

SINGAPORE SEMICONDUCTOR VOICE

Volume 19 • T05SS0291A

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Women's
Forum 2022**
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Making a Difference with
DIVERSITY & INCLUSIVITY

18-19 JUL & 25-26 JUL
VIRTUAL SESSION

SSIA LEADERSHIP IN ENGINEERING PROGRAMME

Following its debut in 2021, the SSIA Leadership in Engineering Programme will be back in 2022 over a four-day agenda.

Who it's for:

Engineers who have been in the semiconductor and electronics industry for at least 3 years.

Objectives:

To prime the next generation of new leaders for the semiconductor and electronics industry, by helping them develop soft skills and sharpen leadership qualities.

Programme Features:

- ▶ Self reflection and awareness
- ▶ Importance of interpersonal and communication skills at work
- ▶ Interactive workshops with semiconductor and electronics industry case studies and discussions
- ▶ Sharing by industry veterans and leaders
- ▶ Networking with fellow participants from different sectors within the industry... and many more!

For more information, email daphne@ssia.org.sg



FOREWORD BY Executive Director

In 2021, SSIA organised the first Semiconductor Women's Forum, our inaugural salutation and commitment to women in the semiconductor sector. On 10 March 2022, we convened for the second edition of Semiconductor Women's Forum. I was thrilled to see industry leaders and partners who joined us at the event, showing their continued support for the cause.

SSIA believes that fostering diversity of thought, perspective and experience is essential in order to innovate and stay competitive. The Semiconductor Women's Forum is but one of our platforms to drive this mission and broader objectives. Electronics Industry Day back in January was another such platform. Our industry continues to become a career of choice for new talents to come onboard and existing ones to stay, thrive and succeed in our industry, and this applies to both women and men who will help make our ecosystem even stronger.

Numbers and statistics are a good reflection of why we need to continue working hard towards talent development. In 2021, the semiconductor industry in Singapore expanded by 14%, and is expected to post healthy growth through 2022. About 2000 jobs will be created in the next three to five years to support the sectoral growth. SSIA and WSG's Career Conversion Programmes saw a 7% increase in female jobseekers joining the industry over the past three years. SSIA and e2i have also committed to working even more closely towards talent development. Companies in our industry posted more than 2000 career and internship opportunities on our Semiconductor and Electronics Job Portal, showing our unity on this front to continue attracting the best talents.

As we move into an endemic phase and learn to live with Covid, our events too will start to evolve. I am happy to announce that we are planning to conduct larger physical events in the coming months. Semiconductor Business Connect, which will be back on 19 May 2022, is SSIA's largest business networking platform. We are planning for a large business conference and exhibition, the largest we have organised since the pandemic started. So do keep a look out for the event, and I look forward to your participation.

SSIA Secretariat team is also planning for our annual Summit at the end of September, and this year we will bring back the much awaited Semiconductor Dinner too! So for all companies who wish to support the Summit and join the Semiconductor Dinner, please reach out to my team for more details.

Thank you.

Best wishes
Wee Seng

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Strengthening and Growing The Local Ecosystem

SEMICONDUCTOR BUSINESS CONNECT 2022

THURSDAY,
19 MAY 2022

Find out how you
can support and be
a part of this event

secretariat@ssia.org.sg

Singapore Semiconductor Leadership Accelerator (SSLA) Programme

Next edition coming up on

11-22 Apr & 10-13 May

Singapore Semiconductor Leadership Accelerator (SSLA) is a custom programme targeted at senior-level managers and directors who are part of the company's succession plan with responsibility for strategic decision-making. Since its first run in 2017, the programme has contributed to the development and growth of more than 100 leaders from over 30 organisations, and its dedicated alumni continue to network and collaborate professionally.

SSLA has been co-developed by a strong team of semiconductor industry L&OD practitioners, in partnership with the Human Capital Leadership Institute (HCLI), Singapore's premier Centre focused on thought leadership and insights on understanding and operating in Asia. Drawing on case studies and industry-specific knowledge topics, the programme provides an immersive and experiential learning experience designed to accelerate personal and professional growth for leaders to succeed in the increasingly volatile, uncertain, complex and ambiguous (VUCA) global environment; with special emphasis and strong focus on the semiconductor industry.

Believing in a well-rounded leadership development, the SSLA program not only builds business and strategic skills, but also people management skills critical for execution (i.e. Leading Business and Leading People). Understanding self and how one interacts with others are equally important for personal growth (i.e. Leading Self).

Learning Outcomes

1. Comprehensively understand the evolving role of leadership in the context of the global workforce landscape and the semiconductor industry.
2. Gain insight into business model innovation and the alignment with business strategies.
3. Learn about best practices in people management, team building, and organisational leadership.
4. Acquire an in-depth understanding of how aligning sustainability efforts and strategies with business outcomes can be a competitive advantage.
5. Create strategies to help organisations identify, recruit, develop and train top talent.
6. Develop networking strategies with leaders from the business, government, and academia.

The theme for Run 7 is "Global Trends, Global Mindsets: Leading for a Sustainable Future", with Module 1 being delivered virtually and onsite between 11-22 April, and Module 2 taking place onsite on 10-13 May. Our faculty and speakers come from both industry and academia, and they will be sharing insights and strategies on topics such as geo-politics and supply chain challenges (by Alex Capri, Senior Fellow and Lecturer at the National University of Singapore), global leadership mindset (by Professor Ric Roi, IMD Business School), communication with impact (by Stephen Krempf, Krempf Communications International, and human-centred leadership and management (by Associate Professor Tan Hwee Hoon, Singapore Management University).

Content Blocks for Run 7



Do join us for this exciting and engaging leadership programme!

For more information and to register your interest, please refer to <https://tinyurl.com/mrxthbdu>

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ARE YOU READY FOR THE NEXT DISRUPTION?

YOUR ALLY IN TECHNOLOGICAL DISCOVERY, ALWAYS.



Microscopy and Thin Film Characterization for Failure Analysis

Ever wondered how imaging and characterisation tools work to provide insights on device failure?

Participants of this introductory course will be equipped with fundamental knowledge on microscopy and thin film characterisation for failure analysis. There will also be hands-on opportunities and demonstrations during lesson to facilitate learning.

LEARNING OBJECTIVES

- By the end of the course, participants will be able to
- ▶ explain how microscopy and thin film characterisation are commonly used in the semiconductor, manufacturing, and coating industries

- ▶ understand the working principles and differences of various microscopes and thin film characterisation tools for an effective failure analysis

- ▶ demonstrate an understanding for a) various types of microscopes (such as optical and electron microscopes) and recognise the relationship among magnification, resolution, and depth of field for an effective imaging; b) various thin film characterisation tools (such as ellipsometer and four-point probe) to obtain important properties of thin film or coating

WHO SHOULD ATTEND?

Engineering or technical personnel who are interested to learn about microscopy and thin film characterisation tools for failure analysis.



Introduction to Vacuum and Plasma Technology

Ever wondered how vacuum and plasma systems work?

Find out for yourself through this introductory course where you will learn about vacuum and plasma technology commonly applied in the semiconductor, electronic, and manufacturing industries. The knowledge and skills gained through this course can be applied to optical coating, IC chip fabrication, 5G, Internet of Things, and more!

Participants will also get the opportunity to participate in hands-on sessions using the MKS training system. This will allow for a better grasp of the working principles and applications of vacuum and plasma technology for processes such as thin film deposition and wafer fabrication.

LEARNING OBJECTIVES

- By the end of the course, participants will be able to
- ▶ provide explanation on vacuum and plasma, their benefits, and applications in the manufacturing industry
 - ▶ understand the working principles of vacuum and plasma technology
 - ▶ operate and calibrate vacuum systems, both hardware and software
 - ▶ deposit copper thin film using MKS sputtering training system

WHO SHOULD ATTEND?

Engineering and technical personnel interested in understanding the vacuum and plasma systems.



TRAIN, UPGRADE & RESKILL with SSIA

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.



MICROSCOPY AND THIN FILM CHARACTERIZATION FOR FAILURE ANALYSIS (1 DAY)



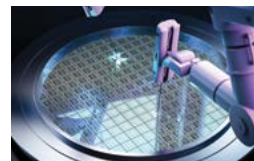
INTRODUCTION TO VACUUM AND PLASMA TECHNOLOGY (1 DAY)



INTRODUCTION TO INDUSTRIAL FAILURE MODE AND EFFECTS ANALYSIS (FMEA) (1 DAY)



IOT FOR ELECTRONICS INDUSTRY (1 DAY)



WAFER FABRICATION IN SEMICONDUCTOR INDUSTRY (3 DAYS)



DATA ANALYTICS FOR ELECTRONICS INDUSTRY (1 DAY)



ROBOTICS OPERATION AND ADAPTATION (3 DAYS)



MACHINE VISION AND PATTERN RECOGNITION IN ADVANCED MANUFACTURING (4 DAYS)



SEMICONDUCTOR PROCESSES (2 DAYS)



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Learn how to prepare and facilitate highly effective presentations and pitches to capture, engage and persuade your stakeholders to action. Through a highly interactive online workshop, and through demonstrations, role plays and feedback, you will learn to develop and conduct the perfect pitch - and increase your chances of winning in the boardroom, in person or virtually, and even at home.



Check out [SSIA website](#) or scan the QR code for full list of events, training and courses. Or contact Cindy Chong at cindy@ssia.org.sg.



SSIA Welcomes New Members



LEWE ENGINEERING PTE LTD



Semiconductor Women's Forum Returns for Second Edition – Celebrating Diversity and Inclusion, and Women in Semiconductor and Electronics Industry

SSIA presented our first 2022 hybrid event on 10 March, with more than 700 onsite and online guests from over 100 multi-national corporations, SMEs, academic and government entities attending the second edition of Semiconductor Women's Forum.

Ms Gan Siow Huang, Minister of State, Ministry of Education & Ministry of Manpower graced the event as Guest of Honour and was part of a panel discussion on “Making a Difference – Towards an Inclusive and Sustainable Ecosystem”. The half day programme also presented multi-faceted perspectives from industry leaders, supported by government agencies, reinforcing support for women in our industry, and pledging an industry-wide commitment to a diverse workforce and inclusive workplace culture.

Semiconductor Women's Forum brought together our industry's brightest minds to exchange ideas, learn best practices and inspire one another. Towards an objective of becoming stronger together to achieve even more, this is one of SSIA's initiatives to boost the sector's positioning as a **career of choice** for new talents to come onboard, and existing ones to stay and thrive.

Trends have shown more female talents joining our sector. One

example is through SSIA and WSG's **Career Conversion Programmes**, with a 7% increase in female jobseekers joining the industry over the past three years. Separately, in collaboration with e2i and WSG, SSIA launched a **Semiconductor and Electronics Job Portal** in Q4 2021.

gender parity, was a **#BreakTheBias pledge** campaign, jointly presented by SSIA and industry partners.

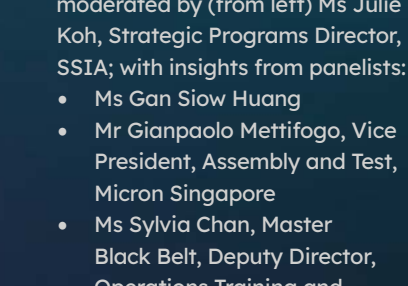
Another effort towards an inclusive society, SSIA also decided on **social gifting** to add another purpose to this year's event. The collapsible cup and handcrafted coaster sets included mosaic creations by Gareth, a teenager with autism undergoing home therapy through art creations.



With that, and the ongoing momentum with Semiconductor Women's Forum, SSIA took the event as an opportunity to strengthen ongoing **collaboration with e2i**, by committing to the following efforts towards talent acquisition:

- i. promoting workforce diversity and an inclusive corporate culture
- ii. providing industry-based career coaching service to attract more talents; and
- iii. organising more training to better position job seekers and switchers in job placement efforts.

This year's Semiconductor Women's Forum continued to see strong support from in and out of the industry. A new segment this year, from a broader perspective towards



- 6. *Our Focus on People – People Make The Difference* by Ms Caryn Lim, CEO, e2i
- 7. *Making a Difference – Championing and Empowering Change* by Ms Yvonne Lee, Site Leader and Corporate Director, Global Operations, ASM Singapore
- 8. *#BreakTheBias - Checking Your Blind Spot* by Ms Sylvia Chan
- 9. From left: Mr Andrew Chong, SSIA Chairman | Ms Gan Siow Huang, Minister of State, Ministry of Education & Ministry of Manpower | Mr Ang Wee Seng, SSIA Executive Director

*Not photographed: *Building a Culture of Inclusion and Diversity* by Ms Antoinette Hamilton, Global Head of D&I, Lam Research (who presented her segment virtually)

Like tiles that gel together to make this mosaic coaster, we acknowledge every one of us is different. Yet, together we bond to create a beautiful piece of work. Supporting one another to stand taller, towards growth and strength!



Making a Difference for ALL – Diversity, Equality and Inclusion





Semiconductor Women's Forum 2021 panel discussion

SSIA's D&I Journey – From the Perspective of Secretariat Julie Koh

Could you tell us how and why Semiconductor Women's Forum was conceived, and into its second edition, how has the initiative changed/not from its initial notion?

Talent development has always been a key focus for SSIA and female talents are an important group to attract, retain and grow in the semiconductor industry. Semiconductor Women's Forum was inaugurated in 2021, where inspiring and accomplished women leaders were invited to share their career journeys and insights on D&I.

and career journey, but also convene prominent male industry leaders who advocate diversity, equality and inclusion. Not forgetting students and fresh graduates who are the future of our industry.

What were the highlights of Semiconductor Women's Forum 2022, from planning, making it different from 2021's, challenges of making things happen and its fruition, both learnings and opportunities?

For SSIA events, we always strive to make each event bigger and better. This edition of Semiconductor Women's Forum is important to raise the awareness of embracing Diversity, Equality and Inclusion, projecting a common voice for the industry that we support a diverse workforce with inclusive workplace culture, and welcoming talents to join us in the semiconductor and electronics industry. This year, in collaboration with International Women's Day 2022, we also did a #BreakTheBias pledge collectively as an industry. I was personally involved in garnering the support and materials from partners, and I could feel the passion and commitment from all of us involved.

Being a woman in semiconductor for so many years, having seen the industry through its many phases, what would you say are the biggest changes and developments for women in semiconductor and engineering? How about challenges that continue need resolving/addressing by the industry and leaders?

I have literally grown up and matured in the semiconductor industry. Back in the early 90s when I first started my career in this



Julie among her Micron colleagues at Micron Women's Leadership Network 2018 Summit in Japan – The Power of You

industry, female engineers are far and few, let alone finding female managers whom we could see as role models. However, semiconductor industry offers equal opportunity for all talents, so long as we work hard and have a growth mindset, opportunities are abundant.

Through the years, engineering schools have observed significant increase in female student intake - which is surely a sign that more female talents are to be joining the industry. However, more can be done to engage, attract and further develop the female talents.

I personally feel the challenge to overcome is changing perception or bias that female talents may not be suitable for certain roles in our industry. From my own experience, starting out as a Process and Equipment Engineer as a fresh graduate back then, the training and execution on the job did not differentiate between male and female engineers. In fact, I believe female engineers tend to be more meticulous and are able to observe minor details. We are equally suitable for roles the men can handle!

Another challenge female talents often face is work-life balance

between career and family. At different phases of our career and personal life, one will always need to adjust and strike a balance. My advice is to have open conversations with supervisors, as I have found mine to be more supportive than we can imagine.

Talent retention and development are priorities now. What are your top/three advice for:

- woman talents in the sector (motivating them to stay on)?
- new female talents who are considering joining our sector (inspiring them to take their step in)?

For women talents who are in the sector, lean in. At times we tend to over-think about the situation. Discuss issues with your supervisors and peers, often there are solutions that we tend to believe is not possible. Support is often there when we discuss it openly with our supervisors.

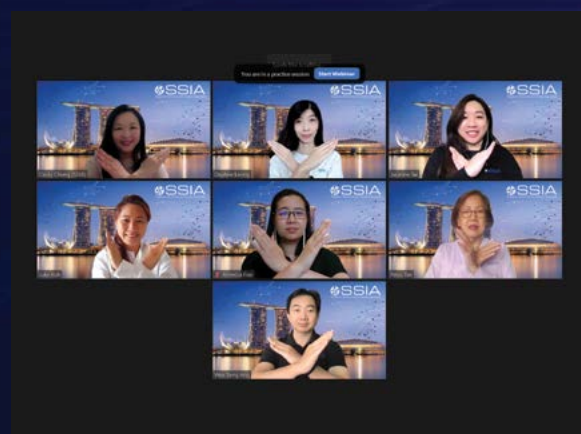
For potential talents considering our sector, we are one industry that provides equal opportunity and strong fundamental training for employees, thus join and experience the growth and inclusive culture.

Lastly, how do you see SSIA's role in driving diversity and inclusion in the Singapore semiconductor scene? With and beyond initiatives like the Semiconductor Women's Forum.

Semiconductor Women's Forum is the platform to raise awareness of diversity and inclusion, engaging the industry and talents to come forward to render support. Companies are encouraged to share their journey and celebration of D&I, to motivate and progress as an industry. SSIA has always put focus on building our network, community and the ecosystem, so that initiatives can be sustainable, and our results can grow from strength to strength. SSIA is also a staunch supporter of other D&I initiatives, such as for the Society of Women Engineers (SWE) which launched its Singapore chapter last year.



Society of Women Engineers inaugurated Singapore's chapter in 2021



SSIA Secretariat's #BreakTheBias pledge for Semiconductor Women's Forum 2022

For Semiconductor Women's Forum 2022, the theme is *Making a Difference – Towards an Inclusive and Sustainable Ecosystem*. We not only bring together female industry leaders and entrepreneurs who pull their own weight in this industry to share their experiences


CONTRIBUTED BY
JULIE KOH
 Strategic Programs Director

 Singapore Semiconductor Industry Association

SSIA and Partners Pledge Commitment to

#BreakTheBias

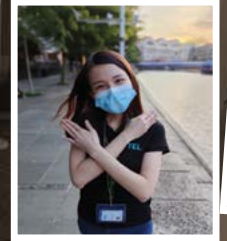
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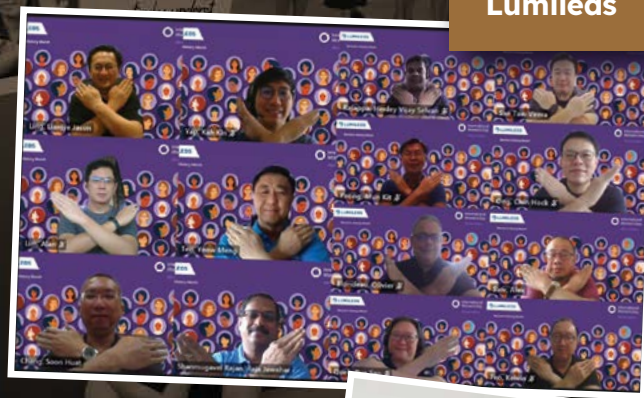
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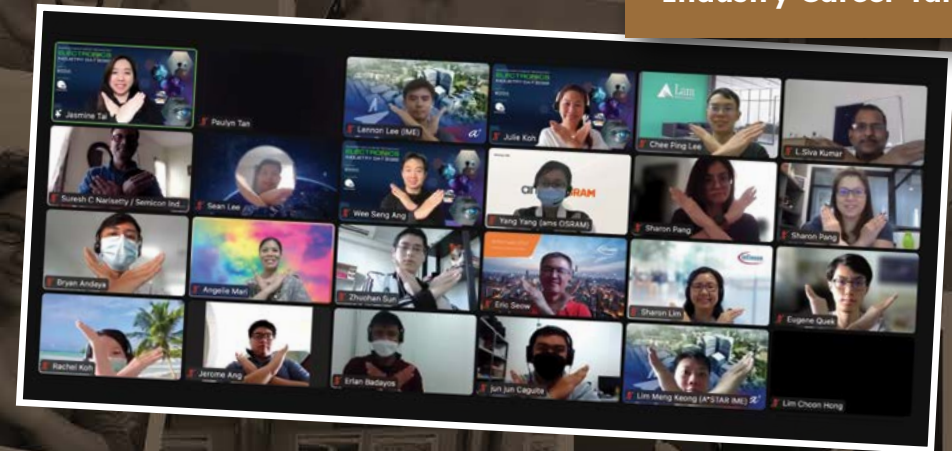
Swagelok



Vanguard



Industry Career Talk with IHL



UTAC



SSIA



For more pledge videos from our partners, scan this QR code

To watch the full #BreakTheBias pledge campaign, scan this QR code or visit: <https://youtu.be/nW9eH7YpJCI>



Allyship for an Inclusive Workplace

Diverse and inclusive

cultures are providing companies with a competitive edge over their peers, concluded The Wall Street Journal in their ranking of S&P500 companies for diversity and inclusion. This makes a strong case for promoting diversity, equity, and inclusion (DE&I) at the workplace.

Applied Materials South East Asia is intentional about inclusion. One way of creating a supportive and inclusive environment for everyone to feel empowered to do their best work is through allyship.

Allyship is when a person uses their position in the dominant group to support and uplift members of non-dominant groups, such as women, through public acts of sponsorship and advocacy. An ally also works on self-education and developing self-awareness.

Employees from Applied share their experiences and how they practice allyship to promote greater inclusion here in Singapore.

John Nunes, Managing Director, Asia Supply Chain Operations

Allyship begins with a willingness to embrace change.

"For me, allyship is about active involvement in the change process. Being an ally is not only modelling the values that we're trying to promote but contributing every day to making that change a reality," said John.

Being a mentor can be that first step for male leaders in allyship.

"When you have someone in the dominant group mentoring a woman or someone from a minority group, you begin to build trust and have dialogue. There's a real opportunity for a woman who's being mentored to give feedback about the impact their mentor has in the organization to demonstrate the behavior of an active ally."

He added that male leaders must recognize their privilege to impact diversity and use it to encourage other male leaders to be part of the change toward greater inclusion.

"If that group is large enough and you see it consistently across an organization, I think you would see a tipping point in terms of the change in behavior overall. It takes time and the commitment to change has to be consistent."

John encourages other male leaders to make an intentional effort to be an ally to women, pointing out that being an ally does not mean reducing the number of opportunities for other men.

"There are lots of opportunities around for everyone. Giving it to someone who hasn't had that opportunity doesn't necessarily take away anything from an ally."

“...male leaders must recognize their privilege to impact diversity and encourage other male leaders to be part of the change towards greater inclusion.”

Khai Shuen Chua, final year Mechanical Engineering student (NUS), Manufacturing Engineer Intern

During Khai Shuen's internship, her manager's commitment to mentorship and sponsorship allowed her to see the value of her work in the wider manufacturing ecosystem, gave her the opportunity to present her work to a larger audience, and connect her to the right individuals to enable success for her project.

It was the supportive environment at Applied that enabled Khai Shuen to grow as an engineer and apply theoretical knowledge she learnt in university to practical applications in the workplace, and ultimately led to her decision to join the company as a Manufacturing Engineer after graduation.

"Encouraged and enabled," was how she would describe her experience at Applied and how she plans to pay it forward as an ally for future interns.

"Encourage interns to step outside their comfort zones because there is a huge disconnect between school and work. And then, enable them by supporting and making space for them so that they know how their project contributed to the company's objectives," she said.

Khai Shuen believes that an inclusive workplace means conquering unconscious bias and stereotypes, and most importantly, being open to change.

"It's time for us to change the way we do things to enable women to succeed in a stereotypically male-dominated industry like the semiconductor industry".

"All genders are equal, and we should support each other in our collective journey to make possible a better future," she said.



“It's time for us to change the way we do things to enable women to succeed in a stereotypically male-dominated industry like the semiconductor industry.”



Ananth Jupudi, Director, Mechanical Engineer

In recent years, Ananth has seen more women taking up mechanical engineering and electrical engineering courses, and joining a career in STEM and R&D.

"This year, we had about a 50/50 split between men and women in our intern batch who were excited to join Applied," he added.

For Ananth, being an ally is multi-dimensional and can also mean recognizing when a junior staff does things better. Ananth's interaction with the interns in his department made him realize that they excelled at documentation and following procedure, which he made a point to highlight.

"I always believe that there is something to learn from everyone. Fundamentally, a man and a woman think differently, and that's a very good thing. It gives us a lot of different ways to do things."

This view stems from Ananth's own experiences as a beneficiary of female mentorship. When Ananth first joined the semiconductor industry over 15 years ago, both his mentors were capable and well-connected women who trained him from the ground up, and he hasn't forgotten the impact that left on his career.

"Women have helped me grow in the company. I am grateful for the opportunities given and feel I that I should help others. We should always pay it forward."

“Women have helped me grow in the company. I am grateful for the opportunities given and feel that we should always pay it forward.”

Our Journey to a Culture of Belonging

GlobalFoundries celebrates diversity, equity and inclusivity, and is proud to employ a multi-cultural and multi-generational workforce across our global locations, made up of more than 92 nationalities working in 14 countries. As a global establishment, GlobalFoundries recognizes and values the wide variety of cultural values, traditions, experiences, education and perspectives of our team, and the communities they work and live in. In May 2021, GlobalFoundries was recognized as one of the “Leaders in Diversity, Equity and Inclusion” by Albany Business Review, for our efforts in building a fair and inclusive business community as well as diversity within the workplace.

We are dedicated to and actively support gender equality, by paying attention to women being given opportunities in our talent pipeline, offering professional development avenues, assessing pay equity, fostering sponsorship and mentorship, and developing more family friendly policies. Over the past year, we also focused on unconscious bias and cross-cultural appreciation training for all managers.

GlobalFoundries offers customized mentoring programs, opportunities for professional development and partnerships with external educational and professional



GF Singapore employees attending GlobalWomen conference in Saratoga Springs, US, in 2019

affiliates. Our largest employee resource group – GLOBALWOMEN, carries a mission to create sustainable framework for professional development of women by working in partnership with allies to drive meaningful initiatives.



speakers such as Carla Harris, appointed by President Barack Obama in 2013 to chair the National Women’s Business Council, shared insightful ways for women to develop their career. Through this conference, I was inspired and had higher confidence and courage to step out of my comfort zone. Enrolling for an executive education program from one of the most prestigious universities in USA had also elevated my leadership skills and benefited me in many ways. In the past three years, I was able to expand my roles in GlobalFoundries to handle many advancement projects, such as Advanced Analytics and Machine Learnings. I embrace the trust from my management, and am especially thankful for the opportunities to develop myself and my career. Every day in GlobalFoundries is an exciting and fulfilling day!”

YULIA WUNYUTI, Manager, Fab 7 Yield Engineering

Yulia Wunyuti, Manager, Fab 7 Yield Engineering, shares her sentiment. “With the strong support from GF leadership, I am truly blessed to experience GlobalWomen conference in Malta, New York. This special event was attended by more than 300 GlobalFoundries women from around the world. Extraordinary



LIM SING YUN, Senior Analyst Manufacturing Finance

In GlobalFoundries, we also recognize the need for employees to strike a balance between caring for family and fulfilling career aspirations. In 2021, we made an epic move to provide all our women employees 20 paid weeks of maternity leave, a move greatly applauded by our employees since its implementation. Lim Sing Yun, Senior Analyst Manufacturing Finance, is one of the staff who welcomed this. “There is nothing quite as wearying or distressing, as brand-new motherhood. Being a first-time mother, the 20 weeks paid leave truly allows me to spend more quality time with my newborn while learning to cope with my new maternity role. There is ample time for me to recover from birth delivery and caring for my newborn. I understand my caregiving needs better in order to plan for caregiving arrangement when I re-enter the workforce. Thank you GlobalFoundries for this pro-family environment.”

At GlobalFoundries, we celebrate Racial Harmony Day every year. Employees are engaged through virtual interactive games that promote better cross-cultural awareness and inculcating us with richer understanding and appreciation for the many cultural facets. Last year, we created a rewarding experience with many employees coming together to make an upbeat OneGF video, injected with strong cultural flavors of traditional musical instruments.



Racial Harmony Picture (snapshot of music video created)

GlobalFoundries measures employee sentiment through pulse surveys. In each survey, there are Diversity, Equity & Inclusion related questions, which employees can give anonymous ratings and feedback.

We want all our people managers to hear true voices of their team members, and to take prompt interventions to improve our work culture.

By embracing diversity, equity, and inclusion as individuals and collectively as a company, GlobalFoundries and our employees share ownership in how these values are entrenched in everything we do. We strongly believe a diverse team will offer different perspectives and ideas, in turn driving innovation and business success.



GlobalFoundries is hiring. Be part of this empowering team as we position for growth in this industry that is changing the world! Visit www.gf.com/careers



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JANICE LEE

Vice President, Human Resource Business Partner APAC & EMEA



ASM Pacific Technology

Fronting & Supporting Women in STEM

ASMPT (www.asmpacific.com) is a Hong Kong-listed leading global supplier of hardware and software solutions for the manufacture of semiconductors and electronics. Globally headquartered in Singapore, our equipment and solutions help customers organise, assemble and package delicate electronic components into a vast range of end-user devices, including electronics, mobile communications, computing, automotive, industrial and LED displays.

Our people are the key differentiator, with team members in 28 countries globally. Building an inclusive, engaged and skilled global workforce is crucial to continued success. We are committed to fair employment practices, ensuring equal opportunities regardless of gender, race, age, religion, ethnicity, nationality, marital status, disabilities, or sexual orientation, with zero-tolerance for workplace sexual harassment.

Here are two of our team members sharing their experiences ...

What motivated you to step into this male dominated industry?

Puloma: My dad. He always encouraged me never to judge my capabilities on the basis of my gender or looks, despite being from India, where patriarchy runs deep. He worked in an ordinance factory so I was exposed to weapons manufacturing from young, kindling my interest in mechanical engineering. I was the only girl in my university batch, but came out as top student and most importantly, earning everyone's respect. I remember being initially so shy that I was scared to even say hello to others. Life teaches you to stand strong over time.

Shuan Pei: My parents treated all their children the same. They invested in our development and drilled into each of us that the sky is the limit. My father said: "There is nothing to fear, just pick up your courage to do it; at most, even if you failed, you did your best. No regrets!" I always remember his words when the going gets tough. I also focus on improving, and not to wallow in negative feelings. I was also fortunate that the first company I joined in the 1990s was already committed to diversity, which made a deep impression on me.



Cheong Shuan Pei
Vice President, Quality



Puloma Dwibedi
Mechanical Engineer / Enabling Technologies Group, R&D

Any role models besides your family?

Puloma: Indian-born American astronaut Kalpana Chawla. Her biography really inspired me.

Shuan Pei: My first boss who really walked the talk with diversity, always choosing the best candidate regardless; I've always aspired to be like him.

Any advice for women considering a career in the semiconductor industry?

Puloma: Hard work pays off; if you like this field, go for it, keep your head straight and keep giving your best. My experience in ASMPT has shown that all one needs is the interest, passion and the urge to keep learning more and to start innovating.

Shuan Pei: As with other engineering-intensive industries, be prepared to be committed to the hours and be willing to continuously read up and understand developments in the various scientific fields including software engineering. Be proactive in showing your value and don't be afraid of seizing opportunities to demonstrate this. Finally, cultivate very thick skin!

What does #BreakTheBias mean to you?

Puloma: The freedom to approach any decision in life irrespective of gender; every individual would then be able to contribute their fullest toward society. The most important empowerment is from the family - my five year old girl tells me she wants to become an engineer like me and make machines; I am succeeding in helping her know she can think and fly free!

Shuan Pei: Not to see people as female or male per se, but as unique individuals with potential, each able to be their 'best self'. But, if I adopt a posture of constantly feeling discriminated against, then I have already lost. Be professional regardless, focusing on facts and data, seeing obstacles as continuous learning opportunities. Lead by example, practice massive ownership and honour your promise!

Vanguard International Semiconductor Singapore



Vanguard International Semiconductor Corporation (VIS) is a leading specialty IC foundry service provider. Since its founding in December 5th, 1994 in Hsinchu Science Park, Taiwan, VIS has been achieving continuous success in its technology development and production efficiency improvement. VIS has also been consistently offering its customers cost-effective solutions and high value-added services. VIS has five 8-inch fabs located in Taiwan and Singapore with a monthly capacity of approximately 241 thousand wafers in Y2021.

VIS has continued its investment in the product development and process technology for the market needs. VIS offers a wide range of process technologies, including High Voltage, Ultra High Voltage, Bipolar CMOS DMOS (BCD), Silicon on Insulator (SOI), Discrete, Logic, Mixed-Signal, Analog, High Precision Analog, Embedded Memory, and MEMS to further help increase its foundry customers' global competitiveness.

**Passionate about technological innovation?
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Making a Difference *For All:* Diversity, Equality and Inclusion



Diversity, Equality and Inclusion (DEI) is not just about representation. At Micron, it reflects the way we do business, connect global team members and engage in the communities - a commitment to living out our vision of enriching life for all. Micron is committed to driving a more diverse and inclusive technology industry around the world. Hearing all voices, all ideas and all perspectives — being inclusive is in our DNA and core to our vision and values. We want everyone to be heard, seen and valued, no matter who they are or where they work. We inspire talent to bring their best selves to work so they can achieve their full potential. Hear from these two female engineers about how they are empowered in an inclusive working environment.



HENG ZI YUN

Equipment Engineer,
Micron Technology

Many people mistakenly believe that engineering is a field dominated by men. I was the only female engineer when I first joined the equipment

engineering team, but the number of female engineers has grown to four within a year! At Micron, all voices are equally heard. As a female engineer, I appreciate that our feedback, opinions, and suggestions are discussed and acted upon. Furthermore, supervisors and mentors are caring. They always check in, make sure that we are doing well and ensure that we can succeed. The inclusive culture at Micron makes coming to work every day a pleasure.



UMA SUBRAMANIAM

Senior Process &
Equipment Engineer,
Micron Technology

The future of engineering resides in the diversity of minds in this age of

technological revolution. By pooling diverse talents, Micron stays at the forefront of the semiconductor industry enabling the next generation of smaller, faster, and cheaper memory chips. As a woman in this exciting industry, I am glad to have started my career at Micron. My leaders have provided me with equal opportunities to learn and grow in my career. Micron's increasing representation of women in management and leadership positions shapes the environment to be more inclusive and inspiring for future female engineers.

Micron Singapore is currently hiring, find out more about the opportunities!



Check out the career opportunities at Micron.



Want to speak with a Micron recruiter? Submit your inquiry here.



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STATS ChipPAC Makes a Difference with Diversity and Inclusivity

Here at STATS ChipPAC, we are proud to be one of the largest Outsourced Semiconductor Assembly and Test (OSAT) companies. As a leading integrated-circuit manufacturing and technology services provider, we provide a full range of turnkey services encompassing semiconductor package integration design and characterization, R&D, wafer probe, wafer bumping, package assembly, final test and drop shipment to a global clientele. As a member of the JCET Group based in China, STATS ChipPAC offers a comprehensive portfolio with a wide spectrum of semiconductor applications servicing the telecommunications, consumer, automotive and other industries through advanced wafer level packaging, 2.5D/3D, and reliable flip chip and wire bonding technologies. As always we are eager for talent to join and grow with us.

We recognize human capital as one of the key ingredient in fostering innovation, resource optimization, manufacturing capacity and delivery excellence. The twin traits of diversity and inclusivity resides intrinsically in STATS ChipPAC.



We cast spotlight on **Ms Chew Lee Huang, HOD and Director in Test Operation.**

Armed with a semiconductor background, Lee Huang can readily understand and anticipate customer requirements. Nonetheless one must adapt to the working culture and be willing to take on new challenges. She said “in today’s context I see more women in engineering roles and climbing up to leadership positions. The key is to have drive and passion.” In addition, she is elated that management granted her empowerment and autonomy. This has enabled her team to engage in deep-dive problem-solving and delivering innovative



We next feature **Ms Rima Chong - a veteran employee from Malaysia**

who made her second home here in Singapore. Working all the way up when she first joined as an operator, Rima is now an established Senior Trainer with supervisory line duties. Among her duties, Rima works close with the line supervisors to ensure that newly hired operators are deployed ready and properly certified to the line. “I am grateful to the management

here for giving me the opportunity in the past 20 years to continuously upgrade myself, and it’s a joy for me to help new employees master skills and integrate into our big family. This gives me a great sense of satisfaction.”



Next up in the spotlight is Ms **Michelle Khong, a Singaporean working mother** who joined our company during the early days and is currently a manager in

Test Product Engineering. “Like many others before me, I thought this was a male-dominant arena. STATS ChipPAC assured me of my role here and provided me with opportunities to grow over the years and to take on multiple portfolios including New Product Introduction, Test Engineering, among many others. This is possible because of the strong network of support from my higher-ups, peers and subordinates. Despite the challenges and the constant juggling between work and family, I am grateful for the vast opportunities given to me.”

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Woman Engineer in Vanguard – Balancing Work and Family

Vanguard puts the spotlight on their woman engineer Ms Yang Jinghua. Ms Yang has more than 15 years of experience in the semiconductor industry, and is now a Process Integration Manager leading a team of engineers in Vanguard. What exactly has kept Ms Yang going and happy? Let's find out.

What attracted you to the semiconductor industry?

Semiconductors are the Brains of Modern Electronics and essential component of electronic devices, which lead the way for

advancement in all electronic product sectors. Products are widely used in communications, computing, healthcare, military systems, transportation, clean energy, and countless other applications. The broad application of this little chip fascinated me, and with the growth of Artificial Intelligence (AI), IoT, etc., new technologies continue to spark waves of innovation in the industry. For me this constant change and development continue to fuel me with passion and drive to stay in this industry as there are limitless growth possibilities.

What is the motivation that keeps you going in the semiconductor industry?

In the semiconductor industry you get to work with emerging technologies and highly educated people. While the industry is competitive, it also provides competitive pay and stable working environment. With the rapid advancements in the new technologies, it had rapidly boosted the consumption of electronics across the globe, thus job security is very high.

What would you say to inspire more female engineers to follow your footsteps and join the semiconductor industry as a career choice?

Semiconductor is actually a good choice for female engineers. In general, the industry pays a competitive pay, required

less to no business travel, and provides a stable work environment. A lot of female's personality traits such as circumspection, collaboration, etc, are important attributes for semiconductor engineers. I hope that I can be an inspiration to the young female engineers to join the industry in this journey of technology advancement.

How has Vanguard supported you in your leadership journey, balancing between work and family?

Vanguard provides a fair workplace where there is no bias. Any capable employees can be promoted to the right position, regardless of gender and ethnicity.

As a female engineer and mother of two boys, I am really grateful for the company's policy in supporting work and family balance. Besides providing maternity leave and child care leave, the company also offers incremental annual leave. During the COVID pandemic period, our company supports flexible working arrangements, such as WFH, staggered working hours policy, etc. Vanguard provides an environment and culture for women where we feel motivated and supported to succeed as leaders.



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Vanguard International Semiconductor Singapore (VIS)

Beginning a Journey of a Thousand Miles... With a Single Step

Annie Xu graduated with a Master of Science from National University of Singapore; and has been with Skyworks Singapore since its inception. It is remarkable how Annie has progressed her career through the years, advancing from a foundry staff engineer to become the senior director of supplier quality, and she is one of the women leaders in Skyworks. Let us hear more from her below.



A journey of a thousand miles begins with a single step. I was employee #1 at Skyworks Singapore, and I am proud to say that I have never regretted the decision to build my career in the engineering industry. I love the dynamic environment and challenges that are characteristic of this field, overcoming obstacles in order to build greater and better things. Today, I can confidently say that my work in Skyworks has been exceedingly rewarding.

Engineering is an all-encompassing field that has a huge effect on all our lives – from the TV set in your living room to the instruments used in surgery. None of those would be possible without engineering. This is precisely why the sector, which was traditionally known as being male dominated, needs greater diversity to better represent society as a whole. With this in mind, attracting female talent and retaining them is key.

As much as this is critical, we must recognize that although the

engineering industry has progressed tremendously in terms of equity, there still remains a gender pay gap, which might cause frustration and indirectly contribute to a lack of self-confidence. In the face of this, we (women) need to be confident - it is okay to say “no”; it is okay to offer your opinions; it is okay to have a real discussion with your superior.

Most importantly, it is okay to escalate your concerns to HR if you strongly feel that you are discriminated against on the basis of gender.

Of course, it is inevitable that we make mistakes along the way, but it is important to be resilient, and to learn from our errors. The experience gained from mistakes is what will bring us to the next level. Everyone’s path in life is unique – we must find our own calling, and passion will follow suit to guide us through.

All in all, I am happy and extremely proud to be part of the Skyworks family, where diversity and talents are recognized regardless of race and gender, and our goal is to connect the world through our innovative engineering.

Take the steps to your dream and start an exciting career at Skyworks! Look for opportunities to grow and develop here: <https://careers.skyworksinc.com/>

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ANNIE XU
Senior Director, Engineering



EMBRACING DIVERSITY AND EMPOWERING WOMEN

Today, SSMC has 43% of women in our workforce, representing a diverse and innovative culture. The management team is committed to empower all female workers by creating an inclusive environment. We will continue to focus on women wellness and development, breaking the gender bias to enable women to grow professionally and personally.

Did you know? SSMC is using colour coded cleanroom gowns, marking different roles in the Fab. Purple gowns are specially made to provide extra care for pregnant individuals, making them visible to receive attentions during their work duties.



Check out how we make a difference





SEMICONDUCTOR TRADEWINDS

January / February 2022

2022 has started off very strongly for the semiconductor sector and it should be a very bullish year for the industry. Revenue records have been broken yet again, and many merger and acquisition activities are underway. Analysts are predicting that 2022 will be another year of double digit growth with the tight capacity supply continuing throughout the year.

RECAPPING 2021 – A GOOD YEAR FOR SEMICONDUCTORS...

Before we look at 2022, let's have a quick look back at 2021, a year of almost unprecedented growth and new records. Global semiconductor industry sales reached a record \$555.9 billion in 2021 up 26% (Source: SIA). A record 1.15 trillion semiconductor units were shipped in 2021, as chip companies ramped up production to address high demand amid the global chip shortage. Samsung took back the number 1 semiconductor company title - lost to Intel in 2019 - after its sales grew 32% to US\$75.9 billion in 2021.

The world's #1 foundry TSMC reported record revenues for the year with US\$56.8 billion, up 25% in dollar terms, and they predict to grow 25% to 29% in 2022, planning to spend a record US\$44 billion on capex. In Q4, 50% of its revenue came from 7nm and 5nm nodes, and it plans to spend 80% of its capex this year on 2nm to 7nm technology node expansion. Other foundries

reported similar positive results as most foundry capacities are fully utilised.

For backend assembly and test providers, it is a similar story with ASE reporting record revenue up 26% to US\$12 billion in 2021, and Amkor up 22% YOY to US\$6.1 billion.

Equipment manufacturers also had a bumper year. Applied Materials reported revenue up 34% to US\$23 billion. Lithography system manufacturer ASML reported revenue up 33% to US\$18.6 billion. Both companies predict 2022 will remain similarly strong with double digit growth.

2022 has started off in similar fashion, with TSMC already reporting record monthly revenue in January and other Taiwan foundries and OSATs reporting record or near-record monthly revenues.

FAB EXPANSION CONTINUES

To address the current global chip shortage, the fab expansion boon which started in 2021 continues with

more companies announcing new Fab expansion projects in 2022.

South East Asia has benefitted strongly from the Fab expansion, with new Wafer Fab construction plans being announced in both Singapore and Malaysia. In Singapore last year, GlobalFoundries announced it would invest US\$4 billion on a new 300mm Fab at their Woodlands campus and construction is well underway. Recently UMC also announced it would invest US\$5 billion to build a new 300mm Fab next to its existing facility to manufacture 22nm and 28nm technology. Whilst in Malaysia, ams OSRAM announced last November it would build a state-of-the-art LED Fab in Kulim, and recently Infineon announced it will spend over US\$2.3 billion to build a third Fab in Kulim for SiC and GaN products. Malaysian foundry Silterra has also announced it will spend US\$150 million to increase capacity by 20% at its 200mm Kulim Fab.



Worldwide, Intel selected Ohio, USA to invest over US\$20 billion to build two new leading edge Fabs with production coming online in 2025. Toshiba announced it will build a new 300mm Fab in Ishikawa Prefecture, Japan for power semiconductors. Whilst Japanese automotive parts maker Denso has announced it will take a 10% stake in TSMC's new Japanese speciality products Fab, JASM, in which Sony is also a partner. In addition, TSMC announced that it will spend an extra US\$1.6 billion

to expand capacity and processing capability of the JASM site, taking its total planned investment in the site to US\$8.6 billion.

MERGER AND ACQUISITION ACTIVITIES

2020 was a record year for mergers and acquisitions, and 2022 has finally seen the conclusion of three of the major deals first announced in 2020. Two of the deals have finally been called off after the companies failed to get regulatory approval. NVIDIA's planned US\$40 billion acquisition of Arm Technology was finally called off after regulatory bodies in UK, Europe, USA and China had serious concerns about the deal. Softbank, Arm's current owner, now plans to take Arm public by the end of next fiscal year. Similarly Globalwafers' planned acquisition of German wafer manufacturer Siltronic was also called off after it failed to get regulatory approval from Germany in time. Globalwafers now plans to invest the US\$3.6 billion it set aside for acquisition on building new capacity both at Greenfield and expanding existing sites.

One acquisition that was successful was AMD's US\$35 billion acquisition of Xilinx after the company received regulatory approval from China and the deal closed on 14 February this year. Due to the strong appreciation of AMD's share price since the deal was first announced, the final value of the semiconductor deal was a record breaking US\$49 billion.

In new deals, Intel has announced it has agreed to acquire Israeli foundry Tower Semiconductor for US\$4.5 billion. Tower has factories in San Antonio, Texas, Newport Beach, California, and in Japan and Israel, and specialises in analog chips used in cars, mobile devices and

in industrial, medical and military sectors. The merger is expected to close in 12 months.

GOVERNMENT INCENTIVES

The European Commission has announced its planned European Chip Act to attract semiconductor manufacturers to set up plants in Europe. The act will provide US\$17 billion to support the entire supply chain, from semiconductor research and development to industry production that meet the "first of a kind" test. Like the US CHIPS Act, the bill is pending debate and approval by parliament before funds will be available.



It's been a busy start to 2022, and everything is pointing to another very successful year for the semiconductor industry with South East Asia also benefitting from new investments and new jobs in the coming years. It's good to see such a vibrant local scene, bearing testament to the regions' solid track record.



CONTRIBUTED BY

MARK DYSON

Foundry Account Director
ams OSRAM



Dr Reinhard Ploss: Sustainable Business Means Electric and Digital

It's time to bid farewell. To fire. Mastering fire was a huge step for the human race. You could say that's what we built our civilization on. But with the carbon dioxide in the atmosphere, we are paying a price for it that has become very high – too high, in fact. Our society is caught in a dilemma, yet there are ways to solve the dilemma. Technical progress allows us to produce the energy we need in a different way. Electricity is the highest quality type of energy and can easily be converted into light, motion and heat. We can generate it from renewable, climate-neutral sources like the sun, wind and water. That makes it the key to a climate-neutral energy supply that at the same time enables quality of life and climate protection.

If we want to achieve climate neutrality by the middle of the century, we must speed up the resource and technology transition. 4,200 gigawatts of new solar power are needed by 2030 – that corresponds to a fivefold increase in global capacity compared to 2020. And the installed photovoltaic capacity worldwide needs to be increased by as much as a factor of twenty by 2050. That requires a global effort.

We can use electric power to make use of energy sources like green hydrogen or ammonia, which can be generated with solar and wind power and, if necessary, also be converted back into electricity. That makes it possible to also store electricity on a large scale. Basically, we are copying what nature has been able to do for a long time, except on a much larger scale and without CO2.

As a result, we will also be able to decarbonize energy-intensive applications like ship and truck drive systems, and significantly reduce the CO2 emissions of key technologies such as steel and cement production.

To exploit the full potential of electrification, the green conversion must go hand in hand with a digitalization strategy. Digitalized networks, so-called smart grids, can better coordinate power generation and consumption. Sensors enable smart and energy-saving control of building technology – with a high level of convenience. Connected electric vehicles optimize the flow of traffic. Automation in Industry 4.0 saves resources and reduces energy consumption.



The goal of climate neutrality cannot be achieved without innovations. Almost half of the required emission reductions by 2050 depend on technologies that we already master today, but still

need to be developed further to be applied on the gigantic scale that is needed. But we also need a whole range of new ideas, which is why we appreciate it when the European Union supports further research and cooperation between companies in climate-relevant industries. That also includes the semiconductor sector, which is a key industry for the generation and management of electric power and digitalization.

Semiconductors play a central role in the energy transition. They help generate green electricity, and transport, use and store it efficiently. Every chip built by Infineon already saves on average 30 times more CO2 emissions than were needed to build them. New base materials such as silicon carbide and gallium nitride minimize heat losses in semiconductors by half compared with silicon chips. That not only reduces wasteful energy loss in power units, for example, but also increases the range of electric vehicles, and raises the voltage equalization in solar and wind power plants to a new level of efficiency.



The goals have been set and everyone is aware of them, so now it's time to stop talking and start doing. We shouldn't now get lost in the detail of the various challenges and outdo ourselves with targets. The saying – the path is the goal – has never been more appropriate. It's a matter of not losing sight of the bigger picture in relation to society as a whole and, as a company, delivering system solutions that provide real benefit for the users.

For that we need courage and truthfulness. We will only achieve the ambitious goals if we get going and adapt as soon as we recognize that the path we have chosen is the wrong one. We can also learn from nature in this respect. Evolution shows us how successful we are when we adapt and abandon approaches that are unsuccessful. We can do it better, but it won't work without the composure to fail and the absolute determination to shape a future worth living for people. Part of this future is to shape an intact environment.



CONTRIBUTED BY

DR REINHARD PLOSS
Chief Executive Officer
Infineon Technologies AG



Increase Capacity with ZERO Capital Expenditure

Demand for semiconductors is on the rise as ‘intelligence’ is embedded into more things. It is therefore not surprising to see the push to add capacity. That however requires additional capital and will take longer to deliver. Is there a faster way? Increasing asset utilization via improved practices like predictive maintenance is an option. What follows is a live case study where AccuPredict is working with a customer to deliver an estimated incremental 10% output.

Predictive Maintenance is a system that is unfortunately better known in theory than seen in practice! Since the early sixties, theory of equipment failure has been well-researched and books have been published on the topic. So, what holds back implementation? Two big barriers are Cost and Skills. In the past, sensors and low noise cabling were very expensive and hard to maintain on the shop floor. The development of skills took years and that made it challenging for organizations to invest in.

Things have changed in recent years. Availability of Wi-Fi based low cost sensors coupled with virtually unlimited cloud storage and compute capacity has helped cut the Gordian Knot. In one stroke this eliminates the need for expensive cabling as well as the requirement to invest in a Centre of Expertise. Sensors are screwed or glued near critical bearings and transmit

the vibration signal via routers to the cloud. Algorithms running on cloud-based servers process the data to draw conclusions on the state of the equipment including emerging failures and their causes. These are reviewed from a remote location by engineers with deep expertise in machines and the corrective action is communicated to the customer. (See Figure 1 for the schematic of information flow).

There are inherently two approaches to predicting emerging failures. One school of thought pays homage to the growing sophistication and capability of Machine Learning algorithms to do the prediction. It relies on matching historical patterns of data to build failure models. In contrast, AccuPredict relies on the deep expertise of our engineering team in machine fundamentals to make accurate predictions on what component is failing; the cause; as well as the Mean Time to Failure (MTTF). To do this, we parse the vibration spectrum to scrutinize

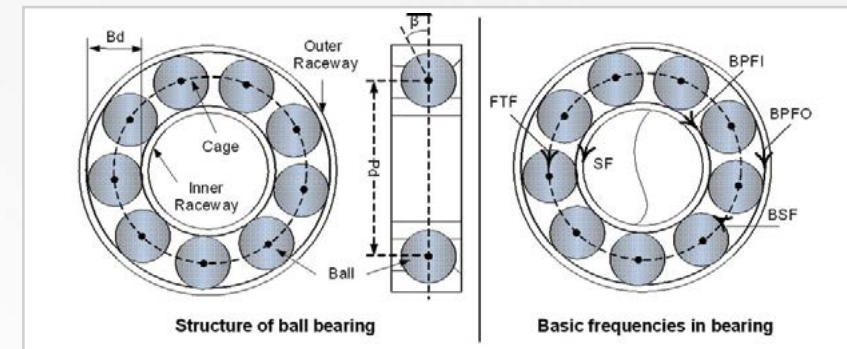


Figure 2: Frequencies emitted by a rotating ball bearing

frequencies where peaks are occurring and then associate these with the failing component. This is akin to a spectroscopic analysis of a compound where a line at a particular frequency is a definitive indicator of the constituent element. Here is an example of vibration signals from a bearing (Figure 2).

The bearing type and model defines the frequency and hence can flag emerging failure. The advantage is that there is no dependence on historical data. Just as a doctor examining an ECG of a patient does not need to also look at historical reports, our engineers can make their prediction purely using ONE data point.

We had an opportunity to demonstrate the efficacy of our approach when a Fortune 100 Global Corporation commissioned us to run a pilot at one of their manufacturing sites. This was a high speed manufacturing line making finished product at speeds higher than 700 units per minute. On a very profitable product, every minute of lost production severely dents their bottom line. Significant waste is generated at startup and shutdown of the line adding to the loss.

Working with the engineering team, we picked 50 sensitive points for installing sensors and started

the monitoring process. Our team commenced reporting emerging failures from Day 1. Initial corrective actions we asked them to undertake were as simple as tightening foundation bolts to the right level of torque using a torque wrench and not relying on human judgment. Likewise, impellers were rebalanced at the operating RPM reducing vibration. Further, left to themselves mechanics lubricate bearings by adding as much grease as the bearing will take. This only causes the rolling elements to stop rotating and start sliding causing accelerated failure. All these are simple practices of maintaining equipment that are often forgotten in the hurry to keep equipment running.

At the end of the first six weeks of the pilot, the plant reported an improvement in reliability of 5.6% (66 Hours lost time avoided in 147 shifts). This is a whopping gain of capacity without a single dollar of CAPEX spent and paid back the additional expense of our service many times over. By carrying out the recommended actions immediately the engineers improved the MTTF of the problem components. Of the 50 sensors, as many as 40 (80%) reported MTTF >200 days, while 18 (36%) had MTTF >100 days and ONE sensor had a MTTF >30 days. Emergencies became a thing of the past as anyone with experience of

working on the shop floor can only imagine! Moving forward they will focus on reducing spares inventory.

The team’s joint focus is on delivering an additional 4% capacity in the next phase. This is by improving performance of the special purpose machines they use. If a well-run Global Corporation’s operations can squeeze out 10% additional output with not a cent CAPEX spent, imagine what your operations could do!

This was just one example among several about the significant opportunity that exists to wring additional output from existing assets. Predictive Maintenance is a much overlooked tool to enable improvement in capacity utilisation.

AccuPredict Services Pte Ltd is an innovative Singapore-based startup offering remote Predictive Maintenance Service. We are also a Supporting Partner for the Singapore Semiconductor Intelligent Manufacturing Framework (SIMF) Please check <https://accupredict.io> for additional details.

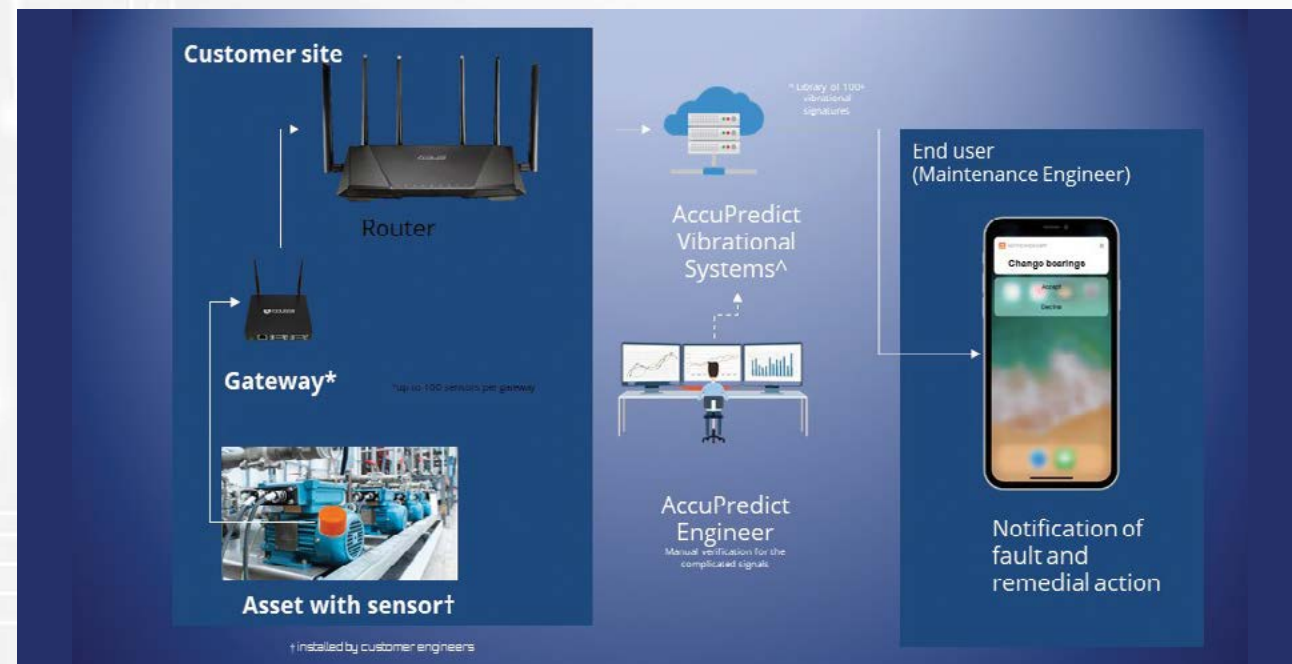


Figure 1: Information flow in a remote predictive maintenance system

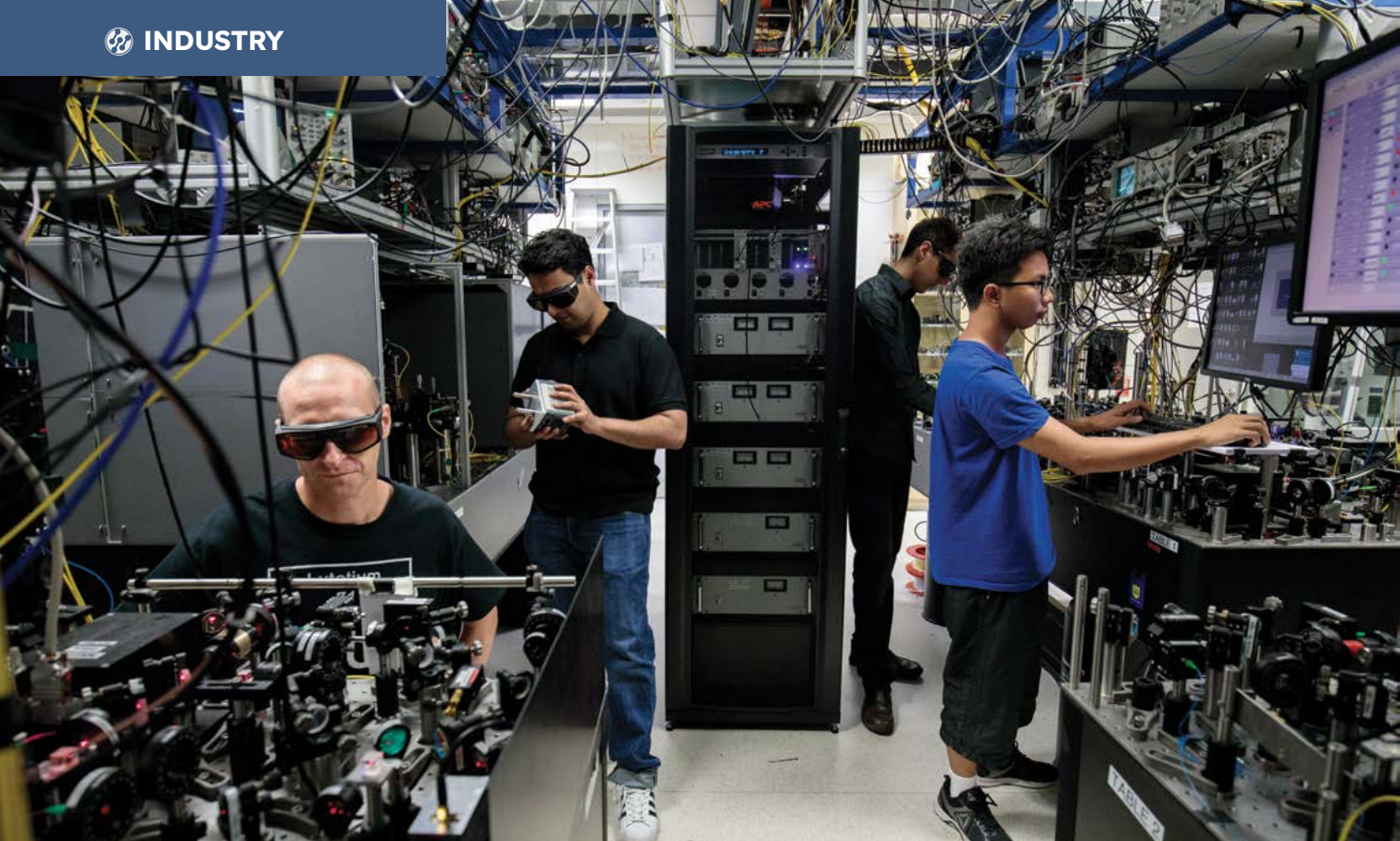


CONTRIBUTED BY

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ACCUPREDICT
MACHINES RUN FOREVER



In this laboratory at the Centre for Quantum Technologies, researchers are building a novel atomic clock to measure time with unprecedented precision. The Quantum Engineering Programme is funding the team to miniaturise some of the clock components to significantly reduce the complexity and overall size of the system seen in the background.

Take a Quantum Leap for New Market Opportunities

The future of microelectronics will be shaped by a global race underway to commercialise a new generation of quantum technologies

By some estimates, the emerging technology of ‘quantum computing’ will create hundreds of billions of dollars in value each year in the decades ahead. Who is going to claim a share? There is now an early-mover’s advantage for semiconductor and electronics manufacturers to enter the fast-evolving quantum supply chain.

The market opportunities reach beyond quantum computing, too.

Quantum computing is a new way of processing information that has become possible thanks to precision tools for controlling matter and light at a microscopic level. Other technologies advancing thanks to these same tools include atomic clocks, sensors, and communication devices, which offer gains in sensitivity, efficiency and security. It is sometimes called a second quantum revolution.

The first quantum revolution, based on understanding the quantum behaviour of bulk materials, delivered the transistor, laser and technologies such as magnetic resonance imaging. The new wave

of technologies depends on control of quantum states down to the level of individual atoms and photons, the particles of light.

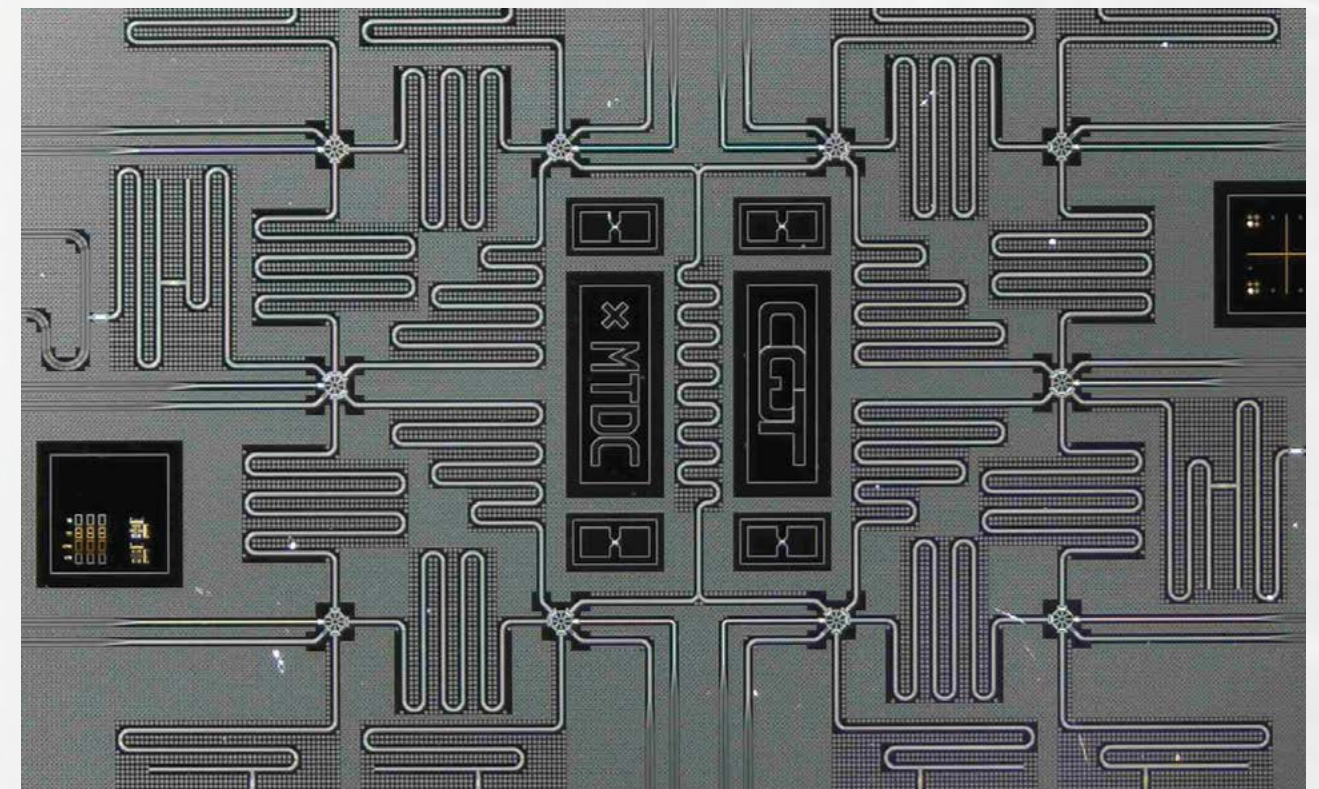
To bring these technologies out of research labs and into the market, and to make commercial products more affordable, there is demand for enabling technologies such as cryogenic analogue and digital electronics, low temperature digital processors, precision microwave and radio-frequency circuit design, heterogeneous integration of optics and electronics and innovative packaging. Foundries may even make the quantum processors themselves.

The Singapore Semiconductor Industry Association will host a webinar by the Centre for Quantum Technologies (CQT) at the National University of Singapore on 28 April 2022 for interested members to learn more about this growing market.

Quantum computers are tipped to be disruptive for industries from healthcare to logistics, providing powerful computational techniques for certain kinds of problem that strain today’s supercomputers, such as modelling molecules or materials and optimising logistics of supply chains. They are in development at multinational companies including IBM and Google, as well as by start-

ups and in research labs worldwide. A recent survey of 110 decision-makers at high-performance computing centres found that 71% expected to have on-premises quantum computers by 2026.

Today’s quantum computers have demonstrated their power on toy problems, where they showed they could outperform a supercomputer, but have not yet hit this same milestone for useful problems. Quantum engineers are working to scale up and improve control of the ‘quantum bits’ in the different quantum computing platforms being trialled. Leading platforms are superconducting chips and trapped



This is a close-up of a quantum computing chip designed and made in Singapore, with aluminium circuits deposited on silicon. The circular shapes enclose 10 superconducting quantum bits (qubits) that can process information in a wholly different way to today’s computers. Where conventional computers process bits that exist as either 0 or 1, quantum computers work with qubits that can exist in a superposition of 0 and 1. Researchers from the Centre for Quantum Technologies collaborated with the Microsystem Technologies Development Centre (MTDC) at Nanyang Technological University and E6 NanoFab at the National University of Singapore, to fabricate this device.

SSIA x NUS CENTRE FOR QUANTUM TECHNOLOGIES WEBINAR

Thursday, 28 April 2022 | 4pm

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ions, while other approaches such as photonic chips show promise too.

Photonic chips are also being developed for quantum communication. It is possible using quantum communication to create shared encryption keys that are resistant to computational hacks, offering powerful security for networks. In the future, there may also be novel applications for a quantum internet that integrates quantum computers and sensors too.

Companies that build up expertise and capabilities in making such enabling technologies may find they are, to borrow an analogy, selling shovels in a gold rush.

Singapore has invested in research in quantum technologies since the early 2000s, building up local capabilities. The QuantumSG community website highlights 48 research groups working in quantum-related areas across the island today. CQT, founded in 2007, hosts 25 of these groups and has some 180 staff and students. It has a foundation in basic science, with outcomes that reach to spin-offs.

Most recently, in 2018 the National Research Foundation launched the Quantum Engineering Programme (QEP) to apply quantum technologies to solving user-defined problems. This programme is investing \$121.6 million

in R&D and ecosystem building. Under QEP, some teams of scientists and engineers that have custom-built, complex proof-of-principle experiments in their research laboratories will receive support to bring their devices closer to commercialisation. The devices need to become more compact, robust and cost-effective to manufacture. For example, key components of an atomic clock can be designed in an integrated chip. QEP also supported a project to manufacture in Singapore a superconducting quantum computing chip (see pictures on the previous pages).

SSIA members may participate in the upcoming webinar to learn about more opportunities ahead. The session will include talks presented by CQT Director José Ignacio Latorre and CQT Principal Investigator Manas Mukherjee.

QUANTUM DISRUPTION by José Ignacio Latorre



Quantum technologies have achieved control of individual elements, such as single electrons, atoms and photons. It follows that new instruments can exploit the properties of quantum mechanics in a controlled way. Industry will

progressively develop an advanced generation of quantum devices in the fields of sensing, communication, and computing.

TAKE A QUANTUM LEAP INTO NEW MARKETS: OPPORTUNITIES TO DEVELOP QUANTUM FOUNDRIES

By Manas Mukherjee



Substantial investments are being made around the world in building quantum computers with different kinds of hardware. This is creating demand for enabling technologies such as cryogenic analogue and digital electronics and precision microwave and radio-frequency circuit design. Other quantum technologies such as sensors may use such products too. We will explore the emerging market opportunities for semiconductor and electronics manufacturers in the quantum supply chain and discuss local initiatives to develop the quantum ecosystem.

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CEI Pte Ltd - An AEM Company

In July 2021, CEI Limited joined AEM Holdings. AEM is a global leader in application-specific intelligent system test and handling solutions for semiconductor and electronics companies serving the advanced computing, 5G, and AI markets.

CEI was listed on the main board of the Singapore Exchange Securities Trading Limited in March 2000. The Company was subsequently de-listed in July 2021 after being an AEM Company and renamed to CEI Pte Ltd.

Headquartered in Singapore with manufacturing sites in Singapore, Batam (Indonesia), Ho Chi Minh City (Vietnam). The Company provides printed circuit board and box-build assembly, cable harness assembly, equipment build and manufacturing services. It is well equipped to provide value-added services such as materials management, circuit layout, prototype & engineering.

The Company serves customers in the industrial equipment market segment. These include electroluminescence displays used in industrial, transportation and medical applications; medical and health care equipment; office equipment as in digital photocopiers; analytical instruments as in gas and liquid chromatographs and measurement instruments; Aerospace products, Oil and Gas; industrial safety controllers and environmental sensors, semiconductor equipment and SMT equipment.

The Company is ISO9001, ISO13485, ISO14001, AS9100, Nadcap, UL508A and UL817 certified.

<http://www.cei.com.sg>

<https://aem.com.sg/>



CEI is a valued EMS partner to many Fortune 500 corporations and leading technology companies.

Our focus is on high-mix, mid-to-low-volume contract manufacturing services and equipment integration.

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SSIA Singapore Semiconductor Industry Association

human capital leadership institute

WELCOME!

Webinar by Professor Arnoud De Meyer

Title: **Ecosystem Edge for the Semiconductor Industry**

Ecosystem Edge for the Semiconductor Industry: Sustaining Competitiveness in the Face of Disruption



The semiconductor sector constitutes one of today's most important industries, providing essential technology that powers the modern digital world. As the demand for semiconductor innovation and microchip increases globally, there is a need for companies at all ends of the design-manufacturing chain to work hand-in-hand. To maintain the industry's long-term strength and resilience, and to ensure a steady talent pipeline to spur industry-wide innovation, it is also important for companies to collaborate closely with various stakeholders in the ecosystem, including government agencies and academic institutions.

In this webinar jointly organised by SSIA and Human Capital Leadership Institute (HCLI) on 11 February 2022, Professor Emeritus Arnoud De Meyer shared key insights from his book, *Ecosystem Edge: Sustaining Competitiveness in the Face of Disruption*, co-authored with Professor Peter J Williamson.



Emphasising the importance of being a part of a dynamic ecosystem of partners and drawing from case studies in the semiconductor industry, Professor De Meyer shared with the thirty participants who attended, strategies, structures and capabilities that are required to harness the power and advantages of ecosystems for competitive success. As the case studies illustrated, successful implementation of these ecosystem strategies could help leaders unlock rapid innovation, tap into new sources of value, create synergies across products, markets, and functions, and practise organisational flexibility to meet the challenges of today and the future.

ABOUT THE SPEAKER

Prof De Meyer is an internationally recognised researcher and thought leader in the areas of R&D and Innovation Management, Manufacturing Strategy, and International Management. A global academic leader with more than 35 years of experience across Asia and Europe, Prof De Meyer concluded his stint as the longest serving President at the Singapore

Management University in 2018 and continues his work at SMU as a University Professor at the Lee Kong Chian School of Business. Before joining SMU, Prof De Meyer was Dean of the Judge Business School at the University of Cambridge, and held multiple leadership positions at INSEAD's Asia campus. He has served as a director on many boards in Belgium, France, Australia as well as in Singapore. He is currently the board chair at Temasek-sponsored Stewardship Asia Centre and has served on HCLI's board since our founding in 2010.



ABOUT THE HUMAN CAPITAL LEADERSHIP INSTITUTE

The Human Capital Leadership Institute is a centre of excellence that facilitates the acceleration of leadership development

and strategic human capital management capabilities in Asia. Through its efforts, HCLI aims to develop global leaders with a strong understanding of leading in Asia, as well as to strengthen the ability of Asian leaders to lead on the global stage. The institute achieves this by creating Asia-specific research and insights, providing industry relevant executive development programmes and fostering rich networks between thought leaders in business, government and academia.

HCLI is a subsidiary of Temasek Management Services, which is wholly owned by Temasek Holdings (Private) Limited, and is supported by the Singapore Ministry of Manpower and the Singapore Economic Development Board.

For further information, please visit www.hcli.org.

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Redefining Supply Chain Management Through Digital Transformation

Digital transformation promises businesses the speed to market and higher performance. In SCM (Supply Chain Management), it gives manufacturing a greater competitive advantage through increased transparency and efficiency.

How digital transformation is linked to SCM is the improved connectivity throughout the entire supply chain. With the emerging Industry 5.0 – a future between man and machine, we will see a rise in smart factories and a change to existing business and supply chain models. Real-time monitoring in manufacturing environments gives humans the flexibility to coordinate with production machines and equipment easily – anytime, anywhere.

Cross-enterprise supply chain network enabled by Digital Continuity in high-tech industry production

The application of statistical methods – which were previously applied exclusively in process engineering to meet quality criteria – are now very useful at a business level to increase efficiency in decision making: Delivering in quality, in time, and in quantity, boosting the term “smart manufacturing solutions” in a new direction. With the right solutions, suppliers will be recognized as a highly reliable and trusted partner in the supply chain.

When five becomes one

Many have heard of Elisa Corporation with its telecommunication roots going back to the 1880s. Its brand “Elisa IndustrIQ”, however, has an entirely different beginning, and its focus is on seamlessly integrated intelligent manufacturing solutions. Early in 2021, Elisa acquired the German-based camLine Group and CalcuQuote based in US state Texas. camLine is a leading software solutions provider for high-tech and semiconductor industries, whereas CalcuQuote is a quoting and supply chain software vendor for electronics manufacturing companies. At the same time, Elisa also became a minority shareholder of Italian-based smart manufacturing company, called sedApta Group. Later last year, Elisa further continued its growth and joined forces with TenForce, a Belgium-based industry software vendor helping manufacturers improve their EHSQ (environmental, health, safety, and quality) performance. This concentrated competence is now unified under the brand “Elisa IndustrIQ”.

Reliability and agility: digital transformation under the notion of “Digital Continuity”

“Reliability” and “agility” are key demands in the future. The goal is to significantly increase the proportion of flexible capacities by implementing standardized process subsections that can be effectively implemented at all production sites. Any strategy of change towards digital transformation must be guided by what leading market analysts subsume under the powerful term “Digital Continuity”. It is the critical enabler for smart manufacturing and new business models where everyone is able to work on a given product or design to view the exact same version of data. Digital Continuity reconnects information silos. What we aim for Digital Continuity is to carry on the same data beyond production and to further the whole supply chain creating a non-disruptive environment where the shared data can go back and forth between different departments or even enterprises. Seamless communication can be achieved through data integrity.

From MES to MOM

Baseline for the “next big thing” is the extension of traditional MES approaching to MOM (Manufacturing Operations Management). MOM includes a range of capabilities located in production management including quality control and materials management. It also encompasses logistical concerns such as platform security and staff scheduling. While the primary purpose of MES is to monitor and manage capacities and to optimize the day-to-day processes inside a facility, solution provider such as camLine is maneuvering itself towards a broader scope – MOM. Today, higher expectations are put beyond monitoring extending its focus also on the controlling tasks of operations. MOM is linked to more global business concerns including overall supply chain efficiency or cross-site productiveness. MOM, in the context of Digital Continuity, copes with increased and multi-site capacity in a shortened amount of time, rather than single-site MES generally focuses.

Advanced Statistical Process Control solution with flagship LineWorks SPACE and beyond

LineWorks SPACE is a software product of camLine. It consists of individual modules that you can implement individually or together with ERP / MES / MOM depending on your requirements and desired approach.

camLine also provides solutions that have its own task focus with special vertical integration. The core modules focus on quality assurance, process integrity, manufacturing logistics including traceability, and OEE (Overall Equipment Efficiency). Powerful reporting functions including a manufacturing data warehouse for all plants and a versatile integration layer for plant connectivity complete the system to an open and agile infrastructure solution as the heart of Industry 4.0 and beyond.

Today, camLine offers quality assurance solutions expanding beyond your production and interactively to the entire supply chain. The incoming quality can be controlled with LineWorks SQM (Supplier Quality Management) even before shipment. A digital version of COA (Certificate of Analysis) allows transparency of quality data and saves the cost of inspection at IQC (Incoming quality Control). For each of your finished goods, LineWorks CQM (Customer Quality Management) automatically generates digital COAs in real time comprising collected quality data from your production site and its supply chains.

Meanwhile, the black box of equipment parameters are unveiled through LineWorks RM (Recipe Management) so that the product can go through the right process recipe on the right equipment following the right process flow.

LineWorks MMS (Machine Management) Solution emerged from the fine-granular monitoring of plant efficiency and utilization. With respect to logistics, tracking and tracing of your goods can be extended to each node of the manufacturing process.

Here, you can retain all the flexibility you need, to combine, replace, and control manual, semi-automated and fully-integrated manufacturing processes for the creation of semi-finished and finished goods. All these solutions point to Digital Continuity where data is always integrated, available, reachable, and reliable at all times.

Implementations of camLine solutions can be found primarily in Europe, Asia, and North America in the semiconductor and electronics industries, as well as in medical technology. The solutions have no industry-specific characteristics, which offers many advantages for individual implementations. camLine understands each and every customer’s language and configure the right solution to their needs accordingly.

Container Distribution Management for chemicals

Let’s say LineWorks SQM (Supplier Quality Management) is designed to monitor, track, and trace the complete supply chain quality data. LineWorks CDM (Container Distribution Management) adds charm to its glamour. For your facilities, all materials – such as gases, liquids, or other chemical materials – are gathered from stock to distribution cabinets and equipment.

LineWorks CDM compliments MOM (Manufacturing Operations Management). It concentrates on the current requirements around consumer goods life cycle in manufacturing. These are typically found in semiconductor, electronics, medical devices, and battery manufacturing industries but also in photovoltaics. The solution supports production sites of a manufacturer to supply each other with consumables already on stock and thus creates a virtual global warehouse. All qualified materials are consumed and connected to the right distribution cabinets and equipment as planned, and are fully documented for traceability.

camLine, Elisa IndustrIQ, and its Diversity

In addition to available software solutions, camLine has become a fully functional, integrated global team across different generations, nationalities, genders, and cultural backgrounds. Young talents from Asia are joining this Bavaria-based company, bringing more vitality in camLine’s transition towards a more inclusive, productive, and successful team.

A gender-balanced working environment is being built as we incorporate and encourage more female employees as well in rebranding camLine through camLine TV channels, Work Smarter Series, camLine live webinars, and versatile activities on social media. camLine wishes to deliver values that are agile, efficient, and reliable to customers worldwide. The impact of Digital Continuity is also evident here in communication and service offerings. This includes not only technical capabilities, but also strong soft skills in respect to industry projects, responsiveness, prompt support, and total customer care.

If camLine services resonate to you, feel free to contact camLine at:

www.camline.com

info@camline.com

www.linkedin.com/company/camline

www.youtube.com/user/camlinetv

Achieving Sustainability

While COVID-19 has dominated headlines for the past years, the global chip shortage and sustainability have been vying for the dubious title of ‘second-most discussed topic’ in global news. As semiconductors found their way into our lives, the industry’s carbon footprint also increased significantly. To alleviate the chip crunch and accelerate the energy transition, new fabs will have to be developed quickly with energy efficiency as a key design criteria.

Today, we talk to Anne Miclo, Head of Engineering and Karen Ng, Head of Digital Solutions. With energy costs now accounting for up to 30% of a fab’s operational costs, we ask them about their experiences in sustainability and how industries can reduce their energy consumption.



Anne Miclo - Head of Engineering, ENGIE South East Asia

What does sustainability mean to you?

Anne: For me, sustainability is just the right thing to do - for us, for our children, and for the community. We need to take care of what we have and give the planet to the next generation in good health. We also try to educate our kids on the importance of sustainability. At home, we recycle our waste and limit the use of air-conditioning. In my working life, I believe that energy efficiency is really the first pillar towards sustainability, because the cheapest energy is the energy you don’t use.

How do you accelerate the energy transition in your role at ENGIE?

Anne: We bring a broad range of tailor-made energy efficiency solutions to real estate, data centers and industries. This means that we design, build, finance and operate energy and utilities assets with a special focus on minimizing our client’s overall operations and energy cost. We don’t just look at the investment costs, but also consider the operation, the maintenance and the energy consumption and develop the solution that best match our client’s needs and constraints.

As the semiconductor industry faces the challenge of improving energy efficiency, what lessons can the semiconductor industry learn from other ‘power-hungry’ industries?

Anne: We live in a world where everyone is aware of the impact of climate change and companies are increasingly motivated to play their part. The key to facing this challenge is to really understand energy consumption. It is difficult to act if it is unclear what drives energy consumption. For industry, it is often the utility production that drives energy consumption. A first focus should be to improve the efficiency of utility production or even completely refurbish existing central utility buildings. As many semiconductor companies are increasing production capacity, this is really the right time to design with sustainability in mind. Compared to upgrading an existing factory, it



Karen Ng - Head of Digital Solutions, ENGIE South East Asia

is just much easier to make utility production more efficient when you develop a new factory.

How can digital tools help to make a factory green?

Karen: Digital is an enabler for sustainability. Energy efficiency initiatives often starts with deployment of digital solutions to track and analyse the energy consumption of factories. Based on the analysis, we can prioritize the energy conservation measures that achieve the most cost and CO2 savings. Advanced digital solutions can also further improve the energy efficiency of our assets, from HVAC-systems to steam boilers without significant investment cost. One successful example is the reduction of energy cost of the HVAC equipment at our customer’s site by at least 5%. This is done simply by deploying an AI-based energy optimization solution which automatically adjusts the set points of the HVAC equipment dynamically.

What are the main challenges in implementing energy efficiency projects?

Karen: Not all companies have the financial means to embark on sustainability journey. Some measures, like solar PV, are relatively easy to implement without requiring much CAPEX. Others, such as optimizing or retrofitting the utility plants, require more expertise and investment. The industry is adapting to this and energy experts like ENGIE offer Zero-CAPEX business models to enable factories to reduce energy costs without having to make any investments themselves. Another challenge is that the reliability and stability of production processes is crucial to industries, so plant managers often focus on minimizing downtime. Our projects support the overall reliability of our customer’s production by guaranteeing the availability of utilities.

Where do you see the future of sustainability in the semiconductor industry?

Karen: The Singapore government has announced ambitious plans to reduce energy consumption. There are clear motivations for power-hungry industries to embark on energy efficiency projects – government incentives, rising energy prices, increasing carbon taxes and shareholders that care more and more about the environmental footprint of their investments. This gives semiconductor players a clear mandate to focus on energy efficiency. I believe that industries will really continue to be at the forefront of the energy transition.

We celebrate International Women’s Day (IWD) on the 8th of March. What does IWD mean to you?

Anne: IWD is important to remind people of the gap in opportunities between men and women. As an engineer in a male-dominated environment, I don’t want to be seen as a woman when I come to work. I want to be seen for my expertise. What is important to me is that everyone is recognized for their skills and abilities.

Karen: Diversity just brings out the best in teams. Diversity does not just mean people of different gender, but also people across cultures, races and beliefs. In my view, diverse teams always come up with more creative solutions to problems.

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www.engie-sea.com

In this edition, we put the spotlight on Mr Francois Guibert. With almost 40 years in the semiconductor sector, including illustrious journeys with Texas Instruments and STMicroelectronics, Francois has managed operations across Singapore, Europe, Greater China, South Asia, Switzerland, Taiwan and USA. He continues to play an active role in the industry he remains passionate about.

Could you tell us more about your background, the highlights and milestones of your stunningly long and solid background in the semiconductor industry?

With an Electronics Engineering Master Degree in 1978 from Ecole Centrale Marseille, I was hired by the number one company worldwide at the time in semiconductor - Texas Instruments, or TI in short. It was my "MBA on the field" since TI was having well recognized and intensive training on Marketing and Finance (Product cost center organization, zero base budgeting, sales force management, etc.) and I thoroughly enjoyed my job with TI.

But European semiconductor companies, rather small at that time, were looking at my profile

for growth. In 1981 I decided to move to the company that is today STMicroelectronics.

I know it looks like an unusually long stay, but I spent more than 35 years with ST. However, every three to four years, I was moving to different locations and positions, and I really enjoyed the experience. You work a lot, you learn a lot, but you also bring good return on investment to the company that hired you!

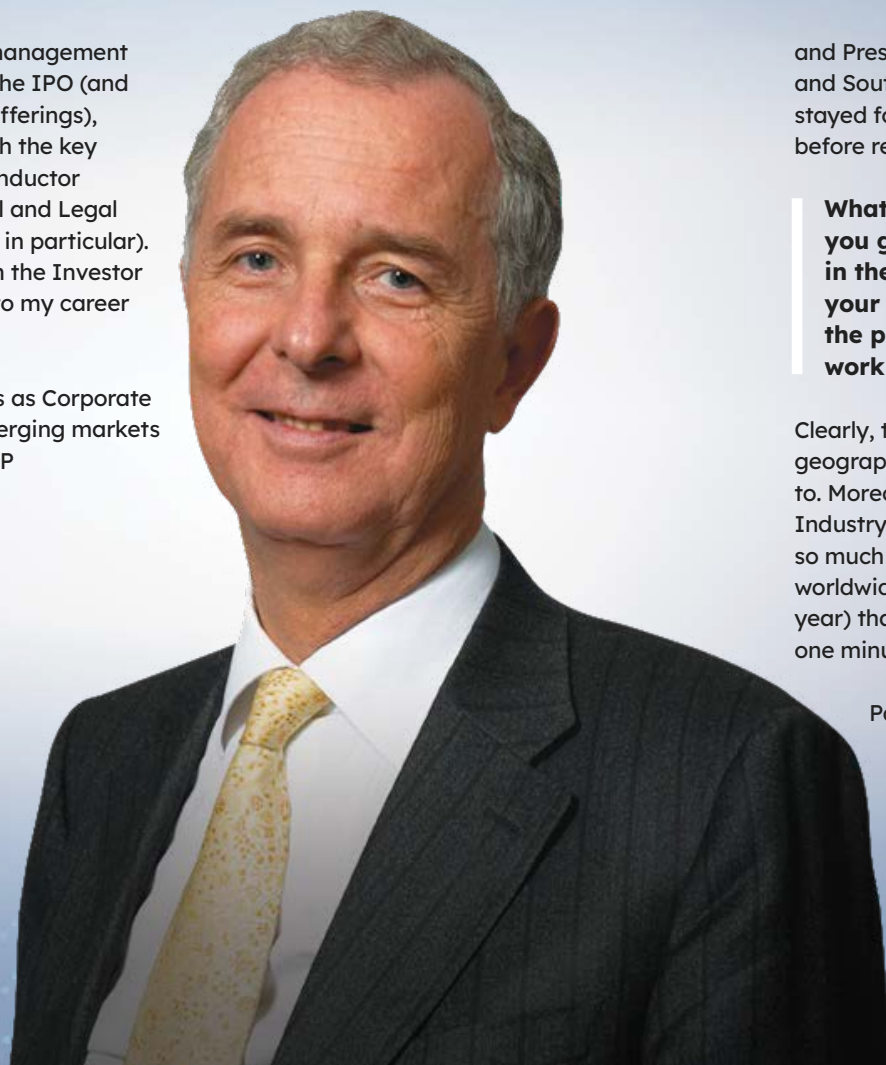
From Marketing Manager in the US and Canada to Line Manager in France and later on in Singapore, I then moved to Taipei to become President of ST Taiwan branch. That was a great and deep experience with the Chinese world!

So, the first decade of my career exposed me to Europe, USA and Asia. Quite an interesting background and variety of experience at that time, when international jobs were less common.

Then the following 15 years (1990 to 2005) brought me to very new and exciting positions close to the ST Corporate organization: dealing with strategic partnerships, joint ventures, M&A and long-term planning gradually became my main responsibilities, and a key milestone for me was the ST IPO on 8 Dec December 1994.

I was invited by my top management to strongly contribute to the IPO (and the following secondary offerings), and I learned a lot on both the key ingredients of the semiconductor industry and the Financial and Legal world (in USA and Europe in particular). This allowed me to add on the Investor Relation Officer position to my career later on.

After one and a half years as Corporate Vice President for the emerging markets of ST, I was appointed EVP



Francois Guibert

INDUSTRY VETERAN SPOTLIGHT



and President of the Greater China and South Asia region, where I stayed for the subsequent 10 years before retiring.

What would you say have kept you going this long and strong in the industry? What were your personal motivation and the purpose you see in the work you did?

Clearly, the huge variety of jobs and geographic mobility I was assigned to. Moreover, the semiconductor Industry is a fascinating one. There is so much innovation and competition worldwide, going on every day (not year) that you can never get bored one minute in your job!

Pasquale Pistorio, our former (and very charismatic and visionary) CEO until 2005, and his direct staff, were giving the management team a controlled yet significant freedom

to take initiative and develop the business. So, even if you were surrounded by the usual procedures and regulations of multinational companies, I was quite often feeling like an entrepreneur within my perimeter of responsibilities, objectives and resources.

From a veteran's perspective, having seen the industry through its many phases, what would you say are the biggest changes/developments that have created opportunities for the sector to transform and be where it is today?

In my opinion, the biggest change for the semiconductor industry was moving from supplying industrial needs in the 1980s, to answering society's calls starting in 2000. It was not only a matter of changing the volume, and therefore the capacity required to address these new markets, but also demanding a very deep understanding of the

huge and volatile market from the consumers, versus the usually well-identified and much smaller volumes for industrial products our semiconductor industry was supplying for 30 years.

How about challenges that continue need resolving/addressing by the industry and leaders?

I see our biggest challenges as twofold:

1. the exponential cost of R&D, manpower and equipment cost for pilot lines to reach nanometer technology
2. the exponential cost of new manufacturing facilities, which moved from around US\$20 million in 1950s, to US\$20 billion for the most advanced technologies of 10 or 7 or 3 nanometers now in 2022

Talent retention and development are priorities for our industry now. What are your thoughts on this challenge the industry needs to overcome?

Human resources for high tech industries in general, and semiconductor in particular, will continue to remain crucial if not vital. Training, upskilling and motivating the existing resources internally or externally must be enhanced for the coming years.

The more difficult task seems to be hiring new talents. The semiconductor industry can surely cultivate more candidates at each stage of the academic process. We need more students opting for related courses, and those who are already pursuing related courses may still go into other

non-electronics/semiconductor roles. This applies globally and not only in Singapore.

I urge our sector to become even more visible to the education system, not only in Singapore but also in the key countries where semiconductor and electronics industry is seeing robust and sustained growth. Let's invest in motivating young and dynamic students, at every stage of their development, to eventually be part of this industry. We are offering really prestigious careers, and contributing to the development of the world economy in its most sustainable way.

At this stage of your life, would you say your perspective, priorities and purpose have changed? And what do you envision doing for the industry, even as you have retired from the corporate life?

No! I feel as enthusiastic today for the semiconductor industry as I was a young student. Five years after retiring from ST, I am still following the industry news and financial results.

From this year, I am also starting to develop a "Masterclass" document of almost 60 pages to make this industry much more visible to the large, educated masses, including academics, corporates and government agencies of the key regions of the world.

This presentation covers the design and manufacturing process of semiconductor chips, the history of this industry and the ingredients of success of the countries that have been performing so well in the past 70 years. I will also touch on the new wave of applications and markets,

and finally to the competitive positioning of the top 20 players and their challenges.

But my ultimate goal is to demonstrate the crucial, if not vital, role of the semiconductor for almost all the other industries and services worldwide, and therefore the need from the overall public to better understand this complex and extremely competitive industry. Semiconductor is the intelligent steel of the 21st century and its development goes beyond imagination.

How do you see SSIA's role in the Singapore semiconductor scene? How do you envision working (even more closely) with SSIA, or do you visualise supporting SSIA's work even more, in your position as a semiconductor veteran?

The role of SSIA in Singapore is well defined, but if I may share two of my personal opinions for SSIA's consideration.

The image of Singapore as the world's manufacturing hub for semiconductor. This is right now looking good as we view ongoing construction of new Fabs, enlargement and upgrading of existing ones and the recent announcements of new fabs to come for the next three to five years.

The image of the semiconductor industry to the whole spectrum of Singapore's education system, from as young as high school to as senior as PHD. This needs to be drastically boosted in the coming years to address requirements for large numbers of specialised workers, including technicians, engineers and other administrative and financial experts.

I believe that my cycle of conferences on the semiconductor industry with Singapore high schools, universities, business schools, R&D institutions, as well as with all chambers of commerce and business associations can contribute towards these directions.

Other than still dedicating time to the industry you continue to be passionate about, what hobbies or commitments do you engage in?

There is indeed a life outside semiconductor! My passion is also dedicated to the vibrant cultural life of Singapore.

My wife being an active docent at the Asian Civilisations Museum since 10 years ago, I'm learning a lot through regular visits of the key magnificent Singaporean museums, and being fascinated by the overall Asean and Asia Pacific history and art.



I am also currently a board member of the Alliance Française, giving my support to the deployment of the French cultural image and language to the Singaporean society through this well recognized institution.



“ Creating advanced semiconductors involves sophisticated process technologies. Working at ST means putting on my thinking cap every day to find logical ways to solve complex problems and ensure our products make a positive contribution to people's lives.

Suzliana SULAIMI
Senior Process Engineer
STMicroelectronics



At STMicroelectronics, we create technology for a sustainable world

Behind every ST solution are skilled men and women, who embody our approach to innovation: **life.augmented**

For more information, visit www.st.com/careersatst