the design transfer to manufacturing phase. A practical example is to use 3D print technology to create fixtures, guides, or tooling, which can assist the iterative changes required during the optimization phases of new product introduction.

An Agile NPI Framework

Implementing an Agile NPI process requires a paradigm shift. Below is a practical guide on setting an Agile NPI framework (Table 1). **SMT007**

References

1. [winshuttle](#)
2. [scrumalliance.org/resources/agile-manifesto](https://www.scrumalliance.org/resources/agile-manifesto)



Alfred Macha is the president of AMT Partners. He can be reached at Alfred@amt-partners.com. To read past columns or contact Macha, [click here](#).

IPC Education Foundation Update and **Looking Ahead**

Foundations of the Future

by Charlene Gunter du Plessis, IPC EDUCATION FOUNDATION

The IPC Education Foundation (IPCEF) takes pride in the accomplishments of its second year. The foundation focused on a variety of digital/virtual exposure and engagement activities to share information about the electronics manufacturing industry. The foundation held 10 webinars covering a wide range of industry-specific topics and conducted 28 interviews with IPC student members, IPC emerging engineers, industry representatives, and IPC leadership, to share knowledge about career paths into the industry that led to blog posts, articles and social media campaigns. The foundation successfully reached more

than 110,000 individuals and engaged with more than 5,500 individuals through these activities.



An IPC student member, Paige Fiet, president of the IPC Student Chapter at Michigan Technological University and graduating in December 2021 with an Electrical Engineering degree/BioMed application, was appointed in February 2020 as student member board liaison representative to the IPC Board of Directors. Elections will open in the fall to identify the next candidate.



Paige Fiet

The IPCEF will continue to create awareness of the careers the electronics manufacturing industry has to offer students in high school and college by providing them with opportunities to access people, courses, and knowledge in 2021.



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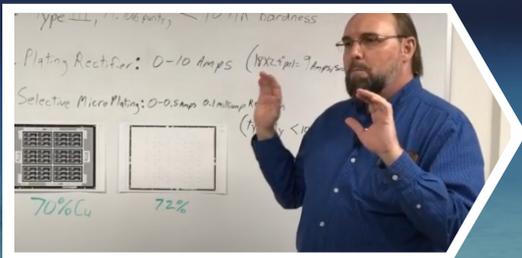
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IPC Student Chapters

The IPC Education Foundation's Student Chapter Program focuses on providing scholarships, offering relevant industry content, and assisting with career readiness for its student members. 2020 was another year of growth. IPCEF chartered 15 new IPC Student Chapters bringing the total to 38 student chapters across 19 states in the U.S., engaging 517 student members. Twenty-five chapters exist at four-year universities while 14 chapters exist at two-year community/technical colleges.

To be eligible for membership, student members must be pursuing degrees in the following disciplines: electrical, electronics, mechanical, computer, technology, chemical, aerospace, and/or broad engineering. IPCEF has student members in certificate programs, two-year degrees, four-year degrees, master's and doctoral students.

The foundation will continue to expand the reach of the program by growing the number of chapters in the United States with plans to expand internationally in 2021 and beyond. The IPC Student Chapter program provides scholarships, industry-standard education, industry connections, and access to hands-on competitions, especially with the support of industry experts and professionals like yourself.

Learn more information about the 2020 scholarship winners [here](#).

High School Student Engagement

The IPC Education Foundation (IPCEF) hosted its STEM Outreach event on February 6, 2020 at IPC APEX EXPO in San Diego, California. Twice as many students were able to participate and the day was packed with several hands-on technical activities, career exploration, and industry engagement. Nine local high schools attended bringing 193 students and 30 educators from: Mission Hills High School, Morse High School, North County Trade Tech High School, San Marcos High School, E3 Civic High School, Point

Loma High School, Otay Ranch High School, Mount Miguel High School, and Otay Ranch High School—Girls in STEM. Each participating high school received a \$1,000 award to support electronics education in their classrooms.

We are truly grateful to our event sponsors who supported and participated in the day's activities. The student participation, awards, and giveaways were made possible through the generous support of Foxconn Interconnect Industries, I-Connect007, Nordson, Panasonic, TTM Technologies, and Weller Apex Tools.

Because of the pandemic, the 2021 STEM Outreach Event will take place during the fall and delivered virtually, allowing more schools, students, and teachers to participate in learning about the careers and skills the electronics manufacturing industry has to offer.

Exciting New Opportunity

By equipping students with valuable industry-related knowledge through specific online IPC resources and content, the foundation may be able to address some of the industry's needs:

- Lack of awareness of the careers and skills needed
- Shortage of qualified technical candidates due to not enough skilled younger workers entering the electronics industry
- An aging workforce
- Lack of job preparedness as many schools are not teaching the students the right curriculum related to industry and career readiness

We will be reaching out to high schools, preferably vocational high schools, as well as technical community colleges and universities to participate in this new program. The goal is to share relevant industry content with students that will not only create awareness but also allow them to better understand the skills needed to pursue and access viable career opportunities.

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The foundation needs company representatives to volunteer their time to host virtual information sessions, facility tours, provide mentorship and guidance, assist with projects, and showcase opportunities in the electronics industry. The students across our IPC Student Chapters and the participating high schools are full of optimism, and ready to join the industry. Please let us know how you wish to support the foundation by answering a three-question survey [here](#). Thank you for your support! SMT007

Interested in Participating and Supporting These Efforts?

The foundation will continue to create awareness of the careers the electronics manufacturing industry has to offer students in high school and college by providing them with opportunities to access people, courses, and knowledge in 2021.



Charlene Gunter du Plessis is the senior director of the IPC Education Foundation.

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ein Electronics Industry News and Market Highlights



My View from CES 2021: Day 1 ▶

What a difference a year makes! One year ago, those of us who cover and attend CES were going from one press conference to the next; this year, we are at home going from link to link. Confusing and challenging, yes, but there are some advantages: no masks, only five steps to get to a restroom, being able to have three of four events or more displaying on your screens at the same time and being able to download press kits as needed. So far, many new devices are being introduced, but of course, they are all online, so you wonder if some of them really exist or are truly operational as yet.

ElectroNeek, a Robotic Process Automation Company, Posts Significant Revenue Growth in 2020 ▶

ElectroNeek reported its 2020 business results posting a 400% increase in its annual software license revenue as compared to 2019. The growth has been powered by an increased demand for business process automation and digital transformation by American mid-market companies and by increasing ElectroNeek's presence outside of the United States, including into areas such as India and the LATAM region.

Siemens Government Technologies Honored as a Top Technology Company by NVTC ▶

Siemens Government Technologies, Inc., announced that the Northern Virginia Technology Council has selected SGT as one of its 100 most innovative technology companies in 2020, as well as recognized SGT President and CEO Tina Dolph as a NVTC Tech 100 Executive.

Geek+, Universal Logic Team Up to Explore New Depths of Flexible Automation, Elevate Industry 4.0 ▶

Geek+, a global leader in autonomous mobile robots (AMRs) and warehouse automation, and Universal Logic, a world-leading pioneer of an AI/sensor/machine-control software "brain" for robots, announce the beginning of a new partnership.

Appear Inc. to Launch First Lightest 5G Smartphone with Graphene Battery ▶

Appear Inc. announced the launch of the world's lightest and first graphene battery-powered smartphone with innovative water-resistant technology.

Tower Semiconductor Participates in DARPA LUMOS Program ▶

Tower Semiconductor, a leader in high-value analog semiconductor foundry solutions, announced that it is participating in the LUMOS program, with partial support from DARPA, to create a semiconductor foundry integrated-laser-on-silicon photonics process.

Hong Kong Cyberport Cultivates Local Mobile, Arcade and Console Game Developers ▶

The novel coronavirus has dealt heavy blows to many industries, yet it has also presented new business opportunities for sectors such as digital entertainment, of which game development is a key component. Although countries like the United States, Japan and China are well-established in the gaming market, Hong Kong's game developers are starting to shine.

REALTIME with... IPC APEX EXPO 2021 *Virtual*

*The top 5 things
you need to know about...*

- ▶ *Solder Masks*
- ▶ *Direct Imaging*
- ▶ *Moisture Management*
- ▶ *Manufacturing Training*



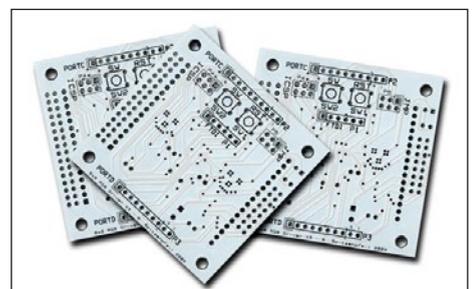
The Top Five Things You Need to Know About

SOLDER MASKS

by Taiyo America

The main function of solder mask is to insulate and prevent the copper surface from oxidizing/corroding and prevent solder bridging. While these are the main objectives for solder mask, in the electronics industry there is a misconception that all solder masks are alike.

- 1 Selecting the Right Solder Mask**
- 2 Solder Mask Applications Evolve**
- 3 Advances in Solder Mask Imaging**
- 4 To Flex or Not to Flex**
- 5 Solder Masks Are Not Only Green**



1 Selecting the Right Solder Mask

In the world of electronics there are multiple industries each with their own requirements when it comes to solder mask. For the automotive sector, solder masks are required to withstand harsh environments. In the aerospace industry, solder masks must meet out-gassing requirements. Over the years, white solder masks have been developed that provide a high degree of reflectivity for the LED market.

2 Solder Mask Applications Evolve

Solder mask and the methods by which they were applied have evolved over the years. When non-photoimageable solder resists were introduced to the printed circuit board (PCB) industry, silk screen printing was the common method of application. As the demand for real estate on PCB designs increased, photoimageable solder masks were developed. The popularity of photoimageable solder masks introduced new application systems such as double-sided screen printing, curtain coating and spray systems. These methods of application have been around for many years and are still being used today. In the past five years, several other application processes have been reintroduced to the market including ink jet and photoimageable dry film.

3 Advances in Solder Mask Imaging

As technologies advance and offer more functions, PCBs have become more populated with the miniaturization of key components. The advancements have pushed the boundaries on image registration using conventional exposing units. Over the years, direct imaging (DI) systems were introduced to the PCB industry to help alleviate the challenge. The DI systems provide different wavelengths in comparison to conventional exposing units. Solder mask manufacturers, working side-by-side with equipment manufacturers, developed DI solder masks that are better suited for these types of imaging systems.

4 To Flex or Not to Flex

Solder masks have some degree of pliability. Thinner PCBs that are not categorized as a flex build can sometimes encounter a degree of bending due to handling or manufacturing processes. Depending on the amount the substrates are bent, they can exhibit a degree of fracturing. Fracturing of the solder mask is not the same as corner cracking caused by exposure to harsh environments. In cases such as this, PCB manufacturers and contract electronics manufacturers (CEM) should consider the use of a flexible solder mask.

5 Solder Masks Are Not Only Green

Solder masks have evolved from green to several other colors over the years. The most common colors besides green are black, blue, red, white, and yellow—all of which fall in the family of primary colors. Colors were developed and brought to market at the request of original equipment manufacturers (OEMs). Colored solder mask can be used for identifying prototypes, revision changes, manufacturing facilities, or for cosmetic reasons. Colored solder masks can also be combined in measured amounts to create a vast number of other colors such as orange, purple and brown. Solder masks can also have various surface finishes such as matte, glossy, or somewhere in between, depending on customers' requirements.



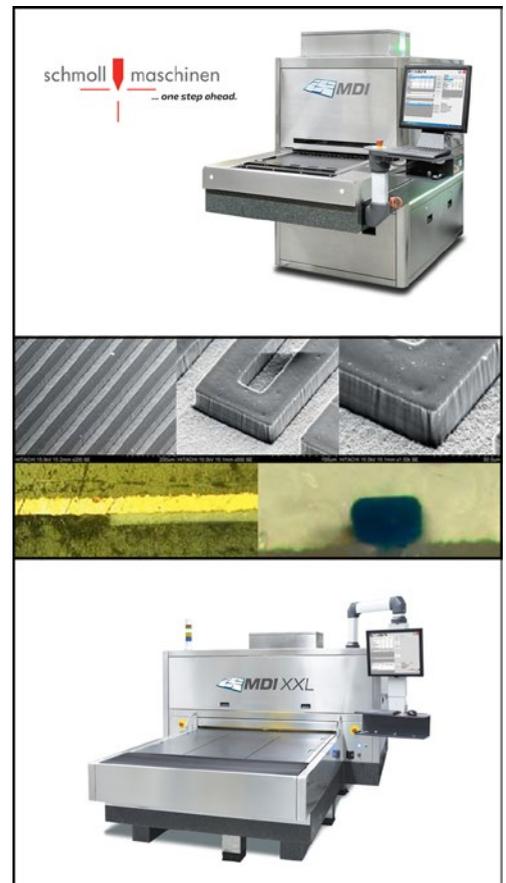
Established 30 years ago, Taiyo America Inc. is a subsidiary of Taiyo Holdings Co. Ltd., the world's leading manufacturer of specialty inks and solder masks for printed circuit boards. Taiyo offers conductive inks for manufacturing printed electronics. Visit us online at: Taiyo-america.com.

The Top Five Things You Need to Know About DIRECT IMAGING

by Burkle North America

Digital direct imaging (DI) was first introduced in the early 1980s and is now an industry-accepted technology for fine line circuit boards. Here are five things to consider when selecting a direct imaging system.

- 1 Resolution/Capacity Trade-off**
- 2 Choosing a New DI Machine?
Test It on Your Work First!**
- 3 Will More Light Engines Increase
Productivity?**
- 4 Floor Space and System Platform**
- 5 Environment, Data Collection
and Support**



1 Resolution/Capacity Trade-off

The machines of today are capable of fine line resolutions that were unfathomable just a few years ago. But it's important to understand the trade-off between fine line capability and high production. A direct imaging machine with two types of light engines—a “hybrid” machine—can offer the best of both worlds.

2 Choosing a New DI Machine? Test It On Your Work First!

Every design is different. Dry films and solder masks are different. And claims made by equipment manufacturers vary wildly. Don't just look at a spec sheet and assume you'll get the same results. Test your work on the machine before you commit. Be aware that production processes greatly influence the outcome and could even potentially limit the capabilities of a new DI machine.

3 Will More Light Engines Increase Productivity?

A common myth about laser direct imaging is that more light engines increase productivity proportionately. It is important to understand that the exposed area (or image field) needs to be distributed well over the width of your panel size to give optimum exposure speed.

When adding further light engines on a multiple head system, it should be considered that these still cover the area of your panel, as you wouldn't see any gain in capacity if one light engine exposes in the “empty” areas.

4 Floor Space and System Platform

Cleanrooms may allow only a limited amount of space for the integration of new DI equipment. Ideally, it should replace older contact exposure units or LDI equipment from the previous generation. However, it is unlikely that the old equipment will be removed before installation of the new; therefore, a space-saving machine design which still offers all capabilities is a good choice as it won't require high infrastructure costs on your side.

5 Environment, Data Collection and Support

Controlling the environment in your direct imaging area is key to optimum machine performance. Since this digital technology provides the ability to log all relevant machine and production data, it makes direct support and preventive maintenance easier and plannable. Don't just look for a good equipment manufacturer; look for a partner that can guarantee good, long-term support for the equipment while supporting the progress of your process capabilities.



Celebrating 30 years in business, Bürkle North America distributes and services Bürkle GmbH and Schmolz Maschinen equipment which includes IMPEX and LHMT. BNA distributes equipment lines for multilayer lamination, drilling, cutting, routing, imaging, registration, automation and measuring. Visit us online at BurkleAmerica.com.

The Top Five Things You Need to Know About **MANUFACTURING TRAINING**

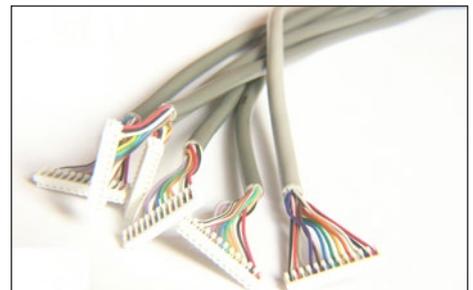
by **Blackfox Training**

Electronics manufacturing companies need skilled and certified workers to perform the intricate and important tasks required to build modern electronic equipment. Here, we explain five ways to gain these workers:

1 Train and Certify Manufacturing Employees and Support Staff to the IPC Standards



2 Fill Training Gaps with Customized Courses that Focus on Basic Knowledge and Skills



3 Access Tools and Resources to Assess Your Workforce and Maintain Skill Levels

4 Offer Self-Paced Learning for Soft and Technical Skills (Available 24/7)



5 Hire U.S. Military Veterans Who Have Already Completed Immense Training

1 Train and certify manufacturing employees and support staff to the IPC standards

IPC certification is an internationally recognized credential that proves an employee's knowledge and skill level. IPC training and certification is industry developed and covers electronic manufacturing quality concerns, including PCB assembly and soldering, rework and repair, wire and cable harness production, and bare PCB fabrication. Having an IPC-certified workforce demonstrates an attention to detail and commitment to quality.

2 Fill training gaps with customized courses that focus on basic knowledge and skills

IPC training and other standardized courses don't cover every aspect of electronics manufacturing. Therefore, it is important to have customized courses that fill those missed gaps. Basic soldering, ESD, and electronic component identification are just a few examples of the many courses that complement IPC certification and ensure that your workforce is prepared for any challenges that may come their way.

3 Access tools and resources to assess your workforce and maintain skill levels

Assessing your workforce before and after training is an essential part of a proper manufacturing training program. The effectiveness

of training and the retention of knowledge gained can be gauged through assessments that are computer-based, interview-based, or audit-based. In addition to assessments, both students and trainers need to have complete access to resource documents and training materials after training has been completed.

4 Offer self-paced learning for soft and technical skills available anytime

Self-paced learning that is delivered in consistent, small snippets will have a higher retention level than content delivered through other methods. When employees can convert non-productive time into learning time, that employee becomes more valuable to the company, and in turn, the company benefits. Self-paced learning for your workforce will increase engagement, productivity, and positive morale.

5 Hire U.S. military veterans who have already completed immense training

Now more than ever, highly skilled and efficient employees are needed in manufacturing. The U.S. military invests an enormous amount of training in our soldiers. They are equipped with a framework of skills and attributes such as loyalty, integrity, leadership, and excellent work ethic. They know how to learn new skills quickly and adapt to changing environments, which are highly desirable qualities for manufacturing.



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The Top Five Things You Need to Know About

MOISTURE MANAGEMENT

by Super Dry Totech EU

Moisture and surface mount components do not mix. This includes PCBs. The risks fall into two categories: solderability and encapsulant damage. How best to meet this continuously growing challenge? Here are five suggestions:

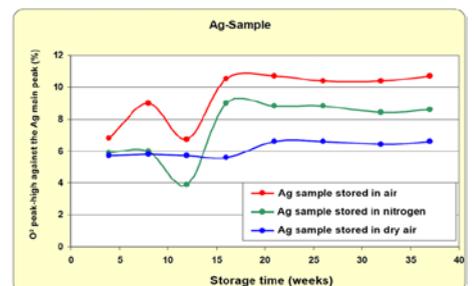
1 When Component Moisture Levels Become Critical, Encapsulant Damage Can Occur During Reflow

2 Components are Rated With a Moisture Sensitivity Level (MSL) Which Dictates Available Floor Life

3 Oxidation Will Occur When Components Are Improperly Stored, Compromising Solderability

4 If the Floor Life is Exceeded, it is Possible to Restore it Under Carefully Controlled Conditions

5 Dry Air Atmospheres Stop Oxidation Better Than Nitrogen



1 When component moisture levels become critical, encapsulant damage can occur during reflow.

Plastic/epoxy resin packaging material is permeable to moisture (as are PCBs). Components should be delivered in properly prepared moisture barrier bags. Once the bag is opened, components absorb moisture from the atmosphere. If moisture levels become critical (0.1% water weight), damage occurs during reflow as the moisture attempts to escape too quickly, exceeding the elastic limit of the encapsulant.

2 Components are rated with a moisture sensitivity level (MSL) which dictates available floor life.

The moisture sensitivity level (MSL) of components is identified by the manufacturer in one of six levels as defined in J-STD-020, displayed in J-STD-033D. This identifies the available safe floor life of components (time out of MBB). For instance, MSL 3 components have a floor life of 168 hours. Tracking the exposure time is critical to preventing defects.

3 Oxidation will occur when components are improperly stored, compromising solderability.

Oxidation will also occur on components stored in ambient RH. This negatively affects solderability. The same safe storage conditions

(<5%RH) that will stop moisture absorption by encapsulants will also stop oxidation. A level of <5% RH provides unlimited safe storage time, thus “stopping the clock” on the MSL floor life. This is particularly significant for low-volume high-mix operations.

4 If the floor life is exceeded, it is possible to restore it under carefully controlled conditions.

Expired floor life can be restored by reducing absorbed moisture to safe levels. Traditional high temperature (125°C) baking reduces moisture but induces oxidation and intermetallic growth, increases wetting times, and compromises solderability. Lower baking temperatures (40-60°C) combined with ultra-low RH (1%) will rapidly restore floor life without reducing solderability, and unlike high temperature, this process can be safely repeated.

5 Dry air atmospheres stop oxidation better than nitrogen.

Nitrogen was a traditional method for safe storage. However, dry air is much less expensive and provides lower RH%. X-ray data of numerous alloys proves low %RH air stops oxidation better than N₂. This is because water is the more aggressive bearer of oxygen than tightly bonded O₂ molecules. Removing the moisture removes the catalyst and prevents the corrosion process.



Super Dry Totech EU® www.superdry-totech.com is a moisture management specialist, providing hardware and process control software for safe storage, floor life reset and automated tracking of moisture sensitive components and materials.



MilAero007 Highlights



Elbit Systems Awarded \$24M Contract to Supply Tactical Computers for Royal Netherlands Army ▶

Elbit Systems Ltd. was awarded an approximately \$24 million contract from the Dutch Ministry of Defence to supply the Royal Netherlands Army with new vehicular tactical computers. The contract will be performed over a 30-month period.

L3Harris Technologies Demonstrates Antenna Technology for U.S. Space Force Satellite Communications ▶

L3Harris Technologies has successfully completed a technology demonstration, under a Defense Innovation Unit prototype contract, for the U.S. Space Force satellite communication system to improve communications with the agency's growing number of satellites.

A Martian Roundtrip: NASA's Perseverance Rover Sample Tubes ▶

The tubes carried in the belly of NASA's Mars 2020 Perseverance rover are destined to carry the first samples in history from another planet back to Earth.

Sensible Design: To Coat or Encapsulate—Making an Informed Choice for Electronics Protection ▶

One of the most frequently asked questions we receive from customers is, "Which is better to protect my PCB: a coating or a resin?" In this month's column, Phil Kinner demystifies why one may be more suitable for your application than the other and explores coatings and resins in more detail.

Tales from a Trailblazer: An Interview with Christine Davis ▶

Columnist Steve Williams recorded a series of interviews with new I-Connect007 columnist Christine Davis, president and founder of contract manufacturer CAMtek, who recently joined Zentech Bloomington. As a female business owner in a male-dominated industry, Christine has a unique perspective on what it takes to thrive in the electronics industry, and shares some of her stories and lessons learned along the journey.

Space Launch System Exploration Upper Stage Passes Critical Design Review ▶

Boeing and NASA have successfully completed a critical design review for NASA's Space Launch System (SLS) Exploration Upper Stage (EUS), confirming the EUS design for continued development and transition to hardware build. Boeing has already started fabrication activities that will support building the first EUS at NASA's Michoud Assembly Facility in New Orleans.

U.S. Congress Approves Funds for R&D on Lead-Free Electronics in Aerospace, Defense and High-Performance Applications ▶

On Monday December 21, 2020 the U.S. Congress approved \$10 million for research into the issues surrounding lead-free electronics in mission-critical applications. IPC, the global association of electronics manufacturers, and its allies had called for these funds to be included in the Fiscal 2021 Defense Appropriations bill.



I-Connect007
GOOD FOR THE INDUSTRY

CES 2021 SPECIAL COVERAGE ➔



A Virtual Show Floor

Feature by Dan Feinberg
I-CONNECT007

I wrote this on the final day of CES 2021, and I expect CES will never be the same. It will not revert back to what it once was. I also cannot imagine it stays a totally virtual show; in doing so, I feel it would fail. Does that mean I think the 2021 show was a failure? No, not at all. In fact, it was a very good event, particularly in light of the medical and political pandemic that we have been enduring.

A Little History

The first CES took place in June 1967 in New York City as a spinoff from the Chicago Music Show, which, until 1966, was also the most popular event for exhibiting consumer electronics. Over the years, the show grew, moved to Las

Vegas, added the attendees and exhibitors that had been obtained by COMDEX, and became the signature event to showcase all electronic industry products from TVs to computers, drones to 3D printers, and complete ready-to-use devices to components. If you wanted to compare ready-to-use advanced computers or if you wanted to compare computer motherboards and power supplies, etc., you'd attend CES to learn what was announced during the show.

Looking at the Future

Why then, do I predict a decline and potential failure if CES permanently transitions to an all-virtual format? It's all about economics, plain and simple. Any company that exhibits at CES must pay to do so and cover the costs of exhibit space transportation, set up, and com-



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pany time. This year, most of those costs (aside from a likely registration fee) simply were not a factor. Some of the companies I wanted to see and speak with had actually set up their own events during CES, but totally separate from CES. They sent out notices and many of us attended those events and received a benefit similar to what we would have just attending CES. In fact, unless you tried to look up an event on the official CES site, you may not have realized that it was an independent event.

I do expect that future CES shows will contain a significant virtual segment, but I certainly feel—in fact, I hope—that next year at this time we will be wrapping up coverage of a new normal, with major similarities to previous in-person shows.

Now, here are some of my observations on the virtual events and presentations at this year's Virtual CES (with the understanding a few of these may not have been part of the actual CES 2021.)

AMD

AMD kicked off with a keynote address by Dr. Lisa Su, CEO and president of AMD. I have seen some of her other presentations, and she is a very impressive and successful leader. With her at the helm, AMD has made great progress.

While AMD is far from the global market share leader, its Zen architecture CPUs have gained respect over the last few years as the most advanced and respected performance leaders in the DIY/high end computer universe. The company's big announcement was “the introduction of a complete portfolio of



AMD Ryzen™ 5000 Series Mobile Processors, bringing the highly-efficient and extremely versatile and powerful ‘Zen 3’ core architecture to the laptop computer.” The new Ryzen 5000 Series mobile processors provide unprecedented levels of performance and excellent, perhaps previously unseen, battery life for anyone using a laptop—gamers, creators, and business professionals. New laptops powered by Ryzen 5000 Series processors will be available from major PC manufacturers within the next few months.

AMD also announced the AMD Ryzen PRO 5000 Series Mobile Processors, which will provide enterprise-grade security and seamless manageability to commercial users. Over the next year, AMD expects a broad portfolio of more than 150 consumer and commercial notebooks, based on the Ryzen 5000 Series Mobile Processors, will become available. AMD is also announcing reduced-TDP (power consumption) alternatives to the award-winning AMD Ryzen™ 9 5900X and AMD Ryzen™ 7 5800X desktop processors, coming to pre-built OEM systems only. Powered by the new “Zen 3” core architecture and with a lower 65W TDP, the Ryzen 9 5900 desktop processor offers an average of 24% faster 1080p gaming across select titles compared to the prior generation 7.

As AMD progresses, it is expected that the high-end Ryzen and Threadripper series of processors used by custom and DIY builders will continue to become available. Keep in mind we are talking up to 16-core, 32-thread processors.



So, what does this mean to the average reader here? For myself, I have built and maxed out my own computers for the last 25 years. Until this year, I have always used an Intel CPU; this year, I decided to use a Ryzen 9 CPU and Zen motherboard and I can testify that the performance and reliability is amazing.

Intel

While I'm on the topic of processors, what did Intel announce this week? Intel seems to have fallen behind in the last few years. Yes, Intel CPUs are still excellent and as the competition from AMD has increased, especially over the last few years, the Intel prices have come down, making the competition more intense. But Intel has been kind of stuck with 14nm architecture while AMD has had architecture down to 7nm, thus reducing size, TDP, and temp, while increasing the number of threads, etc.

Intel did make some interesting announcements, however. The company announced that next-gen business processors are powered by the 11th-Gen platform with Evo™ vPro®. The new vPro systems provide the best productivity experience, up to 23% faster with Office 365 and up to 50% faster productivity with video conferencing, according to Intel executives. It also delivers 1.8 times faster video editing.

Intel also demonstrated its Control Enforcement Technology, or CET, as a strength of its system that can help block a control flow attack, something that a competing notebook from rival AMD has been unable to do.

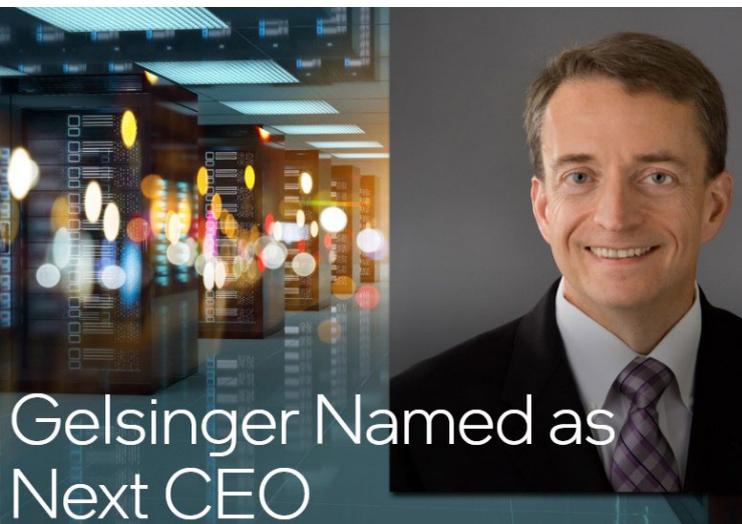


Intel showed off laptops from Dell, HP, and Lenovo. Intel highlighted the Dell Latitude 9420 as a result of its Dell partnership for Evo vPro. For the less powerful CPU market, Intel announced new Intel Pentium Silver and Celeron processors that are designed for the first time on 10nm nodes. They state that these processors deliver up to 35% faster performance than the previous generation, thus faster rendering and productivity for the education market. I believe that these CPUs will be headed to Windows laptops and lower end units such as Chromebooks and Linux laptops.



Recently, Intel introduced Intel® RealSense™ ID, an on-device solution that combines an active depth sensor with a specialized neural network designed to deliver secure, accurate and user-aware facial authentication. Intel RealSense ID works with smart locks, access control, point-of-sale, ATMs, kiosks and more. The device, which comes with a dedicated system-on-chip, can adapt to changing appearances over time, and it is built to withstand spoofing, with a one-in-1-million false acceptance rate.

Intel is still the market share leader in CPUs, and we all know that competition works well to enhance product development progress and control prices, so we can all hope that the competition between Intel and AMD—and with the expanded use of ARM processors by Apple—the competitive atmosphere of the last few years will increase.

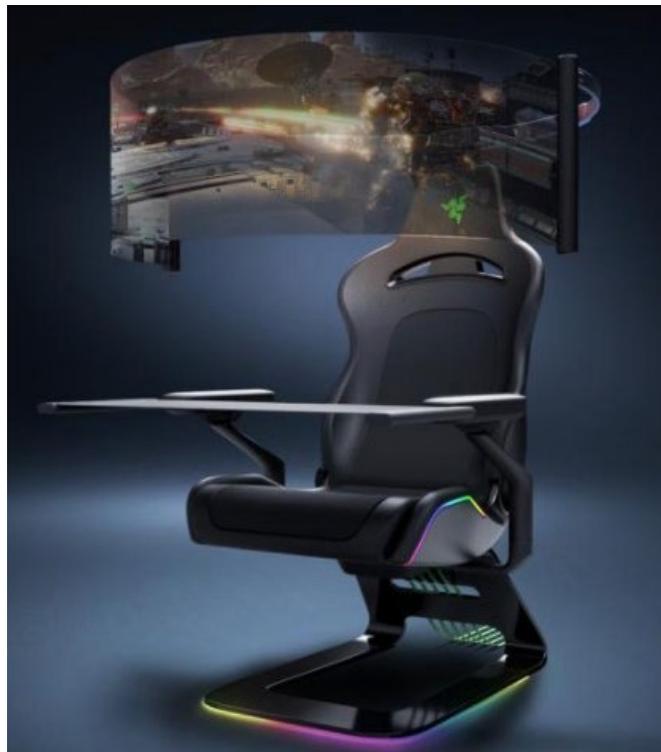


The perceived responsibility for the success or failure of any company falls on the person in charge, true or not. Earlier, Intel made what may be its biggest announcement of CES week. It was not a technical advance but a management one: Former executive Pat Gelsinger as the new CEO, effective Feb. 15.

As usual, at CES it is impossible to cover more than a fraction of the presentations, exhibits and announcements. Following are some of the more interesting ones, especially some where I was able to gain access and meet with the various company representatives.

Razer

Razer, a leading supplier of computers, primarily high-end gaming computers and components, showed some great new offerings, some of them outside of the gaming corral. One such product is the “Project Hazel” face mask.



This higher-tech mask meets surgical requirements, is N95 certified, and works like a powered ventilator, bringing in cool air and releasing hot air. It makes communications easier, has active ventilation, improves social interaction, has a built-in mic and is supposed to be very comfortable to wear. Besides its active ventilation, it also has auto sterilization, a UV sterilizer, and a separate case that can charge it wirelessly. It is not, however, on the market yet.

Their other Razer project that got my attention was the Brooklyn, a very high-end gaming chair that feels like a cockpit, with high-density memory foam, a leather-stitched seat back, and a carbon fiber body. What really catches your attention is built into the back of the chair: a rollable, transparent, 60” OLED display that deploys with the touch of a button. This is one device that I would have loved to have been able to see and try in person.

InWin Development Inc.

InWin, the supplier of over-the-top, amazing computer cases and new CPU cooling systems, as well as power supplies, was showing rack-mount data storage servers. It introduced the



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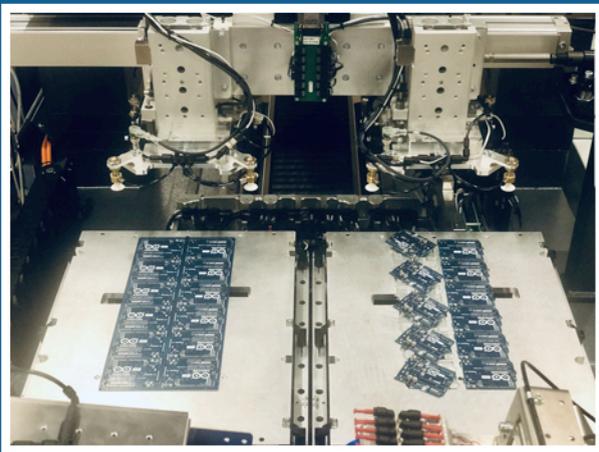
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InWin SR PRO, the latest in the SR-series AIO (for non DIYers All-in-One) liquid CPU cooler lineup that offers new ARGB lighting and up to 7 °C temperature reduction performance improvement compared to the previous generation. It is available in 240 mm (SR24 PRO) and 360 mm (SR36 PRO) options. The CPU cooling block features a new diamond-cut aluminum design, ensuring operational longevity along with a premium look and feel.

The SR PRO cooler continues InWin's patented twin turbine design that leads the industry by simultaneously pushing and pulling the water through the copper cold-plate to significantly reduce the temperature and keep the CPU cool.

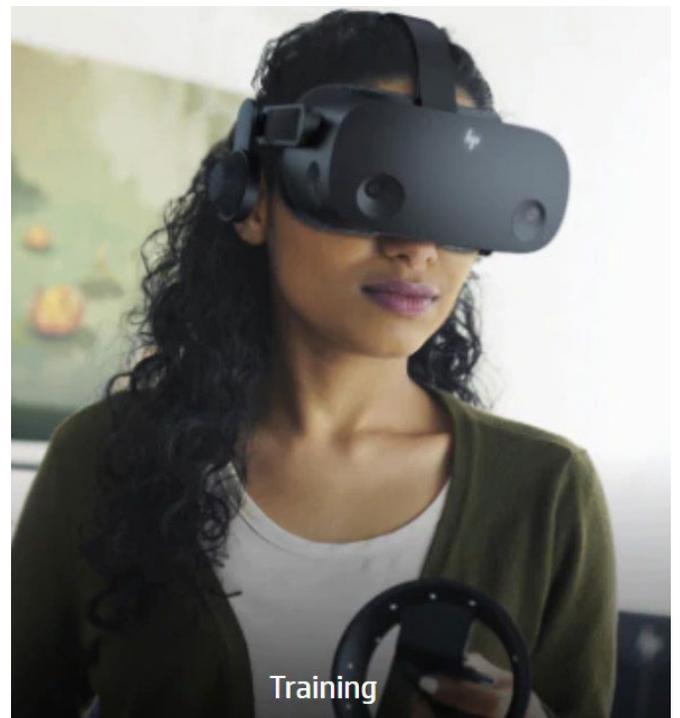
Lenovo

One of my favorite laptop computer companies is Lenovo, and their ThinkPad series. I have always recommended the ThinkPad over the IdeaPad as the ThinkPad was originally designed and supplied by IBM. It seems to be true that there are absolutely no compromises regarding quality and reliability with this device. However, Lenovo will be using CES 2021 to showcase several new devices including the newly announced IdeaPad 5 Pro. This notebook sports a 16-inch display with a 16:10 aspect ratio for a wider amount of usable screen space, reduced blue light technology, up to 350 nits of brightness, and slim bezels for a 90% screen-to-body ratio. The laptop also features an all-metal body in "Cloud Grey" or "Storm Grey" color options. On performance, the IdeaPad 5 Pro will be powered by AMD Ryzen H-Series processors and will be available with NVIDIA GeForce RTX graphics and

up to 32 GB of RAM—very impressive specs. Other key capabilities include an IR camera that enables Windows Hello facial authentication log-in and includes time-of-flight sensors to automatically pause a video when the user walks away. Meanwhile, per Lenovo, the IdeaPad 5 Pro will feature the new Alexa Show Mode capability, which adds voice control via the Amazon Alexa assistant and "turns your PC into an Echo Show-like display."

Hewlett-Packard

Hewlett-Packard was showing off the recently debuted second-gen version of its virtual reality headset, the HP Reverb G2, which is aimed at both commercial users as well as gamers. Developed with the help of Microsoft and Valve, the Reverb G2 includes what HP is calling "the world's highest resolution VR headset among major vendors," with resolution of 2,160 x 2,160 per eye panel. Enhancements over the first-gen version include Valve-designed lenses that offer greater clarity, better tracking through the inclusion of additional cameras and higher-quality audio from Valve speakers. The headset also offers improved comfort with the ability to adapt the width of



the lenses for different eye distances and an increased cushion size on the face mask. The HP Reverb G2 is available now for \$599 but be sure you have a PC that is capable of using it.

Dell

My monitor choice at CES this year is a Dell (although there are a lot of new high-quality monitors being introduced.) Dell is debuting a new series of monitors aimed at improved video conferencing, including the Dell 34 Curved Video Conferencing Monitor. The 34-inch WQHD curved monitor is geared toward use with Microsoft Teams and features a dedicated button for joining Teams meetings, as well as other collaboration-friendly capabilities such as a pop-up 5-megapixel IR camera, dual 5W integrated speakers and noise-canceling microphones

Chromebook

The Chromebook is one of my least favorite devices. To me they are not computers but just terminals that do very little without a connection to the internet. However, they do have an advantage because of their affordable pricing, and they work well for schools and other groups where performance is not as critical as cost. However, the Acer Chromebook Spin 514 stands out as the company's first Chromebook to feature AMD Ryzen 3000 C-Series processors and AMD Radeon graphics, which enable strong performance, responsiveness, and reasonable battery life (up to 10 hours), Acer says. The Chromebook Spin 514 includes a 14-inch display with FHD resolution, and the device is highly durable with Gorilla Glass on the display and a reinforced aluminum chassis, according to the company. Other notable features include slim bezels around the display (for a 78 percent screen-to-body ratio) and a thickness of 0.68 inches, also it has options for up to 16 GB of RAM and up to 256 GB of storage. Additionally, Acer is offering a variant aimed at business users—the Acer Chromebook Enterprise Spin 514—with additional security and manage-

ment capabilities has a starting price of \$479.99 and is planned for availability in February. But a version of the Acer Chromebook Enterprise Spin 514 is reportedly priced at \$749.99, which, in my humble opinion, is a very high price for a Chromebook.

Vespera

The Vespera Vaonis is a portable space observation station that is a “perfect hybrid between a smart telescope and a camera.” With its goal being to make astronomy more accessible, the app-enabled telescope is easy to use thanks to being fully automated, and it allows users to take photos and view findings with the app. The device will cost \$1,499, and is expected to start shipping late in 2021. The Vaonis refines and simplifies telescope design, making them easier to use and opening the doors to a greater audience. Based on user-friendliness, portability and shareability, the company has created the Stellina and Vespera telescope/camera hybrids, offering a simple way to view the heavens and photograph the stars.



MSI

This year, MSI was not part of CES but instead put on a separate, and very entertaining, presentation focusing on its 2021 product launch. I specifically wanted to see their presentation because I'm presently using a new MSI MEG motherboard, and I've personally found their products to be exceptionally reliable. Other components they introduced include:

- New GTX 3000 (NVIDIA-powered) series graphic cards
- New gaming mouse
- New SSD drives with a targeted SSD for gaming, and a very impressive, curved monitor
- New high-powered MEG motherboards
- A K-Series liquid (CPU) cooler (with built in LCD screen)

MSI also showed some complete computers. MSI Center software can search unlimited pictures by image recognition and give com-

mands, and much more. Let's say that you have a few thousand pictures on your storage drive and there is one of your family on a beach that you want to find. You have not labeled them and not even filed them by year taken. Just search for "beach" and all pictures that include a beach will be identified and shown to you. In addition, if you are an extreme gamer or you like lighting effects to match what you are doing or watching on your computer, MSI's impressive sync room lighting with effects for specific game titles just may be your thing.

Kingston

Kingston is a company that specialized in storage and connectivity devices. In fact, I have used their hard drives and found them to be reliable and perform well. During CES, the company announced its new PCIE 4.0 NVME SSDs. The trend to PCIE 4.0 is clearly in its advanced stage. They showed me their new client as well as data center drives and a new external 4.0 USB connected SSD, perfect for external back up and portable file storage for





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pictures videos and file transfer. This will provide the convenience of an external drive with the speed of a modern SSD. They also introduced their workflow system, which is a hub that supports almost any commonly used device to any computer, workstation or laptop through USB 3.2 gen 2. What I liked most is that you can customize it to suit the storage devices you choose.

Microsoft

Microsoft President Brad Smith, in a virtual keynote, urged the tech industry to work together to ward off cyberattacks like the massive breach of network software firm SolarWinds's systems. In a keynote address that Smith pre-recorded for CES 2021, he stated that the SolarWinds breach was not a case of one nation trying to hack into the computer network of another, but "a massive indiscriminate global assault on the technology supply chain." He said it is the responsibility of the entire tech industry to protect that supply chain. He stated, "It is a danger that the world cannot afford." As many as 18,000 of SolarWinds' customers were exposed to a software vulnerability in its Orion products that allowed hackers to breach the systems of U.S. agencies such as the Justice Department and companies that included Microsoft. Smith urged the tech industry to use its collective voice to tell

every government around the world that this kind of supply chain disruption is not anything any government or company should be allowed to pursue. Smith also cautioned that machine learning, which is increasingly being used by companies and organizations across the globe to simplify and broaden a wide range of tasks, can increase the risk of bias and discrimination in a whole variety of

different commercial settings. His comments were somewhat frightening and very timely.

John Deere

Last year, John Deere showed off its huge semi-autonomous tractor. This is the company's third year at CES, and the question remains: Why would John Deere be at a show like CES? The answer: Agriculture is now a high-tech industry and planting is one of the most important parts of farming.

Using this gigantic device, a farmer can know where every seed is placed. It places 100 seeds per second in a precise spacing arrangement maximizing the use of the land. The robot locates and cleans out the residue from last year's crop, then makes a perfect seed trench to precisely place the seeds across the field, all automated. It's still farming, but extremely high tech. The accuracy is 2.5 centimeters, and it can come back weeks or months later and find that exact site. John Deere has become a high-tech company automating the entire process. They are truly approaching autonomous farming. They now gather data to measure and improve the yield of the land. How many seeds vs. size or crop?

John Deere, a company that has lasted 184 years, emphasizes trust and gave assurances regarding the data they gather, how it helps the farmer and helps them improve. It uses the phrase, "Farming is Outdoor Manufactur-



Photo: CES 2020

ing.” And it is becoming high tech.” Using technology, there is opportunity to measure and improve the earth where the crop is planted automatically in the coming years.

So Much More

There was so much more to hear and see at Virtual CES. Perhaps in the future it will again be live with some segment also virtual and with virtual replays available. Is this the new normal? Will be return to the old normal? I don't think that will be the case in either scenario. The new normal is still to be determined.

In any case, following are some additional topics that I did not get a chance to take part in but I still want to view at a later date. You may wish to look up and learn about any of these that may interest you.

- 5G Adoption Showing ‘No Sign of Slowdown’ Amid Pandemic
- Film Distribution Strategy ‘A Work in Progress,’ WarnerMedia Exec Says
- TV Makers Turn to 8K, Super-Sized Panels
- Samsung Unveils New AI-enabled Smart Home Products
- Survey Predicts Consumer Tech Spending Will Spike to \$461B in 2021
- GM Says Auto Sector at ‘Inflection Point’ Toward Zero-Emission Future
- Tech Execs See State, Global Initiatives Driving US Privacy Law
- Consumers at the Wheel for Future of Streaming **SMT007**

Kick-off Keynote

5G as the Framework of the 21st Century

Feature by Pete Starkey

I-CONNECT007

Although the Consumer Electronics Show is now over 50 years old, it has always happened on the other side of the world for me and I had never taken the opportunity to attend previous events. But CES 2021, being of necessity an all-digital experience, enabled me to visit online and get a glimpse of trends and technologies shaping the future. I was particularly interested to hear the opening keynote, discussing 5G as “the framework of the 21st century, the essential tech of the present and the accelerated tech of the future.”

In this digital age, “technology” and “tech” seem to have become accepted as short-form for “digital technology,” whereas in my personal experience “5G technology” has involved design, manufacture, and performance considerations along with an understanding of the physical and electrical properties of materials for printed circuit boards and antenna arrays required to operate at millimetre-wave frequencies. So, this keynote offered a chance to look beyond the challenges of producing the hardware and see 5G technologies in a different dimension.

Consumer Technology Association President and CEO Gary Shapiro welcomed the



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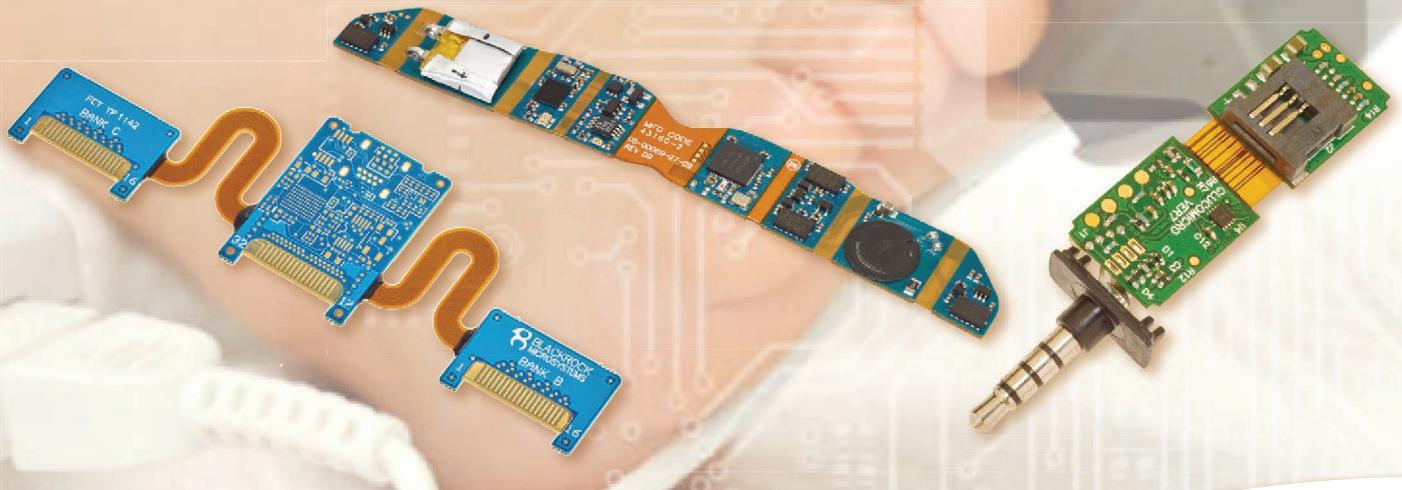
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Hans Vestberg

world to a re-imagined CES 2021 and introduced the keynote speaker, Verizon Chairman and CEO Hans Vestberg, commenting that since the 2019 event—when the theme of Vestberg’s address had been to describe the power and potential of 5G—the 2020 year of crisis had accelerated innovation and triggered a leapfrog of 5-7 years in the digital revolution.

“The 5G future is here—we knew it was coming, but it was closer than we realised,” Vestberg said. He took the virtual stage to deliver a faultless performance, presenting the already-current realities of ultra-wideband 5G technology and some examples of its scope as a world-changing enabler: “...so much more than a just another technology innovation; it’s an innovation platform that makes other innovations possible, a platform for us to build the future we want.”

He reviewed what he had termed the “currencies” of 5G: throughput, service deployment, mobility, connected devices, energy efficiency, data volume, latency and reliability. He summarised the differences with its 4G predecessor: unparalleled upload and download speeds with ultra-low lag, the capacity for more than a million connected devices per square kilometre, and the capability to support mobility up to 500 kilometres per hour,

together with faster and more responsive service deployment.

He demonstrated the benefits of 5G connectivity for the enhancement of spectator engagement in live sports, particularly where COVID-19 regulations prevented physical attendance. Vestberg demonstrated examples of advanced interactive and immersive experiences using multi-camera live action supplemented by augmented reality by discussing future possibilities in a video interaction with NFL Commissioner Roger Goodell and standing on a very realistic virtual football field to speak to Pro Football Hall-of-Famer Deion Sanders.

5G enabled a new era of immersive learning, with Vestberg discussing alternative ways of looking at education in a live video conversation with Lonnie G. Bunch III, secretary of the Smithsonian Institution, bringing education to life beyond the classroom and demonstrating the use of virtual reality to transport the command module of Apollo 11 into the living room. Similarly, he visited the Metropolitan Museum of Art in New York City in augmented reality. His colleague, Rose Stuckey Kirk, described the scope of 5G-enabled learning laboratories and their benefits in under-resourced schools.

The emergence of edge computing, done at or near the source of the data rather than being transmitted to a data centre, overcame the intrinsic problems of the traditional cloud such as high latency and the lack of security and was driving demand for 5G as the key enabler. 5G provided a platform for the simultaneous connection of massive numbers of sensors and actuators, offering smart cities and intelligent transportation systems a means of achieving full integration.

“It just gets better,” Vestberg said with unrestrained enthusiasm of ultra-wideband 5G technology that was conspicuous as he took us on a journey through applications that included robotics, avionics, drone delivery of pack-



Virtual entertainment provided by Black Pumas, the Grammy-nominated soul band.

ages, the healthcare industry and autonomous mobility; his descriptions, explanations and testimonials came from leading personalities in each area. He accentuated the ability of 5G to connect people to their passion, to bridge the digital divide, and to fundamentally alter the way businesses and communities function.

Focusing on entertainment, he acknowledged the damage inflicted upon the industry by the pandemic but declared, “The show can go on, even in the absence of the live audience.” As a music fan, he recalled the days when you had to be a VIP to see a great act up-close with nothing in the way. Now, thanks to 5G ultra-wideband, that experience was available to everyone. He welcomed to his virtual platform digital twins of Eric Burton and Adrian Quesada from Grammy-nominated soul band the Black Pumas to demonstrate how, by combining multiple camera angles and augmented reality with the capacity and speed of the 5G system, the effect of watching their performance on-screen was to bring their show so

close to real life that it was the next-best thing to being on the stage with them. “It just gets better,” he declared again. Fifteen iconic live music venues had already been equipped to provide this experience.

Vestberg concluded by philosophically asserting that, although 5G opened up all kinds of new possibilities, in the end the network was about something timeless: the human need to connect, to reach out, to share stories and to hear the stories of others. 5G is an incredible technology, and what he had just shared barely scratched the surface of current and future realities. But the legacy of 5G depends 100% on the people who use it. His own aspiration is that it will be used for good: learning, sharing, growing, preserving and protecting, community-building and finding ways to reap the greatest outcome for everyone in our society. “In the end, it’s up to you.”

He left it to the Black Pumas to play-out the session with a nicely edited demonstration of how to feel directly involved in their life-like virtual performance of good soul music. **SMT007**

New Innovations at CES:

Fluo Labs and Light-based Treatment for Allergies

Feature Interview by Nolan Johnson
I-CONNECT007

Approximately 30-60 million people in the U.S. suffer from seasonal allergies. During CES, medical tech startup Fluo Labs introduced a new device that promises to dramatically improve the way people manage allergic rhinitis (AR)—more commonly known as hay fever.

Nolan Johnson caught up with Jan Enemaerke, Fluo Labs' chief technology officer and co-founder, via a virtual connection during the show. Fluo Labs has recently completed a successful clinical trial, showing that the device inhibits the release of histamines and reduces inflammation—effectively acting as a natural antihistamine. The Fluo Labs device is also one of four finalists in the P&G Ventures CES Innovation Challenge.

Nolan Johnson: Jan, who is Fluo Labs and what do you do?

Jan Enemaerke: Fluo Labs is a medical device company on a mission to improve the quality of life for millions of allergy sufferers. Our founders are experienced in the development of light-based medical devices and have extensive experience in pharma and biotech therapeutics, including virology, rhinitis drug therapies, and light therapeutics.

Johnson: What's your product and technology, then?



Jan Enemaerke

Enemaerke: Our first product allows people to alleviate the symptoms of allergic rhinitis with light therapy. It's an affordable, easy-to-use, drug-free solution that provides rapid relief with no known side effects.

Johnson: How does the device work?

Enemaerke: The medical device treats allergic rhinitis via a light therapy. Our product uses a safe light to inhibit the release of histamines and reduce inflammation—effectively acting as a natural antihistamine with no known side effects.

The device is also easy and fast to use. Treatment takes less than 20 seconds: Hold the device up to your nostril; click the button for 10 seconds of light therapy; repeat on the other side; use as needed, once or twice a day.

Johnson: Can you explain the science behind the Fluo Labs device?

Enemaerke: Our device uses a light therapy known as photobiomodulation. Used by the medical community for pain relief, inflammation reduction, wound healing and tissue regeneration, photobiomodulation triggers a beneficial chemical change as the light is absorbed by the body's cells. In other words, the transformation of light to energy triggers a complex set of physical and chemical reactions that can enhance the cells' performance and health responses.



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Johnson: What inspired you to create your device?

Enemaerke: An early clinical study demonstrated that light therapy has the potential to be an effective treatment for people who suffer from allergic rhinitis (AR) and seasonal allergies. We were inspired by these findings and especially by the perspective that such therapy could provide non-drug relief to AR sufferers. We are especially motivated by the stories we are hearing directly from people whose lives are not only impaired and burdened by their allergies but also learning of their concern about consuming the quantity of medication needed to achieve some level of relief.

Johnson: How long have you been working on this?

Enemaerke: Ten years—from tinkering with initial prototypes, seeking patent protection, completing a pilot study, and now to undertaking a fastidious regulatory pathway. We had the chance to help many with their allergies during this period as we tested; we were so encouraged by their feedback and the sheer joy they experienced from being able to wean off medications, like corticosteroids and antihistamines.

Johnson: I presume the device uses a LED light source?

Enemaerke: Correct.

Johnson: How did Fluo Labs achieve the board design portion of the device?

Enemaerke: Because we are an early-stage start-up, we chose to contract the work out to a bureau.

Johnson: Over the 10 years of development, how did your circuitry develop? Were there numerous revisions/updates, or was your design pretty stable from the beginning?

Enemaerke: Our design has remained relatively stable. However, we have dramatically improved some aspects of the product over time. Since our initial study, we have incorporated the newest light and battery management system, while still delivering the same dosage of light (wavelengths, duration, pulse, energy). We have established the therapeutic window to alleviate the symptoms of allergic rhinitis, so the goal is to keep the light output within that window. The redesign of the unit was motivated by the need to optimize COGS.

Johnson: Who are your competitors and how do you differentiate yourself from your competitors?

Enemaerke: Our competitors are other treatment options. The three main forms of treatment are over-the-counter and prescription therapies: antihistamines, nasal steroids, and immunotherapy. Antihistamines stop the

body from making histamine, nasal corticosteroids help control inflammation in the nose that is caused by AR, and immunotherapy shots decrease the immune response to particular allergens over time.

While antihistamines provide rapid relief, nasal corticosteroids take several days before they become effective—requiring users to “prime” their body—and immunotherapy requires a three- to five-year treatment plan and frequent office visits.

For many allergy sufferers, side effects can be even more problematic than the hay fever symptoms they are looking to address—side effects that are exacerbated with prolonged consumption of medication.

For allergy sufferers who don't want to or cannot take medication (due to pregnancy, heart or thyroid conditions, job restrictions, etc.), unrealistic solutions are often suggested to manage their symptoms: staying indoors or minimizing outdoor activities, vacuuming carpets and upholstered furniture twice a week, washing curtains in hot water each season, getting rid of stuffed animals, and keeping home and car windows closed.

For consumers who are seeking non-drug solutions, there is no single natural remedy that can do the job of providing efficient symptom relief in a convenient treatment. With millions of AR sufferers around the world, Fluo Labs sought to create a drug-free solution with no side effects.

Johnson: How much will the device cost?

Enemaerke: The device will sell for less than \$100.

Johnson: When will units be available for purchase?

Enemaerke: Once we get approval from the FDA. We anticipate that we will be on the market in late 2021.



Johnson: Has COVID changed the FDA approval process?

Enemaerke: COVID has not changed the FDA approval process. On the one hand the FDA was quick to create accelerated review processes to fast track COVID-related solutions. In order, to facilitate the development of potential COVID-19 treatments, the FDA created the Coronavirus Treatment Acceleration Program (CTAP), a new program designed to expedite the development of potential COVID-19 therapies by using every tool at the agency's disposal to determine if the therapies are safe and effective for their intended uses. This entailed reallocating resources which slowed down non-essential (non-COVID) reviews.

Johnson: As a medical device, what level of certification is the Fluo Labs device?

Enemaerke: We are satisfying the requisite ISO standards for medical devices.

Johnson: Can you describe your manufacturing supply chain? Does this device require any specialized printed circuit board technologies?

Enemaerke: There are multiple sources for components. The design of the PCB is unique to the device and most PCB/SMD manufactures are capable of producing large volume production runs. **SMT007**

CES Overview

Feature by Happy Holden

I-CONNECT007

I have always wanted to attend the Consumer Electronics Show (CES). This year I got my wish, albeit virtually rather than being in Las Vegas. Before 2021, CES had become so large that all rooms in Las Vegas were sold out with nearly 200,000 people attending the show. I am too old and do not have the energy to attend in person, so this year's virtual CES will have to do. The advantage now is that I received press credentials, attended the press conference, and got downloads of new products. Here are some highlights.



Happy Holden

Reviewing CES 2020 Trends

This 30-minute presentation titled “CES 2021—Tech Trends to Watch,” was presented

by Steve Koenig, vice president of research at CTA, and Lesley Rohrbaugh, director of research at CTA. They listed four items in 2020 that came about faster than predicted:

- **e-Commerce:** Sales and deliveries that took 10 years in the past grew that amount in eight weeks
- **Telemedicine:** Doctors seeing patients using the internet grew 10X in only 15 days
- **Streaming videos:** Disney achieved 50 million customers in five months, a feat that took Netflix nearly seven years
- **Remote learning:** Nearly 250 million students went online in a mere two weeks

Next, the panel discussed IoT. Four areas piqued their interest:

- **AI/machine learning:** Nearly every CES participant talked about “their AI.” AI

Consumer
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CES 2021 Tech Trends To Watch



Steve Koenig
VP, Research



Lesley Rohrbaugh
Director, Research

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was highlighted from simple controls to advanced self-learning software. They wondered what the public must think of AI when there were so many variations on the concept presented.

- **Robotics/process automation:** Several new robots were introduced along with interesting automation of repetitive tasks like shopping and cooking.
- **Natural languages:** It was apparent that “voice” is the preferred interface to intelligent devices but since travel has been so curtailed, simultaneous translation of languages has been pushed back in importance for now.
- **Cloud computing:** The “cloud” is seen as the “ultimate home for big data” and the reason that “intelligent devices” need not be powerful computers, for now.

Finally, six markets at CES stood-out in their opinions:

- **Digital health:** Many wearable devices appeared, from the Bio Button to the Oura Ring (which looks similar to a traditional wedding ring). Most were connected to telecare (medical services on the cloud that allow patients to stay at home) using AI diagnostics to provide “predictable” diagnostics to physicians.

- **Digital transactions:** More services are going online using new AI software, like accounting services, legal, security, and education. This is making new services available to suburban and rural-remote regions. They quoted predictions that only 20% of employees working at home will actually go back to their offices after the pandemic.

- **Robotics/drones:** Delivery/shopping was a topic that appeared over-and-over. FedEx predicts that by 2023 there will be 100 million parcel deliveries every day. France already has set up small local drug stores with single items, allowing customers to shop electronically and their purchases will be delivered within 90 minutes to their home or office.

- **Vehicle technologies:** This may be the single largest technology shown at CES. Electrification of vehicles was presented everywhere, and/or refinement of technologies in vehicles from safety, entertainment, to using your vehicle as your home office. Autonomy was again presented but this time more information was given on the stages of development that will lead up to the autonomous vehicle.

- **5G connectivity:** 5G continues to be implemented, as well as 6G. Connectivity in the U.S. during 2020 was 10.8% higher over 2019 and 2021 will see even higher rates.

- **Smart cities:** Cities are investing in infrastructure that is not home or industry. They are looking to provide more services 24/7 while lowering cost of government. This seems especially true for rural broadband availability and the federal government seems to equate this to the early programs of rural electrification.

After listening to these OEMs for three days, and before I talk about them specifically, these are my overall impressions of CES.

The big OEMs spent a lot of time talking about their social responsibilities and their “big picture” concepts and not nearly as much about specific products. This might be because they did not have to bring physical products to Las Vegas, and only one-third as many companies participated. CES painted a fascinating picture of how our future is supposed to look, and hopefully we can afford it. I have learned that it rarely works out as cleanly and brilliantly as the images appear to be painted. Old science-fiction movies seem to indicate that in 50 years we would have flying cars and other utopian marvels, but when the time comes, we do not have them, but we do have marvels that were never predicted.

The most interesting topics and compelling visions seemed to be a bit further off than usual. Again, perhaps this should not be surprising given where we are in the world, but truly little of the coolest stuff is available for purchase. The Samsung robots were cool—“Pour me a glass of wine and then load the dishwasher”—but

will they really be available? Maybe not until mid-decade. Where Samsung missed the need was for elderly assistance in the home, especially in countries like Japan where they do not allow immigration.

Some of the car's digital cockpit videos seem to go a bit too far. Are we going to pay a high price to make our car the place we preferentially want to spend our time? The competing vision, making the home where we will spend more time, seems to be more practical. This will be especially true if Hollywood continues to introduce new films in our home at the same time as theaters. Visual and audio technologies have been making great progress. The TVs are getting bigger and the image quality is improving. Samsung is offering a new 110-inch model, LG can provide a transparent screen or rollable TV, and Sony has an AI chip (Cognitive Processor-XR) to enhance the portions of an image where it believes people are focusing their attention.

All said, my first CES was informative and fun, but I would have loved to have seen the actual electronics and PCBs.

I have focused on the following three OEM presentations:

1. Transportation
2. Consumer electronics
3. Computers and gaming

TRANSPORTATION

General Motors

On Monday, I listened to a keynote address from GM CEO and Chairman Mary Barra. General Motors is now 113 years old, and Barra announced that her company is committing to "an all-electric future." She said that GM will introduce 30 new electric vehicles by 2025, and all will be built on their new EV architecture called Ultium.



Mary Barra

Ultium is a battery-EV strategy that GM believes will give it the flexibility to innovate in EV designs for mobility, passenger sedans,

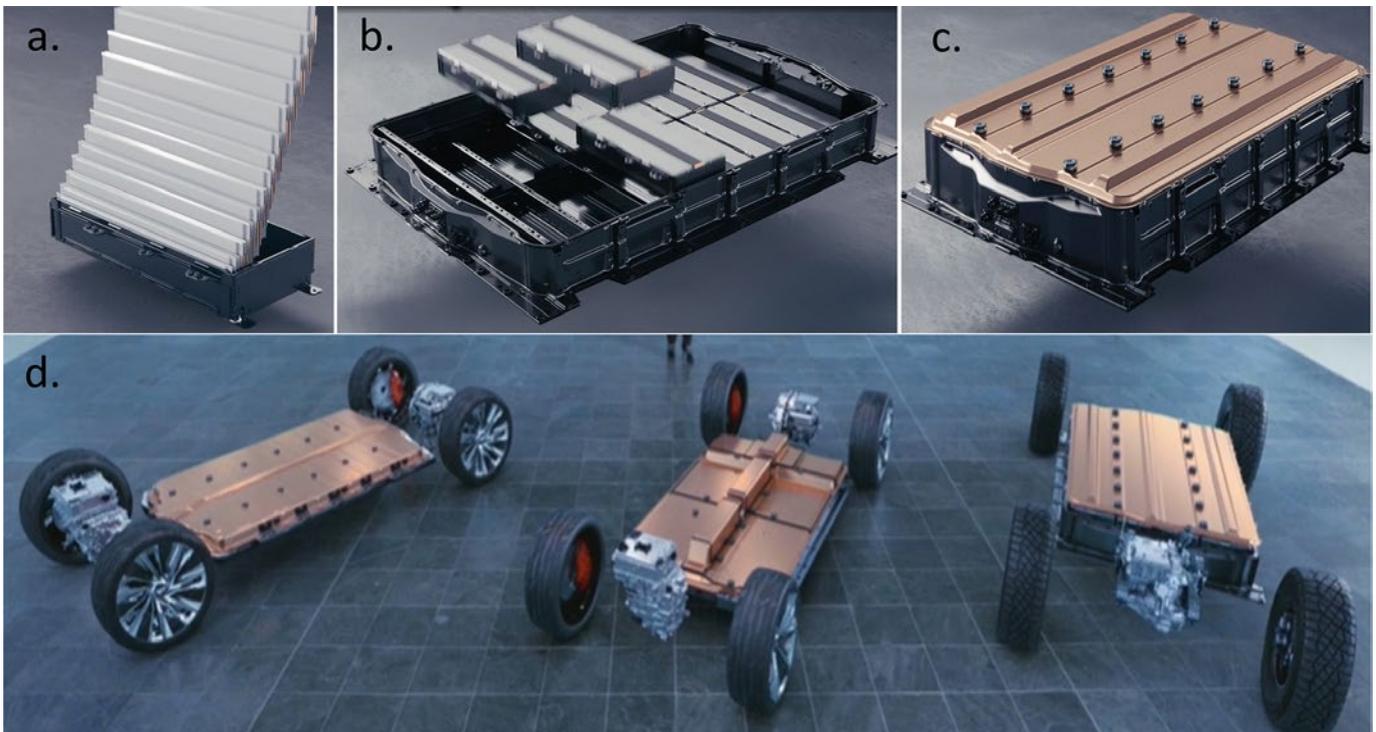


Figure 1: GM's Ultium's EV architecture and platforms: a) Lithium polymer battery modules; b) Modules stacked in a protective frame; c) Power frame with wireless communication; d) 8-, 12- or 20-modules with power plants.



Figure 2: GM's next-generation EVs are expected to be powered by a family of five interchangeable drive units and three drive assist motors known collectively as "Ultium Drive."

trucks, SUVs, and off-road. The EV batteries (Figure 1) are specifically designed for storage and are arranged in modules, and grouped into eight-, 12-, and 20-module frames.

There are five drive trains to choose from for front-, rear-, or all-wheel propulsion (Figure 2). This will provide 450 miles between charging. They will be controlled from a single digital software architecture (vehicle intelligence platform) capable of processing 4.5 terabytes of information per second. This is five times more than their current offerings. Current battery research to eliminate rare nickel and cobalt metals is expected to raise this mileage to 500 to 600 miles between charging.

The first Ultium product is the new 2021 Hummer EV (Figure 3). As ridiculous as it sounds, the Ultium package for the Hummer is rated at 1000 horsepower and capable of 0 to 60 mph in three seconds! To get this kind of performance, you must enter a code, then the Hummer reconfigures the batteries, lowers the chassis, builds up an energy storage, secures your flight harness, checks the available road, and awaits your launch command—all with associated sound effects. Normal driving and off-road all have different battery and chassis configurations that are pre-defined.

At the other end of vehicle design is the new Cadillac Lyriq EV crossover (Figure 4)



Figure 3: The 2022 GM Hummer EV showing its Ultium EV all-wheel-drive power train and skeleton.



Figure 4: The new Cadillac Lyriq EV SUV will include a 33-inch dash.



Figure 5: GM's EP1 EV autonomous delivery vehicles are stored inside the larger EV600 EV delivery van.

that has every bell and whistle you can imagine, including a single 33-inch LCD front panel with heads-up displays, and each wheel being articulated (like the Hummer EV). Later this year, GM will debut the Cadillac Celestiq EV sedan with a new, all glass roof, broken into four zones that can be individually dimmed or colored.

On the commercial end, GM has developed an autonomous EV for package delivery, the EP1 (Figure 5) houses the EV600 inside. Already adopted by FedEx, it has a 90-mile range on just a 10-minute charge while the van has a 350-mile range. Eventually, the delivery van is destined to be autonomous as well.

Bosch

Next, I attended Bosch's press conference, presented by Mike Mansuetti, president of Bosch North America. Bosch is one of the largest suppliers of vehicle components, as well



Mike Mansuetti

as appliances, mobility, power trains, and industrial products. Much of his press conference was dedicated to the company's social responsibilities, but he did highlight their growing use of software. Bosch has reorganized the software into four regional Cross-Domain Computing Solutions centers with 17,000 associates—half of which are programmers. These centers are focused on:

- Driver assistance
- Automated driving
- Vehicle multimedia



Figure 6: Bosch power train unit in a vehicle.



Figure 7: Deanna Kovar with John Deere's latest autonomous farm tractor. Seeds can be placed precisely within 2.5 cm, maximizing growth and optimizing available land.

- Power trains (Figure 6)
- Body electronics

Bosch concluded its short press conference with the announcement of a rapid COVID-19 tester called Vivalytic, that is said to test five samples in just 30 minutes.

John Deere, Caterpillar

Finally, I specifically joined the John Deere and Caterpillar press conferences. I favor these two because of the work I did with them while working as an automation engineer at Hewlett-Packard in the early 1980s. I discovered then that these two companies were more advanced than the military in vehicles, sensors, electronics, and manufacturing technologies. They dominate the markets they work for: John Deere for agriculture and construction, and Caterpillar for mining, marine, construction and power trains (diesel-electric for trains). I discovered they were using “fly-by-wire” and GPS/laser navigation years before the military had it. Their advantage is that they do not operate on public highways and they are financed by their own insurance services.

Deanna Kovar, vice president of production and precision ag production systems at John Deere, explained how technology drives these machines and the modern farmer. The company has built a tractor capable of autonomous navigation (Figure 7) that is guided by satellite, drones and GPS to “plant every square inch of arable land with minimum seed used. Both were demonstrated at CES because John Deere has 20 years

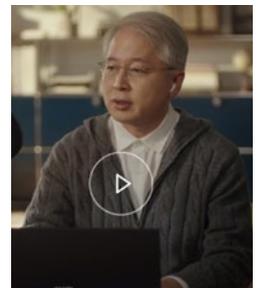
of successful autonomous vehicle design and operations, and Caterpillar has 40 years of AV design, manufacture, and use—all without a single fatality. They are looking to license their technologies.

CONSUMER ELECTRONICS

LG Electronics

LG seemed more prominent this year than Samsung, although Samsung is a much bigger company. The LG presentation was opened by CEO Brian Kwon, but Jin-hong Kim, senior vice president of global marketing, did most of the narrations.

Much of the early presentation was a general overview of life due to the COVID-19 pandemic, but LG has developed a face recognition software that works even with masks and can also measure face tem-



Brian Kwon



Jin-hong Kim

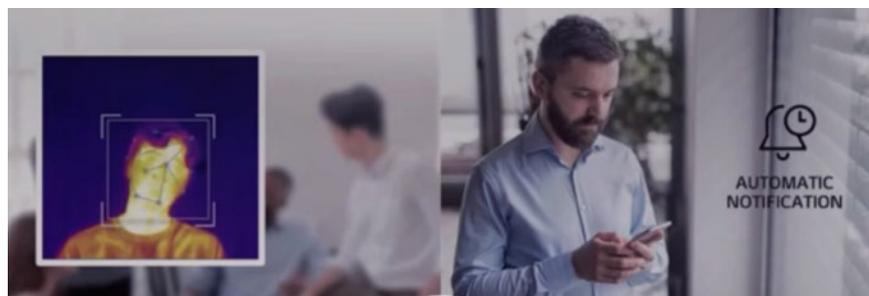


Figure 8: Facial recognition with temperature measurements.

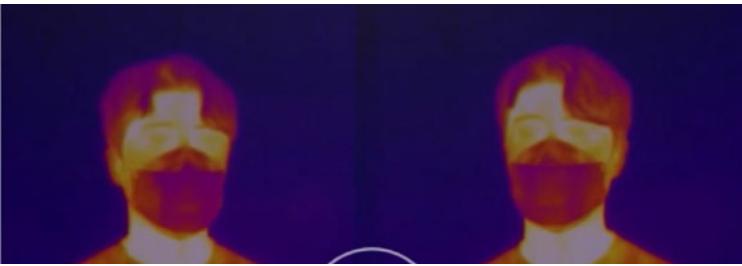


Figure 9: Facial recognition even wearing masks.



Figure 10: Smart mirrors with networking, telemetrics, facial recognition, and AI software.



Figure 11: LG's global networking, ThinQ, for the smart home and vehicle.

peratures. This software is targeted for airports and other public-entry scanning (Figures 8 and 9). This theme of large displays also shows up in their appliances and household items, like a “utility-wellness-fashion” mirror that provides feedback for medical telemetrics, what to wear, and help with applying makeup (Figure 10). The medical aspects could be a boon for the elderly.

LG has a growing line of household appliances for air conditioning, refrigerators,



Figure 12: LG delivery robot.



Figure 13: LG rollable TV at 65 inches.

stoves/ranges, vacuuming, washer/dryers, mobile phones, and more. They all now have various AI features to learn your habits and needs. They are offering this all networked together in what they call ThinQ (Figure 11). I'm not sure of the utility of such a network but I look forward to the Hollywood horror flicks that might be called “The Appliance Wars” or “Revenge of the Robot Servants,” featuring the LG delivery robot (Figure 12).

But LG is most noted for its display and OLED technology. The new Q-NED TVs are available in sizes from 65- to 86-inches, in 4K and 8K densities with new AI chips that divide the screen into 2,500 dimming zones to enhance viewing. They are the first with a “rol-

lable” TV (Figure 13). Finally, they acknowledge the important role of gaming in their displays, and their work with NVIDIA and AMD on curved and enhanced high-speed, high-resolution gaming displays.

Samsung

Samsung is in the same businesses as LG, only it’s much larger and with many more products. But their presentation felt the same as LG’s. Sebastian Seung, president at Samsung Research, had a common story of corporate contributions, smart appliances, enhanced televisions—including a new 110-inch wall TV—and again, robots. The new giant wall TV can be



Sebastian Seung



Figure 14: The Samsung refrigerator intelligence panel.

divided into four quadrants with separate material viewed in each. Each Samsung TV comes with the free 160-channel TV+PLUS internet streaming. I have this on my Samsung TV, and we watch it 40% of the time due to the interesting channels, especially travel, foreign series, and cooking.



Figure 15: Samsung BOT Handy™ home robot loading the dishwasher using its AI and camera.



Figure 16: AMD partners in computing with Hewlett-Packard (Dr. Lisa Su).



Figure 17: AMD using partners like Industrial Light and Magic. (Dr. Lisa Su).

The networked display on the Samsung refrigerator (Figure 14) seems to place the kitchen as the alternative center for the modern home. Maybe working occupants do not have time or know how to cook but the refrigerator connects cooking, recipes and shopping with the assistance

of the Samsung Bot™ Handy robot (Figure 15), which also does dishes, if not yet the cooking.

COMPUTERS AND GAMING

Dr. Lisa Su, president and CEO of AMD, made the presentation for CES. Seventy-five percent of the presentation was about the challenges of the past year, including their gifts/funds to fight the pandemic, and AMD's product partners like HP, Lenovo, Microsoft, Industrial Light and Magic (IL&M) and others. (Figures 18 and 19).

She spent the remaining time on their new line of processors, the Ryzen 5000 Series (Figure 20). This large family of computer proces-



Figure 18: New processors like this Ryzen 5900 for high performance data centers, gaming and computing.



Figure 19: New generation of high-performance gaming notebook computers have solved the problem of cooling with new low-profile fans.

sors are 8-, 16- and 32-cores that can clock up to 5.0 GHz. These are “supposed” to be the fastest in the industry for consumer use. The only ones more powerful are the AMD processors for large, computer centers, the Epyc Series, that contain 32 and 64 cores. Microsoft and IL&M have used these for their new cloud computer centers. IL&M needs this horsepower for rendering the graphics for its movies. A typical center will have 500,000 servers occupying 20 buildings of over two million square feet of space on a 30-acre site with 19,000 batteries for backup including their own diesel power generators.

AMD spent a lot of their time talking about the importance of gaming. Su said that in 2019, gaming had surpassed the revenues of the movie and music industries combined. AMD has been working with Microsoft on a new Xbox and with Sony on the PlayStation 5, as well as on gaming notebooks and workstations, using the Ryzen 5000 HX series and Radian RX6000 series graphic cards. These new graphics drivers work with the new LG QLED curved screen at 1440 pixels with 60 and 100 frames per second refresh for both 4K and 8K resolution. Special designs even support large screen 16K theaters. These souped-up gaming consoles (Figure 19) have two new-generation, flat-silent cooling fans.

Intel Corporation

Intel’s presentation by Gregory Bryant, executive vice president and general manager of Client Computing Group, and Craig Raymond, senior tech marketing engineer, took a different track than AMD. As representatives



Gregory Bryant

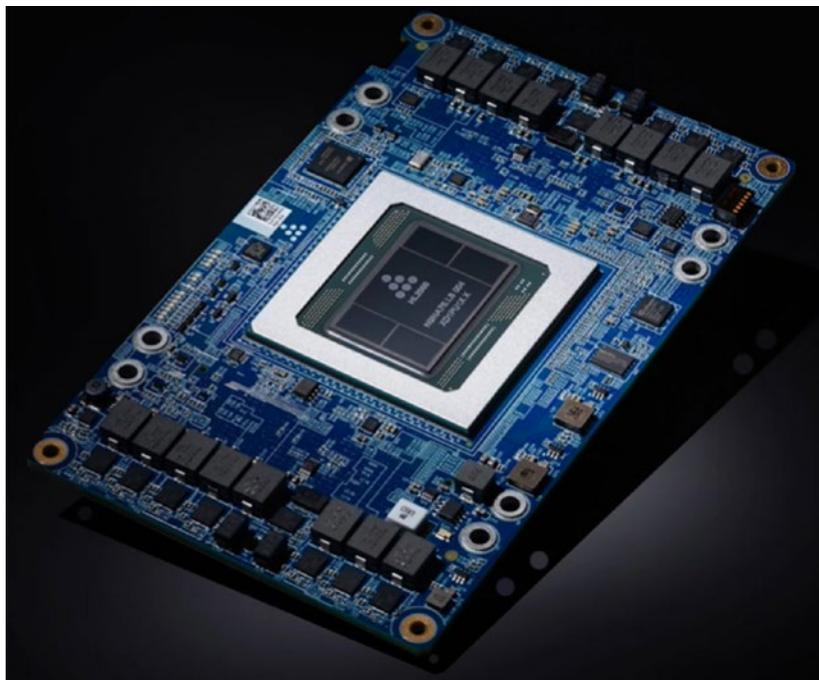


Figure 20: Intel’s next generation of processors, the AlterLake with 4K video, 5G communications and X86 compatible.

of Intel, they talked about VPro, their new security chip hardware/software solutions. They had demos showing how VPro prevents silent and invisible attacks while AMD chips are susceptible.

They also focused on a new generation of processors for students (Pentium/Celeron), and general computing, like the EVO series of i3, i5, i7, and i9 processors. Many of these seemed to be focused on gaming (Figure 20) using NVIDIA graphics chips and cards.

Bryant and Raymond spent much of their time on new AI processors and the Mobileye products for automated driving. They claim there are now 60 million cars on the road using Mobileye, and they are planning for smart driving products for Level 1 to Level 5 autonomy. These products use cameras, radar, and Lidar sensors along with new AI software and hardware. Using silicon photonics and



Craig Raymond

lasers on chips, they are building sensor systems leading up to 2025, when autonomous vehicles may be available to all. In the meantime, they are collecting data from nearly one million cars on the road, including six car vendors that are instrumented to provide continuous big data back to Mobileye to train AI systems to “be careful.”

IBM

The last presentation was a cerebral topic by Dario Gil, senior vice president and director of IBM Research, on “Accelerating Discovery to Solve Big Challenges.” Dr. Gil is talking about using IBM’s large cloud centers (Figure 21) to revolutionize the scientific method to solve



Dario Gil

some of humanity’s largest problems, aided by classic computers, AI and quantum computers.

The scientific method has been around since the 1600s as humanity’s best model for discovery. It is seen as:

- Question
- Research
- Hypothesis
- Experiment
- Observations
- Results/Conclusion
- Replicate

This linear process is repeated with trial and error until a suitable solution is found. But what if we could use big data and AI to accelerate discovery by a simple loop process of study-hypothesize-test-iterate? This can be a foundation for discovery-driven enterprises (Figure 22).

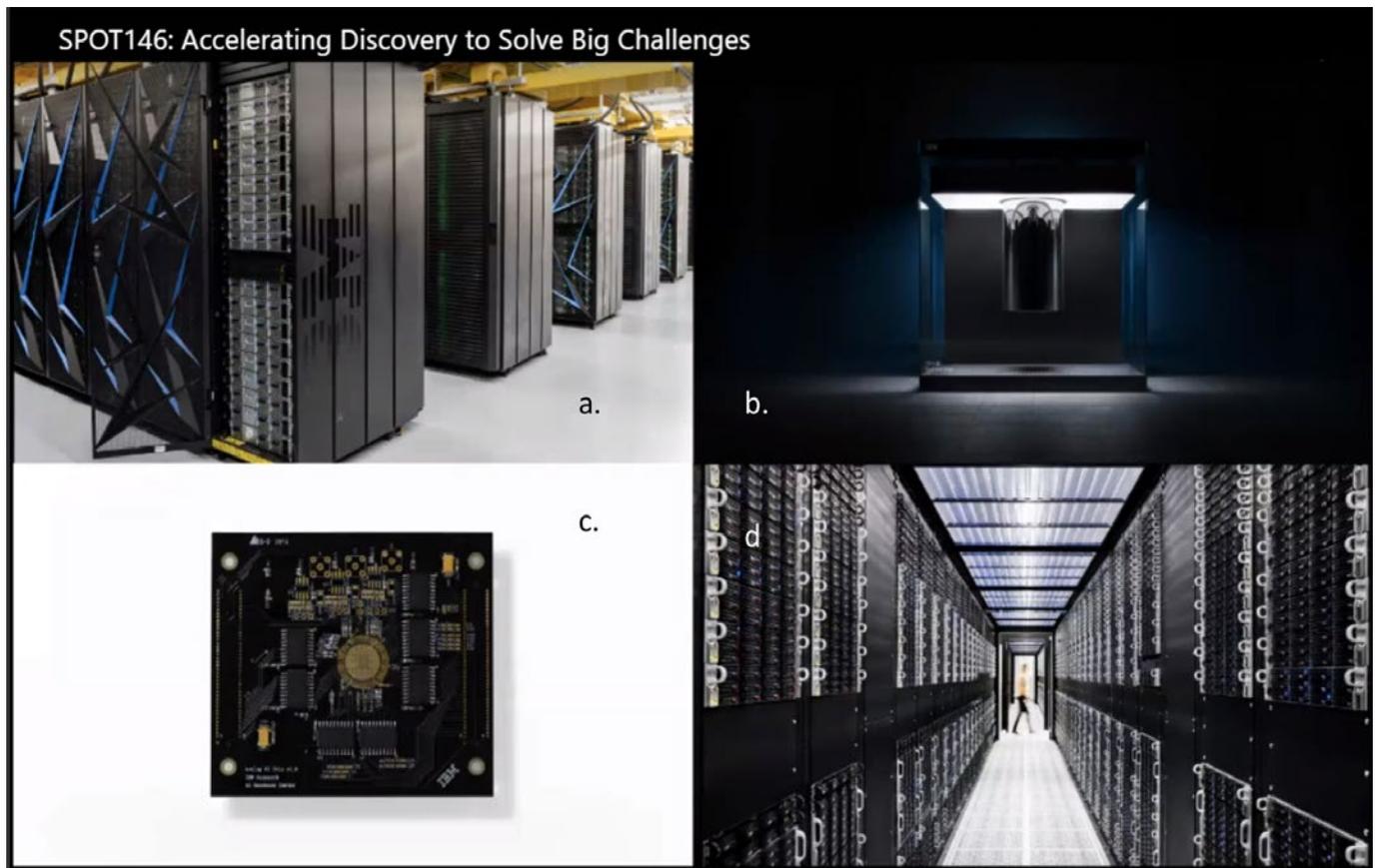


Figure 21: The current resources of a) Super computers like SUMMIT; b) AI based software and hardware; c) The growing use of quantum computing; d) Cloud computing hybrids.

Accelerated Discovery will provide a foundation for the Discovery-driven enterprise.

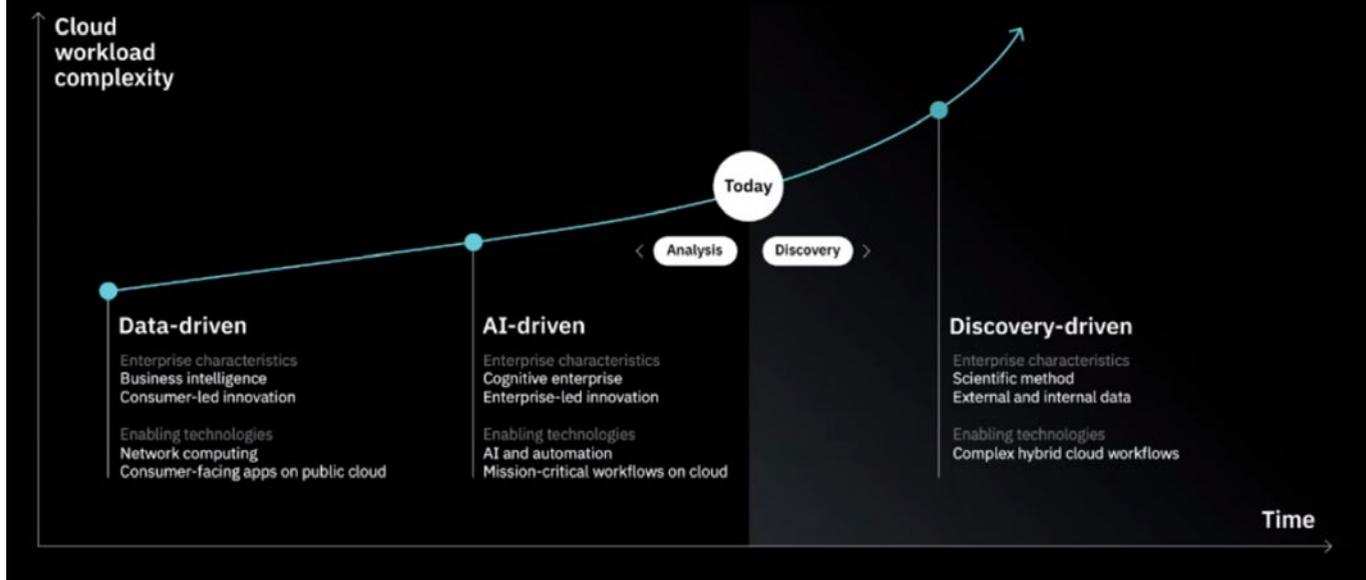


Figure 22: Accelerated discovery will provide a foundation for discovery-driven enterprises.

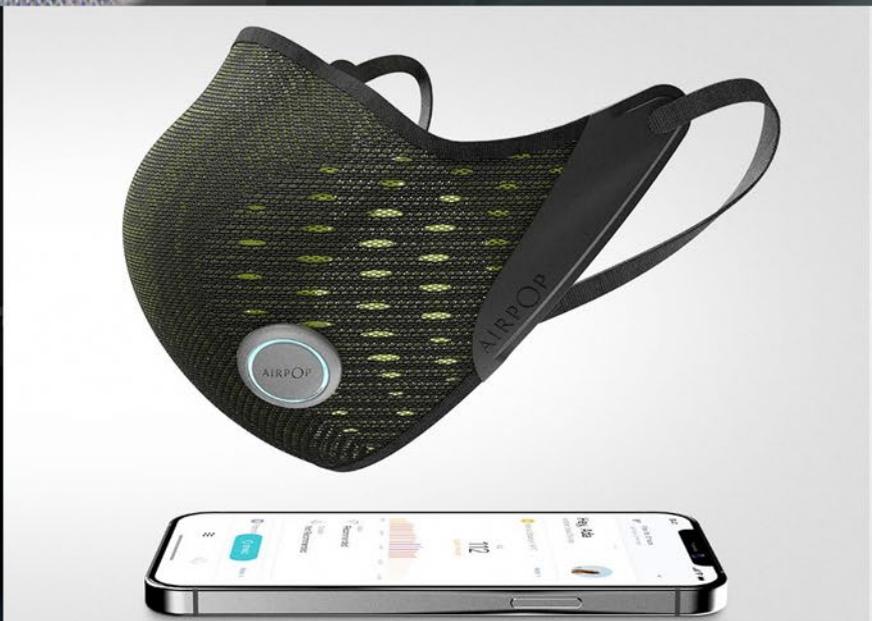
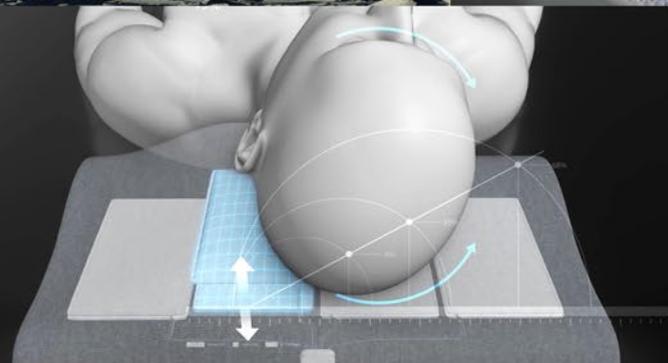
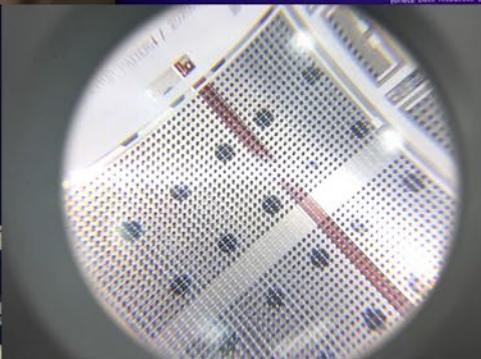
As an example, if this loop were applied to the problem of new materials, say a new photopolymer-resist capable of sub-nanometer geometries for integrated circuit production for the future, how would that work? Using the scientific method, it could look like this:

- **Study:** Using super computers to deep search all available research literature in the world for “photo acid generators” (PAG—the key component of photoresists), 10,000 times more information is digested and structured than done by a human. All the information on PAGs can be organized into classes and family of molecules and displayed as a “circular dendrogram” about PAGs.
- **Hypothesize:** Using AI-based simulation to examine each PAG molecule to understand what could exist in the gaps on the dendrogram then creating AI generative

models of new molecules and predicting their properties suitable for the best PAGs.

- **Test:** Once suitable candidates have been discovered, these new molecules can be synthesized in robot-laboratories like IBM’s RoboRXN Autonomous Lab. These totally new materials can be tested, and their results added to current knowledge.
- **Iterate:** If the new material is not suitable, the process loop can be entered once again until one is found.

This is a real story, and the IBM’s RoboRXN Autonomous Lab has been used by 21,189 scientists, hypothesizing over 2.5 million chemical reactions to synthesize 458 new materials since October 1, 2020. Accelerated discovery is here. **SMT007**



Razer
PROJECT BROOKLYN
CONCEPT - CES 2021



Intel CES
Tech Preview

Pepcom: A Show Within a Show

Feature by Nolan Johnson

I-CONNECT007

On Monday, January 11, I attended the launch of the CES 2021. Well, more precisely, I attended the Pepcom program, one of the multitude of ways to connect with CES in the virtual environment. Pepcom is a regular at CES, functioning a bit like a show within a show.

From Pepcom's website, "Pepcom was founded in 1998—by journalists, for journalists. Pepcom is the proven leader in media showcases. Our demo events consistently put the world's most influential media in front of the world's most innovative companies—with a healthy dash of good fun as we go."

With a mission like theirs, it's no surprise then, that Pepcom is a regular at CES, drawing a mix of stalwart brands as well as up-and-comers. This year was no different. Top-tier brands included companies such as: Lenovo, Kyocera, Targus, Shure, Belkin, Moen, D-Link, Kingston, Dolby, ViewSonic, and many more.

Not every product could be strictly considered electronics, either. A handful of the showcase companies demonstrated accessory products; cell and tablet cases were a common non-electronic product.

Attending a real-life Pepcom follows through with the mini-tradeshow vibe, with showcased companies onsite showing off their products. While the virtual event is different than previous Pepcoms, for those of us who've been attending and reporting on virtual events, the visitor experience was exactly what we would have expected. Virtual Pepcom meant logging in to a rather traditional-looking virtual tradeshow environment. Once in, I navigated to each of the virtual booths.

At a trade show, every exhibitor is of interest to somebody, but not all exhibitors are interesting to everybody. Consequently, walking a show employs multiple layers of information gathering, processing and sorting to find the right type of interesting news to cover. Exhibitors tend to be grouped by industry; for exam-



I-Connect007e

ROUNDTABLES

Lively and insightful discussions from industry experts. **Watch now!**



**App Notes
and Fab Notes**



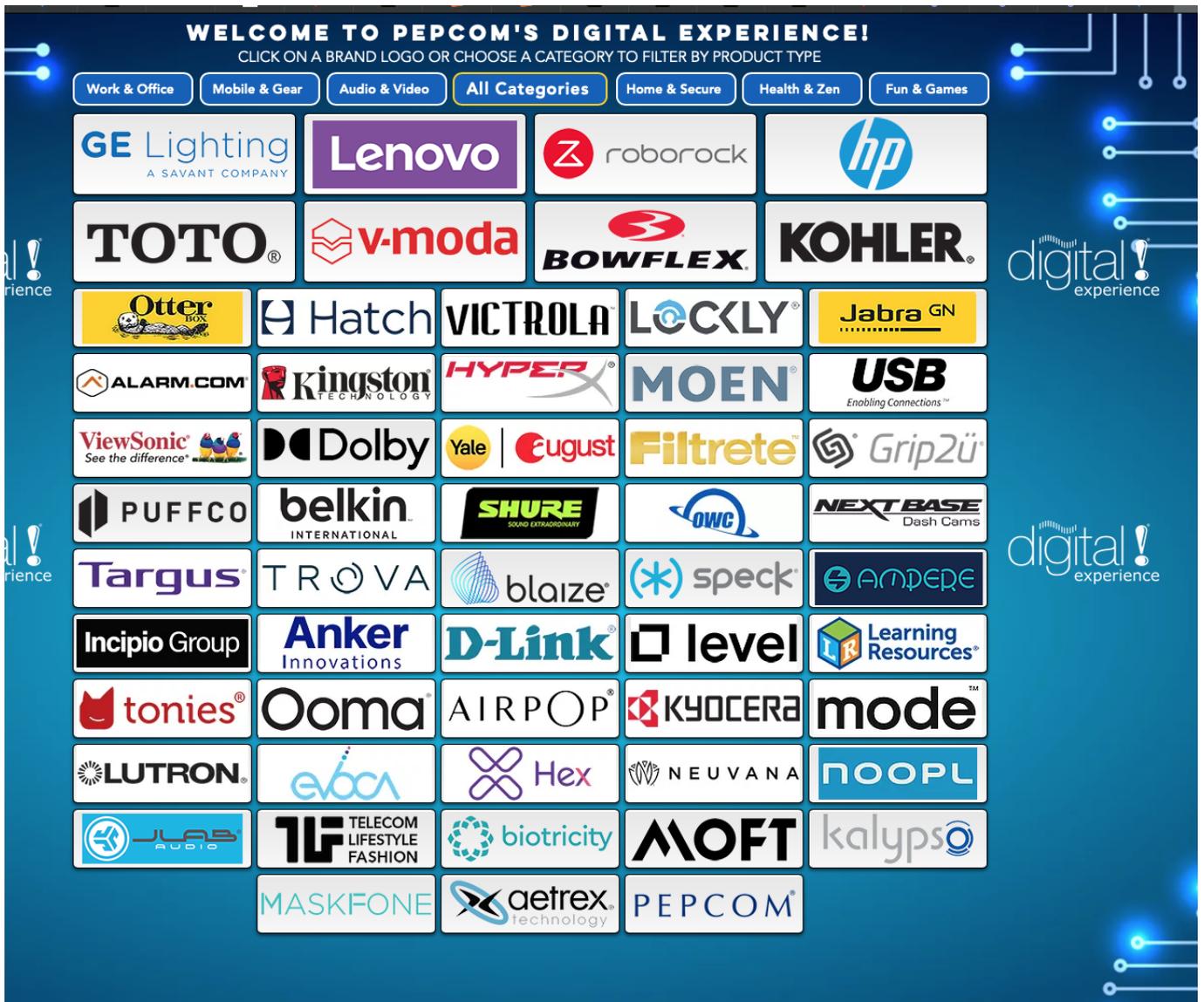
**Process Ionic Contamination
Test (PICT) Standard**



**Achieving Operational Excellence
in Electronics Manufacturing**



**Use of IMS Thermal Materials
in Multilayer Stackups**



ple, when you find the automotive pavilion, mobility electronics suddenly immerses you. Scanning the signs on the towers or hanging from the ceiling to locate brands for an on-the-fly sorting of show participants is the normal way to navigate. Once you're in the same place as the products that interest you, simply walk the aisles and scan the booths. Each booth requires just a few seconds to see if their products are of interest.

However, a virtual showcase/exhibition environment isn't that easy to parse and doesn't go that quickly. A visit to a virtual booth goes only as quickly as the server can serve up the content that makes up the booth. To get a sense for the products, visitors must watch all (or most)

of the introductory video—a two- to five-minute process. If there is interest after that, visitors can click into a live demonstration Q&A session, access the media collateral, and more. On the one hand, the message is more complete for the exhibitor—visitors all get the video messaging. But for the visitor, the process can be slower, sometimes even tedious. Until, of course, the interesting information is found!

Lenovo's Zoom-based demo session featured product sessions with new models of laptops and high-end displays. Two different professional demonstrators had their hands on the products in real-time, reviewing the statistics and the features. Six or seven other press



The ThinkReality A3 tethers to a PC or select Motorola smartphones via a USB-C cable.

professionals were present, taking notes and paying attention. Lenovo also introduced the ThinkReality™ A3 lightweight smart glasses. Said to be the most versatile smart glasses ever designed for the enterprise, they aim to enhance productivity for the office professional, industrial worker, small business or global enterprise and everywhere in between. It's an interesting concept to do away with the conventional monitor or screen in favor of a virtual one—truly a transformation to today's office environment (home or otherwise.)

Over at Hex, the demonstrator was deep in a discussion on radio wave coverage with two other attendees. Hex's product is a home secu-

rity device that interprets changes in Wi-Fi signal coverage to provide intruder security in your home; it was quite interesting to hear about how the sensors read the Wi-Fi signals as if it were a mesh.

Elsewhere, D-Link was showcasing networking products; computer/personal accessories manufacturer Targus had UV disinfecting desk lamps as a highlight; and Ooma, the VoIP phone company had a new 4G LTE "landline-like" phone product to show off. Kyocera was present, teasing the "coming soon" arrival of a new cellphone.

By the time I'd seen all of Pepcom, I'd been introduced to toys for children, personal vaping products, smart door locks for your home, microphones and headphone systems for mobility as well as work-from-home, Bluetooth-headset-enabled facemasks, biodegradable cases for phone and tablet, charger accessories from Belkin, dashcams, Bluetooth-connected personal safe boxes, and even an AI application software development platform from Blaise.

As of launch day at CES, and using Pepcom as a measure, it seemed to me that the virtual experience would likely severely hamper attendees' exposure to new and interesting technologies and products. **SMT007**



Editor's Picks from SMT007.com

1 Meet Christine Davis, I-Connect007 Columnist ▶

Meet Christine Davis, one of our newest columnists! Christine will share her expertise and lessons learned through her journey as one of the few women in the electronics industry to found and run her own company.



Christine Davis

2 SAMI Acquires Advanced Electronics Company ▶

Saudi Arabian Military Industries (SAMI), a wholly owned subsidiary of the Public Investment Fund, announced that it has acquired Advanced Electronics Company (AEC) as part of the largest military industries deal ever concluded in the Kingdom of Saudi Arabia.



3 Foundations of the Future: Scholarships, Awards and Student Opportunities ▶

There was no better way to end 2020 than by making a positive impact in deserving students' and educators' lives. We can help students to invest in their future and reward the accomplishments of those who are hardworking and dedicated. Scholarships are hugely important, especially when helping students avoid and alleviate college debt as well as for professional growth opportunities.



Gunter du Plessis

4 Cerberus Announces Sale of Sparton to Elbit Systems of America ▶

Cerberus Capital Management, L.P., a global leader in alternative investing, has announced that one of its affiliates has signed a definitive agreement to sell Sparton Corporation to Elbit Systems of America, LLC.

5 John Deere Electronic Solutions Earns IPC J-STD-001, IPC-A-610 QML Recertification ▶

IPC's Validation Services Program announces that John Deere Electronic Solutions, a manufacturer of custom, integrated electronics components based in Fargo, N.D., has become the first OEM company to be recertified a second time to the IPC J-STD-001 and IPC-A-610 Qualified Manufacturers Listing (QML).



6 Kaga Electronics Strengthens EMS Business in Inland China ▶

Kaga Electronics Co., Ltd. announces that it has completed construction of a new factory in Xiaogan, Hubei Province, in order to strengthen its EMS business in inland China.



7 Foxconn Technology Group Debuts 5G Innovations at IEEE GLOBECOMM 2020 ▶

Foxconn Technology Group has made its debut at IEEE GLOBECOMM 2020, the flagship conference of the IEEE Communications Society, in Taiwan, showcasing its latest 5G software and hardware innovations and capabilities.



8 Naprotek Appoints New Vice President of Operations ▶

Naprotek LLC, a provider of electronic manufacturing services, announced the appointment of Andrew Dalisa to the position of vice president of operations.



9 Absolute EMS, Inc. Installs Second Full Hanwha Techwin SMT Line ▶

Absolute EMS, Inc., a leading provider of turnkey and consignment manufacturing services, is pleased to announce that it has invested in three HM520 Modular Mounters and a Nitrogen oven from Hanwha Techwin Automation Americas SMT.



10 VDL Groep Takes Over tbp electronics ▶

VDL Groep strengthens its position as an industrial partner in electronics. The family business, with its head office in Eindhoven, has taken over tbp electronics.



For the latest news and information, visit SMT007.com. Subscribe to our newsletters or premium content at [my I-Connect007](http://myI-Connect007).

Career Opportunities



How Do Your Team Members Stack Up?

Find industry-experienced candidates at I-Connect007.

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

In addition, your ad will be featured in at least one of our newsletters, and your posting will appear on our jobConnect007.com board, which is also promoted in every newsletter.

Potential candidates can click on your ad and submit a resume directly to the email address you provide or be directed to the URL of your choice. If you wish to continue beyond the first month, the price is the same per month.

No contract required. We even include your logo in the ad, which is great branding!

To get your ad into the next issue, contact:

Barb Hockaday at barb@iconnect007.com or +1 916.365.1727 (-8 GMT PST)

I-Connect007
GOOD FOR THE INDUSTRY



Career Opportunities



ventec
INTERNATIONAL GROUP
騰輝電子

Sales Desk & Supply Chain Manager, Leamington Spa, UK

Want to advance your career by joining a globally successful and growing world class CCL manufacturing company and help drive that success? As sales desk & supply chain manager you will work towards maximizing the efficiency and effectiveness of controlling stock levels and sales interactions with the customers and ensuring that the requirement of the business for fast turn delivery of quality products is met in the most cost effective and efficient way. Your tasks will include sales desk & stock management, implementing performance improvement measures, procuring materials and resources and assuring compliance. You will be a mentor to your team members and implement best practices across all levels.

Skills and abilities required:

- Proven commercial experience in similar role for minimum 5 years
- Knowledge of organizational effectiveness and operations management
- Experience with ISO9001 or similar QMS required
- Experience with Lean Six Sigma a plus
- Excellent leadership ability and communication skills (English)
- Computer literate (Microsoft Suite)
- Experience with ERP-systems

What's on offer:

- Excellent salary and benefits commensurate with experience

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

Please apply in the strictest confidence, enclosing your CV to humanresource@ventec-europe.com.

[apply now](#)



ventec
INTERNATIONAL GROUP
騰輝電子

Operations Manager, Elk Grove Village IL, USA

Want to advance your career by joining a globally successful and growing world class CCL manufacturing company and help drive that success? As operations manager at Ventec USA LLC, a wholly owned subsidiary of Ventec International Group, you will coordinate and oversee our organization's operations in Elk Grove Village, IL, and Fullerton, CA. Your tasks will include formulating strategy, implementing performance improvement measures, procuring materials and resources and assuring compliance. You will be a mentor to your team members, find ways to maintain and improve the highest quality of customer service and implement best practices across all levels.

Skills and abilities required for the role:

- Proven commercial experience as operations manager or similar role for minimum 5 years
- Knowledge of organizational effectiveness and operations management
- Experience with ISO9001 or similar QMS required
- Experience in budgeting and forecasting & familiarity with business and financial principles
- Excellent leadership ability and communication skills (English)
- Outstanding organizational skills
- Degree in Business, Operations Management, or related field preferred but not required

What's on offer:

- Excellent salary and benefits commensurate with experience

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

Please forward your resume to jpattie@ventec-usa.com and mention "Operations Manager—Elk Grove Village" in the subject line.

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Career Opportunities

Now Hiring

Director of Process Engineering

A successful and growing printed circuit board manufacturer in Orange County, CA, has an opening for a director of process engineering.

Job Summary:

The director of process engineering leads all engineering activities to produce quality products and meet cost objectives. Responsible for the overall management, direction, and coordination of the engineering processes within the plant.

Duties and Responsibilities:

- Ensures that process engineering meets the business needs of the company as they relate to capabilities, processes, technologies, and capacity.
- Stays current with related manufacturing trends. Develops and enforces a culture of strong engineering discipline, including robust process definition, testing prior to production implementation, change management processes, clear manufacturing instructions, statistical process monitoring and control, proactive error proofing, etc.
- Provides guidance to process engineers in the development of process control plans and the application of advanced quality tools.
- Ensures metrics are in place to monitor performance against the goals and takes appropriate corrective actions as required. Ensures that structured problem-solving techniques are used and that adequate validation is performed for any issues being address or changes being made. Develops and validates new processes prior to incorporating them into the manufacturing operations.
- Strong communication skills to establish priorities, work schedules, allocate resources, complete required information to customers, support quality system, enforce company policies and procedures, and utilize resources to provide the greatest efficiency to meet production objectives.

Education and Experience:

- Master's degree in chemical engineering or engineering is preferred.
- 10+ years process engineering experience in an electronics manufacturing environment, including 5 years in the PCB or similar manufacturing environment.
- 7+ years of process engineering management experience, including 5 years of experience with direct responsibility for meeting production throughput and quality goals.

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Now Hiring

Process Engineering Manager

A successful and growing printed circuit board manufacturer in Orange County, CA, has an opening for a process engineering manager.

Job Summary:

The process engineering manager coordinates all engineering activities to produce quality products and meet cost objectives. Responsible for the overall management, direction, and coordination of the engineering team and leading this team to meet product requirements in support of the production plan.

Duties and Responsibilities:

- Ensures that process engineering meets the business needs of the company as they relate to capabilities, processes, technologies, and capacity.
- Stays current with related manufacturing trends. Develops and enforces a culture of strong engineering discipline, including robust process definition, testing prior to production implementation, change management processes, clear manufacturing instructions, statistical process monitoring and control, proactive error proofing, etc.
- Ensures metrics are in place to monitor performance against the goals and takes appropriate corrective actions as required. Ensures that structured problem-solving techniques are used and that adequate validation is performed for any issues being address or changes being made. Develops and validates new processes prior to incorporating into the manufacturing operations

Education and Experience:

- Bachelor's degree in chemical engineering or engineering is preferred.
- 7+ years process engineering experience in an electronics manufacturing environment, including 3 years in the PCB or similar manufacturing environment.
- 5+ years of process engineering management experience, including 3 years of experience with direct responsibility for meeting production throughput and quality goals.

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Career Opportunities



IPC Instructor Longmont, CO; Phoenix, AZ; U.S.-based remote

*Independent contractor,
possible full-time employment*

Job Description

This position is responsible for delivering effective electronics manufacturing training, including IPC Certification, to 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 conduct training at one of our public training centers or will travel directly to the customer's facility. A candidate's close proximity to Longmont, CO, or Phoenix, AZ, is a plus. Several IPC Certification Courses can be taught remotely and require no travel.

Qualifications

Candidates must have a minimum of five years of electronics manufacturing experience. This experience can include printed circuit board fabrication, circuit board assembly, and/or wire and cable harness assembly. Soldering experience of through-hole and/or surface-mount components is highly preferred.

Candidate must have IPC training experience, either currently or in the past. A current and valid certified IPC trainer certificate holder is highly preferred.

Applicants must have the ability to work with little to no supervision and make appropriate and professional decisions.

Send resumes to Sharon Montana-Beard at
sharonm@blackfox.com.

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Our Summit Anaheim, CA, division currently has multiple open positions for planning engineers.

The planner is responsible for creating and verifying manufacturing documentation, including work instructions and shop floor travelers. Review lay-ups, details, and designs according to engineering and customer specifications through the use of computer and applications software. May specify required manufacturing machinery and test equipment based on manufacturing and/or customer requirements. Guides manufacturing process development for all products.

Responsibilities:

1. Accurately plan jobs and create shop floor travelers.
2. Create documentation packages.
3. Use company software for planning and issuing jobs.
4. Contact customers to resolve open issues.
5. Create TDR calculations.
6. Assist in the training of new planning engineers.
7. Review prints and purchase orders.
8. Create stackups and order materials per print/spec.
9. Plan jobs manufacturing process.
10. Institute new manufacturing processes and or changes.

Education/Experience:

1. High school diploma or equivalent
2. Minimum five (5) years' experience in the printed circuit board industry with three (3) years as a planning engineer.
3. Must be able to cooperate and communicate effectively with customers, management, and supervisory staff.
4. Must be proficient in rigid, flex, rigid/flex, and sequential lam designs.

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Career Opportunities



We're Hiring! Connecticut Locations

Senior Research Chemist: Waterbury, CT, USA

Research, develop, and formulate new surface treatment products for the printed circuit board, molded interconnect, IC substrate, and LED manufacturing industries. Identify, develop, and execute strategic research project activities as delegated to them by the senior research projects manager. Observe, analyze, and interpret the results from these activities and make recommendations for the direction and preferred route forward for research projects.

Quality Engineer: West Haven, CT, USA

Support the West Haven facility in ensuring that the quality management system is properly utilized and maintained while working to fulfill customer-specific requirements and fostering continuous improvement.

For a complete listing of career opportunities or to apply for one of the positions listed above, please visit us here.

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We're Hiring! Illinois / New Jersey

Technical Service Rep: Chicago, IL, USA

The technical service rep will be responsible for day-to-day engineering support for fabricators using our chemical products. The successful candidate will help our customer base take full advantage of the benefits that are available through the proper application of our chemistries.

Applications Engineer: South Plainfield, NJ, USA

As a key member of the Flexible, Formable, and Printed Electronics (FFPE) Team, the applications engineer will be responsible for developing applications know-how for product evaluation, material testing and characterization, and prototyping. In addition, this applications engineer will provide applications and technical support to global customers for the FFPE Segment.

For a complete listing of career opportunities or to apply for one of the positions listed above, please visit us here.

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Career Opportunities



SMT Field Technician Hatboro, PA

Manncorp, a leader in the electronics assembly industry, is looking for an additional SMT Field Technician to join our existing East Coast team and install and support our wide array of SMT equipment.

Duties and Responsibilities:

- Manage on-site equipment installation and customer training
- Provide post-installation service and support, including troubleshooting and diagnosing technical problems by phone, email, or on-site visit
- Assist with demonstrations of equipment to potential customers
- Build and maintain positive relationships with customers
- Participate in the ongoing development and improvement of both our machines and the customer experience we offer

Requirements and Qualifications:

- Prior experience with SMT equipment, or equivalent technical degree
- Proven strong mechanical and electrical troubleshooting skills
- Proficiency in reading and verifying electrical, pneumatic, and mechanical schematics/drawings
- Travel and overnight stays
- Ability to arrange and schedule service trips

We Offer:

- Competitive Pay
- Health and dental insurance
- Retirement fund matching
- Continuing training as the industry develops

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SMT Operator Hatboro, PA

Manncorp, a leader in the electronics assembly industry, is looking for a **surface-mount technology (SMT) operator** to join their growing team in Hatboro, PA!

The **SMT operator** will be part of a collaborative team and operate the latest Manncorp equipment in our brand-new demonstration center.

Duties and Responsibilities:

- Set up and operate automated SMT assembly equipment
- Prepare component kits for manufacturing
- Perform visual inspection of SMT assembly
- Participate in directing the expansion and further development of our SMT capabilities
- Some mechanical assembly of lighting fixtures
- Assist Manncorp sales with customer demos

Requirements and Qualifications:

- Prior experience with SMT equipment or equivalent technical degree preferred; will consider recent graduates or those new to the industry
- Windows computer knowledge required
- Strong mechanical and electrical troubleshooting skills
- Experience programming machinery or demonstrated willingness to learn
- Positive self-starter attitude with a good work ethic
- Ability to work with minimal supervision
- Ability to lift up to 50 lbs. repetitively

We Offer:

- Competitive pay
- Medical and dental insurance
- Retirement fund matching
- Continued training as the industry develops

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Career Opportunities



Sales Account Manager

Sales Account Management at Lenthor Engineering is a direct sales position responsible for creating and growing a base of customers that purchase flexible and rigid flexible printed circuits. The account manager is in charge of finding customers, qualifying the customer to Lenthor Engineering and promoting Lenthor Engineering's capabilities to the customer. Leads are sometimes referred to the account manager from marketing resources including trade shows, advertising, industry referrals and website hits. Experience with military printed circuit boards (PCBs) is a definite plus.

Responsibilities

- Marketing research to identify target customers
- Identifying the person(s) responsible for purchasing flexible circuits
- Exploring the customer's needs that fit our capabilities in terms of:
 - Market and product
 - Circuit types used
 - Competitive influences
 - Philosophies and finance
 - Quoting and closing orders
 - Providing ongoing service to the customer
 - Develop long-term customer strategies to increase business

Qualifications

- 5-10 years of proven work experience
- Excellent technical skills

Salary negotiable and dependent on experience. Full range of benefits.

Lenthor Engineering, Inc. is a leader in flex and rigid-flex PWB design, fabrication and assembly with over 30 years of experience meeting and exceeding our customers' expectations.

Contact Oscar Akbar at: hr@lenthor.com

[apply now](#)



Senior Process Engineer

Job Description

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

Position Duties

- Senior process engineer's role is to monitor process performance through tracking and enhance through continuous improvement initiatives. Process engineer implements continuous improvement programs to drive up yields.
- Participate in the evaluation of processes, new equipment, facility improvements and procedures.
- Improve process capability, yields, costs and production volume while maintaining safety and improving quality standards.
- Work with customers in developing cost-effective production processes.
- Engage suppliers in quality improvements and process control issues as required.
- Generate process control plan for manufacturing processes, and identify opportunities for capability or process improvement.
- Participate in FMEA activities as required.
- Create detailed plans for IQ, OQ, PQ and maintain validated status as required.
- Participate in existing change control mechanisms such as ECOs and PCRs.
- Perform defect reduction analysis and activities.

Qualifications

- BS degree in engineering
- 5-10 years of proven work experience
- Excellent technical skills

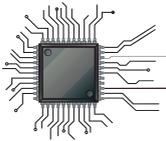
Salary negotiable and dependent on experience. Full range of benefits.

Lenthor Engineering, Inc. is the leader in Flex and Rigid-Flex PWB design, fabrication and assembly with over 30 years of experience meeting and exceeding our customers' expectations.

Contact Oscar Akbar at: hr@lenthor.com

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Career Opportunities



MivaTek

Global

MivaTek Global: We Are Growing!

MivaTek Global is adding sales, technical support and application engineers.

Join a team that brings new imaging technologies to circuit fabrication and microelectronics. Applicants should have direct experience in direct imaging applications, complex machine repair and/or customer support for the printed circuit board or microelectronic markets.

Positions typically require regional and/or air travel. Full time and/or contractor positions are available.

Contact HR@MivaTek.Global for additional information.

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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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Career Opportunities



APCT, Printed Circuit Board Solutions: Opportunities Await

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

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

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

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

[apply now](#)



U.S. CIRCUIT

Sales Representatives (Specific Territories)

Escondido-based printed circuit fabricator U.S. Circuit is looking to hire sales representatives in the following territories:

- Florida
- Denver
- Washington
- Los Angeles

Experience:

- Candidates must have previous PCB sales experience.

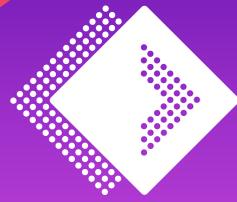
Compensation:

- 7% commission

Contact Mike Fariba for more information.

mfariba@uscircuit.com

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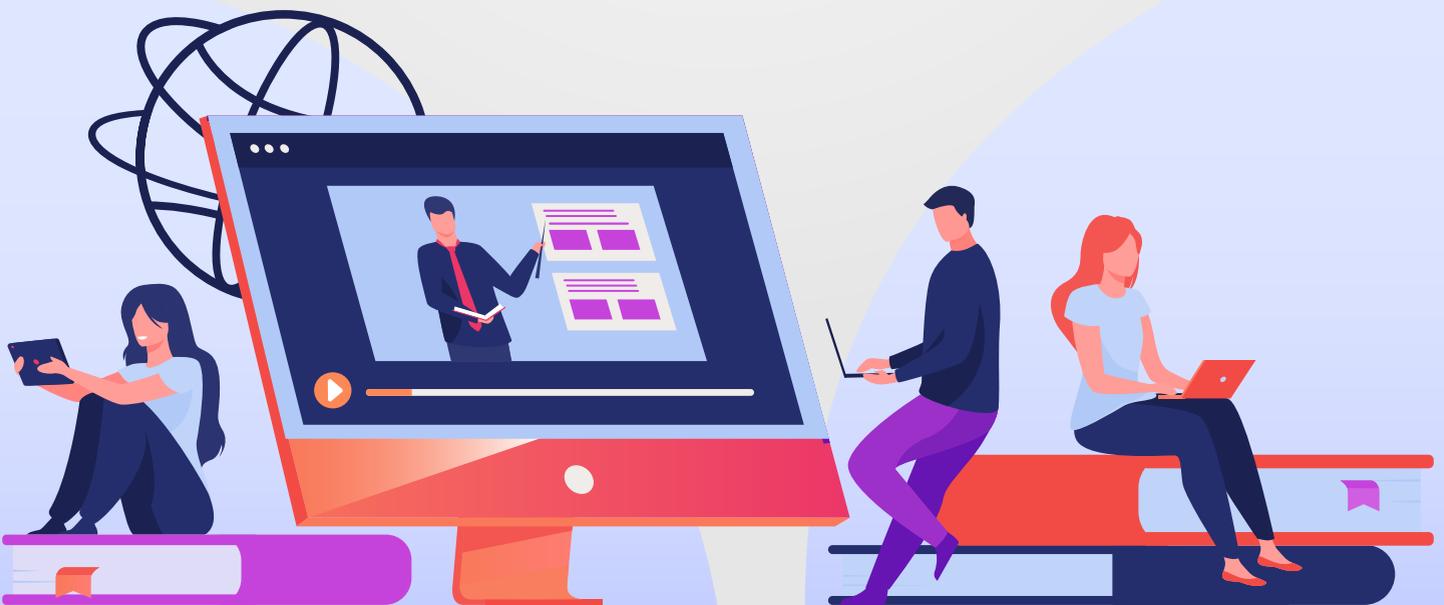
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A Global Association Working at a Local Level

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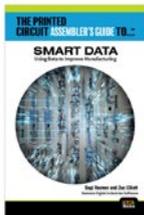
Live and on-demand webinars from KYZEN designed to answer all your cleaning questions.



Implementing “Digital Twin” Best Practices From Design Through Manufacturing with Expert Jay Gorajia, a 12-part micro webinar series.



The Printed Circuit Assembler's Guide to...



Smart Data: Using Data to Improve Manufacturing, by Sagi Reuven and Zac Elliott, Siemens Digital Industries Software

Manufacturers need to ensure their factory operations work properly, but analyzing data is simply not enough. Companies must take efficiency and waste-reduction efforts to the next phase using big data and advanced analytics to diagnose and correct process flaws.



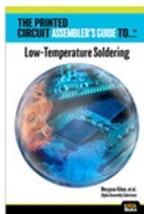
Process Validation, by Graham K. Naisbitt, Chairman and CEO, Gen3

This book explores how establishing acceptable electrochemical reliability can be achieved by using both CAF and SIR testing. This is a must-read for those in the industry who are concerned about ECM and want to adopt a better and more rigorous approach to ensuring electrochemical reliability.



Advanced Manufacturing in the Digital Age, by Oren Manor, Director of Business Development, Valor Division for Mentor a Siemens Business

A must-read for anyone looking for a holistic, systematic approach to leverage new and emerging technologies. The benefits are clear: fewer machine failures, reduced scrap and downtime issues, and improved throughput and productivity.



Low-Temperature Soldering, by Morgana Ribas, Ph.D., et al., Alpha Assembly Solutions

Learn the benefits low-temperature alloys have to offer, such as reducing costs, creating more reliable solder joints, and overcoming design limitations with traditional alloys.

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SMT007

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