SINGAPORE SEMICONDUCTOR VOICE

SSIA
Singapore Semiconductor Industry Association

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Forging Resilience: Navigating Supply Chain Disruptions

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FOREWORD BY Executive Director

Celebrating 55 Years of Semiconductors

Welcome to this special edition of VOICE magazine, marking a momentous occasion in the world of technology — the 55th anniversary of the semiconductor industry. As we reflect on over five decades of ground-breaking advancements, innovation, and transformative impact, we are filled with admiration for the incredible journey that has brought us to this point.

The semiconductor industry has undoubtedly become the backbone of modern technology, powering the devices and systems that have revolutionized our lives. From the humble beginnings of the first integrated circuit to the intricate microprocessors of today, semiconductors have shaped the world we inhabit, propelling us into an era of unimaginable possibilities.

In this commemorative edition, we take you on a captivating exploration of the industry's evolution, showcasing the trailblazers, the brilliant minds, and the myriad of technological breakthroughs that have paved the way for the future. We delve into the past, tracing the roots of semiconductors and paying homage to the visionaries who dared to dream beyond the confines of what was considered possible.

But this magazine is not just about reminiscing; it is about embracing the present and, more importantly, embracing the future. We dive into the cutting-edge developments that are propelling the semiconductor industry forward, shaping our world in unprecedented ways. From artificial intelligence and quantum computing to 5G connectivity and the Internet of Things, we explore the very forefront of innovation and its profound impact on various industries.

We also recognize the immense challenges faced by the industry. The global landscape has become more complex, with geopolitical shifts and supply chain disruptions creating a new dynamic that requires agility and resilience. We delve into the strategies, the solutions, and the collaborative efforts that drive progress in these uncertain times.

Moreover, sustainability and responsible practices have taken centre stage. We address the pressing need for a cleaner, greener semiconductor industry, shedding light on the initiatives and advancements that aim to reduce environmental impact and create a sustainable future for generations to come.

As we celebrate this milestone, we extend our gratitude to the countless engineers, researchers, innovators, and industry leaders who have dedicated their lives to pushing the boundaries of what is possible. It is their unwavering commitment to excellence that has shaped the semiconductor industry into what it is today — a force that propels us forward, empowers us, and connects us like never before.

We invite you to join us on this captivating journey through time, technology, and human ingenuity. Together, let us celebrate 55 years of semiconductors, paying tribute to the past, embracing the present, and eagerly anticipating the exciting future that lies ahead.

Thank you for being a part of this milestone celebration.

ANG WEE SENG
Executive Director
Singapore Semiconductor Industry Association (SSIA)

SECRETARIAT TEAM

EXECUTIVE DIRECTOR
Ang Wee Seng
weeseng@ssia.org.sg

HEAD OF MARKETING AND COMMUNICATIONS & VOICE EDITOR-IN-CHIEF
Yvonne Perpetua Ng
yvonne@ssia.org.sg

COMMUNICATIONS EXECUTIVE & VOICE CREATIVE DESIGNER
Chan Xing Yun
xingyun@ssia.org.sg

DIRECTOR FOR BUSINESS DEVELOPMENT AND PARTNERSHIPS
Amy Ang
amy@ssia.org.sg

BUSINESS DEVELOPMENT MANAGER
Jasmine Tai
jasmine@ssia.org.sg

HUMAN CAPITAL DEVELOPMENT DIRECTOR
Velinda Wee
velinda@ssia.org.sg

HUMAN CAPITAL DEVELOPMENT SENIOR SPECIALIST
Teresa Chong
teresa@ssia.org.sg

STRATEGIC PROGRAMS DIRECTOR
Julie Koh
juliekoh@ssia.org.sg

HEAD OF PROJECTS
Rebecca Foo
rebecca@ssia.org.sg

EXECUTIVE ASSISTANT
Cindy Chong
cindy@ssia.org.sg

HUMAN RESOURCE MANAGER
Patsy Tan
patsy@ssia.org.sg

SSIA BOARD

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SINGAPORE SEMICONDUCTOR

1968–2023

55TH ANNIVERSARY

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Singapore's Thriving Semiconductor Industry and the Role of SSIA

The development of Singapore's semiconductor industry has played a crucial role in the establishment of the Singapore Semiconductor Industry Association (SSIA). Over the past 55 years, the industry has experienced remarkable growth. It has transitioned from being a labour-intensive assembly hub to becoming a high-value-added manufacturing and R&D base.

This shift has not only elevated its stature but also enhanced its capacity for innovation and development. By embracing technological advancements and fostering innovation, the industry has created a conducive environment for the continued growth and development of semiconductor companies. As the industry undergoes constant transformation, SSIA assumes a vital role. Guided by the industry's needs and the collective vision of its leaders, SSIA actively shapes a promising future for the entire sector. The association champions the growth of our talent pool, the development of the local ecosystem, and above all, the relentless pursuit of a more sustainable industry. This will guarantee that the industry remains an essential pillar of Singapore's economy, playing a pivotal role in its growth and development.



SUPPLY CHAIN RESILIENCY

The global semiconductor industry is facing significant challenges as supply chain disruptions have become more frequent and severe. These disruptions, often caused by unforeseen events like the COVID-19 pandemic, can have a ripple effect, impacting not just the semiconductor industry but also the myriad of industries that rely on chips for their products. It is therefore paramount to establish a more resilient supply chain for the semiconductor industry. This would involve, among many others, diversifying sources of raw materials and production capabilities, investing in advanced technologies for forecasting and risk management, and fostering stronger collaboration within the industry. By doing so, the industry will be better equipped to mitigate the impacts of future disruptions, ensuring a steady supply of chips to meet global demand. This resilience will not only benefit the semiconductor industry but also contribute to the stability of global economies, underscoring the critical role of the semiconductor industry in our increasing digital world.

THE IMPORTANCE OF GLOBAL SOLIDARITY TO BUILD A MORE ROBUST SUPPLY CHAIN



In an increasingly interconnected world, the responsibility of building a resilient supply chain for the semiconductor industry must be shared globally. The complexity of the semiconductor supply chain and its critical role in multiple industries necessitates a collective response from countries worldwide. Collaborative efforts could entail sharing best practices, investing together in R&D for innovative solutions, and diversifying production bases. It is no longer practical for one country or region to shoulder the entire supply chain. Instead, fostering inter-regional cooperation can distribute risk and create a more robust, resilient supply chain. This global solidarity will not only help to mitigate the impact of future disruptions but also spur economic growth and technological advancements across countries, reinforcing the importance of the semiconductor industry in driving global progress. SSIA is committed to developing relationships with more countries and this initiative aims at expanding our network of international connections. In the end, fostering global collaborations will fortify the semiconductor supply chain worldwide, enhancing its resilience and ability to swiftly adapt to the dynamic shifts in the global landscape.

The necessity for worldwide collaboration extends beyond the aspirations and ambitions of a single trade association or nation. The importance of semiconductors could one day call for the need to establish an international consortium of countries involved in semiconductor production. This consortium would foster high-level dialogue between nations, facilitating the exchange of ideas and strategies to fortify the supply chain. It could also pave the way for joint research and development initiatives, shared production facilities, and harmonized regulatory standards. In the face of disruptions, this international consortium could act as a unified entity to swiftly mobilize resources and adapt strategies to minimize the impact. Through this collective effort, the resilience and stability of the global semiconductor supply chain could be significantly enhanced, contributing to the progress and prosperity of the global economy. The potential of an international consortium is vast; its establishment would symbolize the successful fruition of shared goals and relentless efforts. It would stand as a testament to the power of global collaboration and the strength of international networks.

A PARADOX OF GREEN TECHNOLOGIES

We are witnessing another significant trend: a growing inclination among semiconductor companies, globally and in Singapore, to embrace environmentally friendly technologies. These companies are making substantial investments in solutions that enhance operational efficiency and minimize environmental impact. Notably, there is a strong emphasis on renewable energy sources and clean production processes. This trend aligns with the Singapore government's steadfast commitment to sustainability.

The semiconductor industry occupies a contradictory position when it comes to environmental impact. On one hand, semiconductors play a critical role in powering green technologies. They form the backbone of renewable energy systems like solar panels, wind turbines and are vital in energy-efficient appliances and electric vehicles. However, paradoxically, the semiconductor industry is also a significant emitter of greenhouse gases. The production of semiconductors is energy-intensive and contributes significantly to carbon emissions. Furthermore, the increasing global demand for electronic devices has led to a surge in the production of semiconductors, exacerbating the industry's environmental impact. Clearly, the semiconductor industry finds itself in a challenging position – being both part of the solution and part of the problem. Striking a balance between these conflicting roles calls for a concerted effort from industry players to adopt more sustainable practices, invest in energy-efficient technologies, and work towards a circular economy model that minimizes waste and maximizes resource efficiency.

This unique juxtaposition presents us with numerous opportunities to reshape and redefine the status quo within the semiconductor industry. First and foremost, Singapore could become a pioneer in green semiconductor manufacturing. By investing in innovative technologies that reduce energy usage and carbon emissions, Singapore can set a new standard for sustainable practices within the industry, putting itself at the forefront of this evolving sector. At the same time, this commitment to sustainability will attract partnerships with environmentally conscious corporations and countries, positioning Singapore as a vital player in the global green economy.

Moreover, by leading the charge in the development and implementation of a circular economy model within the semiconductor industry, Singapore can further bolster its reputation as an innovation hub. This move will not only help reduce environmental impact but also generate economic value by transforming waste into resources, thereby creating new revenue streams and job opportunities.

The semiconductor industry in Singapore holds immense promise and potential, but it also faces significant challenges. To unlock its true capabilities and become a global leader in this space, Singapore must implement effective strategies and initiatives. By embracing a sustainable growth agenda, fostering global collaboration, and harnessing technological innovations such as green solutions and circular economy models, Singapore can set new industry standards and pave the way for a resilient and sustainable future. SSIA will play a crucial role in developing this agenda in partnership with the industry and the government.



ANG WEE SENG
Executive Director
Singapore Semiconductor Industry Association (SSIA)

Note from EDB



"The semiconductor industry is a key pillar of Singapore's economy and manufacturing sector. Today, the industry comprises leading global players undertaking IC design, wafer fabrication, packaging & test, equipment manufacturing and supply chain management activities across key product segments.

The industry's success is due in large part to the close partnership between industry players and the Singapore government to develop strong capabilities and talent pool across the value chain, and to strengthen Singapore's infrastructure and ecosystem to support the industry's growth. In particular, SSIA has played an instrumental role in building a cohesive community that proactively collaborates on programmes such as Semiconductor Business Connect that address common industry needs.

The long-term growth trajectory for the semiconductor industry remains strong despite recent global macroeconomic headwinds. It will remain a key growth sector for the Singapore economy. EDB looks forward to continuing our close partnership with SSIA and the industry to strengthen the semiconductor ecosystem, deepen R&D capabilities and expand the talent pipeline to better support the industry's growth, so that Singapore remains a critical global node for semiconductors in the years ahead."

Mr Png Cheong Boon

Chairman
Singapore Economic Development Board

EDB SINGAPORE



Why Cultivating A Sustained Pool Of Talent Is So Vital

The government's efforts to build talent in the semiconductor industry are ongoing. The industry is growing rapidly, and there is a shortage of skilled workers. However, the government's initiatives are helping to address this shortage, and are ensuring that Singapore remains a global leader in the semiconductor industry. Despite these challenges, Singapore is well-positioned to build talent in the semiconductor industry. The government is committed to the industry, and is providing strong support for talent development. The country also has a strong education system, and a pool of talented and hardworking people. With continued effort, Singapore can ensure that it has the talent it needs to remain a global leader in the semiconductor industry.

Caryn Lim 林芝菁

CEO, Employment and Employability Institute (e2i)
就业与职能培训中心总裁

Caryn Lim is the CEO of NTUC's Employment and Employability Institute (e2i).

She leads the organisation to improve workers' jobs and skills. e2i partners industry sectors to provide sector-specific skills upgrading and jobs support. Caryn also works closely with Government partners on nation-wide manpower initiatives. This includes developing and administering the Company Training Committee Grant to better support worker and business transformation – and strengthening the role and relevance of NTUC's Job Security Council ecosystem in supporting the needs of employers and workers.

Caryn brings with her a wealth of experience in manpower planning and policy development. Under her leadership and guidance, e2i continues to amplify efforts to create solutions for better employment and employability.



CEO of e2i, Caryn Lim shares with us her journey on building talent in the industry over the past years.

Q: How do you see the semiconductor industry evolving through the past 5 years in terms of talent development?

Over the past five years, the semiconductor industry has undergone significant changes in terms of talent development, to keep pace with technological advancements and changing market landscape.

Q: How do you see the future of talent in the industry?

Some key trends observed in talent development include:

- **New emerging job roles** due to rapid technological advancements, such as Artificial Intelligence (AI), the Internet of Things (IoT) and advanced manufacturing processes. In addition, the industry is also placing greater emphasis on sustainable practices and green technologies. This has led to a growing demand by companies looking out for individuals with specialised skills in cutting-edge technological domains as well as sustainable engineering practices.

- **Competition for talent has become global**. Companies are competing to attract the best talent from around the world. It is thus important that companies put in place robust talent acquisition and retention strategies to attract and retain talent in the industry.

- With increasing technological changes, **upskilling and reskilling initiatives** have become critical. Companies need to invest in training programmes to equip their existing workforce with new skills required for the emerging technologies. This will allow the current workforce to grow with the company and enjoy good worker outcomes.

As a result of all these, companies need to increasingly offer continuous learning and development for their employees to stay up to date with the latest technologies; promote innovation to attract talent; and provide career pathways and opportunities for their staff to grow in the role or in the company.

e2i is heartened to see forward-looking semiconductor companies channelling efforts into developing, retaining, and attracting talent into the industry.

Q: What are some of the programmes that e2i have been implementing to help workers to develop the skills needed to succeed in the semiconductor industry or to transition into the industry?

Top challenges faced by Singapore businesses, including semiconductor companies, are the increase in costs, and the availability and retention of manpower.

- To help companies with these challenges, and identify the training needs of employees, the National Trades Union Congress (NTUC) launched the Company Training Committee (CTC) and CTC Grant. The CTC is a collaborative approach between companies' management and NTUC to bring about concrete-level transformation plans, while the grant helps to defray costs for companies by co-funding transformation projects to raise business productivity, redesign jobs, and improve work prospects for their employees.

For the CTC Grant, e2i is supporting projects from semiconductor companies at up to 70% of qualifying cost, to implement projects such as Robotics Wafer Handling Process, Manufacturing Execution System (MES), etc. As a result of the business transformation, workers will either receive a salary increment or embark on a new Career Development Plan.

To mitigate the effects of the semiconductor industry's slowdown, e2i is currently assisting companies with CTCs with increased funding support, enabling their staff to undergo certifiable courses with course fees and absentee payroll covered. This helps to equip their workers with enhanced skills aligned with smart manufacturing trends for them to take on higher value roles, even during difficult times. With the formation of CTCs, companies will have the opportunity to transform their operations and workforce, ensuring that they stay agile and competitive within the industry.

- e2i works closely with the Singapore Semiconductor Industry Association (SSIA) that represents and supports the interest of the semiconductor industry in Singapore, to support companies to hire and convert locals into new job roles through the Career Conversion programme (CCP). The CCP supports career transitions into the semiconductor industry, allowing workers from different backgrounds to join the industry.

- In addition, e2i also refers and places locals into new job roles through dedicated recruitment events and an industry-based job portal.

  » e2i has been running industry-based career fairs to bridge the connection between employers and jobseekers. A notable event is the annual Electronics Industry Day, where key industry employers gather to provide training and job opportunities to tertiary students, graduates and job seekers. Career coaching is provided on-site, together with workshops in areas such as digitalisation and employability training.

  » Since 2021, e2i has partnered with SSIA on an industry portal to aggregate job vacancies. This has attracted interested job seekers to find out more about the industry and its available job opportunities. Job seekers can secure opportunities to be placed under the CCP and Place-and-Train (PnT) programmes through this platform.

- To complement the CCP, e2i has its PnT programme which enables new hires to undergo in-house/on-the-job (OJT) training to transit into the industry. This programme is helpful for new hires who previously held similar positions or came from similar industries to acquire skills top-up, so that they can fit better into the new job.

- e2i also provides funding support for training. The Professional Development (PD) grant encourages companies to impart technical, technological, and adaptive training to their talents. This training approach, encompassing re-skilling, multi-skilling and upskilling, helps to assimilate talents into the industry and aligns them with their respective job roles.

- On top of all these, e2i has also been in close collaboration with SSIA to fuel a sustainable pipeline of talent into the industry. We have provided support to onboard companies into the ITE Work-Study Diploma programme, and are currently working with companies to engage fresh graduates through NTUC's Career Starter Lab. This new initiative by NTUC and the Singapore National Employers Federation (SNEF) offers an enhanced career trial for youth to kickstart their careers, alongside valuable mentorship from our employer partners. To date, we have received encouraging responses from the companies.

The ongoing collaboration between e2i and SSIA plays an instrumental role in providing holistic support to companies through a range of diverse programmes. This synergistic partnership aims to inspire and invite more companies to join hands with us for their workforce needs. Together, we strive to cultivate a sustained pool of talent equipped with the relevant skills and foster good career progression for professionals in the semiconductor industry. This will provide mutual benefits to both businesses and their workforce.

For companies interested to partner e2i to address your manpower needs and attain higher productivity, do reach out to us at https://www.e2i.com.sg/businesses/



SSIA EVENTS Mark Your Calendars

SSIA
Singapore Semiconductor Industry Association

Scan the QR code or email **secretariat@ssia.org.sg** to find out more.



IN CELEBRATION OF THE INDUSTRY'S 55 YEARS OF MILESTONES

Tuesday, 19 September 2023 // Resorts World Sentosa

The Largest Dinner In The Industry

A celebration like no other: congratulating the semiconductor industry for its remarkable 55 years of strong achievements. Here is to building a stronger and more vibrant industry for the future. Let's celebrate our past, our present and our future together.

The Singapore Semiconductor 55 Dinner will be held at Resorts World Sentosa on Tuesday, 19 September 2023 for 1,500 guests — our industry's largest physical dinner to date! We are honoured to have Mr Gan Kim Yong, Minister for Trade and Industry, as our Guest-of-Honour. The industry's stalwarts will convene to network and foster stronger partnerships with all.

Together, we build a dynamic future for the semiconductor industry.

24 JANUARY 2024

Electronics Industry Day

The Electronics Industry Day is a unique platform that brings together diversified businesses and partners within the semiconductor and electronics ecosystem to showcase our industry's vibrancy and resilience to both young talents and mid-career job switchers, looking to pursue a career in the sector. Be a catalyst in building talent for the industry.

MARCH 2024

Semiconductor Women's Forum

Launched in 2021, organised by the Singapore Semiconductor Industry Association (SSIA) and supported by EDB, WSG, e2i, Global Semiconductor Alliance and the Semiconductor industry. This event aims to raise awareness on diversity and inclusion, attract more female talents to join the semiconductor industry, and inspire the current female workforce to stay and thrive in the industry.

MAY 2024

Semiconductor Business Connect

Electronics Industry Transformation Map 2025 is to create a faster and greater adoption of advanced technology and digital solutions into the semiconductor industry. Some companies have started to revolutionise with new and innovative solutions into their manufacture. How then do more companies stay ahead of the curve and be at the forefront of this transformational change while staying on the pulse of sustainability?

Be a part of SSIA's strong ecosystem as we delve into the sphere of collaborations and innovations.

Local Ecosystem Gains Momentum with Strong Partnerships

LANDSCAPE OF SINGAPORE'S SEMICONDUCTOR ECOSYSTEM

Over the past five years, Singapore's semiconductor ecosystem has flourished through strategic collaborations among key stakeholders, uniting government agencies, industry players and research institutions. Over the past few years, a few industry giants, have established their headquarters in Singapore, affirming the nation's attractiveness as a vibrant hub for semiconductor innovation. Their presence has driven technological advancements and fostered groundbreaking solutions in the industry, helping to propel the ecosystem to greater heights.

The expansion of prominent equipment manufacturers has also significantly strengthened Singapore's semiconductor manufacturing capabilities. Their strategic investments have contributed to Singapore's rise as a key player in the global semiconductor supply chain, ushering in a new era of transformative ideas and solutions. Singapore's semiconductor landscape will not be complete without our SMEs, many of whom have made significant contributions to the city-state's technology and system ecosystem. These companies' revolutionary solutions have positioned Singapore as a center of excellence in the semiconductor domain.

With more than 220 members in the SSIA network today, companies can be broadly categorised as Fabless Design House, Integrated Device Manufacturers (IDM), Wafer Manufacturers, Foundries, Outsourced Assembly and Test (OSAT), Equipment Manufacturers, Materials & Chemicals, Design & Software, System Integration, Electronic Manufacturing Services (EMS), Original Design Manufacturers (ODM), Service Support, Consultancy and Research and Academia. All SSIA corporate members contribute to the growth of the local semiconductor ecosystem, and we are committed to continue growing this network of industry partners for the industry.

GROWING LOCAL SEMICONDUCTOR SMEs

In recent years, more MNCs have stepped forward to support the transformation of our local SMEs to ultimately grow and strengthen their businesses to better support the entire semiconductor ecosystem here and the region. In late 2020, several industry leaders from MNCs came together to form a committee with the objective of drawing out a framework for SSIA to help support the local SMEs. Since then, the SSIA Secretariat has expanded the team to focus on this agenda, and many SMEs have benefited from platforms such as Semiconductor Business Connect. However, there remain challenges to achieve this goal.

Many of our local companies have solutions that will help their potential customers (MNCs). However, in many of these cases, there needs to be a partnership between the SME and the potential semiconductor companies to customize solutions to our industry's needs. This is where the challenges arise:

- Solution providers lack the knowledge of semiconductor fab expectations
- Lack of confidence from the engaging fab that the solution will work on their tools, processes or operations
- Solution providers lack the ability to showcase successes because the success in one fab could not be shared with others due to confidentiality

With agreement by A*Star IME's Executive Director, we managed to identify their R&D Fab as the platform to host the local SMEs and have some of their solutions installed onto the facility's infrastructure and equipment. To-date, we have 2 SMEs who have had their solutions successfully installed at IME's fab. Once ready, we will be able to invite the fabs to look at these solutions live at IME's fab and decide on the adoption of the solution and engagement with these SMEs.

Over time, the host fab could continue to engage more solution providers with SSIA's support and can choose to adopt some of these solutions too, if it is beneficial to the host fab operations. Ultimately, we hope this idea will create a closer collaboration between the host fab, the MNCs, and local SMEs to strengthen the overall semiconductor ecosystem here and in the region.



SEMICONDUCTOR BUSINESS CONNECT

SSIA's annual flagship event Semiconductor Business Connect had its rebranding in 2021 (from Industrial Automation Day) to expand areas of focus from Industry 4.0 to sustainability and additive manufacturing. Semiconductor Business Connect strives to bring innovative business solutions to the ecosystem by introductions. This platform, strongly supported by MNCs, aims to connect the semiconductor network, to innovate solutions and collaborate for success for all players in the industry. It plays a critical role in fostering close collaboration and facilitating innovation across the sector through business-matching opportunities. We recently had this event on 6 July 2023 and it was attended by 105 companies / 269 participants.

So how do companies connect? SSIA plays the bridge between companies in the network by making one-to-one introductions via email, in-person meetings by hearing out what the end-users are looking for through a call of problem statements. This year, we have facilitated over 50 connections, hoping for successful business engagements. With the increased emphasis on corporate sustainability at national and global level, we have seen more interests for companies to be connected to learn emerging technologies.





SSIA SUMMIT AND SEMICONDUCTOR 55 DINNER

A very big thank you to all the sponsors (a whopping close to 50 of them this year!) who are supporting this year's gala celebration. This is a strong testament on the unity we have within the semiconductor industry and ecosystem.

The SSIA Summit 2023 is a highly anticipated event within the Singapore and regional Semiconductor industry. This conference is renowned for bringing together industry leaders, experts, and enthusiasts to discuss the most recent mega trends and critical topics affecting the semiconductor landscape. This year's SSIA Summit promises to be a unique and memorable experience, as it coincides with the 55th anniversary of the Singapore Semiconductor industry.

This year's theme is "Forging Resilience: Navigating Supply Chain Disruptions". The semiconductor industry, foundational to the digital world, has faced considerable challenges recently due to supply chain disruptions. These disruptions, exacerbated by recent global events, have revealed the vulnerabilities within our current supply chain models. Hence, this year's theme is chosen to initiate a comprehensive examination of how we can strengthen and future-proof the semiconductor supply chains.

INTERNATIONAL BUSINESS MISSIONS

In our last Voice magazine (Volume 27), we shared that SSIA led a team of our network of companies to Arizona. With the pandemic behind us, this is the start of SSIA's effort to help companies, especially SMEs, explore business opportunities globally. This initiative is in close collaboration with ESG and its global offices. Countries in discussion with SSIA include US, China (Shandong, Suzhou, Qingdao, Guangzhou, etc.), Netherlands, Hungary, Uzbekistan and Vietnam. We also hosted business and government delegates from these countries, organizing platforms for business engagements with our local companies. We welcome all our members to let us know if you have any interest in venturing into any international markets.

3D PRINTING INITIATIVE

Many of the equipment in Singapore semiconductor fabs are getting old. Over time, part obsolescence will become an increasing issue. SSIA strongly believes that 3D printing will be a cheaper alternative to traditional manufacturing parts when there's economy of scale, with shorter leadtime to combat any potential supply chain disruptions.

Early 2023, SSIA came together with Enterprise Singapore to pitch the idea of adopting additive manufacturing (3D printing) for semiconductor operations. Together, we shared with various MNCs how 3D printing technology has matured over the years, better able to meet the stringent conditions of semiconductor manufacturing, and the pros and cons of using 3D parts. We even invited Ho Chaw Sing, CEO of NAMIC who took stage during our Business Connect event earlier in July to share the potential of additive manufacturing.

Over three months, we have organized factory visits to two solution providers identified by Enterprise Singapore with different material capabilities (metal and ceramics) to hear out their technology and throw onto the discussion table the areas of concerns. A couple of MNCs have progressed on with signing of NDAs and shared part samples that could be explored. By introducing additive manufacturing to the industry, we hope that this could also help to alleviate parts supply chain disruption especially for the obsoleted, complex parts.

> ***In mid-July this year, SSIA was also invited by STMicroelectronics to join the Singapore Robotics Consortium to share about this initiative, and to support Dominic, Manager of Central Maintenance & PTC, in his sharing with his fellow consortium members, of the actual/potential benefits his team is seeing in embarking on this 3D printing journey.***

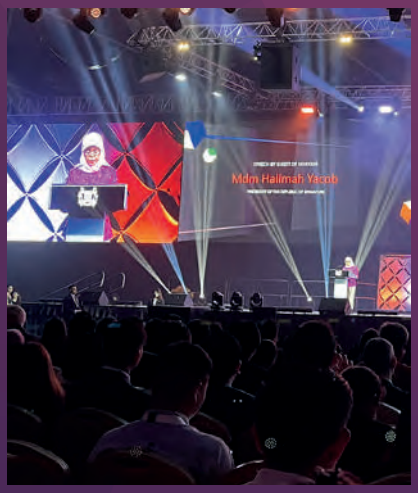
CONTRIBUTED BY

Amy Ang and Jasmine Tai
Business Development

SSIA
Singapore Semiconductor Industry Association

13th WorldSkills ASEAN

The 13th WorldSkills ASEAN came back with a bang in 2023 and this was the largest showcase of professional and technical skills in Southeast Asia. For the first time, Singapore hosted the 13th WorldSkills ASEAN competition from 23 to 25 July 2023 at Suntec Singapore Convention and Exhibition centre. WorldSkills ASEAN 2023 was organised by WorldSkills Singapore in collaboration with the Institutes of Higher Learning as part of the Skills Future Festival 2023. President Halimah Yacob was the Guest-of-Honor at the opening ceremony and she was accompanied by Ms Gan Seow Huang, Minister of State for Education and Manpower.



Delayed since 2020 by the pandemic, the 13th WorldSkills ASEAN competition attracted more than 170 youth talents from 9 ASEAN member countries competing in 22 skill sets. The 13th WorldSkills ASEAN with the theme "Our Skills, Our Future", aims to raise the skills standards among the youth and to showcase opportunities in vocational training and education in the region. It also aims to inspire our young to develop a passion and pursue excellence in the relevant skill sets.

In his closing ceremony speech, Mr Chan Chun Sing, Singapore Minister for Education said:

> ***The sight of so many youth coming together was a sign of our resilience and solidarity. For them to make a difference in their societies, we must equip them with the values and confidence to step forward as leaders, innovators and mentors.***

Team Singapore which was represented by 44 young individuals from the Institutes of Higher Learning won a record number of 26 medals - 8 gold medals, 4 silver medals, 8 Bronze medals and 6 Medallions for Excellence. This placed Singapore second in the medal tally among the nine ASEAN member states that participated. Indonesia led with 27 medals. At the closing ceremony, it was announced that Philippines will host the next competition in 2025.

In conjunction with the WorldSkills event, MOE and the Institutes of Higher Learning organised an education and career guidance fair with more than 40 sponsors. The event attracted a total of 10,000 secondary school students and 4000 post-secondary students who visited the career and education booths and got to experience some of the workshops and industry talks.

SSIA was invited by Singapore Polytechnic to be part of the industry partners in showcasing future opportunities in various career clusters namely Engineering, Creative Arts & Fashion, Info Comm, Social & Personal Services, and Transport and Logistics.

At the 3 days event, SSIA together with 10 other member Semiconductor companies – Analog Devices, ams OSRAM, AMD, GlobalFoundries, Infineon, STMicroelectronics, Soitec, MediaTek, SSMC and Micron Technology came together to join efforts as one industry to engage the students at our Engineering and Semiconductor Industry booths.

At the semiconductor booths, students donned virtual reality headsets to experience "A day at a wafer fab plant" through interactive games that saw them "wearing" safety suits and helmets.

Besides company booths, companies came together to organise 7 workshops on semiconductor awareness. The workshops and the booths were filled with interactive and experiential games and activities where students were exposed to lots of learnings about the semiconductor industry.



CONTRIBUTED BY

Velinda Wee
Human Capital Director

SSIA
Singapore Semiconductor Industry Association

TRAIN, UPGRADE & RESKILL

As the semiconductor and electronics sector strengthen our local ecosystem and relook at ways to attract and retain talents, training, up or re-skilling and upgrading remain critical in staying relevant and future-proofing ourselves. Check out programmes in the pipeline, brought to you by SSIA and our learning partners.

REPUBLIC POLYTECHNIC

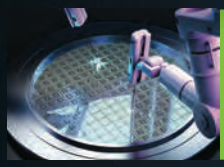


Introduction to Vacuum and Plasma Technology (1 day)



Microscopy and Thin Film Characterization for Failure Analysis (1 day)

SP Singapore Polytechnic



Wafer Fabrication in Semiconductor Industry (3 days)



Digital Integrated Circuit (IC) Testing

Temasek Polytechnic



Advanced Manufacturing Inspection Workshop (4 days)

SSIA Singapore Semiconductor Industry Association



Semiconductor Processes (2 days)

Check out SSIA website or scan the QR code for full list of events, training and courses. Or contact Teresa at *teresa@ssia.org.sg*

Government and Businesses Work Together to Grow and Develop Workforce

CULTIVATING A SKILLED AND AGILE WORKFORCE FOR THE SEMICONDUCTOR INDUSTRY

In this rapidly evolving global landscape, growing the workforce and talent development is no longer an optional endeavour but a strategic imperative for any organisations seeking to thrive in an unpredictable future. By embracing emerging trends, addressing challenges, and implementing innovative approaches, businesses can build a resilient and agile workforce capable of navigating the complexities of tomorrow's world. As organizations invest in the growth and development of their employees, they sow the seeds of long term successes and competitiveness.

Besides focussing on the growth and development of current employees, creating semiconductor awareness among the younger generation is becoming more critical especially given the current role semiconductor plays in modern technology and innovation. We need to continuously grow the talent pipeline that supports innovation, drives growth, and ensures long term success in a rapidly evolving technological landscape. Our dedication to talent development is what enables Singapore's excellence in semiconductor. We had helped each generation of talented graduates and professionals fulfil their potential by igniting passion and showing what is possible. Together, we aim to seed future leaders while embracing the diverse perspectives that makes Singapore a beacon for brighter minds everywhere.

In the recent years, SSIA in partnerships with companies, Institutes of higher learning (IHLs) and the various government agencies had joined forces to co-organise various initiatives to create greater awareness amongst the young. These joint collaborations and activities include:

1. Semiconductor Awareness Initiatives In Schools – Industry Sharing And Career Fairs

SSIA continues to engage in outreach activities to promote Semiconductor industry awareness and Science, Technology, Engineering and Mathematics (STEM) education in schools. SSIA and its member companies jointly organised activities such as industry sharing sessions, career talks, and manufacturing plant visits and workshops in schools. The objectives of such outreach initiatives are to create greater awareness about the semiconductor industry, the work environment, available jobs opportunities in this sector as well as encouraging students to participate in internships and industrial attachments opportunities. SSIA had also participated in various career fairs at secondary schools, ITEs, polytechnics and universities.



In close collaboration with the Ministry of Education, SSIA had been invited to more than 40 schools in this first half of Year 2023 covering approximately 4000 students in various outreach initiatives such as school talks and industry sharing sessions.

2. Company Visits Organised For Secondary Schools

As part of the industry's effort to create greater awareness at secondary schools, on 31 May 2023, SSIA organised its first plant tour for a secondary school to visit a manufacturing plant. This experiential journey was hosted by United Test and Assembly Centre (UTAC) at their Serangoon plant for Secondary 3 to Secondary 5 students from Juying Secondary School.



The plant tour was not only educational but also an eye-opener for the students where it exposed them to the actual work environment and the diverse career opportunities available in the semiconductor industry. During the visits, students got to meet industry leaders and experts in the field. Real-world insights

from professionals can inspire young people and let them have a better understanding of the practical applications of the semiconductor technology.

3. Semiconductor Awareness Sharing With Educators

Besides students, we do see an increase in number of teachers from schools inviting SSIA for talks and engagement sessions to provide better insights of the Semiconductor Industry. In May 2023, SSIA was invited to a fireside chat at the "Beginners Teachers Orientation Program" for 140 student teachers starting their teaching careers to share on the Semiconductor industry. The programme had a segment on Education and Career Guidance (ECG) where we aim to heighten the student teachers' awareness of ECG and the importance of ECG for students in the context of a fast changing future world of work especially in the Semiconductor industry.

4. MINDEF Career Talk – NSF - Skills Future Career Workshop

On 9 March 2023, SSIA jointly organised career talks with STMicroelectronics, ams OSRAM and GlobalFoundries to more than 130 National Service men who are completing their national service duties at the NSF Skills Future Career Workshop.

5. Semiconductor Awareness Day @ Polytechnics and Universities

In the coming months between August to November 2023, SSIA will be jointly organising the Semiconductor Awareness Day @ Polytechnics and Universities with EDB and member companies to promote internship opportunities, industrial attachments and career opportunities in the Semiconductor industry. Companies from the full value-chain of semiconductor industry are invited to set up booths and organise careers talks for this event.

6. Workforce Development Key Events – Electronics Industry Day 2023

On 17 January 2023, SSIA had successfully organised our first event for the year, Electronics Industry Day which was held at ITE Central. We had the honour of Ms Gan Siow Huang, Minister of State for Education to grace the event. The event served to be our industry's largest outreach platform to showcase the immense potential of the Semiconductor industry.

The event attracted participation from various industry partners, leading semiconductor companies, Institute of higher learnings and various government agencies. We had an overwhelming turnout of over 1400 students from schools, polytechnics, universities, and approximately 300 job seekers and industry guests.

More than 25 semiconductor companies set up booths to promote greater awareness of our industry. Besides companies, Institutes of higher learnings had also set up booths to highlight the training programs for this sector.

The Electronics Industry Day 2023 also witnesses the launch of SSIA's **Semiconductor Active Youth (SAY) Ambassador Programme** and the signing of MOU with ITE:

a. ITE-SSIA MOU Signing

The signing of MOU between ITE and SSIA further strengthened the collaboration of the two parties to jointly organise company visits, industry seminars, career fairs and initiatives to promote ITE training programmes, internships and workplace learnings programmes.









b. Semiconductor Active Youth (SAY) Ambassador Programme

The Semiconductor Active Youth programme is meant to create a robust pipeline of young talents for the semiconductor industry.

This programme is a joint collaboration between SSIA, Semiconductor companies and the Institutes of Higher Learning (IHLs) to offer the SAY ambassadors valuable insights and hands-on experience in the semiconductor industry and training & mentorship opportunities with industry leaders from companies across the value chain.

SSIA jointly organised 2 company visits to AMD and GlobalFoundries in April and May 2023 where the ambassadors and mentors gathered to learn, interact and network. During the visits, ambassadors had the opportunity to go on tours of the factory and work premises. More visits to the other participating companies are also planned for the year.

7. WorldSkills ASEAN 2023

Singapore hosted the 13th WorldSkills ASEAN competition from 23 to 25 July 2023 at Suntec Singapore Convention and Exhibition centre. The competition attracted close to 250 top youth talents from 10 ASEAN member countries competing in 22 skills sets. Team Singapore won a record number of 26 medals at the WorldSkills ASEAN 2023 with 8 gold medals, 4 silver medals, 8 Bronze medals and 6 Medallions for Excellence. This international competition aims to inspire young people to develop a passion for skills and pursue excellence in the relevant skill sets.

The event attracted 10,000 secondary school students and 4000 post-secondary students to visit the career and education booths, try a skills booths, skills workshops and industry talks. SSIA was fortunate to be invited by Singapore Polytechnic to be part of the industry partners in showcasing future opportunities in various career clusters namely Engineering, Creative Arts & Fashion, InfoComm, Social & Personal Services, and Transport and Logistics.

At the 3 days event, SSIA together with 10 other member Semiconductor companies – Analog Devices, ams OSRAM, AMD, GlobalFoundries, Infineon, STMicroelectronics, Soitec, MediaTek, SSMC and Micron Technology came together as one industry to engage the students at our Engineering Semiconductor Industry booths. Besides company booths, companies came together to organise 7 workshops on Semiconductor Awareness. The workshops and the booths were filled with interactive and experiential games and activities where students were exposed to lots of learnings about the Semiconductor Industry.

Students got to meet industry leaders who shared their experiences and expertise.







8. Workforce Development Key Events – Semiconductor Women's Forum 2023

On 9 March 2023, the Semiconductor Women's Forum returned for a third run to embrace Diversity, Equity and Inclusion and most importantly to celebrate the women in the Semiconductor and Electronics Industry. The theme for this year's International Women's day "Embrace Equity" highlighted the importance of achieving worldwide gender equity across all aspects of life including the workplace where women remain vastly under-represented despite increasing interest in this field.

In conjunction with International Women's day 2023, all participating companies came together to pledge the "Embrace Equity" collectively as an industry.

With this Semiconductor Women's Forum platform, we hope that more talented women will join this industry, be empowered to grow, inspired to thrive and contribute to the growth of the industry.

9. Singapore Semiconductor Leadership Accelerator Programme (SSLA)

Nurturing future leaders is a vital aspect of developing top talents in the Semiconductor industry. The semiconductor industry stands as one of the most dynamic and transformative sectors of the global economy. At the heart of this industry's success lies effective leadership – individuals who possess a unique blend of technical expertise, strategic vision and ability to navigate complex market landscapes.

SSIA in partnerships with Human Capital Leadership Institute (HCLI) had developed a programme for top leaders in Singapore.





The programme is designed to inspire technical and business leaders to continue creating revolutionary possibilities with semiconductors. SSLA is now one of our industry's largest leadership development platforms that has helped nurture a pool of over 200 future leaders from more than 30 companies for the semiconductor industry over the last 7 years. The platform is essential for developing future leaders who will shape the industry.

Over the years, SSLA has cultivated leaders who have grown exponentially within their given fields and we are proud of the accomplishments they have achieved.

10. Career Conversion Program (CCP)

ADAPTING TO CHANGE

Industries are constantly evolving, which often necessitates workforce transformation. The CCP addresses this need by providing mid-career professionals an opportunity to re-enter the workforce, equipped with the right skills for emerging industries. It aligns with WSG's mission to empower individuals in their career journeys, ensuring they remain employable amidst shifting industry landscapes.

UNLOCKING NEW OPPORTUNITIES WITH CCP

Workforce Singapore (WSG) recognizes the imperative of driving change through its transformative initiative – the CCP. Targeting at mid-career switchers seeking to transition into the dynamic field of electronics engineering, this program offers a comprehensive package of training, job placement assistance and wage support. Moreover, it holds the potential to reshape how companies hire and reskill their workforce.



BENEFITS FOR COMPANIES

The program not only benefits individuals seeking a career change but also offers significant advantages to companies. The program allows companies to tap into a pool of mid-career individuals who bring diverse perspectives and experiences from other sectors. This approach expands the talent search beyond the conventional sources, enabling companies to foster innovation and growth.

DIVERSE MODALITIES

The Career Conversion Program offers three distinct modalities: Place-and Train, Redeployment, and Job Redesign Reskilling. These versatile pathways cater to various workforce scenarios, ranging from onboarding new employees with targeted training to reskilling existing employees to support digital transformation.

REMARKABLE SUCCESSES

Since its inception in 2016, the program has showcased notable achievements. Over the past seven years, it has facilitated placements for over 2,200 trainees across 65 companies. This not only highlights the program's efficacy but also emphasizes SSIA's dedication to supporting workforce evolution.

SUPPORTING THE FUTURE OF WORK

With the Career Conversion Program, WSG and SSIA are paving the way for a more agile, dynamic workforce. By nurturing talent from diverse backgrounds, the program contributes to industry innovation and economic resilience. As industries continue to transform, this initiative serves as a beacon of opportunity for both individuals seeking career transitions and companies aiming to fortify their talent pool.

In conclusion, the Career Conversion Program stands as a testament to Singapore's commitment to empowering its workforce and boosting industrial growth. By providing individuals the tools to reinvent themselves and companies a pathway to a more versatile workforce, the program emerges as a powerful catalyst for success in the ever-changing world of Electronics Engineering.

2024
24
JAN
WEDNESDAY

Electronics Industry Day

Look out for the Electronics Industry Day 2024 which will be held at ITE central on Wednesday, 24 January 2024. We will be expecting greater turnout for this coming year's event with more semiconductor companies participating in the career booths to promote semiconductor awareness and company branding. Institute of Higher learnings (IHLs) will also be at the booths to promote Engineering courses and relevant work study programs to participants.

CONTRIBUTED BY

Velinda Wee
Human Capital Director

SSIA
Singapore Semiconductor Industry Association

Forging Pathways to Growth: Empowering Workforce Development with Workforce Singapore (WSG)

The electronics industry operates in a highly competitive landscape where one of the crucial success factors is the attraction and development of the talent pool. To this end, Workforce Singapore (WSG) has partnered with the Singapore Semiconductor Industry Association (SSIA) to develop and roll out Career Conversion Programmes (CCPs) to support companies in the electronics industry, particularly in the semiconductor sector to reskill their workers for new or enhanced job roles, enabling them to stay competitive and adapt to changing market demands.



Over 2,200 new hires and incumbent employees across 65 companies have been placed through the CCPs since 2016. This shows the growth potential of the electronics industry and WSG's and SSIA's commitment to support the manpower demands of the industry.

The CCPs help companies to hire and reskill motivated mid-career switchers who are eager to learn and contribute to their new roles, in tandem with the adoption of technology and business transformation. An increasingly tight labour market and fierce competition for talents have also made it challenging for companies to hire candidates with highly sought after skillsets in new growth areas. Through the CCPs, workers gain new skills such as semiconductor manufacturing processes, programming languages, data analytics, and project management methodologies. This approach expands the talent search beyond the conventional plug-and-play candidates, enabling companies to hire from a bigger talent pool with portable skillsets that foster innovation and growth.

Companies can enhance the career health of their workforce by redesigning job roles and equipping their employees with new capabilities and renewed career pathways. By paving the way for a more agile and dynamic workforce, companies can be more competitive while value-adding to their customers and capturing new opportunities.

Apart from CCPs, WSG also has programmes such as the Capability Transfer Programme (CTP) that companies can leverage on to bring new capabilities into Singapore, and the Productivity Solutions Grant for Job Redesign (PSG-JR) to help companies redesign their jobs. These programmes support the transformation of Singapore's economy and help companies adapt to the



changing business landscape. By redesigning jobs, companies can improve their productivity, reduce costs, and enhance the job satisfaction and well-being of their employees.

Tripartite partnerships are crucial in the electronics industry due to its cyclical nature. During economic slowdowns, the government has collaborated with the National Trades Union Congress, United Workers of Electronics & Electrical Industries and the Employment and Employability Institute to help minimise the impact of retrenchments and redeploy workers to growth job areas. These partnerships have been instrumental in helping workers acquire new skills and transit to new roles, while also enabling companies to retain their talent and remain competitive. WSG is committed to working with our tripartite partners to provide holistic support to companies, for successful workforce transformation, which helps them emerge stronger in preparation for the upturn.

As the electronics industry continues to evolve and transform for the future economy, the collaboration between the industry and government agencies will be key. Together with SSIA and our tripartite partners, we look forward to supporting the growth and transformation of the electronics industry in Singapore through workforce reskilling.

Scan the QR code for more information on the CCPs

Scan the QR code for more information on other manpower support from WSG

CONTRIBUTED BY

WSG Workforce Singapore



Pioneering a Greener Tomorrow

The semiconductor industry is a major contributor to climate change. It is responsible for about 7% of global greenhouse gas emissions, and this number is expected to grow as the demand for semiconductors increases.

The semiconductor industry is a critical part of the global economy. By becoming more sustainable, the industry can help to reduce its environmental impact and contribute to a more sustainable future.

There are a number of ways that the semiconductor industry can become more sustainable. These include:

- **Using Renewable Energy**
  The semiconductor industry can reduce its reliance on fossil fuels by using renewable energy sources, such as solar power.
- **Improving Energy Efficiency**
  The semiconductor industry can improve its energy efficiency by using more efficient manufacturing processes, operations and equipment.
- **Reducing Water Use**
  The semiconductor industry can reduce its water use by recycling and reusing water, and by using water-efficient technologies.
- **Minimizing Waste**
  The semiconductor industry can minimize its waste by recycling and reusing materials, and by preventing pollution.
- **Adopting A Circular Economy**
  The semiconductor industry can adopt a circular economy approach, which focuses on reducing, reusing, and recycling materials.

The semiconductor industry is taking steps to become more sustainable. Some of the leading companies in the industry have set ambitious goals to reduce their emissions and water use. For example, Intel has committed to net-zero emissions by 2040, and TSMC has committed to reducing its water use by 50% by 2025.

In Singapore, given the acceleration of the importance of sustainability, the Singapore Semiconductor Sustainability Committee was formed in February 2023, led by a team of semiconductor industry leaders and experts with the objective to drive sustainability goals towards Net Zero.

The Sustainability Committee focus on creating awareness on sustainability, benchmarking sustainability indexes across industry in Singapore, and in so doing, help companies, including small and medium enterprises (SMEs) and finally to transform and move towards a business model that embraces sustainability.

Join Forces For Sustainability: Some Initiatives

Semiconductor Business Connect 2023 – Sustainability Focus Track

For this year's Semiconductor Business Connect 2023 on 6 July 2023, SSIA has included an important segment on Sustainability, in addition to the Industry 4.0, Automation and AI. Industry leaders and experts were invited to the podium to share industry trends, and insights towards Sustainability for the semiconductor industry and beyond.

The event is a good platform for potential collaborators and innovators to come together to work towards solutions for sustainability and more. Networking and discussion for cross pollination of innovative ideas and collaboration are always highly encouraged in events like this.

An industry leader and domain expert - Mr. Dan Steele, Senior Director, Global EHS and Security Operations of GlobalFoundries and a Singapore



Sharing by Dan Steele, Senior Director, Global EHS and Security Ops, GlobalFoundries

Semiconductor Sustainability Committee member, shared that semiconductor companies recognize the challenge of climate change and the need to reduce greenhouse gas emissions in our value chain, to meet the 1.5°C target of limiting global warming set by the United Nations, there is a need to accelerate development and implementation of climate solutions and best way is to work collaboratively with our accumulated knowledge and technological expertise. He called out **Join Forces for Sustainability** and this call-out resonated with the audience in the room.

It was also an opportunity for solution providers to come forward to share solutions towards the sustainability initiatives. There were some interesting sharings by Meridionale Impianti and Evoqua Water Technologies, where there might be viable solution for in-situ DRE measurement to monitor emission real-time, thus having the capability to quantify abatement improvement; and improve water recycling efficiency respectively.



Sharing by Max Meschini, Deputy Managing Director, Meridonale Impianti on potential sustainability enabling solutions



PUB Water Efficiency Workshop

PUB water recycling requirement workshop was organized on 27 and 28 July 2023 for Semiconductor, Electronics and Bio-medical Manufacturing sector. PUB presented the focus on water reduction, reuse and recycle. They shared the mandatory water recycling requirement of at least 50% for new frontend Fab or expansion and recycling of specified waste streams that are fairly clean for the electronics plants and bio-medical plants.

It was remarkable to observe sharing of Best-Practice case studies within and across industries, where companies got to learn and exchange strategy and methods of saving and recycling water by various companies. More of such cross-sectorial sharing on sustainability initiatives is encouraged.





Sharing of water recycling best practices by Muthukumar Sethurajan, Staff Engineer, Facility Department, Hoya Electronics Singapore Pte Ltd, at the PUB Water Efficiency Workshop

Pulsing and Benchmarking Sustainability Indexes

The semiconductor industry is eminent with using data for insights, unlocking new possibilities and innovative ideas for improvement. Likewise for sustainability initiatives, the Singapore Semiconductor Sustainability Committee has conducted several pulse surveys to gather inputs, putting forward recommendations to support the industry sustainability transformation. Some of these measures include:

(i) Developing talents with Sustainability Green Skill

In June 2023, a pulse survey was conducted with the semiconductor ecosystem to assess the talent requirement for sustainability green skill. The majority of respondent companies have started on the Sustainability journey, they plan to either create a new role for a Sustainability and Environmental Engineer or include the sustainability function into existing roles.

High majority of respondent companies are interested to send their team members for relevant sustainability related CET training or workshop if they are curated for Singapore industries. Respondent companies have provided great insights in terms of the job-skills required for such sustainability roles that are beyond strategy and planning ; to measure, automate data extraction; control; and reporting. The pulse survey report was shared with relevant agencies to help shape future training courses.

(ii) Developing Transformation Actions for Sustainability

The Sustainability Survey (1) which was concluded in August 2023 focused on pulsing companies readiness to set sustainability goals, confidence in meeting the set targets, area of concerns to focus on, and more. Companies were very supportive in providing the responses and the majority are interested to be either collaborators or innovators for sustainability solutions. The inputs will serve as insights to support the industry sustainability transformation.

Transformation by Collaborating with Innovators

Companies have provided problem statements that need to be addressed by the industry for sustainability goals and was in June 2023, calling for innovative ideas and solutions. Some companies have come forward with potential solutions to be explored by collaborators.

SSIA hopes that more companies will come forward with innovative ideas.

There have been several incentives and schemes available in Singapore to support businesses in the green transition through the Ministry of Trade and Industry, Economic Development Board and Enterprise Singapore. They can be found on their website.

All companies are encouraged to tap on these schemes to increase their energy efficiency, reduce emissions and reduce waste. The journey to net zero is one that requires collective effort. We encourage companies to come together to jointly develop, innovate and implement decarbonization solutions for the industry, for all.

Some problem statements by the Industry which require attention:

Emission

- Near 100% Abatement Destruction and Removal
- Efficiency (DRE) of HFCs/GHGs/PFC
- Hard-to-abate gases reuse technology
- Near-zero Global Warning Potential (GWP) Heat Transfer Fluid (HTFs)
- Real-time In-situ Destruction and Removal Efficiency (DRE) measurement

Energy

- End-to-end wasted energy diagnostic
- Energy recapture technologies

Water

- UPW-grade water treatment technology with low energy requirement
- Cooling tower vapour recapture with low energy requirement

Waste

- Non-RRR waste concentration/treatment technology with low energy requirement
- Recycle/Reuse/Repurpose chemical waste (e.g. H3PO4, H2SO4, CHF to fluorspar)

CONTRIBUTED BY

Julie Koh
Strategic Programs Director

SSIA
Singapore Semiconductor Industry Association

Water Sustainability:
A Waste Water Recycling Rate Of More Than 75%





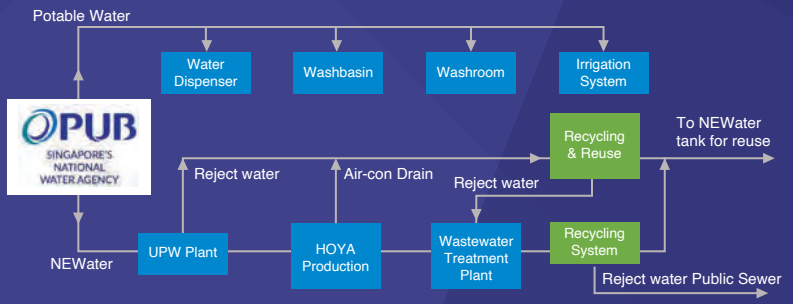
Water sustainability is a complex issue, but it is one that we must address if we want to ensure a sustainable future for our planet. Companies have been taking strides on sustainability efforts through various spheres from recyclable waste, renewable energy, reduction of carbon emission and renewable water.

HOYA Group shares with us some of their best-of-class examples on how the organisation has been contributing to water sustainability efforts. The objective of this article is to share HOYA Electronics Singapore Pte Limited's water-saving knowledge and achievements with all for a water-sustainable society.

The HOYA Group endeavours to effectively utilize water resources by reusing water and reducing water usage on a global scale, in accordance with its Fundamental Environmental Policies. The HOYA Group has set numerical targets in each of its business segments and manages its progress in achieving the targets.

HOYA ELECTRONICS SINGAPORE PTE LTD WATER RECYCLING PRINCIPLE AND ACHIEVEMENTS

HOYA Electronics is a large water user in the semiconductor industry that has implemented extensive water recycling initiatives over the past 5 years and achieved the highest water recycling rate (from 29% in 2014 to 75% this year) in the semiconductor industry to date, with and beyond the support of 3R (Reduce, Reuse, and Recycle) Water Saving principles.



HOYA WATER RECYCLING METHODS

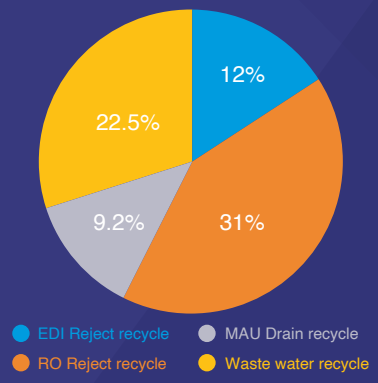
Methodology to **Reduce**, **Reuse** and **Recycle** water:

A. EDI (Electro deionization) system reject water recycle.
B. RO (reverse osmosis) System reject water recycle.
C. MAU Air washer drain reuse for Cooling tower operation.
D. Waste-water recycle.

HIGHLIGHTS

1. Initially, our NEWater needs for the processes depended on PUB supply.
2. With the implementation of Water recycling systems, we can have a secondary source of water supply from our production and reduce about 75 % of NEWater demand from PUB.
3. This result not only saves on our water bill but also reduces our production costs, resulting in a better profit.
4. HOYA sustainability efforts have been published in PUB Best Practice Guide as one of the case studies.
5. HOYA was invited to share our journey of efficiency water usage to the electronics and biomedical industries at PUB Water Hub on 27 July 2023.

HOYA Water Recycling Rate: 74.7%



Balance 25.3% waste water drain to PUB Public sewer via last Inspection chamber

CONTRIBUTED BY



Muthukumar Sethurajan
Staff Engineer, Facility Department
HOYA Electronics Singapore Pte Ltd

Summer Camp
IC Design Your Future 2023

This year is the second edition of Summer Camp – IC Design Your future, after receiving wonderful feedback from last year's inaugural IC Design Summer Camp cohort. As always, SSIA strives to make it bigger and better, for the participants to have an impressionable experience. The IC Design Summer Camp 2023 is proudly sponsored by the Singapore Semiconductor IC Design Committee companies, with the strong support of EDB.

Summer Camp - IC Design Your Future 2023 is a 3-Days immersive program, 19-21 July 2023, which gives the university undergraduates (Electrical, Electronics, Computing and Design Engineering) whom may be interested to join the IC Design sector in the near future, an opportunity to learn more about Semiconductor and Electronics industry, IC Design career prospect, visits to leading multi-national companies like AMD, Silicon Labs and GlobalFoundries; and most importantly, providing the opportunities to interact with various Semiconductor companies' industry leaders and technical experts to experience the vibrancy, focus and passion of the semiconductor industry. This year we have invited 4 universities, namely NTU, NUS, SUTD and SIT, undergraduates to participate.

Industry leaders and experts were invited to share about the Semiconductor and Electronics industry trends, IC Design sector driving new innovations, overview of wafer Fab processing and Backend packaging & test, as well as panellists sharing vast experiences of their career in the industry. Not forgetting to mention the #AskMeAnything sessions with AMD, Silicon Labs and GlobalFoundries team respectively, sharing experiences of team members.



Panel Discussion – IC Design Your Future, with the Singapore Semiconductor IC Design Committee members



IC Design Summer Camp – Day 1 at GlobalFoundries

The visit at GlobalFoundries enable students to experience the manufacturing Fab, enabler of fabrication of integrated circuit chips. The students had fun touring the Fab in a new and high-tech way, using AR/VR Virtual Reality headset which is enabled by the Semiconductor industry. Such AR/VR technology is being utilised in the line for training as well as machine trouble-shooting. They also get to learn the manufacturing flow from silicon wafer and Fab processing to Assembled final products. As well as experience the diverse and inclusive, collaborative culture of the semiconductor industry.



Participants touring the Fab with Visual Reality headset for 360deg view of the cleanroom manufacturing line.

At Silicon Labs, students experience the work nature at product company, ID Designers roles and career prospect. They get to appreciate the impact of chip design enabling advanced technology like digitalisation and Internet of Things (IoT) applications, providing solutions to modern world challenges, adding efficiency to our daily life. Also experiencing the culture of teamwork and collaboration, as well as the semiconductor industry emphasis on diversity and inclusion.



Line tour to experience "A Day as an Engineer"

The experiential project at Silicon Labs, building a robotic motorized vehicle controlled remotely by Bluetooth controller excites the students' interest in IC system design, software development and its application. Without doubt, the students do not wish to end the activities on time.





Experiencing how precise and advanced (tiny) integrated circuit chip can be, and the collaborative culture of semiconductor industry





Experiential project with robotic and Bluetooth application, hosted by Silicon Labs team

IC Design Summer Camp was a great platform to share insights on the latest industry trends, skillsets needed by the students to excel in IC Design and the value of collaboration and team spirit. I would like to take this opportunity to thank all the volunteers, SSIA team and industry leaders from IC Design Committee who worked tirelessly behind the scenes to make this event a resounding success. It also demonstrated the close-knit relationship between the competing companies working towards a common good.

Mr Shantonu Bhadury
Director, Design Engineering, Silicon Labs





IC Design Summer Camp – Day 2 at Silicon Labs

SSIA IC Design Summer Camp is very informative and interesting. It provides us with a very insightful understanding about semiconductor industry from front end to back end. It has sparked my interest in digital IC design.

Gao Liu Yue
NTU EEE Year 3



In this 2nd iteration of the IC Design Summer Camp, the focus was more on experiential learning and giving our participants a feel for what it is like to work in the semiconductor industry and based on feedback from the students, it is something they really appreciate. I'll like to thank the SSIA team, Synopsys, our IC design committee industry partners and volunteers for making this another successful event.

Mr Eu Gene Goh
Senior Director, Design Engineering, AMD
and Co-Chair of IC Design Committee



For the last day of the IC Design Summer Camp, the students were intrigued and thrilled by the IC design experiential workshop, brought to them by AMD, in partnership with Synopsys. The students got hands-on experience with Synopsys' cloud native EDA tools on pre-optimized hardware platforms. They were guided through a typical RTL to GDS design flow, from synthesis to place and route, timing analysis and finally layout vs schematic verification; and experience one the most satisfying parts of a Digital IC Designer's job, a successful final verification and achieving "LVS clean"!



Man Juncheng
NUS ECE Year 2

First of all, I would really like to thank SSIA for putting together this camp for us. It is something I have been looking for, as I was curious to find out more about the IC design and chip production process but did not know where to start with. And what I saw was certainly something I am looking forward to: the biggest new developments in the chip design field, the entire process from designing the chips to manufacturing to packaging and testing, and the life and culture of those working in the field now. It has certainly given me the exposure I had been looking for and will help me to make a more informed decision on my future development direction.



IC Design Summer Camp – Day 3 at AMD, wraps up the whole summer camp experience



The students first hands-on experience of the IC Design Labs, enabled by AMD and Synopsys

The IC Design Labs experience provide a glimpse of future IC Design role to the young talents and the learning experience was feedback as unforgettable.



Happy engaged participants

SSIA is delighted to see the active engagement by the students and their vibrant smiles throughout the IC Design Summer Camp. Looking forward to the young talents joining the semiconductor industry, IC Design sector in the very near future.

CONTRIBUTED BY

Julie Koh
Strategic Programs Director
IC Design Committee

SSIA
Singapore Semiconductor Industry Association



Preparing For Unprecedented Growth And Risk In The Singapore Semiconductor Industry

In the heart of Southeast Asia, Singapore's semiconductor industry is poised for accelerated growth as the global industry is predicted to reach USD$1 trillion in annual revenue by 2030.

Reaching this symbolic goal will not simply be the result of technological advancements; it will be a test of the industry's dedication to sustainability, resilience, and the cultivation of top-tier talent and resource management.

Singapore semiconductor firms, especially the small and medium-sized enterprises (SMEs) supporting global corporations, can lay the foundations for this growth and capture more opportunities by adopting three pivotal strategies:

01

EFFECTIVE SUPPLY CHAIN RISK MANAGEMENT

The semiconductor industry's journey to the USD$1trillion target is interlinked with its capacity to manage supply chain risks effectively. The past few years have highlighted vulnerability of global supply chains, with disruption from COVID-19, trade wars, and geopolitical turmoil exposing the need for robust risk management strategies.

Singapore's semiconductor industry should take proactive steps to fortify supply chains, increase the diversification of suppliers, enhance visibility into suppliers beyond tier 1 and 2, and investing in predictive analytics. This approach not only safeguards against unforeseen disruptions but will also boost overall efficiency and responsiveness. Singapore SMEs that want to scale and be part of the global supply chain should also start working with their key customers to better manage risk resiliency.

02

ENTERPRISE BUSINESS PLANNING INTEGRATION FOR SINGAPORE SMEs

Enterprise business planning is a financial strategy to advance a firm's market share and valuation. It incorporates all stakeholders into the planning process to drive enterprise-wide consensus, consistency, and aligns goals and rewards across the entire product life cycle. It also aligns product development, go-to-market, operations, supply assurance, compliance, and ESG under common processes and governance.

As SMEs are key drivers of economic growth and innovation, they can enhance their operational capabilities and value by investing and committing to enterprise business planning integration to service and supply the global semiconductor supply chain. This increased collaboration will allow them to collectively address challenges such as supply chain disruptions and adopting new technologies. Sharing resources and expertise across the industry not only strengthens individual companies but also elevates the entire sector's competitive advantage. SMEs must start to think win-win and recognize that there are enough opportunities for all to succeed.

03

NURTURING AND DEVELOPING TALENT

Meeting the ambitious goal of reaching a USD$1trillion semiconductor market by 2030 will rely on a highly skilled workforce. But current staffing approaches do not support this growth, with an estimated one million new positions needed to be filled by 2030.

Singapore companies need to rethink traditional staffing and resource planning to take advantage of this growth including investing in automation capabilities for repetitive tasks and taking full advantage of artificial intelligence and machine learning.

Because Singapore is not a low-cost location to run a business, semiconductor firms should partner with managed services and analytics providers to augment staff and support strategic resourcing models. They should also take advantage of the Singapore government's commitment to people development and workforce reskilling to maximize training and mentoring time for new and junior employees to spend with their retirement-eligible peers before they leave the workforce.

THE PATH TO SUCCESS

Singapore's semiconductor industry stands at a pivotal juncture, poised to redefine global technology landscapes with its products and services. To seize the full value of the opportunities from the growth to a USD$1 trillion industry, Singapore semiconductor firms must invest in effective supply chain risk management, enterprise business planning integration, and talent.

By prioritizing these key areas, Singapore's semiconductor industry will not only fast-track growth but also contribute to the nation's economic resilience, sustainable development, and global technological leadership.

Through strategic collaboration, innovation, and a steadfast commitment to excellence, Singapore is positioning itself as a beacon of success in the flourishing semiconductor landscape.

Scan the code to find out about our services for semiconductor firms

CONTRIBUTED BY

genpact

Nurturing Our Community:
The Power of Giving Back Together

At North East Community Development Council (CDC), we are dedicated to serving a community of more than 970,000 residents across approximately 300,000 households, and are driven by our mission to build a caring and inclusive community. Through our schemes, we provide interim financial assistance to support our lower-income residents, as well as those who fall marginally out of the lower-income bracket.









FOR AN INCLUSIVE COMMUNITY

Shaping Hearts is an annual inclusive arts event held by North East CDC in Singapore. The event aims to inspire the community by showcasing the creative expressions of differently abled artists, referred to as "Heartists," who have overcome their challenges. Each art piece presented at the event represents a milestone in their journey of resilience.

The theme for Shaping Hearts 2022 was "Celebrating Arts. Inspiring Hope," emphasizing the power of artistic expression to inspire and create hope. The event featured art exhibitions and an art marketplace where the artworks of individuals with disabilities were put up for sale to celebrate their diverse talents. Additionally, the "Pledge a Heart" movement encouraged community members to show their support for persons with disabilities in Singapore.

The 2022 edition concluded with a successful live art auction, which included paintings created through collaboration with local celebrities Edmund Chen, Jaime Teo, and Jeanette Aw. Thanks to the strong support from corporate and individual donors, the event raised over SGD$672,286. The success of the event was attributed to the participation of Heartists, social service agencies (SSAs), partners, and donors.





For the upcoming Shaping Hearts 2023, the event will be held at two locations: Our Tampines Hub from 11 to 26 November and One Punggol from 18 November to 3 December. The theme for this year is "Follow Our Hearts," inviting everyone to follow and immerse themselves in the world of talented artists with disabilities and be amazed by their art creations. The event's ultimate goal is to foster a caring and inclusive society through art, and by participating in Shaping Hearts 2023, individuals can contribute to this meaningful cause while appreciating the incredible talent and resilience of the Heartists in Singapore.



Our Heartists' masterpieces will be available for purchase, and the proceeds from the sale of these unique art pieces will go directly to support the Heartists and their social service agencies.

Another program aimed at generating employment for Persons with Intellectual Disabilities (PWIDs) within the community is the Community Employment Programme – Inclusive Employment. A partnership between North East CDC and MINDS, the programme enables the integration of PWIDs into the community and provides work exposure to foster their confidence and capabilities for future employment.

One of our beneficiaries, Mardianah, takes on a gardening role at Tampines Changkat community garden through the CEP-IE placement. The job is a natural fit for the trainee from MINDS Farm at MINDS Idea Employment Development Centre, as she has been learning farming skills such as sowing, harvesting of crops, usage of farming tools and equipment.





FOR OUR SENIORS

The Dedicated North East Ambulance Service provides subsidised ambulance services to low-income residents with mobility issues. This enables beneficiaries to travel back and forth from their homes to places of treatment.

Mdm Hasana is one of the beneficiaries under the Dedicated North East Ambulance Service. As a stroke and heart attack survivor, Mdm Hasana's mobility is affected. She was also diagnosed with a brain tumour which added to her health issues. She has to travel frequently to different places as a result to seek treatment and is always accompanied by her husband, who is her key caregiver.

Prior to finding out about the scheme, Mdm Hasana's transport fees for a round trip could easily hit $100. As the couple are already in their late 60s, it is extremely tiring for them to get around and they are prone to accidents along the way. They applied for the Dedicated North East Ambulance Service which had lifted some weight off their shoulders since.



FOR OUR FAMILIES

A collaboration between Young NTUC and North East CDC, Project Refresh aims to improve the living environment of seniors and low-income families through a series of refurbishment works such as painting, cleaning, decluttering. North East CDC also works with corporate organisations to spruce up the houses with household appliances and furniture. In addition, they sponsor groceries, and offer activities such as manicure, grooming and styled photoshoots. Volunteers are also recruited and mobilised to carry out home refurbishment works for beneficiaries, providing them with a platform to help residents in a meaningful way.

After a stroke rendered his wife immobile two years ago, one of our beneficiaries, Uncle Raymond, had to take on night shifts at work to make sure he is around during the day to take care of his wife. From preparing meals to showering, Uncle Raymond does his best as his wife's sole caregiver. With little time for rest, maintaining the house becomes a challenge. He has shared that a fresh



coat of paint and a clean, decluttered home really makes a huge difference to how they feel psychologically.

FOR OUR CHILDREN

Every child deserves a healthy start in life, however, low-income families face a daily challenge in meeting nutritional needs and ensuring the well-being of their little ones. The North East Growth Fund was set up to provide formula milk and diapers to young children up to 6 years old. By defraying the costs of these essentials, we ensure that the well-being of our little ones is not compromised.

To provide financial support to students who face challenges in accessing transportation to school, the School





Transport Assistance and Relief Scheme (STARS @ North East) offers a subsidy of $360 to Primary and Secondary school students, $650 for JC/Polytechnic/ITE students and $1,000 for University students to cover transportation costs.

With the help of STARS @ North East, Mdm Siti Aisah and her family were able to offset their children's transportation cost to school. She also shared that it meant a lot to her family, because they were able to use the money they saved for other important expenses.

Every donation can help young families with milk and diaper purchases, subsidise transportation costs for students, and create a more caring and inclusive community.

Scan the QR Code or visit

go.gov.sg/charity-necdc

to donate to the less privileged residents today.

CONTRIBUTED BY

NORTH EAST community development council

IN CONVERSATIONS WITH



Q: How do you see the future of AI and chips?

This is an incredibly exciting time to be in technology in general and semiconductors specifically as AI re-shapes our industry. The potential for AI to transform people's lives is limitless and there are so many opportunities for semiconductor companies, such as AMD, to have a positive impact on the world. We see AI becoming as pervasive as the Internet, which will require significantly more compute capability in the cloud, at the edge and across a growing number of intelligent endpoints. Enabling this vision is going to require multiple different types of compute engines to be deployed end to end.

Q: What are the challenges and opportunities for AMD in the AI market?

We're still in the early stages of AI, yet we see immense opportunity as the demand for compute grows to power the AI capabilities and models that will enable truly pervasive AI. AI is going to power substantial advances and improvements in virtually every industry and every product, from healthcare to scientific research, manufacturing and the re-invention of PCs. One of the most immediate challenges we see is how we accelerate the pace of AI innovation in a responsible and ethical way. There's so much potential for AI to advance society, but as AI becomes increasingly available, it's also important that we have guardrails in place to do so in a way that's fair, inclusive and without bias.

Q: How is AMD investing in AI research and development?

We have been investing significantly in AI for several years, including our multi-generation family of Instinct AI accelerators, and AI architectures and engines. In the near-term, we are focused on three key areas: Firstly, investing in a broad portfolio of high-performance GPUs, CPUs and adaptive computing solutions for AI training and inference spanning across data center, edge and endpoints. Secondly, developing an open and proven software platform to enable our AI hardware to be deployed broadly and easily. And thirdly, continuing to expand our deep and collaborative partnerships to accelerate AI solutions at scale.

Q: What are your thoughts on the future of the semiconductor industry?

I am incredibly optimistic. AI is transforming every industry we work in, and the semiconductor industry has an opportunity to provide the capabilities that allow customers to implement AI throughout their businesses. When we look back over the last 50 years, our industry has grown from niche to the foundational enabler of modern life, with sales of nearly USD$600 billion last year. Semiconductor technology has evolved from a handful of transistors on a chip to billions upon billions of transistors on a chip and I think the advances we make over the next 50 years across design, manufacturing and packaging are going to drive similar advances.

Q: How is AMD working to ensure that its chips are compatible with the latest AI frameworks?

We are collaborating closely with the open AI ecosystem and community to ensure that solutions using our chips are optimized to run as performant and efficiently as possible. We have made great progress building powerful software stacks that work with an open ecosystem of models, libraries, frameworks and tools. Native support for our software such as ROCm in frameworks like PyTorch (achieved through continuous integration/continuous deployment and hundreds of thousands of test regressions) as well as the porting of thousands of models from Hugging Face to our solutions are examples of initiatives that ensure that AI models run out of the box on AMD platforms.

Q: How is AMD working to address the chip shortage?

As one of the world's largest fabless semiconductor companies, we work with a diverse network of carefully chosen suppliers and partners. We work with our supply chain to forecast demand years in advance to ensure we are meeting our customer commitments. What we saw during the pandemic was an exceptionally large spike in demand for semiconductors hitting in parallel with global transport challenges. I think the industry has learned a lot from this, and it is important to remember the challenge we faced was more related to significant increase in demand as opposed to a lack of supply. Still, as an industry I believe there is clear understanding around the importance of building a global semiconductor supply chain that is as resilient as possible.

Q: What are the ethical implications of AI?

We fully support the safe and ethical development and deployment of AI technology, and we are committed to working collaboratively across public and private sectors to define protocols and safeguards for ethical AI. We believe such measures should cover all aspects of AI, including safety and integrity of model development, deployment and distribution, domain-specific testing, certification and regulation, end-to-end safety and data integrity. While we agree that much work needs to be done in this area, we do not support pausing technical advances in AI at this time.

A conversation with



Lisa Su

Chair and CEO
AMD

When we look back over the last 50 years, our industry has grown from niche to the foundational enabler of modern life, with sales of nearly USD$600 billion last year. Semiconductor technology has evolved from a handful of transistors on a chip to billions upon billions of transistors on a chip

Lisa T. Su is Chair and Chief Executive Officer of Advanced Micro Devices, Inc. (AMD). Over the course of her tenure as CEO, Dr. Su has transformed the company to become a leader in high-performance and adaptive computing and one of the fastest growing semiconductor companies in the world.

Prior to joining AMD, Dr. Su served as Senior Vice President and General Manager of Networking and Multimedia at Freescale Semiconductor, Inc. (a semiconductor manufacturing company) responsible for global strategy, marketing, and engineering for the company's embedded communications and applications processor business. She also spent thirteen years at IBM in various engineering and business leadership positions, including as Vice President of the Semiconductor Research and Development Center with responsibility for IBM's silicon research and development activities.

Dr. Su has published more than forty technical articles and was named a Fellow of the Institute of Electronics and Electrical Engineers (IEEE) in 2009. In 2018, she was elected to the National Academy of Engineering and received the Global Semiconductor Association's Dr. Morris Chang Exemplary Leadership Award. In 2020, Fortune named Dr. Su #2 on its "Business Person of the Year" list and she received the Grace Hopper Technical Leadership Abie Award. In 2021, she was recognized by the IEEE with its highest semiconductor honor, the Robert N. Noyce Medal and was appointed by President Biden to the President's Council of Advisors on Science and Technology. She has been a member of the Board of Directors of Cisco Systems, Inc., since January 2020 and also serves on the Board of Directors for the Semiconductor Industry Association. She was elected a Fellow of the American Academy of Arts and Sciences in 2020. Lisa was recognized as a 2022 Fortune Most Powerful Woman and a 2022 International Peace Honors Honoree for her achievements in revolutionizing high performance computing, the donation of supercomputing power for infectious disease research, and inspiring people from all backgrounds to pursue careers in STEM.

Impact Of Emerging Technologies In Smart Manufacturing

Q: Can you give us an overview of Applied Materials' manufacturing investment strategy?

Over the last one year, we announced our multi-billion-dollar investment plan in our innovation infrastructure in the United States, Singapore, and India, in expanding our global manufacturing capacity between now and 2030. This is in preparation of a $1 trillion global semiconductor market by 2030.

As part of the plan, we are investing up to $4 billion over the next seven years to establish an Equipment and Process Innovation and Commercialization (EPIC) Center in Silicon Valley, which will be the world's largest and most advanced facility for collaborative semiconductor process technology and manufacturing equipment research and development (R&D). There will be an additional $400 million investment in India to develop a Collaborative Engineering Center focused on development and commercialization of technologies for semiconductor manufacturing equipment. The center will bring together Applied engineers, global suppliers, and research institutions to accelerate semiconductor equipment development. It will also foster talent training and expand India's role in the global chip ecosystem.

In Singapore, our 'Singapore 2030' plan is an eight-year strategy to bolster R&D, increase manufacturing output and capacity, broaden technology ecosystem partnerships, and build talent pool. The new greenfield facility – the 705,000sqft facility in Tampines Industrial Crescent – will focus on accelerating the commercialization of new semiconductor technologies, double manufacturing footprint in Singapore, create more than a thousand new jobs in manufacturing, customer support and R&D, to further support customer and innovation activities around the region.

> ***We are investing in manufacturing technology to drive efficient operations, upskill our workforce, and ensure a sustainable and safe work environment. By adopting IoT, Big Data, Automation, AR/VR, and AI, we are creating a more connected work environment that facilitates faster onboarding of new hires and enables our talented workforce to focus on higher-value and more purposeful tasks.***

Q: What are the biggest challenges and opportunities for Applied Materials' manufacturing investment?

The semiconductor field is one that continuously changes due to market demand, and manufacturing costs are continuously increasing due to supply chain challenges, logistics complexity, material cost increases, and labor shortages.

That said, the semiconductor market is poised for substantial growth due to the increased use of Artificial Intelligence (AI), electrical vehicles and digitization, creating a prime opportunity for us as a semiconductor equipment provider. This is also why we believe in investing heavily in R&D and latest manufacturing technology to develop new materials, processes, and equipment. As new semiconductor technologies emerge, Applied Materials is well-prepared to leverage these prospects.

Q: How would you manage a supply chain disruption?

At Applied Materials, we prioritize effective supplier relationship management, treating each of our suppliers as critical partners to enable our success. We take effort to develop them, share market insights and help them to be successful.

Q: What are your thoughts on the use of artificial intelligence (AI) in smart manufacturing?

AI opens new opportunities in smart manufacturing. It improves productivity by providing insights into data, reducing defects, and improving process yields. AI also helps with improving sustainability in manufacturing through waste elimination and efficient use of energy. More importantly, AI allows our limited workforce to focus on higher value-added tasks and leaving repetitive, monotonous, and dangerous works to robots and AI.

Q: How is Applied Materials responding to the growing demand for sustainable manufacturing?

Across our various facilities, value chain segments, and geographical locations, we are actively contributing to the acceleration of the transition towards a low-carbon future. To provide a more detailed overview, let me delve into the specific initiatives we are undertaking in Singapore.

Our newly established manufacturing facility has been meticulously designed to adhere to the stringent requirements of the BCA Platinum Green mark certification. Notably, this facility employs low-carbon concrete in its construction

A conversation with

KC Ong

Corporate Vice President and
Head of Worldwide Manufacturing
APPLIED MATERIALS, INC.

APPLIED MATERIALS
make possible



and incorporates a substantial stormwater storage tank dedicated to rainwater harvesting. Furthermore, all water utilized within our manufacturing processes will undergo a complete recycling process, ensuring a 100% recycling rate.

The facility's rooftop has been intelligently engineered to accommodate an expansive array of solar panels, spanning an impressive 100,000 square feet. This solar panel installation boasts the capacity to generate an ample supply of energy capable of sustaining 500 households. Moreover, as part of our commitment to minimizing waste, we are installing a food waste digester within our cafeteria premises. This innovative system will effectively transform food waste into valuable fertilizers, leaving no room for wastage. To ensure seamless operations and optimal resource utilization, the facility will be equipped with state-of-the-art sensors and an advanced energy monitoring system. This integration enables real-time monitoring and fine-tuning of energy consumption, allowing for continuous optimization.



KC Ong is Corporate Vice President and Head of Worldwide Manufacturing for semiconductor operations. Based in Singapore, he is responsible for driving the company strategy through operations teams around the world, providing leadership for Semiconductor Volume Manufacturing, New Product Introduction, Planning and Smart / Digital Operations.

Mr. Ong brings 25 years of executive experience in operations to Applied and has led Manufacturing and Supply Chain strategies and execution for factories in Asia, the Americas and Europe. He most recently served as Senior Vice President of Global EMS Operations at Jabil Circuits for eight years, and he previously spent 17 years with Flextronics. His leadership in increasing the efficiency and profitability of operations contributed significantly to each company's growth.

Mr. Ong earned a Bachelor of Engineering from the National University of Singapore and an MBA from the University of Strathclyde in Scotland. He has also completed an Advanced Management Program at INSEAD and has been certified a Six Sigma Black Belt by the American Society of Quality.

Singapore: A Strategic Key Node In The Global Supply Chain

Q: Please tell us more about ASM's manufacturing plans. When expanding into Asia, what considerations did the leadership at ASM take when choosing areas of operations?

ASM is a global, leading supplier of semiconductor wafer-processing equipment and process solutions, with customers including the world's top semiconductor device manufacturers. The long-term drivers for semiconductor industry remain strong, and the industry is expected to grow to more than $1 trillion by early 2030s. We will continue to see a need for more powerful chips for new applications such as in cloud computing, artificial intelligence (AI) and the electrification of cars. These will all drive further demand for ASM's advanced deposition technologies.

ASM is investing in the sustainable growth of our company, with exciting expansion underway in Asia. We have recently expanded our Singapore manufacturing facility, nearly tripling our output locally. At our state-of-the-art facility at Woodlands Height, ASM assembles and tests its advanced deposition tools, which are critical to producing leading-edge semiconductor devices. In addition, we broke ground in May this year on our second campus at ASM's manufacturing and innovation center in Dongtan, South Korea, which will be completed in 2025.

The investments we are making in Singapore and Korea will expand ASM's manufacturing, R&D, and product-development infrastructure to meet the needs of our technology roadmap and add more manufacturing capacity. With the two sites in Asia and our existing Milan and Almere manufacturing sites, we expect to have enough manufacturing capacity to serve us through to 2030, supported by our team of talents at each site.

Q: What would you say were the key milestones that shaped the evolution of the company?

At ASM, we strive to stay ahead of what's next. Innovation is at the core of what we do, which enables us to make a difference to and create value for our customers, employees, investors, and other company stakeholders, while we continue to bring our breakthrough technologies into volume manufacturing with high efficiency. Our technology is key to meeting the demand for semiconductor chips needed to make the electronics products that consumers and businesses use worldwide.

Our purpose is to improve people's lives through advancing technologies that unlock new potential, and is enabled by our strategy of Growth through Innovation. ASM has a long history of excellence, with over 50 years of research, innovation and breakthrough technologies advancing the electronics market and society. Through our global R&D network, we partner with leading research institutes and engage customers closely on their technology roadmaps to develop new materials, processes, products, and technology to address the industry's critical issues.

At ASM, sustainability is a key pillar of our corporate strategy. We are making a difference for the planet through our Net Zero by 2035 target, and ASM is the first company in the semiconductor sector to have our net-zero target verified by the Science Based Targets initiative (SBTi). We combine collaboration and innovation with our stakeholders to create a positive impact beyond our individual scale, and bring faster and more meaningful change for our environment. For example, by working closely with our partners in the value chain, we more than doubled the reuse of shipping materials in 2022. I'm heartened to see that our increased focus on sustainability has been recognised in improved ESG ratings, such as with S&P Global CSA and MSCI.

Q: Why did ASM choose to expand in Singapore? Which areas do you see as Singapore's strengths?

ASM is drawn to Singapore because it is an attractive place to do business. We have benefitted from Singapore's global connectivity, strong government support, and dynamic semiconductor ecosystem. Given the global nature of ASM's business operations, Singapore's excellent physical connectivity as an air and shipping hub has been instrumental for serving our customers in the region, as well as for supplier sourcing.

Singapore's stability, infrastructure, transparent business policies, and skilled workforce backed by strong government support make it an ideal location for growth of our advanced manufacturing and operations capabilities. ASM remains committed to Singapore and look forward to contributing to semiconductor innovation and workforce development in Singapore. On a personal level, I am proud to see Singapore playing a key role as a strategic node in the global semiconductor supply chain.

Q: How does Singapore fit into ASM's global footprint?

Over the past 25 years, our operations in Singapore have grown in breadth and depth, transitioning to higher-value activities. ASM entered Singapore in 1998 with a regional customer sales and service office. This was followed by the establishment of ASM Front-End Manufacturing Singapore (FEMS) in 2003. We started manufacturing in Singapore with a single product line, the A412 vertical furnace.

ASM officially launched our state-of-the-art manufacturing facility and operations hub at Woodlands Height in 2022. The new facility allows for more efficient

manufacturing flow, and a higher level of flexibility for supply chain management, increasing our ability to meet our customers' demand and support their transition to the next technology nodes.

Today, the Singapore site is ASM's centralised manufacturing facility for most of our product lines. Beyond manufacturing, the Singapore operations also include key functions such as supply chain management, worldwide IT and Global People. This complements ASM's global network of corporate, sales and service, business unit and product development, manufacturing, and research facilities in 15 countries.

Q: How is ASM contributing to Singapore's semiconductor talent pool and innovation ecosystem?

In addition to physical space, our expansion of manufacturing activity in Singapore needs to be supported by a strong and resilient regional supply chain ecosystem. The challenges faced by the semiconductor industry during COVID reinforced the importance of building agility in our supply chain and ensuring the availability of all the parts we need to build our systems. I believe our supply development efforts will contribute to uplifting the capabilities and supply chain readiness of the supplier ecosystem in Singapore and the region.

Our ambitious expansion plans can only be realised when we have the right people in the organisation. People are our greatest asset, and attracting and retaining talent remains a priority at ASM. Competition for talent is only getting stiffer in the semiconductor industry, and ASM is grateful for our partnerships with local institutes of higher learning and industry partners like SSIA to attract and nurture young talent.

With ASM's leading edge technology and people, we hope to foster a strong spirit of collaboration to drive innovation for the semiconductor sector in Singapore. For example, we are contributing to high quality 200mm silicon carbide (SiC) and specialty epitaxy process development with the Institute of Microelectronics (IME) at the Agency for Science, Technology and Research (A*STAR).

A conversation with

Yvonne Lee

Singapore Site Leader
and Vice President,
Global Product Delivery

ASM



The success of this collaboration will benefit the SiC manufacturing and innovation ecosystem, and strengthen Singapore's position as a leading advanced manufacturing hub.
We look forward to strengthening partnerships with industry players as well as public institutions and universities in Singapore to accelerate discovery and innovation.

2022

Ms Yvonne Lee was appointed as Singapore Site Leader in January, 2022. She is concurrently Vice President, Global Product Delivery and oversees strategies to achieve business excellence in demand management, order fulfilment, global manufacturing, manufacturing quality and training, new product introduction, manufacturing engineering and industrial engineering.

2021

Yvonne is the Asia lead for the Women's Initiative Network (WIN), ASM's employee resource group for women at ASM to help advance and retain female talent through building a more inclusive work environment. She is also the Executive Sponsor for the WeCare Club, ASM's employee resource group to engage with and contribute to communities. Yvonne joined ASM in February, 2021.

2008

Yvonne has over 25 years of experience in the electronics and semiconductor equipment industry. Before joining ASM, she had a 12-year tenure with Applied Materials as part of the team responsible for establishing a greenfield manufacturing site in Singapore in 2008. She went on to hold various managerial positions in demand management, operations and supply chain before becoming Senior Director and Head of Chemical Mechanical Planarization (CMP) Manufacturing Operations and Engineering. Yvonne was also Head of Corporate Social Responsibility for the Singapore office, where she spearheaded and sponsored multiple CSR initiatives for the local volunteer team.

1995

Yvonne started her career in 1995 at Motorola Mobility as a Process Engineer. Yvonne graduated with a Bachelor of Mechanical and Production Engineering (Honors) from Nanyang Technological University Singapore.

Yvonne graduated with a Bachelor of Mechanical and Production Engineering (Honors) from Nanyang Technological University Singapore.

How Do You Find The Middle Ground Between Digitalization And Decarbonization?



Q: The digital transformation that began in the 1990s with the advent of the Internet has pervaded into almost everything else. How has the semiconductor industry evolved correspondingly over the past 30 years?

In the late 80s, we saw the rapid growth in desktop and later laptop computers. This became the main driver for semiconductor growth particularly in CPUs, memories, and HDD controllers. This period of high volatility led to consolidation in the DRAM and HDD businesses. The following decade saw the dominance of tech giants, going by the acronym "GAFA" and the Chinese equivalent "BAT", who led the rise in digital communications. Semiconductor growth in digitalization primarily fulfilled bandwidth and network performance while being driven by advancement in mobile technologies. From 2010s onwards, alongside consumer led growth, a second growth engine emerged in infrastructure: smart grid, smart building, and smart manufacturing where elements of I4.0 such as automation and data analytics were implemented. Most recently, digitalization accelerated due to Covid, boosting demand for semiconductors, and putting a huge strain on semiconductor supply chain. Going forward, the semiconductor industry will continue to be of strategic importance and contribute significantly to GDP, be it artificial intelligence, quantum computing, e-vehicles, or combating climate change.

Q: How has digital transformation impacted Infineon so far given the acceleration of artificial intelligence (AI)?

Infineon has introduced the Digital Agenda which outlined priorities and served as a roadmap for successful transformation through three fields of action: digital products and services, digital customer interfaces, and digital end-to-end processes. Implementing projects and initiatives within the organization creates value for our customers and employees. AI has intrigued us since we embarked on advanced manufacturing in Singapore. In 2019, we decided to build on the successes of earlier projects. In 2020, we launched the ARISE Initiative to make Infineon Singapore an AI innovation hub by 2023. I am happy to announce that presently, over 1000 employees are trained in basic and intermediate AI, around 24 projects in the ideation to proof-of-concept pipeline, and 9 pilot projects Zimplemented in manufacturing, supply chain, sales, marketing, distribution, and finance. The awareness of using AI in our routine has increased while resistance amongst employees had reduced significantly. Moving forward, I hope to see the creation of new use cases becoming part of the routine of employees here.

Q: How do you see digitalization and decarbonization marry each other in reducing carbon emissions?

Earlier, I elaborated on digitalization being a major driver of semiconductor growth in the past. Today, humankind is dealing with dire consequences of climate change resulting from long-term neglect of carbon emissions. To Infineon, decarbonization is using

A conversation with



CS Chua

President and Managing Director
INFINEON TECHNOLOGIES ASIA PACIFIC PTE LTD

Chua Chee Seong is President and Managing Director of Infineon Technologies Asia Pacific Pte Ltd, the Asia pacific regional headquarters of Infineon Technologies – a world leader in semiconductor solutions that enable intelligent mobility, efficient energy management and making Internet of Things secure, easy to use and real.

In this capacity, Chee Seong oversees regional sales, marketing and distribution, R&D and low power IC product line. He is also responsible for strategy, quality management, human resources and communications for Asia Pacific region based out of Singapore with local presence in Australia, India, Indonesia, Korea, Malaysia, Philippines, Thailand and Vietnam. He has held the current role since July 2017.

Chee Seong began his career at Infineon in 2000 At Infineon and has taken on roles in product marketing for industrial microcontrollers and regional marketing covering Asia Pacific's automotive electronics segment. In his last role as the Vice President of Automotive Regional Centre responsible for sales, marketing, OEM business development, concept engineering and application engineering for Infineon's Automotive Division, Chee Seong was instrumental in building up a competent segment marketing and system application engineering team to serve key customers and to grow Infineon's automotive business in the region.

Chee Seong has a Bachelor of Electrical & Electronics Engineering from Nanyang Technological University in Singapore.

semiconductors to reduce overall carbon emissions, specifically those enabling higher efficiency in renewable sources such as solar and wind energy conversion and storage. Currently, approximately half the world's solar and wind power capacity is equipped with our semiconductors. Additionally, we aim to increase energy efficiency of high power-consuming data centers by reducing heat loss from powering CPUs, thus reducing the energy-intensive cooling requirement at data centers.

Q: How is Infineon keeping up with the rapid changes resulting from some of these trends?

Keeping up with development alone requires significantly more resources. We must actively manage our product portfolio and roadmaps while emphasizing sustainable profitable growth. Since innovation cycle is shortening while emerging applications are growing, we must partner and co-innovate with experts in their respective fields, be it start-ups, suppliers, universities, distributors, and customers. Thus, we have taken concrete steps to engage the eco-system through our Co-Innovation Space and Program for start-ups, and our annual flagship event OktoberTechTM, which showcases our partners and solutions. Within the company, we are running improvement projects using AIML (for Infineon to elaborate) while actively researching to maximize Large Language Models to boost productivity and customer satisfaction. We are committed to achieving carbon neutrality by 2030 as outlined in our CSR Policy for sustainable day-to-day business operations. For example, we have implemented the systematic energy management system standard ISO 50001 at our main manufacturing sites along with the ongoing transition to the latest 300-millimeter technology and the promotion of I4.0 to increase efficiency. Green electricity is integral for us in realizing our long-term goal of utilizing accessible green electricity at all major production sites in Asia. This ensures countries with a clear roadmap to optimize green energy infrastructure for industrial growth appeal more to sustainable companies.

Sustainability: What It Truly Means

Sustainability has become a buzzword across most industries especially in the last five years. And the semiconductor industry has also become very much entrenched in this arena. As we speak to Chen Kok Sing, Corporate Vice President and Singapore Country Manager of Micron who has been in the industry over 30 years, we delve more into how Micron is committed on this front and the steps taken to pursue their sustainability goals.

> ***I believe in the power of innovation and strength, not only from our people, but also from SMEs in Singapore to enable a sustainable development for the benefit of our future generations. Now, this is what Sustainability is truly about.***

Q: Do you think sustainability is merely a novelty in the industry?

This is an interesting question. I have been wondering too most times when exactly we started using this "sustainability" buzzword. Interestingly, even though usage of it seems to have accelerated in recent years - especially after Paris agreement in 2015 - "sustainability" was defined 36 years ago in the United Nations 1987 report on 'Our Common Future'. "Sustainable development" is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Following that, we have Montreal Protocol (1987), Kyoto Protocol (1997), and Paris agreement (2015). In short, the term sustainability is not limited to just climate but also the future development of generations.

Here are some ways that we have worked on this front:

a. In the sphere of semiconductor, we challenge ourselves to be ahead in technology, improve our product, our quality, yields and being cost competitive. We know that our industry uses a lot of natural resources, be it water, energy, or materials so naturally, from the start, we have consciously worked on resource reduction and recycling, without using the word sustainability.

b. As we embarked on our I4.0 transformation journey, we have applied I4.0 in our sustainability applications, such as using AI to optimize our energy efficiency, analyze our materials usage and waste reduction opportunities, to provide insight through emission footprint for our sustainability focus areas.

c. We believe that sustainability is good for business. From 2018 to 2021, we have reduced our resources used per GB production by ~45% through sustainable technology development and operation improvements. These improvements cover our 4 main sustainability pillars of energy, emission, water, and waste.

   We integrate sustainability into our end-to-end operations, from sourcing, manufacturing, facilities to supply chain. It is beyond buzzword; we believe sustainability is good for both environment and business. It is not just sustainability engineers' job to work on sustainability projects, our sustainability programs encompass various teams from procurement, process and equipment engineering, facilities, smart manufacturing, and finance. In short, we have everyone's buy-in.

d. Sustainability is a journey, and I would like to call out to our partners, including SSIA and the local companies in Singapore to embark on this journey. Micron has set ambitious time-bound sustainability targets, demonstrating our commitment to reducing GHG emissions, adopting renewable energy, and improving waste management and water recycling infrastructures at our global facilities. We work toward net zero GHG emissions in our operations scope 1 and scope 2 by 2050 and a milestone goal of 42% absolute reduction over CY20 by 2030. We aim for 100% clean energy by 2050, and on water and waste we set goals of 75% water conservation, 95% waste RRR, and zero hazardous waste to landfill by 2030.

   To achieve this goal, we need strong collaboration from governments, IHLs, and our partners to develop the capabilities in Singapore. That includes talent, technical capability, and the industry ecosystem to enable a circular economy.

Worldwide Environmental Ambitions And Recognition

Micron Environmental Targets

Green House Gas (GHG) Emissions

42% absolute reduction in GHG emissions from operations by CY30 from CY20 baseline

Net zero GHG emissions from operations and energy use by CY50

Waste

95% reuse, recycling and recovery, and zero hazardous waste to landfill in CY30

0 hazardous waste to landfill by CY30

Waste

75% water conservation in CY30

Energy

100% renewable energy globally where available

Micron Singapore Green Initiatives

Green Energy
Onsite solar panel generating 24GWh energy, enough to power **6000 homes** upon completion in 2024

Water
98% on recycled water (NEWater)
40% additional recycle in-house

Emission
CO_2 avoided = **7.4million trees**

Waste
85% waste reuse, recycle & recovery

A conversation with



Chen Kok Sing

Corporate Vice President,
Singapore Country Manager
MICRON TECHNOLOGY

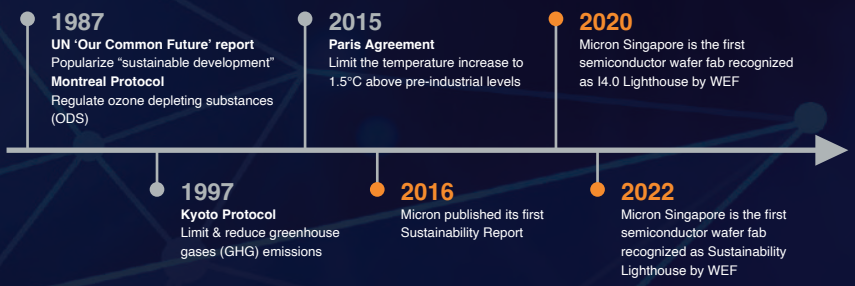
Mr Chen Kok Sing is currently the Corporate Vice President for Frontend Manufacturing and Country Manager for Micron Technology in Singapore, responsible for aligning Micron's goals, strategy and leadership within its Singapore presence.

Mr Chen was part of the pioneer team that established TECH Semiconductor in 1991 and held senior positions of increasing responsibilities to Operations Vice President.

Mr Chen led the start-up of IM Flash Singapore (IMFS), a joint venture between Micron and Intel, as the Managing Director in 2007.

After the amalgamation of IMFS into Micron in 2012, Mr Chen served the positions of Singapore Wafer Fabs Operations Managing Director responsible for Micron's three fabrication facilities in Singapore; Micron Singapore Backend Managing Director responsible for Assembly, Test, and Modules/SSD operations; North America Backend Operations Managing Director based at the company headquarters in Boise, Idaho, USA; and Singapore Wafer Fabs Managing Director.

Our Sustainability Journey



Q: How has Micron made a significant impact on Sustainability?

Firstly, I am glad that semiconductor industry is moving towards a sustainable future. Micron has taken strides in our sustainability journey, and I believe we are among the leaders in sustainability.

We have also been collaborating with industry associations such as SSIA, to push for sustainability collaboration and framework. We are glad to be a part of the founding committee for SSIA's Singapore Semiconductor Sustainability Committee which was formed early 2023.

One of our best practices, and our belief, is sustainability needs to start from mindset. We actively engage our people to think and act sustainably, be it at work, in community, and at home via employee-led committees, trainings, and awareness programs.

Q: How has Micron enabled the circular economy to be more effective since recycling semiconductors can be costly, complex and not environmentally friendly?

Our chip is embedded into our customers' products like mobile phones, laptops, and many of our customers do incorporate recycling programs in their product life-cycle management to recycle or reuse their products or parts. Similarly, as chip manufacturers, we are working on circular economy for our production materials. In the past 3 years, we have increased our waste recycling rate from 58% to 85%. We worked closely with our partners, many of them are SMEs, to generate new circular economy opportunities:

Some of our chemical waste like sulfuric acid are recovered and reused in other industries. Our sludge waste are treated and processed into fluorspar which is used as precursor for metal industry. In doing so, not only do we reduce our waste to landfill, we also reduce our disposal cost, and increase our waste's vendor revenue.

Our commitment and collaboration with the waste company on the waste volume and recycling capability have helped the company to expand their operation. With this, I would like to encourage our SMEs to partner with us, or other semiconductor MNCs to tap on the opportunities and continue to build a circular economy.

Q: Is Micron working on less pollutive methodologies?

We believe that the journey for sustainability is still long but we are making good progress. There is still lack of alternative materials with low or zero Greenhouse Gas (GHG) for semiconductor process gases. However, this is where we believe with the power of our people, and the collaboration with our partners to find the solutions.

The Evolution of the Semiconductor Industry
Pre and Post Pandemic

Q: What are the biggest changes you have seen in the semiconductor industry over the past 5 years especially pre and post pandemic?

The 2020/2022 pandemic led to 2 very significant changes:

The first one was a drastic increase in the semiconductor demand starting with the telecom, computer and consumer segments and later on the automotive one. Overall, the semiconductor market size increased from 2019 to 2022 by 34%.

The second one was a qualitative and unexpected change with the grand public sudden huge awareness of the strategic, if not vital role, of the semiconductor industry within the whole world economy. There was so much media coverage, almost every day for 3 years in a row on the lack of availability of chips to serve millions of different companies in so many sectors of the industry, that suddenly, the word “Semiconductor” became familiar to almost everybody.

Q: How has the rise of artificial intelligence and machine learning impacted the semiconductor industry?

The emergence of a new and potentially very high-volume application is not something new in our industry. Since the 1980s, we have had many waves of applications that went from a few million pieces per year to hundreds of millions, if not a billion of pieces per year (PC and peripherals, Cellular phone, High-end Graphic monitors, video games and decoders and etc) and today, the IOT and the drones; tomorrow the robotics and medical.



So welcome to the new wave of AI that will be mainly impacting data centres content with more performance driven key products such as high-end processors and memories, but also sophisticated microcontrollers and power devices.

Q: What are the biggest challenges facing the semiconductor industry today?

Two key challenges: R&D and manufacturing.

And for 2 main reasons: One is the complexity of the technology below 10 manometers, and cost of their related pilot line equipment. Second is the huge amount of capital needed for the manufacturing infrastructure, USD 20 billion today, USD 30 billion tomorrow for the state-of-the-art fabs.

These are still in the financial ability of the top 3 players having revenues in the range of USD 60 to almost USD 80 billion, but the other players (with revenues between USD 10 to 30 billion) have still to invest USD 5 to 10 billion for a new fab, and this is a bit out of reach for most of them. Therefore, manufacturing joint ventures between themselves and government funding by key regions where they operate will be of strategic importance in the coming years.

Q: What are your thoughts on the role of government policy in the semiconductor industry?

This role is of vital importance for maintaining the highest level of diversity and strength of a geopolitically acceptable level of a fruitful competition worldwide. The COVID crisis taught us that major regional economies need to have some kind of direct access or control of vaccine manufacturing. The semiconductor being at the core, not of course of the health but of the wealth of nations, it is mandatory to have a choice of large numbers of competitors, partners, suppliers, customers, associates in this industry to maintain autonomy.

The huge financial requirements for R&D and Manufacturing specific to this industry is making the contribution of governments, not an option, but a must. And indeed, almost all the key regions of the world are doing it already since a long time, but more visibly now since amounts to commit are becoming gigantic (USD 50 to 100 billion looks to be the basic unit).

A conversation with



Francois Guibert

Former EVP and President of STMicroelectronics for the Greater China and South Asia Region

So, beyond the 2 or 3 players that can afford themselves the financial efforts, it is of strategic importance to diversify the players, both in their products line and market targets, as well as in their regional presence with a strong and continuous support from their government.

Q: What advice would you give to young people who are interested in a career in the semiconductor industry?

This is a very important question. But let's face reality, as of today, bachelors/masters/PHD's graduates are interested in many other jobs than those in the Semiconductor Industry.

Changing this trend will require a lot of efforts from the semiconductor companies to make themselves visible to the young and very demanding generations of graduates.

However, there are a lot of positive ingredients for the success of a fresh graduate: the diversity of jobs, the number of positions in organisations and the large opportunity of great countries to operate in (USA, Asia and Europe) with very often a quite competitive salary and package.

In order to develop their awareness, I am currently doing cycles of conferences in Singapore and Europe with a master class presentation on this fascinating Industry.

This presentation is covering the complexity of this Industry in design and manufacturing, its history, the new applications, the job opportunities, the positioning and challenges of the top 20 players and as a conclusion the strategic importance of this industry within the world economy. Beyond the Business community that reacted very quickly and positively to this initiative I deeply hope that the regional education systems in ASEAN and Europe will grasp this kind of conference opportunity to increase, amongst the graduates, the attractiveness of this fantastic industry.







Understanding the CHIPS Act

The CHIPS and Science Act, often referred to as the CHIPS Act, was passed by the United States government in August 2022 and will invest $52.7 billion into the semiconductor industry with the goal of revitalizing U.S. manufacturing. Semiconductor capacity in the United States declined from 37% of worldwide output in 1990 to just 12% today, putting the country at risk of falling behind in the ecosystem.

This initiative, led by the U.S. Department of Commerce (DOC), aims to strengthen national security, improve supply chain resilience, build upon research and development (R&D), and bolster the corresponding workforce. The funding will facilitate the creation of semiconductor clusters that include manufacturing facilities, suppliers, research, workforce programs and supporting infrastructure.

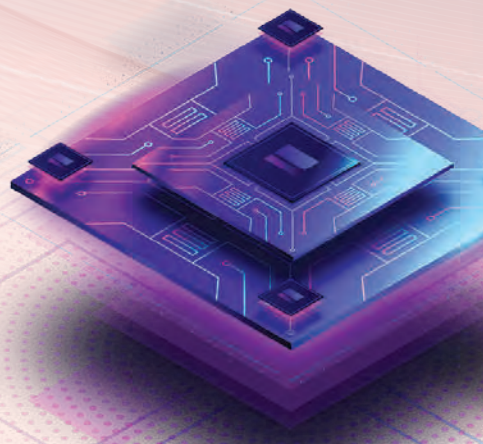
Of the total investment, $39 billion will go towards manufacturing incentives; $13.2 billion will be used for R&D and workforce development, which includes the establishment of the National Semiconductor Technology Center (NSTC) and National Advanced Packaging Program. $500 million will be used for international information communications technology security and semiconductor supply chain activities.

It also provides a 25% tax credit for investments in semiconductor manufacturing and related equipment.

Thus far, the DOC has released two notice of funding opportunities (NOFOs) centered around the construction, expansion and modernization of commercial facilities. The first NOFO covers facilities that produce leading-edge, current-generation, and mature-node semiconductors, including front-end wafer fabrication and back-end packaging. The second NOFO focuses on semiconductor materials and manufacturing equipment facilities with investments of at least $300 million. A related opportunity for semiconductor materials and manufacturing equipment facilities with investment below $300 million is expected to be announced in the late fall of 2023.

International companies with a current or planned U.S. facility are eligible for funding, with the exception of those based in China, Iran, North Korea or Russia, but funding must be used in the United States.

In order to express interest in securing funds and begin the process of determining eligibility, interested companies must apply under the relevant NOFO. The application process includes a statement of interest (SOI) that briefly describes the project scope and intent, an optional pre-application and the full application. While optional, the pre-application is highly encouraged because the DOC will provide feedback to each company, which can be used to inform and improve the final application submission. If successful during the application process, a company may move on to the due diligence phase and then the award preparation and issuance phase.





SIX PRIORITIES FOR A SUCCESSFUL APPLICATION

AS RECOMMENDED BY THE DEPT. OF COMMERCE

1. **Economic And National Security Objectives**
   Projects should advance the national semiconductor ecosystem and increase resilience against supply chain issues.

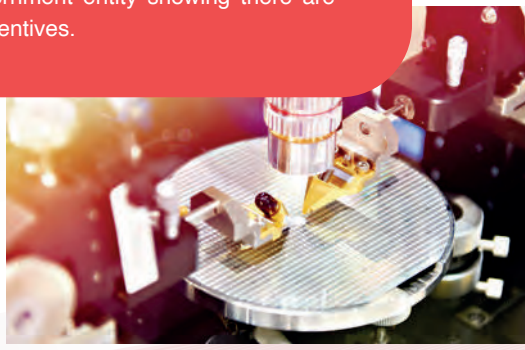
2. **Commercial Viability**
   Long-term viability, including customer base and demand, will be considered.

3. **Financial Strength Of Company**
   The DOC will review historical financial information and creditworthiness of applicants.

4. **Technical Feasibility And Readiness**
   Referencing past large-scale projects completed by the company will show the DOC that the applicant has the experience to succeed again.

5. **Workforce Development**
   Applicants are encouraged to partner with higher education programs.

6. **Broader Impacts**
   Applicants must provide a letter from a state or local government entity showing there are qualifying incentives.



Foreign companies seeking first-time expansion into the United States should focus on supply chain chokepoints and areas in which they can provide a service or product not currently accessible in the market. Applicants who can demonstrate their ability to advance the innovation ecosystem will be favored. International companies that already have a presence in the U.S. should look to support or expand a facility that already exists.

If CHIPS Act funding may be applicable to your business expansion plans, visit the GPEC website or email GPEC Vice President of International Business Development Sean Fogarty at sfogarty@gpec.org for more information on the available opportunities.

www.gpec.org/chips-act/

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Greater Phoenix Economic Council

Semiconductor Quick Start Bootcamp: How A Community College District Is Revolutionizing Workforce Development





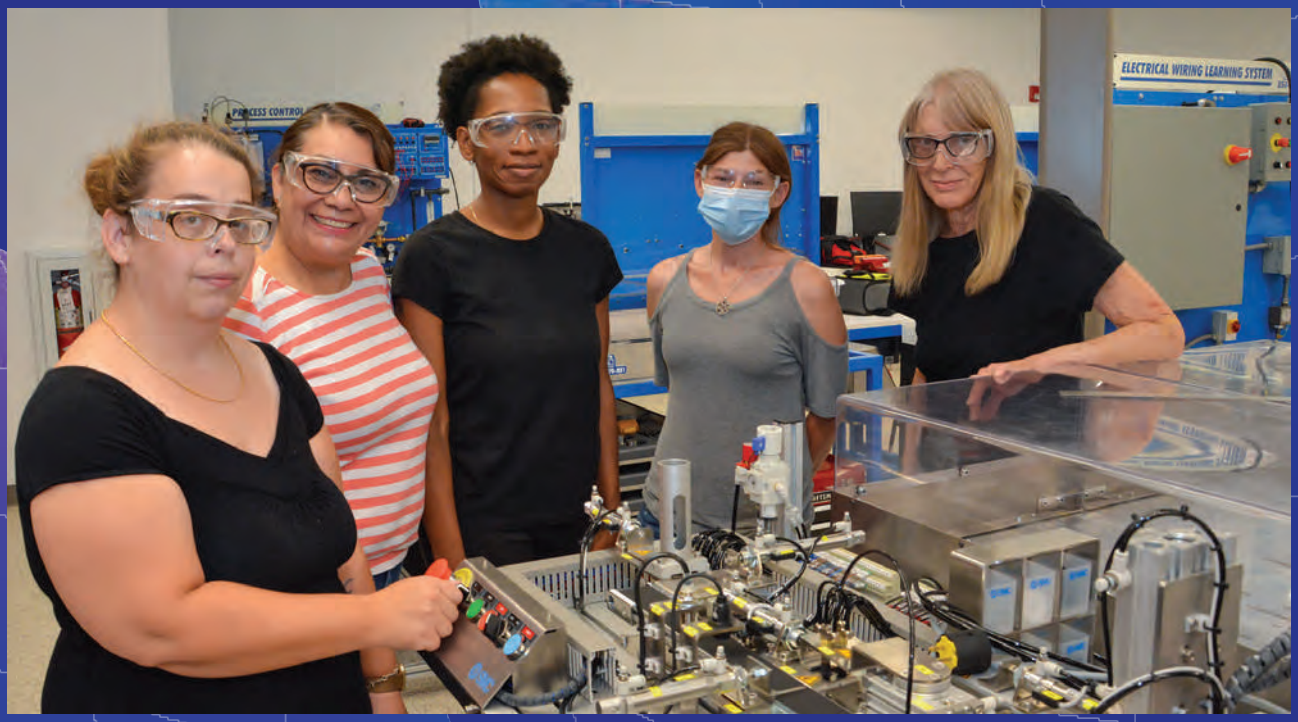
The Maricopa County Community College District (MCCCD) is at the forefront of workforce development in the semiconductor industry, offering innovative training that prepares Arizona's labor market with the skills needed to thrive in this rapidly growing industry.

Global semiconductor corporations invest billions of dollars establishing manufacturing operations in Greater Phoenix, the demand for a skilled entry-level workforce is skyrocketing. As Arizona's largest workforce development provider, MCCCD serves as a pipeline for economic growth by providing job-related training and preparing a well-equipped workforce. Connecting Arizona's employers with a highly-qualified workforce strengthens MCCCD's commitment to bridging the gap between education and occupation at the lowest possible cost to students.

The bipartisan passage of the CHIPS and Science Act in August 2022 invested billions of dollars in the United States semiconductor industry that fortifies our nation's economy, supply chains, and training programs. Arizona's semiconductor industry continues to boom, and MCCCD is poised to train approximately 4,000-6,000 semiconductor technicians to support this employment opportunity over the next few years. The Semiconductor Technician Quick Start, a ten-day, 40-hour bootcamp-style training, is available at three of the ten Maricopa Community Colleges – Chandler-Gilbert Community College, Estrella Mountain Community College, and Mesa Community College and is taught by industry professionals.

The future of the semiconductor manufacturing industry continues to thrive in Arizona. Maricopa Community Colleges remain committed to partnering with industry experts to expand advanced training coursework and provide technicians with opportunities for furthering their careers

—MCCCD Chancellor Dr. Steven R. Gonzales



MCCCD is also creating a distinctive workforce reflecting the diversity of the Grand Canyon State. A majority, 53% of college students in the Semiconductor Technician Quick Start are first-generation with 60% identified as students of color. Furthermore, in a field that has been traditionally under-represented by women, two cohorts of the Semiconductor Technician Quick Start have been all female.

In order to provide a realistic experience of a semiconductor production fab clean room, the Arizona Advanced Manufacturing Institute (AzAMI) at Mesa Community College partnered with Baltu Technologies and Chicanos Por La Causa to incorporate innovative virtual reality technology into the recruitment process to further promote entry-level manufacturing career paths across Maricopa County. The interactive experience is a summarized version of performing maintenance on a complex semiconductor tool. The virtual reality simulation takes three minutes and five steps from start to finish.

"Arizona is on track to be an American leader in the microchip manufacturing industry. Utilizing virtual reality, we are providing prospective students with a hands-on gamified insight into what it takes to work in a modern manufacturing facility," said Leah Palmer, executive director of AzAMI.

Upon successfully completing the Semiconductor Technician Quick Start, students are guaranteed a job interview with local semiconductor companies. After passing the NIMS Certification test, their tuition is waived and will be covered by the college. In this rapidly growing field, the career trajectory for semiconductor technicians is expected to continue to be prosperous. According to the U.S. Labor Bureau, the annual median wage for Semiconductor Processing Technicians is $48,370.

Through the Semiconductor Technician Quick Start, MCCCD connects regional semiconductor employers with a highly qualified workforce to fill targeted labor needs in this critical high-demand industry that not only alleviates Arizona's workforce shortage but global supply chain disruptions.

To learn more about the Semiconductor Technician Quick Start model, visit
https://info.maricopacorporate.com/semiconductor

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MARICOPA
COMMUNITY COLLEGES





Shaping The Future Of Microelectronics One Learner At A Time

From the bustling technology hubs of Shenzhen and Seoul to the innovative corridors of Silicon Valley, the microelectronics industry is undergoing a seismic shift. With the sector poised for unprecedented growth, nations across the globe grapple with the burgeoning demand for skilled professionals, with hundreds of thousands of new jobs being added to the workforce.

Despite these massive numbers, the lack of skilled workers threatens to hamper worldwide progress. China is short 300,000 jobs, with Taiwan, Japan and South Korea experiencing similar labor gaps. At the epicenter of this transformation is the U.S. government's $50 billion investment in the CHIPS Act, which has prompted 42,000 new jobs.

Technicians top the list of high-demand career paths, comprising a 70% gap. From micro-soldering to circuit board design to Internet of things technicians, these roles are both cross-disciplinary and nuanced – necessitating the need for continued education.

Academic institutions must play a pivotal role in equipping the workforce with comprehensive training across the microelectronics value chain. Arizona State University is rising to the challenge with a portfolio of learning experiences. In recent years, ASU has emerged as a nexus for international collaboration.









IGNITING THE SPARK

Recognizing the limited early exposure to semiconductors in education, ASU is forging pathways that introduce learners to semiconductor-relevant degrees sooner, fostering an interest in the field.

TRAINING AND UPSKILLING

ASU programs cultivate global perspectives and enhance cross-cultural mindsets, preparing professionals for a connected, global economy. A comprehensive portfolio of courses and certificates encompasses core industry elements – materials, design, applications, manufacturing processes and packaging. Learners can align their ASU credentials with various job pathways and degrees.

Terry Alford, a distinguished materials science and engineering professor at ASU's Ira A. Fulton Schools of Engineering, has been instrumental in the design and facilitation of the courses. He underscores the significance of these endeavors in closing the talent gap:

> ***Building the New American University means rethinking what is possible within engineering schools and how we serve all learners to meet them where they are. We're making every effort to collaborate with our colleagues in the semiconductor industry to develop engaging learning experiences that not only bridge the talent gap but also enable the workforce for the next decade.***
>
> —Terry Alford, Materials Science and Engineering Professor, Ira A. Fulton Schools of Engineering, ASU

Through ASU's Learning Enterprise, the microelectronics portfolio offers nine distinct specializations to date, each attainable through 35 to 40 hours of interactive instruction and assessment. Amid this strategic push, the Fulton Schools of Engineering have blossomed into the largest engineering school in the nation, with more than 30,000 enrolled students.

This vibrant academic ecosystem is equipped to fulfill the needs of global industry leaders such as Intel, TSMC and ON Semiconductor.

For more information, please visit:
microelectronics.asu.edu/workforce-development/

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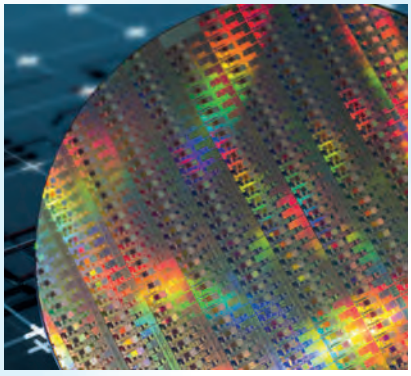


Megatrends Driving Semiconductor Demand This Decade

UMC's comprehensive portfolio of IC fabrication technologies ready to enable 5G, AIoT, and automotive innovations

Global semiconductor sales were close to $600 billion in 2022, and some are projecting the industry will hit the $1 trillion mark by 2030. When that milestone will be reached is up for debate, but what is indisputable is that the devices powering our modern life will consume more and more semiconductors as emerging technologies develop and mature.

UMC has identified 5G, artificial intelligence of things (AIoT), and electrification of mobility as the key megatrends driving semiconductor growth in the coming years. To enable customers to capture opportunities and gain market share, UMC is closely aligning its technology solutions and roadmap with these megatrends.



As 5G continues to proliferate, wireless infrastructure and devices will need more silicon content compared with 4G. For example, 5G-enabled smartphones require more radio frequency front-end (RFFE) components than 4G phones to process the greater bandwidth. UMC recently added to its family of RF solutions with the release of its 40RFSOI platform, targeting the millimeter-wave market. In addition, next-generation smartphones are mostly equipped with high-end displays, such as AMOLED. UMC leads in display driver ICs for small-sized panels in smartphones and AR/VR devices, with over 85% market share.

AIoT refers to the convergence of artificial intelligence and internet of things, which is driving huge demand for connectivity and data processing in homes, workplaces, factories, and city infrastructure. To support this growth, UMC's comprehensive foundry technologies can support IC devices for WiFi/Bluetooth, sensors, power management, and displays. Moreover, AI is accelerating the trend of advanced packaging and heterogenous integration. UMC offers 2.5D interposer and 3D hybrid bonding solutions to fulfill

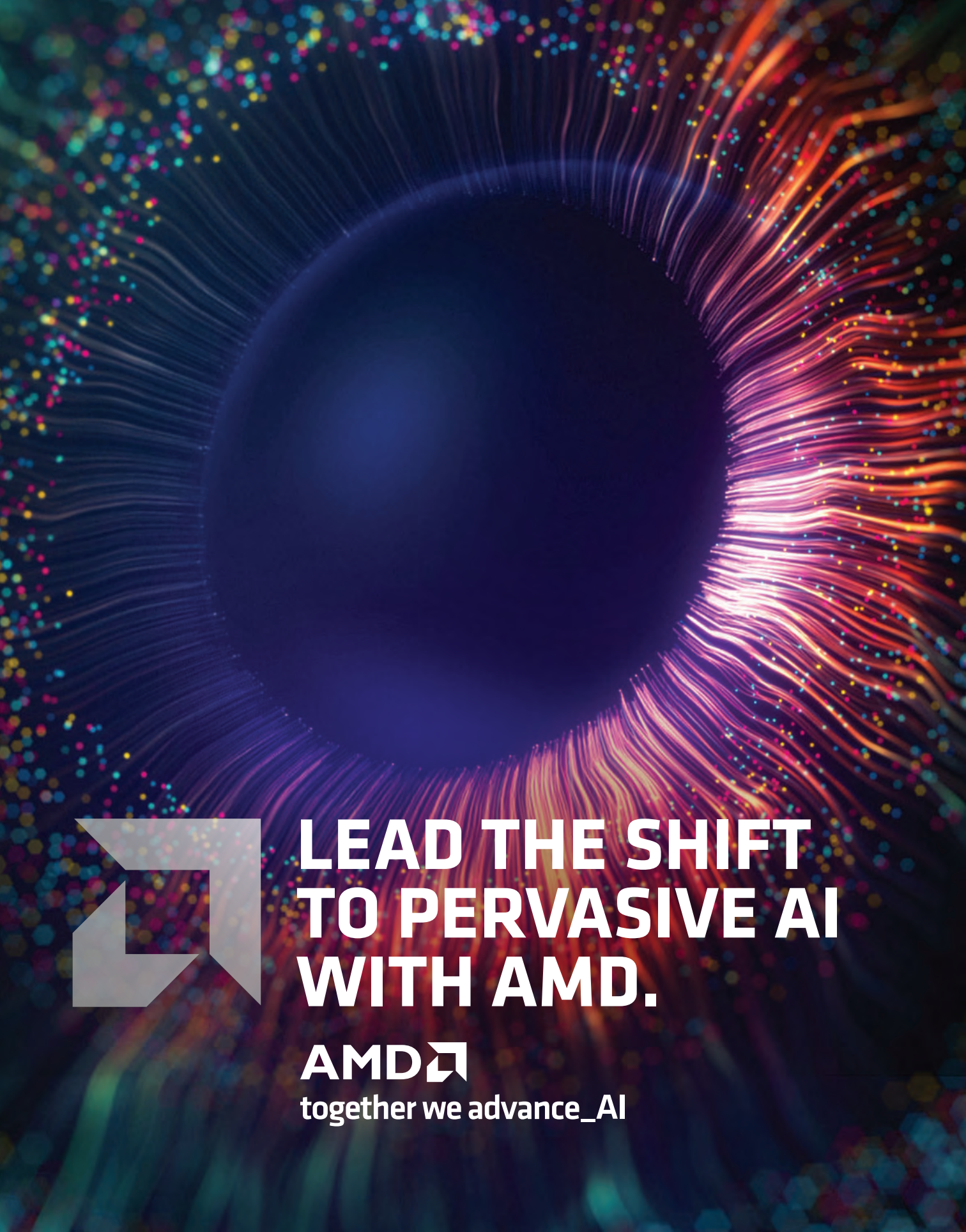


customer demand for improved performance and power efficiency without sacrificing area or cost.

Lastly, adoption of electric vehicles and autonomous driving systems will fuel semiconductor growth this decade. A modern car today contains thousands of ICs, including chips for radar sensors, cameras, power management, not to mention the power semiconductors needed to drive and control electric engines. With stringent fab process controls and IATF 16949 certified fabs, UMC is a foundry partner for leading automotive customers and will continue to expand its relevance in the automotive space.

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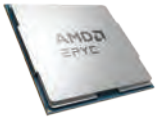

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TO PERVASIVE AI
WITH AMD.
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ADVANCE THE PERVASIVE AI ERA WITH AMD.

PRODUCTS



AMD Instinct™ GPU Accelerators



AMD EPYC™ Server Processors



AMD Alveo™ Adaptive Accelerators



AMD Ryzen™ AI Mobile Processors



AMD Versal™ Adaptive SoCs



AMD Zynq™ Adaptive SoCs

AMD is the only technology provider in this industry that delivers a comprehensive product portfolio to deliver AI deployment from the cloud to the edge to endpoints with incredible efficiency, scalability and flexibility.

APPLICATIONS



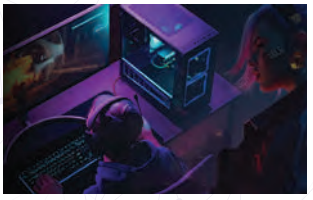
Data Center and Cloud



Adaptive and Embedded



PCs and Productivity



Gaming

AI is defining the next era of computing and AMD is helping to drive the pervasiveness of this technology to support the most demanding AI workloads like HPC to business computing solutions, gaming and beyond.

SCAN TO DISCOVER HOW AMD CAN EMPOWER YOUR AI JOURNEY.

ABOUT AMD

For more than 50 years AMD has driven innovation in high-performance computing, graphics and visualization technologies. Billions of people, leading Fortune 500 businesses and cutting-edge scientific research institutions around the world rely on AMD technology daily to improve how they live, work and play. AMD employees are focused on building leadership high-performance and adaptive products that push the boundaries of what is possible.



Talent Sustainability – A Growth Driver Of The Semiconductor Industry

Q: How will the semiconductor industry evolve in the next 5 to 10 years? What are the major challenges and opportunities you anticipate?

The semiconductor industry constantly evolves, with new trends and advancements appearing regularly. The industry is seeing remarkable progress in the Internet of Things (IoT), artificial intelligence (AI), packaging improvements, automotive electronics, quantum computing, and more. While we see the memory and storage industry growing exponentially with all the demand for data, our highly skilled talent needs will continue to grow at this accelerated rate. According to a Deloitte report, more than 1 million more skilled workers will be needed by 2030 to meet the demand of the chip industry. The difficulty here lies in the race for skilled talent. Addressing this challenge requires a multi-layered approach achieving talent sustainability, both internally and externally. We need to prioritize developing, upskilling, and reskilling internal team members, developing great leaders and invest in strengthening a culture of diversity, equality, and inclusion. On the other hand, we need to focus on external reach beyond boundaries and barriers to ensure diversity of talent.

Q. From your perspective, what are the key factors driving innovation in the semiconductor industry today?

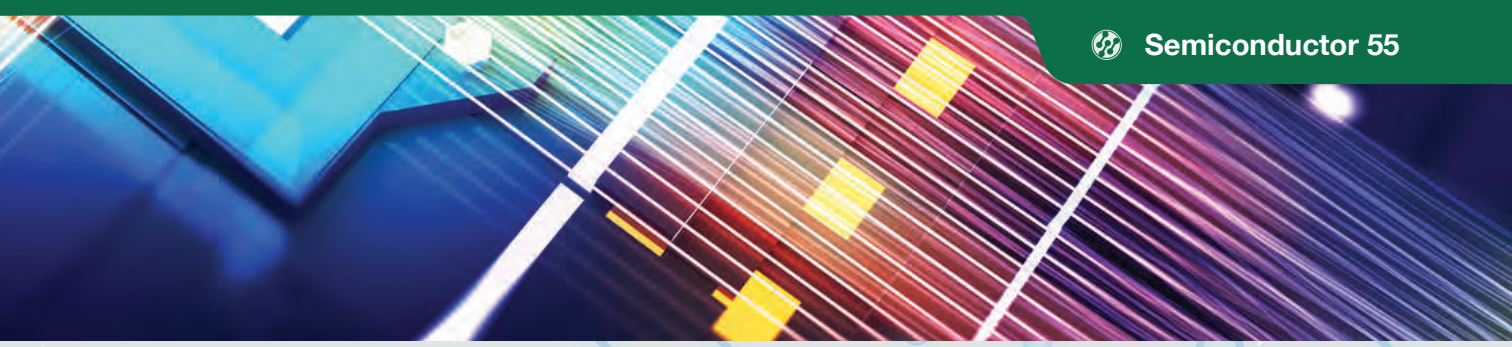
It's crucial to exemplify the collective effort to nurture talents and uplift the community with diverse semiconductor and engineering industry opportunities. With around 9,000 employees, Micron Singapore is one of the largest and most diverse employers, with more than 40% female representation. We also work with our partners on advocating DEI. For example, we have recently partnered with Yayasan MENDAKI to widen Malay and Muslim students' pathways in engineering through scholarships, internship opportunities and learning activities.

Additionally, we are committed to early education in the semiconductor industry, early investment in leading STEM programs, and opportunities for young talent to build the tech workforce of the future. Micron has been a strong partner with Ministry of Education. We have been hosting more than 300 teachers and Education and Career Guidance (ECG) counsellors for fab tours and dialogues in Micron Singapore over the past year. We have provided them with insights into the engineering industry and helped them understand about the talent that we need in the industry. Micron is also honoured to be one of the companies of SSIA's Semiconductor Active Youth (SAY) Ambassador Programme which aims to create a robust pipeline of young talent in the semiconductor industry.

Q. How do you see the role of artificial intelligence and machine learning in shaping the workforce models in the semiconductor industry?

As a technology leader, we are at the forefront of digitization across the organization, enabling our team members to adapt quickly to this digital-led new normal. We have implemented new technologies and tools to aid in talent development, recruiting, onboarding, and integrating team members into the Micron family. Moreover, we are assisting team members in broadening their perspectives on how digital tools can automate workflows and increase productivity.

The future of recruiting is being shaped by digitalization, and individuals are taking the initiative to prepare themselves accordingly. By leveraging HR tech and work tech, we can improve our recruitment efforts and attract



INCLUSION IS THE FOUNDATION OF A THRIVING WORKPLACE, LEADING US TO INNOVATION.

According to McKinsey research, racially diverse companies are 35% more likely to outperform less diverse companies

candidates with diverse skill. It is equally important to involve multiple stakeholders, such as business leaders, managers, and team members, to gather feedback and insights before investing in technology and ensuring its optimal impact on recruitment.

Q. What are the critical skills and qualities that you believe professionals need to succeed in the semiconductor industry?

It is important to have a growth mindset and passion for the industry. Micron's success depends on attracting and engaging the brightest and most talented people in the world. In addition to candidates with industry-relevant knowledge and skills, we are also looking for people with creative problem-solving skills, collaboration skills to drive win-win outcome, a growth-oriented mindset, and ultimately core values that align with our company. It is also crucial for talent to develop T-shaped skills in the job market today. It means they have acquired specific skill sets, complemented by experience, transferable skills and enthusiasm to learn and collaborate with others.

CONTRIBUTED BY



Sim Cher Whee
Vice President Of
Global Talent Acquisition,
Mobility And Immigration
Micron Technology

Bloom into the future



The world that emerges in a few short years
may transcend the boundaries of our imagination.
We provide sustained support for
an unpredictable future in our capacity
as a semiconductor production equipment manufacturer.
Why? Because we are confident that awe-inspiring
technological innovation nurtures humanity's dreams
in the present so they may bloom into the future.

TEL | 60 years

Tokyo Electron will celebrate its 60th anniversary on November 11, 2023

Unlocking the Future:
The Trajectory of the Semiconductor Industry in the Next Decade



Rapid technological advancements and relentless pursuit of innovation present both challenges and opportunities.

Continued miniaturization and advanced packaging trends will intensify as the industry continues pushing for smaller and more powerful chips. Advancements in lithography, 3D integration, and heterogeneous packaging will enable higher performance and energy-efficient devices and our expertise in advanced packaging technologies positions us well.



The progress of artificial intelligence and 5G will drive growth in various industries, including automotive, healthcare, and smart devices. This will lead to increased demand for specialized chips tailored for these. Here, our focus on providing flexible and adaptable manufacturing solutions is an advantage. The proliferation of IoT and edge computing will create a massive market for sensors and low-power, high-performance microcontrollers, and we have significant capabilities in developing precise assembly processes for complex microchips.

As environmental concerns intensify, we will face mounting pressure to adopt eco-friendly practices. With our commitment to sustainable manufacturing and resource-efficient technologies, we are in a favourable position to support the industry's shift towards greener practices. As a founding member of the global Semiconductor Climate Consortium, we have committed to meet both Scope 1 and 2 zero emissions targets by 2035.

As the industry continues to evolve, demand for skilled engineers and technicians will escalate. We are committed to talent development, workforce training, and employee retention to ensure we remain at the forefront of innovation. The industry's recent supply chain disruptions highlight the need for greater resilience. There must be more collaboration with industry partners and investment in research to develop robust supply chain strategies to ensuring a stable flow of components to customers.

The backdrop to all this remains unchanged: a vast appetite for more chips and electronics to power the ever more connected world of the future. A strong emphasis on innovation, sustainability, and global cooperation, together with a proactive approach to address challenges and to capitalize on emerging opportunities, will enable us to continue shaping the future of semiconductors and to help drive the industry to new heights.



CONTRIBUTED BY



Robin Ng
Group CEO

ASMPT enabling the digital world



life.augmented

JOIN US to shape tomorrow's sustainable world!

Our technology starts with you

SCAN ME

or visit: https://www.st.com/careers



Driving decarbonization and digitalization. Together.

Semiconductors are crucial to solve the energy challenges of our time and shape the digital transformation. This is why Infineon is committed to actively driving decarbonization and digitalization. As a global semiconductor leader in power systems and IoT, we enable game-changing solutions for green and efficient energy, clean and safe mobility, as well as smart and secure IoT. We make life easier, safer, and greener. Together with our customers and partners. For a better tomorrow.

Infineon



ASM Celebrates 25 Years Of Innovation In Singapore

Today's world is becoming more digital, which will fuel the demand for more advanced semiconductors. With facilities around the globe, ASM is proud to play a key role in pushing the semiconductor industry forward – and its operations in Singapore continue to play a strategic role in enabling the company's long-term growth.



DRIVING INNOVATION FROM SINGAPORE

Since establishing its presence in Singapore 25 years ago, ASM has remained steadfast in its purpose to explore new ways of advancing process technologies and ultimately improve people's lives around the world. In recent years, the company has doubled down on efforts to help its customers stay competitive amidst supply chain challenges.

Valued at around $0.5 trillion, the semiconductor supply chain is one of the most complex in the world. The industry works with partners across various services and commodities, and the strategy and supplier footprint for each one is unique. In recent years, manufacturing has emerged as a major focal point for boosting the resilience of the worldwide semiconductor supply chain.

ASM's global operations hub at Woodlands Height is one of the company's largest infrastructure investments. It has enabled ASM to more than triple its manufacturing capacity and is set to help the company meet growing customers' demand around the world. This facility is also the testbed for ASM's advanced deposition tools, including ALD (atomic

layer deposition) and epitaxy, which are critical for producing cutting-edge semiconductor devices. Today, the Singapore site accounts for ASM's largest manufacturing output globally.

Going forward, building agility into ASM's supply chain is a priority. The company has developed a proprietary approach to product-specific system shipment forecasting and an AI-powered spares planning engine. This allows ASM to intelligently assess potential capacities and anticipate suppliers' needs in advance. As a result, ASM can now source for and expedite alternatives quickly to ensure a steady output of equipment to the world's semiconductor manufacturers.



A PEOPLE-CENTRIC AND SUSTAINABLE APPROACH

ASM believes that the challenges of continuing Moore's Law can be turned into opportunities by creating leading-edge semiconductor processes and products that unlock new potential, and by having talented colleagues work together across geographies and disciplines. That is why inclusion and diversity is important for the industry. For example, ASM is actively pursuing a goal of having 20% of women in its workforce by 2025 – after all, the semiconductor industry thrives on innovation, and a diverse, collaborative workforce creates a more idea-rich work environment.

Tapping into Singapore's diverse and highly educated workforce, ASM's team in Singapore comprises over 1,000 employees from more than 20 nationalities, with 19% female participation. ASM has launched successful company-wide initiatives like the Women's Initiatives Network (WIN), a program for advancing and retaining our female talent, and building a more inclusive culture. Female and male colleagues alike are invited to be part of WIN, to support each other in their respective professional journeys.

In addition, ASM is committed to delivering a lasting impact to the community, paving the way for future innovations that make a difference. ASM colleagues in Singapore show their commitment by volunteering to support those in need, such as with local non-profit organizations to distribute food to vulnerable families living in the neighbourhoods around our Woodlands Height facility.

At ASM, sustainability is an integral pillar of its corporate strategy. In line with its aim to reach Net Zero emissions by 2035, ASM became a founding member of the Semiconductor Climate Consortium (SCC) last year. This global group of semiconductor companies has committed to accelerating the response to climate issues. ASM had a principal role in its formation and was the first company to join the SCC when it launched its membership outreach.

BUILDING A FUTURE TOGETHER

As it celebrates its 25th year in Singapore, ASM is still pushing the limits of semiconductor development. This is where some of ASM's most advanced applications are developed, and Singapore continues to play an instrumental part in ASM's long-term growth plans.

Building on a strong tradition of effective collaboration, ASM prides itself on fostering meaningful, long-term relationships with suppliers and other partners. With a shared vision, this network enables all companies involved to work together to develop the technological innovations of tomorrow.

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ASM





GlobalFoundries
GlobalFoundries.Singapore
GlobalFoundries APAC

GlobalFoundries Celebrates the Grand Opening of GF Singapore Expansion

GlobalFoundries (GF) announced the opening of the Singapore Fab Expansion in September 2023. The new facility, which broke ground in 2021, will add to GF's global manufacturing footprint to support fast-growing end-markets in the automotive, 5G mobility and secure device segments. It will further enhance GF's ability to provide its feature-rich RF, analog power, non-volatile memory solutions. The new facility will have the capacity to manufacture 450,000 wafers (300mm) per year, raising the total capacity of GF's Singapore site to approximately 1.5 million wafers (300mm) annually. It will support the creation of 1,000 new jobs, including technicians and engineers.

We thank all our partners for your strong support!

GlobalFoundries

Collaborative Frontiers: Unveiling The Power Of Machine Learning And AI





Q: Can you provide an overview of your background and experience in the semiconductor industry? What led you to pursue a career in this field?

My passion for the semiconductor industry started in college at the University of Texas at Austin where I graduated with a B.S. in Electrical Engineering. I joined Silicon Labs in 2005 and have served in various leadership roles throughout my tenure. From my early years as a chip design engineer to executing Silicon Labs' overall R&D strategy, my career has taken me from Austin to Shenzhen, Singapore, Norway, and back. During my time in Singapore, I managed a team of design engineers building microcontroller and touch controller products. Today, I also hold a M.S. in Electrical Engineering from Stanford University and four patents in radio and low-power technology.

Q: How does the semiconductor industry collaborate with other sectors, such as automotive, healthcare, or telecommunications, to drive technological advancements?

At Silicon Labs, we make wireless chips and software that connect embedded systems to the internet. Semiconductors and connectivity are the driving force of the Internet of Things, delivering phenomenal technology at a lower cost, for a longer period of time that supports the scale and diversity of IoT devices. With an estimated impact of $5.5 to $12.6 trillion by 2023, IoT devices will be in our factories, work sites, homes, offices, cities, medical facilities, and more. The data moving off and on to these end products will enable higher safety, efficiency, security, and productivity. The silicon powering this growth will need more wireless, compute, security, and machine learning.

Q: How do you see the role of artificial intelligence and machine learning in shaping the future of the semiconductor industry?

Generative AI is certainly getting a lot of attention right now, and rightfully so. It will have a massive impact on just about every industry out there. We certainly see opportunity for it in the future of the IoT where we are focused, but predictive AI and machine learning at the edge don't get enough attention. (pull out quotes. Edge devices are the unsung hero making AI possible. Machine learning expands the smart machine possibilities in industries such as energy, agriculture, health care, industrial automation, and more. As the number of ML application ideas grows, so do the tools and technologies that enable ML at the IoT edge, or tinyML. With smaller sizes, devices at the edge save energy and reduce costs in addition to enhancing security and lowering latency.

CONTRIBUTED BY



Daniel Cooley
Chief Technology Officer
Silicon Labs



Moving Machine Learning To The Tiny Edge

From unlocking mobile phones with facial recognition to setting spam filters to receiving product recommendations, we interact with machine learning (ML) every day. Manufacturers of a variety of products know this and are taking advantage of ML to introduce feature-rich, low-power products that stand out in the market.

WHAT ARE ML AND DEEP LEARNING?

A subset of artificial intelligence, ML includes complex statistical techniques that enable machines to improve at tasks with experience. Deep learning (DL), a subset of ML, encompasses the algorithms that software uses to train itself and improve at performing tasks – like speech and image recognition – by exposing multilayered neural networks to vast amounts of data.

For DL, engineers create multilayer models with many decision layers. To train a model, engineers present it with many examples of data relevant to a pattern, or patterns of interest. Then, the model finds a statistical structure in the example data, develops rules for recognizing that data, and is able to determine if real-world, in-field data is like the patterns learned from the training data.

Once a trained ML model or algorithm is deployed to run inference in the field, the model classifies the real-world data and gives probabilities that this new data represents a relevant pattern of interest.

Thanks to the advances of tinyml, deep neural networks are able to perform meaningful tasks on embedded devices with limited resources.

An ML model is an application-specific, intelligent, pattern-matching algorithm that has to be administered precisely for each application to make the right inference. A precise ML model can give a company a competitive edge by reducing bandwidth requirements, saving power, and increasing a device's ability to make smarter decisions.



ML AT THE EDGE

Due to the complexity and data burdens ML involves, widescale ML implementation on the cloud has raised cost, security, and latency concerns. Given these obstacles, ML is now more often being conducted at the "edge", meaning data can be stored, processed, and analyzed on the physical device or as near the source as possible. Performing these actions on the local environment instead of sending data to the cloud saves money and protects sensitive information like health care data.

As the demand for wireless products and smaller devices grows, developers are recognizing the benefits of the edge and applying ML's pattern matching at the source, or the tiny edge. Edge-native AI is embedded directly into a microcontroller or microprocessor to offer a smaller footprint and centralized, potentially real-time control for smarter machines that are more secure and reliable. Silicon Labs supports ML in all Series 2 wireless SoCs including newly released BG24 and MG24 products with built-in AI/ML hardware accelerator.

ML continues to expand the smart machine possibilities in industries such as automotive, energy, entertainment, food, health care, housing, industrial automation, and telecommunications. As the number of ML application ideas grows, so do the tools and technologies that enable ML at the IoT edge, or tinyML. With smaller sizes, devices at the tinyML save energy and reduce costs in addition to enhancing security and lowering latency. This means companies will be better able to interpret data, improve customer satisfaction, and address the ML demand, which has grown drastically since the onset of the COVID-19 pandemic. In March 2022, Fortune Business Insights estimated that the ML market will grow from $15.44 billion in 2021 to $209.91 billion by 2029.

BIG FUTURE AT THE TINY EDGE

As intelligence is pushed down from the cloud closer to the source of the data, also known as the endpoint or tiny edge (e.g., a light switch or doorbell itself), data analysis using ML is becoming more efficient. Reducing latency, conserving bandwidth, increasing privacy, and decreasing costs are all benefits of ML on the tiny edge.

Developers are also seeing the advantages of incorporating ML as a value-added feature to existing embedded applications. With all these benefits, the number of devices running ML at the tiny edge is expected to grow from 4 billion to 12 billion over the next four years—what an exciting prospect!



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SILICON LABS



SMART AND SECURE

IoT

As the digital transformation advances, demand for intuitive, secure, and smart 'things' is rising across everything from buildings and homes to factories and cities.
Our semiconductor solutions make connected 'things' context-aware, intelligent, energy-efficient, and secure.
We make IoT work.

A Clear Resilience Strategy. Is This The Solution? Peter Dressler Shares His Thoughts

Q: Please briefly share your background and experience and what led you to pursue a career in semiconductor supply chain?

I have been with Infineon for about 24 years, and as the Head and Vice President of Infineon Logistics in the last 13 years. I have persisted in this field as it perfectly utilizes my expertise in supply chain and IT. I also gained much from cultural exposure.

Q: What are the trends and advancements in semiconductor industry that excites you?

I am excited by the significant impact of semiconductors on decelerating climate change, creating easier, safer, and greener lifestyles. Previously, semiconductors focused on miniaturization and data-driven needs. Today, semiconductors have evolved significantly, powering a wider range of applications. I am intrigued to see the continuing evolution of semiconductors as the pace of digitization quickens. This applies to the supply chain domain as well.



Q: What are the major challenges and opportunities you anticipate for the semiconductor supply chain in the next 5-10 years?

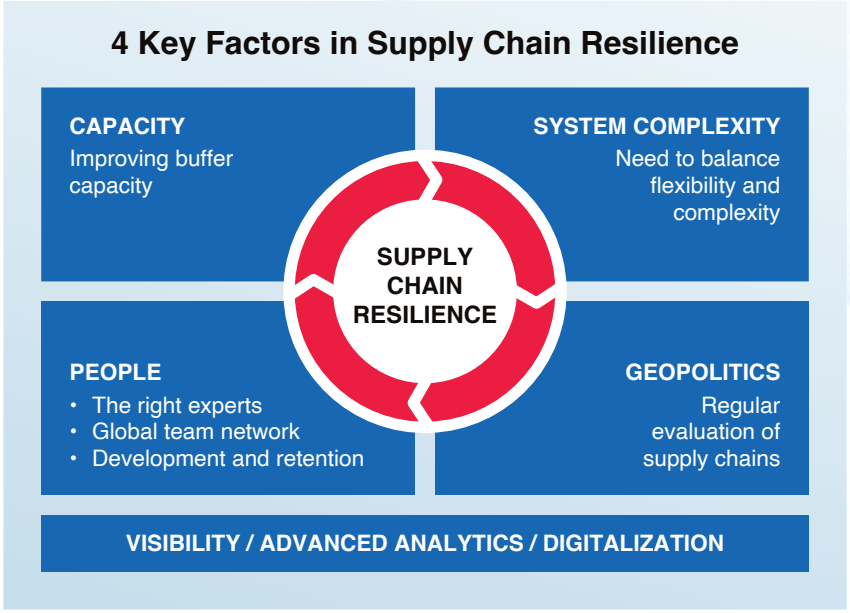
A major challenge is how current geopolitics unfolds. This era of globalization has benefitted the industry's growth. The effect of sovereign active involvement and legislation will be long-lasting. Therein lies also new opportunities in advanced integrated manufacturing and supply chain digitization.

Q: From your perspective, what are the key factors driving innovation in the semiconductor supply chain today?

For semiconductor logistics and supply chain, that would be the sophisticated use of data to assure better, more resilient, and sustainable solutions, that can be executed at a high degree of automation.

Q: How can companies better prepare for semiconductor supply chain disruptions?

Adopt a clear resilience strategy. We did it for logistics, and we continue to improve it. One core element is having well-prepared back-up solutions in transportation, production capability, and storage stressing on simplicity and flexibility to allow for fast switches wherever possible.



Q: What advice do you have for aspiring professionals in the semiconductor supply chain industry?

Be open, connected, and be willing to go the extra mile. Don't take no for an answer.

CONTRIBUTED BY



Peter Dressler
Vice President Logistics

Infineon

The Future of the Semiconductor Industry: A Q&A Session with Tan Yew Kong



Q: How do you see the semiconductor industry evolving in the next 5 to 10 years? What are the major challenges and opportunities you anticipate?

Every decade or so in the past, we have seen a single megatrend driving the demand for semiconductors, be it the adoption of personal computers, demand for enterprise servers, or the proliferation of mobile devices. Today, we are experiencing several technological evolutions concurrently, from the Internet of Things (IoT), to 5G and electrification of the automotive sector. The explosion of data demands more computational and artificial intelligence (AI) capabilities, advanced sensors, better secured connectivity and improved energy efficiency, pushing the industry towards the $1 trillion revenue mark in the next 8 to 10 years.

Future innovation in our industry will be more than just shrinking transistor size to make smaller, faster chips. We need to innovate through adding features and capabilities on the chips we make to meet the unique, dynamic needs of our customers at the best economics. This is where GlobalFoundries (GF)'s global footprint and world-class operational performance can partner with our wide range of customers to produce feature-rich solutions, all within a high-volume-high-mix secured production environment. In fact, we have in place long-term agreements with partners who reserve multi-years of manufacturing capacity with GF to ensure supply for their future growth.

With the world moving from globalisation to regionalisation, a mixture of onshoring, offshoring, friend-shoring and reshoring is taking place at this inflection point. The already complex and interdependent global semiconductor ecosystem is also adjusting to the new economics, responding to demands for security and supply resilience. This creates massive opportunities for existing and new semiconductor suppliers, big to small enterprises, to further strengthen collaboration in accelerating regionalisation and industry transformation.

In Singapore, we are working closely with the government to help achieve its strategic goal of increasing manufacturing sector value-add by 50% by 2030. The launch of our Singapore Expansion was to address this need. We will also continue to invest in the talent of tomorrow to sustain our industry's growth for the next 10 years and beyond.

Q: What are the critical skills and qualities that you believe professionals need to succeed in the semiconductor industry?

At GF, we pride ourselves on providing industry-leading performance metrics that have little or no room for error. As such, some of the fundamental attributes needed to succeed in this industry include sensitivity to data, an observant eye and a careful hand, being a team player, and above all, commitment to quality, performance and innovation. A small error - such as failing to detect the need for equipment maintenance before it happens - could lead to production downtime, and ultimately compromise the ability to deliver products on time to the customers. The impact cascades down the supply chain right through to end-users who may experience delays with their shipments as a result. It's important for any young professional to start with passion and prioritise quality from the get-go.

The semiconductor industry is always at the forefront of experimenting and developing new technologies, especially with Industry 4.0 solutions like AI and machine learning. Being able to harness the power of such solutions to further advance our manufacturing practices, capabilities, and efficiency will be a core skill for professionals looking to grow in this industry.

Ultimately, the learning never stops, and it's critical we stay willing and ready to upskill and reskill ourselves for the future. GF places a strong emphasis on workforce development, and has established a holistic development framework to help employees with their growth, no matter which stage of their career they are at.

Q: Can you share some insights into the research and development efforts within the semiconductor industry and how they are shaping its future?

With growing demand for smarter, feature-rich, secured, energy efficient, and more connected IoT devices for personal and industrial applications, a major focus of research and development (R&D) for GF is looking into how we can create process innovations that further reduce power requirements for more sustainable solutions. The semiconductors we deliver to our customers seek to enable energy efficiency across multiple end-markets, along with the associated reductions in greenhouse gases.

Some exciting R&D efforts at GF include our **FDX™ platform** which offers a differentiated combination of high performance, energy efficiency, cost-effectiveness and flexibility with a range of features including embedded non-volatile memory. Another innovation is **gallium nitride (GaN)**, for high voltages and currents at extremely high energy efficiencies, and in harsh environments.

In addition, GF's industry-leading radio frequency silicon-on-insulator (RF SOI) technologies support high-growth, high-volume wireless and WiFi markets. They are optimised for low power, low noise and low latency/high-frequency applications that enable longer battery life and high cellular signal quality. In fact, GF has 75% of silicon area in top premier smartphones in Radio Frequency Front End (RFFE), Audio and Near Field Communication (NFC).

Going forward, GF will continue to partner with world-leading companies, consortia, universities, researchers, and others to expand the differentiation and impact of our feature-rich technologies to support our customers and overall industry growth.



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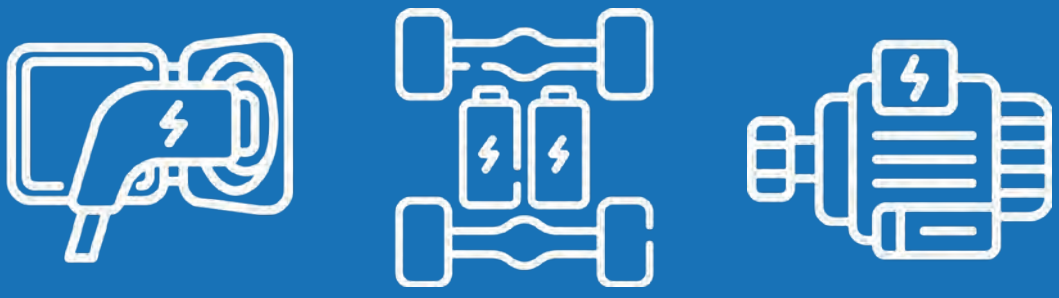


Tan Yew Kong
Senior Vice President
and General Manager
GlobalFoundries Singapore site

GlobalFoundries

soitec

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SINGAPORE SEMICONDUCTOR

1968–2023

55TH ANNIVERSARY

SSIA
Singapore Semiconductor Industry Association

CONGRATULATORY MESSAGES



Brian Tan
Regional President
Applied Materials SEA

Congratulations to the Semiconductor Industry in Singapore on reaching this incredible milestone! For the past 55 years, it has been a platform for collaboration, innovation and knowledge-sharing. Strong connections have been forged and effective partnerships have been established to drive the industry's growth and a sustainable talent pipeline. Cheers to the industry's success!



David Ferguson
Corporate Vice President
AMD

"Congratulations to the Semiconductor Industry in Singapore on an incredible 55 years! Having been in Singapore for almost 40 years, AMD is honoured to be part of this journey. The SSIA's impact on the sector and the individual members is profound in building a collaborative eco-system. Here's to a bright future of fruitful collaborations and greater achievements."



EL Saravanan
Senior Director
AMD

Happy 55th anniversary to the industry! The exponential growth of the sector during this period is a testament to the unwavering commitment and hard work of SSIA as well as the individual members. AMD is extremely proud to be part of this growth & thrilled for what we could offer to further propel our industry to the next level!



Eu Gene Goh
Senior Director
AMD

Heartiest congratulations on the Singapore Semiconductor Industry's 55th anniversary! As the industry continues to evolve under the nurture of SSIA, we anticipate a future of endless possibilities. Together, we'll embrace advancements, foster talent, and shape a thriving semiconductor landscape for generations to come.



Soh Lip Leong
Senior Vice President/
General Manager –
Operations & Manufacturing
ams OSRAM

ams OSRAM celebrates proudly, this monumental milestone of the 55th Anniversary of Singapore's semiconductor industry. As a valued partner of SSIA, we will continue contributing to the technological advancement of the semiconductor sector and I look forward to a new journey as the semiconductor landscape offers enormous prospects for value creation that will continue making Singapore a strong innovative hub.



Tan Hock Seng
Senior Vice President,
Global Procurement
ams OSRAM

Congratulations to the 55th anniversary of Singapore's Semiconductors Industry! Together with ams OSRAM, we commend SSIA for rallying industry leaders over the decades to foster a robust semiconductor ecosystem that continues to grow and progress. ams OSRAM endeavors to forge forward to building a sustainable future for the semiconductor industry.



Valerie Lee
Head, Country HR,
Singapore and
the Philippines
ams OSRAM

ams OSRAM is delighted to share this remarkable celebration of Singapore semiconductor industry's 55th anniversary! This achievement is a testament to the strong partnership and the investments in the development of human capital that can withstand constant changes. I am confident that through the strong collaboration within the industry network, we can chart the future of Singapore's semiconductor industry.



Jerry Fan
Asia President
Analog Devices

Congratulations to the Singapore Semiconductor Industry on its 55th anniversary! The unwavering commitment to advance the industry and enlarge its ecosystem is of key strategic importance to its members and Analog Devices. As President of Asia, I applaud SSIA's exceptional work and look forward to forging stronger partnerships to drive transformative growth.



Mike Eng
Managing Director
Channel and Sales Operation
Asia Pacific
Analog Devices

Congratulations to Singapore Semiconductor Industry on its 55th anniversary! Analog Devices values the pivotal role SSIA plays in promoting collaboration and innovation within the industry and ecosystem. The dedication and tireless drive to grow the industry are truly commendable. We eagerly look forward to supporting continued success of the industry.



Kent Rossman
Senior Vice President and
Head of Global Operations
ASM

Congratulations to Singapore's semiconductor industry for 55 years of excellence. ASM is honored to be part of a vibrant ecosystem shaping leading-edge technologies. Singapore has fostered a pro-business environment with talent instrumental for ASM's expansion, and we look forward to strengthening industry partnerships to drive innovation in the semiconductor sector.



Goh Yee Leng
Vice President, People
ASM

Singapore is a global semiconductor hub with world-class talent. ASM is grateful for the support from Singapore and SSIA to invest in our people and contribute to a diverse talent pool that solves impactful problems. May the semiconductor industry continue to inspire creative minds to deliver the technologies of tomorrow.



Delyn Lew
Field Service Engineer
ASM

I'm excited to be part of an industry that is improving people's lives through technology. With increasing focus on sustainability in the industry, I'm confident that we will reach greater heights and create a bright future for my generation and beyond. Here's to the next 55 years!



John Lim
Head
Low Wei Hsien
Deputy Head
ASMPT Singapore

Congratulations to the semiconductor industry in Singapore on 55 successful years! The industry continues to grow and remain competitive, and this journey has spanned generations of visionary leaders from SSIA and its partners. As we continue on a strong and sustainable path, we at ASMPT strongly support SSIA and we look forward to achieve future success in the industry, together!



Tan Yew Kong
SVP and GM, Singapore Site
GlobalFoundries

Congratulations on 55 years of excellence advancement in Singapore's Semiconductor Industry! Our combined efforts have put Singapore on the world map as a semiconductor hub. GlobalFoundries (GF) is proud to have played an integral role in our industry's growth. Together with the strong government support and collaboration with organizations like SSIA, GF will continue to partner the industry to scale greater heights!



Janice Lee
VP, HR, APAC
GlobalFoundries

It's been an amazing journey of 55 years for the semiconductor industry in Singapore, and we are delighted to be part of this vibrant ecosystem that continues to inspire and develop the next generation of STEM talent. GlobalFoundries is committed to doing our part, and we look forward to working with organizations like SSIA and building on the good work done to continue strengthening Singapore's talent pipeline for the future.



S Lawanya
Senior Process Engineer, Lithography
GlobalFoundries

I'm excited to be a part of this dynamic industry and looking forward to another exciting 55 years ahead. From AI to IoT and the electrification of cars, working at GlobalFoundries has given me the opportunity to be at the forefront of innovation. I'm honored to be part of the team manufacturing chips that betters the lives of people and look forward to growing together with Singapore's semiconductor sector.



CS Chua
President and
Managing Director
Infineon Technologies Asia Pacific Pte Ltd

Warmest congratulations on achieving this monumental milestone for Singapore's semiconductor industry! Your exemplary efforts have been integral in the transformation of a vibrant semiconductor ecosystem from its humble beginnings, creating a robust foundation for years to come. Let us celebrate our industry's achievements while driving sustained growth and stability.



Celeste Yeo
Senior Vice President and
Site Head Plant Singapore
Infineon Technologies Asia Pacific Pte Ltd

Congratulations on this historic milestone for Singapore's semiconductor industry! Your remarkable efforts have been vital in nurturing talent and driving manufacturing excellence across the sector, propelling the future of our industry to greater heights. Here's to SSIA's continued success in fostering professional growth within and beyond our borders.



Yan Huey Miin
Senior Vice President and
Chief Financial Officer
Infineon Technologies
Asia Pacific Pte Ltd

Heartfelt congratulations to Singapore's semiconductor industry on reaching this momentous milestone! We have overcome economic downturns, pandemic, supply chain disruptions and geo-political tensions. By capitalizing and striving on with opportunities, we created higher value jobs and achieved operations excellence. May we continue to evolve positively and remain future proof amidst the ever-changing industry landscape.



Tan Lye Seng
Vice President
Supply Chain and Logistics
JCET STATS ChipPAC

STATS ChipPAC is proud to journey with SSIA and many other semiconductor wafer fabs, IDM customers as well as our valued suppliers to celebrate this 55 years milestone of Singapore Semiconductor Industry!

I look forward to meeting all our industrial partners and friends to celebrate this milestone and collaboratively strive for greater heights towards Singapore's economic growth.



Ng How Hua
Senior Director, Assembly /
Wafer Level Operations
JCET STATS ChipPAC

Heartiest congratulations to Singapore's Semiconductor Industry on achieving 55th years of remarkable milestones! STATS ChipPAC and SSIA shall continue to pursue this success and ground-breaking achievement in the years ahead.

Let's get together and celebrate this significant moment!



Paul Ang
Senior Manager
Procurement
JCET STATS ChipPAC

Congratulations on 55 years of Semiconductor industry in Singapore! We at STATS ChipPac Pte. Ltd., are proud to partner with SSIA in creating a vibrant and impactful semiconductor community and promoting innovative technological advancements.

Here's to many more years of strong partnership and continued success!



Tong Liang Cheam
Vice President
Corporate Strategy
Kulicke & Soffa

The experience gained from the last 55 years will prepare us for the new era of semiconductor to deal with the complexity in supply chain resulted from the fragmentation of demand and technonationalism. Let's do our part in securing the integrity of the semiconductor value chains as we celebrate Singapore semiconductor industry's 55th year anniversary. Congratulations!



Chan Pin Chong
Executive Vice President
Products & Solutions
Kulicke & Soffa

2023 is a great year to remember the Singapore Semiconductor industry for 55 years. SSIA has been a great proponent to support the Semiconductor ecosystem in Singapore and bringing things together to make the industry successful for the past 55 years of tremendous growth. Congratulations and happy 55th anniversary!



Nelson Wong
Senior Vice President
Global Sales & Global Supply Chain
Kulicke & Soffa

Happy 55th anniversary to our Semiconductor industry! Semiconductor in Singapore has grown significantly, starting with backend assembly moving on to establish a foothold in the front-end. SSIA had always been here to support and played a critical role in this growth journey. Thank you and continue to be the torch bearer!



Andrew Goh
Corporate Vice President and
General Manager
Lam Research Southeast Asia

Lam Research extends its warmest congratulations to Singapore's Semiconductor Industry on reaching this momentous 55th anniversary milestone! With strong commitment to innovation and continuous breakthroughs, Singapore's semiconductor industry has grown into a dynamic and thriving ecosystem, assuming a pivotal leadership position in the global semiconductor supply chain. Let's join hands to achieve even greater heights in the promising future ahead!



Christopher Wong
Managing Director and
Regional Operations
Executive
Lam Research
Southeast Asia

Congratulations to the Semiconductor Industry on your 55th anniversary in Singapore! We are glad to be your partner in your journey to advance technology, develop talent and promote sustainability, as we continue to grow the industry in Singapore and around the world. May SSIA continue to be the beacon for the semiconductor industry here and abroad!



Kelvin Tay
Director
Business Operations
Lam Research
Southeast Asia

I would like to extend my warmest congratulations to the Semiconductor Industry in Singapore on this monumental 55th anniversary! We have witnessed the transformation of the semiconductor industry through the years into a diverse and inclusive one with immense opportunities for people to excel and succeed. Here's to many more years of success for the industry!



Mario Traeber
VP Engineering
MaxLinear

On behalf of Maxlinear, I would like to wish the Singapore Semiconductor industry a very happy 55th anniversary. This admirable success is a direct result of strong commitment to innovation and collaboration within the Singapore community. Wishing for many more years of growth and achievements.



Dr. Angela Locke
Director Human Resources Asia
MaxLinear

Congratulations to the Semiconductor industry in Singapore on its 55th anniversary. Success is best when it is shared, and it is with great pleasure that we, Maxlinear, take part in this monumental event cementing Singapore's place in semiconductor history.



Xu Bing Tao
Senior Director
System Development
MaxLinear

Maxlinear would like to extend its most sincere congratulations to Singapore's Semiconductor industry on its 55th Anniversary. From sparking possibilities to creating a smarter future ahead, the SSIA has helped to establish Singapore as a critical member in the global semiconductor value chain. Here's to continued success in the coming years.



Geok Hong Tan
Vice President,
Front End CPIE &
Strategic Program
Micron Technology

Congratulation to Singapore's Semiconductor 55th anniversary! Over the past 55 years, Singapore, a little red dot on the world map, has built world-class design, research and manufacturing facilities, thanks to the commitment and innovation of leaders and talents in the semiconductor industry. Let's continue to drive the path forward, leaving a lasting impact on generations to come.



Al Lee
Senior Manager,
Test Engineering
Micron Technology

I'm proud to be part of the team celebrating the 55th year of the semiconductor industry in Singapore. I have witnessed the fast-paced technological advancement in the industry over the years and participated in different community initiatives to give back to society together with the Micron Foundation and CSR teams. I look forward to the next chapter of growth.



Nurulhuda Jumahri
Manager
Material Planning
Micron Technology

Congratulations to the semiconductor industry for its 55 years of growth in Singapore. I truly enjoy my ride in this fast-paced industry, full of challenges, innovation, learning and growth. It has also provided opportunities for me to be involved in various employee resource groups to promote diversity, equality and inclusion.



Shieh Ping Lung
Senior Director
Realtek Singapore Pte Ltd

When I first joined semiconductor industry, the industry was still small and there were only handful of IC design houses. We have come a long way. Today, Singapore has made its mark in the semiconductor supply chain as a global node anchored by major chipmakers. Congratulations to our semiconductor industry for 55 years of excellency.



Angela Yeh
Project Management Director
Realtek Singapore Pte Ltd

Congratulations, Singapore's semiconductor industry – your outstanding contributions to both Singapore's economy and the advancement of technology are truly remarkable. Your innovation and excellence have propelled Singapore to the forefront of the global tech landscape. Here's to continued success and shaping a brighter future!



Georgie Mok
Product Test Engineering Director
Silicon Laboratories International

As we celebrate our contributions to Singapore's participation in the golden age of semiconductor, let us wish for the next generation even greater success in leveraging on the foundation to accomplish even more for Singapore's semiconductor industry.



Shantonu Bhadury
Design Engineering Director
Silicon Laboratories International

The semiconductor industry has significantly evolved since the first wave of companies set up the operations in Singapore. The ecosystem is extremely vibrant and resilient under the stewardship of EDB. The community is closer than ever before; strongly supported and guided by the SSIA. I wanted to extend my heartiest congratulations to the whole semiconductor family on this significant milestone.



Pierre Barnabé
CEO
Soitec

Congratulations to the Singapore Semiconductor Industry on its 55th anniversary. SSIA cultivates a culture of collaboration by uniting semiconductor companies, industry players, and government agencies. Through a diverse range of events organized by SSIA, members have the chance to connect, exchange knowledge, and establish strategic alliances. This collaborative synergy fosters the exchange of ideas, drives innovations and new business opportunities.



Cyril Menon
COO
Soitec

SSIA plays a vital role in setting industry standards and promoting best practices across diverse aspects of semiconductor manufacturing and operations. By fostering standardization, the association improves efficiency, quality, and the seamless integration of various semiconductor companies, ultimately resulting in favorable outcomes for the entire industry. Congratulations to the Semiconductor industry in Singapore on its 55th anniversary.



Nicole Kong
HR Director Asia & US
Soitec

SSIA actively facilitates workforce development within the semiconductor industry through the organization of training programs, workshops, and skill enhancement initiatives. These programs are instrumental in narrowing the skills gap, ensuring a continuous influx of competent professionals, and elevating the overall expertise of the semiconductor workforce in Singapore. Congratulations to the Semiconductor industry in Singapore on its 55th anniversary.



Bertrand Stoltz
Executive Vice President, Finance, Global Shared Services, Systems and Asia Pacific Public Affairs
STMicroelectronics

Congratulations to the Semiconductor industry in Singapore on its 55th anniversary. As a pioneer in the semiconductor industry, STMicroelectronics has been an integral part of Singapore's semiconductor journey since 1969. We are proud to continue our partnership with SSIA by driving growth, ensuring resiliency, and fostering innovations that align with Singapore's vision for a better future.



Christophe Ayela
Group VP, Analog & Power Front-End Manufacturing, General Manager Asia-Pacific Region
STMicroelectronics

Happy 55th anniversary to the Singapore Semiconductor industry! STMicroelectronics' dedication to sustainability has always been at the heart of our respective discussions. We appreciate your efforts in supporting us on this critical topic and are excited to be part of this journey towards a greener and more sustainable future.



Kuo Yang Foo
Senior Director, Singapore Business and Operations Human Resources
STMicroelectronics

On behalf of STMicroelectronics, I extend our warmest congratulations to the Singapore Semiconductor industry on its 55th anniversary. Our shared commitment to nurturing talent and developing a skilled workforce has been instrumental in driving innovation and growth in Singapore. We are thrilled to collaborate with you in building a strong and capable workforce.



Hideki Ito
Executive Management, President
Tokyo Electron Singapore Pte Ltd

Congratulations on the 55th anniversary of Singapore's semiconductor industry! This is indeed a remarkable milestone that showcases our industry's growth and achievements over the years. We are honoured to be a part of this journey and will continuously contribute to the technological innovation in semiconductors towards a dream-inspiring society. Special thanks to all stakeholders and partners for their unwavering support.



Michael CC Hsu
Vice President
UMC

Congratulations to the Semiconductor Industry in Singapore on turning 55!

UMC is proud to be a member of SSIA for nearly two decades, and it is a great honor to witness this exciting milestone. We are deeply grateful for the collaboration and innovation within the industry over the years. Here's to another year of strength and success.

Happy Anniversary!



Johnson Liu
Associate Vice President
UMC

Singapore's semiconductor industry has come so far since its establishment, and to reach today's milestone of 55 years is no easy feat. UMC is honored to be part of SSIA's anniversary celebrations for the industry, and we look forward to building a new era of success and prosperity together with our industry partners.



Benjamin TM Lin
Fab Senior Director
UMC

Heartfelt congratulations to the Singapore Semiconductor Industry on its 55th anniversary. It takes generations of constant improvement and progress to achieve this memorable milestone today. Thank you for taking on the essential role of driving and promoting Singapore's semiconductor industry. Wishing the industry continuous success for many years to come!



Mark Ting
SVP & General Manager
ASML Taiwan & S.E. Asia

Congratulations to Singapore's semiconductor industry on reaching a remarkable 55-year milestone! ASML proudly joins in celebrating this incredible journey of technological innovation and growth. We commend the industry's perseverance and contributions to advancing semiconductor technology. This is how we strive to make the world better for future generations!



Steve Long
Corporate Vice President
Sales, Marketing &
Communications Group
General Manager Asia Pacific Japan
Intel

Congratulations to Singapore Semiconductor Industry on completing 55 remarkable years! This milestone celebrates both exceptional achievements and the incredible individuals who have propelled us forward. As the strong bridge between agencies, companies, technology, and human capital, we wish Singapore's Semiconductor Industry continued success on its Emerald Anniversary!



Theo Kneepkens
Country president (Singapore)
and Senior Vice President of
Global Operations
KLA

My heartfelt congratulations to Singapore and SSIA on the remarkable achievement of 55 years of excellence in the semiconductor industry. KLA is honored to be a part of the growing semiconductor ecosystem in Singapore. May we jointly continue to inspire and lead the way towards a future powered by technology.



Chia Wee Teck
GM SEA
KLA

Congratulations to everyone who has contributed to this significant milestone for Singapore Semiconductor industry. It takes a whole village, from our pioneers to existing teams, to get this far. Looking forward to an even brighter and larger Singapore contribution to this growing industry that is shaping our future.



Yih-Hsiung Goh
Regional Sales Director
NI

Congratulations on the Emerald Anniversary of the Semiconductor Industry in Singapore! Your contribution and dedication to positioning Singapore at the forefront of excellence in the semiconductor industry to the world is truly commendable. Here's to many more years of innovation and achievements ahead. Cheers!



Joseph Soo
APAC Vice-President
NI

55 years is a remarkable milestone, showcasing decades of excellence as the driving force behind Singapore's pivotal role in the global semiconductor industry today. NI is proud to be part of SSIA's incredible network of collaboration and knowledge-sharing, which will continue to fuel the growth of the industry. Here's to 55 years of Singapore Semiconductor Industry excellence, and to the boundless possibilities that lie ahead!



Gary Eves
Senior Vice President of
Global Engineering Operations
and Singapore Country Manager
NXP Semiconductors

NXP would like to extend sincere congratulations to Singapore's Semiconductor industry on its 55th Anniversary. Your solid commitment to innovation, persistent pursuit of excellence and quality, and tremendous contributions have congealed Singapore's position on the global playing field. Here's to continued success and pioneering achievements in the years ahead."



Katharina Westrich
Head of Semiconductor
Vertical Markets
Siemens AG

Congratulations to the Singapore Semiconductor Industry on its impressive 55 years anniversary! Siemens celebrates your remarkable achievements in advancing the semiconductor ecosystem fostering innovation and close collaboration across the industry. I am wishing SSIA continued success in shaping the future of the semiconductor industry and looking forward to many years more of fruitful exchange.



Sascha Maennl
Head of Factory Automation
Siemens Digital Industries
Asia Pacific

Congratulations on reaching this remarkable milestone! The Singapore Semiconductor Industry has been an integral force in shaping the Asia Pacific semiconductor market. Siemens is proud to have been part of your journey, and we eagerly look forward to continuing this partnership, supporting your success every step of the way. Here's to many more years of growth and innovation!



Niew Bock Cheng
President
Siltronic

Congratulations to all semiconductor companies in Singapore for making remarkable progress over the last 55 years. Technology today such as Automation and AI are propelled and enabled by many local companies in the semiconductor supply chain. Siltronic as a wafer manufacturer will continue to play a vital role in supporting new emerging technologies.



Koh Yeow Meng
Vice President, Engineering
Siltronic

Congratulations to the Singapore Semiconductor Industry for its 55 years of achievements! Siltronic as one of the leading wafer manufacturers has focused on supporting next-generation technology and sustainable strategies which benefit the environment. Siltronic will continue to manufacture the highest quality silicon wafers for the new technological era globally.



Goh Seow Meng
General Manager
and VP, Operations
Skyworks

Congratulations to the Singapore semiconductor industry as it marks 55 years of great achievements. Thanks to all the exceptional people and leading technology capabilities making it a robust sector!



Lim Mui Fong
Director, Finance
Skyworks

Congratulations to the Singapore semiconductor industry! It is remarkable to see all the achievements that have been made. Singapore has expanded its presence across the globe and into an ever-expanding market providing benefits for the global economy.



Ivan Hee
Vice President
of Supply Chain &
Business Operations
SSMC

Congratulations on celebrating 55 years of Singapore Semiconductor Industry. Semiconductor sector has been a strong pillar of economic growth engine during Singapore 58 years of independence. As we overcame the past challenges of globalization, the current de-globalization and regionalization trend will present new opportunities. Let's look forward for the best is yet to be, happy anniversary!



Nakamura Ryosuke
President
Yamaha Robotics Holdings

On behalf of Yamaha Robotics group, we would like to extend our sincere congratulations to Singapore's Semiconductor Industry in its 55th anniversary. Looking forward to many more years of successful growth and technology advancement in the Singapore's Semiconductor market.



Tashima Hirotoshi
President
Yamaha Robotics Asia

Congratulations to Singapore's Semiconductor Industry in achieving another important milestone on its 55th anniversary. We, at Yamaha Robotics Asia are glad to witness yet another outstanding achievement and contributions by the Singapore's Semiconductor industry. Looking forward to further enhancement Singapore's position not only regional but also in the global Semiconductor market.



Ricky Sim
Managing Director and CEO
Advantest Singapore



Larry Liow
Sales and Marketing Director
Advantest Singapore



Lee Kwai Mun
President
ASE Inc, Southeast Asia



Takatoshi Kyo
President
DISCO Hi-Tec



Hugh Duong
Sales Director
Edwards South East Asia



Bryan Chen
Service Director
Edwards South East Asia



Jerry O'Sullivan
Senior Vice President Operations, RA-SEA
Exyte



Lee Hong Ping
Business Development, Singapore & Malaysia
Exyte



Michael Ciatto
Senior Vice President I Global Supply Chain Service Line CEO, **GenPact**



Eng Kuan Simon Seet
Vice President I Global Semiconductor Supply Chain Service Line, **GenPact**



Jing Yao
Head of Southeast Asia
Henkel Adhesive Technologies, Electronics



Peter Vogelsang
Head of Global Marketing and Strategy
Henkel Adhesive Technologies, Electronics



Jeff Tan Yew Ann
Managing Director
HiTec Innovative Technologies



Masafumi Ishiyama
Division President, LSI
HOYA Electronics



Muralitharan Subramaniam
Managing Director
HOYA Electronics



Lim Shin Yeh
Fab Operation Department Manager
HP



Paul Romano
CQO
Prosemi Pte Ltd, Singapore



SC Lee
Lab and Quality Director
Prosemi Pte Ltd, Singapore



Jen Tan
Head, Renewables Business, Singapore & Indonesia, **Sembcorp Industries**



Tan Shaw Chyi
Senior Business Manager
Silicon Connection



Steven Wong
Business Development Manager
Silicon Connection



Jason Tee
Director
Sin Chew Woodpaq



Rui Yu
Business Support Manager
Sin Chew Woodpaq



Vince Teo
Head of Southeast Asia Sales
Toppan Photomasks



Asif R. Chowdhury
Senior Vice President — Marketing & Corporate Business Development, Japan Business, **UTAC Group**



Low Fatt Chye
General Manager USG
UTAC Group



Dr Goh Inn Swee
General Manager
Vanguard International Semiconductor



Peh Jing Jing
HR Director
Vanguard International Semiconductor

APPLIED MATERIALS®
make possible

Applied Materials celebrates 55 years of the Singapore semiconductor industry



Brian Tan
Regional President,
Applied Materials SEA

"On behalf of Applied Materials South East Asia, we would like to congratulate all of our partners, customers and ecosystem players on 55 years of innovation, collaboration and reaching incredible heights in the Singapore semiconductor industry together!

Applied Materials opened its first office in Singapore in 1991 – 32 years ago. The semiconductor industry was already experiencing rapid growth back then. Since then, we've seen the highs and lows of local and regional economies, but Singapore's semiconductor industry remained resilient. Year after year, it continued to grow, becoming the international hub for innovation, research and development, and talent.

I would like to thank SSIA for playing a crucial role in driving this growth – for the past 55 years, the association has continued to be a platform for collaboration, innovation and knowledge-sharing. Thanks to SSIA, we have forged strong connections within the industry, establishing effective partnerships to drive workforce development and build a future-proofed sector.

As we celebrate this milestone with you, we reaffirm our commitment to keep the industry resilient and be the most valued partner to our customers. We aim to strengthen the semiconductor ecosystem through innovative solutions and collaborative partnerships, ensuring a stable and sustainable future for our industry and society. Ultimately, we look forward to continue making a better future possible together.

Cheers to Singapore's semiconductor industry and the many more achievements to come!

Celebrating the industry that is changing the world

In the fast-paced world of semiconductors, the industry's growth has been nothing short of stellar. Applied Materials is proud to be a part of this industry and is excited to see what the future holds. Here are what some of Applied's talents have to say about their journey and why they love what they do.





Prayudi Lianto
Senior Process Integration Engineer,
Semiconductor Products Group

"For the past 10 years, I've witnessed various technology inflections in the industry. What I find most exciting is the opportunity to contribute to improvements of consumer electronic devices in terms of their Performance, Power, Area, Cost, and Time to market (PPACt). This is possible through extensive collaboration in materials engineering across the industry ecosystem to bring about constant innovations for thinner and more powerful chips. I would like to thank all the engineers and scientists who have worked tirelessly to make these advancements possible. Your work has made a real difference in the world.

"The semiconductor industry's impact has been remarkable, now being a hundred times greater than two decades ago. From pagers to smartphones, the advancements have been unimaginable, transforming our connectivity and communication needs. I have had the privilege of witnessing this transformation firsthand, from my early days as an engineer to my current role as Senior Operations Manager. As we embrace the future, I firmly believe in the immense possibilities for continuous learning. My advice to fellow professionals in this industry: Always stay curious!



Michelle Phua
Senior Operations Manager,
Worldwide Manufacturing Operations



Mohamed Nazirudeen Bin Abdul Rahman
Operations Manager,
Worldwide Manufacturing Operations

"As I transitioned from a technician to an operations manager, I've witnessed the revolution of the semiconductor industry. One area where this change is evident is in supply chain management, utilizing software and tools to track inventory, monitor production schedules, and meet customer demands with real-time adjustments. Ultimately, my goal is to leverage technology to its fullest potential, delivering top-notch products and services to our customers. I am forever grateful for the belief and support of my mentor, Mr. Chin Soon Yap. He saw my potential from day one and has helped me to become the person I am today.

"One cannot help but marvel at the strides taken by innovative technologies, especially in this new age of generative AI. For us in the semiconductor industry, we remain buoyed by the prospect of a bright and promising future, harnessed by the potential of technology. We should always adopt the continuous learning mentality in order to drive the industry forward. As Applied Materials South East Asia's first intern 28 years ago, I'm grateful to my mentors for their guidance and care, which has enabled me to have a great career in the company. It is also thanks to them that I can now pay it forward and guide the new generation of talent we have here.



Tan Way Tat
Senior Director Process Support Engineer,
Semiconductor Products Group



Dominic Hee
Director, Applied Materials Advanced Packaging Development Center (APDC)

"R&D in the semiconductor space has been nothing short of remarkable since the early 90s, and I feel privileged to have actively contributed to this transformative process. I am grateful for the opportunity to have worked with such talented and dedicated individuals. After having established our R&D centers and leading our R&D expansion, I believe we are setting a new standard for global manufacturing and R&D capabilities. Our strategic move not only positions Applied as a leading player in the semiconductor industry but also positively impacts the entire ecosystem.

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For more information, please visit **www.appliedmaterials.com**



Trends To Watch In The 3D Era

By **Aaron Fellis**
Corporate Vice President and General Manager,
Dielectric ALD Products, Lam Research

As electronic devices become more sophisticated, the demand for semiconductor technology that can deliver greater performance and capacity at lower cost continues to increase. These trends have fueled major advancements in semiconductor technology, with 2D NAND transitioning to 3D NAND over the last decade. The 3D transition has also begun in logic, with FinFET technology giving way to gate-all-around (GAA) transistors and complementary field-effect transistor (CFET) architecture offering attractive benefits. Many are also expecting DRAM to follow in the future. However, scaling semiconductors in the "3D era" is immensely difficult. Chipmakers contend with rising levels of complexity at every new node and are challenged to increase transistor density while reducing power consumption.

Continued advancement in fabrication methods and technologies will be essential to enable and further scale the next generation of GAA transistors, DRAM architectures and 3D NAND devices that today contain over 200 layers. To sustainably create chips with nanoscale-level precision and the right cost structure, wafer fabrication equipment (WFE) makers like Lam Research will need to push the boundaries of plasma physics, materials engineering and data science to deliver the equipment solutions needed. Harnessing the power of data is proving to be a game-changer in delivering these capabilities into production. We are collecting richer data from our equipment and using more advanced data science techniques to convert that into repeatable processing of millions of wafers.

As the industry tackles the challenges of the 3D era, here are five potential trends to watch.

MULTI-FUNCTION PROCESS CHAMBERS WILL BRING ETCH AND DEP EVEN CLOSER TOGETHER FOR HIGH-VOLUME PRODUCTION

As films become more complex and nuanced, and requirements increase for both vertical and lateral fill and removal, chip manufacturing processes must evolve to meet a range of requirements in economically viable ways. A promising avenue is the performance of multiple functions in a single process chamber. This could include integrating different deposition or etch techniques to handle the demands of 3D structures, or even the integration of both deposition and etch capabilities, with an eye toward better coverage of 3D topography and in-situ repair processes. This approach may accelerate reliable film creation in the most challenging high-volume situations.

MORE ADVANCED LOGIC CHIPS WILL NEED MORE ADVANCED INTERCONNECT METALS

Tungsten and tungsten oxides have already begun to displace damascene copper in some logic interconnects. As scaling in the 3D era continues, wafer fabrication technologies are pushing the boundaries of traditionally used metals to achieve less resistance and minimize power consumption and signal loss. Alternative metals such as Molybdenum are also being explored, particularly for backend applications.

THE INTEGRATION OF CHIPLETS WILL ENABLE GREATER SCALING TO EXTEND MOORE'S LAW

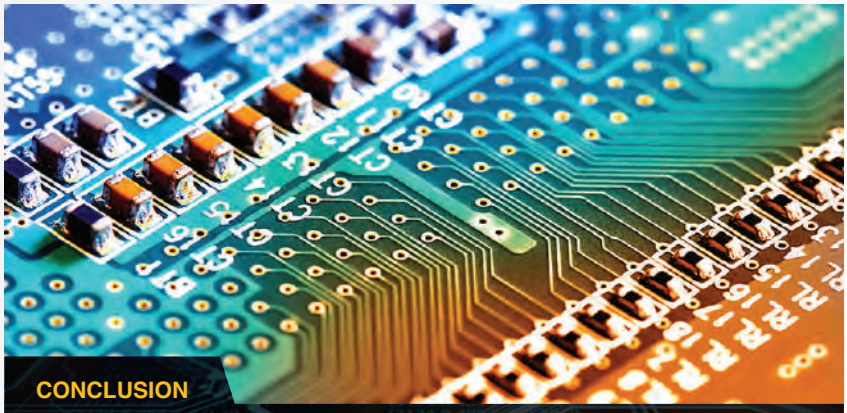
As silicon scaling becomes more expensive, it also becomes more challenging to hold to the traditional development time between technology nodes. Chipmakers are adopting chiplet-based solutions to enable scaling beyond silicon. Packaging plays a significant role in driving greater system-in-package integration and extending Moore's Law. TSV etch and plating solutions will be critical in high-aspect ratio integration schemes for advanced packaging solutions. New substrate-based approaches are also necessary to meet the requirements for next-level interconnect. Lam's recent acquisition of SEMSYSCO broadens its packaging offerings to bring innovative cleaning and plating capabilities for chiplet-to-chiplet or chiplet-to-substrate heterogeneous integration.

DATA INSIGHTS WILL DRIVE GREATER OPERATIONAL EFFICIENCY

AI-based predictive modeling techniques are accelerating R&D and enabling chipmakers to get to the manufacturing step faster, while giving tool and process developers new insights and greater efficiency. Increasingly, data has also become a critical asset during the manufacturing process. In-chamber sensors can monitor tool consistency and help quickly detect issues. A great example is Lam's groundbreaking, self-aware Sense.i® platform, which brings together data intelligence with advanced plasma etch capabilities in a compact, high-density architecture to deliver high-productivity process performance. Powered by Lam's Equipment Intelligence® technology, the Sense.i platform delivers the critical etch capabilities required to continue advancing uniformity and etch profile control for maximizing yield and lowering wafer costs. Sense.i enables semiconductor manufacturers to capture and analyze data, including pattern recognition, and specify actions for improvement. Sense.i also features autonomous calibration and maintenance capabilities that reduce downtime and labor costs and deliver machine learning algorithms that allow the tool to self-adapt to minimize process variations and maximize wafer output.

SUSTAINABLE INNOVATION WILL DELIVER PERFORMANT CHIPS THAT USE FEWER MATERIALS

As demonstrated by Lam's 2021 goal of 100 percent renewable energy by 2030 and to achieve net zero by 2050 and the formation of SEMI's Semiconductor Climate Consortium in 2022, there is increasing focus on advancing sustainability. Many chipmakers are looking for manufacturing equipment and technologies to not only deliver the right performance and cost structure, but also support their long-term goals to reduce power consumption and use fewer materials.



CONCLUSION

The growth of sophisticated electronic devices that demand increasingly advanced semiconductor technology is challenging WFE providers and chipmakers to think beyond current methods and materials in the 3D era. Continued collaboration, innovation and new breakthroughs that take fresh approaches and leverage abundant data may hold the keys to powering progress and more sustainable manufacturing to deliver leading-edge technology.

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Lam RESEARCH



Technology Enabling Life



Technology for creating semiconductors is technology that makes dream products real

Shockingly groundbreaking products –
this is what semiconductor advancements bring.
Our technology produces equipment to
manufacture semiconductors,
and it makes wonders real.

TEL TOKYO ELECTRON

60 years

Tokyo Electron will celebrate its 60th anniversary on November 11, 2023.

At STMicroelectronics, we create technology for a sustainable world,

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in a sustainable way.



Sustainability has been part of our DNA for over 25 years

- Carbon neutral by 2027
- Reducing waste & water usage
- Promoting the circular economy
- Accelerating the transition to clean, safe & smarter systems

Smart mobility



Helping car manufacturers make driving safer, greener and more connected for everyone

Power and energy



Enabling industries to increase energy efficiency and the use of renewable energy

Internet of Things & Connectivity



Supporting the proliferation of smart, connected IoT devices with products, solutions & ecosystems

ACCELERATING SUSTAINABILITY TOGETHER

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SUSTAINABILITY

At STMicroelectronics, we are committed to creating sustainable products while minimizing environmental impact. We strongly believe that technology can play a key role in solving environmental, social, and societal challenges. That's why we develop responsible products that enhance quality of life or user experience while minimizing environmental impact.

How Semiconductors Contribute to Green and Low Carbon

Sustainability has been a guiding principle for our company since the early 1990s. Today, it is integrated into every part of our business to bring innovative solutions to environmental and social challenges. As one concrete example among many, we launched our Sustainable Technology program in 2011. This program implements a global approach to ensure sustainability is taken into consideration when developing new products. The program is a unique product Life Cycle Assessment (LCA) approach to semiconductors. This approach covers the chip life cycle from cradle to grave and is performed in terms of greenhouse gas (GHG) emissions, water, and water eutrophication, for example.

We understand that power devices with better conversion efficiency are critical in moving towards a low carbon economy. The impact can be seen in mobility, infrastructure, and in all applications where power devices are used. Efficiency in power conversion is also critical in the deployment and adoption of new energies, including solar and battery-powered applications.

At ST, we offer a wide range of products, including high-performance silicon devices and the latest generation of wide bandgap technology to satisfy the high efficiency required by renewable energies. Our SiC technology has been at the forefront of development for over 25 years, and we manufacture our SiC products to the highest standards to ensure reliable performance and efficiency gains for electric vehicle (EV) applications, solar inverters, energy storage, industrial motor drives, and power supplies.

In addition to SiC, we're aggressively pursuing Gallium Nitride (GaN) development. This technology is crucial to our focus on AC-DC converter, adapter, smartphone fast chargers, server power supply, solar energy, and energy storage systems.



Our wide bandgap devices can minimize energy wastage by cutting switching losses in half, leading to around 50% reduction in installation costs. We focus on renewable energy productions, increasing efficiency, and introducing intelligence to energy saving. Semiconductors are crucial to the transition to a new emerging clean energy economy and unleash innovations for secure, scalable, and reliable energy solutions.

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GlobalFoundries is Great Place to Work Certified for the Second Year!

GF wins 11 awards at the Employee Experience Awards 2023 Singapore









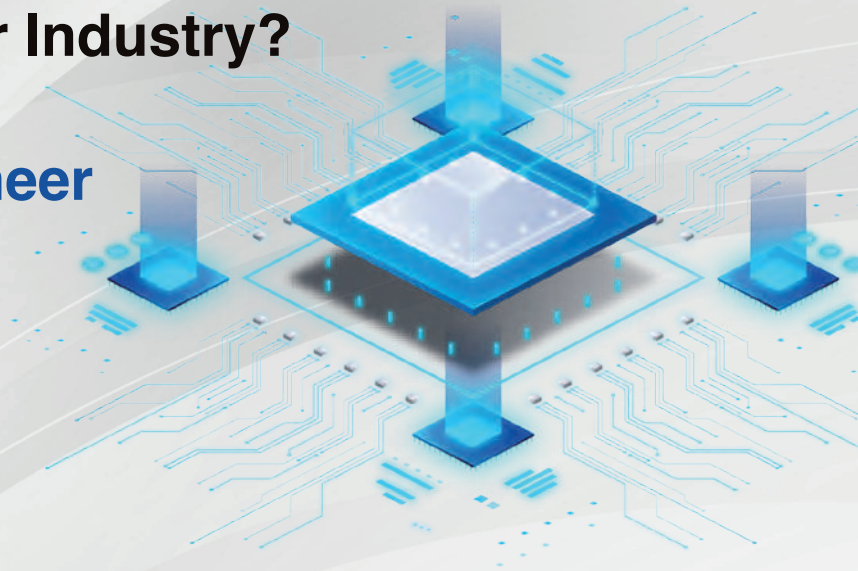
Join us

GlobalFoundries is one of the world's leading semiconductor foundries and the only one with a truly global footprint. We manufacture complex, feature-rich integrated circuits that enable billions of electronic devices. At GF, we make things that matter – from the solutions that enable the way we live today, to the technologies that drive what's possible for tomorrow.

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How Do You Succeed In The Semiconductor Industry?

Perspectives Of An IC Design Engineer



Q: Can you provide an overview of your background and experience in the semiconductor industry? What led you to pursue a career in this field?

I started my career as digital IC design engineer immediately after graduation. I have been with the industry for 33 years. Since young, I have always wondered about how things work around me, which naturally drew my attention towards electronics. Being passionate about electronics and fascinated by what a tiny mighty transistor is capable of doing led me to pursue my career in digital IC design.

Q: From your perspective, what are the key factors driving innovation in the semiconductor industry today?

While the future of the semiconductor industry looks bright, no one knows with certainty where it is headed. Several key factors drive semiconductor innovations in the industry today. Advancement in semiconductor materials and process technologies, demand for performance and efficiency, adoption of AI and ML in design methodology, environmental and energy concerns, design and packaging innovations, supply chain and manufacturing optimization, global competition, and the list goes on, will inevitably drive innovations, impact sales, create opportunities, and present fresh challenges.

Q: What are the critical skills and qualities that you believe professionals need to succeed in the semiconductor industry?

To succeed in the semiconductor industry, individuals should possess a combination of technical knowledge, problem-solving abilities, attention to detail, creativity and innovation, constant upgrading of skills and knowledge, and soft skills that are crucial to thrive in this fast-paced and dynamic field. As the semiconductor industry evolves rapidly, professionals stay up-to-date with the latest advancements, emerging technologies, and industry trends.

> ***A WILLINGNESS TO LEARN AND ADAPT TO NEW DEVELOPMENTS IS CRITICAL. KEEP ON LEARNING.***

Multicultural awareness is also important. The semiconductor industry is global, with diverse teams and customers worldwide. Cultural awareness and sensitivity are valuable for effective communication and collaboration in a multicultural environment. Integrity and ethical behaviour are essential in handling sensitive information, protecting intellectual property, and ensuring fair business practices.

CONTRIBUTED BY



Shieh Ping Lung
Senior Director, President's Office
Realtek Singapore Pte Ltd

REALTEK

The Beating Heart of Technology

Realtek was founded in Taiwan in 1987 and now has branch offices in the US, China, Japan, Korea, and Singapore. In 2023, Realtek Singapore is set to commemorate its 10th anniversary. As a world-leading IC provider that designs and develops various IC products for connected multimedia applications, communications networks, computer peripherals, and smart interconnect. In the future, we will provide more diverse and inventive solutions while continuing to focus on the AIoT, Ethernet, and automotive markets and aiming to create a brighter future and a better world through advanced technology.



AIoT Empowering Health Care

Wireless technology enables the essential connection between IoT devices and the cloud. Bluetooth and Wi-Fi are the two most important and widespread wireless technologies adopted by IoT devices. Realtek's IoT solution is widely used in home appliances and smart IoT terminals, including personal wearables and home security equipment. Leveraging many years of expertise in digital and analog research, and knowledge in imaging and acoustics, Realtek is further developing wireless technology in Health Care. For instance, our Bluetooth smartwatch solution offers high performance and low power consumption, collecting personal physiological data. We are also actively involved in optical sensors and corresponding monitoring algorithms, providing a wearable platform for personal health and transforming wireless technology.

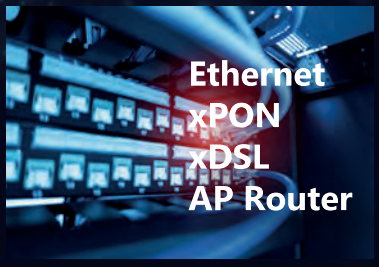


Furthermore, Realtek's Bluetooth hearing aid solution is dedicated to addressing hearing difficulties among individuals with hearing impairment, particularly in the older generation who require clearer communication of environmental sounds to ensure a safe home environment. The AI camera, combined with technologies such as facial and posture recognition, can enable emergency response in case of falls and provide timely feedback through voice control, making remote caregiving easier to achieve.



Ethernet Accelerating Infrastructure

Realtek ethernet communication product groups cover from high bandwidth enterprise / carrier ethernet switch equipment, carrier broadband router to SMB/SoHo/Home gateway devices. Image that, when we are browsing from our Cell phone, the network data send from the phone to AP, then get into our xDSL/xPON home gateway, then all the way transmitted to the carrier ethernet switch equipment's, they could be all Realtek inside. All these devices with full coverage of Realtek owned core technology such as high speed wire copper/fiber Ethernet, xPON and verity Wi-Fi applications. All these products are widely popular and deployed everywhere in the world.



Realtek's Mesh router is a favored option for home Wi-Fi usage due to its exceptional performance and user-friendliness. The product also incorporates the latest Wi-Fi 7 technology. Meanwhile, ethernet solutions offer integrated SoCs with advanced security encryption engines and secure standards for centralized and secure network equipment maintenance.

Enhancing Automotive with Speeds Up to 10G and Beyond

Ethernet is a widely adopted technology in the automotive industry. Realtek offers comprehensive solutions for automotive Ethernet and Switch technologies that can reach speeds of up to 10G or beyond. In addition, Ethernet technology also has wireless solutions for automotive applications, such as Bluetooth Sensor technology for pressure detection and keyless applications. Furthermore, infotainment systems come with a Wi-Fi combo for better connectivity. To improve Ethernet security and power-saving capability, it has supported MACsec and EEE in its new products to enhance the user experience of Ethernet in cars.



Contact Us



Micron Paves the Way for a Green and Sustainable Future

Micron Technology has recently released "The Power of Partnership, Micron's 2023 Sustainability Report," underscoring the company's continued commitment to innovation, the environment, its people and their communities.

Micron's accomplishments this year were wide-ranging — including launching new products to meet customers' emphasis on energy efficiency, working closely with providers to advance renewable energy goals and collaborating with industry peers and suppliers to support pathways toward net zero operations.

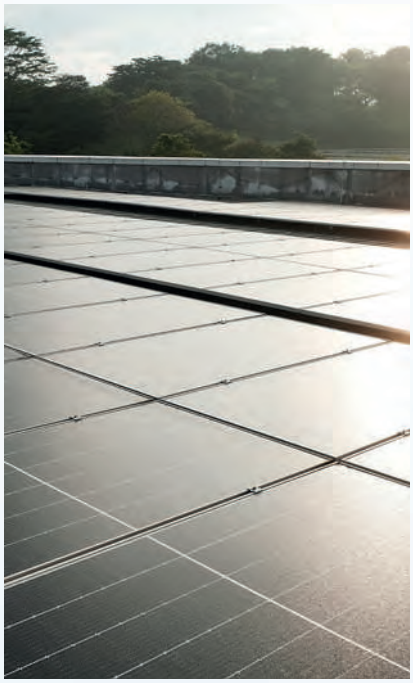
GROWING INNOVATION AND PRODUCT LEADERSHIP

In 2022, Micron achieved mass production readiness of the world's most advanced DRAM technology node, 1β DRAM technology, which delivers approximately a 15% power efficiency improvement over 1α memory. This innovation will be in Micron's first-to-market LPDDR5X DRAM. Micron was also first to market with 232-layer NAND, which reduces data center infrastructure requirements and is more energy efficient than previous generations and comparable hard disk drives.

FOCUSING ON THE CLIMATE

In line with the Paris Agreement and the latest climate science, Micron actively works with suppliers to identify emissions-reduction projects such as manufacturing equipment upgrades, efficiency improvements and renewable energy purchases to achieve its goal of net zero greenhouse gas (GHG) emissions in its operations (scope 1) and purchased energy (scope 2) by 2050.

To date, Micron has initiated several energy projects in the U.S., Singapore, Taiwan and Malaysia. In Singapore, one of the projects include installing over 36,000 solar panels at Micron sites. Upon completion, the amount of energy saved could power 6,000 homes locally.



Micron also collaborates with industry peers and customers worldwide to set new standards for the sustainability of semiconductor production. In calendar year 2022, Micron joined more than 60 other member companies in founding the Semiconductor Climate Consortium, a group that focuses on reducing GHG emissions across the industry. Micron will also work with other partners to support technology initiatives that drive emissions reduction.



> Sustainability continues to be core to our business strategy and how we navigate complex global challenges, a focus that strengthens our company and promotes innovation. The partnerships we are forging reflect our ambitions to increase sustainable practices across our industry and support our global community.
>
> **Sanjay Mehrotra**
> Micron President and Chief Executive Officer

ADVANCING RESPONSIBLE OPERATIONS

Micron remains committed to its 2030 water and waste goals and continues to explore new ways to advance its sustainability efforts. The company engages in water restoration projects and works with alternate waste disposal vendors. In addition to collaborating with suppliers on emissions-reduction initiatives, the company is engaging with diverse supplies and growing its fixed-income investments managed by diverse financial institutions.

As a member of the Responsible Business Alliance (RBA), Micron is committed to supporting the rights and well-being of workers and communities worldwide affected by global supply chains. The company follows strong industry standards for labor, health and safety, environment and ethics. As of Dec. 31, 2022, Micron's RBA audit score was 197 out of 200.

RECOGNITIONS

At the facility in Singapore, smart-controlled systems and predictive maintenance technologies have enabled Micron to increase manufacturing output while reducing resource use intensity. In recognition of this accomplishment, Micron Singapore was named a sustainability lighthouse, the first front-end semiconductor fab in the world to receive the World Economic Forum's sustainability-specific lighthouse designation. The designation demonstrates Micron's leading position in driving the future of sustainable manufacturing and acknowledges Micron's proactive approach to eco-efficient operations that are good for its business and the planet.



Solar panels installed at the carport of Micron Singapore, which is one of the largest carport solar installations in Singapore and Southeast Asia.

Read Micron's latest sustainability report here

www.micron.com/sustainability

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Micron



About ADI

ADI empowers the Intelligent Edge with the world's most innovative analog, digital, and software solutions, to accelerate breakthroughs that benefit society and the planet,

OUR MISSION

The most exciting development in technology today is the dawning of the Intelligent Edge era, where pervasive sensing, AI-driven edge computing, and ubiquitous connectivity are coming in smart, connected systems that enable new capabilities, applications, and markets. ADI is at the center of this new era, supplying the intelligent sensing and connectivity on which it depends. Leveraging our strong position at the boundary between the physical and digital worlds, innovation capabilities, and domain expertise, ADI is working closely with customers to bring intelligence to the edge.

WHAT DRIVES US

Since our founding 58 years ago, ADI has been driven by a deep sense of purpose and a desire for the impact of our work and innovations to reverberate across all stakeholders – employees, customers, partners, communities, and investors. Providing inspiring and rewarding work for our employees, partnering with our customers and suppliers for mutual business success, and focusing on both our investors and the communities in which we operate has enabled us to deliver tremendous impact at the human, societal, and planetary scales for nearly sixty years. ADI's long-term strategy lays out the path by which we will accelerate technology breakthroughs at the Intelligent Edge and deliver sustainable, profitable growth that will expand and extend our impact for decades to come. Within this framework, Environment, Social, and Governance (ESG) is more than an initiative. It is a natural outcome of our long- term focus and a guiding principle informing every element of our organization and operation.

OUR APPROACH

At ADI, we have long held the belief that we can and should be a force for positive change in the world. We believe that our strategic growth over the past few years gives us the opportunity to take an even stronger leadership position in driving the changes that must take place to create a better society and a healthier planet. Environment, Social, and Governance (ESG) principles are at the heart of everything we do, because it's the morally right thing to do and ESG is smart business. The efforts we take across ADI to operate with integrity, preserve the environment, slow down and remediate climate change, and inject greater diversity, equity, and inclusion (DE&I), both within our leadership and workforce, are key to our long-term growth and profitability. We believe sustainability means delivering holistic solutions that make a positive, demonstrable impact on the world.

IMPACT OF OUR SOLUTIONS

Semiconductors are truly the backbone of modern digital economy. Analog Devices has become an industry leader in designing system solutions that bridge the physical and digital worlds for the benefit of our planet and its people. We collaborate with customers and co-create innovations that improve quality of life and solve the world's most pressing challenges. Together, we deliver breakthroughs at the Intelligent Edge that help make our world safer, more efficient, and sustainable.

Our Solutions

With a strong foothold bridging the physical and digital worlds, ADI is uniquely positioned to drive innovation in our key markets, including automotive, industrial, communications, digital, healthcare and consumer.





WHAT IF SUSTAINABILITY WAS SUSTAINABLE?

Last year, ADI's electrification technology helped save more than 100 million tons of CO_2 emissions from entering the atmosphere. But better EVs are just the beginning. To reach a truly sustainable future, we need better energy storage and more efficient energy monitoring. That's why ADI is helping to advance grid resiliency - so the transition to renewable energy isn't only better, its the best it can be.

Analog Devices. Where what if becomes what is.
See What If: analog.com/What If

ANALOG DEVICES
AHEAD OF WHAT'S POSSIBLE™

Forging Resilience:
Navigating Supply Chain Disruptions

In the dynamic landscape of the semiconductor industry, the global industry players in the ecosystem must be innovative and agile in adapting to changes in emerging technologies, market trends, economics, political situations, and the resilience of their supply chain.



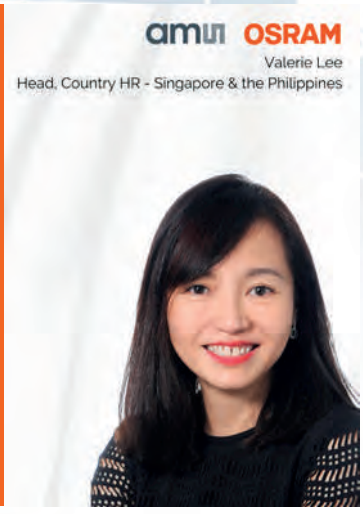
Soh Lip Leong, Senior Vice President & General Manager – Operations Backend of ams OSRAM says timing is a critical component to success. “Deciding the time to market is critical in our semiconductor business as technology evolves very rapidly. To be competitive, technology enablement compels us to reinvent R&D practices, expand our collaboration models with our partners and improve our supply chain predictivity, constantly,” he explains. Mr. Soh further comments that automation and SMART factories deploying AI (artificial intelligence) and machine learning will play a pivotal role in the next couple of years in tackling demand seasonality, capitalization availability, and supply chain disruptions.



Toh Yew Wan, ams OSRAM’s Vice President – Finance, APAC, says multiple factors have contributed to turbulent times for the semiconductor industry. “The global semiconductor supply chain has been tested numerous times in recent years by several factors, including the COVID-19 pandemic and ongoing geopolitical tensions. This has led to shortages of semiconductors that have had a significant impact on a wide range of industries. Furthermore, technological complexity, miniaturization, and rising costs have made it more expensive for semiconductor companies to produce chips and that is putting pressure on the profit margins,” she says. Ms. Toh advises that to mitigate the disruptions that the global semiconductor supply chain is facing, companies need to diversify their supply chain by expanding their supplier base and positioning manufacturing facilities in strategic regions. This, she explains, will reduce the dependency on specific areas and make the supply chain more resilient.



Meanwhile, ams OSRAM's Senior Vice President – Global Procurement **Tan Hock Seng**, points out some bright spots in market opportunities and highlights some key challenges faced by the semiconductor players. Mr. Tan foresees growing market demands for automotive, wireless telecommunications, and cloud computing to continue growing till 2030. Advancement in new materials has also fueled market growth in applications that require high power and frequency. The exponential usage of these expanding markets has pushed semiconductor manufacturing companies like ams OSRAM to build resilience in our supply chain by broadening our supplier base and co-investing with our clients to build country-specific value chains. However, as the semiconductor industry comprises multiple components and each semiconductor company and its manufacturing sites tend to focus on selective segments, the absence of a single component can halt the manufacturing of the end product. This further demonstrates the criticality of building resilience in supply chains by changing our collaboration models with our partners.



Another challenge highlighted by Ms. Toh and Mr. Tan centers on human capital, particularly in the areas of talent shortage and skill gaps. This is echoed by **Valerie Lee**, Head – Country HR (Singapore and the Philippines) who says that the digital era calls for a mix of sound technical know-how, adaptability, critical-thinking, and problem-solving skills for successful professionals to strive and develop in the semiconductor industry. "There are abundant opportunities for continuous learning in the semiconductor industry. Successful next-generation semiconductor professionals will need to have a love for technology and an openness to change. This is essential in the semiconductor industry's constantly changing digital environment," she says.

Change can and will come to every industry, as the potential to improve and enhance is limitless. For example, in the automotive industry, inroads are being made into creating fully adaptive driving beam capabilities. ams OSRAM's new intelligent multipixel EVIYOS® 2.0 LED for precision adaptive headlights, launched in mid-2023, looks to create a new era in road safety by providing additional ways a car communicates with the driver and others in the car's surroundings. Using 25,600 individually controllable LEDS with a pixel pitch of 40 μm, EVIYOS® 2.0 can project high-resolution images like warning symbols or driver guides onto the road's surface. This will increase the time drivers have to react to hazards. EVIYOS® 2.0 can also selectively illuminate the road ahead to maximize the driver's view in high-beam mode without creating the glare typically experienced by other road users. This innovative invention provides superior views of the road making night driving both easier and safer and is the result of a decade of continuous engineering development at ams OSRAM.

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ams OSRAM

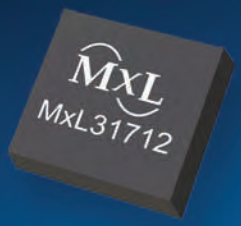
Semiconductors that transform how the world connects and communicates

A commitment to innovation that pushes the boundaries of connectivity

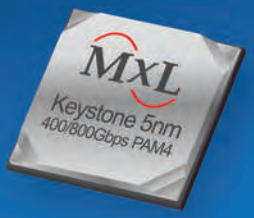
MaxLinear is driving the future of connectivity with a comprehensive portfolio of systems-on-chip that are designed to enhance the speed, capacity, and efficiency of the networks that connect the world. Our highly integrated semiconductor devices and platform-level solutions are leading the transformation to the next generation of networks for connected homes, mobile and wireline infrastructure, data centers, and industrial and multi-market applications. Through excellence in engineering, integrity, and compassion, we are reshaping how individuals, businesses, and industries connect and communicate.



First single-ship universal gateway solution



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MAXLINEAR



MaxLinear's Wi-Fi 7 SoCs: Unleashing the Next-Gen Wireless Revolution

MaxLinear has built a groundbreaking Wi-Fi 7 solution, marking a revolutionary leap in wireless connectivity supporting unrivaled throughput, coverage, and performance, making them a game- changer for the seamlessly-connected era.

Built on the IEEE 802.11be standard, also known as Extremely High Throughput (EHT), MaxLinear's Wi-Fi 7 SoCs deliver an impressive peak throughput of 11.5Gbps on the 6GHz (6E) spectrum.

Furthermore, the Wi-Fi 7 SoCs are specifically optimized to complement MaxLinear's AnyWAN™ (URX) broadband SoCs and Puma™ family SoCs. This integration enables the wireless traffic to be fully offloaded with zero CPU utilization, freeing up the CPU for advanced services like edge computing, Metaverse rendering, security, analytics, and parental controls.

MaxLinear’s large scale, end-to-end R&D setup in Singapore is one of the driving forces to create this leapfrog technology and fuels the growth of the Singapore Semiconductor Industry.

Come join us: https://www.maxlinear.com/company/careers



To A Sustainable World Of More Connectivity

Q: Can you provide an overview of your background and experience in the semiconductor industry?

During my 30-plus-year career in semiconductor technology development, I've focused on driving greater value out of existing fab assets by developing specialty technologies for top-tier foundries. To give you an idea of how far semiconductor technology has come, I was developing radio frequency (RF) transceiver solutions for 2G mobile phones when I first entered the industry. Today, I'm leading microphone, power management, and RF projects as 5G proliferates, enabling exciting new applications, while 6G challenges have already started knocking at the door.

Q: What are the current trends and advancements in the semiconductor industry that you find most exciting or promising?

Semiconductor technology development is always advancing and evolving. A decade ago, it was commonly thought that BCD (bipolar-CMOS-DMOS) and display driver technologies will stay at 200mm production. Today, every major foundry is investing in developing 300mm process for these technologies as they continue to improve. Many people see 14nm and above processes as mature technology, but there is still never-ending innovation that can happen for the specialty technologies that don't need to utilize the most advanced nodes. In addition, in the more-than-Moore era, heterogenous integration is a trend that is quickly developing and will drive performance improvements despite limitations to transistor shrinkage.

Q: How do you see the semiconductor industry evolving in the next 5 to 10 years? What are the major challenges and opportunities you anticipate?

In the next decade, we see only 2-3 companies left to chase Moore's law, while the majority in our industry is focused on more-than-Moore solutions such as heterogenous integration, optics integration into silicon, and compound semiconductors. In terms of manufacturing, we see greater automation and adoption of AI tools to enhance productivity. On a more macro level, semiconductor production onshoring efforts by various countries as well as the push for supply chain diversification will present both opportunities and challenges for our industry.



Mr. Verma currently leads specialty technology development at UMC in Singapore, the company's designated R&D center for advanced specialty technologies.





At the IC level, the industry continues to be driven by the need for better performance, smaller form factor, and cost effectiveness. Once satisfied by the progression of Moore's law, these needs are now sparking innovations in the form of 3D-IC and chiplets, compound semiconductors, silicon photonics, and more. All these efforts will contribute to a world that is more connected, safer, and more sustainable.

Q: From your perspective, what are the key factors driving innovation in the semiconductor industry today?

Technology trends including 5G/6G, AI and VI (virtual intelligence), and electrified mobility will drive semiconductor innovation in the years to come, which will require a wide range of application-specific technologies.



Q: What are some of the biggest obstacles or bottlenecks the semiconductor industry is currently facing? How can these be addressed?

One of the biggest bottlenecks facing our industry is talent. As companies expand to meet growing silicon demand, and as countries from the US to India to Germany seek to beef up their own semiconductor production capabilities, global competition for talent is becoming more heated. To address this, governments can reduce obstacles for inflow of international talent while the private sector and academia can work closely to encourage more young people to pursue careers in semiconductor technology development.

CONTRIBUTED BY



Raj Verma
Associate Vice President of Technology Development

UMC

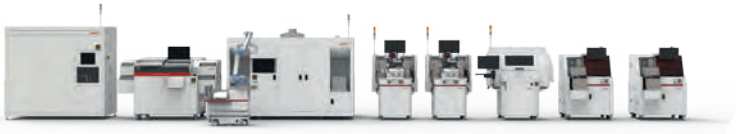


ASMPT enabling the digital world

Our vision - enabling the digital world – captures how our solutions truly link the entire semiconductor packaging and assembly value chain. Our solutions cover mainstream, applicative, and advanced tools, and our customers span the globe across many industries. They use our solutions to organise, assemble, and package delicate electronic components into a vast range of end-user devices that go into computers, servers, smartphones, wearables, LED displays, and more, helping achieve higher productivity, reliability, and quality.

Simply put, we give our customers the ability to create the products that anchor modern society. When you use a phone, a modern car, the latest computers, smart wearables, healthcare devices at doctors or hospitals, smart homes, or internet computing or 'smart applications', chances are that ASMPT's solutions enabled the manufacture of the electronic chips or components in those items in some way.

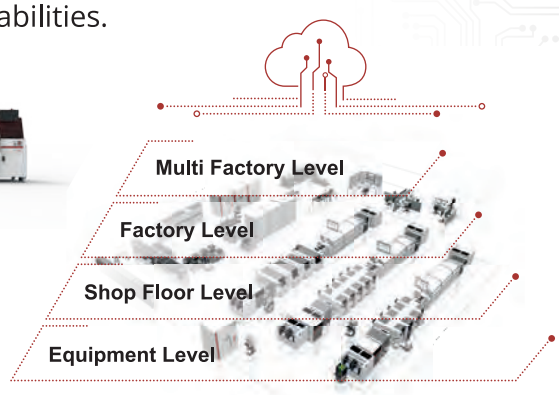
As the largest solution provider for semiconductor and electronics manufacturing, our unique, broad-based portfolio spans wafer-level to die-level high-accuracy placement tools and SiP placement tools that address a broad range of packaging technologies including 2.5D, 3D-IC, Fan-in, Fan-out Wafer-Level and SiP. We are also building out software solutions that encompass smart process control and optimization, manufacturing execution, and AI-driven advanced inspection, analytics, and predictive capabilities.



Semiconductor Solutions Complete Line



SMT Solutions Complete Line



Integrated Smart Factory Solutions

We are proudly headquartered in Singapore with numerous innovation centres, manufacturing facilities, and sales & service offices around the world and we have a long history of commitment to R&D and partnering with customers for success. We have a key competitive advantage as a major supplier and technology partner across many applications and solution areas, with the crucial expertise to connect our solutions in unique ways.

Our strategic growth initiatives involve targeted product enhancements and widening our technological leadership, including tapping emerging markets with high-potential solutions such as high-bandwidth memory, advanced display technology, advanced placement and MCM bonding solutions, and high-performance computing.

Together with enduring structural trends in computing, IoT & generative AI, automotive electrification, smart factories, green infrastructure and 5G, we are confident of helping to enable a bright and sustainable future for customers, employees, partners, investors, and society.









New era in road safety as ams OSRAM launches intelligent multipixel EVIYOS® 2.0 LED for precision adaptive headlights

EVIYOS® 2.0, a new type of intelligent multipixel LED that enables fully adaptive, dynamic headlight operation and image projection.

Sensing is life

ams OSRAM

Supporting The Workforce For Years To Come



By **Jong-Aik Goh**
Vice President
Global Sourcing & Procurement
Managing Director Singapore
Soitec



The Singapore Semiconductor Industry Association (SSIA) plays a vital role in the development, growth, and competitiveness of Singapore's semiconductor industry. As an industry association, SSIA serves as a collective voice and platform for semiconductor companies, providing numerous benefits that contribute to the industry's success and sustainability. SSIA's role was essential in the decision of establishing Soitec's presence in Singapore.

SSIA supports workforce development in the semiconductor industry by organizing training programs, workshops, and skill enhancement initiatives. These efforts help to bridge the skills gap, ensure a steady supply of skilled professionals, and improve the overall competence of the semiconductor workforce in Singapore by enhancing technical skills, promoting innovation, and keeping the workforce up to date.

Collaborations with industry stakeholders, educational institutions, and government agencies enable SSIA to design and implement training programs that cater to the specific needs of the semiconductor industry. The association also facilitates internship and apprenticeship programs, providing students and aspiring professionals with hands-on experience in semiconductor companies based in Singapore.

With the support of the Singapore Semiconductor Industry Association (SSIA) skilled worker program, Soitec was able to find the right talents that will help to develop tomorrow's technologies that will disrupt our world.

Soitec is very proud member of SSIA. We would like to congratulate the semiconductor industry in Singapore for an excellent 55 years, and with SSIA's guidance, here's to another 55 years and beyond!

Congratulations on this amazing achievement.



Soitec specializes in developing and producing advanced semiconductor materials, including silicon-on-insulator (SOI) and other innovative materials used in the semiconductor industry.

The company has a strong focus on innovation, which allows it to stay at the forefront of technological advancements in the semiconductor sector with examples like the proprietary manufacturing process Smart Cut™, and Smart-SiC™ technology that enables the future generations of electric vehicles. Soitec products are also a key enabler for new generations of smartphones, as well as the rapid development of 5G networks and Wi-Fi 6/E standard.

Soitec is sustainable by design. Our products drive energy savings, multiplied across billions of microchips and the devices they power. Our commitment to sustainability is not only embodied in the products we make, but also in our bold and ambitious policies on climate change, water management as well as diversity and inclusion.

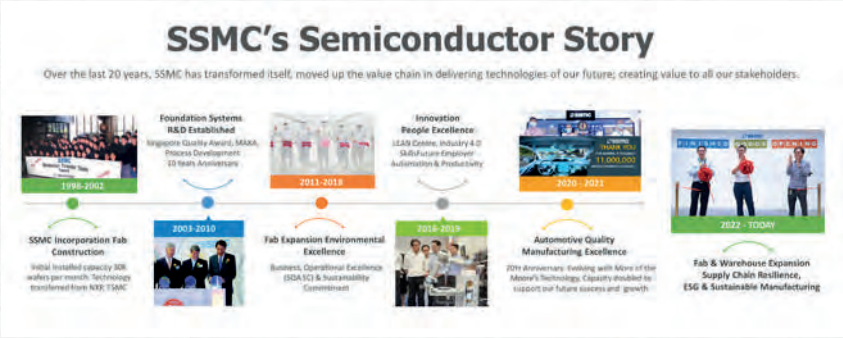
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soitec



SSMC's Resilient & Flexible Supply Chain Management

In spite of global semiconductor supply chain challenges, SSMC continues to deliver on customer wafer shipments while meeting all operational metrics. There are three major strategies SSMC pursues in achieving resilience and driving solid operational performance to ensure its service promise.



STRONG PARTNERSHIPS

SSMC as a company is structured to be highly customer centric, and we strive in staying agile and nimble in all aspects of our business. SSMC has gained reputation from its JV Partners, NXP and TSMC, for being a predictable fab.

> "SSMC is ever progressing from the day I joined in 2000, to the present 2022. The company continues to evolve and make progress in its capacity & business. We continue to grow and develop into an important automotive wafer fab for our shareholders."
>
> — ***Lim Soon, CEO of SSMC***



STRATEGIC FAB & FACILITIES EXPANSIONS

With the projected long term growth of the semiconductor industry, SSMC is going to further increase its fab capacity to meet the rising demand.

> "The success of SSMC lies in its continuous transformation and ability to learn and adapt to changes. SSMC has been making profits which enables us to invest and grow to more than two times of our initial capacity. Being financially self-sufficient is a result of our transformative success and excellent operational performance. The future outlook and prospect of SSMC is excellent. With our latest fab expansion and the upcoming construction of new warehouse facilities, we are well positioned to drive our business forward."
>
> — ***Jerry The, CFO of SSMC***



RESILIENT SUPPLY CHAIN MANAGEMENT

Ivan Hee, VP of SSMC Supply Chain and Business Operations shared how he turned around and managed Supply Chain disruption situation during the COVID-19 period.

> "SSMC rides over the Perfect Storm (global supply chain crisis due to lockdown and geopolitics) because we adopt the "Expect the unexpected" mindset and "Agile & Proactive Total Defence" strategy. In fact, the Perfect Storm presented us opportunities to strengthen our own supply base and sharpen our response to handle the supply chain disruption. SSMC's robust Supplier Partnership management and our focus on suppliers and geographical diversification are the key factors that helped SSMC overcome challenges and ready for future opportunities."
>
> — ***Ivan Hee, VP of SSMC (Supply Chain & Biz Ops)***

Going forward, SSMC will continue to foster intimate partnership with customers, suppliers and key partners; leverage on symbiotic relationship with JV partners, and stay flexible to become an even more resilient wafer fab. SSMC is committed to thrive towards their vision to be the preferred wafer fab and ensure continuity of operations for all stakeholders.

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(A Joint Venture of NXP and TSMC)

The Growth Mindset Is The Crux of Success

In an exclusive interaction with SSIA, Seow Meng, Goh, Skyworks Solutions Inc.'s newly appointed General Manager and Vice President of Operations for the filter solutions group at Skyworks' Singapore facility talks about the current trends and advancements in the semiconductor industry that he finds most exciting. He also shares about the critical talent skillsets that professionals need to succeed in this promising industry.



Q: What are the current trends and advancements in the semiconductor industry that you find most exciting or promising?

At the heart of the computing, mobility and communications revolution lies the semiconductor, a technology that has changed how humans work, play, learn, communicate and so much more. Semiconductors remain critical in advancing breakthrough technologies, including artificial intelligence, cloud computing, autonomous driving, IoT and global 5G deployment. That is why I decided to join Skyworks, an innovative analog and mixed signal semiconductor company that is connecting people, places and things spanning new and previously unimagined applications within the aerospace, automotive, broadband, cellular infrastructure, connected home, defense, entertainment and gaming, industrial, medical, smartphones, tablets and wearable markets.

Universal connectivity is rapidly transforming industries, communities and our daily lives. While it is becoming a reality, billions of connections are yet to be made. Our products leverage multiple wireless technologies – for a wide range of applications requiring different frequency ranges, data rates and battery life – to bring everyone and everything to vital information wherever it is needed.

Q: What are the critical skills and qualities that you believe professionals need to succeed in the semiconductor industry?

One of the key critical skills and qualities that I constantly look for in an engineer is the ability to navigate today's ever-changing work environment. A distinct attribute I have observed that makes a high-potential engineer stand out is the "hunger" to always learn new insights and perspectives.

Characteristics of these individuals typically include: a natural curiosity and the ability to ask questions and gain the desired knowledge needed to bridge gaps, even if it means learning from the junior staff. These individuals are constantly abreast of the latest technologies yet remain lifelong learners with a growth mindset. They are coachable, flexible, and willing to guide others. These traits are key attributes for an engineer to grow into a future leader of the semiconductor industry.



Seow Meng, Goh is an experienced general manager who now helms the overall filter operations at Skyworks' manufacturing plant in Singapore that employs about 1,200 team members. He started his career as a lithography manufacturing engineer before joining notable American and European semiconductor multi-nationals. Prior to joining Skyworks, he was the Vice President of Operations of a German leader in optical solutions. He was directly responsible for manufacturing, engineering and facilities and led cross-functional teams of research and development, quality, finance, human resources, IT and planning.

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Seow Meng, Goh
General Manager and
Vice President of Operations

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Singapore is regarded as one of the world's greatest commercial centers for its diverse, robust economy and the largest port in Southeast Asia. KLA Singapore has over 1,400 employees across four offices and manufacturing locations. We are ranked in the Top 50 Singapore's Best Employers by The Straits Times. KLA Singapore has the largest of the company's global technical training centers. Recognized by Training Magazine as a Hall of Fame organization, the training center offers specialized product training and certifications to internal and external customers that ensure KLA's offerings are serviced and maintained according to the highest standards.





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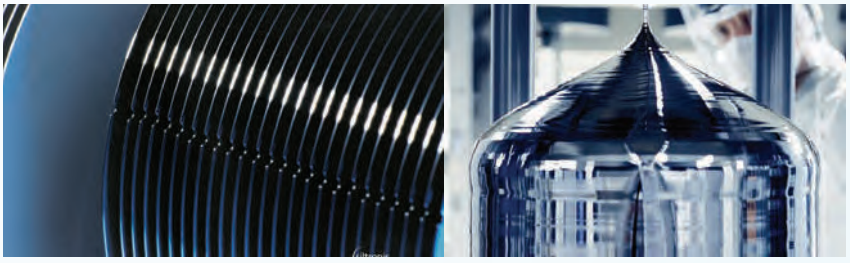
A Leading Producer Of Silicon Wafers

Siltronic is one of the world's largest manufacturers of hyper pure silicon wafers and partner to many leading semiconductor companies. The company operates production sites in Asia, Europe and the USA. With a strong presence in Asia, Siltronic Singapore plays a crucial role in the production of high quality 200 mm and 300 mm silicon wafers.



Siltronic Singapore Pte. Ltd. was established in 1997 for the manufacturing of 200 mm wafer. The 300 mm wafer manufacturing facility was established in 2006 under a joint venture with Samsung Electronics Co. Ltd. In 2014, Siltronic increased its shareholdings and the entity was renamed as Siltronic Silicon Wafer Pte. Ltd. The two legal companies operate under one-system and one-management synergy concept which makes Siltronic a strong and robust site in Singapore.

In 2019, a new CZ crystal pulling hall in Singapore was inaugurated to meet the increasing wafer demand. On October 26, 2021, Siltronic broke ground for its new 300 mm wafer manufacturing facility in partnership with the Economic Development Board. It is currently the most advanced wafer facility of Siltronic, manufacturing crystal ingots as well as polished and epitaxial wafers. The investment will play an important role in meeting the growing semiconductor demand.



One critical success factor for Siltronic is the technological competency, which is necessary for its highly complex manufacturing processes. Today, Siltronic holds roughly 1,850 patents and patent applications for the industry. With Siltronic Singapore state-of-the-art manufacturing facilities and advanced technologies, it ensures delivery of precise and reliable silicon wafers.

Apart from successful technological development, Siltronic recognises the importance of Sustainability in the industry. It has put in place strategies that are based on product, safety, health, and environmental protection and resource conservation. Siltronic is committed to reconcile the effects of its business activities with the needs of society.

We are confident that the semiconductor industry in Singapore will continue to soar to greater heights and together with our partners, Siltronic Singapore is well-positioned to maintain its prominence in the semiconductor market and contribute to the development of innovative technologies worldwide.

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Accelerating Innovation In An Evolving Semiconductor Landscape

Semiconductor technology is constantly evolving. The soaring demand for new technologies such as artificial intelligence, machine learning, 5G, the Internet of Things (IoT), and autonomous vehicles has propelled the industry's growth significantly. This surge in demand has also sparked innovations in chip design and packaging. Advanced techniques like 3D packaging, wafer-level packaging, and chiplets have enhanced performance, power efficiency, and reduced the overall form factor of semiconductor devices.



Test and measurement has undergone a revolution of its own, capitalizing on connected software, analytics, and artificial intelligence to enable more efficient design, test, and characterization of semiconductors. These recent advances have created significant, untapped opportunity to leverage test as a competitive advantage.

At the heart of this opportunity is inefficiency caused by disjointed design and test stages throughout a semiconductor product's development lifecycle. As product complexity drives the need for multiple development phases, inadequate communication and coordination exacerbates inefficiencies, especially in large organizations. Standardizing test and measurement tools and connecting engineering functions through shared software can significantly streamline operations, reducing time to market and improving engineering efficiency. Furthermore, as technology continues to rapidly evolve, developing flexible and efficient test strategies will be critical to quickly adapt to new requirements. It is these strategies that will enable semiconductor companies to scale effectively and win in the race to market.



For semiconductor companies to continue driving innovation, they must rethink their approach to test and take a closer look at the individual stages in their product development process. Leveraging a test vendor's specialized expertise, advanced testing solutions, and connected software is key. At NI, our goal is to help test organizations boost their engineering productivity with intuitive automation tools and adaptable test systems that allow engineering teams to focus their time in critical areas and become product experts.

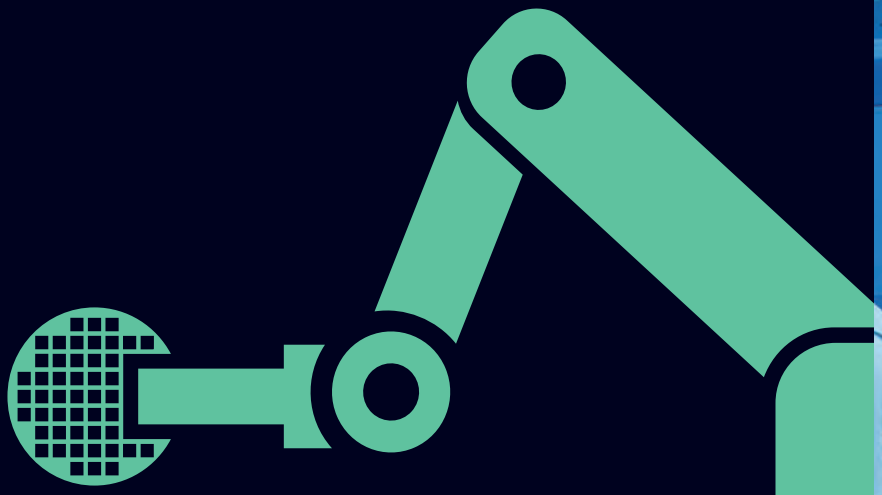
In navigating the evolving semiconductor landscape, embracing collaboration is vital to innovation. The journey towards a connected and intelligent world is a collective endeavor, and together, we can unleash the power of semiconductor technology to shape a brighter, smarter, and more sustainable future.

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Robert Manion
Vice President
General Manager Semiconductor
Productor and Reliability Solutions

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Siemens Semiconductor Executive Summit 2023

The semiconductor industry faces challenges and opportunities in response to increasing consumer demand, constraints on the production supply chain, as well as concerns about sustainability. There is a need for new solutions and innovative approaches to make semiconductor operations more efficient, resilient, and flexible.

Taking semiconductor manufacturing to the next level, **Siemens held its first ever Semiconductor Executive Summit on 7 July 2023** themed "Unleashing the power of resilient semiconductor manufacturing". The executive summit gathered global experts, industry leaders, and key stakeholders in the semiconductor ecosystem to discuss some of the most pressing challenges facing the industry and the path towards creating the factory of the future.

The summit covered a wide range of topics, including:

- Development of operational intelligence: The use of data and analytics to improve decision-making and optimize operations.
- Product design and production with increased efficiency: The use of new technologies and methods to reduce costs and improve yields.
- Secure from start to finish: Cybersecurity integration across the semiconductor manufacturing process lifecycle:
- The need to protect sensitive data and intellectual property from cyberattacks.
- The application of innovative technologies to achieve environmental sustainability: The use of renewable energy, energy-efficient manufacturing processes, and recycled materials to reduce the environmental impact of the semiconductor industry.



Semiconductor Executive Summit key takeaways

Digitalization: A growing number of semiconductor companies are embracing digital technologies to improve their operations. These technologies include artificial intelligence (AI), machine learning, and the Internet of Things (IoT). The advent of digitalization can assist semiconductor manufacturers in improving yields, reducing downtime, and accelerating the innovation process.

Sustainability: There is also a commitment to sustainability within the semiconductor industry. Siemens is embracing the DEGREE framework which represents Siemens five areas of commitment - Decarbonization, Ethics, Governance, Resource efficiency, Equity and Employability. The framework helps semiconductor manufacturers reduce their environmental impact.

To learn more about Siemens' solutions for the electronics/ semiconductor industry, visit the ***Siemens booth at ITAP 2023, October 18-20, 2023, Singapore Expo Hall 2, Booth E09****.*

Smart Manufacturing: Smart manufacturing is the use of digital technologies to automate and optimize manufacturing processes. As a result, semiconductor manufacturers can improve their efficiency, flexibility, and productivity.

Cybersecurity: The semiconductor industry faces several cybersecurity challenges. Siemens is committed to protecting the data and intellectual property of its customers. In order to enhance cybersecurity, Siemens employs a number of measures, including encryption, secure communication protocols, and intrusion detection systems.

The Siemens Semiconductor Executive Summit provided a valuable opportunity for industry leaders to come together and discuss the challenges and opportunities facing the semiconductor industry. The summit also highlighted Siemens' commitment to helping its customers achieve their sustainability goals.



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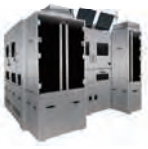


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Semiconductor back-end process



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Wire Bonding



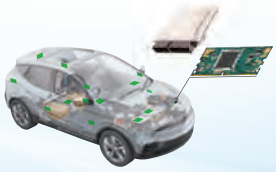
Flip Chip Bonding



Molding



IC Package





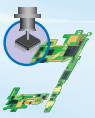


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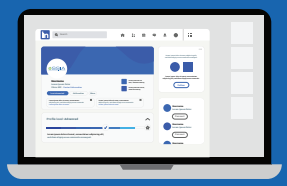
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