EIPC NEWS

EIPC TECHNICAL SNAPSHOT WEBINARS

During the Autumn of this year, EIPC will be organising three webinars which will be of particular interest to those involved with automotive, telecom and high-speed technology. We will have three well-known PCB industry speakers, each of whom has their own view on the technology challenges facing this industry.

These webinars will be held on:

Wednesday October 14th,
Wednesday November 18th
Wednesday December 16th.

They will last for some 45 minutes with each speaker taking 15 minutes for their presentations and then the webinar will be open for questions and comments from the participants. These webinars will be free to EIPC members and € 50 for non-members

This first session will focus on automotive technology and some of the key factors driving the global Automotive Printed Circuit Board industry. They will look at how the whole supply chain of PCB manufacturing can be ready for that change which will need input on materials, processes, measurement systems, reliability, and environmental impact and are there some new technologies for PCB manufacturing which will support these new demands.

The webinar on 14th of October will start at 15.00 hrs.

The presenters this day will be:

Lenora Clark from ESI Automotive

Her presentation topic: An exploration of advanced semiconductor packaging's effect on automotive electronic hardware design and assembly

• In the presentation there will be discussion and review on all aspects of the electronic build, starting with how increased performance influences the semiconductor packages, how that then affects design for PCB

fabrication, and finally it considers the influence on materials for perfect assembly.

Alun Morgan from Ventec

His presentation topic: "Reliability needs to be designed-in from the lowest level"

• In the presentation you will hear about cutting-edge technology demands more care to ensure reliability and resilience.

Paul Waldner from Multiline

His presentation topic: "Multilayer Printed Circuit Requirements for the Automobile Industry in the Age of High Speed"

The PCB industry is facing the challenge of automotive and 5G product requirements based on the demand for higher speed. The material offering is wide and requires well-controlled technology for PCB manufacturing. One of the critical processes is multilayer pressing and registration which are also key challenges for high-speed products.

We would like to present a new technology to laminate multilayers at very high temperatures with a control of temperature per panel previously thought to be impossible. Conventional Multilayer presses require huge amounts of energy pushed into a relatively high stack of to-be-laminated panels from a huge mass of metal that had to be heated up even before the panels could begin to be heated up. This meant that the temperature gradient of a stack of laminates could be as high as 40 degrees C from the outside-panels in the stack to the inside-panel. Indubond's press technology can heat every panel in a stack to exactly the same temperature at exactly the same time.
The presentation will also introduce the technology of registering those panels is old, but still necessary to insure the best registration of multilayers composed of differing materials no matter how hot the press. Pin-lam combined with data collection of inner-layer movements at every point in the fabrication process is worth discussing again.

The signal integrity of high speed circuits is also helped by as near-to-perfect rectangular cross-sections of the tracks that comprise the way from sensors to processors to output devices. Multiline would like to introduce to Europe a new semi-additive process which is designed to improve signal integrity while making it easier to improve resolutions of tracks and gaps.

• In the presentation you will hear some new ideas on multilayer pressing technology and how the registration can be improved to fulfil the demand for tighter tolerances

Registration is free of charge to EIPC Members.
The Non Member fee is € 50.-

To register for October 14th please fill in the online registration on www.eipc.org or send an email to kwestenberg@eipc.org

NEWS FROM THE UK

IMAPS-UK Autumn 2020 Online Conferences

Click on Links Below

Online Conference - Making Sense of Sensors - Thursday 12th November 2020 at 10:00 UK
· **Assembly Processes** – vacuum, hermetic and non-hermetic packaging of MEMS and MOEMS devices
· **Sensor Types** – imaging, flow, pressure, LIDAR and tactile sensors
· **Graphene** – sensors applied in structural performance monitoring
· **3D Printing** – how 3D printing technologies are making an impact in sensor manufacturing

Online Conference - Thermal Management - Wednesday 25th November and Thursday 26th November at 13:30 UK
· **End User Needs** – challenges in transportation and industrial sectors
· **Passive Cooling** – overcoming thermal management issues through advanced materials and processes
· **Active Cooling** – thermoelectric generators, additive manufacturing, embedded cooling
· **Measurement and Testing** – ensuring reliability/fitness for purpose
· **Simulation** – shortening the design and validation cycle

For any other details or information please contact:
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e-mail: Office@imaps.org.uk

NEWS FROM THE USA

Rogers Corporation Introduces SpeedWave™ 300P Ultra-Low Loss Prepreg

Rogers Corporation (NYSE:ROG) is pleased to introduce SpeedWave™ 300P Ultra-Low Loss Prepreg. With the increasing need for stackup flexibility in high layer count designs for 5G mmWave, high resolution 77 GHz automotive radar, aerospace & defence and high speed digital designs, SpeedWave 300P prepreg offers a broad range of competitively priced high performance options for the circuit designer. SpeedWave 300P prepreg can be used to bond a variety of Rogers' materials including XtremeSpeed™ RO1200™, CLTE-MW™, and RO4000® series laminates.

SpeedWave 300P prepreg system offers a low dielectric constant of 3.0 – 3.3 and a low dissipation factor of 0.0019 – 0.0022 at 10 GHz with stable performance over a broad frequency range. This material is offered in multiple spread and open weave glass style*s* and resin content combinations to maximize stackup options.

SpeedWave 300Pprepreg provides excellent thermal reliability for the most demanding high layer count designs requiring multiple sequential laminations. It also delivers superior fill and flow capability around heavy copper features, a low z-axis expansion for plated through-hole reliability and is CAF resistant. This UL 94 V-0 rated material is compatible with modified FR-4 fabrication processes and lead-free PCB assembly processing.

About Rogers Corporation
Rogers Corporation (NYSE:ROG) is a leader in engineered materials to power, protect, and connect our world. With more than 180 years of materials science experience, Rogers delivers high-performance solutions that enable clean energy, internet connectivity, and safety and protection applications, as well as other technologies where reliability is critical. Rogers delivers Power Electronics Solutions for energy-efficient motor drives, e-Mobility and renewable energy; Elastomeric Material Solutions for sealing, vibration management and impact protection in mobile devices, transportation interiors, industrial equipment and performance apparel; and Advanced Connectivity Solutions for wireless infrastructure, automotive safety and radar systems. Headquartered in Arizona (USA), Rogers operates manufacturing facilities in the United States, China, Germany, Belgium, Hungary, and South Korea, with joint ventures and sales offices worldwide. For more information, visit www.rogerscorp.com.

ELECTRONIC INDUSTRY NEWS

Inside the US campaign to cut China out of the tech supply chain

Apple, Google and others shift production to prepare for 'decoupled' global market

LAULY LI and CHENG TING-FANG, Nikkei staff writers

OCTOBER 7, 2020 06:09 JST

TAIPEI --- It was a hot summer morning in Taipei when several officials from the American Institute in Taiwan, the de facto U.S. embassy, visited the top management of a major tech company, a key supplier to Apple.

It was immediately apparent that this was unlike previous courtesy visits, where U.S. officials stop in from time to time to hear what's happening in the industry. This time, they cut the chitchat and threw out a blunt question soon after they sat down: "Why aren't you moving more of your production capacity outside of China?" they asked. "Why aren't you moving faster?"

Participants described the conversation as "serious and unsettling." "We felt uneasy," said one. "They asked many questions that we didn't know if we could answer. The answers would have involved unreported strategies about ourselves and our clients." But the message was unambiguous: The U.S. government was directly appealing to his company to cut its ties to China, he said.

The American officials also met with several top Taiwanese chipmakers -- companies whose products are used by Huawei Technologies, the Chinese telecoms equipment supplier that Washington accuses of spying for Beijing. The meetings, likewise, appeared to be an effort to draw those companies over to the U.S. side in the escalating Washington-Beijing tech war, multiple sources with knowledge told Nikkei Asia.

"They were here to make sure we understood clearly about U.S. export control rules and told us the U.S. stance about Huawei," a chip industry source familiar with the matter said. "But we read those words as a warning."

For executives in Taiwan's electronics industry, the meetings are another sign that the battle for tech supremacy between the world's two superpowers has reached a new level. It began in 2016 with sanctions against telecoms equipment company ZTE, and has turned steadily more serious as Washington ramps up pressure on Chinese companies which it says threatens U.S. national security.

A person close to AIT declined to confirm the specifics of the meetings, but said that it is routine practice to keep in touch with Taiwanese companies about "supply chain restructuring and export control compliance."

In the space of one year, Washington has revised its export control rules three times to target Huawei -- changes that have affected both U.S. and non-U.S. suppliers of the Chinese company. Suppliers are now cautious over the long arm of the American law, they say. And over the past two years, the Trump administration has accelerated its efforts to blacklist Chinese companies by placing them on the so-called Entity List, adding some 70 more companies and organizations so far this year.

Now, what started as U.S. government pressure on American companies to boycott specific Chinese entities has since become a concerted effort to force non-U.S. suppliers to join a wholesale blockade of Chinese technology.

"Washington has weaponized tech supply chains, for example, in semiconductors, in order to slow down China's technology ambitions," said Alex Capri, a research fellow at the Singapore-based Hinrich Foundation and visiting senior fellow of National University of Singapore Business School. The U.S. is aiming to "suppress Beijing's techno-authoritarianism model," he said.

The message, as understood by the Taiwanese executives, was urgent: Move production facilities out of China, reduce ties with Chinese clients like Huawei and stand with the U.S., or face the potential worst-case scenario of becoming Washington's next target.

Both sides, now

The idea of unpicking the sophisticated tech supply chain that has grown up in China over the last two decades would have been unthinkable just two years ago. But pressure from the Trump administration has made this a reality, with companies from Apple to Google decamping from China to Vietnam, India, Thailand and Malaysia in the last 36 months. For the global tech industry, the question is whether the alternative supply chain that emerges

can match the efficiency of the one in China that builds more than 200 million iPhones a year.

Taiwan is in a key position to witness this new emerging U.S. policy because its tech companies sell equally to both sides -- from Taiwan Semiconductor Manufacturing Co., the world's biggest contract chipmaker, to Foxconn Technology Group, formally known as Hon Hai Precision Industry, the largest electronics contract manufacturer globally. They count as clients top U.S. companies like Apple, Microsoft, Google, Amazon, Qualcomm, Hewlett-Packard, and Dell, as well as leading Chinese companies such as Huawei, Lenovo, Xiaomi, Alibaba Group Holding, and Oppo. Sitting astride a fault line separating China and the U.S. in a new technology cold war, Taiwan's companies are being forced, albeit unwillingly, to choose sides.

"It is a very confusing era. The tech industry in decades has never needed to pay such close attention to the international political dynamics as now," Tung Tzu-hsien, chairman of key Apple supplier Pegatron, recently told a Taipei forum on the post-coronavirus era.

Last month the U.S. government, via the AIT, publicly echoed its private message that all foreign technology suppliers should leave China.

On September 4, AIT Director Brent Christensen hosted a forum on supply chain restructuring, together with EU, Canadian, and Japanese counterparts, to publicly advocate for decoupling. It was the first time the U.S. had held such an event in Taiwan, a diplomatic gray zone without a full-fledged U.S. embassy, viewed by Beijing as a breakaway part of the People's Republic of China.

"Shared interests and shared values": American Institute in Taiwan Director Brent Christensen at the Sept. 4 forum on supply chain restructuring in Taipei.   © Reuters

International companies "increasingly recognize the dangers of linking their futures to the PRC" and have begun to seek alternative production and manufacturing hubs other than China, he said.

Christensen called on other countries to cooperate on rebuilding the supply chain elsewhere. "Our shared interests and shared values make us natural partners, and we believe we will be stronger and more effective if we work together."

But it is not so simple for technology companies, for whom China is not only a deeply-rooted production base but also their fastest-growing market. Twenty percent of Apple's total revenues, more than 20% of Intel's revenue and 60% of mobile chip king Qualcomm's sales come from China, although in many cases items sold in China are later re-exported to other markets.

A number of the biggest companies are doing their best to straddle the widening chasm between Beijing and Washington, in an effort to avoid picking a side. Apple, for one, has adopted a two-sided strategy to balance itself from the tech war. While it has been pushing suppliers to accelerate their shift away from China since late 2018, it has also been aggressively cultivating Chinese homegrown suppliers to play a more important role inside China, and secure continuous access to the 1.4 billion strong market.

With Apple's consent, Taiwan's Wistron sold its iPhone-assembly factory in the Chinese city of Kunshan this summer to local rival Luxshare Precision Industry. The handover was

significant: It paved the way for the Chinese supplier to move up the Apple supply chain, fueling hopes that it could become China's equivalent of the Taiwanese Foxconn, a giant of tech manufacturing. China's Lens Technology also bought iPhone casing factories from Taiwan's Catcher Technology, a longtime Apple metal casing provider, in the city of Taizhou in August.

"Apple has always been cultivating Chinese suppliers. The rationale behind this used to be that it gave Apple more price bargaining power against the existing suppliers, but now it has also become a strategy to diversify geopolitical risks," said an executive-level source familiar with Apple's thinking.

Foxconn, meanwhile, has moved part of its production out of China, but insists they will not be choosing a side. "The global trend toward a G2 [group of two] is inevitable. How to serve the two big markets is something that we've always been planning for," Young Liu, chairman of Foxconn Technology Group told an investor conference in Taipei in August, referring to the U.S. and China.

But not every company has the resources to straddle the widening gap like the Apples and Foxconns of the world. The reality, they say, is that chip developers still rely on a handful of critical U.S. chipmaking production and design tool providers such as Applied Materials, Lam Research, KLA, Synopsys, and Cadence Design Systems to craft the most advanced chips possible.

That has forced all the chip suppliers in the world to apply for licenses from the U.S. government to ship to Huawei, an order which came into effect on Sept. 15. Since then, tech supply companies have put in a nearly impossible position, maneuvering between the U.S. and China to avoid incurring the wrath of either government.

"Generally speaking, multinational tech companies would not want to choose sides in the U.S.-China trade war, but they still have to prepare themselves for [a] possible worsening scenario," Chiu Shih-fang, a senior tech supply chain analyst at Taiwan Institute of Economic Research, told Nikkei.

So far, China's reaction has been muted, but few tech executives think they can count on continued forbearance by Beijing. One tech supplier told Nikkei that they have been receiving more requests to meet with local Chinese officials "for tea," and in those meetings, officials would seek assurance of no exit plans or job reductions.

Some suppliers have been asked to set up offices operated by the Chinese Communist Party within their manufacturing complex. These are all signs that the authorities want to be more informed about the movements of the suppliers, and to prevent any massive exodus, they said. Suppliers are mostly cautious not to make their diversification plans known, for fear of attention from Chinese local governments.

Meanwhile, on Sept.19, China also created its own version of the U.S. trade blacklist: the "Unreliable Entity List," reserved for any foreign companies that treat Chinese companies unfairly, according to the government's judgement. While no one has been put on the blacklist yet, China's state-backed nationalist newspaper Global Times in May said that Apple, Qualcomm, Cisco Systems and Boeing could potentially be added on the Chinese list.

"What we are trying to do is to protect ourselves from being hurt in this fight between two huge elephants [the U.S. and China]," said one supply chain executive, who added that they had been trying to quietly dispose of some Chinese assets and get the money out of the country to invest in Southeast Asia. "We are worried our assets in China could one day be a hostage if the tensions between the U.S. and China continue to deteriorate," he added.

'Out of China'

For the tech industry, it signals the end of an era. Previously, they could design products in the West and manufacture in China's industrial heartland, an area labelled by Bank of America as a "Goldilocks Zone" that, for three decades, has offered the optimum mix of costs, quality, human resources, and infrastructure.

Now, the industry as a whole must face the new reality of nationalism and trade protectionism, and rely increasingly on a scattered, decentralized supply chain emerging in Southeast Asia.

The industry has already begun a migration not seen in two to three decades. Some 2,000 Taiwanese, Japanese, and South Korean companies across all sectors -- including many key tech suppliers -- have indicated plans to diversify production away from China, according to government data. Tech companies, especially American brand vendors like Apple, are looking at moving 15% to 30% of their total output out of China, a share equivalent to their U.S.-bound shipments, and asked its Asian suppliers to help facilitate diversification plans over the next few years.

Japan has launched a 220 billion yen ($2.08 billion) subsidy program to encourage companies to bring manufacturing back home, and allocated an additional 23.5 billion yen to fund moving production to Southeast Asia. Nearly 90 Japanese companies were approved for the subsidies as of July this year, while more than 1,600 companies have applied for the

funds. Taiwan, in turn, has been running a "move production back to Taiwan" campaign with special tax breaks and loan interest rates since late 2018.

Apple started mass-producing its popular wireless AirPods in Vietnam starting earlier this year and plans to bring more products to the Southeast Asian country, when, just last year, all such production occurred inside China. The Cupertino-based tech giant also asked key iPhone assemblers Foxconn and Wistron to expand manufacturing capacity in India, and rushed another key supplier, Pegatron, to quickly build a facility there this summer.

Decoupled: A cyclist rides past the now-closed smartphone factory of Samsung Telecom Technology in the city of Tianjin, China, on Jan. 1, 2019.   © AP

Samsung Electronics closed its last smartphone assembly facilities in China in 2019 to shift its focus entirely to Vietnam and India. Production of servers for Google, Amazon and Facebook data centers has moved to Taiwan -- two years ago, all such servers were made in China.

"The clients' mindset has changed. The rising tensions between Washington and Beijing forced them to think of their production strategies, just like buying insurance for themselves. In the next two to three years, you will see not just the big electronics assemblers, but also more and more component suppliers shifting their capacity outside of China to support a new supply chain," an iPhone supplier executive said.

The unexpected outbreak of COVID-19 further drove tech suppliers to diversify the risk in putting all their resources in a single region. Meanwhile, rising fears of foreign espionage have hardened attitudes against Chinese technology companies.

A manager at Taiwan-based Alpha Networks, a router, switch, and networking gear provider, told Nikkei: "Since last year, when we sat down with our U.S. clients, their first question has become: Do you offer an 'out of China' option, especially for those products that will go into mobile wireless networks?"

He added that, as a result, Alpha Networks has started to lower its dependence on China in terms of production. "These American clients now think it's not safe if these products are made in China."

For companies like Acter Group, a facility builder for Google, and key Apple suppliers such as Pegatron, Wistron, and many others, the tech supply chain's Southeast Asia-bound expansions have become an important growth catalyst. "We see our future projects from Southeast Asian nations such as Vietnam, Thailand and Indonesia jumping a lot," said Lai Ming-kun, general manager of Acter.

"Last year, we just heard a lot of news that certain companies are trying to diversify production from China," said Angie Tsao, director and spokesperson of Acter told Nikkei Asia. "But this year, all this news became reality. ... These tech suppliers really started building or expanding new facilities, and we also allocated some of our China staff to help our growing businesses there."

A costly migration

The costs of leaving China are immense, however. The country still offers an unbeatable combination of well-organized infrastructure, skilled labor that no other country can match, capable of mobilizing hundreds of thousands of workers and delivering components in hours with just one phone call.

Research by Bank of America Securities shows that the lead time for products to hit shelves in U.S. stores can take up to 40 days from Thailand, almost twice as long as from China.

Maurice Lee, an executive at Unimicron Technologies, a key printed circuit board maker, said it is still extremely challenging for his company and its peers to move production out of the country. "There are at least 30 to 40 manufacturing processes of making a PCB. ... In China, we've got a complete ecosystem and we are very close to all of our suppliers. ... Moving to anywhere else means all the processes, logistics need to be redesigned, and it also means we have to train workers all over again," Lee, also the chairman of Taiwan Printed Circuit Association, said. "That means an increase in costs."

"Tech manufacturing would face a fundamental change [if it were to move out of China]," said Pegatron's Tung. His company, which previously concentrated production only in China and Taiwan, has built new production facilities in Indonesia and Vietnam in the past two years and is about to build a new one in India. "In the past, it would only take two hours to mobilize the delivery of components from other Chinese provinces. But in the future, it would take at least one to two weeks of waiting time as the supply chain becomes decentralized outside of China."

"This is a new reality that we all have to face and adapt [to]," Tung added.

"Manufacturing would face a fundamental change": Tung Tzu-hsien, chairman of key Apple supplier Pegatron.
© Reuters

Government-led policies helped the little-known inner Chinese city of Zhengzhou of Henan Province transform from a deserted agricultural city to a manufacturing center churning out 50% of the world's iPhones every year. The city government of Chongqing, in China's west, assisted HP and its suppliers to establish one of the world's biggest notebook manufacturing hubs. It once produced one in every three laptops globally.

Even before the trade war, however, several suppliers were looking to move some production to Southeast Asia amid rising costs and labor shortages in China. For the past four to five years, it was already getting harder for manufacturers to attract enough production-line workers during peak season. Lack of workers and rising land prices and wages have become a common headache for suppliers in recent years, and had already prompted companies to look for alternatives outside of China.

China's "iPhone City": The central business district of Zhengzhou City, in Henan Province.   © AP

Sean Kao, an analyst with IDC, said many companies have suffered the rising labor costs in China for several years and started to evaluate some diversification plans, but none of them had acted on these plans until the trade war started.

"Still, none of the countries could fully replace China," Kao said. "But the escalating tension between the U.S. and China and, later, COVID-19, pulled the trigger to push all these suppliers and their clients to be really determined to shift at least some production to other countries, and step out of their comfort zone. ... This new, irreversible move is happening."

Doubts, mosquitoes

Efforts to shift operations outside China have had mixed results. A new supply chain is emerging in Southeast Asia and India, less than 1,000 days after the first wave of punitive tariffs against Chinese imports was implemented in 2018 as tit-for-tat Washington-Beijing trade tensions escalated.

Big tech suppliers like Apple Watch maker Compal Electronics have secured land in Vietnam; AirPods and Xiaomi phone maker Inventec has facilities in Malaysia; while iPhone and Acer notebook assembler Wistron has plants in the Philippines. But those plants, often small-scale, are scattered across Southeast Asia and not operating at their full capacity.

Compal, which also supplies parts to HP and Dell, was given land for a factory in the northern Vietnamese province of Vinh Phuc. But it was fined in 2013 by the local government and had much of the property taken back, after it failed to make use of the land and hire local labor as promised.

"In some of the cases, there used to be no one in these idled factories. Only mosquitoes," a supply chain executive told the Nikkei, describing the state of his company's plants in Southeast Asia a few years ago.

While these factories are no longer idle, the lack of efficiency in Southeast Asia is a new challenge for the suppliers. Yancey Hai, chairman of Delta Electronics, a key power supply components provider for Apple, HP and Dell, said his company has launched a diversification plan for the trade war to expand production in Taiwan, Thailand and India.

However, he said, the Chinese government's efficiency during the coronavirus outbreak is hard to beat. It was among the quickest in the world to help manufacturers resume production with guidelines of virus prevention measures amid the pandemic.

Industries across sectors and market watchers are paying close attention to the upcoming U.S. presidential election, but not many of them believe the competition and geopolitical tensions between Washington and Beijing will die down, no matter who becomes the next American president.

Martijn Rasser, senior fellow of the technology and national security program at the Center for a New American Security, said the U.S. and China are not likely to go back to "good old days," as he put it.

"Should Joe Biden become president, I do expect a change in tone and tactics. [But] there is strong bipartisan consensus on the challenges that a rising China poses, as well as a broad acceptance among the international allies that ... bringing China into the world economy to gradually open [up], and prompt Beijing to moderate its position on a range of geopolitical issues, did not work."

Willy Shih, a professor of management practice at the Harvard Business School, told Nikkei: "The U.S. election could change the leadership on one side ... and that might somewhat improve relations. But there is also bipartisan support for a more aggressive policy toward China, so I'm not optimistic."

"I think a lot of supply chain movement in tech products has been set in motion, and it has momentum that will be hard to change."

The Memory Market
By Brian Santo

The market for memory ICs has always been dynamic, but with edge computing, artificial intelligence (AI), 5G and autonomous driving all taking off, the demand for memory technology is both expanding and evolving. Add dramatic shifts in the world of work and business because of the ongoing pandemic, and the memory industry has more challenges to solve all at once than ever before.

Our latest EE Times Special Project looks at how diverse memory technologies are advancing and what's driving their evolution. Contributing editor Gary Hilson has been on the memory beat for a long time and he helped develop this Special Project and wrote many of the stories.

One of those takes a look at a set of memory technologies that are still described as "emerging," even though most of them have been around for years. Hilson looks into whether they merit the renewed hype they've been getting in Emerging Memories May Never Go Beyond Niche Applications.

Speaking of which, we have a story on one of those emerging technologies — MRAM — and how it's catering to its specialized market. Alan Patterson, our correspondent in Taiwan, contributed Spin Partners with Arm, Applied in MRAM Manufacturing.

In the companion piece to the one on emerging technologies, Hilson investigates the so-called "legacy" memories too. Read Plenty of Life Left in Legacy Memories.

Security, reliability and longevity are just as important as performance for many of the applications that need more memory. Automotive, networking, industrial and medical applications don't necessarily need the latest and greatest memory such as DDR5 DRAM or 3D NAND. We put that into perspective in Memory Only a Piece of the Security Puzzle.

Our resident AI maven, editor Sally Ward-Foxton, takes a look at how the demands of artificial intelligence applications are creating interesting new demands on memory technology. Read Memory Technologies Confront Edge AI's Diverse Challenges.

Hilson was also our guest on a recent episode of our Weekly Briefing podcast, where he gave a pretty thorough overview of the memory market based on all of our research for the Special Project. He talks about the prospects of some of the emerging memories (ReRAM, MRAM and FRAM, for example); about PCRAM which might be considered to have actually emerged in the form of Intel Optane; and why it is that legacy memories are so enduring. You can find the podcast here: Interview: Roboticist Ayanna Howard | Memories May Be Beautiful, And Yet | Math & Neptune.

Also, memory technology has to be one of the most heavily acronymmed segments of the electronics industry. We provided A Memory Technology Glossary.
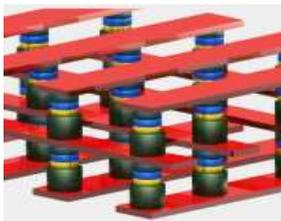
Articles in this Special Project:

 Remote work Spurs Desktop Performance Increases

Workstations will demand more memory, but the future all-purpose device may be a smartphone.

By Gary Hilson

 Spin Partners with Arm, Applied in MRAM Manufacturing

MRAM specialist Spin Memory attracted some important allies as it goes after the U.S. military memory market.

By Alan Patterson

 Emerging Memories May Never Go Beyond Niche Applications

Healthy markets are possible for emerging memories without trying to supplant DRAM or NAND flash.

By Gary Hilson

[Plenty of Life Left in Legacy Memories](#)

Legacy memories are no longer lowly devices that hit their end of life (EOL) because a major vendor is focused on the latest and greatest.

By Gary Hilson

[Memory Only a Piece of the Security Puzzle](#)

Security features must be configured properly and work within a larger ecosystem.

By Gary Hilson

[Memory Technologies Confront Edge AI's Diverse Challenges](#)

Edge AI applications are many and varied, which means that there are nearly endless options for memory for edge applications.
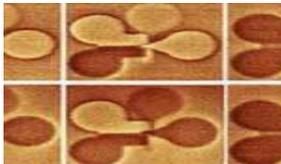
By Sally Ward-Foxton

NVMe-oF is Ready to Go the Distance

Is 2020 the year NVMe over Fabrics (NVMe-oF) finally takes off?
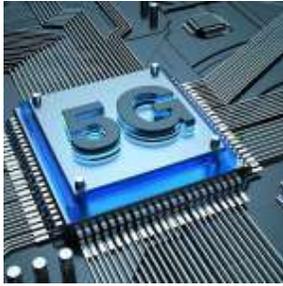
By Gary Hilson

A Memory Technology Glossary

By EE Times staff

Interview: Roboticist Ayanna Howard | Memories May Be Beautiful, And Yet | Math & Neptune

The Weekly Briefing podcast, September 25, 2020: A conversation with EE Times contributor Gary Hilson about emerging memories. Also, an interview Georgia Tech professor Ayanna Howard, an expert in AI and robotics.

By Brian Santo

[5G Mixes, Matches Memories](#)

Networking infrastructure will require new and established technologies, as smartphones advance. 5G memory demand is likely to be similar to 4G memory demand.
By Gary Hilson

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Brian Santo

Brian Santo is Editor-in-Chief of EE Times. He has been writing about technology for over 30 years, for a number of publications including Electronic News, IEEE Spectrum, and CED; this is his second stint with EE Times (the first was 1989-1997). A former holder of a Radio Telephone Third Class Operator license, he once worked as an engineer at WWWG-AM. He is based in Portland, OR.

NEWS FROM THE IPC

North American PCB Industry Sales Down 2.5 Percent in August
IPC Releases PCB Industry Results for August 2020

IPC have announced the August 2020 findings from its North American Printed Circuit Board (PCB) Statistical Program. The book-to-bill ratio stands at 0.94.

Total North American PCB shipments in August 2020 were down 2.5 percent compared to the same month last year. Compared to the preceding month, August shipments fell 1.0 percent.

PCB bookings in August fell 24.9 percent year-over-year and declined 1.6 percent from the previous month.

"The North American PCB industry saw historic growth in the early months of the pandemic with supply from China constrained and many manufacturers bidding for alternative capacity. Over the last two months however, order flow has slowed precipitously as the economic recovery moderates and downstream industries become more cautious in the face of mounting uncertainty," said Shawn DuBravac, IPC's chief economist. "August saw the lowest orders since July 2016. The supply chain remains healthy, but slowing downstream demand is weighing on the PCB industry and is likely to remain a headwind in the coming months."

Detailed Data Available

Companies that participate in IPC's North American PCB Statistical Program have access to detailed findings on rigid PCB and flexible circuit sales and orders, including separate rigid and flex book-to-bill ratios, growth trends by product types and company size tiers, demand for prototypes, sales growth to military and medical markets, and other timely data.

Interpreting the Data

The book-to-bill ratios are calculated by dividing the value of orders booked over the past three months by the value of sales billed during the same period from companies in IPC's survey sample. A ratio of more than 1.00 suggests that current demand is ahead of supply, which is a positive indicator for sales growth over the next three to twelve months. A ratio of less than 1.00 indicates the reverse.

Year-on-year and year-to-date growth rates provide the most meaningful view of industry growth. Month-to-month comparisons should be made with caution as they reflect seasonal effects and short-term volatility. Because bookings tend to be more volatile than shipments, changes in the book-to-bill ratios from month to month might not be significant unless a trend of more than three consecutive months is apparent. It is also important to consider changes in both bookings and shipments to understand what is driving changes in the book-to-bill ratio.

IPC's monthly PCB industry statistics are based on data provided by a representative sample of both rigid PCB and flexible circuit manufacturers selling in the USA and Canada. IPC publishes the PCB book-to-bill ratio by the end of each month.

# # #

IPC APEX EXPO 2021 Dates Changed!

Meet us in San Diego March 6-11, 2021!

Because the health and safety of all attendees at IPC APEX EXPO is paramount, we reached out to the San Diego Convention Center to request a date change. When we were offered the March date, we surveyed several potential exhibitors and attendees, all who supported the decision to host IPC APEX EXPO 2021 later in the year. **We can't wait to see you March 6-11, 2021 in sunny San Diego!**

Both IPC and the San Diego Convention Centre are committed to the well-being and health and safety of all attendees at IPC APEX EXPO. In addition to IPC's social distancing protocols, face mask requirements and daily temperature checks, the San Diego Convention Center (SDCC) will implement a program of stringent processes for cleaning, disinfection, and infectious disease prevention under its **Global BAC STAR™ facility accreditation.** For more information on the precautions the San Diego Convention Center is taking regarding sanitation, social distancing, food and beverage and staff protocols and training please visit: https://visitsandiego.com/safe-meetings.

The IPC team is actively curating the industry's leading technical conference covering the newest technologies, latest studies, advanced materials and processes, and best practices from all segments of the worldwide electronics industry. We are so excited to show you the schedule which is coming soon!

This is the place to see what's new. IPC APEX EXPO annually showcases the largest exhibition for electronics manufacturing in North America, with this year's event highlighting the industry's leading equipment manufacturers, suppliers, and innovators.

Registration opens early October. We look forward to welcoming you to sunny San Diego March 6-11, 2021.

Please note: If you already have hotel reservations with onPeak for the original January dates for APEX, you will receive an email notifying you that your reservation has been cancelled. If reservations were made through any other channel, you will need to reach out

to that entity to cancel. We are working to secure rooms for the March dates and ask that you do not book a hotel room until you have heard from IPC and onPeak with the new reservation site.

IPC Releases IPC-6012EM, Medical Applications Addendum to IPC-6012E, *Qualification and Performance Specification for Rigid Printed Boards*

IPC is known for developing addendums to some of its most widely used standards for specific industry sector use, including military/aerospace, space flight, automotive and telecommunications. Now, IPC has responded to requests from the medical device segment of the electronics industry and has released IPC-6012EM, *Medical Applications Addendum to IPC-6012E, Qualification and Performance Specification for Rigid Printed Boards.*

The IPC D-33AM Task Group developing IPC-6012EM realized that there are two different focuses for electronics in the medical device industry sector: the relatively high-volume production of "standard-sized" printed boards for medical diagnostic equipment applications; and the miniature, high density printed boards for very small devices which are often human body implantable.

"We understand the medical industry utilizes electronics in laser surgical devices, radiation emitting devices, x-ray machines, ultrasound devices and implantables where product failure can result in the high risk of injury to the patient," noted John Perry, IPC director of printed board standards and technology. "IPC recognized the industry's desire for more stringent printed board fabrication requirements than can be provided within the current IPC Class 3 Performance class for these types of medical devices. The IPC D-33AM Task Group was created to develop an addendum to the base IPC-6012E printed board performance specification that addresses those technological needs."

IPC's family of printed board design standards (IPC-2220 series) and board performance specifications IPC-6010 series) make use of three IPC producibility levels, intended to convey to the end user an increasing cost and sophistication with respect to fabricating printed board features of smaller and smaller size. IPC-6012EM is the first addendum to an IPC specification that makes use of a new design level "D", which was created to address the miniaturization level of medical devices. This new design level "D" goes beyond the typical feature sizes of what is typically considered "high density interconnect" (HDI) and addresses conductor width/spaces below 60 μm as well as via structures below 100 μm.

Many regulatory requirements provided by both the United States Food and Drug Administration (FDA) and the European Union (EU), help ensure the safety and security of human beings (and animals) with respect to not only human and veterinary drugs and biological products, but also electronic medical devices. Examples include the EU Medical Device Directive, EU Active Implantable Medical Devices Directive and the EU Commission Regulations. As noted by Andres Ojalill, IPC technical staff liaison to the IPC D-33AM Task Group, "IPC-6012EM has been written to streamline the production of high reliability printed boards for medical devices in accordance with regulations mentioned above so that there are no gaps between technical and regulatory requirements."

For more information on IPC-6012EM, visit https://shop.ipc.org/IPC-6012EM-English-D.

EIPC SPEeDNEWS

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International Diary

2020

Technical Snapshot Webinar
Registrations via www.eipc.org
14 October

TPCA Exhibition
21-23 October
Taipei, Taiwan

Electronica 2020 VIRTUAL
10-13 November
München, Germany

KPCA
24-26 November
Incheon, Korea

ECWC15, WECC World Electronics Circuits Council
Webinar
30 November-2 December

HKPCA Exhibition
2-4 December
Hong Kong, China

2021

IPC APEX EXPO
March
San Diego, USA

EIPC @ SMTconnect
4-6 May
Nuremberg, Germany