

MARCH 2026

# SMT007

M A G A Z I N E



SPOTLIGHT ON

# EUROPE

PODCAST | SERIES 8



# PCB Materials: The Backbone and Future of Electronics

with Sean Mirshafiei, Isola

Experts from Isola, examine the critical role PCB base materials play in product reliability, manufacturability, and long-term performance.



Listen on  
**Apple Podcasts**

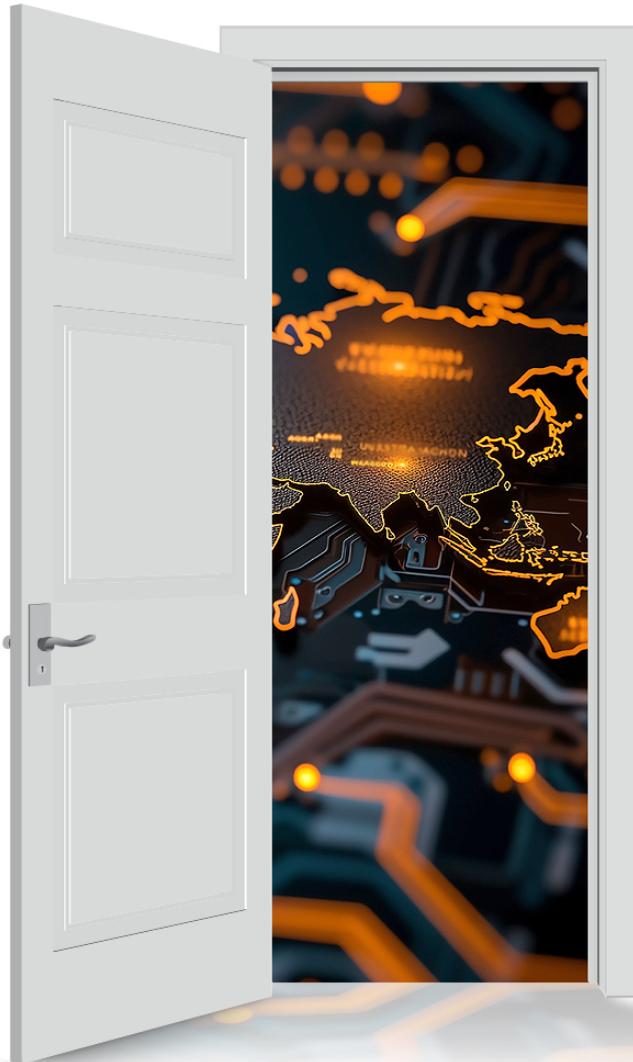


Listen on  
**Spotify**

**LISTEN NOW!**



# Open the Door to a **WORLD** of PCB Sourcing Solutions



Our staff can open the doors to Asia-based factory solutions not previously available to your purchasing team. We do this with integrity and transparency, as if we were a trusted member of your PCB sourcing team.

[Open the Door and Learn More](#)

**Linkage**  
Technologies

✉ [info@linkage-tech.com](mailto:info@linkage-tech.com)  
🌐 [linkage-tech.com](http://linkage-tech.com)

# Spotlight on Europe

Europe's EMS sector has contracted and the landscape has shifted, but momentum is building again. As defense priorities grow and supply chains are reevaluated, industry and policymaker are moving to strengthen regional capabilities. This issue explores how Europe is positioning its electronics ecosystem for a more resilient future.

## Feature Interviews

- 8** **A Critical Moment for Europe's Electronics Ecosystem**  
with Alison James
- 14** **SMT Renting Redefining Equipment Investments**  
with Christian Thers
- 28** **A New Strategic Partnership in Europe**  
with Sara Menclossi and Craig Wright

## Feature Articles

- 22** **A Balanced Approach Needed to Regulate PFAS in Electronics**  
by Dr. Diana Radovan
- 34** **EIPC Winter Conference 2026: Innovation, Energy, and Sustainability**  
with Pete Starkey
- 44** **An Update on the EU Sustainability Omnibus**  
by Dr. Diana Radovan

## Articles

- 54** **Road to Reliability: Safety First—ADAS, Connectivity, and Interfaces on the Road to Reliability**  
by Stan Rak

## Columns

- 6** **Nolan's Notes: Our Spotlight on Europe**  
by Nolan Johnson
- 18** **Powering the Future: How Packaging Choices Make or Break Performance**  
by Brian Buyea



## Shorts

- 27** **A Faster Path to Funded Workforce Training in California**  
by Victoria Hawkins
- 43** **Top Three Reads: Tariffs, AI Agents, and the Rise of Consumer Robots**  
by John W. Mitchell
- 52** **PEDC: Built for the Design Community by the Design Community**  
by Peter Trinitz

## In Every Issue

- 32** MilAero007 Highlights
- 61** Career Opportunities
- 66** Educational Resources
- 67** Advertiser Index

# SMT007

M A G A Z I N E

# Your customers require the best, so manufacture with the best.

Our partners are among the best in the business. We invite you to visit the booth numbers listed below during APEX EXPO 2026 to learn about the latest in technology.

 <b>ASMP</b>	1813	 <b>Technica, U.S.A.</b> by ELECTRO DESIGN	4024		4024
—	<b>SIPLACE</b>		4041	<b>PARMI</b>	2131
		 <b>essemtec</b> A NANODIMENSION DIVISION	3629	 <b>INOVA</b> INNOVATIVE MATERIAL HANDLING SOLUTIONS	1110
 <b>Critical manufacturing</b>	1813	<b>Heraeus</b>	1730	 <b>Cogiscan</b> * Track Trace Control	1410
<b>MP DRY CABINET</b>	1110	 <b>Creative Electron</b> THE X-RAY PEOPLE	2146	 <b>TAKAYA</b>	2635
<b>rite-temp</b> <sup>®</sup> WATER CHILLERS	4024	<b>MODI</b> VISION FOR IDENTIFICATION	1110	<b>teknek</b>	4024

*\*Certain lines not available in all Technica Territories*



**TECHNICA, U.S.A.**

(408) 240-5950 • [www.technica.com](http://www.technica.com)

4024



# Our SPOTLIGHT on EUROPE

BY NOLAN JOHNSON, I-CONNECT007

**The European PCB industry has faced a prolonged decline** over the past two decades. Reporting on the EIPC Winter Conference in January, Pete Starkey wrote:

“Europe’s industrial recession continues. Germany’s manufacturing sector has been in continuing decline since mid-2022, and corporate bankruptcies are at a 10-year high. UK electronics sales are down, and France is showing slight signs of recovery after three years of decline. (Presenter Jonathan) Custer observed that while general manufacturing continues to contract in Western Europe, the trend is toward the industrialisation of Eastern Europe, yet R&D and the manufacture of complex systems remain in Western Europe. Predictably, the defence sector, with turnover up by 13.8% and employment up by 8.6%, is perform-

ing well. ‘Europe’s electronics industry is shrinking in volume but growing in strategic importance,’ Custer said.”

Custer believes that the European PCB industry is set for steady growth, supported by innovation and localized production, but companies are navigating uncertainties. “Supply chain vulnerability is a serious consideration, particularly since the European industry now has a 100% dependency on non-European materials, and prices are subject to severe inflation,” Starkey wrote.

There are several ongoing themes for PCB manufacturing in the European Union, including Asian competition on price, supply chain volatility, regulatory compliance and environmental standards, fragmented capacity leading to strategic dependency, and the rise of capital intensity due to tech-

nological complexity. In this issue, we look at how Europe is responding to these challenges.

Alison James, who leads government relations in Europe for the Global Electronics Association, updates us the EU Chips Act and the Association's call-to-action letter emphasizing the strategic importance of defense to European PCB manufacturing. While there are simultaneous challenges, James is hopeful. "This is a key moment for EU electronics manufacturing," she says. We're also including more of Pete Starkey's report from EIPC, which thoroughly covers both technical and financial topics.

**“Never underestimate this region of the world. They always find a way to come back stronger.”**

Europe's non-military business is strongly built around automotive OEMs, where reliability and sustainability continue to drive development. As such, Diana Radovan, the Association's sustainability policy director, shares updates on both PFAS and the EU's Omnibus bill. Stan Rak continues his series on reliability in EVs, with a look at vehicle safety systems.

Continuing our business coverage in Europe, we spoke with the leadership at the UK's Connexion Technologies and Italy's OMR Italia to learn

more about their recent strategic partnership to leverage their respective strengths. Their goal is to improve their competitiveness by working together, rather than separately. We also spoke to Christian Thers of SMT Renting, a Denmark-based business with a unique model to help lower barriers to capital upgrades.

In fact, it's Craig Wright, CEO of Connexion Technologies, who makes the hopeful statement, "Resilience isn't about replacing global supply chains; it's about strengthening the European layer within them. The future of manufacturing in Europe will be more collaborative, more connected, and more specialised."

Rounding out the issue, Brian Buyea of Remtec continues his increasingly popular column on how packaging choices affect performance.

As defense priorities in Europe grow and supply chains are reassessed, and as industry and policy-makers push to rebuild regional capability, you will undoubtedly hear more about Europe's strengthening electronics ecosystem. Never underestimate this region of the world. They always find a way to come back stronger.

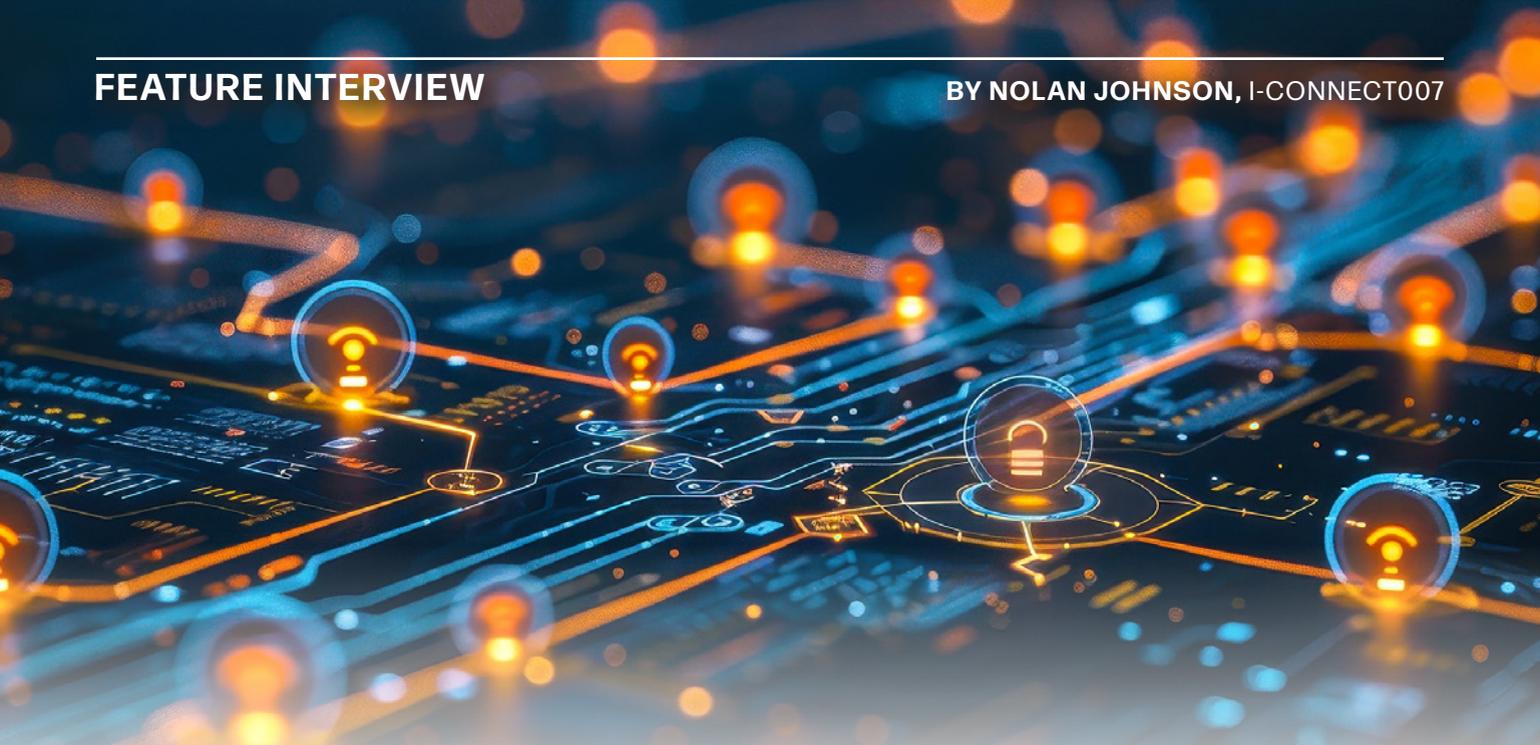


**Nolan Johnson** is managing editor of *SMT007 Magazine*. Nolan brings 30 years of career experience focused almost entirely on electronics design and manufacturing. To contact Johnson, [click here](#).

**Industry news. Real time.  
On LinkedIn.**

**FOLLOW US**

**I-Connect007**  
The Global Electronics Resource



# A Critical Moment for Europe's Electronics Ecosystem

**As Europe reexamines** its industrial strategy amid geopolitical shifts, how does electronics become a critical priority? In this interview, Alison James, senior director Europe, government relations, at the Global Electronics Association, explains how industry advocacy is influencing the review of the European Chips Act, and why the conversation must extend beyond semiconductors to include PCBs, EMS, and complete systems. With 27 member states to align, can policy move fast enough to secure Europe's electronics future?

***Nolan Johnson:** Alison, let's start our conversation with an update on legislative efforts regarding the European Union's redevelopment of an electronics manufacturing infrastructure.*

**Alison James:** It starts with the industry call to action we made to the new European Commission in 2024, stating that we needed to put electronics at the heart of Europe's strategic interests and focus. That electronics strategy includes supply-and-demand instruments, and ensuring we have the electronics required for our critical industries. That was the starting point for everything that we

look to do in the European Union. In other words, we laid out a roadmap in the call to action.

So, what's happening? First, we have made the critical case for an instrument that enables the building up of the electronics value chain—not only semiconductor chips, but also printed circuit boards and assemblies. We must be able to make the electronic systems for critical industries, including defense, security-critical infrastructure, and industries linked to the digital green transition. So, supply chain resilience is central.

The European Chips Act is currently under review. As part of that, the European Commission asked us to organize a workshop with PCB fabricators and assemblers, something that hadn't happened before. They told us, "We've heard what you said, and we want to understand the situation, concerns, and interests of the PCB and EMS industries." Just before Christmas, we gathered companies across Europe for a workshop with the Commission.

In January, we met with the political cabinet and emphasized the need for the Chips Act Plus, so there are multiple things happening simultaneously.

# HORUS



## AI 4 AOI. Enhanced by Elements.

Together with Elements, Horus is more than AOI and SPI. It's an AI-native platform built to adapt to every SMT and THT\* stage, now capable to see more: from underfill and encapsulation glues to UV-reactive substances and fine-pitch elements. Precision and performance, engineered to fit your production line.

\*coming soon

## Meet Elements

### Conveyor

**DUO** Dual-lane conveyor + fast loading and unloading

**ITU** Inspects both sides of PCBs by rotating the boards on the X-axis



Read the  
brochure



Swiss Precision Thinking.  
Powered by AI.  
Perfected by Design.

Visit us at  
**APEX EXPO 2026**  
booth 2127

[delvi.tech](https://delvi.tech)

### *What efforts are you making around defense electronics in Europe?*

In our study from last year, we determined that to achieve greater autonomy in defense, you need electronics, and we now have several initiatives and positions ongoing within the European Union. As Europe looks to build up its defense industry, we need to ensure we have an electronics industry capable of supporting and facilitating it.

### *What else is happening now?*

There are multiple discussions and revisions regarding public procurement reviews, including defense, as well as other strategic industries. Remember our call to action, where we said we need to ensure a minimum autonomy threshold for critical electronic supply and manufacturing in Europe? A demand signal is needed to achieve this minimum autonomy. Therefore, public procurement and public funding can, of course, be very helpful tools for stimulating demand. Also, in this context, there should be a revision of the public procurement directives so we can have the ability to procure European content in strategic sectors and industries.

That's a sweeping overview, but ultimately, we're consistently rolling out our call to action regarding supply and demand instruments.

### *What was the focus of the workshop with the European Commission?*

It was the official consultation of the European Commission on the review of the European Chips Act. We were part of it through a workshop specif-

ically for PCB and EMS supplier companies in the context of that review. It was meant to present the views in the same way that the European Commission consulted the semiconductor industry.

Through us, they heard the perspectives and feedback of the PCB and EMS industries on what they would need in the Chips Act going forward.

### *You also mentioned the demand signal. How is that signal being expressed and heard?*

We are at the very early stages of something that you find very normal in the U.S., where you have provisions like "Made in the USA." There's also "Make in India" or "Made in China." There is nothing like that in the European Union. It doesn't exist. We are completely open to the free-trading world. This is the start of a quite fiery discussion on some kind of "Made in Europe" minimum content, broadly speaking. It's beginning to gather momentum, but it is also meeting some opposition. We want electronics to be a key part of that for strategic industries as this evolves. This would be a fundamental change in the European Union, introducing local content provisions.

### *So, you have technical capabilities, supply chain, manufacturing infrastructure, and culture to change all at the same time.*

It's a geopolitical shift, which means that thinking has to change. Because this is a global industry, we want to ensure, when we talk about minimum content thresholds, that we're referring to critical areas and sectors. We argue that the European Union must remain deeply connected to the global supply chain.

Many things are happening at the same time, and it's all in progress. We have to steer the conversations and framework so that electronics stay in the spotlight, and we create a resilient supply chain.

### *From where you sit, is the current momentum sufficient?*

There's always a frustration in the European Union because the decision-making process is tied to 27 member states, each with its own opinion. We don't have the ability to issue executive orders in Europe, ensuring something happens very quickly. Instead, it is built into the structure of the European Union that decisions are made in consensus with





# BLACKFOX

Premier Training & Certification

# Experience the Blackfox Difference!

## Premier IPC Training & Certification

- High quality training and customer service
- Offering 6 certification programs in 6 locations and online
  - *Colorado, Arizona, Guadalajara & Queretaro, Mexico, Malaysia and Singapore*
- Custom courses to fill knowledge & skill gaps
- IPC/WHMA-A-620 Space Addendum for trainers and specialists
- Online store supporting the training industry



[CLICK FOR COURSE SCHEDULE](#)

For more information contact us at  
888.837.9959 or [sharonm@blackfox.com](mailto:sharonm@blackfox.com)

[www.blackfox.com](http://www.blackfox.com)



27 countries and multiple political parties, and that takes time. The process does not easily lend itself to adapting at the same speed at which the world is changing.

*Is there room for more focused momentum to accomplish this?*

Absolutely. But how to do that? There was definitely recognition that the European Union's industrial base has been eroding across the board over time. Not just with electronics, the industrial manufacturing base has been eroding. Energy prices are high, and other regions are subsidizing and supporting their industries in a way that the European Union doesn't. Shifting alliances are taking place, the world is changing very quickly, and if you don't have the structure to rapidly adapt, that becomes difficult.

We constantly highlight the need for speed and action. We reiterate the need to act, but there is no easy mechanism because you still have a 27-member state structure. Everyone has to point in the same direction and then agree to move in that direction.

*Do you see consensus developing? Is this work bringing a more unified perspective on how to move forward?*

We definitely see it at the European Union and Commission levels: a much greater understanding of the electronics ecosystem because of the work we have been doing over the past few years.

The work is never done. At the Brussels and European Commission levels, we've done a lot, and I definitely saw it reflected in their understanding, but we're not finished because there are so many parties in so many countries.

*What do you hope to accomplish this year?*

We are focused on getting the right measures in place under the European Chips Act. If that is not the right instrument, then we need another one that will support the electronics value chain. We want procurement rules that lend themselves to supporting critical industries and capacities in electronics manufacturing for areas like defense. We need recognition and support for local industries. That will be our focus this year, but it goes beyond a calen-

dar year when you look at any legislative process in the European Union.

*Of course. Anything that requires us to build this much infrastructure and coordinate this much capital investment is certainly not a 12-month process. We're talking years of work.*

We are, but this is a critical time, and certainly this year as they look at what is needed for defense, and the Chips Act. This is when many of the areas we've been talking about come together, and we are keeping up the pressure to keep electronics and the ecosystem in the spotlight, so that as they roll out measures and programs, they're considering the strategic nature of electronics.

*How hopeful are you that this will all work out?*

We will keep going until they do. What we have less control over is the very differing views of the 27 member states. (Ultimately, it has to be a consensus among all of these parties).

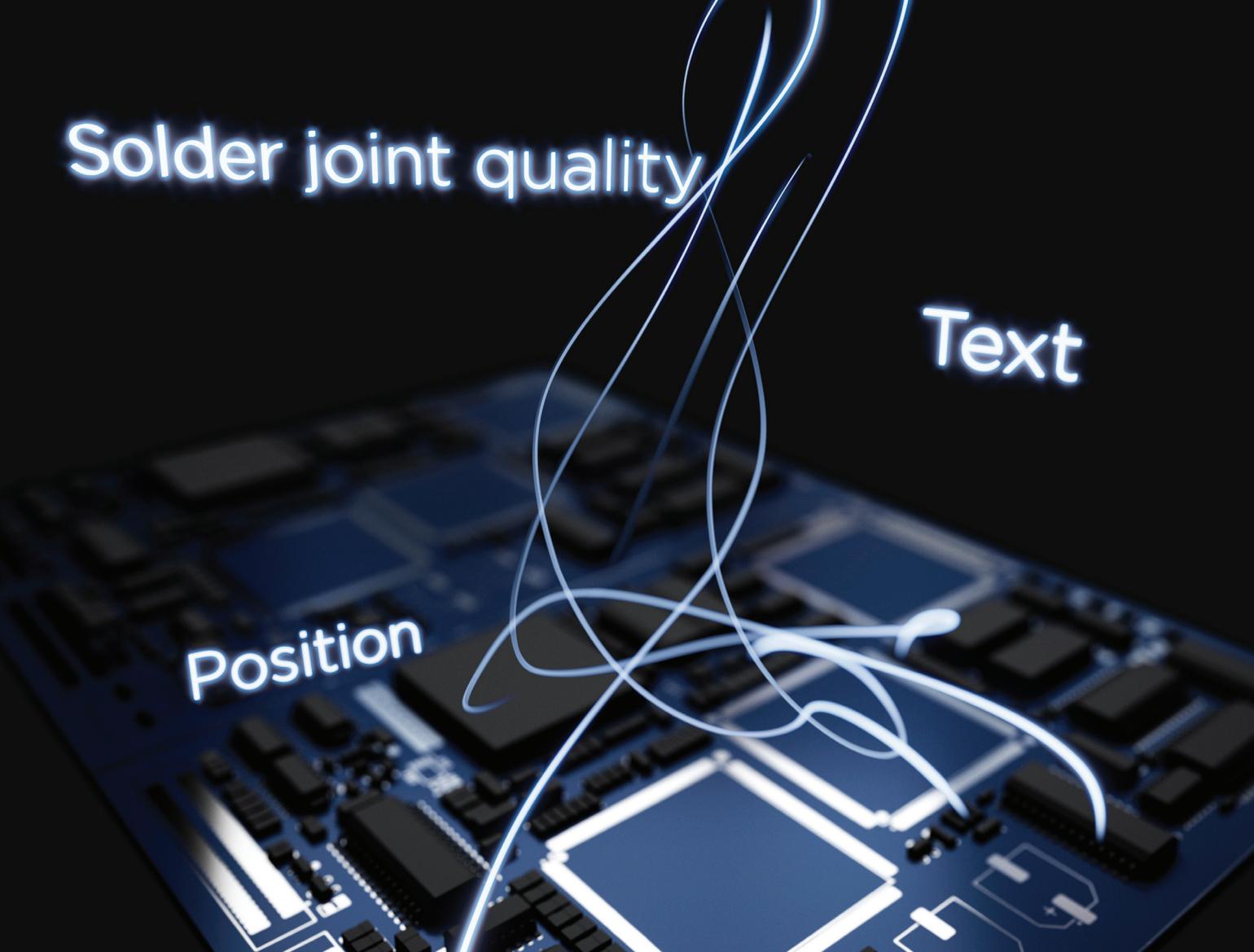
*Analysts report that much of the capital investment in PCB manufacturing is in Eastern Europe. What are your thoughts on PCBs and electronics assembly as a growth opportunity for some of the smaller EU member states?*

This is a European industry. It's not just a couple of big companies concentrated in one or two member states. This is a vitally important ecosystem spread across the European Union. We've explained to the Commission that this is a network, with many SMEs and a number of mid-caps across the European Union.

This is a key moment, and we are making the case for policies that will support a regional electronics industrial base for critical industries, as well as the needed supply chains globally, because we also need that for our critical industries. We see things are starting to shift. They're now looking at critical industries; they're recognizing that there is more beyond semiconductors. The coming years will be key to building on the foundation we've already laid. I've definitely seen a shift over the past couple of years; there was no question. I can say I never would've imagined the European Commission thinking in terms of electronic systems before this.

*Alison, thank you.*

My pleasure. **SMT007**



Solder joint quality

Text

Position

## Liberate yourself from AOI programming

---

### Introducing GenI™ Generative AOI Programming

Whatever your product mix, full-coverage 3D AOI is just minutes away. With zero model creation. Zero complex AOI engineering. And zero library management. GenI™ Generative AOI Programming is the first of its kind to autonomously create production-ready 3D AOI inspection programs based solely on pick-and-place and initial 3D AOI scan data. Giving you the confidence of inline 3D AOI metrology for every batch, without the programming downtime. Introduce any new product, any new component, and any new layout with total control – and total programming freedom.

**Discover a new era in generative inspection at APEX EXPO 2026,  
booth #2135, March 17-19.**

MYCRONIC

# SMT RENTING

## *Redefining Equipment Investments*

**SMT Renting, based in Copenhagen,** is challenging the traditional machine-ownership model with a flexible, service-based approach. Business Manager Christian Thers discusses how rental options, “stop and swap” flexibility, and a new pay-per-placement model help electronics manufacturers reduce risk and adapt quickly in an unpredictable market.

**Marcy LaRont:** *Christian, please tell us a bit about SMT Renting and your role there.*

**Christian Thers:** We were founded in 2015, and our focus is on providing flexible rental solutions to electronics manufacturers for equipment such as SMT and through-hole technology (THT), as well as material handling for logistics, including component handling and storage. I’ve been with SMT Renting for almost six years.

We handle all the tasks a typical electronics manufacturer would manage when investing in new technology. We source the equipment, have agreements with top suppliers in the industry, and finance it through flexible contracts ranging from 12 to 60 months. We also handle service and warranty for all our equipment.

Through our unique “stop and swap” option, we build flexibility into every contract. This allows customers to adapt to market demands by changing out rented equipment regardless of manufacturer or technology. The primary concept is to make things flexible and as easy as possible for our customers to win new business with lower risk.



*Christian Thers*

*That’s a really interesting business model. Flexibility and adaptability are heavy-hitter descriptors for companies trying to stay competitive today. How did SMT Renting get its start?*

We’re part of the SMT House business group, founded in 2012. The founder was looking at the consumer car market, particularly leasing models. If you want a convertible this year, you lease it. A few years later, maybe you have a family and need something different, so you switch cars.

Today, we see similar service-based models across industries, from cars to IT equipment to copiers. People want everything taken care of, including service and the ability to upgrade. That thinking inspired SMT Renting.

This industry is quite conservative, so adoption took time. But over the past five or six years, market sentiment has changed significantly due to COVID, the war in Ukraine, and ongoing geopolitical uncertainty. Companies are less confident about long-term forecasting. If you invest \$1 million in an SMT line, you want it to stay relevant for seven years. Today, that’s hard to predict. Leaders want flexibility because they don’t know what they’ll be producing a few years from now.

Right now, we see strong THT demand. But in two or three years, AI-driven advances could shift production needs. The ability to adapt quickly is essential to staying competitive.

*Is part of that flexibility the option to purchase leased equipment?*

Yes. Electric vehicles are a good example. We offer three options. First is operational leasing, where the

# FactoryLogix<sup>®</sup>

Flawless Manufacturing Means...

Knowing the Past | Mastering the Present | Predicting the Future

**85%**  
**Reductions** in  
Manual Data Entry

**90%**  
**Less** Work Instruction  
Creation Time

**30%**  
**Reductions** in  
Assembly Re-Work Time

**10%**  
**Improvement** in OEE &  
Average Productivity

**75%**  
**Decrease** in ECO  
& NPI Time

## FactoryLogix<sup>®</sup>

*\*Derived from Aegis  
Customer Case Studies*

### Manufacturing Execution & Operations Solution for Factory-Wide Connectivity

- ▶ Digital Manufacturing Engineering
- ▶ Manufacturing Process Execution
- ▶ RMA/MRO—Returns & Overhaul
- ▶ Lean Materials Management
- ▶ Tactical Planning & Scheduling
- ▶ Quality Management System
- ▶ Regulatory & Customer Compliance
- ▶ Manufacturing Intelligence
- ▶ Active Rules Engine
- ▶ Connectivity (IIoT Edge & Business Systems)
- ▶ Augmented Reality
- ▶ AI Copilot ARIA™
- ▶ Digital Twin Simulation
- ▶ Advanced Planning & Scheduling
- ▶ Sustainability & Energy Management

Visit Aegis Software at Booth 1623

[www.aiscorp.com](http://www.aiscorp.com)

# SMT as a Service

Companies pay one monthly rate for the use of SMT equipment and services



equipment belongs to SMT Renting. At the end of the contract, customers can re-rent it, return it, or purchase it at market value.

Second is financial leasing, similar to bank financing, where the customer owns the equipment at the end. The difference is that banks don't allow returns or upgrades, but even with financial leasing, we still offer "stop and swap."

This year, we're launching a new concept: pay-per-placement. Customers pay a low base fee to have the machine available, then pay based on usage. If a line normally costs €10,000 per month, pay-per-placement might be €3,000 per month plus a fee per component placement. The more you use it, the more you pay.

## *That must require a sophisticated algorithm.*

Yes, we've been working on it for quite some time. It's finalized now and will launch this year. It's a unique offering for the market.

## *What does the future look like for SMT Renting beyond pay-per-placement? Are you expanding geographically?*

Absolutely. We operate in more than 15 global markets and recently received our first U.S. order. This is a capital-intensive model that requires strong partnerships. We work closely with local suppliers and distributors for installation and

service. It took years to build this infrastructure, but we're in a very good place now and seeing strong interest from the U.S.

## *Do you cover the full spectrum of SMT equipment?*

Yes, everything from screen printers and SPI to pick-and-place, AOI, X-ray, THT equipment like selective and wave soldering, and odd-form mounting.

## *Do you work exclusively with specific brands?*

We focus on top suppliers in each category. For example, in Europe, we work closely with Panasonic for pick-and-place. Many machines do similar jobs, so we streamline our offerings to ensure quality and consistency.

## *What do you enjoy most about your job?*

A lot of things. It's a very international business, and every country is different. We also have a truly unique concept for this industry, which is exciting. We're getting attention from major customers and recently won a nearly €4 million project with one of the world's largest EMS companies. Seeing customers like that choose us is really rewarding.

## *Congratulations. SMT Renting's model feels timely and well-suited to today's global market.*

Thank you, Marcy. **SMT007**



# inTFlex

## INNOVATIVE PRECISION FOR YOUR INNOVATIVE PROJECTS

*Industry-leading flex design services, premier in-house manufacturing of flexible circuits and EMS services!*



**Global Experts in Flex Design**



**High Reliability & Advanced Manufacturing**



**State-of-the-Art Facilities**



**Comprehensive Services**



We provide precision engineering, quality production, and cost-effective solutions that will bring your products to market faster!

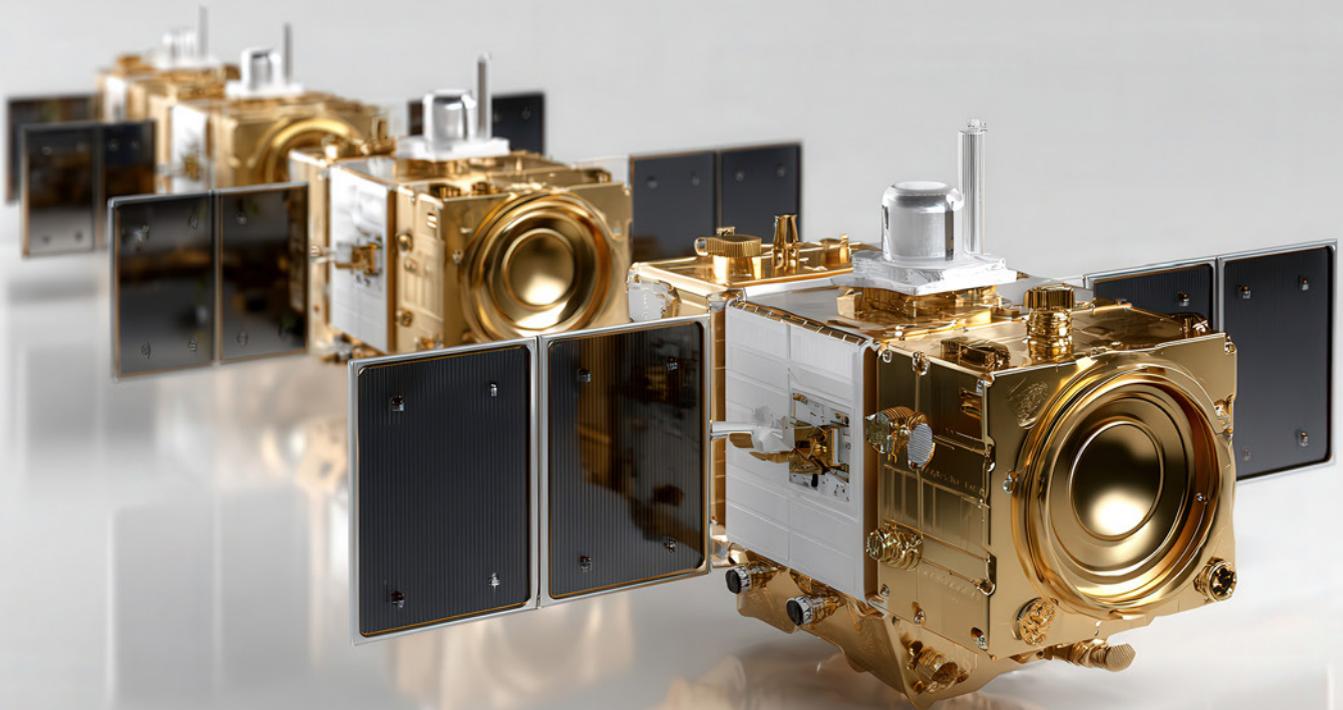
**CONTACT US FOR A FREE FLEX DESIGN REVIEW**

[sales@flexiblecircuit.com](mailto:sales@flexiblecircuit.com)

763.545.3333

[www.flexiblecircuit.com](http://www.flexiblecircuit.com)

# How Packaging Choices *Make or Break* Performance



BY BRIAN BUYEA, REMTEC INC.

**W**hen we talk about reliability in electronics, we often focus on the system level: redundancy, fail-safes, or software resilience. But long before the system is assembled or even tested, reliability is considered in materials, metallization, and the packaging process itself. If the foundation isn't built to survive the environment, no amount of clever design downstream will make up for it.

In high-performance sectors, from defense and aerospace to automotive and industrial power electronics, the packaging of a device is the unsung hero that determines whether a product lasts just 10 months or a long 10 years.

### **The Hidden Architecture of Reliability**

Every engineer knows that packaging is more than a mechanical enclosure. It's a multi-material system designed to handle electrical, thermal, and



# HOW DO CLEANING TECHNOLOGY BREAKTHROUGHS ADVANCE?



# INNOVATION

DRIVING ENVIRONMENTALLY RESPONSIBLE CLEANING INNOVATION WORLDWIDE

At KYZEN, your most complex cleaning challenge is the opportunity to do what we do best — perfect the science of clean. Innovation and expertise deliver results that improve your process and keep you ahead. Our renowned collaborative culture celebrates curiosity, rewards persistence and thrives on solving your problems together, when others cannot.



YOUR CLEANING BREAKTHROUGH STARTS HERE.  
SEE US AT BOOTH 4005 AT APEX

mechanical stress simultaneously. Ceramic packages, in particular, sit at the intersection of these demands. Their role is not just to house components, but to protect them against the very forces that can destroy them.

We've seen how subtle differences in material selection and metallization can make the difference between a reliable long-life device and one that fails under thermal or mechanical fatigue. It's easy to underestimate how much the packaging architecture contributes to performance stability. But reliability is designed in—or designed out—long before the first power-up.

### The Substrate Sets the Stage

The journey toward reliability begins with the substrate. In harsh-environment applications, traditional organic laminates simply can't deliver the stability, conductivity, or heat dissipation needed. That's where ceramics like alumina ( $\text{Al}_2\text{O}_3$ ), aluminum nitride (AlN), and beryllium oxide (BeO) step in.

Each offers a different balance of thermal conductivity, mechanical strength, and cost:

- **Alumina:** Remains the workhorse as it's affordable, robust, and stable under most conditions
- **Aluminum nitride:** Offers roughly five to six times the thermal conductivity, making it ideal for high-power or high-density designs
- **Beryllium oxide:** While less commonly used today due to safety concerns, remains unmatched in thermal performance where ultimate heat transfer is needed

The right substrate is selected based on mechanical compatibility. A mismatch in the coefficients of thermal expansion (CTE) between the substrate and the active device can lead to delamination, cracking, or solder-joint fatigue over time. Ceramic substrates allow for much closer CTE matching to silicon and wide-bandgap materials such as SiC and GaN, dramatically improving mechanical reliability under thermal cycling. In other words, choose the wrong base, and every other reliability effort will fight an uphill battle.

### Metallization: The Bridge Between Materials and Performance

If the substrate is the foundation, metallization is the bridge that makes it functional. Metallization bonds must be strong enough to withstand thousands of thermal cycles, chemically stable enough to resist corrosion, and conductive enough to carry high currents without degradation.

Direct bond copper (DBC) and direct plated copper (DPC) technologies are two metallization methods that fundamentally influence reliability.

- **DBC:** Uses a high-temperature oxidation process to bond copper directly to ceramic. The result is an extremely robust bond layer, ideal for power electronics, RF modules, and other applications that demand exceptional thermal and electrical conductivity.
- **DPC:** By contrast, it builds copper layers through an additive process, allowing for thinner lines, finer geometries, and multi-layer designs, all without compromising adhesion or integrity.

Both methods offer outstanding thermal performance and mechanical stability, but the choice often depends on the application's power density, layout requirements, and long-term reliability needs. What matters most is that the metallization process is executed with precision. Any inconsistency—voids, contamination, or poor adhesion—can become the seed of early failure.

### Process Integrity: Where Reliability Is Won or Lost

Even with the best materials and designs, process control ultimately determines real-world reliability. Metallization adhesion, plating thickness, firing profiles, and even surface cleanliness can affect how well the package performs under stress.

For instance, consider the demands of thermal cycling in a military or automotive power module: hundreds or thousands of heat-up and cool-down cycles, each expanding and contracting the materials at different rates. If the copper-ceramic interface isn't perfectly bonded, micro-cracks form, electrical paths degrade, and thermal resistance rises, eventually leading to catastrophic failure.

It's important to treat reliability not as a test result, but as a process discipline. Every stage, from raw ceramic handling through metallization, firing, and inspection, must be tightly controlled and verified. Reliability is built into the line itself.

### Design for the Environment, Not the Lab

Too often, packaging design is optimized for performance in perfect lab conditions, at a static temperature, in clean air. But what about in the real world? It's filled with vibration, humidity, corrosion, and unpredictable thermal spikes. The only way to design for reliability is to design for the environment in which the product will actually live.

That means understanding the thermal gradients, mechanical loads, and environmental contaminants that will act on the package. Will it be mounted to an engine block? Exposed to salt spray? Cycling between  $-55^{\circ}\text{C}$  and  $+150^{\circ}\text{C}$ ? Each of these factors demands specific metallization chemistries, plating stacks, and protective coatings.

**If there's one principle every engineer should remember, it's that reliability cannot be tested into a product. It must be designed into it."**

Reliability by design means thinking beyond the datasheet and engineering for the worst-case scenario. It's when the customer depends on you most.

### The Reliability Challenge of Integration and Miniaturization

As power densities rise and footprints shrink, reliability challenges multiply. Smaller geometries mean thinner copper, tighter vias, and higher localized stresses. What used to be a safe thermal margin is now razor-thin.

The inherent rigidity, chemical stability, and thermal conductivity of ceramics allow engineers to push power density without sacrificing lifespan. Combined with advanced metallization like DPC,

designers can achieve both precision and durability in compact, high-power modules.

But miniaturization only works when reliability principles scale with it. Fine-line features still require robust adhesion. Reduced standoff heights demand better thermal paths. Every micron saved in layout must be compensated with process integrity and material robustness.

### Reliability Is the Real Value Proposition

In today's race for efficiency, cost, and speed, it's tempting to cut corners on packaging. After all, it's not the visible part of the system. But reliability is the true measure of value. The upfront investment in advanced ceramics, high-integrity metallization, and disciplined process control pays off exponentially over the product's lifetime.

Whether it's a satellite power converter, a down-hole sensor, or an EV inverter, reliability is the foundation, which starts with packaging choices that respect the physics of materials and the realities of the environment.

### Common Sense for Design Engineers

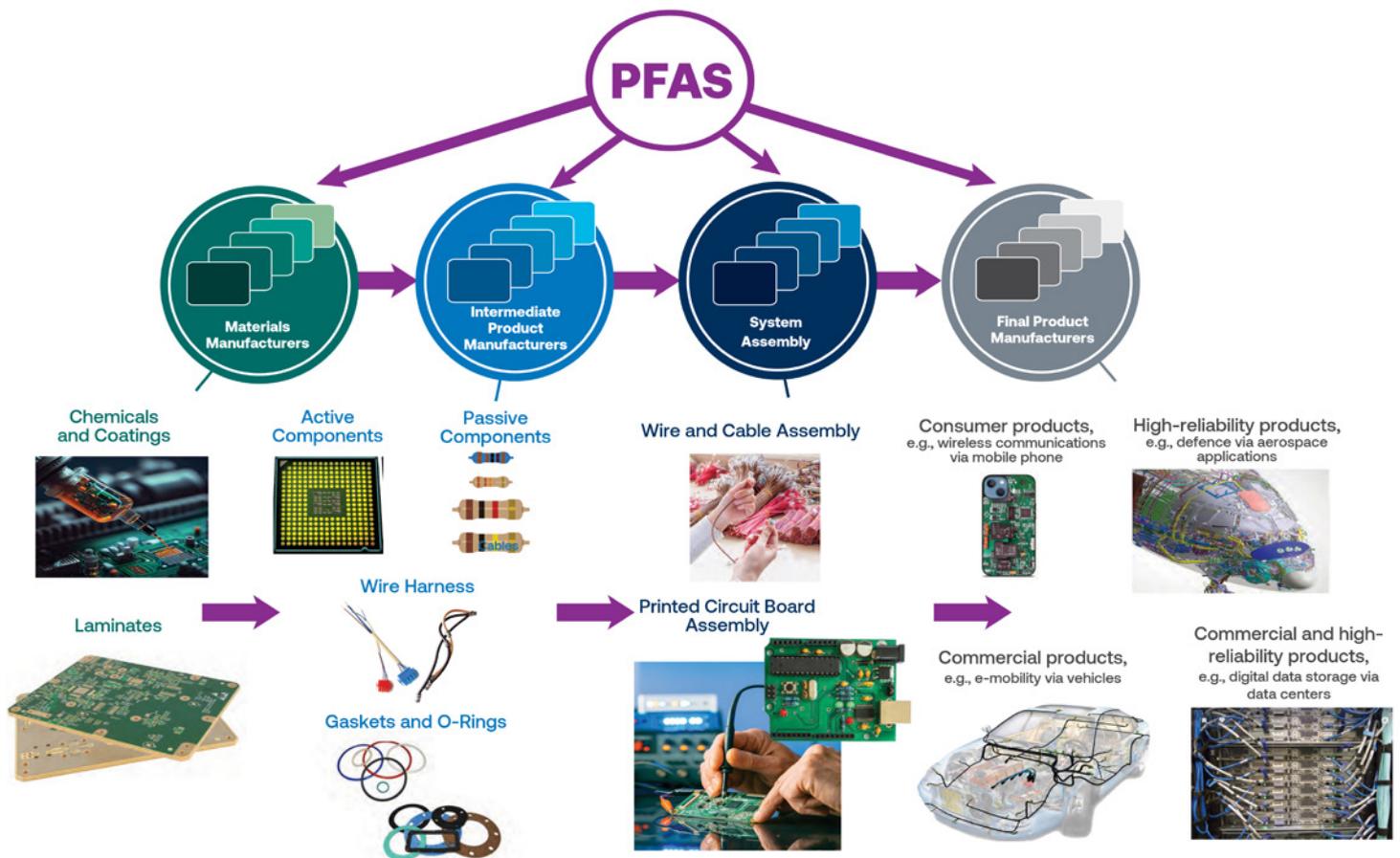
If there's one principle every engineer should remember, it's that reliability cannot be tested into a product. It must be designed into it. That means:

- Choose materials for the mission, not just the budget
- Engineer every interface, from copper to ceramic to assembly, as a reliability-critical junction
- Treat process control as sacred, not optional
- Design for the field, not the bench

When reliability is embedded at the material and process level, performance stops being a hope and becomes a certainty. That's the power of packaging done right. That's reliability by design. **SMT007**



**Brian Buyea** is president of Remtec Inc. To read past columns, [click here](#).



# A Balanced Approach Needed to Regulate PFAS in Electronics

The very broad per- and polyfluoroalkyl substances (PFAS) group has widespread use in both consumer and highly specialized applications, including, perhaps surprisingly, green technologies. Among these, the fluoropolymers subgroup plays a complex and critical role in electronics. To date, there are hardly any technically comparable alternatives.

The electronics industry is facing a major regulatory and business challenge as inconsistent policies on potential PFAS restrictions in electronics are emerging across regions worldwide, and in different states in the U.S. Some states and regions exclude specific types of fluoropolymers from broad bans (for instance, policies in New Mexico or Canada), while others don't. The Draft Background Document developed by the European Chemicals Agency (ECHA) proposes time-

limited derogations for specific PFAS applications, but these are insufficient when no technically comparable alternative exists today.

Given other ongoing and upcoming chemical bans for critical uses in electronics and the global nature of manufacturing and operations in our industry, broad PFAS bans that do not account for their function-critical properties risk creating significant technical and socio-economic challenges for our industry. It also creates a disruptive impact on businesses, which we aim to avoid. This is why PFAS advocacy work is crucial and a priority for the Association.

ECHA will release its final Committee for Risk Assessment (RAC) opinion and Committee for Socio-economic Analysis (SEAC) draft opinion at

# WHEN PCBs WON'T DO, BE CERTAIN WITH CERAMIC.



**Working on a design that exceeds the capabilities of ordinary PCB? Remtec's metallized ceramic substrates, components, and packages may be the solution.** Offering superior thermal conductivity, isolation, and dielectric strength – as well as exceptional mechanical stability, environmental robustness, and plenty of versatility and integration opportunities – Remtec ceramic techniques like Direct Bond Copper (DBC), Active Metal Braze (AMB), and Plated Ceramic Thick Film (PCTF) are a powerful option for today's high-power, high-density, microelectronic applications. All from a U.S.-based, ITAR-compliant, and OSAT-ready resource with decades of experience.

**PCBs not cutting it? Consider the many advantages of ceramic from Remtec.**

Visit [remtec.com](http://remtec.com), call **781-762-9191**, or email [sales@remtec.com](mailto:sales@remtec.com) to initiate a quote.



Visit [Remtec.com](http://Remtec.com)





### ***The use of fluoropolymers in electronics***

*Fluoropolymers*, in particular, are a class of advanced materials characterized by their unique properties, including chemical resistance, thermal stability, dielectric insulation, and non-stick characteristics. The main electronics uses include, but aren't limited to, the following fluoropolymers: PTFE, FEP, PVDF, PVDF-HFD, PFPE, FKM, and CTFE-VDF. Unlike in textiles or consumer goods, where PFAS are often applied broadly, their use in electronics is narrow, controlled, and highly engineered.

### ***Fluoropolymers have unique properties***

Their unique properties and applications make them irreplaceable in many high-performance environments, such as aerospace, automotive, and medical technology, due to their unmatched durability, chemical resistance, and stability in extreme environments.

### ***Fluoropolymers have a unique hazard profile***

They are chemically inert, have significantly lower toxicity, reduced bioavailability, and limited environmental stability, distinguishing them from other PFAS types. Their use in electronics is generally highly contained, and their hazard potential is low. Thus, they are safe to use in highly specialized applications when handled responsibly.

### ***Other PFAS types in electronics and the challenge of regulatory restrictions***

More obscure PFAS types can also be present in electronics. These are harder to detect due to, for example, operational challenges and insufficiently developed analytical detection methods. They are harder to regulate. Specific applications, such as data storage products, have unique uses of various polymeric and non-polymeric PFAS with no feasible alternatives, which are required to meet the unique operational requirements inside the sealed product environment.

Some critical, relatively unique PFAS uses do not appear to be included in the derogations under consideration in the current version of the ECHA Draft Background Document. This is an example of the challenging task that restriction developers have with electronics, where many critical uses are not widely known and where rulemaking risks leaving out derogations for more obscure uses, due to the difficulty of gathering all possible uses in electronics.

the end of March, and a consultation window on the SEAC draft opinion will be open for two months. Please consult our blog [here](#), and the information in this article on how to prepare for the consultation.

Our new PFAS position paper, based on Q3–Q4 2025 industry-wide research, identifies where alternatives are available today and where more time is needed to phase out PFAS. It calls for a balanced, risk-based approach, rather than a hazard-based one, to regulating PFAS in electronics in Europe and around the globe. It safeguards planetary health while preserving the reliability and performance that modern electronics demand on the path to an effective digital and green transition.

### **Why Use PFAS in Electronics?**

PFAS use is expensive. If PFAS chemicals are used in electronics, they're there for a good reason. PFAS are durable, chemically inert, and mechanically strong in harsh conditions. This unique combination of properties makes them a critical material across many sectors, with broad benefits for society.

PFAS are not easily replaceable without a loss in essential properties for the intended functions of, for example, airplanes. For the past 30 years, researchers in the electronics industry have tried, and largely failed, to identify alternatives that are technically at least as good as currently used PFAS. Very few alternatives exist, for limited uses, and (if at all), they are technically inferior. Even when alternatives exist, their use cannot be extrapolated to an entire product line.



# PROVISION



## Fast Inspection Program Creation for AOI & AXI

- Significantly faster program creation through automated AI processes
- Reduced setup times & programming costs
- Maximum inspection quality & depth

Come visit us at:

**APEX  
EXPO<sup>®</sup>  
2026**

by Global Electronics Association

**APEX EXPO 2026**

March 17 – 19, 2026

Booth #2836

3D SPI

3D AOI

3D AXI

3D MXI

3D Bond

CCI

vAI

## The Advantages and Challenges of Durability and Persistence

It is the precise properties of PFAS that make them desirable in high-performance applications, where use is highly contained, and less desirable in consumer applications, such as ski wax, dental floss, and waterproof clothing, as PFAS tends to persist in the environment. Likewise, trying to place all PFAS in one bucket is inappropriate (like saying “all metals”), as this class of substances is broad and diverse. Rather than a blanket ban, PFAS restrictions should follow a differential approach.

## The Challenges of Tracking PFAS Across the Electronics Value Chain

Moreover, there are many types of PFAS, with thousands of variants within a very broad group. For many of them, the right analytical detection tools are missing. If suppliers fail to identify PFAS in their value chain, then, in theory, there is no PFAS. While there are tools to detect some types of PFAS, such as the IPC-175x series for materials declaration, others, including AI tools, are just emerging. A global value chain means a company can have several thousand direct suppliers; therefore, it can take up to one year to trace a known substance across the entire value chain. With unknown substances, this can take even longer.

“Rather than a blanket ban, PFAS restrictions should follow a differential approach.”

### Key Recommendations for Regulators:

- Follow a risk-, science-based, rather than hazard-based approach, in restricting PFAS.
- Consider whether technically comparable alternatives exist today. If not, a 12.5-year transition period and even a longer time-limited use is not a proportionate approach. In such cases, time-unlimited derogations for critical uses of PFAS in electronics are needed.

- Handle fluoropolymers differently, through exemptions, as long as no technically equivalent alternatives exist today; follow the Canada and New Mexico models, accounting for the unique profile of fluoropolymers, their contained use, and the realities of global value chains.
- Other PFAS types with function-critical applications and no alternatives must also be considered.

### Key Recommendations for Electronics Companies

Prepare for the upcoming ECHA SEAC consultation, expected at the end of March 2026, and open for two months.

- A draft mapping by sector and several draft questions are already available [here](#).
- Plan for the consultation and potential phase-out, internally and with your suppliers.
- Ensure timely, sufficient multi-stakeholder dialogue with a common vocabulary.
- One major identified challenge is that electronics are spread over multiple sectors, and are not only covered in the electronics and semiconductor sectors. Thus, it is crucial that you conduct a gap analysis and determine in time which sectors you will submit comments to. Let us know as well.
- ECHA is seeking PFAS emission and socio-economic data for the EU/EEA specifically; data with global estimates will not be considered and will only skew the final regulatory outcome. It’s essential for your business that you collect and provide accurate data.
- ECHA will not allow the inclusion of attachments and external links. For most survey answers, there will be a predefined limit of 5,000 characters. Thus, answers must be prepared in advance with a strategic, data-based content and mindset.
- Collect data on PFAS alternatives research and be ready to provide it; exemptions or derogations won’t be granted if such substantial evidence can’t be provided up front.

Reach out to [DianaRadovan@electronics.org](mailto:DianaRadovan@electronics.org) to coordinate with regulators so we can speak with one voice on PFAS restrictions for electronics. The Association will submit industry-consolidated comments to the ECHA SEAC consultation and we are collaborating with companies and other electronics associations worldwide to ensure that key messages are consolidated in Europe and beyond.

### Conclusion

A proportionate, risk-based, regulatory-coherent approach worldwide is needed to address the use of function-critical PFAS in electronics, particularly fluoropolymers and other PFAS for which no technically viable alternatives exist today.

At the same time, electronics companies need to start collecting specific evidence regarding the socio-economic impact of PFAS restrictions in electronics and act as one voice through the Global Electronics Association during the upcoming ECHA SEAC consultation.

**Read our full PFAS position here.**

*A summary of recent PFAS survey results is included at the end of the position.*

**Contact [DianaRadovan@electronics.org](mailto:DianaRadovan@electronics.org) to actively engage in PFAS advocacy work.**

The Association is advocating for global policy and regulatory coherence and for smarter regulations on behalf of the electronics industry.



**Dr. Diana Radovan** is director of sustainability policy for the Global Electronics Association.

---

## A Faster Path to Funded Workforce Training in California

BY VICTORIA HAWKINS, GLOBAL ELECTRONICS ASSOCIATION

**California's workforce demands are evolving rapidly**, and so are the tools available to help employers keep pace. The California Employment Training Panel (ETP) remains one of the state's most effective yet often underutilized funding mechanisms for employee upskilling. It is designed to strengthen California's competitiveness, and ETP reimburses eligible employers for the cost of job-related training that enhances worker productivity, retention, and advancement.

Building on this opportunity, the Global Electronics Association was recently awarded a Multiple Employer Contract (MEC) with ETP, creating a streamlined pathway for California-based electronics manufacturing employers to access training funds with significantly reduced administrative burden. Through our MEC, employers can leverage the Association's industry-recognized training and certification preparatory programs while having a portion or most of their training costs covered or offset by ETP funding. For employers facing tight margins, rapid technologi-

cal change, and ongoing talent shortages, this support can translate into meaningful savings and faster workforce readiness.

To help employers take full advantage of this opportunity, the Association will host an in-person ETP information and onboarding session on Monday, March 16 at APEX EXPO. This session is designed specifically for California electronics manufacturers who want practical, actionable guidance, not just theory. We will demonstrate how the ETP program works, eligibility requirements, real-world training use cases, and, most importantly, begin the onboarding process onsite.

For California employers looking to invest in their workforce while controlling costs, the combination of ETP funding, MEC, and on-site onboarding at APEX EXPO represents a timely and powerful opportunity to turn workforce training into a competitive advantage.

**Victoria Hawkins** is director of workforce grants and funding.

# A New Strategic Partnership in Europe



## Marcy LaRont connects with OMR Italia

General Manager Sara Menclossi and Connexion Technologies CEO Craig Wright to discuss the new strategic partnership between OMR Italia and Connexion Technologies: a merger between advanced PCB manufacturing and engineering-led PCB sourcing that “connects two very complementary strengths.” What does that mean for the two companies, their customers, and the electronics industry in Europe?

*Sara and Craig, congratulations on the exciting partnership. Let’s start with a brief introduction to your company, the services you offer, and the markets (applications) you serve.*

**Craig Wright:** Connexion Technologies is a UK-based advanced manufacturing group focused on high-reliability sectors like aerospace, defence, energy, life sciences, and communications. We cover a wide range of capabilities from advanced

PCB manufacturing and semiconductor packaging through to RF systems, precision engineering, and integrated supply chain support. At our core, we support complex programs where performance, traceability, and long-term reliability really matter.

**Sara Menclossi:** OMR has been part of the European PCB landscape for over 50 years. Today, we’re focused on engineering-led PCB sourcing, technical support, and supply chain management. We work with carefully selected manufacturing partners across Europe and Asia, managing projects end-to-end through our technical team. That includes supplier selection, engineering support, and quality supervision to ensure consistency and reliability.

**Wright:** What makes this partnership work is that it connects two very complementary strengths. OMR brings deep PCB expertise. We bring broader advanced manufacturing capability. Together, that’s a powerful combination.

# Small. Powerful. Efficient.

Reduce selective soldering floor space usage by up to 60% with SELECT Synchro and scale your production floor's potential.

## What will you do with all that floor space?



**Nordson** *Electronics Solutions*



*How did this arrangement come about?*

**Wright:** We've been looking for the right way to expand our presence in mainland Europe for some time, but it had to be done in a way that builds capability and long-term trust, not just footprint. OMR stood out for its reputation, customer relationships, and technical credibility across Europe. It's a partnership built on shared values: engineering quality, long-term thinking, and customer focus.



Craig Wright

**Menclossi:** For OMR, this came at the right moment in our evolution. Our focus has shifted more toward engineering support, sourcing, and managing complex supply chains. Partnering with Connexion Technologies gives us the strength and infrastructure of a larger group, while allowing us to stay focused on what we do best.

*From your view, what is the synergy, the "special sauce," for why this should be a successful alliance?*

**Wright:** At a strategic level, this is about creating something more connected across Europe. OMR has a strong footprint with major European OEMs. We bring sovereign UK manufacturing capability and a wider set of advanced engineering services. Together, that creates a more complete offer.

**Menclossi:** From our perspective, it means we can continue supporting customers locally, but with more strength behind us. Customers still work with the same teams. The difference is that now there's a broader network of capability supporting them.

*Why is something like this so important for Europe right now?*

**Wright:** The industry has changed quite quickly over the past few years. There's a much stronger focus now on stability, trust, and long-term partnerships.

**Menclossi:** Yes, and customers are also looking for partners that are close to them geographically and technically. This partnership strengthens that European layer without changing how global supply works.



Sara Menclossi

**Wright:** Europe has a very strong position in high-reliability and high-complexity sectors. That's where the real value is.

**Menclossi:** There's a long history of engineering excellence here.

*What does it mean for your customers?*

**Wright:** For customers, it's about confidence. The past few years have shown just how important strong regional supply chains are. This partnership strengthens access to capability across Europe while maintaining strong UK manufacturing.

**Menclossi:** It gives customers more reassurance. This partnership gives customers more confidence in stability, continuity, and technical support.

**Wright:** Exactly. It's important to be clear about something: Resilience isn't about replacing global supply chains; it's about strengthening the European layer within them.

*Is there anything else you would like to make sure people know about this exciting partnership?*

**Wright:** What we're building is long-term. The future of manufacturing in Europe will be more collaborative, more connected, and more specialised. We see this as a key step toward closer support for major European OEMs, especially in high-reliability and regulated sectors.

**Menclossi:** For OMR, this is a new chapter. We remain the same partner our customers know, but with greater capability and support behind us. Success for us is being seen as a trusted long-term partner across Europe's high-reliability sectors.

**Wright:** This partnership is about strengthening Europe's capability in high-reliability electronics by bringing together two organisations with deep engineering heritage and complementary strengths. **SMT007**

REDUCE SOLDER  
USAGE UP TO  
**85%**



**“Using MS2 Molten Solder Surfactant for Solder Dross Recovery has been extremely efficient and profitable for the company. We are getting 80% +/- recovery.”**

**David Ramirez**  
SME Engineer in Guadalajara, Mexico

**CALCULATE YOUR SAVINGS**



+1 (800) 757-6533 | [sales@pkaymetal.com](mailto:sales@pkaymetal.com)

**PK**  
M·E·T·A·L

[www.pkaymetal.com](http://www.pkaymetal.com)

## **Ukraine Expands Partnership With ICEYE ▶**

This agreement ensures that the Ministry of Defence continues to receive a high volume of high-resolution satellite imagery through ICEYE's world-leading SAR constellation, supporting the Ukrainian Armed Forces with persistent situational awareness on tactical timelines.

## **NASA's SunRISE SmallSats Ace Tests, Moving Closer to Launch ▶**

When the six tiny spacecraft of NASA's SunRISE (Sun Radio Interferometer Space Experiment) mission settle into their orbits high above Earth after launching later this year, they'll function as one giant radio dish to track the rumbles of radio bursts coming from deep within the Sun's corona.

## **Is Washington Ready to Get Serious About PCBs? ▶**

Years of advocacy, the shock of COVID-era supply chain disruptions, and the long road to the CHIPS Act have helped to reshape the federal mindset on industrial policy. How have those years of effort made a difference for electronics manufacturing?

## **New Studies for Manufacturing Advanced Materials in Orbit ▶**

The UK Space Agency has awarded contracts to three UK companies to investigate producing these advanced materials in Low Earth Orbit, where the conditions, including microgravity, natural vacuum, and extreme temperatures, can create products that are difficult, expensive, or impossible to manufacture on Earth.

## **Defense Speak Interpreted: The New Railgun Is Big News, But Can It Work? ▶**

President Trump announced two new battleships, each equipped with a railgun. This is not just any railgun; it's a 32-megajoule, with the same electrical power requirements as I recently reported. The battleships will also be equipped with laser weapons—again, the ones I discussed in my November column.

## **US Navy, Marines Select L3Harris T7 Robots to Enhance Ordnance Disposal Capabilities ▶**

L3Harris T7 robots help keep troops out of harm's way by neutralizing explosive threats from a safe distance. The company designed the robotic systems for high-risk missions, providing mobility, manipulation, and intuitive control.

## **Salient Motion Announces Collaborations to Transform Aircraft Systems Manufacturing ▶**

Salient Motion has developed motion control systems for commercial aircraft that can achieve certification in months rather than years, marking a significant departure from traditional aerospace development timelines.

## **Teledyne Demonstrates Autonomous System for Anti-Submarine Warfare to NATO Members in the North Atlantic ▶**

The Teledyne team was able to deploy the autonomous underwater gliders into the North Atlantic in the Greenland-Iceland gap from a Coast Guard Ship. The Sentinel Glider towed a passive acoustic thin-line hydrophone array specifically designed to identify surface and subsurface vehicle noise in the water.

## **MDA Space, Hanwha Sign MOU to Pursue Korean Military Constellation Program ▶**

Through this MOU, MDA Space and Hanwha will explore opportunities to collaborate on the development of Korea's sovereign Low Earth Orbit (K-LEO) defence constellation, leveraging MDA's AURORA™ software-defined digital satellites.

## **PCBAA Sets Its Priorities for 2026: Support in the House and Senate ▶**

David Schild, executive director of PCBAA, talks about the ways his organization is aligning its priorities with Washington, in particular, the Executive Branch.



# Engineering-Led EMS From Silicon Valley Innovation to Vietnam Scale

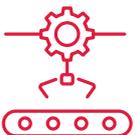


**Accelerate NPI. Reduce risk.  
Optimize cost through controlled global scale.**

U.S.-based engineering leadership combined with scalable Vietnam production creates one seamless execution strategy – from prototype through volume.



**Design**  
with oversight



**Build**  
with discipline



**Scale**  
with confidence

## Explore Scalable Production with Omega

408-341-9739

[info@omega-ems.com](mailto:info@omega-ems.com)

[omega-ems.com/contact](https://omega-ems.com/contact)

Silicon Valley HQ | Vietnam Production Facility  
Dedicated Program Managers  
ISO 9001 | ISO 13485 | AS9100 | ITAR  
80+ Years Combined EMS Leadership

# EIPC Winter Conference 2026

*Innovation, Energy, and Sustainability*



Panel comprising Andre Bodegom of Adeon, Chris Haley of Amphenol-Invotec, Vincent Dronnet of Elvia Electronics, Joachim Verhegge of Group ACB, Thomas Michels of ILFA, and Hugo Tang of Ventec.



► Pete Starkey

*Editor's note: This article contains EMS-related excerpts from Pete Starkey's three-part series covering the conference published in the I-Connect007 Daily Newsletter. To read the entire proceedings, [start here](#).*

**Aix-en-Provence** (pronounced “**ex-ahn-pro-vonse**”), a historic city and commune in the south of France, about 20 miles north of Marseille, was the pleasant venue for EIPC's Winter Conference in early February. Industry delegates from 11 European countries, as well as from the U.S. and China, gathered at the Renaissance Hotel for a two-day programme, “Driving the Future: Innova-

tion, Energy, and Sustainability in PCB Technology.” An added attraction was a privileged visit to the ITER fusion power project at the Cadarache research and development centre.

Newly elected EIPC President Rico Schlüter, recognised in recent years for his outstanding contribution to the establishment of Unimicron's new PCB manufacturing plants in Germany and Teltonika's in Lithuania, welcomed delegates to the event. He also gave a keynote address.

The audience warmly applauded his acknowledgement of the longstanding dedication, commit-



THERMAL SYSTEMS

# CREATE YOUR Connections



## Rehm at APEX EXPO – Let's Connect!

Rehm Thermal Systems is an expert in connection technologies for electronics manufacturing. With innovative system solutions for soldering, drying, and coating, we empower our customers to create their own reliable connections on electronic assemblies – customized, process-secure, and future-oriented.

**Create your Connections** – with Rehm, you shape the connection technology of tomorrow.

We look forward to connect with you in Anaheim!

## APEX EXPO

March 17 – 19, 2026  
Anaheim, USA  
Booth 942

**We look forward  
to seeing you!**

[www.rehm-group.com](http://www.rehm-group.com)

ment, and achievements of his predecessor Alun Morgan.

Schlüter's keynote focused on the ongoing campaign to raise awareness among EU politicians to recognise, evaluate, and support the complete electronics supply chain in Europe, especially the PCB and EMS industries and their suppliers, as well as the domestic semiconductor industry. He highlighted the challenges in the raw material supply chain facing the European PCB industry in 2026.

Schlüter hopes that when the 2026 EU Chip Act 2.0 review is published, the complete ecosystem, including PCB and EMS, might be acknowledged and some incentives and actions be offered to support our industry. He recommended that manufacturers make longer-term agreements with raw material suppliers to secure their supply chain on a realistic basis.

## Business Outlook

The session on business outlook and new opportunities was moderated by EIPC technical director Tarja Rapala-Virtanen, who introduced the time-honoured and much anticipated Custer Consulting Group Business Outlook in Europe, presented in video by Jonathan Custer.

Custer said the global AI boom is reshaping the semiconductor landscape, driving unprecedented growth and investment, but also straining supplies of advanced materials and exposing critical supply chain bottlenecks that might limit expansion in 2026. Material shortages and capacity shifts are key constraints, making supply chains, not demand, the defining risk for 2026. Additionally, trade wars and tariff walls are causing geopolitical fractures.

In 2025, Custer reported that the global economy experienced moderate growth, estimated at 3–3.5% in GDP, and reflecting uneven performance across regions, with the United States around



2–2.5%, China around 4–4.5%, Europe between 1–2%, and strong performance in Southeast Asia, India, and Latin America. Against this background of resilient yet uneven growth, technology, renewable energy, and emerging markets were seen as key growth engines, with high costs, geopolitical uncertainty, and inflation shaping risks and opportunities worldwide.

Europe's industrial recession continues. Germany's manufacturing sector has been in continuing decline since mid-2022, and corporate bankruptcies are at a 10-year high. UK electronics sales are down, and France is showing slight signs of recovery after three years of decline. Custer observed that while general manufacturing continues to contract in Western Europe, the trend is toward the industrialisation of Eastern Europe, yet R&D and the manufacture of complex systems remain in Western Europe. Predictably, the defence sector, with turnover up by 13.8% and employment up by 8.6%, is performing well. "Europe's electronics industry is shrinking in volume but growing in strategic importance," he said.

Custer believes the European PCB industry is set for steady growth, supported by innovation and localised production, but that companies must navigate regulatory and geopolitical uncertainties to remain competitive. Supply chain vulnerability is a serious consideration, particularly since the European industry now has a 100% dependency on non-European materials, and prices are subject to severe inflation.

He referred to the new Teltonika PCB plant in Lithuania as an example of how a strategy of vertical integration could reverse the trend. The concept of building a complete vertically integrated ecosystem under one roof has reduced Asian supply chain reliance and increased security.

Custer considers AI the organising principle for 2026, with global semiconductor revenue nearing \$1 trillion and logic and memory prices



# Protection That Performs

THE PRINTED  
**CIRCUIT DESIGNER'S GUIDE TO...**<sup>TM</sup>

## UV Curable Conformal Coatings

*Addressing Future Manufacturing Speed and Need*



Brian J. Chislea  
Cody Schoener, PhD  
Dow, Inc.

I-007  
BOOKS



Look Inside

*"This book contributes useful clarity to an area of growing importance in high-reliability electronics manufacturing."*

—Stanton Rak, PhD, SF Rak Company

I-007eBOOKS

rising by more than 30%. He expects a massive demand for infrastructure, particularly for HDI PCBs used in AI servers. AI's impact on materials will be upstream volatility, with an oversupply of low-end products and a corresponding shortage of high-end products.

Innovation is shifting from the chip to the package and the board, and the technology frontiers he anticipates between 2026 and 2030 include 800G optical interconnects becoming mainstream, further developments in advanced packaging and chiplet functionalities, glass substrates in mass production, and 6G telecommunications based on non-terrestrial networking technologies.

Custer noted his four strategic imperatives for 2026 are to reduce single-source Asian dependency by diversifying supply, to counteract high labour costs by aggressive automation, to defend margins by passing on component price increases immediately, and to lobby the European Commission to level the playing field by addressing the inverted tariff structure on raw materials.

Dieter Weiss has been acknowledged for many years as a leading expert market researcher. He has been compiling accurate market statistics for the European EMS and PCB industries through his brands in4ma and Data4PCB. He shared his latest observations in "European Insights Into PCB and EMS Market Data."

Weiss focused on the EMS industry statistics, with an introduction to in4ma and its processes for collecting, collating, and reporting its market research activities.

In4ma has identified and analysed 2,303 EMS companies in Europe in 2025, with total revenues of 54.19 billion euros. Weiss said that 72% of these EMS companies have revenues of less than 10 million euros and together account for only 7.5% of the market.

Revenues collapsed in 2024 with more than 6,800 job losses, representing 3% of the workforce. Most



were in Central Eastern Europe, mainly in Poland and Romania.

Weiss concluded that continuing business as usual is not the option anymore, and while other global areas are strongly growing, the European PCB and EMS industry is losing ground. Cautious, uncertain market behaviour reduces workload and creates cascading effects, leading to unstable profitability. Additionally, Europe needs a stable supply chain.

He reminded delegates that the PCB & EMS Forum 2026 is scheduled for July 8–9 in Würzburg, and this is an opportunity to analyse the situation with colleagues from the industry and to discuss the development of strategies and what to watch out for.

## Technical Sessions

The theme of the first technical session was "Miniaturisation and fine-line PCB production: From design to manufacturing." The session was moderated by EIPC Vice President Thomas Michels, CEO of ILFA in Germany. The theme of the conference is "Driving the Future: Innovation, Energy, and Sustainability in PCB Technology."

The opening presentation came from applications engineering specialist Dr. Roland Steim of Dyconex in Switzerland, who described how the company has addressed the challenges of miniaturisation and fine-line PCB production.

The general trend for more functionality and smaller size, and the need for efficient signal transmission in high-frequency and high-speed communication, has led to requirements for

increasing layer count and/or increasing density of lines, spaces, vias and pads, together with more precise trace edges and smooth surfaces. Steim said successful miniaturisation is not only about lines and spaces but includes consideration of thinner flex and rigid materials, improved bend-zone technologies for flex materials, fine-line production technologies and better registration, as



Zero Stress. Infinite Flexibility.

# LASER DEPANELING REDEFINED

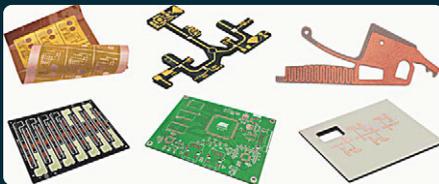
Micron-precise, clean, and stress-free PCB separation with today's advanced laser systems delivering unmatched performance at the lowest total cost in years. No compromises on quality or your bottom line.

- Non-contact cutting: Eliminates stress
- Clean, burr-free edges
- Higher yields & material savings: Tighter panel layouts reduce waste up to 30%



## MACHINE FEATURES

Stand-alone or in-line • Upgradable lasers • Dual-head for volume



Various PCB materials



Laser cutting in action



Superior cutting quality

Contact us at  
E: [photonics-systems-group.com](mailto:photonics-systems-group.com)  
T: +1(419)574-4965

See it live at

**APEX EXPO 2026**

We look forward to seeing you!

well as a review of solder masks and surface finishes.

Examples of how material thickness can be reduced include using flexible resin-coated copper and thinner polyimide layers in flex constructions, as well as incorporating an additional conductor layer in the build-up. Bend radii could be reduced by pre-routing, depth routing, or laser ablation, depending on design complexity.

Dyconex has addressed the demand for finer lines by adopting additive technology. Their SAP process enables 80-micron pads on 110-micron pitch, with 8-micron lines and spaces, and two lines between pads.



*Dr. Roland Steim*

lenges and has continued, together with their customers, on an ongoing learning curve to push the limits further.

Henk Berkel, senior application engineer at Multek in the Netherlands, discussed how new technologies are pushing interconnects to the next level of integration. He put a perspective on the current situation by referencing an overview of myriad integration options from Fraunhofer, who saw

system integration as key to helping manufacturing companies to remain competitive in high-wage countries and defend their market leadership.

Berkel commented that although certain “mature” integrated technologies, such as embedded resistors and capacitors, remained a small niche market, embedded copper coin technologies for thermal management have now become mainstream, especially in Massive MIMO applications in 5G and future wireless networks.

He sees artificial intelligence as a new world, remarking that AI data centres are extremely power hungry—up to 350 megawatts and more—before exploring the complexity of NVIDIA devices and considering system densities and power consumptions. He believes that the surging demand for artificial intelligence and machine learning could lead to power losses that, from a cooling perspective, would be prohibitively expensive to manage.

Looking ahead, he considered that although the incorporation of decoupling capacitors and MOSFETs directly into a single PCB substrate would significantly streamline design and reduce cost, the thermal and cooling implications require careful analysis, particularly with regard to manufacturing, cost, and system reliability.

Berkel described new packaging concepts such as CoWoP assembly (chip on wafer on platform PCB), where chip-plus-interposer is bonded directly onto an advanced platform PCB, using mSAP processing to embed the RDL interposer into the substrate-like PCB.

His final topic was humanoid robot

**“Changes in fine-line PCB production include seed-layer adhesion, inspection, and repair.”**

Steim gave several examples of applications of fine-line circuits: cables, inductive positioning sensor coils, increased pixel density imaging, packaging for flip chip, and photonic ICs.

Challenges in fine-line PCB production include seed-layer adhesion, inspection, and repair. Surface finishes have a significant influence on bending performance, with the brittle nickel in ENIG giving the worst results and nickel-free finishes being preferred. But perhaps the biggest challenges include the need for investment in equipment, and increasingly fragile products demanding higher cleanroom and production standards.

Dyconex achieved success on multiple projects in series production by addressing the sum of many chal-



*Henk Berkel*



# Collaborate to Win

When PCB manufacturing becomes a true partnership, everyone wins.



technology, where many small electromotors need control and space is limited, and he listed key components and potential suppliers. There are many areas requiring specialist PCBs in the controller, perception, and sensing planes: main controller, coprocessor, vision processing unit, visual module, audio processing unit, inertial measurement unit, force/torque sensing unit, tactile sensor unit, and LiDAR control unit.



In closing, he said, "Innovation happens with a speed as never seen before, and tomorrow this presentation might already need additions!"

Refreshed after a reasonably early night and a restful sleep, delegates dutifully re-assembled for Day 2 and Session 4 of EIPC's Winter Conference.

Session moderator Martyn Gaudion became a presenter with a thought-provoking presentation on the accuracy of field solvers at UHDI dimensions. Gaudion has a talent for holding the audience's attention while addressing a technically challenging subject, keeping it informative and entertaining.

What are UHDI dimensions? Ultra-high density interconnect represents the next generation in density and miniaturisation of PCB design geometry. It is not simply "smaller HDI," because it generally involves fundamentally different manufacturing processes. Lines and spaces are typically less than 65 microns, sometimes much less.

Gaudion's opening slide put a perspective on dimensions. It is a set of engineers' feeler gauges, 0.05 mm being the thinnest—50 microns! He followed with cross-sections of a human hair, 50 to 70 microns, down to 2 microns for a spider's web. His example of a UHDI trace was 25 microns wide and 10 microns thick.

To illustrate time-domain reflectometry (TDR) measurements, he showed a couple of typical distributed-resistance discontinuities and their reflections dating back to 1970, and compared them with a contemporary 50 ohm plot from one of Polar's test systems, followed by the



results of a series of tests on a 75 ohm line. Using a dimensioned schematic cross-section of an offset differential stripline, he demonstrated how the measured differential impedance compared with the originally calculated value, and qualified the results by correlation with careful microsectioning.

"Is what you made what you designed?" he asked, displaying a microsection showing conductors of 32 microns and 33 microns with a 97-micron space between them.

Gaudion commented on the influence of foil roughness, and stressed the importance of compensating for the effect of DC resistance on TDR impedance measurement to avoid the TDR reading being higher than predicted. He further advised to "ensure you made what you think you made," "Turn on the imbalance check on your TDR," and "If in doubt, microsection!"

The final technical presentation came from sustainability-driven innovator Victor Verlinden, founder and CEO of Virenti in Belgium. He was spreading awareness of a breakthrough technology that has advanced into a viable PCB application and is now moving toward scale-up and market entry. His presentation, "Towards sustainable PCB substrates: system-level considerations for bio-based laminates," was meant to secure a green future for electronics by replacing fossil-based circuit boards with European bio-based alternatives.

Reviewing the current situation, Verlinden noted several areas of concern regarding the sustainability of traditional laminates, including environmental concerns about certain aromatic brominated flame retardants, shortages of raw materials, particularly glass fabric, increasing geopolitical tension and strain, and, not least, the erosion of local European laminate production.

Although the system-level framework was shifting, the core concept of laminates has not. He mentioned IPC-4101 and showed a chart of its slash

sheet variants and their properties. FR-4 is a known and stable system with known limits, known compatibility, known workarounds when it fails, large-scale supply, and over 50 years of de-risking.

By comparison, bio-based substrates, where a significant part of the material originates from renewable feedstocks, are not necessarily lower in performance, nor biodegradable, disposable, or experimental, but there are notable design constraints and differences to their performance envelope.

Are they good enough to be used as drop-in replacements for FR-4, even if matching the main specifications of FR-4? They have no universal compatibility, and new workarounds are needed when they fail. They are novel materials, so there is no 50-year track record. But scale follows adoption, and they have significant potential to improve the bottom line across the value chain.

Verlinden admitted that bio-based materials have performance-window constraints regarding moisture, thermal limits, mechanical strength, and durability, and are initially more suited to lower layer-count boards, non-HDI designs, and moderate reflow exposure. Their introduction should follow risk-profiles and he gave examples of realistic applications.

His charts of available constituent biomaterials and their properties demonstrated that reinforcing fibres could reach exceptional strengths at low densities and that resin components span the full range from degradability to long term durability.

The conference ended with a discussion on supply chain improvements, weaknesses, and sustainability by a distinguished panel comprising Andre Bodegom of Adeon, Chris Haley of Amphe-nol-Invotec, Vincent Dronnet of Elvia Electronics, Joachim Verhegge of Group ACB, Thomas Michels of ILFA, and Hugo Tang of Ventec. The conversation was centred on the question, “How do PCB manufacturers incorporate EU regulations,” and was skillfully moderated by Rico Schluter.

Schluter brought proceedings to a close, thanking all who had participated, and extending an invitation to attend the upcoming EIPC Summer Conference, June 9–10, in Vilnius, Lithuania, which will include a visit to Teltonika.

My personal thanks to Tarja Rapala-Virtanen for organising an outstanding programme and to Kirsten Smit-Westenberg and Carol Peltzers for their expert management of another excellent event. And thank you Kirsten for sharing your photographs. **SMT007**

---

## Top Three Reads: Tariffs, AI Agents, and the Rise of Consumer Robots

BY JOHN W. MITCHELL, GLOBAL ELECTRONICS ASSOCIATION

**There is so much happening**—both exciting and challenging for our industry. Here’s what is top of mind for me at this moment.

**First**, the Supreme Court ruled that President Trump’s primary tool (IEEPA) for justifying his power to impose tariffs was overturned. There are so many questions now. What happens to the previously illegally collected monies? Under what and how quickly will these new tariff threats come to light? What is the quote (curse)? “May you live in interesting times...”

**Second**, there have been so many rapid changes to the world involving AI, it is hard to keep up. A recent development I’m keeping my eye on is, OpenClaw, which seems to be what all the Agentic AI hype has been pointing to. No big data center required just a

\$600 Mac mini by one account—cool and potentially scary advances here!

**Third**, in a recent conversation, I asked an executive what he thought the biggest near-future impact would be in electronics. He surprised me a little when he said robots. However, after a few days at CES, I’m starting to believe. See the market projections in the article below. anRobots for everyone!

1. [Tariff ruling limits Trump’s leverage but won’t end uncertainty for trade partners](#)
2. [OpenClaw—what happens when AI stops chatting and starts doing](#)
3. [Humanoid Robot Market Size to Surpass USD 251.40 Billion by 2035](#)

# An Update on the EU Sustainability Omnibus

## BACKGROUND INFORMATION

The European Commission (EC) released its Omnibus on Sustainability Reporting Proposal on Feb. 26, 2025, as part of its agenda to simplify EU sustainability legislation and reduce administrative burdens for companies while safeguarding the objectives of the EU Green Deal, including content and a timeline proposal. The initial “content” proposal amended key content-related provisions of:

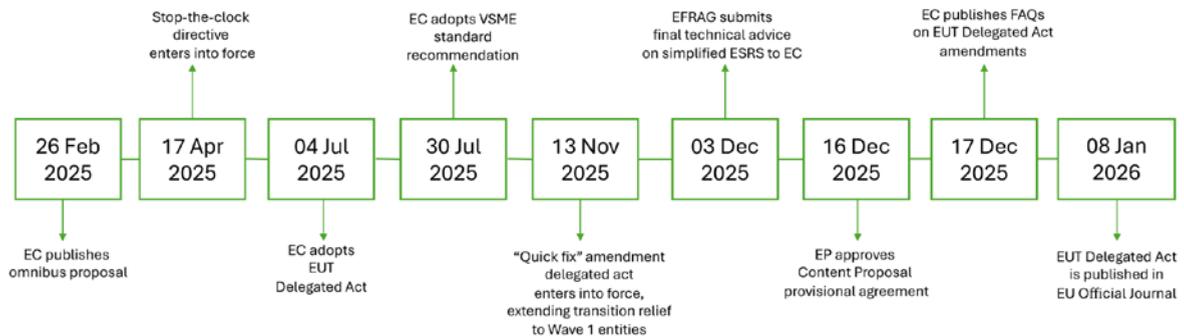
- The Corporate Sustainability Reporting Directive (CSRD)
- The Corporate Sustainability Due Diligence Directive (CSDDD)
- The EU Taxonomy (EUT) Regulation

The Global Electronics Association has consistently advocated for proposed content-related simplification measures regarding sustainability reporting in these three key policies. Read our position [here](#). Amendments to the Carbon Border Adjustment Mechanism (CBAM) Regulation were also proposed.

In a parallel process, the European Financial Reporting Advisory Group (EFRAG) has been tasked by the EC with simplifying ESRS, including adjustments to Double Materiality Assessment (DMA) requirements.

Following negotiations with the Council of the European Union, the European Parliament (EP) adopted the final legal text on Dec. 16, 2025, to be

### Omnibus on Sustainability Reporting – Timeline



### Simplified ESRS Implementation Timeline (current estimate)

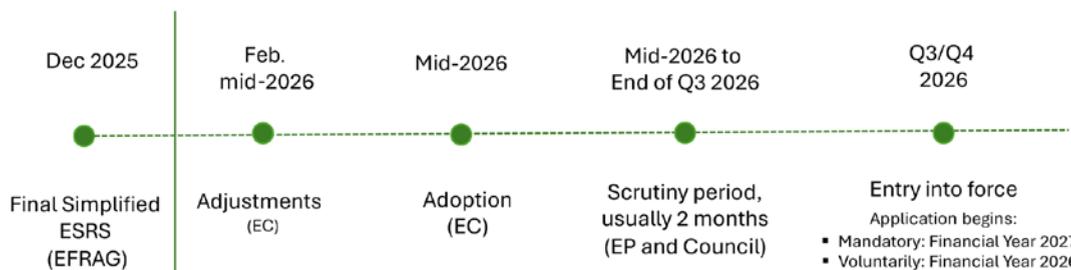


Figure 1: Omnibus on sustainability reporting timeline (top), and the current estimate of a simplified ESRS implementation timeline (bottom).



The Test Connection, Inc.

Leading in quality and test engineering since 1980

# LEADING-EDGE TEST SYSTEMS



Test Solutions & Services for Test Programming, Board Test, In-Circuit Test, Functional and Boundary Scan

APEX  
Booth  
3522



**THE TRAINING CONNECTION, LLC**

Knowledge • Training • Certification • Success



Your fast track to hands-on mastery, industry-recognized credentials, and career-boosting confidence.



410-205-7300

112 Lakefront Drive

Hunt Valley, MD 21030-2225

## New CSRD Scope – Omnibus agreement 16 Dec 2025

	Mandatory <b>2027</b> Large undertakings	Mandatory <b>2028</b> Non-EU companies	Voluntary SMEs
Scope	Listed and non-listed with: • Net turnover >450 m Euro • And employees >1000	Non-EU companies: • Net turnover >450 m Euro  And subsidiaries or branches with: • Net turnover >200 m Euro	• Employees <250
Standard	Simplified ESRS, including DMA	Simplified ESRS, including DMA	VSME
Assurance	Limited	Limited	None

Figure 2: The current estimate of a simplified ESRS implementation timeline.

published in the *Official Journal of the European Union* in March 2026. European Member States are required to transpose all provisions of the directive within 12 months of their entry into force, except for those related to CSDDD, which must be transposed by July 26, 2028. Read our statement on the omnibus **political agreement**.

In addition, the related so-called “Stop-the-Clock” directive (the “timeline” proposal) postponed the application of the existing reporting requirements for Wave 2 and Wave 3 entities under the current CSRD, including EUT disclosures required by the CSRD, and delayed the effective date to comply with the first phase of requirements of the CSDDD by one year.

The directive was published in the *Official Journal of the European Union* on April 16, 2025. European Member States were asked to transpose the legal text by Dec. 31, 2025, to be effective for the 2025 reporting period. An up-to-date transposition tracker by Member State is available **here**.

Given that Wave 1 entities were not included in the Stop-the-Clock directive, on July 11, 2025, the EC adopted, through a delegated act, the so-called “quick fix” amendments to the European Sustainability Reporting Standards (ESRS), allowing such

legal entities to maintain, and even reduce, the level of reporting applied in 2024 for 2025 and 2026 reporting by:

1. Extending certain transitional provisions applicable to the first and second year of reporting.
2. In certain cases, providing additional reporting relief.

The delegated act was published in the *Official Journal* and entered into force in November 2025.

In a parallel process, the European Financial Reporting Advisory Group (EFRAG) was tasked by the EC with the simplification of European Sustainability Reporting Standards (ESRS), with an impact on Double Materiality Assessment (DMA) requirements under CSRD (Figure 2).

A DMA is critical because it requires companies to analyze how sustainability issues affect their business (financial materiality) and how their operations impact people and the environment (impact materiality). This dual perspective is essential for compliance, strategic decision-making, risk management, and building trust with stakeholders. The Evolve sustainability program at the Global Elec-

# THE NEXT REVOLUTION OF SOLDER



## Durafuse<sup>®</sup> LT

- ✓ Low-temperature reflow to help eliminate HIP & bridging on large size BGAs
- ✓ Enhanced thermal cycle reliability in harsh conditions
- ✓ Reflow temperature 205–260°C

## Durafuse<sup>®</sup> HR

- ✓ Enhanced thermal cycling performance
- ✓ Superior voiding performance
- ✓ Reflow temperature 235–260°C

## INDIUM 12.9HF

- ✓ Engineered for fine-pitch assemblies, delivering high transfer efficiency & superior SPI yields
- ✓ High oxidation resistance to eliminate graping in air reflow
- ✓ Low BGA, CSP, LGA, and QFN voiding

Visit us at APEX, Booth 1038



[indium.com](https://www.indium.com)  
From One Engineer  
To Another<sup>®</sup>

©2026 Indium Corporation



tronics Association has tools available for the electronics industry to complete their DMA.

On Oct. 17, 2025, the Omnibus amendment to the CBAM Regulation was published in the *EU Official Journal* as Regulation (EU) 2025/2083. Following the publication of key implementing and delegated acts on Dec. 17, 2025, CBAM compliance is now entering its definitive phase.

**The Omnibus Directive significantly narrows the CSRD scope: Only large undertakings with more than 1,000 employees and a net annual turnover exceeding €450 million are required to report.”**

### Scope of the CSRD

The Omnibus Directive significantly narrows the CSRD scope: Only large undertakings with more than 1,000 employees and a net annual turnover exceeding €450 million are required to report. Listed Small and Medium-sized Enterprises (SMEs) are exempt, which marks a substantial shift from the original legal framework. Other changes include (see also Figure 3):

- **Scope for third-country companies:** Non-EU undertakings generating €450 million net annual turnover in the EU (individually or on a consolidated basis) for each of the last two consecutive years, and having a subsidiary or a branch in the EU exceeding €200 million net turnover
- **Value chain cap:** Safeguards have been introduced for companies in the value chain that fall below the threshold of 1,000 employees; the information requests are limited to the information included in the voluntary sustainability reporting standard

- **Permitted information omission:** Companies may omit certain information, such as commercially sensitive, classified, or IP-related information if certain conditions are met
- **Voluntary sustainability reporting standards (VSME):** The EC will adopt VSME for undertakings with under 1000 employees
- **Sustainability assurance:** Limited assurance remains mandatory, with a limited assurance standard to be adopted by July 1, 2027
- **Digital support:** The EC will establish a one-stop-shop portal with information, guidance, and support, including templates, linked to sustainability reporting

### Change to the CSDDD

Substantial changes have been introduced to the CSDDD. Member States must transpose the Directive by July 26, 2028.

The amended rules will apply from July 26, 2029, while the obligation for in-scope companies to publish on their website an annual statement on sustainability due diligence matters will apply to financial years starting on or after Jan. 1, 2030.

- **Narrowed scope:** The scope of the CSDDD is narrowed by higher applicability thresholds. The Directive applies to EU companies with more than 5,000 employees and a net worldwide turnover exceeding EUR 1.5 billion, and to non-EU companies generating more than EUR 1.5 billion in turnover within the EU.
- **Amended due diligence framework:** The risk-based due diligence approach is retained, with modified operational requirements. Companies must conduct a scoping exercise based on reasonably available information to identify areas across their operations, subsidiaries, and relevant business partners where adverse impacts are most likely and most severe. In-depth assessments are limited to these. Information requests to business partners are restricted to the necessary, with additional safeguards for partners with fewer than 5,000 employees.
- **Changes to penalties and civil liability:** Penalties for non-compliance are limited to a

## REAL-TIME METROLOGY SOLUTIONS FOR DESIGN, TESTING AND MANUFACTURING

Akrometrix is the industry leading manufacturer of thermal warpage metrology tools

Optical Technology - In-Situ at Temperature up to 350°C

- **Shadow Moire** - Most accurate Warpage
- **Digital Fringe Projection (DFP)** - Warpage on samples with discontinuous surfaces
- **Digital Image Correlation (DIC)** - Strain and CTE

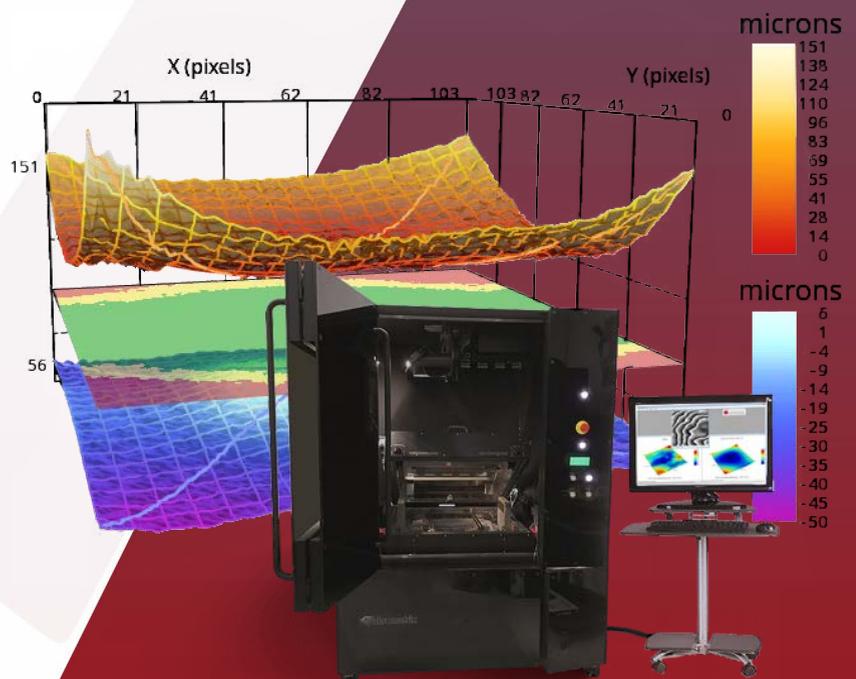
**APEX  
EXPO**®  
**2026**

by Global Electronics Association

**Booth: 3812**



Send us your components, boards, assemblies, connectors, wafers, etc. to test today



[www.akrometrix.com](http://www.akrometrix.com)  
[sales@akrometrix.com](mailto:sales@akrometrix.com)  
1-404-486-0880

maximum of 3% of net worldwide turnover, and civil liability is narrowed by deferring to national law.

- **Maximum harmonization:** Full harmonization is extended to additional provisions governing the core elements of the corporate due diligence process, i.e., Member States can no longer introduce national rules diverging from the Directive in these areas.
- **Other key changes:** The obligation to adopt climate transition plans is removed, the definition of “stakeholders” is narrowed, the stakeholder consultation obligation is tightened, termination of a business relationship is no longer required, suspension is the only last-resort measure, and monitoring frequency is reduced to once every five years.

### What It Means for the EUT

The current agreement eliminates the EC’s proposed provisions on optional taxonomy reporting. It thus remains mandatory for all EU and non-EU entities listed on an EU-regulated market that have a net turnover exceeding €450 million and 1,000 employees on average during a financial year. On July 4, 2025, the EC adopted an EUT Delegated Act to finalize proposals to simplify the EUT. On Dec. 17, 2025, the EC published a draft Commission Notice to provide interpretation and implementation guidance on the amendments to the EUT Delegated Act in the form of frequently asked questions (FAQs). The EUT Delegated Act had an effective date of Jan. 1, 2026, and covers reporting for the 2025

financial year. However, entities may apply the measures starting with the 2026 financial year.

In addition, on Nov. 7, 2025, the EC published two calls for evidence on proposals to simplify the technical screening criteria of the EUT Climate and Environmental Delegated Acts. The deadline to provide comments was Dec. 5, 2025. In response to the calls for evidence, two delegated acts will be drafted, each with a four-week public consultation period. The final delegated acts should be adopted by the EC in Q2 2026.

### CBAM

CBAM is an EU regulation designed to prevent carbon leakage by placing a carbon price on certain imported goods. It aligns the carbon cost of imports with the EU Emissions Trading System (EU ETS), ensuring equal treatment between EU and non-EU producers. CBAM currently applies to high-emission goods, including cement, iron and steel, aluminum, fertilizers, electricity, and hydrogen. Importers must report the embedded greenhouse gas (GHG) emissions of these products and, for imports made from 2026 onwards, purchase CBAM certificates to cover those emissions. The CBAM Omnibus Regulation, adopted in 2025 and now in force, together with the implementing acts published on Dec. 17, 2025, introduces binding simplifications and operational clarity ahead of the definitive phase. Key CBAM regulation updates include a binding, de minimis exemption (50 tons/year), an updated timeline, and clarified emission data and verification rules.

**“My go-to tech magazine  
from the very beginning.”**

— Cheah Soo Lan, Global Electronics Association

Read what the industry is reading.

**SUBSCRIBE HERE**

**I-Connect007**  
The Global Electronics Resource

# Upgrade Your Engineering Future

## Subscribe to Engineering Pro Today

### ENGINEERING PRO SUBSCRIPTION

COURSES | CERTIFICATES | INDUSTRY EXPERTS

- ✓ Access curated, expert-led training tailored for today's electronics industry.
- ✓ Gain certificates that showcase your professional growth and credibility.
- ✓ Equip your team with continuously updated content that keeps pace with emerging standards and technologies.

### 120 + Hours of Training

Essentials for New Engineers,  
Manufacturing Engineering,  
Quality & Acceptability Standards,  
And More!

UP TO  
75% off

Explore the courses included in  
[Engineering Pro](#)

**Electronics U**  
by Global Electronics Association

## Conclusion

We know that sustainability is important to our industry. While we welcome this simplification initiative in reporting burden, a certain legal uncertainty remains on the path to its effective implementation. We continue to monitor omnibus developments and to inform our members in the EU and beyond of changes in sustainability reporting requirements and their impact on business. **SMT007**

**Dr. Diana Radovan** is director of sustainability policy for the Global Electronics Association. Contact her at [DianaRadovan@electronics.org](mailto:DianaRadovan@electronics.org) to receive future updates on this important policy.

Please check the **Association's blog** for the latest information on omnibus developments.

# PEDC: Built *for* the Design Community by the Design Community

BY PETER TRANITZ, GLOBAL ELECTRONICS ASSOCIATION

**The Pan-European Electronics Design Conference (PEDC)** was developed to provide Europe's electronics design community with a non-commercial, Pan-European, technologically advanced forum. PEDC 2026 delivered exactly that.

This second edition of the conference brought together 130 participants from 23 countries across Europe and beyond for two days of technical exchange, discussion, and connection. Hosted by the Global Electronics Association and Fachverband Elektronikdesign und-fertigung e.V. (F.E.D.), and supported by Altium, Siemens, and Zuken, the event featured three technical tracks, 36 presentations, three keynotes, and a group of exhibitors.

PEDC provided a space to speak openly with peers, exchange experiences, and see the full electronics ecosystem represented in one place.

This kind of environment is exactly what the European design community needs.

Europe is diverse in its markets, industries, and company sizes. That diversity makes it even more important to have a neutral, pan-European platform focused purely on education and technical excellence. PEDC was designed to be non-commercial, with sales activity clearly separated from the technical program, and conducted in English to ensure open exchange across borders.

The Global Electronics Association chose to lead this effort because we believe it is our responsibility to be visible from a technical perspective. As the voice of the European EMS and PCB industries and a

trusted partner to policymakers, we want to be recognized not only for advocacy but also for technical leadership and high-quality content. PEDC is a natural extension of that role.

Day 1 included keynote presentations from Tomide Adesanmi, Circuit Mind, UK; Alexander Gerfer, Würth Elektronik eiSos, Germany; Simon Seereiner, Weidmüller Interface GmbH & Co. KG, Germany; and Thomas Keller Rosenberger Hochfrequenztechnik GmbH & Co. KG, Germany. Their presentations aligned with panel discussions on key issues such as AI in product development, energy management for high-performance systems, silicon-to-systems design and simulation, among others.

On the second day, from the first sessions onward, the rooms were full, and the discussions were active. The Silicon-to-Systems track drew strong interest. Designers are dealing with increasing complexity every day, and sessions on multi-physics simulation, UHDI PCBs, and IC substrates clearly resonated.

Design for Excellence was another area where we saw strong engagement. Topics ranging from compliance and cost to manufacturing and assembly reflected the real, practical challenges design teams across Europe face. These discussions were grounded, honest, and relevant.



**Peter Trantz** is senior director of technology solutions in Europe. The original blog post can be found [here](#).

We are dedicated  
to excellence through

# innovation, technology and most importantly, service.



COMMERCIAL • MILITARY • MEDICAL • BAREBOARD



**U.S.C. CIRCUIT**

[www.uscircuit.com](http://www.uscircuit.com)



# Safety First

## *ADAS, Connectivity, and Interfaces on the Road to Reliability*



**EVs function as intelligent,** software-centric platforms where safety, connectivity, and user experiences are deeply intertwined. Advanced driver assistance systems (ADAS), vehicle connectivity architectures, and digital driver interfaces now play a central role in both vehicle operation and customer perception. EVs provide synergies for

ADAS and connectivity because their strong electrical base provides a natural framework for integrating the advanced sensors, telematics, and high-reliability control units required for ADAS and connected systems. As these systems proliferate, their electronics' reliability increasingly governs not only functional safety but also user trust and brand reputation.<sup>1</sup>



# REVOLUTIONIZING PROCESS IMPROVEMENT

Harnessing the Power of AI Tools



**Simplify** programming and expedite production with Koh Young Auto Programming (KAP)



**Minimize** false calls and escapes while reducing operator subjectivity with Smart Review 3.0



**Apply** real-time process control and adjustment with Koh Young Process Optimizer (KPO)

## **ADAS: Safety-Critical Electronics**

ADAS technologies such as automatic emergency braking, adaptive cruise control, lane-keeping assistance, blind-spot detection, and driver monitoring are among the most safety-critical electronic systems in an EV. These features rely on a fusion of sensors, including cameras, radar, ultrasonic sensors, and increasingly LiDAR, all coordinated by high-performance processors.<sup>2</sup>

Reliability challenges arise because ADAS electronics must operate accurately under extreme temperature swings, vibration, precipitation,<sup>3</sup> road debris, and electromagnetic interference (EMI). Field investigations have shown that sensor degradation,<sup>4</sup> misalignment, or contamination<sup>5</sup> can lead to false alerts or system disablement,<sup>6</sup> undermining both safety and driver confidence. In some cases, vehicles revert to reduced-function modes when sensor data becomes unreliable, impacting usability even when no hardware failure has occurred. The shift toward centralized or zonal electronic architectures further amplifies reliability risk. Multiple ADAS functions may now reside on a single domain controller, improving efficiency and reducing wiring complexity but increasing the consequence of single-point failures. This makes fault isolation, redundancy, and graceful degradation essential design-for-reliability (DfR) considerations.<sup>7</sup>

Robust validation of ADAS electronics increasingly requires combined-environment testing, including thermal cycling under bias, vibration with live sensor operation, and EMI susceptibility testing beyond minimum regulatory requirements.<sup>8</sup> Over-the-air (OTA)-enabled field monitoring is also becoming a key tool for detecting early-life reliability issues before they escalate into safety recalls.<sup>9</sup>

## **Connectivity: Enabling Features While Introducing New Failure Modes**

Connectivity has become a defining attribute of EVs. Telematics systems, vehicle-to-cloud communication, vehicle-to-everything (V2X) interfaces, and OTA software updates enable continuous improvement, remote diagnostics, and feature upgrades. However, they also introduce new reliability and cybersecurity challenges.<sup>10</sup> Connectivity hardware including antennas, gateways, telematics control units, and network switches is often distributed across the vehicle and exposed to harsh environ-

ments. Failures in these modules can disrupt functions ranging from navigation and infotainment to safety recalls and compliance updates.<sup>11</sup>

OTA updates exemplify the dual nature of connectivity. They allow manufacturers to address issues without physical service visits, but insufficient validation can introduce unintended consequences. Documented cases show that OTA updates intended to fix existing issues can in fact introduce new problems. For example, an OTA update to Jeep Wrangler 4xe vehicles disrupted vehicle module communication and caused drive system malfunctions, leading to a recall and rollback of the software release, underscoring the need for rigorous regression testing and rollback strategies when deploying OTA updates in connected vehicles.<sup>12</sup>

As EVs transition toward software-defined vehicle (SDV) architectures, distinguishing between software-induced faults and underlying hardware weaknesses becomes increasingly complex.<sup>13</sup> Reliable connectivity therefore depends not only on robust electronics design, but also on disciplined software lifecycle management.

## **Driver Interfaces: Reliability as a Measure of Quality**

Human-machine interfaces (HMIs) including touchscreens, digital instrument clusters, head-up displays, voice controls, and haptic feedback systems, are now central to the EV driving experience. Unlike many powertrain components, interface failures are immediately visible to drivers and strongly influence perceptions of vehicle quality.<sup>14</sup> EV HMIs integrate high-resolution displays, advanced graphics processors, and complex software stacks. These systems must remain responsive across a wide range of temperatures, lighting conditions, and usage patterns. Field reports have linked display delamination, touchscreen unresponsiveness, and intermittent resets to thermal stress, material incompatibilities, or inadequate assembly robustness.<sup>15</sup> Importantly, HMIs are not merely convenience features. They serve as the primary channel for safety alerts, ADAS warnings, and system status information. Delayed or ambiguous alerts can impair driver response and erode trust in automated assistance systems.

Reliability expectations rise as manufacturers consolidate multiple vehicle functions like climate

# APEX EXPO<sup>®</sup> 2027

by Global Electronics Association

april 3-8, 2027

anaheim convention center • ca

meetings + courses • april 3-8

conference • april 5-8

exhibition • april 6-8

## the point of convergence

This is the era of technology convergence. Where we must embrace comprehensive system-level integration to build tomorrow's electronics. Where common ground for collective intelligence is vital. APEX EXPO 2027 is that essential convergence point. It's where innovative ideas, collaboration, and breakthrough technologies unite the entire global electronics ecosystem. Where face-to-face engagement, technical education, nextgen packaging technologies, and system-level solutions move all industries forward, creating **Better Electronics for A Better World**.

THANK YOU TO THIS YEAR'S SPONSORS, EXHIBITORS, SPEAKERS, AND ATTENDEES.

join the momentum for 2027! →

[apexexpo.org](https://apexexpo.org) | [#apexexpo](https://twitter.com/apexexpo)



## Why EVs Are More Synergistic for ADAS and Connectivity

EV platforms are designed for electrical propulsion, high voltage systems, and software defined control. This strong electrical base provides a natural framework for integrating advanced sensors, telematics, and high reliability control units required for ADAS and connected systems. An analysis describes that EV platforms already incorporate advanced cooling, electrical distribution, and telematics infrastructure, which can be repurposed or shared for demanding compute loads like ADAS and real time connectivity. In platforms with dedicated liquid cooling for battery and motor, EVs

Advanced camera technology aids in ADAS situational awareness.

control, navigation, ADAS visualization, and vehicle settings into unified displays. A single interface failure can now affect multiple vehicle systems simultaneously, increasing the operational impact of what might otherwise be considered a minor electronic fault.<sup>16</sup>

### System Convergence and Cascading Risk

In software-defined and zonal E/E architectures, ADAS, connectivity, and HMI subsystems increasingly share computing resources, high-speed communication buses, and power supplies. This interdependence means that a fault in a shared processor or communication channel can propagate across domains. For example, an ADAS sensor data bus failure can degrade not only safety functions but also navigation or infotainment feedback unless isolation and redundancy mechanisms are designed into the architecture.<sup>17</sup> OTA updates further complicate this interaction. Updates intended to improve one function may inadvertently affect others, particularly when hardware margins are already constrained. Industry experience shows that defects introduced late in the development cycle are significantly more costly to resolve once vehicles are in the field.<sup>18</sup> To manage this risk, OEMs are adopting holistic validation strategies that treat software and hardware as an integrated system. These include fault-injection testing, hardware-in-the-loop (HIL) simulation, and long-duration endurance testing that reflects real-world usage patterns.<sup>19</sup>

can also support high performance compute (e.g., autonomous driving domain controllers) more efficiently than internal combustion engine (ICE) platforms. This integrated thermal/compute synergy helps maintain stable performance for safety critical electronics.<sup>20</sup>

Connectivity in EVs is often tightly coupled with essential vehicle functions such as battery management, smart charging, OTA updates, and safety monitoring. For EVs, onboard cellular and telematics systems are fundamental to the vehicle's operation, not just for convenience. Real time communication supports predictive diagnostics, safety updates, and performance tuning, which directly influences reliability of embedded safety systems. A technology analysis points out that EVs rely more heavily on stable connectivity for core functions than ICE vehicles, where connectivity has historically been optional or auxiliary.<sup>21</sup>

### Reliability, Trust, and the Path Forward

Reliability in safety and interface electronics extends beyond traditional metrics such as mean time between failure. It encompasses predictability, clarity of feedback, and consistency of behavior, all which shape user trust. Consumer studies show that driver confidence in ADAS can decline sharply after even a single false alert or unexpected system disengagement.<sup>22</sup>

As EV adoption accelerates and autonomy features expand, expectations for flawless operation will only increase. Industry standards addressing functional safety (e.g., ISO 26262), cyber-

security (ISO/SAE 21434 and UNECE Reg. 155/156), display reliability, and OTA governance are evolving, but many remain in development or show gaps in coverage and harmonization, leading to inconsistent application across OEMs and technologies.<sup>23</sup>

EVs can provide a stronger, more unified electrical and software platform that facilitates tighter integration of ADAS and connectivity systems than ICE or HEV platforms. This synergy stems from the foundational design of EV architectures around electrification, networking, and software defined control.

Ultimately, the road to reliability for ADAS, connectivity, and driver interfaces will depend on disci-

plined DFR practices, cross-domain collaboration, and continuous learning from field data. Vehicles that succeed will not only perform safely but will communicate that safety clearly and consistently to the people who rely on them. **SMT007**



**Stanton Rak** is principal consultant for SF Rak Company, and co-chair of the APEX EXPO Technical Program Committee.

## References

1. “Understanding Functional Safety and Ensuring Reliability in Critical Systems,” by U. Yesilmen, June 4, 2025.
2. “Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles,” by SAE International, 2022.
3. “Classifying Advanced Driver Assistance System (ADAS) Errors in Adverse Weather and Visibility Conditions,” by G. Lee, *Sensors*, 2025.
4. “Safety Implications of Potential Advanced Driver Assistance Systems Sensor Degradation,” by L. Stowe, J. Alcazar, S. Huggins, G.T. Beale, M. Palmer, and Z.R. Doerzaph, National Highway Traffic Safety Administration, 2025.
5. “Sensor Testing in Adverse Visibility Conditions (SUS Final Report),” by P. Eriksson, E. Ronelöv, O. Tullberg, and V. Chernoray, Swedish Governmental Agency for Innovation Systems (Vinnova), 2023.
6. “Evaluation of False Alarm Rates in Forward Collision Warning Systems Under Varied Driving Scenarios,” by Y. Bao, *International Journal of Transportation Science and Technology*, 2024.
7. “Evolutionary Path to Vehicle Zonal E/E Architecture,” by S. Jiang, SAE Technical Paper 2026-01-0071, 2025.
8. “AEC-Q100: Stress Test Qualification for Integrated Circuits,” by Automotive Electronics Council, 2021.
9. “How OTA Updates Reduce Automotive Recalls,” IoT For All, Aug. 24, 2025.
10. “21434: Road Vehicles – Cybersecurity Engineering,” ISO/SAE, 2021.
11. “Connected Vehicles: Technology Review, State of the Art, Challenges and Opportunities,” by G. Abdelkader, K. Elgazzar, and A. Khamis, *Sensors*, 2021.
12. “SW Update Leaves Some Jeep Wrangler 4xe Owners Stranded,” by Caleb Miller, *Car and Driver*, Oct. 17, 2025.
13. “What Is a Software-Defined Vehicle (SDV)?,” by H. Taller, PTC, Sept. 4, 2025.
14. “MyFord Touch,” by Wikipedia.
15. “Technology Woes Continue to Erode New-Vehicle Dependability,” by J. Youngs, J.D. Power, Feb. 8, 2024.
16. “Design of Automotive Human–Machine Interfaces: New Challenges in Enhancing User Experience, Safety, and Security,” by I. Grobelna, D. Mailland, and M. Horwat, *Applied Sciences*, 2025.
17. “Review of Electrical and Electronic Architectures for Automotive Systems,” by W. Wang, et al., *Vehicle System Dynamics*, 2024.
18. “Accelerate Automotive UI Development with Kiro, Squish, and Virtual Targets,” by P. Bartsch et al., Amazon Web Services, Jan. 14, 2026.
19. “HIL Testing for Complex Automotive Systems: Consistent Test Reuse Across MIL → SIL → HIL in a Model-Driven Development Workflow,” Siemens Digital Industries Software.
20. “Systemic Integration of EV and Autonomous Driving Technologies: A Study of China’s Intelligent Mobility Transition,” by J. Gao, et al., *World Electric Vehicle Journal*, 2025.
21. “Connected Mobility: Why EVs and Cellular Networks Are Inseparable,” by P. Gadenius, Webbing Solutions, Sept. 10, 2025.
22. “Factors Influencing Trust in ADAS for Current Users,” by C. A. DeGuzma, *Human Factors and Ergonomics Society*, 2023.
23. “Standards relevant to automated driving system safety: An in-depth assessment of current and emerging automotive standards,” by S. Ballingall, Transportation Research Interdisciplinary Perspectives, 2023.

# Find Industry-experienced Candidates at jobConnect007



For just \$975, your 200-word, full-column ad will appear in the Career Opportunities section of all three of our monthly magazines, reaching circuit board designers, fabricators, assemblers, OEMs, suppliers and the academic community.

In addition, your ad will:

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

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

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

Contact [barb@iconnect007.com](mailto:barb@iconnect007.com) to get your ad posted today!

# CAREER OPPORTUNITIES



## HR Coordinator & Senior Cost Accountant

Remtec is growing and has two exciting opportunities at our dynamic, team-oriented, and innovative tech-manufacturing company, based in our newly renovated headquarters in Canton, MA (just south of Boston).

### HR Coordinator

The HR Coordinator supports key HR functions, including recruitment, onboarding, training, legal compliance, employee engagement, and employee relations. This role manages the full recruitment cycle—posting jobs, screening candidates, coordinating interviews, conducting background checks, and guiding candidates through the hiring process. The HR Coordinator also leads new hire onboarding, assists with benefits administration and open enrollment, ensures compliance with federal and state laws, and serves as a trusted resource for employee questions and support—helping foster a positive, high-performing workplace culture.

### Senior Cost Accountant

The Senior Cost Accountant supports daily accounting operations, focusing on cost accounting, financial reporting, and inventory control. Responsibilities include maintaining standard costs, analyzing manufacturing variances, reconciling inventory and general ledger accounts, supporting month- and year-end closing processes, preparing journal entries, and working with Operations and Production leadership to ensure financial accuracy, compliance, and timely reporting.

**Join Remtec and contribute to a collaborative culture focused on quality, integrity, and innovation. Learn more and apply here:**

[Apply Now!](#)



## Independent Sales Representatives Wanted

P. Kay Metal / MS2 Technologies, headquartered in the United States, is seeking established **independent sales representative firms** to add a proven, patented product to their portfolio.

We manufacture and supply **MS2® Molten Solder Surfactant**, a patented solution designed for both **Tin/Lead and Lead-Free soldering processes**, delivering measurable performance and cost benefits to electronics manufacturers.

MS2® already has successful customer installations throughout the United States, as well as a growing international footprint with active customers in Mexico, El Salvador, Honduras, Ecuador, and the Dominican Republic. We ship globally and support customers worldwide.

This opportunity is ideal for rep firms currently calling on electronics manufacturing, PCB assembly, soldering, or process engineering accounts who are looking to expand their offering with a differentiated, high-value consumable.

Strong technical products, international growth potential, and factory support provided.

To learn more about our company and technology, visit [www.pkaymetal.com](http://www.pkaymetal.com).

**Interested firms are encouraged to reach out for additional details to Gladys Flores at [gladysflores@pkaymetal.com](mailto:gladysflores@pkaymetal.com).**

[Apply Now!](#)

# CAREER OPPORTUNITIES



Join a Global Leader in Electronics Manufacturing

## Technical Sales Manager—PCB Division Location: Hybrid (Tustin, CA)

PalPilot International Corp. is a global leader in electronics manufacturing, delivering advanced engineering and production solutions for over 30 years. Our divisions include Printed Circuit Boards (PCB), Interconnect, Magnetics, and Semiconductor components, serving world-class OEMs across medical, industrial, and consumer technology sectors.

We're seeking an experienced Technical Sales Manager to grow our PCB Division and strengthen key customer partnerships. This role will lead new business efforts, support customers with technical coordination, and collaborate with global engineering and operations teams to deliver high-quality manufacturing solutions.

### Key Responsibilities:

- Develop new OEM accounts and manage existing customers
- Provide quotations, technical support, and project follow-up
- Identify new market opportunities and shape sales strategy
- Represent PalPilot at meetings and trade events

### Qualifications:

- 3+ years in PCB, ODM/OEM, components, or EMS sales
- Bachelor's in Electrical or Mechanical Engineering preferred
- Proven success in sales growth and customer relations
- Excellent communication and negotiation skills

To apply, contact Kevin Niu at  
[kevin.niu@palpilot.com](mailto:kevin.niu@palpilot.com)

[Apply Now!](#)



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

## Instructors—Anywhere in the US and Canada

EPTAC is hiring experienced electronics manufacturing professionals to join our team as Instructors. This flexible role (part-time or full-time) is ideal for individuals with backgrounds in soldering, quality control, PCB design, or related fields. Current or past IPC certification is required.

We're seeking hands-on, motivated individuals eager to grow while sharing their expertise. Responsibilities include managing logistics for training kits and supplies, supporting new classroom setups across North America, and driving continuous improvement in operations. You'll be a key team player—supporting instructors, tracking performance metrics to ensure consistent quality, delivering hands-on demonstrations, maintaining a positive learning environment, and staying current on industry trends.

### Candidates must have:

- 10+ years in electronics manufacturing
- IPC certification (current or past)
- Bachelor's degree or equivalent
- Strong communication, teaching, and organizational skills
- A practical, problem-solving mindset and commitment to student success

You'll deliver hands-on demonstrations, maintain a positive learning environment, and stay current on industry trends.

### About EPTAC:

With 24 locations across North America and headquartered in Salem, NH, EPTAC is a leading provider of Electronics Manufacturing Training and Certification. We offer a strong team culture, modern work environment, and benefits including healthcare, PTO, retirement savings, and professional development. Join us in shaping the next generation of electronics professionals!

[Apply Now!](#)

# CAREER OPPORTUNITIES



**TECHNICA, U.S.A.**

## Various Positions

For 40 years, Technica USA has been providing products, equipment, and services to the printed circuit board fabrication and assembly markets.

Working with our worldwide partners, we offer our customers solutions through best-in-class product lines.

Technica has offices in San Jose, Calif, and Rancho Cucamonga, Calif.

We are expanding and looking for highly qualified Business Development/ Account Managers for both the PCB and PCBA markets.

We are adding to our growing national equipment service coverage and looking for experienced Equipment Service Technician/Engineers.

Are you a PCBA equipment applications expert with experience in component placement and inspection? We are looking for Equipment Product Specialists to work within our San Jose, Calif., PCBA Equipment Demo center.

Please visit [www.technica.com/careers](http://www.technica.com/careers) to learn more about these positions and submit your resume today!

**Apply Now!**



## Applications and Service Engineer (Field)

atg is seeking an Applications Engineer located in the Chicago area to join their U.S. team to support system installations, customer demos, and ongoing technical service. This role provides pre- and post-sales support, oversees machine setup and calibration, and troubleshoots on-site and remote issues. You'll work closely with customers, engineering teams, and product developers to deliver innovative solutions and influence future system enhancements.

### Key Responsibilities:

- Perform software installs, machine setup, and calibrations
- Conduct demos, training, and system buyoffs
- Develop and optimize customer assembly processes
- Troubleshoot and resolve technical issues
- Document procedures and contribute to manuals
- Collaborate cross-functionally to improve products

### Qualifications:

- Associate's degree in electrical engineering or related field
- 2–3 years in applications or field service engineering
- Experience in PCB testing or circuit board assembly preferred
- Strong knowledge of electronics, networking, and documentation
- Excellent communication and customer service skills
- Ability to travel up to 50%, domestic and international

Work is hybrid/home-based with travel. Must have valid passport.

Contact Klaus Koziol at [Klaus.Koziol@mycronic.com](mailto:Klaus.Koziol@mycronic.com) to apply.

**Apply Now!**

# CAREER OPPORTUNITIES



## Sr. Test Engineer (STE-MD)

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

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

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

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

[Apply Now!](#)



## Rewarding Careers

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

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

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

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

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

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

[Apply Now!](#)



## Quality Assurance Specialist—Bare Board PCB Manufacturing

Accurate Circuit Engineering seeks an organized, technically proficient Quality Assurance Specialist dedicated to bare board PCB production. You will champion compliance with industry standards, lead internal audits, manage certifications, and drive continuous improvement based on product performance data and customer feedback.

### Key Responsibilities:

- **Standards Compliance & Certification:** Enforce IPCA600, IPC6012 (CIS/CIT preferred), and ISO 9001 quality standards throughout fabrication
- **Internal Process Auditing:** Conduct scheduled and ad hoc audits of incoming materials, fabrication stages, testing protocols (etest, AOI), and documentation traceability
- **Employee Training & Development:** Create and deliver training programs for inspectors and production staff on IPC standards, quality procedures, and inspection tools to maintain certification
- **Failure Analysis & Corrective Actions:** Investigate nonconforming boards—including internal findings and customer returns/RMAs—analyze root causes, and lead corrective/preventive actions (8D/CAPA)
- **Procedure Optimization:** Analyze quality trends and RMA data to update processes, inspection checklists, and control plans

### Qualifications:

- Associate degree or equivalent experience in electronics manufacturing
- 3+ years in bare board PCB QA, with IPCA600/ CIS and IPC6012 certification
- Strong auditing, training, documentation, and cross-functional collaboration skills
- Proficient in rootcause failure analysis

Join us to ensure rigorous compliance, elevate fabrication quality, and continuously improve manufacturing standards.

Contact [brandon@ace-pcb.com](mailto:brandon@ace-pcb.com) and [James@ace-pcb.com](mailto:James@ace-pcb.com) to apply.

[Apply Now!](#)



## Are You Our Next Superstar?!

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

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

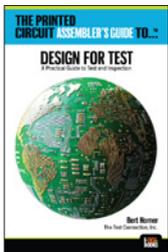
[Apply Now!](#)

# EDUCATIONAL RESOURCES



*"A great read on materials and processes that help electronics succeed in harsher conditions."*  
—Jason Keeping, Celestica

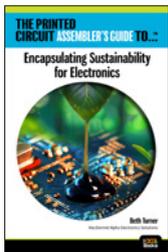
← Look Inside



## ***Design for Test: A Practical Guide to Test and Inspection***

by Bert Horner

This book presents a practical roadmap for integrating DFT into PCB and CCA development, emphasizing early test strategy rather than adding it after design completion. The author highlights the cultural shift required to make DFT a shared responsibility across engineering, manufacturing, quality, and leadership teams. [Download your copy today!](#)



## ***Encapsulating Sustainability for Electronics***

by Beth Turner, MacDermid Alpha Electronics Solutions

This book discusses the growing demand for sustainable solutions in the market and highlights examples of bio-based resins and the demand from emerging technologies. [Read it now!](#)

## PODCAST SERIES



# I-Connect007

The Global Electronics Resource

Executive Director | Managing Editor

**MARCY LARONT**

marcy@iconnect007.com • (480) 280-5229

Managing Editor

**NOLAN JOHNSON**

nolan@iconnect007.com

Associate Editor

**MICHELLE TE**

michelle@iconnect007.com

Technical Editor

**PATTY GOLDMAN**

Contributing Technical Editor

**HAPPY HOLDEN**

happy@iconnect007.com

Business Development Manager

**BARB HOCKADAY**

barb@iconnect007.com

Marketing Services Manager

**TOBEY MARSICOVETERE**

tobey@iconnect007.com

Digital Marketing Manager

**BRITTANY MARTIN**

brittany@iconnect007.com

Art Director | Production Manager

**SHELLY STEIN**

Magazine Layout

**TYLER ZAPOLUCH**

Ad Design

**TOBEY MARSICOVETERE**

Director of Digital Operations

and Media Systems

**BRYSON MATTIES**

Cover Design

**SHELLY STEIN**

Cover Image

**ADOBESTOCK © SUDIYOARISTINSOLS**

SMT007 MAGAZINE®

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

© 2026 IPC Publishing Group, Inc. does not assume and hereby disclaims any liability to any person for loss or damage caused by errors or omissions in the material contained within this publication, regardless of whether such errors or omissions are caused accidentally, from negligence, or any other cause.

March 2026, Volume 41, Number 3

SMT007 MAGAZINE is published monthly,  
by IPC Publishing Group, Inc., dba I-Connect007.

## ADVERTISER INDEX

Aegis.....	15
Akrometrix.....	49
ASC Sunstone.....	41
Blackfox Training Institute.....	11
Delvitech.....	9
Flexible Circuit Technologies.....	17
Global Electronics Association.....	51, 57
I-007eBooks.....	37
Indium.....	47
Koh Young.....	55
KYZEN.....	19
Linkage Technologies.....	3
Mycronic.....	13
Nordson.....	29
Omega EMS.....	33
On the Line with.....	2
P Kay Metal.....	31
Photonics.....	39
Remtec.....	23
Rehm.....	35
Technica USA.....	5
The Test Connection.....	45
US Circuit.....	53

# SMT007

MAGAZINE



# Problems solved!

