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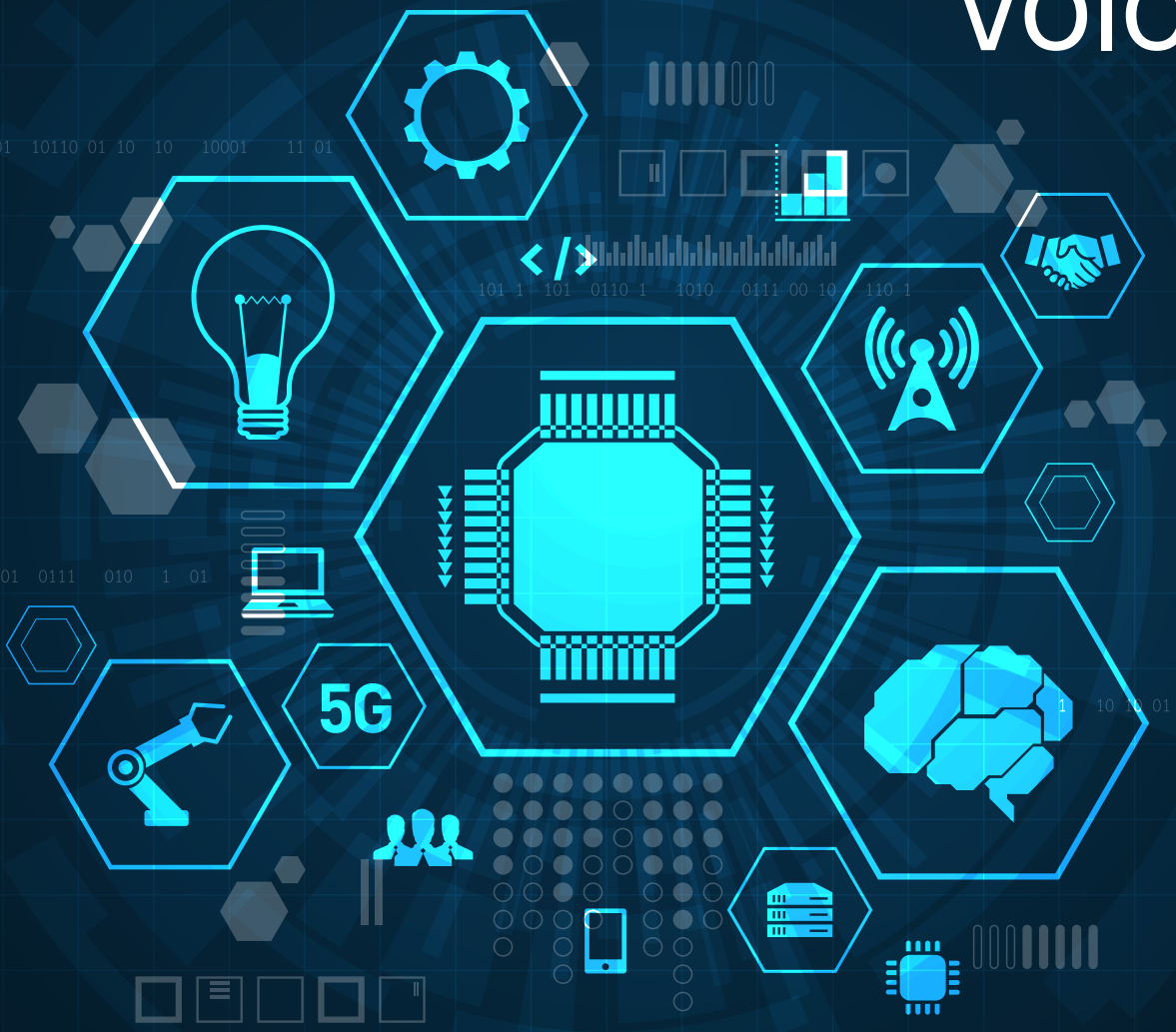

STRENGTHENING AND GROWING THE SEMICONDUCTOR LOCAL ECOSYSTEM

The Automation and Robotics Consortium

GlobalFoundries New S$5B Singapore Fab to ramp up in 2023

Lumileds - Commitment to Sustainability

SSIA
Singapore Semiconductor Industry Association

SSIA SUMMIT AND SEMICONDUCTOR DINNER 2021

Building a Smart Nation with Innovation and Technology

30 SEPT 2021
HYBRID EVENT

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https://ssia.org.sg/ssia-summit-semiconductor-dinner-2021/

Foreword by Executive Director

By the time this edition is published, Singapore is well underway to meet our target of fully vaccinating two-third of the population by early August. As the nation adjusts to new norms brought about by COVID-19 becoming endemic, we reflect on the past year – and consider the semiconductor industry fortunate.

Multiple factors, including an increased demand for consumer electronics and new technologies such as 5G gaining traction, have led to a surge in demand for semiconductor chips globally. While this has caused a global shortage and impacted many related industries relying on semiconductor chips in their products, many countries now realize the importance of semiconductors, not just economically, but even from their national security standpoint.

Some countries have been investing heavily to further grow and support the semiconductor industry, such as in the US and China. Others are ramping up their commitment. We see fabs around the world addressing the chip shortage by expanding both short and long term capacity. GlobalFoundries recently announced their S$5B investment into a new 300mm facility in Singapore. Targeted to be operational by 2023, what this means is job creation and a further boost to our local ecosystem, in tandem with Singapore's vision to grow the manufacturing sector by 50% over the next decade.

Our semiconductor industry will grow significantly in the coming years, and we must be ready to support this growth. We see potential to fill gaps in talent cultivation, training and upskilling. We want to optimize technological advancement in areas such as AI and automation to future-proof our workforce. SSIA is finalizing our pipeline of initiatives, and will share details in due time.

Additionally, we recognize the need for a more robust local ecosystem to support the industry. The pandemic made many multinational companies realize their reliance on local firms, and the need to help them grow. With this in mind, SSIA is fronting a committee pooling the industry's MNC leaders as well as partners such as EDB and ESG. We have also started scaling up relevant platforms to bring international and local entities closer, such as our annual Semiconductor Business Connect.

Speaking of which, we will be organizing our flagship SSIA Summit and Semiconductor Dinner this year! Keeping a close eye on the pandemic and safety measures, but optimistic about the nation's vaccination rate, we hope to be able to bring everyone together by end September. Themed "Building a Smart Nation with Innovation and Technology", we look forward to discussing mega trends that will drive our industry's growth, and most importantly, engage in much-missed physical networking (within safe measures, no doubt). I take this opportunity to thank the companies which have pledged their sponsorship, and welcome more to reach out to us. More information on SSIA Summit and Semiconductor Dinner 2021 is available on **SSIA website**. With your strong support, I am sure this event will be a success!

I look forward to catching up with you partners and industry leaders at the event, and in the meantime, stay safe and healthy!

Best regards
Wee Seng

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PEOPLE

Soh Lip Leong: Hunting As A Pack

In the shadow of the COVID-19 pandemic, companies large and small are regrouping to plan for more stable times. Joining the SSIA board at this pivotal moment, ams OSRAM Sensors Singapore Senior VP and GM Soh Lip Leong is setting his sights on supporting SMEs wade through the aftereffects of the pandemic and bolstering them to regional heights.

"If you look from a strategic perspective, Covid-19 basically shut down borders which badly affected a lot of SMEs and even some MNCs. From the very start, ams OSRAM managed to implement initiatives to protect our people and our revenue. Last year, even amid this pandemic, the company broke productivity and efficiency records," Soh says.

Learning from the ams OSRAM's strategy may aid other corporations and SMEs as countries all over the world continue to battle fresh outbreaks and vaccine supply disruptions. "Our strategy was based on three pillars. The first being supply chain continuity. We must ensure that delivery and set up of machines/equipment and delivery of raw materials are all on time. Those with external manufacturing partnerships must ensure that your sub-assembly is prompt. Second is human resources availability. As the borders shut down, the traditional source of labour just disappeared and companies need to contend with that. The third pillar is logistic capabilities. This looks beyond Singapore because if your parts come from the Philippines, Taiwan, China, Vietnam or anywhere else in the world, there are many touch points along the way that are facing disruption," Soh adds.

Solutions to these challenges will be unique for each company but Soh emphasizes that a vital tool is knowing where to seek assistance and information. "Trying to know or remembering everything is not as important as knowing where to obtain information. The Singapore government has various bodies that support SMEs. Thus, a list should be made available for SMEs to know who to reach out to for information," Soh says.

"SMEs are diverse with many different needs. It is our role to listen to their needs, aggregate them and bring these needs to the relevant ministries who can address them. As MNCs have a "louder voice", being a bridge between SMEs and the government is also a crucial role that SSIA plays." he says.

Looking beyond the pandemic, Soh proposes two key areas to move Singapore SMEs to regional levels. "We hope to instill a broader mindset in local SMEs to treat the semiconductor ecosystem as a bigger corporation that they are a part of. SMEs often see everyone else as a competitor therefore sharing, learning and benchmarking have not been practiced often. Big players have deeper pockets but for smaller players, you need to go in as a team; collaborate and hunt as a pack," Soh says.

Second is to focus on diversifying what SMEs can offer. "Business is so interconnected now that you cannot rely on just one thing, be it technology, capability or innovation. For example, if you look at automation today, it cannot be just about bringing in a fabricator or a machine integrator.

To move forward, a company needs to look at how they can use all the data from these new machines to generate more things, be it artificial intelligence (AI) or what I prefer to call computer-integrated manufacturing," he says.

Having worked at various stages of the supply chain in his career, covering cross-continental responsibilities whilst leading diversified teams, Soh feels that his experience combined with that of the other SSIA board members, can benefit local SMEs at this time in terms of depth, regions, single responsibilities and end-to-end accountability. "SSIA can walk with these SMEs in their journey to grow and reach regional heights," he says.

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ams OSRAM

WinTech Nano Technologies – Lables Vision

On 17 May 2021, Mr Ang Wee Seng, Executive Director of SSIA, was invited as a Guest of Honor to grace the celebratory event of WinTech Nano-Technology, which have been featured on the Fortune Times Magazine. This remarkable milestone featuring Mr Li Xiaomin, the President of WinTech Nano-Technology as front page was a recognition of the achievements of Lables Vision which WinTech Nano has brought to the Semiconductor Industry.

The Lables Vision is indeed a great inspiration and strategy for our industry. This vision allows semiconductor companies to focus on their core business while entrusting the laboratory services to 3rd party companies such as WinTech Nano. This in turn allows the reduction in operating cost for the company, and most importantly, leveraging the advancement of technologies which WinTech Nano can offer.

Over the past few years, WinTech Nano has been providing the trustable lab analytical solution, a key service to the semiconductor industry here in Singapore and the region.

They have grown into a successful and significant local company that supports our industry.

The semiconductor industry remains a bright spot in our economy despite the pandemic. The sector is fortunate to have performed well and is set to continue its robust growth well into the next decade due to the digitalization trends, driven by technologies such as 5G, 6G, AI, IoT, EV and many more.

An important factor to grow our industry is not just the heavy investment into large multinational companies, but also the strengthening and growth of the industry's local ecosystem.

In line with the national call, SSIA is committed to help build a strengthened semiconductor local ecosystem to emerge stronger and make Singapore a global semiconductor hub. Growing local companies, such as WinTech Nano, will be crucial to the growth of our industry here and the region.

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SSIA
Singapore Semiconductor Industry Association

Clockwise from top left: moderator Kenji Kawase, Julie Koh, Dan Wang and Mitsunobu Koshiba speak during an online panel discussion on June 29.

Asia's Technology Boom – Transforming the Post-Pandemic Future

FT Live and Nikkei Asia presented Asia's Technology Boom – Panel : Semiconductors: Meeting a global shortage, on 29 June 2021.

Ms Julie Koh, Strategic Programs Director of SSIA was invited to join the panel discussion, together with Mr Mitsunobu Koshiba, Chairman Emeritus of JSR Corporation and Dan Wang, Technology Analyst of Gavekal Dragonomics; and the session was moderated by Mr Kenji Kawase, Chief Business News Correspondent, Nikkei Asia.

A global shortage of semiconductors that power such digital technologies -- from smartphones and data centers to cars -- is now in focus. Experts said the dearth, combined with U.S.-China tensions and tighter border controls during the pandemic, is prompting countries to rethink their supply chain.

"We are always taking the approach of collaboration and regionalization, considering how big Singapore is," said Julie Koh, strategic programs director at Singapore Semiconductor Industry Association. "The semiconductor companies have also recognized that it is very important that we grow and strengthen the local ecosystem, so as to ensure there is sufficient support for the industry."

Gavekal Dragonomics' technology analyst Dan Wang said that China could be the most vulnerable. "China has seen that the U.S. is almost a monopolist in certain semiconductor technologies, especially on semiconductor production equipment," he said. "China is probably five to 10 years behind on all different types of segments, and the main question now is how quickly China can close that gap where the U.S. has become much more hostile. And Chinese tech companies are now trying very, very hard to close this gap."

Mitsunobu Koshiba, chairman emeritus at Japanese materials supplier JSR Corp., said the industry needs to face the "inconvenient truths" of rapid growth, including the massive amounts of energy required to operate the most advanced chipmaking equipment. Koshiba said he is looking for "some creative way to overcome this dilemma, such as quantum computing."

For the original Nikkei Asia article, it is available in **https://asia.nikkei.com/Business/Startups/**

To watch the event recordings, it is available Video-on-Demand until 31 December 2021. Please click **https://asiatechboom.live.ft.com/agenda** to watch.

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FT LIVE

NIKKEI Asia

Temasek Polytechnic Advanced Manufacturing Centre – Enabling Talents and Solutions for the Industry

Temasek Polytechnic (TP) has set up a S$7 million TP Advanced Manufacturing Centre (TP AMC) on its campus. It was officially opened by Minister for Education, Mr Chan Chun Sing, on 18 June 2021.

AI-empowered and data driven, TP AMC is an authentic advanced manufacturing environment that comes complete with a nerve centre, a production shop floor and an intralogistics automation system. It is also a 'live' advanced manufacturing model factory that is capable of autonomously assembling six different customisable products.

In conjunction with the launch, a Memorandum of Understanding (MOU) was signed between the five local polytechnics and the Advanced Manufacturing Training Academy (AMTA), deepening the collective commitment to future-proof Singapore's manufacturing sector by providing the necessary skills training.

In addition, MOUs were also signed between TP and members of its Industry Partners Network, comprising trade associations and key industry partners, including the Singapore Semiconductor Industry Association (SSIA) and Singapore Precision Engineering & Technology Association (SPETA), as well as Arcstone Pte Ltd, Fujitsu Singapore, M8M Pte Ltd, OMRON Electronics, PDS Pte Ltd, SMC, SMT Technology and Swisslog. Through these MOUs, the parties pledged their commitment to joint capability and knowledge development, training, as well as the transformation of companies in this sector.

The TP AMC provides applied and skills-based training, and serves as a model for best practices and solutions in advanced manufacturing for companies. It is well-equipped with the right expertise and resources to support companies in their Industry 4.0 transformation effort, taking reference from the Singapore Smart Industry Readiness Index (SIRI) in doing so.

Here, TP students as well as adult learners will get to experience core emerging technologies such as Applied Artificial Intelligence, Advanced Robotics, Cyber-Physical Systems, Industrial Internet of Things (IoT), Augmented Reality, Virtual Manufacturing & Digital Twin, and Operation Technology Cybersecurity. Working in multi-disciplinary teams, they will be directly involved in the factory's operations involving high speed inspection of product quality on the fly, IoT monitoring of equipment availability and inventory status, workplace safety and health within the factory, as well as the integrity of the IT network hinging on AI-powered surveillance and cyber-secured systems. Guided by experts from leading companies such as OMRON, Fujitsu and Swisslog, students will also be involved in Proof of Concept (POC) projects, as part of their final-year Major Project and internship programme.

In addition to providing students and adult learners with experiential training, TP AMC also provides staff with opportunities to pursue multi- and inter- disciplinary applied research projects in line with industry trends. For instance, TP is working with OMRON and several system integrators to double the payload of an Autonomous Intelligent Transporter for warehouse and cleanroom applications as well as shop floor digitalization for connecting up to 100 moulding machines in collaboration with Beyonics. The polytechnic has also teamed up with partners such as SSIA, SPETA, and OMRON, to offer a series of hands-on courses and set up the POC project test-bedding laboratory. These programmes are expected to benefit more than 2,000 adult learners from about 180 companies in the advanced manufacturing sector within a period of 3 years.

TP AMC will give both TP staff and students first-hand experience of learning and working in a multi-disciplinary industry setting and prepare them for the new digital economy. At the same time, the Centre will build a sustainable talent pipeline in advanced manufacturing to support the national manpower needs for Industry 4.0.

Cyber-Physical Systems at the Production Shop Floor

Nerve Centre

Intralogistics Automation System

ENQUIRIES

For enquiries and requests for a tour of the TP AMC model factory, email us at **contactamc@tp.edu.sg**

For more details, please scan the QR code and visit our website.

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Temasek POLYTECHNIC

Advanced Manufacturing Centre

With the Right Advice, You Can Put Your Possibilities to Work

SSIA is supporting Workforce Singapore's volunteer Career Advisors (vCA) initiative, which provides individuals (especially mature workers) with peer-level support and career guidance as they navigate professional pathways to advance their careers, or transition to other jobs.

We have invited our vCAs in the electronics and semiconductor sector to share their personal career journey and how advisees can connect and benefit from their industry experience.

MR CHOK YEAN HUNG
Board Member, AEM Holdings Ltd

What made you interested to join the WSG's volunteer Career Advisors initiative?

Being retired and having benefited from the Electronics and Semiconductor industry, volunteering into this initiative is a way of giving back to this industry and the society.

Through this initiative, I hope to be able to help shine a torch into this industry, attracting more fellow workers coming in and participate

in its growth in Singapore. With the current pandemic situation, this WSG's vCA initiative is indeed timely, where me and other fellow advisors from this industry can help workers from many other suffering industries to appreciate the electronics & semiconductor industry's needs and potentially build their career here.

As a vCA, what experience/ guidance would you like to provide for your advisee(s)?

Prior to offering guidance to advisees, it is probably key to know their aspirations and core areas of competency. Only from there, appropriate guidance can be given, be it the type of complementary skillsets needed or WSG's various programmes to enhance individuals' market value to enable them to progress in their careers.

Do you have a mentor/ advisor in your career journey? Could you share with us about it and how this experience has supported your career's growth?

I am blessed to have many individuals who have given me advice or mentored me at various stages of my career. They are either my peers, supervisors, customers or even business friends. Each of them has imparted their learning and wisdom, helping me to build my foundation to excel.

The key was really the willingness to listen and learn from others' experience as at times we can be blindsided. I remembered one of them saying "Ego and believing only in legacy methods will ultimately fail you". This has always reminded me to listen and challenge myself to do better.

MR SHANTONU BHADURY

Design Engineering Director, IoT Products, Silicon Labs

What made you interested to join the WSG's volunteer Career Advisors initiative?

The opportunities, challenges and outlook in the electronics/ semiconductor industry have evolved and become more diverse. The barrier to entry has also been going up in certain sectors. As a result, even with electronic industry having a big presence in Singapore, people are unable to navigate opportunities in this field due to misconception, lack of guidance and confidence. My aim is to help as many people as I can to understand their situation and ease their entry into the electronics career.

As a vCA, what experience/ guidance would you like to provide for your advisee(s)?

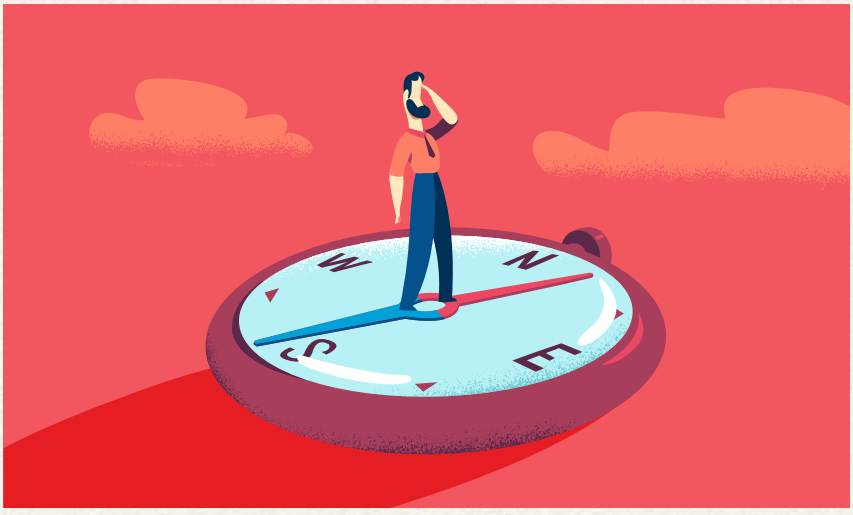
I would like my advisees to have an open mind to appreciate alternatives. I would also encourage them to embrace new opportunities with their whole heart and with confidence. Lastly, advisees should try to inculcate a culture of lifelong learning as career landscape is constantly evolving, which requires continuous upskilling.

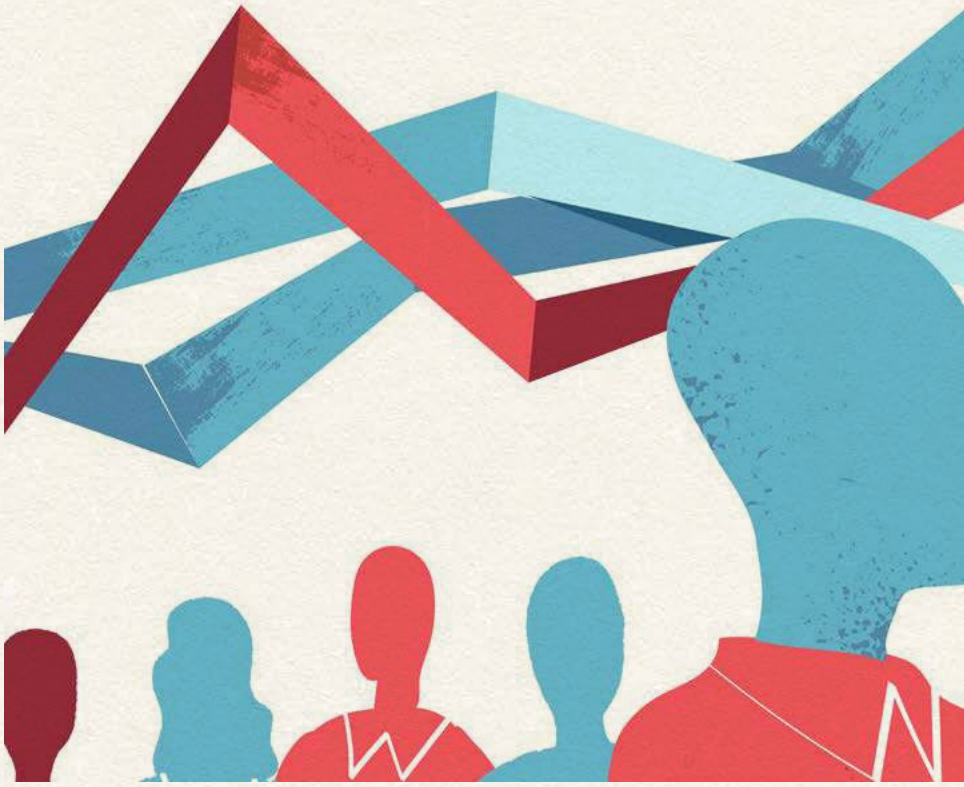
Do you have a mentor/ advisor in your career journey? Could you share with us about it and how this experience has supported your career's growth?

I have been blessed with excellent managers, who also mentored me throughout my career. My mentors continuously challenged me with different responsibilities, career goals and guided me throughout the journey. This helped me to build my confidence, develop strong work ethic and to feel empowered to take tactical and strategic decisions.

Any other ideas you would like to share about joining this programme?

This program is currently geared towards mid-career professionals who are looking to pivot. I am hoping that this program can be extended to help students at the cusp of choosing their career and to guide them to make a more informed choice.





MS JULIE KOH
Strategic Programs Director, Singapore Semiconductor Industry Association

What made you interested to join the WSG's volunteer Career Advisors initiative?

The COVID-19 pandemic has impacted people's life and livelihood. With the Semiconductor and Electronics industry strengthening and hiring, it is a wonderful opportunity to help people understand more of the opportunity in this industry and join the sector. vCA is voluntary and my way of giving back to the society and the Semiconductor industry.

As a vCA, what experience/ guidance would you like to provide for your advisee(s)?

I would like to help others understand that with technological disruptions, which is accelerated by COVID-19 and digitalisation, it has impacted many industries and jobs. It is important that we understand the trend and growth, work towards upskilling, staying relevant and remaining employable. I hope to empower jobseekers to be aware of what they really wish to do in their career, what they are passionate about, and work towards it.

Do you have a mentor / advisor in your career journey? Could you share with us about it and how this experience has supported your career's growth?

I am fortunate to have met many wonderful mentors in my career. One who has made a profound influence in my career is Mr Rajan Rajgopal, President and CEO of Denselight Semiconductor. Back then as a young Manager, I was coached to expand my role, progress from being a technical expert to managing customers and suppliers, increasing my span of responsibility. The growth experience taught me to focus on people, their strength, and developing them to their fullest potential.

MR VINOD NARANG
Senior Engineering Manager, Product Development Engineering, Global Operations, AMD

What made you interested to join the WSG's volunteer Career Advisors initiative?

The business transformation has accelerated, and many industries are being transformed rapidly. vCA volunteers help guide the individuals in the transition from other industries to the electronics industry. The vCA initiative helps them overcome some of the challenges faced by individuals who have spent decades in the same role and industry to shift to a completely new industry.

As a vCA, what experience/ guidance would you like to provide for your advisee(s)?

I would like to guide the advisee(s) on transferrable skills that can be applied in the semiconductor/ electronics industry, such as critical thinking, analytical reasoning, deeper communication skills and teamwork.

I also plan to act as a channel to various placement services being offered by the WSG including relevant workshops like art of interviewing, resume writing, etc.

Do you have a mentor/ advisor in your career journey? Could you share with us about it

and how this experience has supported your career's growth?

Many years back, we had a leadership training that had a big influence on me. After the training, I kept in touch with our coach. Whenever I had some complex questions or wanted some guidance, I would seek his advice. He would gently nudge me, point in few directions and let me find the best answer for myself. He greatly helped me at many critical junctures and I am really thankful for his advice! I hope to provide similar help to advisee(s) to find and charter their own paths, giving me huge satisfaction!

Any other ideas you would like to share about joining this programme?

The main motivation is to contribute to society in a small and meaningful manner. I am passionate about working on advanced semiconductor technologies which almost test the laws of Physics. I hope more individuals can join this industry which has become the foundational technology for the advancement of our society.

MR DENNIS FOO

Vice President
Corporate Sales,
Manufacturing
Integration
Technology Ltd

What made you interested to join the WSG's volunteer Career Advisors initiative?

I have been volunteering as an NTUC YCN Career Guide, an SIT Mentor, a PSB Academy Brand Ambassador, and 1st VP and 2nd VP in NTU Alumni Club Management Committee in the last 8 years. The WSG's volunteer Career Advisors initiative is a meaningful outreach platform where like-minded volunteers can bring experience sharing and value creation to the industry at large, and also to young graduates entering the workforce.

As a vCA, what experience/ guidance would you like to provide for your advisee(s)?

While different industries demand different skillsets, the individual contributor or team player shall always bring his/her creativity and tenacity to the job. Such pride and passion are sometimes missing in the organization. With experience, as a vCA, I hope to share other perspectives on such less-explored areas so that we can all extract the self-motivation that shall keep us striving for meaningful achievements in our long careers.

Do you have a mentor/ advisor in your career journey? Could you share with us about it and how this experience has supported your career's growth?

Throughout my 28 years in the workforce, I have the privilege to know 2 mentor bosses. Both can see "through" people and bring out the best in them. Encouraged by their helicopter view of even the worst situations and not losing sight of what is happening on the ground, I have been emulating them all these years to achieve a blessed personal development and climb the career ladder.

To connect with one of the volunteer Career Advisors, please visit **https://go.gov.sg/vcai-app**

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wsg Workforce Singapore

volunteer Career Advisors initiative

SINGAPORE SEMICONDUCTOR LEADERSHIP ACCELERATOR PROGRAMME

SKILLSfuture Leadership Development

Programme Dates

Module 1: 10 to 13 Aug, 17 - 20 Aug 2021(Virtual session)
Module 2: 14-17 Sept 2021(Virtual and in-person session)

Please contact **Daphne at daphne@ssia.org.sg** or **scan the QR code** for more details.

Organised by:

SSIA
Singapore Semiconductor Industry Association

Speakers clockwise from top left: Mr Chok Yean Hung (AEM Holdings), Ms Julie Koh (SSIA), Ms Daphne Leong (SSIA) - Moderator, Mr Martin Leo (HP), Mr Ong Eng Hui (Skyworks), Ms Sek Mun Foong (Innowave Tech)

Virtual Career Talk: Opportunities in the Manufacturing Sector

The electronics and manufacturing industry has been thriving despite the COVID-19 pandemic, with several companies in Singapore set to expand in the second half of 2021. To shed light on the vacancies in the industry, SSIA, with the support of Workforce Singapore (WSG), hosted a webinar on 29 Jun 2021 titled **Virtual Career Talk: Opportunities in the Manufacturing Sector**.

The webinar covered two main topics – the growth opportunities in the industry and the initiatives from WSG that job seekers can tap on. Ms Julie Koh, Strategic Programs Director of SSIA, opened with an overview of the Semiconductor and Electronics ecosystem and future hiring trends, followed by presentations by Mr Martin Leo from HP Inc and Mr Ong Eng Hui from Skyworks Global Pte Ltd on the various job opportunities and work culture at their companies.

Screenshot from the presentation on volunteer Career Advisors

On initiatives, Mr Chok Yean Hung, a board member of AEM holdings, introduced the volunteer Career Advisors (vCA) program which links job seekers to industry professionals whom they can tap on for advice and to facilitate career progression, followed by Ms Sek Mun Foong of Innowave Tech sharing her experience coming from a non-technical background and transitioning to a Project Engineer role through the training provided by her company under the Professional Conversion Programme (PCP) initiative.

During the Q&A session, many attendees were keen to hear about employability for mid-career job seekers and senior staff. The panel of speakers agreed that having transferable skills and a willingness to learn were traits that hiring managers looked out for as technical skills can always be acquired through training. For those thinking of coming back to the industry after a break, Mr Chok advised linking up with a vCA who can help identify the skills gap that can be filled to increase employability.

We hope that the attendees have a better understanding of the opportunities in the industry now and wish them all the best in their job search!

To connect with a vCA, go to **www.go.gov.sg/vcai-app**

To learn more about PCP, go to **https://ssia.org.sg/pcp/**

To view vacancies in the industry, go to **https://ssia.org.sg/jobs-listing/**

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SSIA
Singapore Semiconductor Industry Association

UPCOMING ELECTRONICS & INDUSTRY RELEVANT COURSES

SSIA
Singapore Semiconductor Industry Association

Building a Smart Urban Farm (1 day)

7 Aug / 21 Aug / 4 Sep / 18 Sep 2021

The objective of the course is to introduce participants on how a smart urban farm can create a sustainable and affordable food source and they will learn how technology can make farming effortless and increase yields. Basic farming knowledge, techniques and maintenance processes will be discussed. Participants will also learn hydroponics farming and enjoy hands-on session during the course.

Who should attend? People interested in building their own urban smart farm

Data Analytics for Electronics Industry

25 Aug / 15 Sep / 14 Dec 2021

The objective of this course is to equip participants with knowledge of fundamentals of data analytics. Participants will also be able to apply these analysis tools to their data when designing and developing their future intelligent systems for the electronics & semiconductor industries. There would be hands-on session with the data analysis tools such as data wrangling, visualisations, regression models and prediction. Participants can apply the knowledge and skills to help improve their operational tasks and increase work productivity.

Who should attend? All engineering or technical personnel

Story Telling Skills To Capture Hearts And Minds

26-27 Aug 2021

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.

Who should attend? All companies, including MNCs and SMEs and strongly recommended for all engineering / technical personnel.

Quality Management Systems for Semiconductors

30-31 Aug 2021

The course covers the fundamentals of quality systems, and how each component supports the overall architecture of the QMS. It gives a general overview of how to implement these systems in the company

Who should attend? Non-technical personnel in the semiconductor industry

Industrial Robotics Workshop (3 days)

7-9 Sep / 7-9 Dec 2021

This course provides participants with the knowledge and practical skills to plan and integrate robotics and automation systems for robot assisted production in advanced manufacturing. Techniques for adaptation of industrial robots to meet the requirements of various industrial process control and automation in advanced manufacturing will be demonstrated; a visit to a model factory where industry use cases in Autonomous Robotics will also be demonstrated.

Who should attend? Associate Engineer / Technical Support / Machinist / Operator.

Advanced Manufacturing Inspection Workshop (4 days)

7-10 Sep / 7-10 Dec 2021

This course covers the application of machine vision and pattern recognition technologies in Advanced Manufacturing. Participants would be instilled with the essential knowledge of machine vision systems including their key components, functionality and the image processing technologies. The course will also provide an overview of the techniques in image analysis and the derivation of useful hidden patterns in the images. The workshop will be concluded with a visit to a model factory where industry use cases in Inspection-On-The-Fly will be demonstrated.

Who should attend? Engineers, Technology Specialist

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

8 Sep 2021

The purpose of this One-day course is to equip participants with knowledge of the various microscopes and thin film characterization tools used for failure analysis and in-line process monitoring in the semiconductor / manufacturing / coating industry. Participants will get to understand the working principles and applications of some of the tools through a hands-on and demo session.

Who should attend? All engineering or technical personnel

Introduction to Vacuum and Plasma Technology (1 day)

9 Sep 2021

One-day classroom/practical session to equip participants with knowledge of vacuum and plasma technology commonly applied in the semiconductor / electronic / manufacturing industry. Participants will get to the working principles and applications of vacuum and plasma technology using MKS training systems through a hands-on session.

Who should attend? All engineering or technical personnel

IoT for Electronics Industry

9 Sep / 7 Oct / 13 Dec 2021

One day classroom/practical session to equip participants with knowledge of the Internet of Things (IoT), IoT applications and its eco-systems used in the semiconductor/electronics manufacturing industry. There is a hands-on session for participants to apply their knowledge.

Who should attend? All engineering or technical personnel

Wafer Fabrication in Semiconductor Industry (3 days)

13-15 Sep / 5-7 Oct / 13-15 Dec 2021

Interactive 3-day course with classroom sessions and practical laboratory work that provides participants with the relevant knowledge and skills of the Wafer Fabrication process in the semiconductor manufacturing industry. The courses are conducted in person.

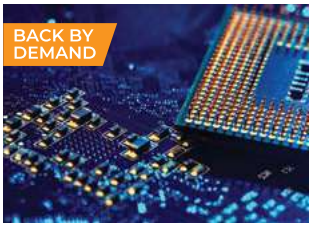
Who should attend? Those who have recently joined the semiconductor industry or engineering technical or personnel under the Electronics Skills framework

Introduction to Industrial FMEA

28 Sep / 9 Dec 2021

The objective of this course is to equip participants with the knowledge of Failure Mode and Effects Analysis (FMEA), a step-by-step approach for identifying all possible failures in a design, a manufacturing process, an equipment, or even a service. Participants will also have the opportunity to work on real-life case studies where they will learn how to create a proper risk assessment, prioritise the different critical levels of risk, and trigger necessary mitigation actions.

Who should attend? Technician, Associate Engineer / Assistant Engineer, Equipment Engineer, Maintenance Engineer



Semiconductor Processes

8-9 Nov 2021

This 2-day online course enables the learners to gain knowledge of the journey of semiconductor manufacturing from sand to finished chip. Students will understand the eco-system and how all of them come together to support the semiconductor industry

Who should attend? Non-technical audience who wants to know a high-level overview of semiconductor devices and how they are fabricated

If you are interested to customize an in-house course for your company, or for any other enquiries, please contact cindy@ssia.org.sg

Scan the QR code for more details

Emerging Stronger - Innovate, Connect and Collaborate

SEMICONDUCTOR BUSINESS CONNECT 2021

HYBRID EVENT

27 - 29 JULY 2021 (3 DAYS)

27 Jul 2021 | Tuesday | **Day 1**

The opportunities in the next wave of Semiconductor landscape

- Outlook of Singapore as the Innovation & Manufacturing Hub
- Supply Chain Re-configuration for the New Normal
- Strengthening of local ecosystem - challenges and opportunities
- Transformation journey towards I4.0

28 Jul 2021 | Wednesday | **Day 2**

Advancing Technology towards Intelligent Manufacturing

- Riding the wave of I4.0 towards Autonomous Manufacturing
- Leverage Data-Platform to drive industry 4.0
- Automated FDC: Machine Learning at the Edge
- Workforce Transformation – Driving Productivity in a Post Pandemic World

29 Jul 2021 | Thursday | **Day 3**

Enabling Regionalization

- Arizona Semiconductor ecosystem and its opportunities

SSIA
Singapore Semiconductor Industry Association

SEMICONDUCTOR BUSINESS CONNECT 2021 SPEAKERS

KEYNOTE SPEAKER

DR MARVIN LEE

Vice President, Semiconductors,
Singapore Economic Development Board

DR HAI WANG

Corporate Vice President,
General Manager, Product Supply Chain and External Manufacturing
Intel

TAN YEW KONG

Vice President and General Manager, Fab Management
GlobalFoundries

JAMIE NEO

Director,
Ink Supplies Operations
HP Inc

DR TAN PUAY SIEW

Research Division Director,
Manufacturing System Division (MSD)
SIMTech, A*STAR

TARIQ SHALLWANI

Solution Sales Lead, APAC,
Manufacturing & Distribution Industry Vertical
Hewlett Packard Enterprise

JAMES BRAMANTE

Data Scientist
INFICON

MELINA LEE

Product Marketing Manager-
Modern Work & Security
Asia Pacific
Microsoft

SOON HYUNG HWANG

Product Marketing Manager APAC,
Azure AI, Mixed Reality & IOT
Microsoft

Scan here for more info

27 - 29 JULY 2021 (3 DAYS)

SSIA
Singapore Semiconductor Industry Association

APPLIED MATERIALS
SOUTH EAST ASIA

make possible a
better future

2021 is a significant milestone for Applied Materials South East Asia as we celebrate our 30th anniversary.

Over the last 50 years, semiconductor technologies have changed the world. The recent years have been unlike any other in our lifetimes. Now more than ever, we need to continue blazing the trail in innovation, to re-imagine the future and to enable the technologies that shape it. At Applied Materials South East Asia, we are in a privileged position to do so with you – our team, our customers, our suppliers and our partners.

We look forward to building on our strong foundations – investing in our team, our capabilities and our infrastructure – to be truly ready for the future and to continue to make meaningful impact in the communities where we operate.

Let's work together to make possible a better future!

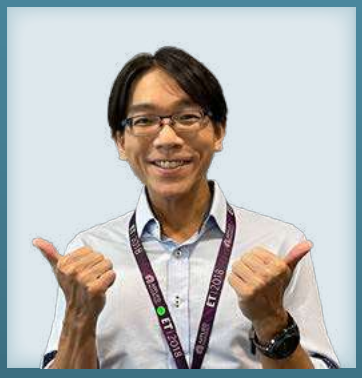
Yours sincerely,
Brian Tan
Regional President
Applied Materials South East Asia Pte Ltd.

APPLIED MATERIALS®
make possible



















30 YEARS

APPLIED MATERIALS
SOUTH EAST ASIA

SME Local Ecosystem Improvement Committee

The SME local ecosystem improvement committee was started in October 2020, led by a team of industry leaders with the objective to strengthen the local semiconductor ecosystem through closer collaboration between semiconductor manufacturers and their suppliers.

The committee invited 3 representative suppliers / SMEs who service the semiconductor industry, namely Kinetics, Richport and Aircond Network, to understand the challenges that they faced to support the Fab Operations during the pandemic. It was concluded that automation and digitalisation will help to improve their productivity by at least 20%, making the tasks less manual and repetitive, thus improving customers' support, as well as making the role more appealing to attract local talents to take up jobs in the industry.

Both Mr Chen Kok Sing, Corporate Vice-President and Singapore Country Manager of Micron and Mr CS Chua, President and Managing Director of Infineon Technologies, applauded all three SMEs for their transformation journey leveraging Industry 4.0 technologies to automate and digitalize. For instance, Aircond Network, with the data from their workflow digitalization project, will be able to assess other problems or opportunities for further improvement.

With this learning, the committee wants to extend this improvement experience to other local SME suppliers supporting our Semiconductor industry. Semiconductor Business Connect 2021 is the platform to support this sharing with the rest of the network - Riding the wave of Industry 4.0 towards Intelligent Manufacturing. Inviting the network to ride along this transformation.

Not only are we focusing on improving the innovation and productivity, we are also collaborating with AMTA - Advanced Manufacturing Training Academy, to help companies understand the gap and opportunity towards Industry 4.0 and also the trainings needed to upskill and reskill the workers for the upgraded jobs.

Mr Tan Yew Kong, Vice-President of Operations, GlobalFoundries Singapore, encouraged the team: "As we advanced with Industry 4.0, it is important to develop capability courses to support the growth of the local semiconductor ecosystem".

"Strong collaboration across the semiconductor ecosystem is critical to advance innovation in the thriving semiconductor industry. We look forward to more engagements and collaborations with our suppliers and partners," said Mr Chen Kok Sing.

Together, we will emerge stronger – through innovation and collaboration.

List of organizations participating in the SME Local Ecosystem Improvement Committee

- Aircond Network
- Applied Materials
- Denselight
- GlobalFoundries
- Infineon
- Kinetics
- Micron
- Richport
- Singapore Semiconductor Industry Association

SOURCE OF CONTENTS

SSIA
Singapore Semiconductor Industry Association

Partnering with Industry for Success

As Singapore begins the process of booting up her economy, the need for strategic, long-term partnerships between semiconductor manufacturers and their suppliers is now more critical than ever.

Innowave Tech understands the seriousness of this shift – speed is critical and any business that can lead the pack early will ultimately reap significant rewards. As such, they have partnered with their customers (manufacturing Fabs, OSAT, IDM) to develop customized end-to-end products and solutions that not only address customers' pain points, but more importantly provide key strategic advantages.

These include their popular InnoGlas, an augmented reality (AR) smart glasses solution that, among many custom computer vision applications, enables remote collaboration/assistance.

Remote assistance allows Fab or tool vendors' engineers to monitor and assist technicians from anywhere in the world. Engineers are no longer required to be on-site for troubleshooting, maintenance, and repairs, greatly improving time and cost efficiency.

Another fully customized solution is the Autonomous Smart Detector (ASD). Mounting their proprietary array of advanced sensors onto any type of AGV, the ASD can be programmed to patrol any area within a factory across different terrains. Equipped with Innowave Tech's advanced computer vision technology, the ASD detects various environment and equipment conditions, including flooding and smoke.

Fig. 1 Autonomous Smart Detector

A significant result of their partnerships with key industry members is the development of their Automatic Optical Inspection (AOI) tools. Leveraging on their domain expertise in computer vision and automation, Innowave Tech has developed and retrofitted several types of AOI tools - based on incredibly specific customers' requirements! These include defect types, defect sizes, UPH, wafer sizes, macro and micro inspection, with full integration to their enterprise systems.

While their experience in fab operations and technology development cannot be denied, the key factor in winning support from customers is their flexibility. From product design and deployment timeline to business models and payment methods, Innowave Tech adopts an agile and nimble strategy based on customers' needs.

Their strong local partnerships also enable them to overcome supply challenges, considerably reducing lead time – a key concern for the industry today. They also participated in several important SSIA programs, like the SSIA Automation Supplier Day for business matching and Professional Conversion Program (PCP) upskill/reskill initiatives, allowing them to stay deeply engaged with the industry.

Innowave Tech understands what it means to prove to their customers that in such challenging times, they are in it together. With increasing collaboration with customers and suppliers, they are in a great position to continue supporting the semiconductor industry.

Fig. 2 Automated Macro/Micro inspection station

SOURCE OF CONTENTS

INNOWAVETECH®

Cross Fab Visit GlobalFoundries and ST (17 Feb)

"Coming Together is the Beginning. Keeping Together is Progress. Working Together is Success."

Cross Fab Visit Skyworks and ST (3 Mar and 10 Mar)

The Automation and Robotics Consortium

Back in 2014, the Automation and Robotics Consortium was started by GlobalFoundries Singapore, SSMC and ST Microelectronics, with the publication of the white paper and further expanded to today's many more companies joining it, with the common vision to share Industrial 4.0 automation and robotics learning across Manufacturing Fabs in Singapore. Seven years have progressed and the team is continuing its strong momentum with great collaborations across the semiconductor industry, to collectively improve the productivity of the Fabs here.

To begin, GlobalFoundries took the lead to showcase its success stories on the implementation of wireless, self-charging AMRs (Autonomous Mobile Robots) running on its 200mm manufacturing floor. The members re-iterated that this sharing was for the common good of the semiconductor community, not to restrict the use of the IP application, so as not to reinvent the wheel. Through the years, the companies have been very munificent with sharing of their experiences, organizing cross Fab visits, fostering exchange of ideas for innovation and improvement. The consortium currently consists of companies like GlobalFoundries, HP Inc, Lumileds, Qualcomm RF360, Siltronic, Skyworks, SSMC and STMicroelectronics; and supporting partners EDB and SSIA.

Building a new advanced fully automated Fab is not an easy feat. Converting an existing fully installed 200mm Fab to be autonomous automated is a whole new set of challenges due to fully build up space constraint. SSMC shared that they have overcome the challenge and upgraded the Automated Material Handling System (AMHS) in their 200mm line. It was remarkable to see the engineering innovation that goes into the realization of robotics connectivity and automation integration. The new AMHS transforms production lots movement within machines, across tools and bays, between the main fab and the cleanroom extensions. This significantly optimized the shop floor efficiency while increasing manpower productivity and manufacturing quality. To make things happen, they emphasize not

only on the integrated approach of the Industry 4.0 technologies, but also the strategic partnership and strong collaboration with automation suppliers and partners, including academia.

In another meeting, Mr Dominic Tay, Engineering Director of STMicroelectronics shared on STM implementation of in-process control, to monitor and optimize the line performance. It was amazing how the team used STM's control box STM32, with various types of IoT sensors, enabling readout of process output to control the line performance. The inline control was not only implemented in the production line, but also extended to the facility with real-time detection. Everyone was curious how STM set up such a team for this in-line real-time process control transformation. It was done by their internal team, who learnt and trial on the job. As they progress and gain success for each process in-line control, they extend and build on the learning to the next process. It is important that the leader and the team have the vision and passion to make it happen. Kudo to the team.

This is also a wonderful platform where suppliers were invited to share their solutions to fix customer's problems. GlobalFoundries invited SixSense, a startup company that offers an AI-powered software solution for defect review and classification for yield acceleration and quality improvement in the Fabs, OSATs, and IDMs.

Ms Akanksha Jagwani, SixSense co-founder and CEO, presented the implementation journey of classifAI (Auto Defect Classification) at GlobalFoundries fabs in Singapore. It was highly encouraging to deep dive on follow-up topics such as how to make the data AI-ready, transfer learnings from a fab to another of an organization, and the cloud deployment compatibility of classifAI. Hope this session encourages other fabs to also embark on the AI journey and automate their defect classification using the best of the machine and human world.

Mr Cedric Poirel, Director of Engineering at Qualcomm RF360, finds the consortium helpful; as a platform for knowledge sharing on challenges and best practice, with professionals from the same industry. After the meeting, he was able to trigger some actions like starting potential collaboration with the company SixSense on Artificial Intelligence applied to Auto Defect Classification. He was thankful to the team for organizing such a consortium, which is very open and flexible.

Not forgetting to mention the support rendered by EDB to the consortium.

Dr Marvin Lee, Vice President, Semiconductors of Singapore Economic Development Board, commented: "It is remarkable to see how different players in the local semiconductor industry are capable of self-organizing and coming together during this industry upcycle, when competition is keen, to share best practices in addressing various technical challenges. This demonstrates the desire amongst our industry players to create a win-win environment for everyone and speaks to the maturity of our local ecosystem. The regular cross-sharing sessions also serve as a useful platform for local solution providers to showcase their tools and capabilities, fostering greater partnerships with the MNCs through technology adoption."

This Automation and Robotics Consortium is a wonderful platform to share with the rest of our Semiconductor network. Appreciate the technical leaders from the various companies, their leadership and collaboration, driving towards Industry 4.0 transformation, striding forward to bigger success.

SOURCE OF CONTENTS

Automation and Robotics Consortium

Driving Smart Manufacturing Innovation

INFICON provides the most comprehensive and advanced Intelligent Manufacturing Systems for the electronics manufacturing industry. Our products are proven to increase capital productivity, labor efficiency, and overall factory efficiency by presenting critical information, automating complex decision making, and delivering industry-leading execution capability—all in real-time.

- Hundreds of sensors for thousands of applications
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- Microelectronic industry's most holistic digital twin integrates your relevant data
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- Creates a comprehensive learning digital version of your factory

- Expanding suite of predictive applications optimizing factory performance
- Fab and metrology scheduling, Smart FDC, AI/ML, excursion prediction, advanced process control, process tool maintenance
- Scheduling more factories than any company in the world

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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 (PCBA, Cable Harness, Box Build, Equipment Build, Control/Electrical Panel) and equipment integration. CEI also designs and builds wafer handling equipment as an OEM and provides custom automation solutions.

CEI Pte Ltd design and build its own brand of equipment as an OEM to meet the semiconductor manufacturing industry needs for automation, hands off production, with a focus on wafer handling using robotics - Such as Equipment Front-End Module (EFEM), Wafer Sorter/Packing and Unpacking Systems, Wafer UV Eraser Systems, Wafer Macro & Micro Inspection Systems, 3rd Optical Inspection Systems and AMR/AMT – autonomous mobile robot material handler/transporter. CEI Pte Ltd also takes on customized automation project, working closely with customer's equipment team to realize their automation needs.

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ISO9001:2015 ISO14001:2015 AS9100D ISO13485:2016 Electronics AC7120 UL508A

Deionized Water Recycling Unit

DWR1722

Ultra-compact DI water recycling unit with extraordinary energy and water conservation

Multi-function ultra-compact DI water recycling unit

The DWR1722 is a DI water recycling unit for dicing saws with functions for DI water production, water temperature adjustment, filtration, and removal of suspended solids such as cutting particles.

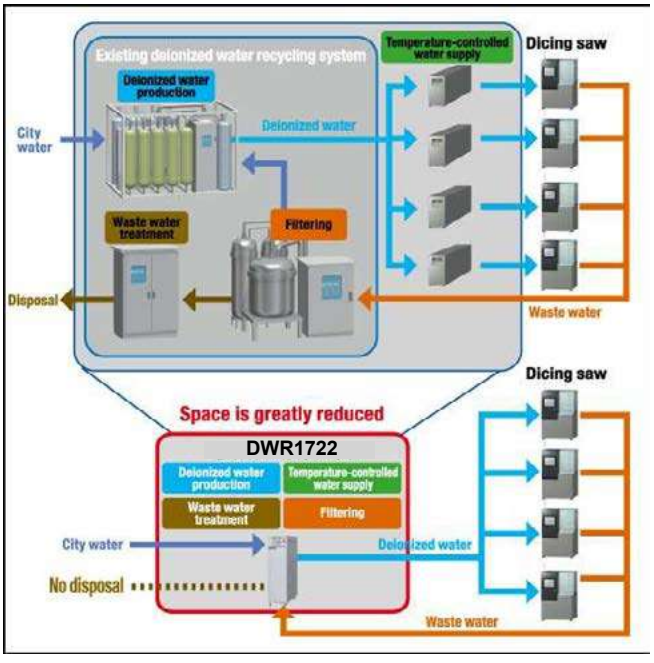
Providing environmentally friendly performance

The high recycle rate (99.5% with zero wastewater) exceeds what is possible with conventional recycling units and greatly reduces city water consumption. Since this unit can be installed adjacent to dicing saws, piping can be shortened and water temperature fluctuations as the water runs through the piping can be minimized.

Enabling efficient introduction into your facility

Different from the conventional large scale DI water recycling facilities, this unit can be introduced efficiently in accordance with the number of dicing saws installed. For the DWR1722, the RO unit and other functions have been reclassified as options, for a simplified standard specification.

DWR1722



CC Filter

Easy maintenance: The CC Filter and ion exchange resin can be replaced with a one-touch coupler connection.

CC Filter: The DISCO original CC Filter provides both high filtration performance and long life time. Suspended solids filtered out by the CC Filter can be disposed of easily together with the filter.

Easy operation: Operation of the DWR1722 can be linked with a dicing saw (optional). This reduces the load on the operator and the possibility of human error

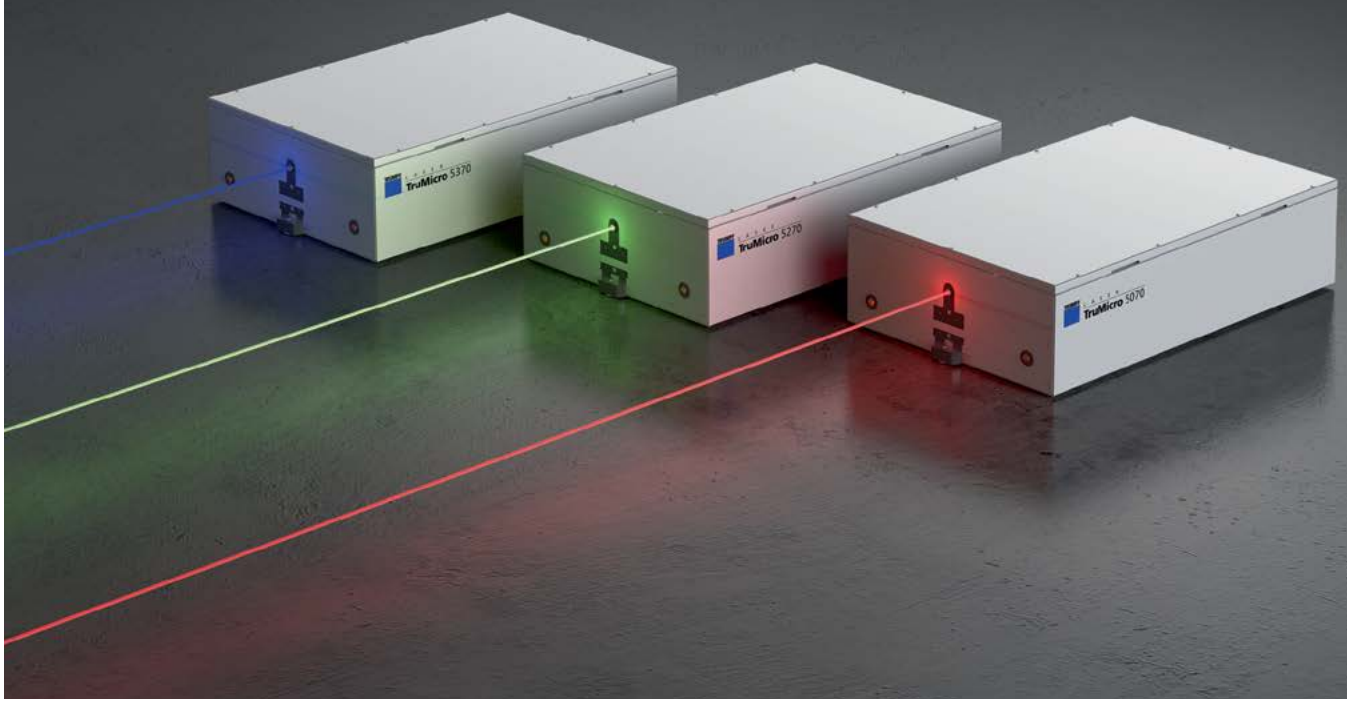
* Notes: - A separate water supply at a controlled temperature is necessary in order to cool the chiller unit. The DWR1722 can handle two dual spindle dicing saws or four single spindle dicing saws. When producing DI water from city water, an RO film unit (option) is required. For further information please contact your local sales representatives.

DISCO CORPORATION
www.disco.co.jp
Contact :- DHSsales@discosin.com.sg

Power of Choice

Modern laser technology can achieve outstanding results in almost any manufacturing process while making it efficient use of resources. When it comes to developing new products, you can rely on light to provide the right tool for your production environment. With its long history in laser sources for manufacturing, TRUMPF has developed lasers, optics and processes for a wide variety of industries.

Lasers can be used for "hot" processes as continuous wave and nano second lasers as well as for "cold" processes with femto and pico second lasers. Different wave lengths rounding up the flexibility of TRUMPF lasers to find the sharpest tool for your manufacturing needs.



Endless Opportunities : Semicon Spotlight

Join us in our Semicon Spotlight, focusing on photonic technologies in the semicon industry. Register for the event via the QR code and experience presentations on the fascinating technologies of the semicon industry, insightful discussions and live chats with our experts on **27th July, 2021** from **2 PM to 4 PM.**

www.trumpf.com

Enabling the Digital World

Robin Ng, Group CEO, ASM Pacific Technology (ASMPT)

ASMPT serves a diverse array of industry-leading semiconductor and electronics manufacturers globally. As the leading global hardware and software solutions provider for semiconductor and electronics assembly, our customers (chipmakers, foundries, IDMs, fabless, OSATs and more) use our tools to manufacture the many complex electronic components in all modern electronic and computing devices. A typical smartphone can contain components enabled by no less than six of our product lines, from mainstream bonders, CIS tools, LED tools, to various Advanced Packaging (AP) solutions that intricately create, combine and connect the many modules and systems serving various device functions.

We have progressively developed various pioneering technologies and solutions, often partnering very closely with customers. Within our 2,000 strong global R&D team across 11 R&D centres worldwide (with Singapore a major R&D node), we have generated more than 1500 technology patents (and counting).

Our consistent commitment to R&D is clear, with our average R&D investment around 10% of equipment sales for many years. This has helped make us a partner of choice, and innovation has been key to our success.

Our progress is guided by a simple, compelling Vision - "Enabling The Digital World", capturing the key role we play in enabling the manufacture of many of the 21st century's key technologies.

Our two business segments - Semiconductor Solutions (ICD, Optoelectronics & CIS) and SMT Solutions (Printing & Placement) - have strong leadership positions and provide a uniquely well-positioned portfolio for customers globally, helping them experience superior value from our solutions and services.

Let me highlight a couple of these.

ASMPT's AP solutions

These are helping create the vital components powering large, high-growth application areas such as:

- Automotive electrification – in CPU, GPU and XPU
- Data Centres, high-speed computing, cloud computing & AI
- GPUs for increasingly advanced Virtual Reality and Augmented Reality devices
- Complex components within smart wearable devices
- Others: including 5G infrastructure, factory robotics, telemedicine, and connected homes

Advanced Packaging (AP)

A wide range of current and potential AP markets are enabled by ASMPT's AP solutions. AP technologies help balance miniaturization with performance, and we have methodically built up the industry's most comprehensive product portfolio of AP solutions across our portfolio. These support a whole spectrum of customer needs, including 2.5D, 3D-IC, fan-in and fan-out wafer-level packaging, and system-in-package (SiP). Our AP solutions are delivering industry leading capabilities to customers, who serve in high end end-user markets like CPU, GPU, XPU and SiP applications.

Optoelectronics (LEDs)

With LED technology in displays from the smallest wearables to largest video walls, the market is demanding better and sharper picture quality across the board. ASMPT is a major player in Mini/MicroLED technology space, our broad suite of solutions positioned to capture significant market opportunities when they fully actualise.

- MiniLEDs - our innovation has focused on developing high-accuracy machines that enable ultra-small die processing capability in both laser singulation and die placement. This is compelling for meeting increasingly demanding product requirements for automotive displays, computer notebooks, and TV & video wall applications. Some key customers in Asia are entering into mass incorporation of our technology into their products.
- MicroLED represents next-generation display capabilities with many advantages over traditional LCD technology, e.g. significantly greater contrast, response, durability and especially energy efficiency. Presently expensive and slow to produce, our innovation has

ASMPT's AI of Things Approach

ASMPT's Ubiquity and Growing Demand Across Key End-Market Applications

focused on developing mass ('gang') bonding methods that enable quality at significant scale, to the order of thousands or even millions of units (depending on dice size/pitch) in a single pass process. Another example of innovation is our process control capability that allows extraordinary yield values of up to 99.9999%. We are working with some key players this area.

Artificial Intelligence of Things (AIoT)

Our deep, broad industry process experience and expertise makes us uniquely positioned to develop a compelling proposition for electronics manufacturing to leverage growing opportunities for AI and advanced data analytics to support digitisation efforts in manufacturing.

With some IoT capabilities already in our smart manufacturing solutions, we worked with some customers to connect their production lines to integrate information collection and analysis.

Marrying these capabilities with machine learning, ASMPT's 'AI of Things' approach represents a fundamental paradigm shift in manufacturing. It involves infusing AI capabilities into 'smart assembly lines' that enable equipment to independently examine and analyse data, make decisions and act based on those decisions. At highest level, this will deliver data-driven closed-loop insights and automation *without* human intervention.

The core of our AIoT platform is a software engine that uses advanced machine learning algorithms and ASMPT's own AI edge node capabilities to process manufacturing data and unlock a range of benefits. We are progressively integrating AIoT solutions into our broad product portfolio.

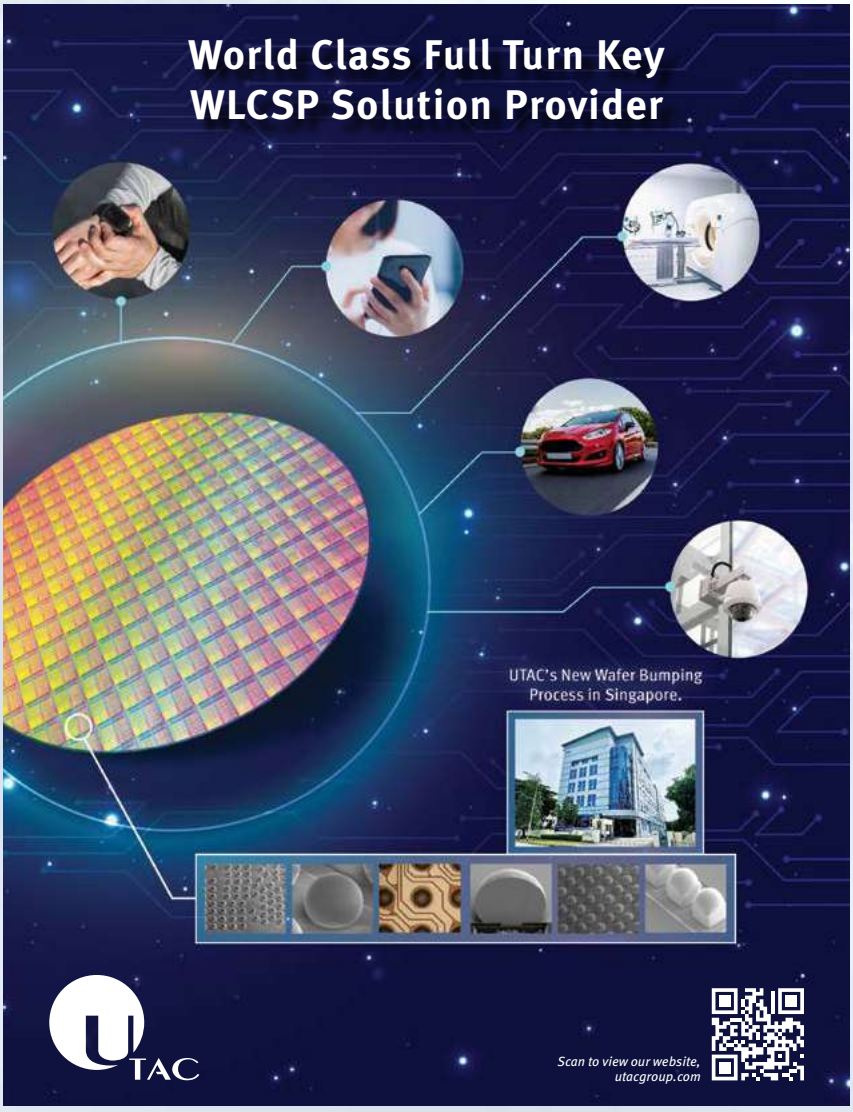
Looking Ahead

ASMPT's exposure to long-term sustainable market trends towards increased silicon content across devices and systems, e.g. 5G infrastructure, automotive electrification, consumer electronics, industrial systems, computers, displays, will help fuel growth, with our solutions increasingly used for new market applications.

Our position in core markets, commitment to innovation and enduring customer relationships bode well for our future. In this journey, we will always be looking for good people to join us. I believe we are just at the cusp of an era of massive connectivity, speed, and possibility.

SOURCE OF CONTENTS

ASM Pacific Technology



Enabling WLCSP Full Turnkey Solution Within The Island

Asif Chowdhury is the Senior Vice President of Marketing and Corporate Business Development at UTAC Group located in Singapore. He is also the head of UTAC Japan, in charge of Japan sales and business development. Over thirty years of experience in the semiconductor industry, he has worked in various aspects of semiconductor assembly and test industry including package design and development, product and business line management, R&D and business development.

In recent news, chip shortage continues to dent new electric vehicle rollout, what is your view of the demand and supply of semiconductor?

Asif: The market clearly underestimated the demand for semiconductors, especially for the automotive sector. The automotive market took a significant hit during the first half of 2020 due to COVID19 but the fast recovery during the second half caught many by surprise. The semiconductor companies were also unprepared for the recent acceleration of the sales of electric vehicles. With the demand surging from almost all other market segments as well, the whole semiconductor supply chain is struggling to keep up with the demand not only from the automotive customers but across almost all product markets.

Interestingly, COVID19 had some unintended and perhaps unforeseen, positive consequences for some of the key sectors of the semiconductor market. As companies implemented 'working from home' policy for better part of 2020, which is still being continued in most countries, it requires employees to have PCs and laptops, significantly increasing the sale of PCs and peripheral equipment. In 2020, 275 million PCs were shipped, almost a 5% increase from 2019 - highest year over year growth for PC shipment during the last ten years. Similarly, due to travel restrictions, people staying at home got more involved in on-line shopping, social media and watching TV series and movies in outlets such as Netflix and Amazon, soaring the demand for servers and storage which in turn created a significant demand in semiconductor devices, particularly for power products. This created

a demand that out-stripped the supply across the semiconductor supply chain. With the dip of automotive demand in first half of 2020, the capacity was allocated towards some of these other market sectors. We believe that the chip shortage, especially for the automotive sector, will likely continue through the end of 2021 at a minimum.

Understand that UTAC has recently acquired / built a new WLCSP facility, how will this support the immediate customer demand?

Asif: In January of this year, we acquired a wafer bumping facility in Singapore from a Taiwanese OSAT. We have been doing WLCSP back-end processing in Singapore for many years including wafer probe. So, the bumping facility nicely complements our WLCSP back-end operation and now enables us to provide our customer one-stop full turnkey solution within the island. We have won several new opportunities in the new facility for full turnkey as well as wafer bumping services. Some of our existing customers for WLCSP backend are working closely with us to do full turnkey in Singapore.

With the new facility expansion, how do you think the local SMEs and suppliers can support UTAC more?

Asif: The semiconductor supply chain is global. However, many of the equipment and material suppliers have significant presence in Asia and with many of the SMEs having their Asia headquarter based in Singapore. It is very helpful to have this direct access to key suppliers especially as we plan to increase our wafer bumping capacity in the coming years.

What is the opportunity for the local workforce?

Asif: We retained most of the employees when we acquired the wafer bumping facility. We plan to increase our capacity through next year. We are also investing in new technology related to wafer services such as plasma dicing. Hence, we plan to hire local semiconductor talents as we grow our wafer bumping business in Singapore and introduce new advanced process technology.

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UTAC

SSIA Welcomes New Members

ACCUPREDICT
MACHINES RUN FOREVER

AIRCOND.NETWORK

EMERSON

FASA

GSP

Hewlett Packard Enterprise

MPiCS INNOVATIONS
IDEATE • COLLABORATE • CREATE

PEP

PYXIS
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TRANSYSTEM

Vision
Technology for Factory Automation

XING TECHNOLOGIES

Virtual Groundbreaking Ceremony on June 22, 2021, attended by GOH Minister S Iswaran and H.E. Khaldoon Khalifa Al Mubarak among others

GlobalFoundries New S$5B Singapore Fab Ready in 2023

Celebrating GF's first shovel in the ground in over a decade in Singapore – this will be the first step of its plan to expand its global manufacturing footprint to meet increasing worldwide customer demand.

The global demand for semiconductor chips is growing at an unprecedented rate, with worldwide semiconductor revenue projected to increase 2.1 times in the next eight years. To meet that demand, GlobalFoundries has planned capacity expansions at all its manufacturing sites in the U.S., Germany and, starting with the construction of phase one of its 300mm Fab expansion, Singapore.

Transport Minister and Minister-in-charge of Trade Relations Mr S Iswaran attended the virtual groundbreaking ceremony in June as the guest-of-honor. He was joined by Managing Director and Group CEO of Mubadala Investment Company H.E. Khaldoon Khalifa Al Mubarak among other dignitaries as well as key GF executives.

"GlobalFoundries' investment of over 5 billion Singapore dollars will significantly increase its foundry capacity. The semiconductor industry has been in the spotlight in the last year because of the surge in demand for chips," said Minister S Iswaran. "It will add another 1,000 jobs directly, and many more indirectly through the supporting ecosystem of suppliers, contractors and service providers. Many of these are skilled jobs which meet the aspirations of Singaporeans. Beyond jobs, these investments also enhance the vibrancy of our economy and help us stay relevant to the world."

"We are committed to partnering industry leaders such as GlobalFoundries to address the global demand for semiconductors, especially in growth areas such as artificial intelligence and 5G. The semiconductor industry is a key pillar of Singapore's manufacturing sector, and GlobalFoundries' new fab investment is testament to Singapore's attractiveness as a global hub for advanced manufacturing and innovation. It will help GlobalFoundries' customers to strengthen the resilience of their supply chains, and also add to the vibrancy of our economy through the creation of good jobs for Singaporeans and business opportunities for our local enterprises," said Dr Beh Swan Gin, Chairman of the Singapore Economic Development Board.

Construction of GlobalFoundries' new Singapore Fab is underway

GF Singapore Campus located in the Woodlands Wafer Fab Park

Artist impression of GF's new Singapore Fab

"GF is meeting the challenge of the global semiconductor shortage by accelerating our investments around the world. Working in close collaboration with our customers and the Government of Singapore is a recipe for success that we are pioneering here and looking forward to replicating in the U.S and Europe," said GF CEO, Mr Tom Caulfield. "Our new facility in Singapore will support fast-growing end-markets in the automotive, 5G mobility and secure device segments with long-term customer agreements already in place."

"With construction already underway, our new Fab adjacent to GF Singapore Woodlands campus has more than 23,000 square meters of cleanroom space is planned to ramp up in 2023. This new Fab will be the most advanced wafer manufacturing facility in Singapore featuring GF's feature-rich technologies and solutions," said Mr KC Ang, Senior Vice President of Global Fab Operations, GlobalFoundries. "This will add a further 450,000 wafers per year, bringing the total capacity in our Singapore operations to approximately 1.5 million (300mm equivalent) wafers per year."

"On behalf of SSIA, I would like to congratulate GlobalFoundries on their new Fab here in Singapore. This new 300mm facility will provide jobs for Singaporeans and further support the growth of our local ecosystem" said Mr Ang Wee Seng, Executive Director of Singapore Semiconductor Industry Association (SSIA).

Semiconductor chips are more pervasive than ever, becoming one of humankind's most vital resources. From smartphones and automobiles to technology in schools and hospitals, modern society can no longer survive without them. GF is a trusted provider to more than 250 customers worldwide and is investing, in partnership with these customers and regional governments, to expand the capacity of its global manufacturing footprint to help right the demand-supply imbalance.

GF is currently the only semiconductor manufacturer of scale with a global footprint and this investment will play an integral role in meeting the challenge of the global semiconductor shortage.

SOURCE OF CONTENTS

Chipmakers Achieve Higher Equipment Availability with Lam's WCO

Preventative Maintenance

"What is wet, but dry?" might sound like a riddle, and the answer for plasma process tools are "wet cleans," an important type of preventative maintenance. The term "wet clean" comes from the early days of the industry when preventative maintenance meant disassembling the reaction chamber, submerging the quartz parts in acids, rinsing, drying and then reassembling the chamber. In today's high precision maintenance for process tools the only wet chemistry usually used is a lint-free wipe, moistened with deionized-water, but the name persists. So, maintenance is called "wet," but is actually "dry."

The goal of preventative maintenance is to keep the equipment running to specifications and to minimize any unplanned downtime, which is typically very disruptive, expensive and results in lost production. Regularly changing the engine oil, for example, is key to maximizing the life and performance of a car. Over the course of etching thousands of wafers, polymers of the removed material build up on the plasma process chamber surfaces. The polymer build-up needs to be managed for two reasons; they can be a source of contamination and they have the potential to change the chamber induction or conductance which can affect the plasma processing. Build-up is mostly managed through sophisticated plasma clean cycles but at some point, the chamber will need scheduled preventative maintenance. Preventative maintenance has seen a dramatic increase in steps and required precision. In the year 2000 there were typically around 35 steps needed for maintenance, nowadays this can exceed 150 steps and the precision required is so much higher. As a consequence, the failure rate of maintenance can often be as high as 30%, which is not only a loss of production, but a significant cost increase in wasted spare parts and test wafers.

Reactive Maintenance

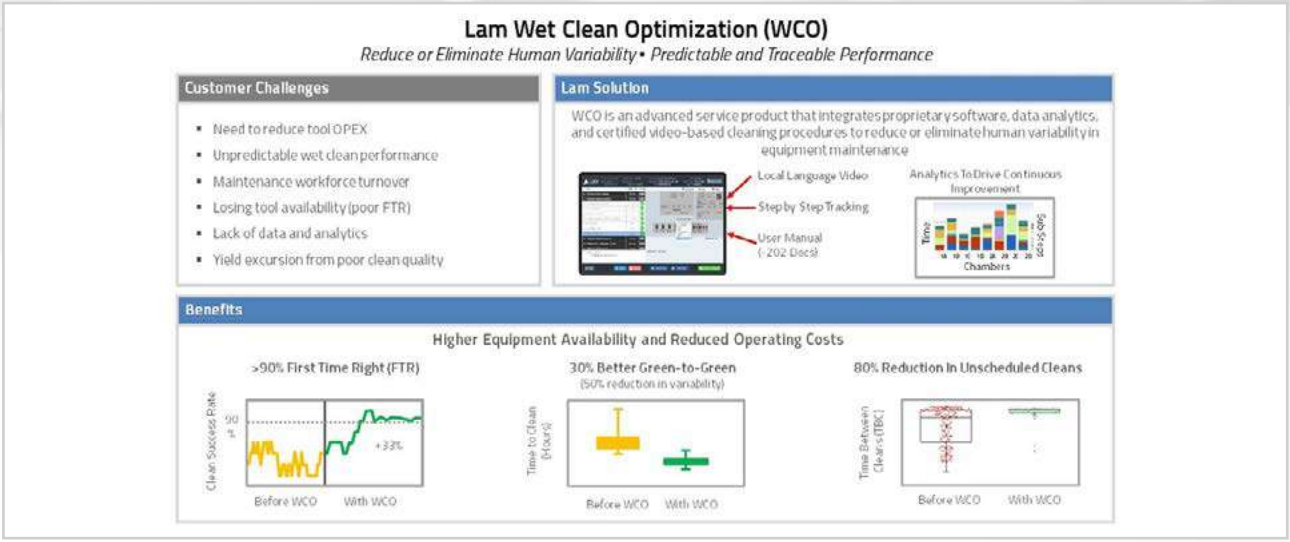
Repair equipment when it has failed

Preventative Maintenance

Perform tasks periodically with the goal of preventing equipment failure

Wet Clean Optimization

Lam's solution is a service offering called 'Wet Clean Optimization,' or WCO, which helps eliminate human variability and increases the success rate of preventative maintenance. WCO has been adopted on a significant number of etch and deposition chambers worldwide solving several customer problems, such as increasing production and significantly reducing wasted spending. This holistic solution combines specialized tooling, multi-media step-by-step instructions in local languages, data analytics, and support from an expert to diagnose problems with maintenance and to drive continuous improvement.



Specialized Tooling: Having the right tools at hand greatly increases productivity and efficiency, as well as worker safety. The WCO service cart ensures the right tools, both standard and custom, are available where and when they are needed.

Multi-media Step-by-Step Instructions: The step-by-step procedures and easy to follow documentation are invaluable to the maintenance teams who are commonly faced with the challenges associated with a high turnover of technicians performing preventative maintenance – this can be as high as 100% over 18 months.

Data Analytics: A key part of WCO is the included data analytics, which takes wet cleaning data and transforms them into information that can be used. A critical requirement to be able to drive continuous improvement is to have quality analytics to identify the areas in need of most improvement and a way to measure and quantify improvements.

Expert Support: A specialist engineer drives accountability, investigates mistakes and initiates systematic improvements.

Scenarios

To better understand the power of WCO, let's take a look at a couple of scenarios.

Chipmaker A was experiencing unpredictable wet clean performance of its plasma etch tools, which was affecting tool availability. The fab manager understood it was due to the high workforce turnover, but was unable to improve the situation with in-house training or other actions. With WCO, new employees simply followed the step-by-step on-screen instructions in their local language and consistent wet clean performance was quickly achieved. Yield excursion rates decreased, and tool uptime increased – both from faster wet clean times and from fewer unscheduled tool down situations.

Chipmaker B was ramping up a new chamber type and wanted to achieve high productivity as quickly as possible. By implementing the best-known methods provided by WCO, staff were quickly trained. The new chambers rapidly achieved high, consistent uptimes and a reduction in maintenance time variability.

Summary

WCO is an approach to help customers ensure they are successful and self-sufficient with their preventative maintenance. This is enabled through the integration of Lam's proprietary software, data analytics and certified video-based cleaning procedures. WCO is part of a larger portfolio of Equipment Intelligence® productivity solutions, all built on a foundation of Lam tool knowledge and data.

WCO

- Quickly achieve consistent wet clean performance
- Improve tool productivity
- Increase tool uptime
- Decrease yield excursions

SOURCE OF CONTENTS

Lam RESEARCH

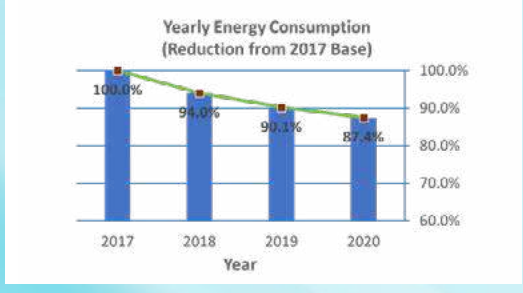
Lumileds – Commitment to Sustainability

Lumileds Singapore Pte. Ltd., 190 Yishun Avenue 7, Singapore 768925. Website: www.Lumileds.com

Lumileds is a global light engine leader, delivering innovative, high-quality and sustainable LEDs and automotive lighting to enable the inventors of next generation illumination to create truly breakthrough products. Lumileds is committed to protecting health and safety of our employees, contractors, customers and visitors; minimizing the impact of our environmental footprint; and delivering quality products that enable the transition to a low-carbon, green economy. Our approach is to integrate EHS aspects into our business processes and decision making for innovations, operations and supplier management.

Recognition for Sustainability efforts

Lumileds Singapore has been recognized for its continuous improvement on sustainability management and performance over the years. Lumileds was the first manufacturing plant awarded with Building Control Authority (BCA)'s "GREEN MARK PLATINUM" award in 2014, for its green credentials and it was subsequently renewed in 2018 and recently in 2021.



National Environmental Agency (NEA) of Singapore recognized Lumileds with "ENERGY EFFICIENCY NATIONAL PARTNESHIP (EENP)" award for 'Excellence in Energy Management' in 2015 and Public Utilities Board (PUB) awarded Lumileds with Watermark Awards "GOLD for Water Efficient Building" in 2012, 2013 and 2016.

Process Nitrogen Plant

Energy Conservation Programs

PROCESS NITROGEN PLANT INSTALLATION AND OPTIMIZATION: Lumileds used to haul in liquid nitrogen almost daily, to support usage in production tools. To make things greener (reduction of CO2 emission from LN2 tanker) and cost effective, on site Nitrogen Gas generation plant which offers a low cost, reliable, flexible and efficient means to deliver consistent, high quality gaseous nitrogen with cryogenic purity was installed.

With a capacity of 1800CMH (2 X 900CMH Compressors) the plant can be operated in two running modes. Energy usage in Mode-1 (1 compressor) & Mode-2 (2 compressors) are 350KW & 690KW respectively. Earlier, there was a need to run the plant in Mode-2 when nitrogen usage crosses 1050CMH. To prolong the need to operate the plant in Mode-2, Lumileds reduced the nitrogen usage onsite and increased the nitrogen generation capacity of the compressors from 900CMH to 1030CMH, by increasing the plant extraction ratio from 0.38 to 0.395. That has shifted Mode-2 operation to 1200CMH which delays the need to run the 2nd compressor.

	0.65KW/RT 5.8°C				0.63KW/RT 7.0°C								
Chilled water temperature (°C)[8]	3	4	5	6	7	8	9	10	11	12	13	14	15
MEES Level (kW/RT)	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.59	0.58

According to major chiller suppliers, the chiller efficiency can differ by 2-5% for each 1˚C deviation in chilled water supply temperature

PROCESS VACUUM PUMP UPGRADING:
Lumileds used to have 11set of oil sealed rotary vane process vacuum pumps located at different floor levels, to supply vacuum pressure of -25inHg to production tools through process vacuum network at level 2, 3 and 4, with the total energy consumption of 52KW. After the vacuum load profile study, it was found that the system configuration was inefficient. Lumileds explored alternative technology and adopted 2 units of VSD screw compressor with better operating efficiency of 0.018KW/CMH over the fixed speed rotary vane of 0.024KW/CMH @ peak load of 2210CMH. This installation also helped Lumileds in eliminating smaller individual vacuum pumps attached to the production equipment by supplying vacuum from the central network. Achieved an overall energy savings of 35KW, with an estimated cost savings of $45,000 per annum.

PLANT COOLING LOAD OPTIMIZATION:
Lumileds took a holistic approach in optimizing the plant cooling load, starting from air supply optimization to chilled water system optimization. The air supply optimization was achieved through minimizing air leakages from pressurised cleanroom, door gaps to corridors using cost effective door seal and by performing building cooling load study followed by AHUs/MAUs optimization (reducing fan speed/shutting down AHUs/ reducing fresh air intake) in achieving overall cooling load savings of 100RT. The cooling load study also helped in optimizing the supply air duct configuration by re-engineering the duct work which in turn optimized AHUs/MAUs cooling capacity and resulting in shutting down of AHUs/MAUs. Installation of UV-C tubes at AHUs/MAUs cooling coil improved the efficiency of AHUs/MAUs by keeping the coil clean from bio fouling which in turn reduces the pressure drop across the coil and reduces the downtime for maintenance.

Through the air supply optimization program, an energy savings of 70KW with an estimated cost saving of $90,000 per annum was achieved.

Chiller Plant Optimization:
After the completion of Plant Cooling load optimization, Lumileds has increased the chilled water leaving temperature set points for Chillers, from 5.8deg C to 7.0deg C gradually, which improved the Chilled water plant efficiency from 0.65KW/RT to 0.63KW/RT, which exceeds well above the Minimum Energy Efficiency Standards (MEES) of 0.67KW/RT @7.0deg C, set by NEA (refer to the table).

Carbon Emission reduction

Plasma Abatement System:
Lumileds Singapore embarked on carbon emission reduction in the manufacturing operation to minimize the contribution to global warming. Plasma Abatement System were installed to treat the PFC gases (C4F8, SF6, N2O) in the waste air stream from CVDC production tools, in order to reduce the overall carbon emission before discharging to atmosphere. Plasma Abatement System with the Destruction Removal Efficiency (DRE) of 95%, is helping Lumileds Singapore, in reducing the carbon emission by >90%, from the initial level of 63.4KTons CO2.

Plasma Abatement System

Lumileds is committed to provide a safe & healthy workplace through compliance & risk management and evaluation of environmental impact over the life cycle of a product, taking steps towards energy efficiency, more effective use of materials, extension of lifetime and reducing or eliminating hazardous substances. Also, by setting challenging targets and promote a Plan-Do-Check-Act systematic approach at all levels in the organization to ensure continual improvement.

SOURCE OF CONTENTS

LUMILEDS

Meeting Environmental Social Governance Goals with Water Recycling & Reuse

What is Environmental Social Governance (ESG) and why is it important for the semiconductor industry to address sustainability?

Environmental Social Governance (ESG) can be defined as corporate governance and its impact on social and sustainability matters. Good ESG practices can help companies build resilience by getting them ready for the impact of emerging issues – such as water scarcity. Businesses are also motivated to adopt ESG practices as it affects their ability to secure financing, as banks have increasingly incorporated it as an investment criteria to manage their risks.

Semiconductor manufacturing requires large volumes of ultrapure water. We have seen TSMC taking a proactive stance on wastewater treatment and water reuse in tackling the recent drought in Taiwan 2 months ago. In a recent news report, TSMC will gradually ramp up the treatment capacity of industrial wastewater and aim to generate 67,000 tons of water daily for the chip making process by 2024.

How can Veolia help manufacturers achieve their ESG goals?

Veolia's proven technologies are designed to deal with the significant challenges faced by the semiconductor industry – whether it is providing large volumes of ultrapure water and process water, managing wastewater, or developing advanced water reuse strategies, or offering water footprint audit services.

A common misconception that people have about environmentally friendly technologies, such as those for water reclamation and recycling, is that such solutions require high CAPEX to implement and involve greater effort and OPEX to maintain. This impression is largely contributed by reverse osmosis and ultrafilter membrane technologies. However, water recycling through non-membrane processes tends to be less costly and can better meet a company's sustainability and cost efficiency goals. In fact, Veolia's non-membrane solutions – such as the Actiflo® clarifier, Hydrotech discfilter, and Service Deionization – offer up to 95% recovery, consumes extremely low energy, and requires minimal chemicals. This allows businesses to save on energy and chemical consumption, reduce the need for clean-in-place or chemical enhanced backwashes, and to address their ESG goals simultaneously.

To learn how we can help you meet your sustainability goals, visit **www.veoliawatertechnologies.com/asia/** or contact Mehbub Khan, at **mehbub.khan@veolia.com**.

ABOUT THE AUTHOR

Mehbub Khan
Asia Pacific Market Manager, Microelectronics, Veolia Water Technologies

ITAP 2021 – An Inspired Vision

In an ever-changing and challenging landscape, manufacturers are in urgent need of Industry 4.0 solutions to help future-proof and build a resilient business. Over the next decade, the ASEAN manufacturing bloc is forecast to grow at an average annual rate of 4.9 per cent per annum to reach US$4.9 trillion. Despite setbacks in the region, Vietnam, Thailand, Singapore, Malaysia, and Indonesia have seen a high bounce-back-ability due to adaptability and integration of technology solutions for cost and quality considerations.

Into its 4th edition, the **Industrial Transformation ASIA-PACIFIC – a HANNOVER MESSE event** happening from **22-24 November 2021**, is an essential milestone for businesses to build a good core of talent and tech capabilities and, more importantly, to sustain these efforts vis-à-vis evolving customer needs.

With 'Stepping Up Capabilities with Industry 4.0' as the driving theme, the event focuses on driving transformation to help businesses to **START**, **SCALE** and **SUSTAIN** their journey in industry 4.0, starting from **People** to **Technology**, the event aims to inspire and prepare future workforces with the right technologies and skillsets.

Organised by Constellar and Deutsche Messe, the international partner and organiser of the world-renowned Hannover Messe, this event is strongly supported by various government agencies, including Singapore's **Agency for Science, Technology and Research (A*STAR)**, **Economic Development Board (EDB)**, **Enterprise Singapore (ESG)**, **JTC Corporation (JTC)**, **SkillsFuture Singapore (SSG)** and the **Singapore Tourism Board (STB)** along with their regional counterparts as well as global industry leaders and key players in the region's business ecosystem. It will forge ahead with a hybrid event, maximising physical and digital spaces with regional outreach and physical showcase that bring together stakeholders and targeted audience groups for networking, knowledge transfer opportunities to prepare, adopt and sustain efforts for the Future of Manufacturing.

Find out more at **https://industrial-transformation.com/**.

SOURCE OF CONTENTS

Industrial Transformation
a HANNOVER MESSE event
ASIA-PACIFIC

Semiconductor Tradewinds May/June 2021

As we approach the half way point in 2021, it has been a good year so far for the semiconductor industry, with semiconductor demand outstripping supply across almost all segments, and the outlook still looks good.

Global sales of semiconductors increased 3.6% in Q1 2021 compared to Q4, rising to US$123 billion according to the Semiconductor Industry Association. This is up around 20%, compared to Q1 2020 when the pandemic hit. Intel retained its top spot as the leading semiconductor manufacturer in terms of revenue in Q1 but Samsung gained on Intel and may take top spot in Q2 due to the resurging memory market. The equipment market had a good Q1 with global equipment billing increasing 21% compared to Q4 to US$23.6 billion with South Korea reporting the biggest increase in equipment spending.

IC Insights has raised its 2021 forecast, predicting the global IC market will exceed US$500 billion for the first time this year, and they are predicting further growth in 2022 and 2023 with sales exceeding US$600 billion in 2023.

Trendforce is forecasting the overall LED market will grow 8.8% this year to US$16.5 billion mainly due to strong demand from automotive/mini LED applications.

The top 10 foundries managed 1% quarter on quarter growth in the traditionally slow Q1 with total revenue of US$22.7 billion, and Q2 revenue is forecast to increase a further 1~3% QoQ. TSMC took top position in the foundry market with 55% market share with Samsung, UMC, GlobalFoundries and SMIC among the top 5 foundries according to Trendforce. Only Samsung and GlobalFoundries posted a revenue drop for 1Q21 due to Samsung's Austin Fab power outage and the GF's sale of Fab3E to VIS, respectively.

Trendforce reported that revenues of the top 10 largest packaging/testing OSAT (outsourced semiconductor assembly and test) companies reached US$7.17 billion in 1Q21. ASE took top spot with 23.5% market share followed by Amkor, JCET, SPIL and PTI.

Boom in Fab Construction Announced

The automotive chip shortage caused most major automotive makers around the world to continue scheduling short production line shutdowns due to the shortage of chips. Despite the shortage of chips, automakers worldwide are expected to sell around 87 million cars this year, almost equaling the number of cars sold in pre-pandemic 2019. The chip shortage is also impacting many other segments with components limiting supply of everything from mobile phones to consumer electronic goods.

This shortage has spurred a great increase in the amount of capex being announced worldwide. Most foundries and OSATs have announced plans to increase capacity of existing lines this year. In addition, according to SEMI, there are 29 new Fabs that are planned to start construction either this year or next, 19 of which will start construction in 2021, most of which will be 300mm Fabs.

China and Taiwan will account for the majority of Fabs built with 8 new Fabs planned in each country over the next 2 years, with America accounting for a further 6 Fabs. Half of the Fabs built will be foundries with memory Fabs accounting for a further 4.

All this new construction bodes very well for the equipment industry over the next few years. Whilst most equipment will only start to be installed from 2023 onwards, the next few years will also see high equipment demand from manufacturers increasing the capacity of existing lines. It is expected that equipment spending will exceed US$140 billion/year for the next few years.

In South East Asia, construction on 2 new large semiconductor facilities have been announced. GlobalFoundries has started construction of a new US$4 billion 300mm Fab at its Woodlands campus in Singapore. The fully automated new Fab will have capacity for 450,000 wafers/year when it is fully on line creating 1000 new jobs, and increase GlobalFoundries Singapore capacity to around 1.5 million wafers/year. Whilst in Malaysia, Austrian company AT&S have announced they will build a new US$2.1 billion PCB & IC substrate production plant in Kulim, Kedah. Construction will start in 2nd half of 2021 with production targeted for 2024. In addition, equipment supplier LAM Research is scheduled to start operations at its new US$250 million semiconductor equipment production facility in Penang in the 2nd half of this year.

Governments jostle to attract future Semiconductor Manufacturing Investment

As the chip shortage has highlighted the dependance on Asia for chip manufacturing, governments around the world continue to try to attract new semiconductor manufacturing investment locally. The US continues to inch forward to approve its bill to fund US$52 billion in grants for US based semiconductor-related manufacturing and R&D programs. The US bill has undergone another name change and is now known as the US Innovation and Competition Act which was passed in the Senate in June. In addition, a bipartisan group of U.S. senators in June proposed a 25% tax credit for investments in semiconductor manufacturing.

South Korea unveiled the K-semiconductor blueprint offering US$450 billion in government subsidies and tax incentives until 2030 aimed at keeping South Korea's position as a chip powerhouse.

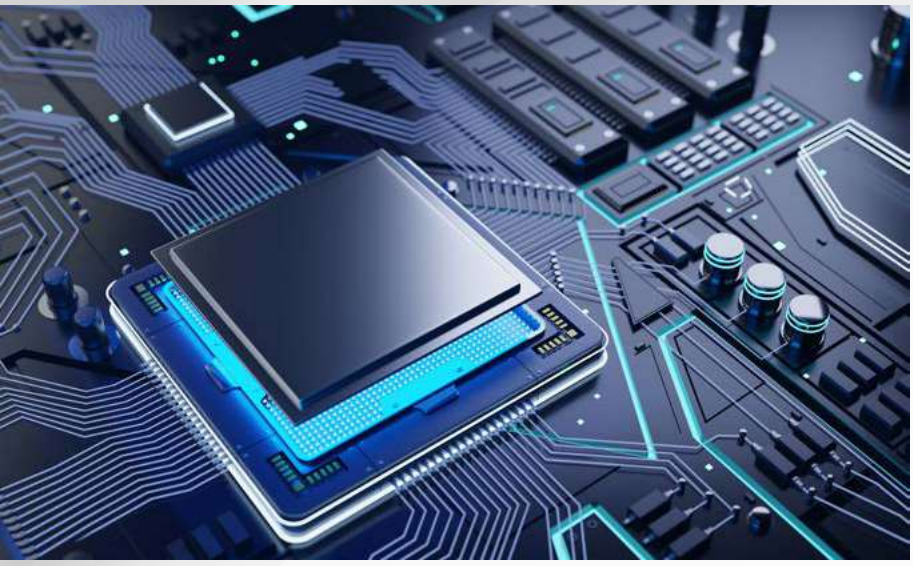
Whilst in China, President Xi has appointed Vice Premier Liu He to lead the development of 'third-generation' chips, as he renews China's push to make China self-sufficient in semiconductors.

Outlook

Looking ahead the semiconductor market outlook overall looks very good for 2021 and the current strong chip demand should continue at least until the end of the year. With semiconductors increasing capex this year to increase capacity, the outlook for the equipment industry also looks good and should continue for the coming years with the boom in Fab construction breaking ground this year and next starting to come on line from 2023 onwards. The strong demand creates lots of supply chain issues but it is a good problem to have.

ABOUT THE AUTHOR

Mark Dyson
Head of Global Subcon Manufacturing of Osram Optoelectronics



Henkel Adhesives Electronics – A Partner in Advanced Packaging Solution

Today, we have Kevin Tan of Henkel Electronics, Head of Sales for Singapore, Malaysia, and Indonesia in the electronics business unit. He oversees the business maintenance in the three countries and formulate the strategies to achieve sustained growth for the company.

What are the latest technology that Henkel Electronics Business Unit is bringing to the industry?

Henkel Electronics brings innovative adhesive solutions to accelerate electronics evolution. The latest is the Semi-Sintering paste technology which is a polymer resin matrix blended with sintering material. This technology is set to be a game changer in the high thermal conductivity realm. Traditional full sintering material requires attachment to either Gold or Silver surface and high capital expenditure investment in specialized equipment to run the process. With the semi-sintering technology, the industry can have a high thermal conductivity material which could be processed in standard atmospheric pressure just like a polymer-based die attach material. The semi sintered material is also able to meet automotive grade 0 reliability and is an ideal material for emerging high-power electronics.

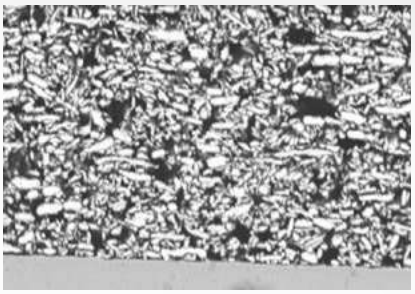
What are some of the advanced packaging trends you are seeing in the semiconductor industry?

From a material standpoint, for the automotive segment, the trend is tipping towards ultra-high thermal conductivity for solder replacement. Solder had served the semiconductor industry well for power packages and Cu clip packages for years, however, environmental concerns and reliability limitations have resulted into search for alternative solution.

Semiconductor sensors manufacturing have become extremely important. In sensors packaging, high refractive index material is an increasingly important trend particularly in devices that relates to light sensing. In this segment, a high degree of customization for adhesive material is required as every device has slightly different criterion.

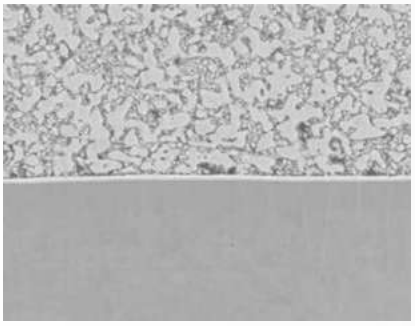
The consumer segment is more adventurous in terms of packaging trends and is the most active in wafer level packing to drive miniaturization and achieve Moore's law. Fan-in/out Liquid compression molding and wafer backside coating materials are key enablers for this trend.

ORGANIC DIE ATTACH



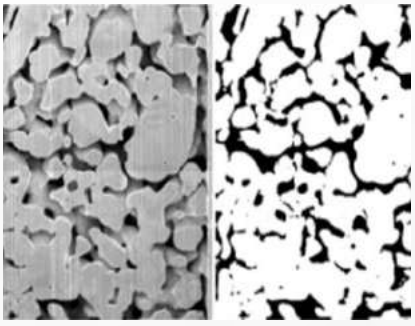
Traditional die attach with silver flakes. Limitations in thermal conductivity

SEMI SINTERING



Dense Silver structure with "micropores" filled with Resin. Improve compatibility to different surfaces and excellent thermal cycling performance

FULL SINTERING



Dense silver structure with micropores. Micro-pores could cause reliability issues during thermal cycling

What is Henkel's edge?

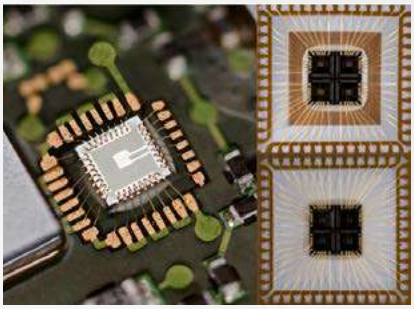
Henkel has been in the adhesive market with strong reputation for reliability and a proven track record for innovation. As a global company, we have demonstrated great leverage for business continuity even during times of crisis. Our procurement and business support team spans throughout the globe, giving us great adaptability to the ever-changing supply conditions, hence giving our customers a peace of mind.

Our dedication to innovation sets us apart from competitors, spending a significant portion of retain capital on Research and Development. Customers see us more as a solutions provider rather than a material supplier as we co-develop the whole process from application to testing with them.

Who are some of Henkel Electronics's customers and the reason for their long-term partnership?

Almost all the top Integrated Device Manufacturers are our customers for more than twenty years. Their long-term partnership with Henkel stems from our dedication on customized development for our customers. We set up regular roadmap sharing sessions to understand package development direction from our customers, which we then translate into specific quality characteristics required from the adhesive perspective.

We reach out into our chemistry toolbox and work with the customers to provide an entire solution for them. In addition, during the evaluations of our material, Henkel also sends field engineers to the customer line to define and optimize the process together with the customer engineers. In summary, Henkel Electronics customers value the customized innovation that we provide.



Where do you see the industry moving for Henkel Electronics?

The mega trends in the industry are the advent of electronic vehicles (EV), 5G telecommunications and integrated electronics. The number of electronic components In EVs is exponential compared to traditional vehicles. The components also have more functionalities, requiring complex packaging methodology. Die thickness is getting thinner due to miniaturization and hence die attach solutions with controlled bond line thickness and without overflow is becoming ever critical. Optics in electronics is also gaining prominence because they are used in Radars and Cameras in electronic vehicles and these entail novel adhesive solutions. For 5G telecommunications, the industry is moving toward higher switching speeds using SiC and GaN dies. This results in drastic increased demands for heat dissipation which in turn translate into higher thermal conductivity gap pads/fillers. To summarise, the industry is moving towards technology improvement in Thermal, Optics and Thin Die attach solutions.

SOURCE OF CONTENTS

Henkel

ARIZONA COMMERCE AUTHORITY | ARIZONA BECOMES "U.S. SEMICONDUCTOR CENTRAL"

As manufacturers from Detroit to Bengaluru look to the world's largest semiconductor makers to fill the high demand for microchips, those companies are increasingly looking at one place: Arizona.

Already a top-five state for semiconductor employment, Arizona has made global headlines lately for landing two record-breaking semiconductor projects.

In May 2020, Taiwan Semiconductor Manufacturing Company (TSMC) announced it had selected Phoenix as the site of the company's new fabrication facility. The company's $12 billion investment is projected to create more than 1,600 high-tech jobs and helped make Arizona the number one U.S. state for Foreign Direct Investment in 2020.

More recently, leading U.S. chipmaker Intel announced in March 2021 a new $20 billion investment to build two new semiconductor fabs east of Phoenix, leading to 3,000 new jobs. Intel's expansion in Chandler, Arizona—where it operates four high-tech fabs already—represents the largest private sector investment in state history.

HISTORIC ARIZONA ANNOUNCEMENTS AIM TO MEET HEIGHTENED DEMAND

Announced just ten months apart, these massive projects sent shockwaves around the world and placed Arizona at the epicenter of the race to meet heightened chip demand.

How does one state land not one but two of the world's largest semiconductor investments to date? Industry leaders point to a robust and high-tech workforce, ample energy, plenty of open space along with miles of modern transportation infrastructure, an environment relatively free of natural disasters, and a thriving innovation ecosystem that includes some of the world's top research universities. A strong base of semiconductor talent and expertise also plays a central role.

As far back as the 1950s, Motorola was developing groundbreaking transistors at its research and development lab in Phoenix. Motorola's operations would expand to three manufacturing sites across the metro area.

ARIZONA'S RECENT RECORD BREAKING PROJECTS

intel **$20 BILLION** INVESTMENT WITH 3,000 PROJECTED NEW JOBS

tsmc **$12 BILLION** INVESTMENT WITH 1,600 PROJECTED NEW JOBS

In 1980, Intel launched its Fab 6 and Assembly Test facility in Chandler. Among Intel's fabs currently in the state is Fab 42, the company's largest chipmaking factory in the U.S. and said to be the most advanced in the world. With its latest expansion, Intel will employ nearly 16,000 Arizonans and will have invested more than $50 billion in the state.

Additional semiconductor industry leaders operating in the state include NXP, ON Semiconductor, Qualcomm, Microchip, Benchmark Electronics, and Broadcom.

In total, more than 200 semiconductor manufacturing establishments currently employ more than 22,000 people in the state. It should come as no surprise, then, that Forbes recently labeled Arizona, "U.S. Semiconductor Central."

A WORKFORCE FUELED BY INNOVATION

With thousands of new jobs in the semiconductor industry coming online over the next few years, the United States' second fastest growing state stands ready to meet the workforce demands of today and tomorrow.

Arizona is home to one of the world's most robust and diverse workforces. The state's interconnected talent pipeline includes world class public universities, some of the largest community college districts

in the nation, strong public sector support and the engaged participation from industry partners.

Recently, labor market analyst Emsi ranked the Phoenix metro area No. 1—again—on its 2020 Talent Attraction Scorecard for the region's ability to attract and retain high-quality workers. This ranking was driven by Phoenix's No. 1 regional competitiveness score and 18% growth in skilled jobs.

TOP PROGRAMS
FOR
TOP ENGINEERS

#1 MOST INNOVATIVE UNIVERSITY
ahead of Stanford & MIT

2ND MOST ENGINEERING GRADUATES
with a master's or doctorate degree in the western United States

NEARLY 9,000 GRADUATES
in relevant fields for the semiconductor industry in 2019

NEARLY 25,000 STUDENTS enrolled in Arizona State University engineering programs (170% increase since 2010)

Driving this talent growth are universities such as Arizona State University (ASU), which has been named America's most innovative university six years in a row by *U.S. News and World Report.*

At ASU's Fulton School of Engineering, the largest engineering school in the country, nearly 25,000 students are enrolled in engineering programs —a 170% increase since 2010.

ASU plans to build on this growth even further. In the fall, the university will launch Fulton's newest school, the School of Manufacturing Systems and Networks, which will prominently focus on the growing semiconductor sector.

With renewed attention from the public and policymakers alike, there may be no better time for advanced manufacturing investments in Arizona.

THE SEMICONDUCTOR TALENT EPICENTER IS IN ARIZONA

#1
County for Attracting and Retaining High Quality Workers: Maricopa County
(Emsi, 2020)

#1
Fastest-Growing County: Maricopa County
(U.S. Census Bureau, 2019)

#1 **Net Migration: Phoenix Metro Area**
(U.S. Census Bureau, 2019)

#2
State for Job Growth
(Bureau of Labor Statistics, 2019)

#2
State with the Fastest-Growing Population in the U.S.
(U.S. Census Bureau, 2020 estimates)

SMART POLICY DRIVING FURTHER INVESTMENTS

In June, the U.S. Senate passed the United States Innovation and Competition Act of 2021 with bipartisan support. The legislation includes $52 billion to boost domestic semiconductor manufacturing and research and has been a priority of President Joe Biden as well as congressional leaders.

Arizona also has taken recent steps to improve the state's already top-ten status for business investment. In June, legislative leaders and the state's governor, Doug Ducey, passed historic tax reform legislation that reduces rates for all taxpayers and decreases commercial and industrial property taxes.

Combined with the state's decades-long leadership in the global semiconductor industry, these reforms have Arizona poised for further explosive manufacturing growth.

In a world marked by uncertainty, there's one thing business leaders and investors can count on: Arizona's impact on the semiconductor industry is only just beginning.

6G and Beyond: The Journey Starts Now

At the International Workshop on Future Communications, experts emphasised the key role of emerging technologies like 6G in driving a more connected, digitalised world.

At the **International Workshop on Future Communications**, leading scientists across the industry and academe discussed 6G networks and the possibilities offered by emerging technologies. Aside from 6G, speakers also delved into topics ranging from blockchain-empowered Internet of Things networks to optimal design frameworks for machine-to-machine communications. The workshop was organised by the Singapore University of Technology and Design's (SUTD) Office of Research, on 23 and 24 June 2021.

Beyond ultra-fast streaming, there are several reasons driving the need for 6G, highlighted SUTD's **Professor Tony Quek**, Head of the Information Systems Technology and Design pillar, in his talk.

Prof Yeo Kiat Seng, Associate Provost for Research and International Relations, SUTD, gave the opening address at the workshop.

While current mobile networks engage two senses – sight and sound – 6G could lay the foundation for the "Internet of Senses", which will rely on virtual/augmented reality and artificial intelligence to expand the spectrum of digital sensory experiences. For instance, 6G's extremely low latency may realistically recreate tactile sensations that take our bodies milliseconds to register.

Prof Quek says that there is much work to be done before 6G becomes a reality. "6G will be commercially available in 2030, but we do not yet have a clear picture of the technology–this is the biggest challenge that all researchers are facing now," he explained.

As the **fifth-most influential research institution in telecommunications globally**, SUTD is set to play a key role in driving future communications research. "In our next phase of growth, SUTD will be actively seeking out partners to identify and seize opportunities, leveraging upon our unique value proposition in twinning technology and entrepreneurship in co-advancing innovation," explained Prof Yeo Kiat Seng, SUTD Associate Provost for Research and International Relations during his opening address at the workshop. "The future communications workshop will enable SUTD to build new networks to facilitate innovation going forward."

To read the full article, please visit SUTD website **https://www.sutd.edu.sg/About/happenings/News/2021/7/6G-and-beyond-the-journey-starts-now**

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Wisdom of a Homegrown Tech Start-Up Expert

We all have heard of the term intrapreneur, and if you want to be one, the question is, whom could you learn from to ensure greater success? Well, I decided that an entrepreneur has the same skill sets that you should be emulating, so let's take a peek at how they think and bring an idea to market.

I interviewed Deb Mazumdar, the co-founder of Optimax Group Singapore and Newton's Meter Singapore (www.newtonsmeter.com). He is a hands-on professional with an impressive 22 years of diversified global working experience with Dow Chemicals / Sino Chem, Asian Development Bank, and R.C.L. Besides, he has ten years of managing implementation of consulting services delivery and 11 technical patents.

So, he seemed the perfect person for me to find out "How are Tech Start-ups different from other Start-ups?"

He related there were three distinct differences.

The first was what the product looks like, that is, the proposed physical features of the proof of concept (P.O.C.). The second is the complexity of the engineering design, and thirdly thinking about how to scale the product and the associated manufacturing challenges from D.F.A. to D.F.M.

So as an intrapreneur, you have to think through in its entirety all the potential challenges that you might face, especially if you need to sell the idea to senior management.

Then I asked him what was needed to ensure the idea for a product was to be successful. He provided three more suggestions and something to watch out for.

First suggestion, have a clear proof of concept. Second is something not everyone pays attention to, ensure you have a team with the complementary skillsets for creating

the P.O.C. requirements. The third is what he called a "not so perfect" or rough start to finish timeline with milestones. Why "not so perfect", as things could change as unforeseen challenges come up.

Then he cautioned, "a big watch out that one must avoid is waiting for perfect data, perfect analysis because by the time one gets the perfect analysis, (especially if it takes too long) the situation might have changed." So even though the analysis or your data is perfect, it has little relevance in its usability and market timing.

Then my next question I asked was, "What is the best way to structure a tech startup?" and he immediately provided these suggestions:

1. Create A Team: But keep it small, a max of three
2. Divide the Work: Track with strict milestones against a timeline
3. Expense proofing: Ensure someone keeping a log of the expenditure
4. Mistake proofing: Keep a lesson learned Log with an A3 report

So what can we learn from these suggestions that Deb has provided us? My thought is simple, create a checklist and think through if you have all these in place for your intrapreneurial idea or startup.

Define your product / Idea:

- Do you have a P.O.C?
- Do you have the exact design details?
- Do you know how you can scale the idea / product?

Ensuring Success of the Idea:

- Do you have the right team with Complimentary Skillsets?
- Do you have a set of Milestones and Timelines?
- Do you have supporting data and analysis?

Structuring Your Team:

- Do you have a small initial team?
- Do you have a system for tracking expenses?
- Do you have a lesson learned, Log?

Whether you want to be an entrepreneur or intrapreneur, looks like you need a few must-haves that you need to put in place. Otherwise, you will be halfway through and not have all the pieces in place and then go back and redo or backtrack on your project.

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ITE students presenting their industry proof of concept projects to Intel®

Intel and ITE Collaboration: Building Digital Readiness for Singapore Competitiveness

Covid-19 and digitalization have changed the way we live, play, learn and work. 75% of Singaporean firms are accelerating digitalization due to Covid-19 as per IDC Asia Pacific. Businesses are increasingly looking at using Artificial Intelligence (AI) to improve efficiency, reduce costs, multiply product and service offerings, and support decision-making. However, there are concerns about the availability of talent and skills in this era of double disruption of Covid-19 and automation. As per Morning Consult – IBM Global AI index 2021, limited AI expertise or knowledge is identified as the biggest barrier to AI adoption by 39% of business leaders. Demystifying and democratizing AI skills for people will be critical to rebuild economies and drive competitiveness. Broader digital access and readiness is the first step for digitalization to succeed and build an inclusive digital society. The industry, academia and government must come together to enable digitalization and local innovations necessary for the economic growth.

Intel's corporate purpose is to create world-changing technology that improves the life of every human on the planet. Intel strives to create a more responsible, inclusive, and sustainable future, enabled through technology, and the expertise and passion of its employees. Intel is committed to helping make technology fully inclusive and expanding digital readiness. Digital readiness encompasses the technical and social skills, a deep trust, and the ability to use technologies responsibly and effectively for broader socio-economic benefits. To accomplish that, Intel has rolled out the Intel® Digital Readiness Program, which aims to empower wider non-technical audiences with digital skillsets, mindsets, toolsets and opportunities to use technology responsibly in an AI-fueled world. Intel is expanding the program to 30 countries, enabling access to 30 thousand institutions, and training 30 million people for current and future jobs by 2030 with the support of government and academia. Intel has to date trained and certified more than 150000 people across 8000 institutions in 15 countries.

In Singapore, the Institute of Technical Education (www.ite.edu.sg) is an excellent example of a digital readiness program partnership. Intel and ITE have a long-standing relationship and have rolled out together multiple initiatives for Singapore tech-ecosystem:

- AI for Citizens: for developing awareness and understanding of AI among the public. More than one thousand people have already completed the micro-learning program since its launch on 21 March 2021. Anyone interested can take the 4-hour program at https://www.ite.edu.sg/courses/course-finder/course/short-course-ite-intel-ai-for-citizens-a-global-ai-public-awareness-program.
- AI for Youth: for empowering next-gen students on AI tech & social skills and getting these students AI-ready. More than 3500 students have taken the course, and students regularly create technical solutions, and work on joint projects with industry partners such as using vision AI to ensure personal protection equipment is worn at construction site.
- AI reskilling & upskilling for current workforce through a suite of Certificate of Competency (CoC) certifications: ITE has created a set of CoCs with Intel, which is supported with SkillsFuture funding, for upskilling the local industry workforce. Local SMEs such as CosmoFuture and Humankind Design Pte Ltd have benefitted from these trainings. Furthermore, ITE is launching new Higher National ITE Certificate NITEC in Technology - AI Applications in October 2021.

ITE has collaborated with Intel as trusted partners for addressing Singapore's growing technical ecosystem needs and offer joint certifications. Intel offers content, training, support, and technology guidance, while ITE implements trainings and offers mentorship for target audiences.

Singapore has a golden opportunity to become one of the AI capitals of the world and build lasting national competitiveness. Intel and ITE are committed to help Singapore's tech ecosystem and local industry players build digital and AI readiness for that purpose. For companies looking for AI skilling solutions, they can contact ITE on **sts1@ite.edu.sg**.

ITE student innovators presenting to ITE and industry on 16 March 2021

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Celebrating the Launch of SWE@SG on International Women in Engineering Day

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SSIA is a supporting partner for the SWE@SG Launch Event

The 23rd June is a special day dedicated to all women engineers as we celebrate INWED, International Women in Engineering Day. This year, a group of passionate like-minded women came together to achieve one common goal, that is, to make INWED 2021 extraordinary for women engineers in Singapore by launching the Society of Women Engineers Singapore, SWE@SG. SWE is no stranger to many, it is the world's largest advocate and catalyst of change for women in engineering and technology for nearly 70 years. With SWE closer to home, we are all truly excited about the endless potential collaboration opportunities this platform can enable.

The 2.5 hours SWE@SG Launch event was a success. We had nearly 400 participants from 68 companies and societies joined us virtually. We are honored to have Dr Richard Kwok, President of The Institution of Engineers, Singapore (IES) to join our event as the Guest of Honor. The highlight of the event was the launch ceremony. We had the SWE@SG leadership team, including Ms Jamie Neo, President of SWE@SG, Assoc Prof Sierin Lim, Vice President of SWE@SG (Academic), Dr Mousumi Bhat, Vice President of SWE@SG (Corporate), to join Dr Kwok on screen and did a countdown sequence together. It was also a special day for the four university affiliates NTU, NUS, SUTD and SIT that launched together on INWED. Themed as "All Together: Empowering Women Engineers in Singapore", the event featured experts from leading engineering firms and academia to discuss key industry policies, actions to enable parity for women leadership in STEM, and trending topics on innovations, access and progress for all.

In the Innovation for All segment, our speakers shared about the latest innovations and current trends in technologies. We learned that innovation was both a skillset and a mindset that could be nurtured. Factors contributing to responsible innovation included understanding the needs of humanity and the changes in lifestyles, to keep abreast of the ever-changing policies, stability of supply chain and environment impact.
In the second segment, Access for All, it was amazing to learn that many societies and corporates were actively supporting women initiatives in Singapore. Finally, in Progress for All segment, SWE@SG kicked off the "Gender Parity in STEM Leadership" research. The presented data made it clear that now is the time for all-hands on deck to address this issue. We ended the segment with an engaging panel discussion on the topic and actions to "propel women leadership in engineering".

We caught up with the SWE leadership team and here is what they have to say.

"Never under-estimate the collective power of women-in-action! I am thankful to the founding members, exco and committee members whose passion brought us together. Within a few weeks from early February, a couple of us went from chatting to pulling on our contacts and SWE@SG affiliate was accredited in March! With the official launch on 23 June 2021, we wanted to create a platform to empower women to succeed and advance in the field of engineering and be recognized for their life-changing contributions as engineers and leaders. Placing our little red dot on the global SWE community, let us work together towards SWE's vision of a world with gender parity and equality in engineering and technology." said SWE@SG, President, Ms Jamie Neo.

"Thank you all for the overwhelming support. Our journey has just begun. We have only scratched the surface of the problem that is pervasive in leadership in STEM and look forward to starting our research in earnest so as to provide a roadmap for parity in STEM leadership by 2030", SWE@SG, Vice President (Corporate), Dr Mousumi Bhat.

"Singapore needs more women engineers, and now it is more important than ever that we empower them to Innovate by providing them Access and ensuring their Progress! It takes the whole island of individuals with aligned missions to drive change for women in engineering in Singapore. From industry leaders and professionals, university officials, faculty members, students, to members of our societies. SWE@SG will serve as an inclusive platform, for industry and academia to come together to elevate the engineering and technology profession as the career of choice for women. We invite all of you to join us. Visit our website and social media channels for events, initiatives, and partnerships." SWE@SG, Vice President (Academic), Prof Sierin Lim.

HR Tech Festival Asia Online 2021: Defining HR's Roadmap for 2022

Taking place from September 21-23, Asia's largest HR Tech event of 2021 will highlight the key drivers of leadership, culture and employee experience in 2022.

As markets rebound and companies demand better results post pandemic, organisations are expediating plans to prepare themselves for next year. During this time-critical period in the year, HR leaders are gathering their teams to start strategising and taking stock of the changing business needs as they head into 2022.

Join us at the award-winning HR Tech Festival Asia, now in its 20th year, where we will once again bring together the region's biggest HR community, global influencers and industry experts together to network, share and inspire. Powered by ADP, HR Tech Festival Asia Online 2021 is taking place from September 21-23 and is brought to you by the industry's global leading HR media and event organisers HR Tech Conference Las Vegas, HRE Magazine US, HRM Magazine and HRM Asia.

The entirely virtual event will allow you to hear new ideas on how to breathe new life into your HR strategies for 2022, and source new technologies from the region's largest gathering of global solutions providers together in one virtual expo.

Besides hosting the largest virtual gathering of HR and business leaders from Asia, HR Tech Festival Asia Online 2021 will also feature an exciting lineup of some of the most forward-thinking personalities and authorities in the HR field.

Join distinguished names such as Lars Schmidt, Author and Founder of Amplify; Josh Bersin, Global Industry Analyst and Dean of the Josh Bersin Academy; Lucy Adams, CEO of Disruptive HR; Jon Ingham, Director of the Strategic HR Academy; and more, as they discuss what will shape the future of work in 2022 and beyond.

Many of the speakers lined up for HR Tech Festival Asia Online 2021 will be speaking exclusively in Asia for the first time, and will provide fresh thinking to solve familiar challenges, as organisations in the region plan the execution of their HR roadmaps in 2022.

Delving into key workforce issues such leadership, culture and employee experience, these speakers will examine how organisations can prepare for the new paradigm of talent management, provide key tips on how to build and lead HR teams that are relevant in a disrupted world, predict how next generation HR will look like, and propose a people-centric approach to employee experience.

Scan the QR Code to register for HR Tech Festival Asia Online 2021 and don't miss your only opportunity this season to be part of a regional event which delves into in-depth discussions across key workforce issues such leadership, culture, technology and employee experience.

Visit **https://www.hrtechfestivalasia.com** for event programme and speakers.

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