SINGAPORE SEMICONDUCTOR VOICE

SSIA
Singapore Semiconductor Industry Association

SINGAPORE SEMICONDUCTOR 50

BUSINESS OUTLOOK 2019

50 YEARS 50 TALENTS

50TH ANNIVERSARY SPECIAL FEATURE

AN ERA OF NEW TECHNOLOGY

VOLUME 01

MCI (P) 057/10/2018

SKILLSFuture
Leadership
Development

SINGAPORE SEMICONDUCTOR LEADERSHIP ACCELERATOR PROGRAMME

Organizer:

SSIA
Singapore Semiconductor Industry Association

In partnership with:

human capital
leadership institute

FOREWORD BY EXECUTIVE DIRECTOR

Over the past months, as I started the campaign to rally support to organize the Singapore Semiconductor 50 dinner celebration, I constantly pitch the same story about how we have reached a key milestone for the semiconductor industry in Singapore. It all started 50 years ago, and how the industry has grown to become one of Singapore's largest industries and a key pillar of our economy. This is the year we celebrate the golden jubilee of semiconductor industry. However, I realized right from the start, this is not about another event we organize to celebrate together. It gives us an opportunity to reflect on half a century of success this industry has made in Singapore, and this motivates us to make sure that Singapore's semiconductor industry will continue to be successful today and the future. It gives us an opportunity to be inspired by our pioneers, to truly appreciate what they have done for this industry over the past years.

That is the reason I joined SSIA, a new and exciting organisation that is transforming. Though SSIA has been around for more than a decade, it is only in recent months that it has started to play a more active role for this industry. It is a society that is evolving to better support the semiconductor industry, in line with Singapore's Industry Transformation Map (ITM). The new SSIA will have an expanded secretariat team to better support the increased activities that brings greater values to its members, and thus creating a positive impact to the semiconductor industry in Singapore and this region. Some new initiatives SSIA have started over the past quarter is the HR Roundtable, Tech88 (student outreach initiatives) and the launch of this publication. Look forward to more activities next year such as charity golf tournament, career fairs to support this industry talent demand and several workshops with specific topics, in line with the needs of the companies, both MNC and SME.

Singapore Semiconductor Voice is SSIA's publication for the semiconductor industry. It will be published once every two months, in both hard and soft copy. The goal of this publication is to create a platform to bridge the various companies in this industry with the IHLs and government agencies. This is the publication where we can read about the latest news and trends of the industry, understand the researches and activities in schools and universities and to know more about the various initiatives by the government in helping this industry. I am excited to have the launch edition of this wonderful publication to coincide with Singapore Semiconductor 50 celebration. The timing couldn't be better.

I would like to congratulate our semiconductor industry for its remarkable achievements and success through these 50 golden years.

Ang Wee Seng

EDITORIAL TEAM

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

ADMINISTRATION MANAGER
Sandy Chan
sandychan@ssia.org.sg

PROJECT MANAGER
Daphne Leong
daphne@ssia.org.sg

MARKETING AND COMMUNICATIONS EXECUTIVE
Kamaliyah Majeed
liyah@ssia.org.sg

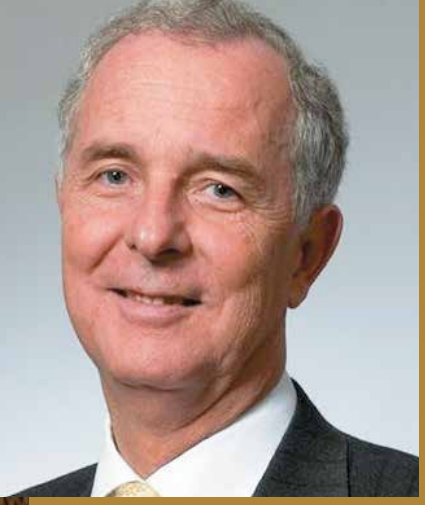
BUSINESS DEVELOPMENT EXECUTIVE
Amelia Yeo
amelia@ssia.org.sg

PROJECT EXECUTIVE
Delia Cheung
delia@ssia.org.sg

PUBLISHING AGENT
Superskill Graphics Pte Ltd

SSIA EXECUTIVE COMMITTEE

SSIA BOARD OF ADVISORS



MESSAGE BY CHAIRMAN

50 years of semiconductor industry in Singapore celebration - From basic Back-end to state of the art Front-end

In Singapore, the first footprint of the semiconductor started in 1968 with the setting-up of National-Semiconductor's Back-end manufacturing operation.

The technologies at the time were based on Zener diode and simple power transistors, then RTL, DTL, and TTL Integrated circuits and evolved gradually to the first microprocessor and finally to gigabit speed multiprocessors coupled to terabyte of memory products. Singapore started to make assembly of such devices in its first back-end, moving quickly in 1984 to the opening of its first Front-end by STMicroelectronics and finally reaching in 2018 the status of world semiconductor manufacturing hub with 14 wafer fab operations covering from submicron to nano technologies on a huge variety of products (Power, Analog, Logic, memories, sensors, processors and microcontrollers)...**what a fantastic journey !!**

With the onset of many new product and technology trends, this industry is set to continue to move to greater heights and the last 50 years have taught us the value of robustness and determination. As we forge ahead with the same attitude we will transform and emerge even more successful.

As Chairman of the SSIA Advisory Board, I wish Singapore and the semiconductor industry many more decades of strong and successful growth.

Francois Guibert

MESSAGE BY PRESIDENT

First and foremost, I want to offer my heartiest congratulations to the Singapore Semiconductor Industry for achieving the milestone of 50 years.

Since 1968, the industry has grown and evolved through many phases of Test and Assembly activities, IC Designs Centers, Wafer fabrication plants, R&D centers and support infrastructure. Today SSIA has members comprising of the full value chain of the ecosystem and is at the forefront of synergising collaborative business matching and knowledge sharing among the member companies in the community.

Singapore Semiconductor Voice, the launch of 1st SSIA print publication, is yet another initiative to keep members abreast with SSIA activities, alliances and forthcoming projects. We hope that members can fully engage and participate in all our programme and reap the full benefit of membership through the outcome of our initiatives.

Singapore Semiconductor Voice also features content from our government agencies so that members can stay updated with the latest policies and standards. I hope members would use this platform to share and learn as one community on the latest technology, innovations and trends and to keep abreast with our fast evolving industry.

The 1st edition of Singapore Semiconductor Voice is launched in conjunction with the 50th anniversary celebrations of the Singapore Semiconductor industry and will continue as a bi-monthly edition. We hope to get your continuous support in making Singapore Semiconductor Voice a success, a voice for members projected by members.

I wish all SSIA members and partners continuous success in the years to come.

C K Tan

CONTENT PAGE

SINGAPORE SEMICONDUCTOR50

A Story of Five Decades

1968, the setting up of National Semiconductor at River Valley Road, kick starts the birth of an industry that is going to transform the landscape of economical development in Singapore for years to come. The journey has been a long and robust one, with sprouting of new fabs and IC design companies along the way creating the full value chain ecosystem we pride in having here in Singapore - from integrated device manufacturers and wafer foundries to assembly and test service companies. Today we rejoice in celebrating 50 years of an industry which is one of Singapore's largest industries and a key pillar of our economy, accounting for a third of our manufacturing output and 4.4% of GDP.

Singapore Semiconductor 50 is initiated by Singapore Semiconductor Industry Association (SSIA) to commemorate these 50 remarkable years of an industry that has continuously shown strength and stride over time, adapted and evolved its innovative process, market expansion and diversity. Today the electronics and semiconductor industry extends beyond mobile chips and electronic devices to automotive, healthcare and security systems. The emergence of Industry 4.0, IoT and AI technology is further opening doors to exponential growth potential for the electronics and semiconductor sector in the next decade.

The common thread across the five decades has been undying passion, unparalleled talent and the hunger to continuously innovate and excel. This was the inspiration behind the theme for Singapore Semiconductor 50, **50 years of Talent, Innovation and Passion.**

This golden jubilee celebration brings with it much more than just golden memories. To make this more than just a get-together, the association has made a special take away memento for every distinguished guest attending "Singapore Semiconductor 50". A medallion designed like a wafer with minted Singapore Semiconductor 50 logo engraved onto its surface adds to the grandeur of the celebration. It is also an appropriate signature gift to commemorate the 50 golden years of the industry with a 24K gold plated medallion.

> ***We wanted to make this 50th anniversary of the semiconductor industry something special and memorable so we weaved in a medallion in the shape of a wafer. Most of our guest would be familiar with wafers, and it is now imprinted with the mark of the celebration to add that extra special touch to Semiconductor50. Now everyone gets to take home a 24K gold plated wafer and keep it for many years to come.***
>
> - Executive Director of SSIA, Mr Ang Wee Seng

Advanced Wafer Fab Signing Ceremony April 11th 1991

Strategic planning for sponsorship request and team effort resulted in an overwhelming response and support for Singapore Semiconconductor50. Within 1 month from the start of the sponsorship campaign, all sponsorship was fully redeemed. SSIA was heartened with so much companies reaching out to support the celebration of an Industry. This reflects the pride and conviction of leaders in an industry that has much more potential to transform and evolve to greater heights in the years to come. SSIA is deeply grateful and appreciative for the support rendered from our sponsors.

Here's wishing the Singapore Semiconductor Industry another 50 golden years ahead!

Image Source: The Knowledge Centre (EDB)

Advanced Wafer Fab Signing Ceremony April 11th 1991

National Semiconductor Presser May 5th 1986

Tech Semiconductor Ground Breaking Ceremony November 11th 1991

Philips Government Training Center October 2nd 1976

Transforming atomic-scale engineering with market-leading deposition, etch, and clean technologies for front-end wafer processing and advanced packaging applications

Learn how our innovative solutions can help you achieve success on the wafer

Lam® RESEARCH

Connect with us

www.lamresearch.com

life.augmented
is our contribution to people's lives

ST is a world leader in providing semiconductor solutions that make a positive contribution to people's lives, both today and in the future.

For more information, please visit www.st.com

life.augmented

TECH 88

SSIA Student Outreach Initiative

CANBERRA CAREER TALK

May 18th 2018

We start inspiring from the young.

Mr Eu Gene Goh from Xilinx addressing Secondary 3 students to inspire them on the adventures of an Engineer. Students questioned on the work conditions and prospects of being an Engineer, and had a field day hearing from Mr Eu Gene and other industrial leaders.

Students listening to the Industry professionals sharing

BEDOK GREEN CAREER DAY

August 24th 2018

Mr Eu Gene Goh from Xilinx continues his mission to inspire at Career Fair Day at Bedok Green Secondary School. Students had the option to sign up for their favorite career choices, and more than 50 students, in two segments, chose to hear from an Engineer. From Aerospace engineering to salary benefits, no questions were spared by these future potentials!

Students listening to Eu Gene presentation

NTU INDUSTRY VISIT

August 31st 2018

Industrial visit to MICRON and UTAC inspiring graduates.

35 students from NTU went on an adventure trip to explore the opportunities from the Industry. Zerlinda from the Human Resource department in Micron addressed the students at a presentation during the visit. The highlight was the NTU Alumni from Micron making themselves available to network and inspire these students.

NTU students at Micron

A group photo taken at the front office of UTAC Group before embarking on a presentation and site tour. Students had a touch and feel of some old micro chips during the presentation followed by a site tour, conducted by HR personnel Mr Rosli.

NTU students at UTAC

NTU CAREER TALK

October 19th 2018

The NTU Career Talk co-organized by SSIA and NTU garnered more than 200 engineering students, coming to engage with industry professionals. As part of the TECH 88 initiative, SSIA brought in four leading companies, ASM, GLOBALFOUNDRIES, QUALCOMM and SSMC to present on the hiring trends and skillsets necessary for future jobs in the electronics and semiconductor industry. Students benefited greatly getting up-close with the hiring managers and leaders via a networking session after the presentation. More such sessions are in the pipeline as we forge ahead with the vision to create a dynamic platform for industry student collaboration.

NTU students at career talk listening to industry professionals

TECH 88 STUDENT OUTREACH

WHAT IS TECH 88?

• As Singapore strengthens its position as a global hub for talent, the local semiconductor companies face increasing challenge of attracting and retaining the best technical workforce to enter the industry.

• There is a huge opportunity for young graduates to immerse and thrive in this industry but there is a lack of guidance and inspiration to educate and engage these young masses.

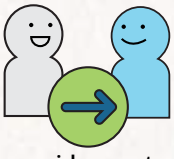
• SSIA, leading the Electronics Industry Transformation Map (ITM) implementation, sees this gap and creates a unique programme to entice and engage the young engineering and science students across the Singapore institutes of higher learning (IHLs)

TECH 88 OBJECTIVES

• To build awareness of industry amongst students / pre-workforce

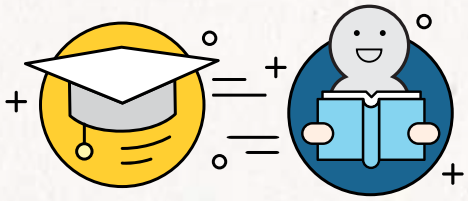
• To support industry HR in meeting recruitment needs

• To provide internship opportunities for students



• To provide mentorship matching for young industry professionals

WHO DO WE ENGAGE



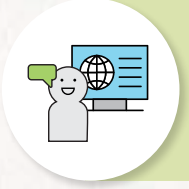
- Tertiary/ universities (NTU/ NUS/ SIT/ SUTD)
- Polytechnics
- Institute of Technical Education (ITEs)
- Junior Colleges
- Secondary Schools (Students/Parents)

HOW DO WE ENGAGE

Industrial visits and field trips

Internship

Onsite prgrammes and career fairs



Technical talks

Workshops and demonstrations

Competitions

SINGAPORE SEMICONDUCTOR LEADERSHIP ACCELERATOR PROGRAMME

The Singapore Semiconductor Leadership Accelerator (SSLA) is a collaboration between the Singapore Semiconductor Industry Association (SSIA) and Human Capital Leadership Institute (HCLI).

Designed and launched in response to the Singapore Semiconductor Vision 2020, SSLA aims to nurture and equip the industry's leaders and high potentials to be globally agile, innovative and collaborative, ready to compete and lead in the global market.

Drawing upon HCLI's strength in Asian leadership, andragogy and global network of leading academia, industry and practice leaders, the SSLA programmes is the creation of HCLI's eco-system building, open architecture and Asian leadership perspectives.

Built into the programme's design, the SSLA experience boasts of leadership themes covering leadership agility, megatrends, digital disruptions, communication, innovation, strategic thinking, expanding influences, cross-cultural awareness and includes an experiential learning element involving a visit to a leading global and innovative company. To maximize the participants' value from the leadership development programme, master coach Bill Cornwell assisted the class in applying their learning into practice through an action learning journey.

Through SSLA, leaders and high potentials from the Singapore semiconductor community enjoyed the opportunity to learn and engage in dialogues with globally renown experts such as Dr Parag Khanna, Co-founder and Director of Hybrid Reality Institute, Taru Jain, CEO of Futuremarketer, Stephen Krempl, CEO of Krempl Communications International and Professor Paddy Miller from IESE Business School. The range of learning included themes such as global megatrends, digital disruption, leadership communication and leadership practices, which are important for aspiring leaders to be mindful of.

A high-level business leaders panel discussion provided a platform for the participants to hear and learn from the personal journeys of senior members of the semiconductor and engineering communities. Gracing the panel discussion were Andrew Chong, Member, Board of Advisors, Singapore Semiconductor Association, Russell Tham, President, New Enterprises & Ventures of ST Engineering and member of the SSIA Board of Advisors, and Jeff Tang, Chief Technology Officer of HOPE Technik. The panel candidly shared about various challenges they faced in their leadership journeys and provided words of advice and tips for success to the participants.

SSLA participants experienced and applied their learning in a Discovery – Innovation – Growth (DiG) business simulation session. The daily synthesis of learning facilitated by HCLI helped participants internalize their group and individual learnings by weaving together their daily learning themes and making the new insights and experiences into meaningful and relevant learnings for each participant. These programme features enabled the SSLA programme to build an important foundation needed to facilitate Singapore semiconductor leadership development, in line and support with the Singapore Semiconductor Vision 2020. ***Image Source: HCLI***

SSIA
Singapore Semiconductor Industry Association

human capital leadership institute

VINCE TEO

UP-CLOSE WITH SINGAPORE SEMICONDUCTOR LEADERSHIP ACCELERATOR (SSLA) GRADUATE

"SSLA is truly a unique and valuable course"

Managing Director - TOPPAN Semiconductor Singapore

1. What is your vision for TOPPAN Semiconductor Singapore as a Managing Director?

My vision for Toppan Semiconductor Singapore is to transform it to be a dependable partner in our businesses, in tandem with the growth and needs of our industry in this region.

2. What leadership strategy you believe in? Who inspires you in business leadership?

As a leader I firmly believe in leaders that walk the talk, as integrity holds central to the core of our business conduct. Coming into my full 3 decades into the industry, I have had the opportunity to work with many leaders whom had made great impacts and have imparted values that I have internalised for life. In short, Walk the Talk; focus on details [that matters] to minimise being thrown off balance.

3. Do you think leadership as a trait is important for your position and how do you think this quality can add value to your current role?

In my opinion, leadership is central to carry and conduct businesses and as leader of our organisation, the value we hold will be emanated to the rest of the team and therefore the team works in tandem to the leadership.

4. You have attended SSIA's SSLA programme and have successfully graduated from the coursework. How do you think this programme has helped you?

SSLA is truly an unique and valuable course; besides the great coaches and materials for learning/discussions/comprehension/reference in presentation etc, it created a platform that focuses on our semiconductor Industry, cutting across the supply chain. This provided a valuable network beyond the limited direct line of work, allowing for a better appreciation of the industry and the supply chain dependency.

5. What is the most significant thing you have learnt from the SSLA programme?

Collaborate, unframe and reframe challenges (into opportunities) with agility. In other words, "Aggregate and Maximise".

6.You did a group project as part of your SSLA programme, please share with us on the process and takeaway.

We took on an industrial wide forward looking project - SGP: Reinventing for the Future. The perspectives brought in by each one of us was different coloured by our experiences, attributes and persona. To derive the final deliverables, we had to use the newly taught skills [spanning, framing and deframing etc..] and were forced to collaborate and leverage on one another's strength with hours after hours, meetings after meetings and interviews after interviews, in order to have a cordial and collaborated result projecting a great teamwork. The key takeaway again was "Aggregate and Maximise".

7. Would you be an advocate for SSLA and if yes, why?

I will advocate and support SSLA for training and creating the platform for close interaction and networking within the supply chain; towards aggregating and maximising our industry, to compete in the global landscape.

HR ROUNDTABLE

A resourceful gathering!

Date 27 September 2018
Venue Hotel Fort Canning

Singapore Semiconductor Industry Association (SSIA) organised a HR Roundtable on 27th September this year at Hotel Fort Canning. The intention was to bring together the human resource community of the electronics and semiconductor companies in Singapore for greater collaboration and learning. Leaders from the human resource departments of more than 25 MNCs together with representatives from government agencies such as WSG, e2i, SkillsFuture, TAFEP and EDB, gathered under the umbrella of SSIA's HR Roundtable initiative.

It was an eventful morning with insightful presentations from different agencies covering a wide range of topics from Professional Conversion Programmes (PCP) to adhering to tripartite standards. Each of the presentations were catered to provide useful information for the participants in forming their manpower policies and programmes moving forward. For example, WSG touched on giving opportunity to job seeking Singaporeans and gaining the benefit of salary claims, while e2i talked on maximising the use of mobile technology to upload training programmes using the ULEAP platform. The feedback was positive and participants wanted access to the content presented as there were a lot of new learnings.

The highlight of the morning was the networking lunch which followed after the presentations. Everyone was ushered to a sumptuous buffet spread in a beautiful setting in a grand ballroom. As people started picking their food, the engagements also started picking momentum. Soon everyone was indulged in deep conversations along with great food within their tables and across the room.

Participants at HR Roundtable interacting during lunch

Participants at the HR Roundtable listening to the speaker

Mr Ang Wee Seng addresing the participants at the HR Roundtable

> ***"It is a fulfilling experience to create a platform for knowledge sharing and meaningful connections says Mr Ang Wee Seng, the Executive Director of SSIA. "Its crucial to reach out and engage the Human Resource leaders from the industry, as they are the key players who make a difference in the policy formation for talent development and recruitment".***

SSIA looks forward to organising many more such HR Roundtables inspired by the success and feedback from this first collaborative effort.

SNUG SINGAPORE BY SYNOPSYS

Annual technical conference.

Date 21 September 2018
Venue Park Royal Hotel

There was an overwhelming turnout at the SNUG Singapore held on 21st September 2018 at Park Royal Hotel. More than 450 participants including design engineers, leaders and professionals from the electronics and semiconductor sector assimilated for an insightful experience at SNUG.

Overwhelming turnout at SNUG Singapore

Participants at buffet lunch

SNUG Singapore is an annual technical conference bringing together Synopsys users, technologists and industry experts devoted to the challenges of electronic design and verification. It serves as a platform to promote sharing and exchanging of IC designers experience using Synopsys tools and IP in overcoming difficult design challenges as well as to accelerate design innovation.This year there were a total of 28 technical sessions which include user paper presentations, Synopsys tutorials and user experience co-presentation with Synopsys. There were nine exhibition booths showcasing Synopsys and sponsor products. The highlight of this conference is the peer-reviewed technical papers and keynotes from industry leaders. Some of the keynote topics covered at the SNUG Singapore includes "The Future of Mobility – Autonomous Vehicles" by Chua Chee Seong, President and Managing Director, Infineon Technologies Asia Pacific and "The Pace of Innovation" by Don Chan, SVP of Design Group.

> ***"I am glad to see an increasing trend of participation in SNUG Singapore. The number of paper submissions and attendance hit a record high this year. This indicates that Synopsys users highly value this event."***
>
> **Eric Lee, Director of Application Engineering, Synopsys (Singapore) Private Limited.**

SNUG Singapore offers a great opportunity for the IC design community to come together to learn, synergize and spearhead design innovations admist challenges. Recent years have seen increasing popularity for this event here in Singapore. Synopsys received record number of paper submissions and record number of attendance this year. This indicates the vibrancy of the design community as well as the willingness to share design experiences from using Synopsys EDA products.

> ***"I am impressed with the large participants of the Synopsys SNUG event. This is a testimony of the vibrant IC Design ecosystem in Singapore."***
>
> **Jerome Tjia, Head of Design Centre, Infineon Asia Pacific Pte Ltd and Executive Committee member of SSIA.**

The overall event and the technical content scores based on Synopsys' survey during the event indicate that attendees highly valued the conference. This is a welcoming trend as Singapore forges ahead with advanced manufacturing technology.

Singapore Semiconductor Industry Association (SSIA) hosting a booth and connecting with the participants at SNUG

LEADING THE INDUSTRIAL TRANSFORMATION TOUR @ ITAP 2018

Uncovering the potential of Industry 4.0.

The inaugural Industrial Transformation ASIA-PACIFIC (ITAP) was a Tech Conference, held in October, at Singapore Expo. It was a call inviting businesses to uncover the potential of Industry 4.0. featuring more than 200 exhibiting companies across 13 countries. Exhibitors from various industries such as aerospace, automotive, chemical, electrical engineering, energy, logistics and supply chain, oil and gas, semiconductor, urban solutions as well as food and beverage showcased their latest technological breakthroughs and enthralled the participants.

SSIA's Curated Tour @ ITAP

Guided tours were available for different industrial groups and SSIA led the curated tour for electronics and semiconductor companies. Organised as three groups, the tour led participants to different key exhibitors and learning labs who gave an in-depth presentation of their showcase.

Exhibitor explaining to tour participants

SSIA Curated tour participants listening to an exhibitor iterating on the latest technology

Sandbox

As part of the curated tour, SSIA organised a Sandbox speech by Mr Robert Ronald from HP Inc., who talked on SMART Manufacturing and its benefits. His inspiring speech on vision boarding was an instant crowd puller and the highlight on the last day of the event.

More than 100 participants from 19 companies registered for the SSIA curated tour and had a great time engaging with the exhibitor companies and unraveling the potentials of Industry 4.0.

Robert Ronald from HP Inc. giving a speech at Sandbox at ITAP 2018

SSIA hosts a booth at ITAP 2018. Director Ang Wee Seng with the team

“Congratulations for Singapore’s semiconductor industry celebrating its 50th anniversary”

First of all Congratulations for Singapore’s semiconductor industry celebrating its 50th anniversary

Tokyo Electron (TEL) started business in Japan in 1963 and also reached 50 years recently as nearly equal as Singapore semiconductor industries. TEL also started business to other than Japan from 1990’s and contributed to Singapore semiconductor industries.

The history of semiconductors started in 1947 with the invention of the transistor, and has already passed its 70th-year milestone. Along with the advancement of semiconductors, remarkable improvements in social productivity and standards of living took place throughout the world. The increasingly popular Internet of Things (IoT) technology is enabling everything to be connected via the internet, ushering in the age of big data. We are already seeing the emergence of big data application and service industries backed by such technologies as artificial intelligence (AI), virtual reality (VR), augmented reality (AR), and mixed reality (MR), which in turn require further advancements in semiconductor technology to support faster processing of massive data using less power. TEL’s semiconductor production equipment, which forms the foundation for these new industries, also serves as their core technologies that support innovations and enable the evolution of wide-ranging electronic devices.

TEL established Tokyo Electron Singapore in 2012 and upgraded to direct sales structure for further contribution to Singapore semiconductor industries from April 2018. Besides, Tokyo Electron Malaysia also established in September 2018.

TEL will continue to contribute to further development for Singapore semiconductor industries.

Tokyo Electron Singapore Pte. Ltd

Image Source: TEL

Professional Conversion Programmes (PCPs) for Electronics Industry

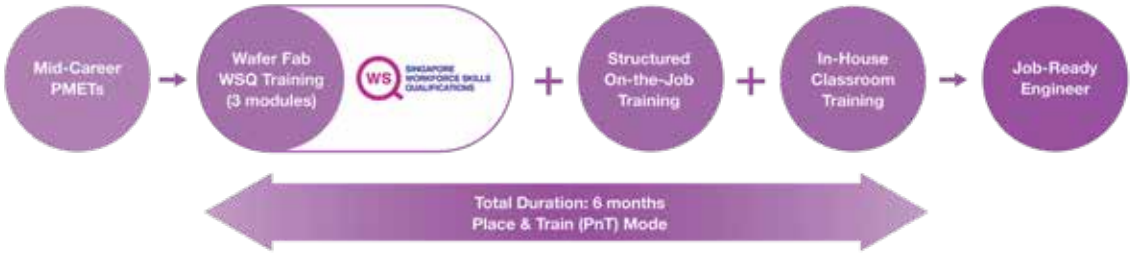
PCPs for Electronics Engineer and Assistant Engineer

Job Functions • Manufacturing / Operations • Industrial Engineering • Technical Support • Research & Development • Product Design / Engineering • Software / Firmware • Automation

PCPs for Assembly & Test (A&T) Engineer and Assistant Engineer

Job Functions • Product Test • Process • Quality • Equipment • Facility • Industrial • Manufacturing • Package Development

PCPs for Wafer Fabrication Engineer and Assistant Engineer



Job Functions • Quality • Production • Process • Equipment • Facility • Integration

Programme Manager:

SSIA
Singapore Semiconductor Industry Association

For more information on above PCPs, please contact **pcp@ssia.org.sg**

WSG Workforce Singapore

Hear From Us

> **“ In SSMC, we have a comprehensive competency development framework to equip and successfully transition mid-career PMETs into the wafer fab industry. The PCP is a good initiative to develop more engineering talents to support Singapore’s vision of a SMART nation. ”**

Mr Jagadish C.V.

CEO of Systems on Silicon Manufacturing Company Pte Ltd (SSMC), a pioneer adopter of Wafer Fab PCP (launched by Minister for Manpower Lim Swee Say in May 2016 at SSMC)

> **“ Based on the several initiatives taken by the industry-government collaboration, I believe the semiconductor industry in Singapore is a stable one which further reinforces my reason to choose it to rebuild my career. No doubt it may be a daunting feat to try to fit into a new environment and learn new skills at the same time but fortunately, my superior and colleagues have been very supportive and warm in helping me to settle in and I am very thankful to them for that. ”**

Mr Tay Kheng Thong, 47

Candidate under the PCP for Wafer Fab Engineer at STMicroelectronics

Information provided is accurate at time of printing

SSIA EVENTS CALENDAR 2019

JANUARY
- Overseas Recruitment Drive

FEBRUARY
- HR Roundtable
- Career Fair

MARCH
- Singapore Semiconductor Leadership Accelerator Programme (SSLA) - Run 4 Module 1

APRIL
- Supplier Automation Day
- SSIA Members' Meet
- SSIA Golf Tournament
- Trade Compliance Workshop

MAY
- Singapore Semiconductor Leadership Accelerator Programme (SSLA) - Run 4 Module 2

JUNE
- Soft Skills Training Programme

JULY
- SSIA Summit 2019

AUGUST
- HR Roundtable
- Career Fair

SEPTEMBER
- SSIA Members' Meet

NOVEMBER
- Annual General Meeting (AGM)

Please note that the dates and event names are subject to change

ULeap

Future of Learning

More than micro-learning

Crowdsourced Learning

Connect, learn and share knowledge with the community through user-generated content.

Bite-sized

Learn short, micro-learning modules that takes less than 10 minutes.

Just-in-time

Trending topics and discussions are populated to address immediate needs on the ground.

On-the-go

Learn on any mobile devices, anytime, anywhere.

ULeap Enterprise

Keen to deliver bite-sized learning for all your staff to learn on-the-go?
ULeap Enterprise allows for learning in closed, private groups catered to your organisation.
Tap on our training network to customise content for your training needs.

Speak to us to find out more!
https://e2i.com.sg/contact-an-industry-specialist/

An initiative by:

ntuc National Trades Union Congress

e2i Better Jobs For Life Employment and Employability Institute

Download the ULeap App now!

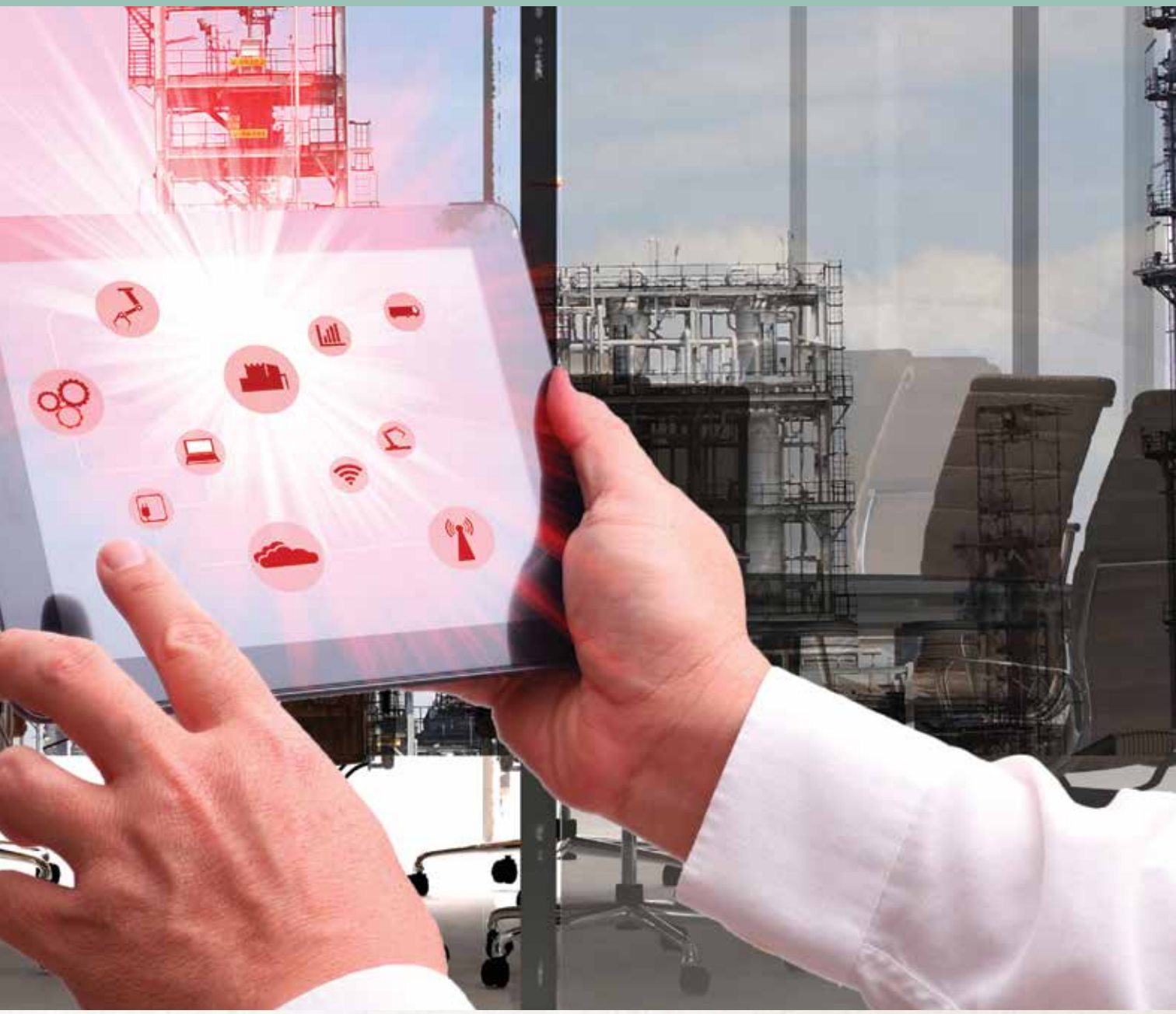
Available on the App Store

ANDROID APP ON Google play

or visit www.e2i.com.sg/ULeap

SINGAPORE'S ELECTRONICS & SEMICONDUCTORS INDUSTRY OUTLOOK 2019

Driving Growth through Innovation and Transformation



A. OVERVIEW

As a key pillar of Singapore's manufacturing sector, the electronics cluster, including the semiconductor segment, accounts for more than a quarter of the country's manufacturing gross domestic product, at S$90 billion. The sector is expected to remain moderate in 2018.

Against a backdrop of global trade wars, cost pressures and regional competition, coupled with local structural shifts towards higher-value production and services, Singapore still retains its lead as a world-class semiconductor hub. Singapore remains the location of choice for multi-national corporations (MNCs) to enter new markets or launch new products.

In 2019, the rapid advancement of disruptive technologies will affect the electronic and semiconductor manufacturing industry. These technologies, which include artificial intelligence (AI), robotics and the Internet of Things (IoT), are set to transform industries and catalyse new growth areas.

B. TRENDS & OPPORTUNITIES

1. The Consumer Electronics Revolution

The rise of the digital economy has led to the development of many electronic appliances – from the ubiquitous smart phones and wearables such as health and

fitness devices and smartwatches, to smart TVs, intelligent refrigerators and security systems to 3D printers, unmanned systems (unmanned aerial vehicles, unmanned vehicles, and home robots) and internet protocol cameras.

Smart phones, which are driving social media usage in Asia, are expected to double and grow more than 100% year-on-year. The wearable device category is projected to reach 30 million units and generate in excess of US$5 billion (S$6.83 billion) in annual revenue over the next few years. The biggest growth area in this segment would be the health and fitness devices, which is projected to hit 20 million units. These digital technologies with their increasing memory needs would in turn create demand for DRAM and NAND flash memory products. The revenue is expected to surpass US$1.8 billion (S$2.46 billion).

2. New Growth Areas

New growth areas such as green electronics, bio-electronics, plastic electronics, blockchain transactions and security are expected to triple their contribution to 30% of the electronics output.

3. Disruptive Technology

3.1 Artificial Intelligence (AI)

AI will speed up the process and increase chip performance. As with any industry in the technology value chain, the semiconductor industry will need to constantly innovate products to meet newer technology demands. In 2018 and beyond, there will be a major focus on smaller chips that consume less power and provide better support for wireless connectivity. There will also be greater focus on developing secure chips to address the security concerns around connected devices driven by IoT, especially those used in medical electronics and industrial automation.

3.2 Internet of Things (IoT)

IoT connects the world by connecting billions of physical devices worldwide to the internet, by collecting and sharing data.
There is significant growth potential especially in the area of microcontrollers, sensors, memory, and connectivity. In particular, IoT could possibly turn niche segments such as smart home applications, medical electronics and connected cars into game changers for the semiconductor industry.

3.3 5G and AR/VR Technologies

The industry will benefit from the deployment of 5G technology in the coming year. Major telecommunications companies, together with mobile phone device manufacturers, are ramping up to release 5G capabilities. With the recent 3GPP release of the 5G new radio (NR) specifications, a number of 5G chipsets are already gearing up for production manufacturing.

Additionally, an increase in the adoption of augmented reality/virtual reality in industrial and gaming companies will create significant growth opportunities in the future. Bandwidth-intensive applications such as high-resolution video streaming and AR/VR are driving the integrated circuit (IC) evolution as video streaming now accounts for 70% of broadband data usage, and that is only expected to rise rapidly.

4. Autonomous Vehicles

The industry will see a rise in demand for multiple high-performance AI processors, which drive Level 3 autonomous vehicles.

5. Production Innovation

To stay ahead, manufacturers must be ready to meet the demands for better quality products, faster delivery and greater inter-connectivity.

5.1 Improving Manufacturing Efficiency with Virtual Reality

Electronic manufacturing companies have been incorporating virtual reality technology to improve manufacturing efficiency. This enables companies to inspect design objects at all conceivable scales, thereby eliminating defects in the product in the design stage.

5.2 Enhancing Productivity with Robotics and Automation

Robotics and automation are also vital to improving plant efficiency and productivity. Sensors used in various machines allow access to invaluable data for improving efficiencies and reducing potential breakdowns. According to a report by Boston Consulting Group (BCG) in 2016, 1.2 million industrial robots are expected to be deployed by 2025, while the electronic equipment is expected to reach $2.1 trillion by 2020 according to TBRC.

C, INCENTIVES & PROGRAMMES

Moving forward, the industry can seek collaborative partnerships and investment in workers' skills upgrading training programmes to prepare for the challenges and opportunities in the future economy.

6. Partnership for Growth

6.1 Partnerships for Capability Transformation (PACT)

PACT by Enterprise Singapore supports collaborations between companies of all sizes, in areas such as capability upgrading, business development and internationalisation. It also supports knowledge transfer, capability upgrading and co-development of new solutions.

6.2 JTC nanoSpace
Strategically located within Tampines Wafer Fab Park, JTC nanoSpace offers a plug-and-play, quick-start space solution that meets the stringent operational requirements of semiconductor manufacturers. The provision of this future-ready infrastructure supports the growth of local and global companies and is key to enabling companies to make investment decisions quickly.

6.3 SSIA's Complex Equipment Consortium (CEC)
CEC brings together MNCs, SMEs and institutes of higher learning (IHLs) on a private-private-public approach to explore opportunities for co-innovation in specialty capabilities, new technologies and productivity.

6.4 The IoT Open Innovation Community
Set up by Nanyang Polytechnic's Centre of Innovation for Electronics, the IoT Open Innovation Community brings together more than 130 members across enterprises, technology partners and public institutions to collaborate.

6.5 Market Readiness Assistance (MRA) Scheme
The MRA Scheme offers targeted grant support for SMEs making their first foray into overseas markets. In 2017, 1,629 MRA grants were disbursed, which included support for SMEs expanding into regional markets.

7. Employee Training Schemes

The rapid transformation of the electronics industry marks a major skills challenge for the workforce. SkillsFuture Singapore (SSG), Workforce Singapore (WSG) and the economic agencies, together with industry stakeholders such as employers, industry associations, unions as well as education and training institutions have launched several initiatives to equip Singaporeans with the necessary skills to take on these jobs.

7.1 Skills Framework
An initiative of EDB and SSG, Skills Framework for Electronics help employees identify the key skills and competencies. The Skills Framework provides support those to those in the electronics industry. These include the SkillsFuture Earn and Learn Programme, Enhanced Internship, Singapore Industry Scholarships and Professional Conversion Programmes (PCPs).

7.2 SNEF Digital initiative
Offered by the Singapore National Employers Federation, the scheme aims to help companies, especially SMEs, adopt digital technology, equip their employees with digital skills and build capabilities among human resource professionals.

7.3 Tech Skills Accelerator (TeSA)
TeSA is a SkillsFuture tripartite initiative to train and build the Infocomm Technology workforce. It is open to sectors like manufacturing and professional services, where digital technologies are increasingly important.

7.4 SkillsFuture
A new set of the SkillsFuture series of adult training programmes was rolled out in October 2017, offering more than 400 courses across eight areas developed by the Singapore government in collaboration with industry partners. Data Analytics, Tech-Enabled Services, Cybersecurity and Advanced Manufacturing are just four of the areas that train the Singaporean workforce in skills that are integral to smart factories.

7.5 SNEF Agency for Productivity Practices, Human Resource and Industrial Relations (Sapphire)
Sapphire helps companies overcome the challenges of introducing new technology with its expanded Technology-enabled Workplace Transformation Programme, which grants companies a 70 per cent subsidy for up to 100 consulting hours.
As applications for these advanced technologies continue to emerge, and a new wave of demand arises for electronics that are smarter, faster and more efficient, businesses must be ready to capitalise on these trends and growth opportunities.

ABOUT THE AUTHOR

PATRICIA ANG has 18 years of extensive experience in corporate communications, media relations, event management and alumni relations. Her passion lies in writing. Patricia has written for marketing collaterals, newsletters, personality profiles, feature writings, magazines, corporate brochures, banners, website contents, yearbooks, online articles, annual reports, speeches and press releases.

anghweeshen@yahoo.com.sg

A.I. IN BUSINESS: MICRON USES AND ENABLES SMART MANUFACTURING TECHNIQUES

Technology, and its enabling of industry, has gone through multiple bursts of paradigm shifting revolution, that has fundamentally changed the way businesses operated and people reaped the benefits. Now, we're on the precipice of a brand-new revolution.

Artificial intelligence is the key to the next industrial revolution, known as Industry 4.0. To enable the technologies of the future— the A.I. powered smart cars, in-home assistants, manufacturing equipment, and various industry specific innovations used in countless fields—data flow needs to be fast and efficient. As these technologies become more commonplace, vast repositories of data will need to be processed and mined for important insights.

To understand Industry 4.0. is to understand connectivity. The linkage of smart devices in the Internet of Things (IoT) and the subsequent collection, analysis and movement of large amounts of data is critical to unlocking a brand-new era in business, in which A.I. provides the key to processing information in more nuanced, human-like ways, powered by connectivity and consistent data flow.

Through this A.I.-centric industrial revolution, businesses will be freed up to focus more on maximizing yields and improving the bottom line. Within this new era, communication, automation and innovation will become exponentially faster, simpler, and more connected, and factories of the future will be able to essentially run themselves, through a process known as smart manufacturing.

Smart manufacturing, in which connected, smart devices exchange information at a rapid pace to speed up workflow, is a hallmark of Industry 4.0. Micron has both enabled the growth of IoT and Industry 4.0. through our memory solutions, as well as used smart manufacturing techniques to improve our own manufacturing processes. The elevation of efficiency and productivity found in Industry 4.0. is powered by an ecosystem of Industrial IoT devices, themselves powered by Micron memory, while at the same time, Micron as a company is pushing the boundaries of what can be achieved using smart manufacturing techniques.

Micron in Singapore has been at the forefront of developing a data-driven approach toward smart manufacturing, beginning with the Singapore Center of Excellence (COE). Using our vast array of connected data, intelligent automation and enhanced use of sensors, we are engaging in predictive analytics to improve

operations, and using several groundbreaking techniques to practice predictive maintenance.

We train our computers to classify and detect defects on wafers through image pattern recognition — producing more accurate results than the naked eye, and enabling early detection to alert equipment owners to investigate abnormalities. Acoustic detection techniques proactively determine if a wafer has been scratched in the handling process, creating potential for rectification.

Micron in Singapore's North Coast fabrication facility implemented a system which allows our operations and engineering teams to remotely monitor and control equipment in the clean room, letting our teams to make faster tactical decisions and formulate strategies to deal with developing situations. The result is higher quality output and process optimization.

Our use of real time auto diagnosis enables us to quickly diagnose and identify the root cause of a possible manufacturing error within 30 minutes, giving fab engineers plenty of time to fix the problem.

> **"We aspired to do this type of work a decade ago. But there wasn't technology in place for us to achieve this."**
>
> **Chen Kok Sing, VP and Singapore Country Manager**

> **"These new, innovative solutions have come about in the last three years, allowing us to quickly achieve consistencies and efficiencies that we never imagined."**
>
> **Chen said, of Micron's innovative use of smart manufacturing techniques.**

It's not all inside of Micron, however. We work hard to expand the scope of IoT beyond company confines, providing our customers with the solutions they need.

Because a modern smart-factory can generate up to 1 Petabyte of data per day, significant edge-processing and data storage requirements are needed to derive benefits from data analytics, and increase in use of IoT Gateways. The rise in use of IoT gateways and edge servers creates opportunities for Micron to be the "gatekeeper of data" according to Micron Senior Fellow, Mark Helm.

Micron has provided memory solutions for edge devices that create long term success and drive down total cost of ownership, through our Micron Industrial Quotient (IQ). Micron IQ reflects the company's vision - that the right electronic storage solutions matter greatly to long term success. From considering application specific optimization, to ruggedization, to extensive quality testing and extended product longevity support, Micron is committed to providing the best possible memory solutions.

Industrial IoT gateways and edge devices also need safe and secure devices with specific industry optimization methods. Similarly, to continue to enable Industry 4.0, fast, powerful memory is needed to process the increasingly large amounts of complex, nuanced data and ultimately drive technology to become more autonomous. Informational data must be processed and machine behavior must be adjusted in real time.

Our GDDR6 graphics memory feeds graphic processing units at extreme high speeds. Our DRAM and NAND memory streams data within a large system, creating a fast and autonomous flow. Micron's industrial SSD portfolio provides low-power consumption, high durability, light weight, smaller sizes, and most importantly, incredibly fast transfer speeds. Micron's M500IT SSD is built with robust data security methods, along with processing data quickly and efficiently. These memory solutions can be used to enable the future of fast intelligence and Industry 4.0.

Comparing the previous transactional tasks that automation had enabled, for example checking emails and internet browsing, with the technology of artificial intelligence, it's clear that data is of the essence and of the moment. Artificial intelligence is powered by data that moves fast. As the systems that mimic human decision-making capabilities become more commonplace, computers become the enablers of even larger amounts of work and, most importantly, innovation.

The future of Industry 4.0. lies in the hands of those with memory to build the systems that can change the world. Micron knows to do that, we must find innovative ways to accelerate intelligence, both within Micron and outside of it.

Image Source: Micron

GLOBALFOUNDRIES®

GLOBALFOUNDRIES Singapore (GFS) offers a broad range of semiconductor wafer manufacturing capabilities on mainstream and leading edge technology nodes, to meet the fast and dynamic electronics industry demand for IC chip design customers around the world. Incorporated in 1987 as Chartered Semiconductor Manufacturing, the company was integrated into GLOBALFOUNDRIES in January 2010.

With 30 years of wafer fabrication manufacturing excellence, GFS has transformed itself and grew its six wafer fabs in Singapore with an annual installed capacity base of over 3 million 200mm and 300mm wafers being produced and exported from Singapore to serve our customers around the world. GFS is also one of the largest employers in Singapore Semiconductor Industry with staff strength of over 5500. We are also ISO/TS16949 (automotive) and ISO15408 (secure) certified.
GFS prides itself in having best-in-class operational excellence to ensure the highest degrees of quality, reliability and cost effective wafers to customers. We are committed to continuous innovation through offering technologies spanning from 180nm to 40nm, and continue to invest in the most advanced and sophisticated equipment. We have a proven track record of deploying highly innovative and cost effective solutions for customers who are looking for analog, RF (Radio Frequency), high voltage power management, embedded memories and MEMS (micro-electromechanical systems) IC (integrated circuit) applications.

With our comprehensive technology portfolio and foundry service excellence, GFS is well positioned to ride the current wave of growth driven by the internet of things (IoT), automotive, 5G, cloud storage and security.

Image Source: GLOBALFOUNDRIES

As a pioneer of Silicon Valley, HP first arrived in Singapore in 1970 as a low-cost manufacturing base stringing together core memories in a flatted factory at Redhill Industrial Estate. With the strong support from the Singapore government, we have grown from a pioneer Multinational Corporation to a diversified site, with the new campus bringing together 3,000 employees from 35 nationalities.

Singapore serves as the headquarters for HP's business in Asia-Pacific Japan and HP's global supply chain control towers.

• HP has a significant manufacturing presence in Singapore, including printing manufacturing at Depot Road and a state-of-the-art manufacturing facility for Indigo ink, Latex and UV signage printers in Tuas.

• Our Tuas facility also houses the GSB Center of Excellence and the GSB Demo and Training Centers.

• HP Print R&D Center in Singapore was first established in 1988. It has expanded multiple folds and grown to take on printing businesses and printer development of an expanding range of inkjet printer products. It was elevated to be the center of excellence for inkjet printer development for the majority of HP's inkjet printer portfolio in 2016.

Our new campus at Depot Close was officially opened in December 2017, and the ceremony was graced by previous Minister for Industry, Mr. S Iswaran. With an investment of more than S$100 million, the new campus houses our Customer Welcome Center, which features our latest products and the Smart Manufacturing Application and Research Center (SMARC), a research and prototyping facility jointly funded by HP and EDB.

HP looks to disrupt the $12 trillion global manufacturing industry with our Jet Fusion 3D printing solutions, Singapore plays an important role to drive this transformation of the global supply chain. ***Image Source: HP***

WHAT DOES THE FUTURE HOLD FOR DESIGNERS WHO WORK WITH ELECTRONIC SENSOR SYSTEMS?

Thomas Riener, Executive Vice-President for Color and Spectral Sensing, ams AG

Chip-scale sensor systems today are growing more complex and more sophisticated at a rapid rate. In fact, design engineers working at manufacturers of mobile devices, home appliances, automotive systems and other types of products are benefiting from a remarkable extension of the usefulness and value of sensors in almost every kind of electronic device.

There are various forces underpinning the change in the role of sensors in electronics systems. They include:

• The extreme miniaturization of components of many sensor systems. In optical applications, for instance, ams has pioneered the fabrication of on-wafer interferometric light filters for multi-channel spectral sensors, and micro-optic lens arrays for miniature light sources and light detectors.

• The availability of advanced computing resources in all sorts of devices that are not actually computers – a capability which enables products such as smartphones to process and make intelligent use of vast amounts of sensor data.

• The creation of the Internet of Things (IoT), which is giving rise to a new class of connected, autonomous devices that need the ability to see, hear, feel and smell, and to report their 'perceptions' to cloud-based monitoring and control systems.

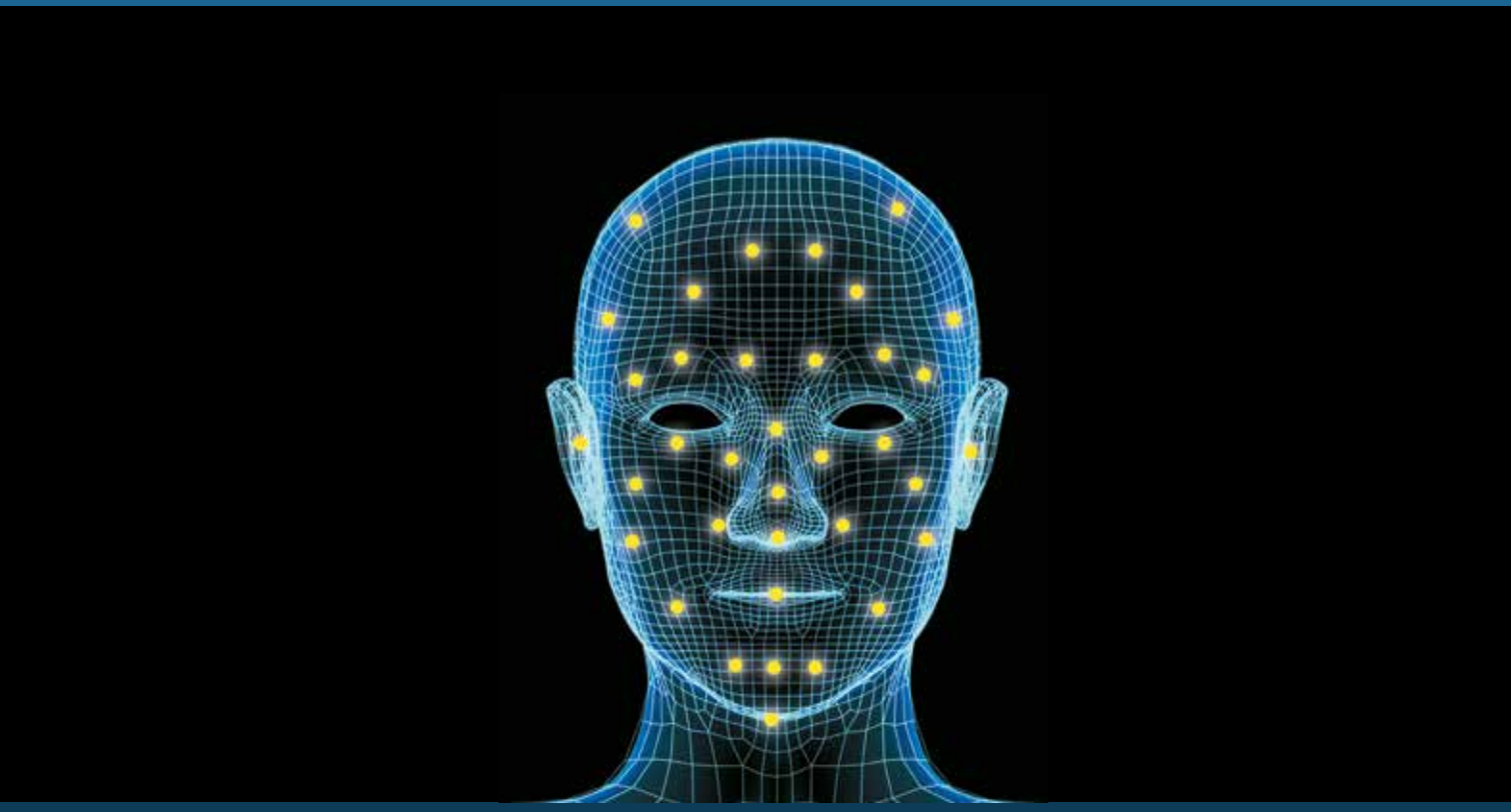
• Climate change, which gives urgent impetus to OEMs' energy-saving innovations, many of which depend on capturing more precise and relevant information about the real-world phenomena experienced or produced by electronics devices, such as heat, noise and vibration.

These forces have driven manufacturers of sensors and sensor systems to intensify a elerate their development efforts. The result is a radical change in the nature of the chip-scale sensor: before, it was normally a simple, single-function analog device which supported an application implemented via a microcontroller or other digital device. Now the sensor is more likely to be a complex, intelligent system which itself implements an entire application - a sophisticated and valuable function such as heart-rate measurement, air-quality monitoring or color matching.

This can be illustrated by reference to examples of the new type of sensor system. One such is the 3D imaging sensor solution, a system which has found its best known use in user face recognition in smartphones.

At the heart of a face recognition system is a classic analog optical sensor – a set of photodiodes for detecting the reflections from the user's face. **But to work effectively in the real world, the system needs much more:**

• a sophisticated LED light source, often of 'structured light', emitted in complex patterns which enable the generation of a detailed and accurate depth map of the face consisting of thousands of points, and which can overcome the effect of interference from ambient light and other sources



• very small and low-profile micro-optics to focus the light from the light source and to capture reflections

• a logic circuit and algorithms to convert the raw reflected light signals into a depth map, and to analyze the depth map in order to perform face recognition

All of the hardware elements need to be precisely characterized so that they work in unison. The system software is also an absolutely essential element of the sensor solution's operation. In practice, therefore, the only viable way in which an OEM can implement such a complex system is by procuring it as a modular solution, in which the complete application - in this case, 3D depth mapping of the face - is implemented in the module.

The integration of modular sensor systems is becoming an increasingly common feature of new OEM design projects. In areas in which ams focuses, such as optical sensing, audio sensing, imaging and environmental sensing, OEM customers are rapidly adopting application-specific sensor systems for object detection and ranging, for gas and pollution detection, for mobile spectrometry and color analysis, for X-ray scanning and for color tuning of LED lights.

A fascinating consequence of the development of these sophisticated new sensor solutions is that it is enabling new and previously unimagined applications. Chip-scale spectral sensors, for instance, are able to perform incredibly detailed and accurate detection of the spectral content of reflected light, and may be used, for instance, in portable devices for color matching of fabrics, materials and coatings.

But color analysis is a powerful tool in many other operations: one is to assess the dirtiness of the waste water produced by a washing machine. If the machine can detect when the clothes are clean, it can end the washing cycle early rather than continuing to the end of a set programme, thus saving energy, water and time.

This, and any other chip-scale spectrometry application, relies on the provision of a complete spectrometer module, including the firmware for rendering raw photodiode signals as color co-ordinates.

This is the future of sensors: complex, sophisticated, application-focused and often supplied as a modular solution. And enough examples of it already exist for the electronics industry to be able to see clearly how this future is going to play out. ***Image Source: ams***

For Further Information:
ams AG
Tel: +43 (0) 3136 5000
www.ams.com

Press Contact:
Guy Forster
TKO Marketing Consultants
Tel: +44 1444 473555
Email: guy@tko.co.uk

The 50th anniversary of the semiconductor industry in Singapore also coincides with Intel celebrating its 50th anniversary on 18 July 2018. During the past five decades, the company has evolved from a small memory manufacturer to a leader in the computing revolution.

While Intel's role in the PC industry is well known, its full history is even more remarkable. Before the PC industry took off, Intel manufactured chips that were eventually used in everything from fuel pumps to airliners. It has pioneered advancements in car engine control and changed the way technology is marketed. It has also made many big financial bets on its ability to continue advancing processor technology.

Intel's development can be seen, from a PC company to one focused on powering the cloud and the connected world, Intel's data centre products would process data from billions of devices, connected by Intel-enabled Internet of Things (IOT) solutions. In Singapore, Intel continues to work with the eco-system to explore new use cases that can improve the quality of human life and productivity with the application of new technologies such as Artificial Intelligence and IOT.

Intel is also celebrating its 50 year anniversary in 2018. Intel's first employees.

Intel breaks Guinness World Records Title for Drone Lights Shows in Celebration of 50th Anniversary in 2018, flying 2018 drones to celebrate!

> ***"Intel is in the midst of a transformation, evolving from a PC centric company to a data-centric company. We are looking beyond our traditional businesses to unlock the power of data to make self-driving cars a reality, help people experience virtual worlds, connect with each other over fast mobile networks, and be touched by computer-assisted intelligence in ways yet unimagined."***

Santhosh Viswanathan, Intel managing director for the APJ Territory.

50 YEARS TALENTS

ABDUL MALIKI ABDUL GANI
Engineer, (Lumileds)

Would like to congratulate everyone involved in reaching this milestone. Let's keep working towards another strong 50 years!

ALICE LEONG TIT KWAN
Trainer, (STMicroelectronic)

Happy 50th anniversary! Wishing all fellow employees the very best for their continuous commitment and great teamwork!

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

Reflecting on half a century of success motivates us to make Singapore's semiconductor industry more successful today and the future.

AMARJIT SANDHU
Vice President (Micron), Semiconductor Backend and Micron Malaysia, Muar

Congratulations on reaching the 50th anniversary milestone. Best wishes for greater success and impactful contributions to the Singapore economy.

CHONG PEI FEN
Director, Quality Engineering Management, (Micron)

Delighted to celebrate the achievements of our semiconductor industry. Let us excel for many years to come. Happy Golden Jubilee!

CLARINE YONG SIEW CHOO
Director, Operations Product Planning, (Xilinx)

Congrats on 50 years, being the true key driver of the electronics revolution that has changed the world.

ANDREW CHONG
Past President and Managing Director, (Infineon Technologies)

A privilege to have participated in the tremendous and tumultuous development of semiconductors in Singapore. This is a testament to the innovation, tenacity and resilience of our industry. Happy 50th

BRIAN TAN
Regional President, (Applied Materials)

50 years of semiconductor innovation is a remarkable milestone. I am proud to be in a transformative industry that is enabling unlimited possibilities for the future.

C K TAN
President, (Singapore Semiconductor Industry Association)

Wishing Singapore Semiconductor Industry a Happy 50th and may the next 50 be even better!

CHEN KOK SING
Vice President and Singapore Country Manager, (Micron)

Congratulations on the 50-year milestone! Privileged to be part of this industry and proud to celebrate with all. Cheers!

EU GENE GOH
Senior Director, Design Engineering, (Xilinx)

Congratulations! It's been a terrific 50 years and now in Industry 4.0, the next 50 should be even more interesting!

LAI FONG YEE
Senior Supplier Quality Manager, (Silicon Laboratories International)

Silicon Labs is delighted to have been a partner of SSIA for many years and looking forward to working together to shape an even better future.

JENNIFER TEONG
CEO, (Silicon Laboratories International)

Congratulation on reaching this fantastic milestone. All of us at Silicon Labs would like to wish SSIA management and members the very best on the continuing journey.

EE SZE KHOO
Deputy Director, (MediaTek Singapore Pte Ltd)

I wish the semiconductor industry many more exciting and fulfilling years ahead. May we scale new heights together!

JOSHUA LEE
Senior Director, Fab 10N Director, (Micron)

Congratulations on this jubilant achievement. Let our sense of wonder inspire and excite, as we create the future together!

JOE NG KIT KEONG
Director, Industrial Quality, (Lumileds)

Truly there is no shortcut to success! Congratulations on a brilliant 50 years of success and finally getting to see our dreams come true.

DR SONG KENG YEW
Vice President and General Manager of Backend Equipment Segment, (ASM Pacific Technology)

With the strong foundation built in the last 50 years in Singapore, we can focus on building an innovative global ecosystem for the next 50 years!

DR TAN KHENG SANG
Senior Advisor, (Mediatek Singapore Pte Ltd)

I would like to send my heartfelt congratulations to the Semicon50 event. I am very grateful and fortunate to have joined the Singapore semiconductor industry in early 1990s when it was just starting to embark on various R&D activities in semiconductor technologies. Tremendous progress has been made ever since. Congratulations!

DR HAI WANG
Senior Vice President, Global Technology Innovation, (NXP)

It gives me great pleasure in celebrating this commemorative day with SSIA and fellow industries. My sincerest congratulations on this outstanding achievement and best wishes on another 50 years' of success.

K C ANG
Senior Vice-President & General Manager, (GLOBALFOUNDRIES, SINGAPORE)

Congratulations on achieving the 50 years milestone of semiconductor in Singapore and best wishes for many more good years ahead!

KHOO CHONG LING
Director, Product Characterization, (Xilinx)

Congratulations to the semiconductor industry for contributing to Singapore nation-building for the past 50 years. I'm proud to be part of it.

LOH KIN WAH,
Chairman, (Synesys Technologies Holding Pte Ltd & Group of Companies)

Heartiest congratulations on 50 years of accomplishments! Let us look forward to another 50 years of innovation and success!

LEE KOK CHOY
Former Singapore Country Manager, (Micron)

Congratulations to the Singapore semiconductor industry for 50 years of growth and technology advancement. It has been an exhilarating journey.

LOH TICK KWANG
Director, Operation Engineering, (Kulicke & Soffa Pte.Ltd.)

We celebrate 50 years of SEMICONDUCTOR in Singapore where opportunities were created for professionals like me to realize our dreams.

MAHESON PALANIYANDI
General Manager, (UTAC Group)

Singapore has grown from strength to strength to become a semiconductor power-house with a world-class semiconductor hub attracting global companies with great achievement through collaboration with both public and private sectors. Wishing Semicon industry another 50 years of success.

MARIO TRAEBER
Senior Director R&D, (Intel)

Singapore's most successful mid-ager turns 50! Congratulation to the most innovative of all industries on the island for the next 50 years to come!

LEE WAI KWONG
Chief Executive Officer, (ASM Pacific Technology)

Singapore's semiconductor industry is one of the largest in the region, and home to some of the biggest players. ASMPT salutes you and are proud to call Singapore our "home" too.

MOUSUMI BHAT
Senior Director, Customer Quality (Micron)

I am excited to celebrate this brilliant milestone with the industry. Congratulations and looking forward to an equally exciting next 50 years!

MUHAMMAD SYAMIL BIN MAULOD
Customer Engineer, (Applied Materials)

I'm excited to be working at Applied Materials and be part of an industry that is shaping Singapore for the digital nation of tomorrow.

NG CHIEW LAY
Principal Engineer in Quality Engineering Assembly, (UTAC Group)

I've witnessed the ups and downs in semiconductor industry since 1989. With continuous innovation, I believe this industry will perform and grow. Congratulations Semiconductor50!

LAWRENCE HE WENYONG
Environment, Safety & Health Staff Engineer, (UMC)

Cheers to the collective contributions with undying resolve, in breaking boundaries beyond revolutions through the years & years ahead.

QUEK PUA SAN
Yield Engineering Director, (Lumileds)

Happy 50th Anniversary! Wishing Singapore Semiconductor industry continues to scale to greater heights in another 50 years and beyond!

RAMESH DHANABALAN
Senior Manager, Global Construction and Engineering, (Micron)

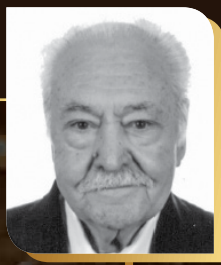
Congratulations to all who have contributed to the industry's success. May we continue to grow from strength to strength.

SERENE KWEK OI CHIN
Senior Manager, (Lumileds)

Congratulations for accomplishing many remarkable achievements in this 50 years milestone. I am honoured to be part of its growth.

PASQUALE PISTORIO
Honorary Citizen, Republic Of Singapore

Congratulations for the 50th Anniversary of Singapore Semiconductor Industry, that has contributed in a very significant way to the fantastic development economic and social of Singapore.



QUEK KWANG YONG
Senior Manager, Operation Engineering - Advanced Packaging, (Kulicke & Soffa Pte. Ltd.)

Congratulation to 50 years of amazing achievements! I trust that we will continue to conquer new pinnacle of success towards Semiconductor100!

SHEIKH MAHFOTH B A HAMID
Senior Manufacturing Design Manager, (KLA -Tencor)

Our ability to adapt, innovate and embrace the Digital economy will open new opportunities for the Semiconductor industry. Congratulations SSIA!

OW LENG LENG
Quality, (Returns Debug) Senior Manager, (AMD)

Congratulations on SEMICONDUCTOR50 milestone! A perfect moment to celebrate the journey and achievements. Wishing many more decades of continued success!

SIAH SOH YUN
Vice-President of Technology Development, (GLOBALFOUNDRIES, SINGAPORE)

Congratulations to Singapore Semiconductor industry on inking 50years milestone. Wishing longevity and prosperity for the industry in the coming years

SUBRAMANIAN HARIHARA VENKATA RAMANAN
Director, Head of Test, (UTAC Group)

Congratulations Semiconductor50 in your successful achievement of 50 years. Well done and may we continue to celebrate more victories.

TAN BOON KIAT DANIEL
Senior Customer Support Engineer, (KLA-Tencor)

Semiconductor50; a milestone which manifest the evergreen and dynamic growth for Singapore semiconductor industry. Congratulation to SSIA & EDB!

TOH EE YIAN
Customer Engineering Account Manager, (UMC)

Congratulation to Semiconductor Industry for achieving this remarkable 50 years milestone!

ULF SCHNEIDER
Vice President & General Manager, (Infineon Technologies)

I wish Singapore's semiconductor community all the best to grow further in future innovation, business and global impact. Singapore is a fantastic place for an exciting industry!

VINCENT YAP THEAN LOY
Senior Manager, Test Hardware, Development (AMD)

30 years in the semi-conductor industry is a dream come true. I congratulate this wonderful industry for its success.

TIAN SHUANG
Process Integration Assistant Engineer, (UMC)

Warmest congratulations to Semiconductor Industry on this 50 years milestone! It is a great achievement and a moment of pride

YEE JIA JIA
HR Business Partner, (ASM Pacific Technology)

We will not be here if not for the pioneers. Looking back in gratitude, let's create more collective achievements for Singapore's semiconductor industry

YVONNE LEE SHEAU HUEY
Senior Director, Worldwide Operations, (Applied Materials)

Congratulations for 50 years of driving innovation and talent development. We will continue to help sustain such momentum, by developing talent through building more advanced manufacturing and R&D capabilities

TAN HOCK THAI
Senior Maintenance Engineer, (STMicroelectronics)

Heartiest congratulations to Singapore's semiconductor industry for reaching half century. May we continue to prosper and celebrate together again at the next milestone!

YEO HUI MIAN
EWS Engineering Senior Section Manager, (STMicroelectronics)

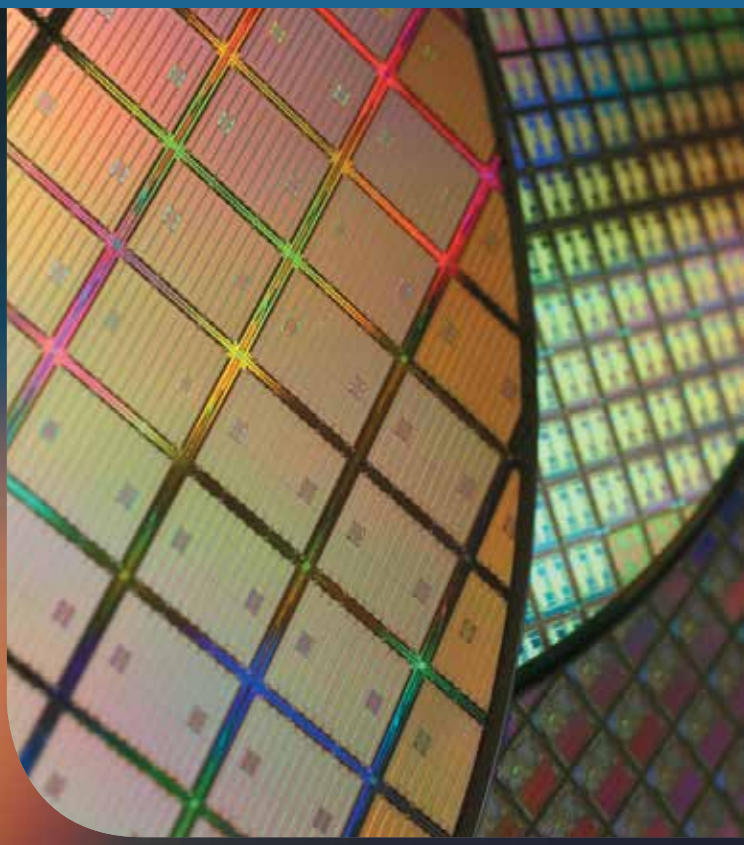
Congratulations to Singapore's semiconductor industry on its 50th anniversary. Looking forward to many more years of continued growth and success!

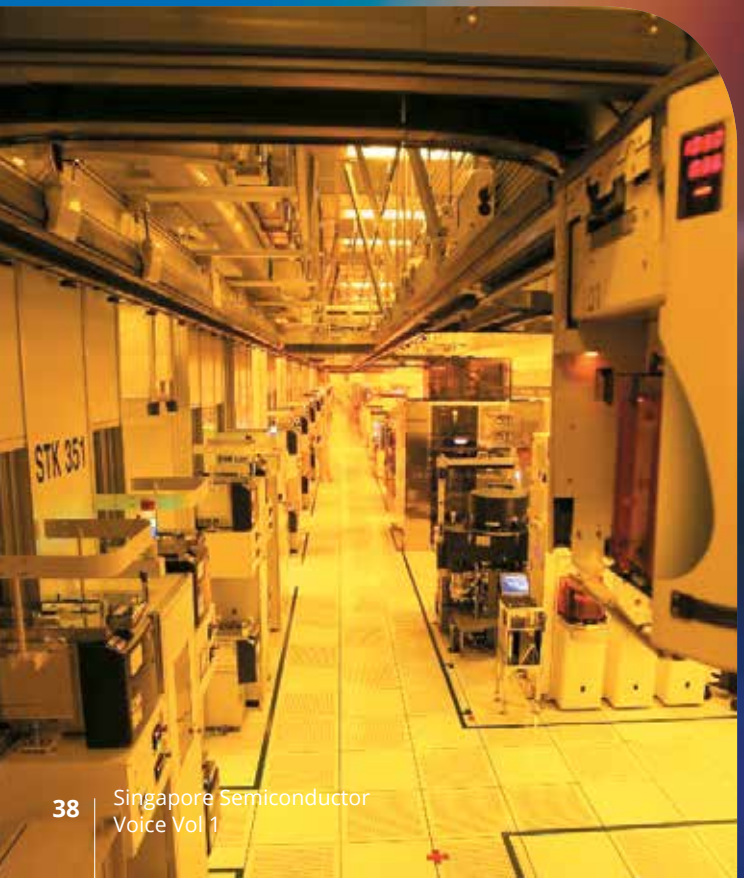
YEONG MUN KIT
Manufacturing Director, (Lumileds)

Congratulations to Singapore Semiconductor Industry on reaching this milestone. Wishing the industry many more decades of continued success!

A FOUNDRY PIONEER

UMC (NYSE: UMC, TWSE: 2303) is a leading global semiconductor foundry that provides advanced IC production for applications spanning every major sector of the electronics industry. Founded in 1980 as Taiwan's first semiconductor company, UMC led the development of the commercial semiconductor industry in Taiwan. It was the first local company to offer foundry services, as well as the first semiconductor company to list on the Taiwan Stock Exchange (1985). UMC's comprehensive foundry solutions enable chip designers to leverage the company's sophisticated technology and manufacturing, which include world-class 28nm High-K/ Metal Gate technology, 14nm FinFET volume production, specialty process platforms specifically developed for AI, 5G and IoT applications and the automotive industry's highest-rated AEC-Q100 Grade-0 manufacturing capabilities for the production of ICs found in vehicles. The company employs over 20,000 people worldwide, with offices in Taiwan, China, Europe, Japan, Korea, Singapore, and the United States.





WORLD-CLASS MANUFACTURING

UMC is a 300mm manufacturing leader with several advanced 300mm fabs in operation. Fab 12A in Tainan, Taiwan has been in volume production for customer products since 2002 and is currently manufacturing 14 and 28nm products. The multi-phase complex is actually three separate fabs, consisting of Phases 1&2, 3&4, and 5&6. Fab 12A's total production capacity is currently over 75,000 wafers month. UMC's second 300mm fab, Fab 12i, is located in Singapore's Pasir Ris Wafer Park. This second-generation 300mm facility was established in 2004 as Singapore's first 300mm wafer fab, and currently has a production capacity of 48,000 wafers per month. UMC's newest 300mm fab, Fab 12X in Xiamen, China, began volume production in Q4, 2016. The total design capacity of Fab 12X is 50,000 wafers per month when fully equipped. Combined with the foundy's seven 200mm fabs and one 150mm specialty fab, UMC has a total monthly capacity of over 600,000 8" equivalent wafers.

IC 2.0: NEXT GENERATION IC FOR AN INTELLIGENTLY CONNECTED WORLD

Artificial Intelligence (AI) is already being used everywhere, from the consumer space (VPA, photo tagging and fraud detection) to industrial segments (precision medicine, security surveillance, smart manufacturing, etc.) and automotive (ADS, V2E). AI will become more integrated into Internet of Things (IoT) connected devices, which will lead to next generation technologies offering unprecedented computation density with high-bandwidth interconnectivity. UMC calls this new digital generation "IC 2.0," for "Intelligently Connected."

IC 2.0 will be powered by the upcoming 5G protocol, which is not just an evolution of 4G. More than a faster iteration of its predecessors, 5G is expected to deliver extremely low latency combined with incredibly high bandwidth. This means that 5G will enable new demands for data volume and an increase in connected devices to drive AI and deep learning applications.

IDC's forecast for AI systems calls for the global market to jump from $7.9 billion in 2016 to $46.3 billion in 2020. AI is widely anticipated to revolutionize the speed and accuracy of problem-solving and decision-assistance and will be delivered across cloud, networking and ultimately end-user devices through 5G connectivity. At present, the world is seeing widespread AI integration with the advent of personal assistants and bots (Amazon's Alexa, Apple's Siri, Google's Assistant, Baidu Duer), image recognition (Facebook), personalized recommendations (Netflix, Amazon), and more. Going forward, the trend will be for discrete AI chips to evolve towards integrated solutions that will further empower end products with enhance intelligence, for example VPA, surveillance, automotive, smartphone and so on.

UMC has developed specialty technologies that specifically target IC 2.0, such as MEMS, mmWave, RFCMOS, 2.5D Through Silicon Interposer (TSI), embedded flash and BCD processes across multiple technology nodes. These UMC processes are already in use to power emerging IoT applications in smart industry, smart home, cloud computing, medical and automotive sectors. As smart applications advance and evolve, silicon content will continue to grow. With its manufacturing excellence, almost 40 years of semiconductor experience and broad technologies ranging from 14nm FinFET to ultra-low power and a wide variety of specialty processes, UMC is well-positioned to capitalize on emerging AI, 5G, IoT and automotive IC applications. Singapore based Fab 12i, designated as UMC's Specialty Technology 300mm fab, will undoubtedly play an integral role in helping UMC to realize its goal of bringing the upcoming I.C. 2.0 generation to life. ***Image Source: UMC***

STMICROELECTRONICS: SEMICONDUCTOR GIANT'S GLOBAL FOOTPRINT FOR INNOVATION

STMicroelectronics (ST) is a global semiconductor company offering one of the industry's broadest product portfolios, serving customers across the spectrum of electronics applications with innovative semiconductor solutions for the automotive industry, industrial systems, the smartphone industry and the Internet of Things.

Headquartered in Geneva, Switzerland, ST is amongst the world's largest semiconductor companies, with more than 45,500 employees worldwide, 80 sales and marketing offices in 35 countries, serving more than 100,000 customers worldwide and has 11 main manufacturing sites.

To fuel its technology edge, ST has approximately 7,400 employees working in R&D and product design, and spends about 16% of its revenue in R&D (2017).

ST also believes in the benefits of owning manufacturing facilities and operating them in close proximity and coordination with its R&D operations. ST has a worldwide network of front-end (wafer fabrication) and back-end (assembly and test and packaging) plants. ST's principal wafer fabs are located in Agrate Brianza and Catania (Italy), Crolles, Rousset, and Tours (France), and in Singapore. These are complemented by assembly-and-test facilities located in China, Malaysia, Malta, Morocco, the Philippines, and Singapore.

DEEP ROOTS IN ITALY AND FRANCE

While being present and active in 5 continents, ST maintains deep roots in Italy and France where it all began, with two companies merging in 1987 to set up STMicroelectronics.

STMicroelectronics is the most important industrial player in Italy in the semiconductor field in terms of personnel and industrial base. With 2 Front-End manufacturing plants (Agrate Brianza near Milan and Catania, Sicily), Research & Development centres, product design, tests (EWS) and sales & marketing activities, it covers a wide range of semiconductor technologies and applications. ST is also partner of many research centres, universities and colleges based in Italy and abroad. Activities cover joint research projects, as well as education and training on the job programmes meant to foster and share learning and knowledge on microelectronics and semiconductors.

Today, STMicroelectronics is the main industrial player in France in the semiconductor field in terms of personnel and industrial base. ST France has also established partnerships with more than 100 public labs worldwide, with more than 120 on-going PhD theses under ST employee mentorship. It participates in key competitiveness clusters around Tours (power management), Rousset (secure communication), Crolles/Grenoble (digital technologies), as well as in the Paris area (complex systems and automotive / mobility).

ST IN ASIA PACIFIC

ST began its operations in Asia with the setup of an assembly and test plant in Singapore in 1969. Since then, the Company has built a strong integrated presence in the region that spans Greater China, India, Japan, Korea, South-East Asia, as well as Australia and New Zealand.

Headquartered in Singapore, the Asia Pacific region operates world-class R&D, advanced IC design, and application support centers in China (Shenzhen), India (Greater Noida), Japan (Tokyo), Korea (Seoul), Singapore, and Taiwan (Taipei), complemented with high-volume front- and back-end manufacturing facilities in Singapore, China (Shenzhen), the Philippines (Calamba), and Malaysia (Muar).

ST has 35 sales and marketing offices all across the Asia Pacific area, with its main wafer fab and logistics hub located in Singa-

pore, distribution centers in China (Hong Kong), Japan (Chiba), and Singapore (Loyang). The region also employs close to 40% of the Company's global workforce.

ZOOMING INTO SINGAPORE

In 1969, STMicroelectronics was among the first wave of MNCs to have established its operations in Singapore, which helped kick start Singapore's industrialization journey. Since then, operations in Singapore have grown dramatically, cementing ST's place as a major industry player in Asia Pacific. Today, Singapore is the sales and marketing headquarters for ST's Asia Pacific Region, with a full representation of product groups, central and support functions, and has also grown to encompass the entire value chain of the business.

In 1984, ST became the first company to build a four-inch wafer-fabrication plant in Singapore and also South East Asia. The official opening was officiated by Dr Tony Tan, then Minister for Finance, Health and Education, on April 1985. Success of the launch was a demonstration of a perfect partnership between Singapore's Economic Development Board (EDB) and STMicroelectronics. This first wafer fab served as the reference model for the nascent wafer-fabrication industry in Singapore.

ST's wafer-fabrication operations in Singapore have since grown into the Company's single largest wafer-fabrication site by volume, and is one of the principal wafer fabs. The fab now manufactures both six-inch and eight-inch wafers, with an ongoing conversion to eight-inch wafer production. In 2017, the company expanded its presence in Ang Mo Kio through the acquisition of another wafer fabrication facility.

DESIGN ACTIVITIES IN SINGAPORE

Complementing ST's manufacturing capabilities in Singapore, the ST Asia Pacific Design Center (APDC) was set up in 1984 to provide full custom-design activities. It was also the first microchip design centre in Singapore, boasting advanced technical-development capabilities.

Today, ST's design activities in Singapore include 4 dedicated competence centres focusing on the technical marketing and application development of Telematics, Touch & Analog, Imaging, and Smart Cards, addressing a wide variety of market segments including automotive, mobile phones and mobile security, ID and banking. ST's design activities in Singapore have generated more than 550 patent filings to date.

BACKEND AND LOGISTICS OPERATIONS

Toa Payoh, where ST built its first simple assembly and test plant in Singapore in 1969, is now the headquarters of the Company's Packaging and Test Manufacturing organization. The original plant was converted into an Electrical Wafer Sorting (EWS) facility; part of ST's front-end manufacturing operations.

ST's regional logistics and warehousing centre was founded in Loyang in 1995, to manage distribution and facilitate just-in-time delivery to customers in Asia Pacific.

AWARDS AND RECOGNITION

ST's technical, marketing, and manufacturing strengths are further enhanced by an unwavering commitment to sustainable excellence. In recognition of these efforts, the Singapore government bestowed upon ST the Singapore Quality Award and the Technology Achievement Award in 1999

In 2009, the Company received the President's Award for the Environment, the highest accolade in Singapore, for its exemplary practices in environmental protection, water conservation, and its reduction in the generation of waste and pollution emissions at its wafer manufacturing site in Ang Mo Kio.

Singapore's Economic Development Board conferred on ST its Business Headquarters (BHQ) status in 1994 for the Company's outstanding contributions to the semiconductor industry and for its substantial presence in Singapore. The Company was further honored with the Distinguished Partners in Progress Award in 2000.
Image Source: STMicroelectronics

SINGAPORE POISED TO BE THE EPICENTRE OF THE SMART MOBILITY MODEL

Author: Andrew Turley, Senior Director of Innovation & V2X Business Development, NXP Semiconductors

Many of us with a driver's license in Singapore may recall having to apply the brakes suddenly during the final driving test. For the uninitiated, the examiner makes a loud tap on the car dashboard halfway through the test as a signal for the examinee to perform an emergency brake. This task aims to test if the driver can respond fast enough in critical situations.

The ability of an autonomous vehicle (AV) to avoid a collision by applying the emergency brake is a key aspect of concern when it comes to the safety driverless cars.

As Singapore moves forward with its Smart Mobility plans and new AV technologies, the safety of driverless cars for passengers and road users will continue to be a key factor in turning this

vision into reality.and road users will continue to be a key factor in turning this vision into reality.

Cars, Computers, Communication

Many new cars on the road today are loaded with advanced safety systems that can "see" what's around you, exposing blind spots and nearby hazards. Featuring radar and vision processing technology, these cars automatically steer and brake you to safety if you're slow or unable to react.

But what if you could "see" even further than what's nearby, around curves, around other vehicles, through the dense urban environment, and even up to a mile away? With V2X (vehicle-to-everything) communications, cars can "talk" to other cars, motorcycles, emergency vehicles, traffic lights, digital road signs, and pedestrians, even if they are not directly within the car's direct line-of-sight.

The V2X communications platform produced by Semiconductors is the first automotive qualified, high-performance single-chip DSRC modem. This platform can verify more than 2,000 messages per second and operates within a radius of up to a mile, even in areas where cellular network connections are not available. It has been proven to be fast enough to enable fully autonomous truck or car platoons separated by less than 0.5 seconds.

V2X also makes intersections safer, smoother, and improves traffic flow. Cars approaching traffic lights receive real-time warnings to slow or speed up prior to arriving at the intersection. In fact, as cars move towards complete autonomy, knowing how much time remains before the traffic light turns red is essential information to guarantee a smooth autonomous driving experience.

V2X alerts can even pinpoint road construction blocks away, see approaching motorcyclists or other vulnerable road users, and help smooth the way for approaching emergency vehicles through traffic or complex rural conditions.

V2X has been successfully deployed both in the United States and Japan. The V2X 802.11p momentum will continue with European implementation in 2019.

Advantage Singapore

A truly intelligent transportation system will be imperative in Singapore's ongoing transformation into a Smart Nation. To this end, the Singapore government has been partnering with various agencies, research institutes and industry players to realize the Smart Mobility 2030 master plan.

First, there was the formation of the Committee on Autonomous Road Transport for Singapore (CARTS), made up of renowned international experts, academics and industry representatives, to chart the strategic direction for AV-enabled land mobility concepts in Singapore. To support the visioning work of CARTS, the Singapore Autonomous Vehicle Initiative (SAVI), a partnership between Land Transport Authority (LTA) and A*STAR, has also been set up to provide a technical platform for research and development and test-bedding of AV technologies.

Experts from universities and businesses have also been actively involved in the development of driverless vehicle technologies. In January 2017, the NTU-NXP Semiconductors Smart Mobility Consortium brought together 12 industry partners to test bed V2X technologies for vehicular use. This initiative provided the opportunity for companies, researchers and students to play a key part in shaping the future of Singapore's smart transportation system. To take the lead in the setting of regulatory standards to test and certify self-driving vehicles in an urban setting, a S$3.6 million test centre was also built to support the work of the Centre of Excellence for Testing and Research of Autonomous Vehicle – NTU (CETRAN). The facility will allow CETRAN to put self-driving vehicles to test by placing them on a circuit replicating Singapore's road and traffic conditions.

The active involvement of tertiary institutions like NTU in these projects allows students, who are tomorrow's technology designers to gather experience. By involving these talents in the development of the Singapore's future transportation network and nurturing them, Singapore can remain at the forefront of the Smart Mobility evolution.

Future of Mobility

Singapore is on track in driving its Smart Mobility agenda with the combination of clarity of government vision, support of regulatory environment and the nurturing of talents. There are plans for three new towns in Punggol, Tengah and the Jurong Innovation District to have AVs deployed by 2022 where residents will ride driverless cars as part of their daily commute.

With V2X, these transport enhancements can be safely incorporated into the living environment with increased safety, increased efficiency and fewer traffic incidents.

If advancements continue along this track, it's possible that a little red dot on the global map can be the epicentre of the Smart Mobility model in the years to come

Image Source: NXP

Infineon Technologies ("Infineon") has played an important role in the development of the semiconductor industry in Singapore. Since establishing a small 50-man manufacturing plant in 1970, Infineon had grown in scope and scale over the past 48 years. Today, Infineon Technologies Asia Pacific ("IFAP") is Infineon's Asia-Pacific Headquarter, largest IC design centre in Asia, and Global Test Manufacturing Hub for all of its most advanced automotive integrated circuits.

IFAP has continued to expand and automate its test manufacturing operations, investing more than $700 million since 1970. Today, IFAP's test manufacturing operation is the most advanced semiconductor back-end manufacturing plant in Singapore. Singapore is also where Infineon pushes the boundaries for productivity and quality, innovating new test automation systems and processes that are subsequently adopted in other back-end manufacturing sites.

Infineon has also established IFAP as its regional hub for solutions development, product road mapping and project management for Asia-centric solutions. The 300-man R&D operation is one of Singapore's largest IC design and development team.

Infineon also leverages Singapore as a location to groom its future leaders. Since 2011, IFAP oversees and manages Infineon's regional talent management programmes catered to talents in management and technical ladder career tracks in collaboration with SMU.

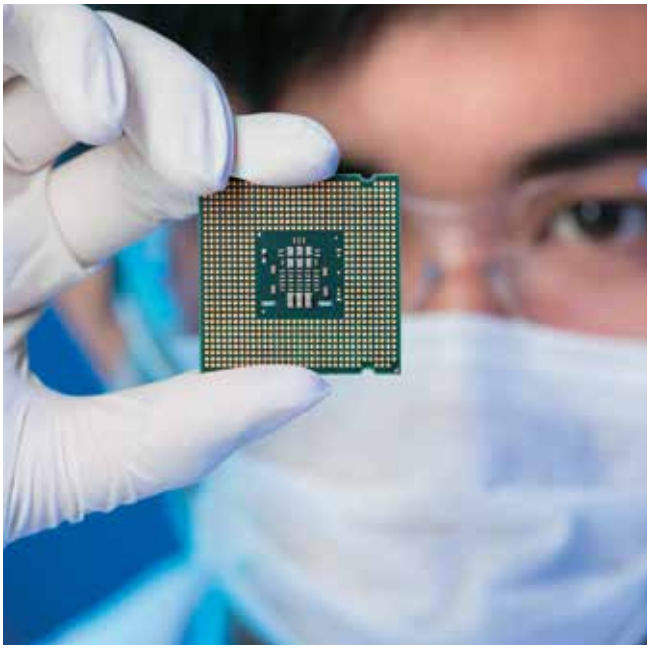
Looking ahead, Infineon plans to strengthen its strategic base in Singapore by building a vibrant innovation eco-system and co-innovating with start-ups in its first ever Co-Innovation Space worldwide. ***Image Source: Infineon***

World leader in engineering and construction of advanced technology facilities.

Exyte (formerly known as M+W Group) is a world leader in engineering and construction of advanced technology facilities. We have delivered complete design and build solutions across multiple industries worldwide for over 100 years, including more than 300 semiconductor fabs, specialty laboratories, process and manufacturing facilities.

Customers also rely on our proven 50+ year track record delivering state-of-the art controlled environments and cleanroom technology expertise, providing the optimum infrastructure for subsystems in all industries where contamination control requirements are critical. Exyte's full range of consulting and management services, from design through implementation, ensures that your advanced technology facilities are completed on time and within budget, according to both current industry standards and future technology roadmaps.

As the global market leader, Exyte has commissioned over 4 million m2 of production area in semiconductor fabs and over 2 million m2 of display production areas worldwide. We are strategically located to serve our key markets around the globe.



Our technology-driven expertise in semiconductor fabs and factory integration/ automation of large-format deposition, lithography, dry etch, wet processing and metrology tools for display manufacturing, enhances the building's optimization and provides us with a unique specialist capability as a facility engineering and construction company in these segments.

Exyte Singapore was established in 1995, and is the headquarters for our Asia-Pacific region. We are proud to have contributed to the success of many of our semiconductor clients, including Micron Semiconductor Asia, Siltronic, UMC, SSMC, RF360, Qualcomm, GlobalFoundries, STMicroelectronics, ST Electronics, AMS and Applied Materials.

We continue to be a global partner of choice for leading companies in the semiconductor, photovoltaic, flat panel display, battery and other associated electronics industries, as we understand the specific challenges and demands of advanced technology facilities and support our clients to achieve their next technology nodes and roadmap milestones.

Image Source: Exyte

BUILDING A CULTURE OF INNOVATION

In the last decade, we saw the semiconductor industry evolve from a growth industry to a matured industry. This essentially implies that the overall semiconductor market is tied to world gross domestic product (GDP). As a result, the industry has painfully transitioned from years of double-digit growths to low single-digit growth, even though the memory segment seems to enjoy higher growth as we have witnessed, especially in the last two years. On a global scale, the worldwide semiconductor revenue saw an increase of 21.6 per cent in 2017, double-digit growth for the first time in eight years, with a total revenue of USD $420.4 billion according to a 2018 report by Gartner, Inc. The report further underlines that a key driver of this growth was a surge in the memory market to USD $130 billion in 2017.

On top of that prices for general semiconductor devices continues to be on a downward trend while material cost is on the rise. The price-down pressure is higher in the assembly and test area, a lot of it due to the emerging Chinese competitors. This requires OSATs to be innovative to remain competitive in the semiconductor market.

Despite being a relatively large-sized company with over 11,000 employees, UTAC's management culture resembles more of a start-up with continuous effort to innovate in all aspects of our business. This approach has been instilled and is continuously preached by our CEO, John Nelson.

A couple of key examples will highlight this innovative culture. About three years ago, the mobile industry was concerned about the quality of the Wafer Level Chip Scale Packages (WLCSPs) with potential latent damage coming from the singulation process. Despite having one of the top quality WLCSP back-end processes, UTAC quickly came up with its own side-wall protection solution

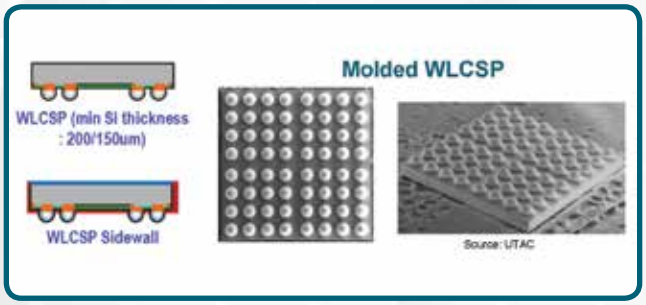
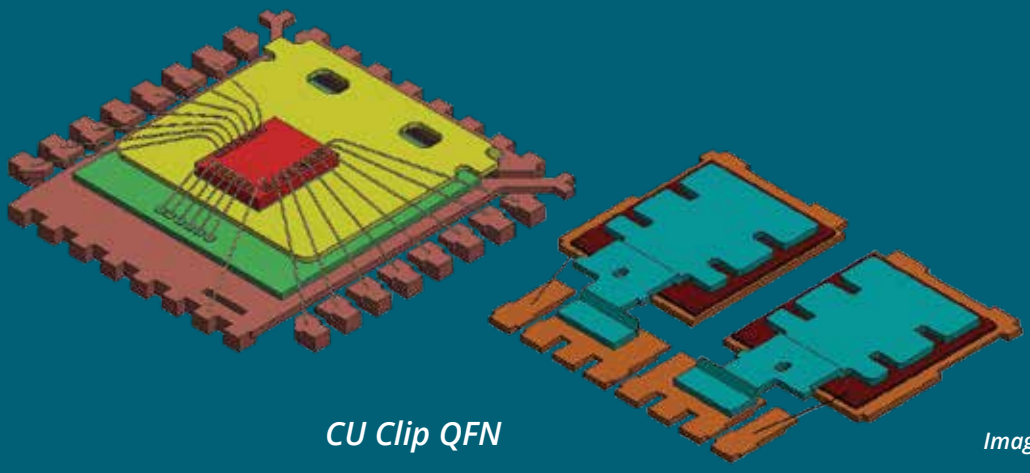


Image Source: UTAC

thru a unique wafer-level moulding process. While the process itself is not new, UTAC's unique solution provided the smallest increase in X-Y dimension of the WLCSP, ensuring the increase in the size of the package is kept at a minimum – less than 30 microns per side (total). The moulding process covers not only sides but also the bottom of the die, partially covering the solder balls. This provided an added advantage of improved second level (board level) reliability.

The second example will illustrate that the innovative culture is not only limited to package development. The automation team in UTAC continues to come up with innovative solutions to automate some of the key manual process steps. In this effort, the key innovative approach is utilizing old or even obsolete assembly equipment; redesigning and re-fitting them as necessary. This not only reduces the process cost through automation but also reduces, and in some cases, avoids any significant capital expenses to implement them. These process automation steps have been very well received by all our customers but especially by our automotive customers. These automation steps have helped improve the automotive quality level.



CU Clip QFN

Image Source: UTAC

With solid leadership in the field of assembly and test services, UTAC has a comprehensive portfolio across multiple market segments e.g automotive, power, industrial, smartphones and computing. In these key market segments, we can offer the knowledge, experience and technical expertise across a wide assembly portfolio that consists of laminate, lead-frame, wafer level, CMOS image sensor, security IC card and smart cards.

To date, the company's global footprint extends beyond Singapore to Thailand, Taiwan, Indonesia, Malaysia and China. Across its offices and factories, UTAC meets strict quality and security certifications from quality processes to automotive quality, environmental certifications, and more. For instance, in the automotive space, UTAC is not only automotive grade certified but also have EAL6 security certification for servicing security devices, a requirement as the industry moves towards autonomous driving. UTAC is running high volume production of automotive packages and test, that are approved by tier one automotive manufacturers and their end-customers around the world.

In line with the growth of the semiconductor industry, we believe in investing in our workforce. The company has been active for over 20 years and considers its employees to be its biggest asset. Most recently, UTAC received the highest accolade for employers by the Singapore government, winning the SkillsFuture Employer Award 2018. As part of this award presented by the President of Singapore Ms Halimah Yacob, companies are recognized for their strong commitment to lifelong learning and focus on career development and skills mastery for employees.

As a leading provider of assembly and test services, UTAC takes pride in its customer-first approach with a commitment to excellence in execution and quality – built on unity, trust and alignment with customers. UTAC continues to invest in technology and research & development (R&D) to help our customers deliver greater value and gain a competitive advantage for the future. UTAC will continue to drive innovation in our key market segments, primarily in the automotive, power devices, industrial and MEMs. The company remains well-positioned to provide our knowledge and expertise in packaging developments such as WLCSPs, Cu Clip QFN, System in a Package (SiP), CMOS image sensors and security smart cards, and are ready to support customers in overcoming the challenges ahead.

LOH KIN WAH

A LEADER'S PERSPECTIVE ON LEADERSHIP

"Invest in yourself. At the heart of the Leadership – literally and figuratively – is personal proficiency."

1.WHAT ARE THE MOST IMPORTANT DECISIONS YOU MAKE AS A LEADER OF YOUR ORGANIZATION?

The most important decisions are those decisions that will enhance and increase the value of the company – topics related to customers engagement, shareholders confidence, organization capabilities and employee commitment and expectation

2. DO YOU BELIEVE GREAT LEADERS NEED CREATIVE THINKING SKILLS?

No doubt. Creative thinking skill is essential for a leader. It is a skill that enables a leader to develop and shape the future of the company. This creativity will determine where the organization needs to go to succeed. The leaders test these ideas pragmatically against current resources (money, people, organizational capabilities), and they work with others to figure out how to get from the present to the desired future.

3. HOW DO YOU ENCOURAGE CREATIVE THINKING WITHIN YOUR ORGANIZATION?

It is important to establish a participative culture in the company that encourages free exchanges and brain storming of ideas to ensure propagation of creative thinking. I have set up Personal Leadership seminar " Seven Habits of Highly Effective People and Creative techniques for problem solving: de Bono's 'Six Thinking hats' in the company.

4. HOW DO YOU KEEP THE INSPIRATION ALIVE AS YOUR BUSINESS EXPANDS AND WILL THERE BE OCCASIONS WHERE YOU NEED TO COMPROMISE ON YOUR VISION?

It is a VUCA environment - That is inspiring and that is the fun. This environment demands the flexibility to continuously adjust and align activities. We can make compromises on these activities but No compromises will be made to the vision.

5. WHAT IS THE MOST SOUGHT-AFTER QUALITY OR TRAIT THAT SETS ONE CANDIDATE APART FROM ANOTHER WHEN YOU DECIDE ON BRINGING THEM ONTO YOUR TEAM?

Intelligence, competence, commitment and others are expected and assumed. Trustworthiness - this is the quality that is the most important to be on my team.

6. WHAT DO YOU DO ON A DAILY BASIS TO STAY INSPIRED AND GROW AS A LEADER?

Invest in yourself. At the heart of the Leadership – literally and figuratively – is personal proficiency. Leaders are learners: from success, failure, assignments, books, classes, people, and life itself. Passionate about their beliefs and interests, they expend an enormous personal energy and attention on whatever matters to them. Effective leaders inspire loyalty and goodwill in others because they themselves act with integrity and trust. Decisive and impassioned, they are capable of bold and courageous moves. Confident in their ability to deal with situations as they arise, they can tolerate ambiguity. While individuals may have different styles (introvert vs. extrovert, intuitive vs. sensing, etc.), any individual leader must be seen as having personal proficiency to engage followers.

7. WOULD YOU LIKE TO SHARE ANY WORD OF INSPIRATION FOR ASPIRING LEADERS IN THIS INDUSTRY?

"Success is more permanent when you achieve it without destroying your principles."

– Walter Cronkite

Principles are essential for leaders, as they give the leaders guidance and focus to navigate through the challenges leadership imposes on them. But leadership is in constant change, as successful leadership is a reflection of the world around it. Be yourself and stay the course with your guiding principles.

LOH KIN WAH PROFILE

Loh Kin Wah has over 38 years managing experience in leading semiconductor enterprises

He started his career as a quality engineer and move on to process engineering, manufacturing, R & D, Sales and marketing before taking up global general management role in leading semiconductor companies.

Currently he is the chairman of a family investment holding company, Synesys Technologies Holdings Pte. Ltd., Singapore. Additionally, he is:

Member of Supervisory Board, BESI, BV, Netherlands.

Member of Supervising Board, AMS AG, Austria.

Independent Director, AEM Holdings Ltd, Singapore.

Pushing the Boundaries of Light

No matter where you look, lighting innovations are making our world safer, better and more beautiful. And one company is consistently at the forefront of those breakthroughs: Lumileds.

As a global provider of superior-quality, highly reliable lighting solutions— from automotive, mobile and illumination, to security and IoT—Lumileds is helping forward-thinking designers and manufacturers around the world gain a competitive edge by bringing truly differentiated solutions to the markets they serve.

The best innovation happens when great minds work together—when we act with integrity as trusted partners to our customers, honouring commitments, offering deep expertise, and going the extra mile. Because it's only together that we can make the world safer, better and more beautiful—with light.

World-class Automotive lighting

Building on more than 100 years of leadership and innovation, Lumileds delivers state of-the-art LED solutions to automotive market segments worldwide. In an industry where stringent performance is required today and an innovation roadmap is essential for tomorrow, Lumileds is a trusted partner to leading automotive players around the world.

LUMILEDS

Market Share Leader in Camera Phone Flash

Exceptional light output and colour rendering for mobile devices including smartphones and tablets LUXEON Flash LEDs combine high lumen flux, industry leading colour control, and a compact form factor to provide designers and manufacturers unmatched flexibility for their smartphones, tablets and other mobile devices. Lumileds Flash products empower smartphone device makers to maximize the quality of images for their customers. Lumileds leads the industry with investments in technology and product innovation, as well as a vertically integrated manufacturing model. Our commitment to quality, performance and delivery has enabled Lumileds to become the market share leader by selling over 3 billion flash LEDs since we pioneered this application in 2004.

Illumination

In a constant quest to help luminaire manufacturers outpace the competition, Lumileds has pioneered a comprehensive line-up of high performance, application optimized LED solutions

How we Work

Lumileds is helping to build a more sustainable future—both through the way we work and our products' impact on the planet. We value our employees and the communities in which we operate, and embrace strict Environmental, Health and Safety (EHS) management guidelines that help ensure safe, secure and healthy working conditions across the globe. Our worldwide team maintains a singular focus on delivering products that consistently meet or exceed sustainability requirements by integrating environmentally conscious practices throughout every stage of research and development, operations, and supplier management processes. We will continue to develop lighting solutions that enable the transition to a low-carbon, green economy to fulfil our commitment to making the world better with light.

ENABLING THE DIGITAL WORLD

"Enabling the Digital World" is the mission of ASMPT. This is because every day one can see how more and more people are interconnected through digital devices or media 24/7 -- creating a world full of ideas, opinions, learning and opportunities. It is not only about technology; it is about ultimately contributing to a new world of possibilities.

Founded in 1975, ASMPT is the world leader in leading edge solutions, equipment, surface mount technology and materials for the semiconductor assembly and packaging industries. Its surface mount technology solutions are deployed in a wide range of end-user markets including electronics, mobile communications, automotive, industrial, LED and alternative energy.

To ensure technological and market leadership, the company invests continuously in research and development. Innovation has always been at the heart of ASMPT as it commits up to 10 percent of its annual equipment turnover in R&D.

A few examples of its technological innovation are the AB339, the world's first gold wire bonder with 50µm pad pitch capability; the Phoenix TCB system with breakthrough in fine pitch high I/O flip chip bonding; and the world-leading placement platform for high-volume production, the SIPLACE X-Series that have helped to transform and contribute to the high quality of life enjoyed by people globally.

ASMPT has a global presence in over 30 countries and a workforce of over 16,000 who share a set of core values which are expressed through "POWER": Passion to be the #1 "Go to Partner"; Ownership of actions and behaviours; Win with our customers, Excellence in all we do; and Respect for one and all.

EU GENE GOH, SENIOR DIRECTOR, DESIGN ENGINEERING (XILINX)

INSPIRING THE FUTURE ENGINEERS

Eu Gene leads a team of more than 80 engineers and has spearheaded industry firsts in power and performance.

Eu Gene Goh has continuously supported SSIA outreach activities, under the branding TECH 88. He has been in the semiconductor Industry for more than 22 years, starting his career in Bell Labs Singapore (part of AT & T Microelectronics) in 1995, as an integrated circuit designer. In 2006, he joined Xilinx as a technical manager, and has been continuing his career at Xilinx ever since. Today, Eu Gene leads a team of more than 80 engineers and has spearheaded industry firsts in power and performance.

When asked what motivates him to inspire the future generation to join the Electronics and Semiconductor sector, Eu Gene comments**: "Electronics and semiconductors are at the core of the technology revolution. I'm motivated by a desire to see more of our young people take a keen interest in technology and hope they will want to pursue a career in this industry and contribute to furthering technologies that will improve our lives".** But what keeps Eu Gene motivated on a personal level, even after 22 years in this Industry? **"I've always had an interest in technology and since electronics and semicon are a key enabler, working in the industry, in particular, in design, gives me a good understanding of how these systems work. Moreover, it's a fast paced industry where there is constant learning and never a dull moment".**

Recently he joined the Industry day talk at Bedok Green Secondary School, where he gave a presentation to Secondary three students curious about the engineering sector. These students signed up for the engineering talk amongst many other industries and tapped into the opportunity to hear from the industry expert himself.

Eu Gene believes there is a lot of potential in this industry and the next 10 years will be even more interesting than the last. He says that with the coming to an end of Moore's Law, the industry will be forced to be more innovative and creative than ever to support the demands of the wireless bandwidth explosion that 5G cellular will bring and in particular, artificial intelligence. He reiterates that these two technologies are likely to have the most profound impact on our lives since the introduction of the smartphone and that choosing this industry means participating in this revolution.

As an inspiring professional, Eu Gene shares his top 3 advices for the younger talents venturing into this sector. He says **"The foundations of engineering are math and science, work hard to do well in these"** and **"Cultivate an attitude for continuous learning".** Last but not least he adds, **"Be curious, don't stop at learning what and how to do something, but also seek out the answers as to why you're doing it".**

May this golden sharing be a source of motivation for the younger generation to rethink and strategise their career potential in the engineering and semiconductor industry, and venture into the limitless possibilities of creating an industrial revolution in the near future.

New SkillsFuture Initiative to Groom "Data Analytics" Talent

Earlier this year, SkillsFuture Singapore (SSG) and Generation launched the SkillsFuture Work-Learn Bootcamp (WLB) in partnership with the 5 Polytechnics and ITE. Our goal is to equip fresh-graduates and mid-career individuals with skills they need to succeed in emerging roles and help local employers meet challenges they face in hiring costs, productivity, and retention. We will launch a program in Data Analytics in January 2019, directly addressing a need in the semiconductor industry and other engineering & connectivity sectors.

Maintaining a talent pipeline is a challenge for every organization. Two out of every five employers globally say that they have entry-level job openings but can't find qualified candidates to fill them. As semiconductor companies in Singapore move towards Industry 4.0, they are expected to face these same difficulties in finding good talent who can start day one with the right skills.

At the same time, Singapore's skills gap affects both mid-career and youth workers: 40% of retrenched employees are still unemployed after 6 months, and 5% of young people are unemployed— more than double the unemployment rate across all ages.

Generation is a global employment program designed to bridge this gap. We offer programs in 24 professions and 4 sectors in 83 cities and 200+ sites across eight countries (Hong Kong, India, Italy, Kenya, Mexico, Singapore, Spain, and the United States). More than 22,000 students have graduated from the program thus far.

We have proven in other countries that it is possible to provide employers the highly-skilled, motivated talent they need while at the same time empowering people to build thriving, sustainable careers. Both employers and job seekers want to know that their investment of time and money in training is worthwhile.

A few of the elements needed to make a program successful for job seekers and employers:

1. **Employer Engagement:** Work with employers up front to identify openings and build a pipeline for them.
2. **Practical Curriculum:** Run rapid "bootcamp" training programs with repeated practice in the specific job skills that matter most.
3. **Results Tracking:** Demonstrate return on investment by tracking employment, job retention, productivity on the job, and associated costs.
4. **Skills-Based Hiring:** Shift employer mindsets from the traditional qualifications model of hiring to one based on demonstrated proficiency in the skills for the role.

These lessons, and others, have been gleaned from global experience with 2,400+ employers—and mean that our graduates become entry-level employees that are retained longer and deliver improved performance and productivity. The new SkillsFuture Work-Learn Bootcamp will bring these global learnings to Singapore to benefit local industries.

SSIA members may contact SSG: joseph_yap@ssg.gov.sg or Generation: prateek@generation.org for more information on how to benefit from this initiative.

www.generation.org **www.skillsfuture.sg/worklearnbootcamp**

In fact, Generation has developed a tool that allows employers to estimate the average return on investment they can achieve with this training approach. Try it today!

Belén, Generation Spain 2015 Alumna

Generation's Global Impact

22,541 graduates

82% employed within 90 days

65% still employed one year after placement

US $70 million in cumulative earnings

2,458 employer partners

84% of employers would hire our graduates again

As of October 15, 2018

Benefits to Employers

1. **Recruiting**
   Reduction in required interview hours, ads, use of recruiting agencies, etc.
2. **Training**
   Better trained professionals who are productive from day one
3. **Turnover**
   Fewer hires who leave in a short amount of time (<1 year)
4. **Quality of Work**
   Individual performance increases
5. **Professionalism**
   Reduction in absenteeism and disciplinary actions
6. **Access to High-level Human Capital**
   Internal promotion of candidates to higher level jobs rather than costlier external new hires

SKILLSfuture Work-Learn Bootcamp | in partnership with Generation | SKILLSfuture SG

STAND OUT AS AN EMPLOYER OF CHOICE WITH THE TRIPARTITE STANDARDS

TALENT MANAGEMENT STARTS WITH EMPLOYER BRANDING

Talent management is becoming increasingly critical to success in the semiconductor industry. In KPMG's Global Semiconductor Industry Outlook 2018, talent development and management remain among the top three strategic priorities over the next three years.

Talent management does not begin with hiring, but employer branding. In Singapore, semiconductor companies, like many other businesses, face the challenge of differentiating themselves as employers of choice.

The Tripartite Standards could provide semiconductor companies with an invaluable competitive advantage.

TRIPARTITE STANDARDS

The Tripartite Standards is a tripartite initiative that identifies and recognises employers with specific progressive employment practices. Today, over 1,500 organisations have adopted at least one of the eight Tripartite Standards, such as Age-friendly Workplace Practices, Flexible Work Arrangements, Grievance Handling, Recruitment Practices and more.

Companies that have put in place the practices stated in the Tripartite Standards can adopt the Standards at TAFEP's website (www.tafep.sg/tripartite-standards). These companies will be listed on TAFEP's website and can include the relevant Tripartite Standards logomarks in their marketing collaterals to differentiate themselves as progressive employers.

5 BENEFITS OF ADOPTING THE TRIPARTITE STANDARDS

1. PUBLICITY

Your organisation will be listed on TAFEP's website as an adopter of the Tripartite Standards and profiled as progressive organisations.

2. TRIPARTITE STANDARDS LOGOMARK

The Logomark can be used in all of your organisation's job advertisements and marketing collaterals.

3. LINKS FROM TAFEP'S WEBSITE

For greater visibility, TAFEP's website will contain direct links to your corporate website.

4. LEARNING OPPORTUNITIES

Receive invitations to TAFEP's workshops, seminars and conferences.

5. ACCESS TO RESOURCES AND ADVICE

Gain access to TAFEP's wide range of resources.

FLEXIBLE WORKING AT FEINMETALL

SSIA member, Feinmetall Singapore was one of the industry's first movers to adopt the Tripartite Standards in 2017. The 60-strong SME is a German-Singapore joint venture company specialising in the design and manufacturing of wafer probe cards for semiconductor wafer tests. Established in 2007, the SME started with a small team of five and has grown rapidly to 64 employees, occupying a 6,700 square foot digital manufacturing facility. All these were made possible only with the company's acceptance of new technologies, innovation and a great work-life strategy.

The company recognised that the key to better attract and retain talent in an SME is to provide a conducive work environment and help employees achieve great work and personal outcomes. A survey was conducted to understand and assess the work-life needs and concerns of the company's diverse workforce. Based on the findings, the company ran a trial of two types of flexible work arrangements (FWAs) for three months: Flexi-Time, i.e. (staggered working hours), and Flexi-Place (remote working for up to 2 days a month). The trial was highly successful and paved the way for company-wide implementation.

IMPROVEMENTS IN PRODUCTIVITY AND MORALE

The company saw an improvement in productivity and staff morale, stemming from better planning of resources, time and autonomy. Meetings were more structured and focused as staff made the best use of common time belts when they were present in the same location.

This also meant greater empowerment for employees in making decisions when their managers or supervisors were not on-site. The management also observed closer teamwork and improved communication with co-workers and supervisors. More importantly, employees were able to strike the balance between work and personal life, and better manage their responsibilities."Today, we can see the benefits and feel staff morale is strong. Flexi-work arrangements have helped us attract and retain staff, especially the younger generation, who want some control over their working hours," said Mr Sam Chee Wah, General Manager of Feinmetall Singapore.

COMMITTING TO PROGRESSIVE PRACTICES WITH THE TRIPARTITE STANDARDS

With a formal structure of FWAs in place, Feinmetall Singapore adopted the Tripartite Standard on Flexible Work Arrangements. "We find the Standards very useful as it consists of verifiable and actionable practices that employers can take reference from to implement the practices at the workplace. We have adopted four Tripartite Standards: Employment of Term Contract Employees, Flexible Work Arrangements, Grievance Handling and Recruitment Practices. This is to demonstrate our commitment to fair and progressive employment practices," said Mr Sam.

Feinmetall employee, Huang Simin, working from home as part of the company's Flexi-Place programme

Find out more about Tripartite Standards at **tafep.sg** or contact **ts@tafep.sg**

THE SINGAPORE SMART INDUSTRY READINESS INDEX

WHAT IS SINGAPORE SMART INDUSTRY READINESS INDEX?

The Singapore Smart Industry Readiness Index is a world-first tool developed by the Government in partnership with the industry to drive industrial transformation. The Index is a diagnostic tool that companies - across all industries and sizes - can use to better understand Industry 4.0 concepts, evaluate the current state of their facilities, architect a comprehensive transformation roadmap and deliver concrete, sustained value for their businesses.

WHO DEVELOPED THE INDEX?

The Index, developed by the Singapore Economic Development Board (EDB), in partnership with global testing, inspection, certification and training company TÜV SÜD, was launched in November 2017. It is a world-first diagnostic tool developed by the Government in partnership with the industry, to drive industrial transformation by helping companies harness the potential of Industry 4.0 in a systematic and comprehensive way.

HOW CAN THE INDEX HELP MY INDUSTRIAL TRANSFORMATION?

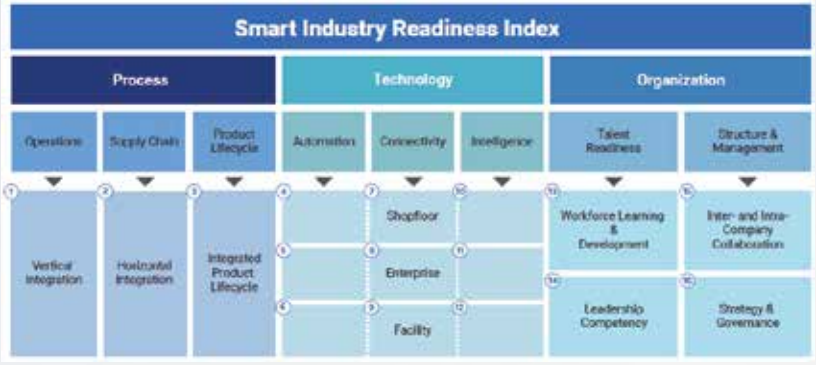
The Index serves as a diagnostic tool that companies - across all industries and sizes - can use to better understand Industry 4.0 concepts, evaluate the current state of their facilities, architect a comprehensive transformation roadmap and deliver concrete, sustained value for their businesses.

THE INDEX OVERVIEW

The Index comprises three layers. At the top are the 3 fundamental building blocks of Industry 4.0: Process, Technology and Organization. Underpinning these building blocks are 8 pillars of focus. These pillars then map onto 16 dimensions of assessment, which represent the key components that any organisation must consider.

For each of the 16 dimensions, the Index provides an assessment matrix which companies can use to evaluate their current processes, systems, and structures within one to two days. The assessment matrix also doubles as a step-by-step improvement guide, as each dimension provides intermediate steps needed for companies to progress. ***Information Source: EDB***

The Index: ensuring no aspects are overlooked



HOW CAN I GET ON BOARD THE INDEX?

There are 300 funded assessments for the Singapore Smart Industry Readiness Index. Companies who wish to register their interest for the funded assessments can do so at **http://www.edb.gov.sg**

Companies are invited to download the Singapore Smart Industry Readiness Index White Paper at www.edb.gov.sg/en/news-and-resources/news/advance-manufacturing-release.html

For more information on the Index you may contact http://www.edb.gov.sg/ | Source: EDB

The Future is With Us Now

By Andy Micallef, Chief Operations Officer,
Marvell Semiconductor Inc.

Marvell® congratulates Singapore on the exciting milestone of 50 years of the semiconductor industry, and we are thrilled to share in the celebration of this remarkable achievement! On this momentous occasion, it gives us pause to reflect on where we have been and where we are going.

Woven into the very fabric of our everyday lives, we see semiconductors at the heart of a global network of connected intelligence that is evolving at an astonishing rate. This ever-expanding network of smart devices is unlocking new capabilities, collecting and moving vast amounts of data to the cloud while depending on seamless, high-speed connectivity between the core and the edge.

At Marvell, we understand the core technology driving this infrastructure as we helped build it. Since our founding in 1995, Marvell has instilled an environment that encourages innovation and drives forward technological progression. The more than 12,000 patents attributed to our engineering team is testament to our decades of experience advancing the industry. As one of a handful of companies providing the core technology to drive the world's infrastructure, our expertise lies in securing and transmitting data at extremely high speed over cables or airwaves; packing complete systems onto a single chip; or exponentially increasing storage density to keep up with demand.

We are honored to play a small part in the rich history of Singapore's semiconductor industry. At Marvell, we believe that the future is with us now and we are more excited than ever to have our customers and partners with us on the cutting-edge—today, tomorrow and beyond. ***Image Source: Marvell***

MARVELL®

CULTIVATING COMPASSION IN OUR NEXT GENERATION

As one of the top three largest semiconductor memory and storage companies in the world, Micron Technology Inc. supports innovative Science, Technology, Engineering, and Math (STEM) education and research, and works with educators to help create the future's next industry experts.

Community outreach and charitable donations are supported and facilitated by the company's charitable foundation Micron Gives. The foundation awards STEM education grants and other community support at all the company's locations throughout the world. Each year, Micron Gives distributes more than USD $10 million to charities, schools, and universities.

In Singapore, local polytechnic schools and universities receive funding by way of STEM student scholarships and university STEM club workshops. In addition, Micron Singapore has contributed to STEM-related national Olympiads in informatics, mathematics, chemistry and physics. Micron Singapore also recognizes STEM educators by selecting science or computer science teachers for awards annually.

HUMAN SCIENCE COMBINES SCIENCE AND HUMANISM

Academics alone does not necessarily nurture compassionate students and members of society. By combining the Micron Give's emphasis on science scholars and community outreach, Micron Singapore has participated in community activities in which students and mentors work together, such as TOUCH Community Services' Meals on Wheels. In this particular project, scholars and mentors delivered meals together to home-bound elderly.

Micron also partners with other businesses in the U.S. to support a study abroad scholarship programme which promotes greater mutual understanding and collaboration between next-generation Singaporeans and Americans. The study-Community outreach and charitable donations are supported and facilitated by the company's charitable foundation Micron Gives. The foundation awards STEM education grants and other community support at all the company's locations throughout the world. Each year, Micron Gives distributes more than USD $10 million to charities, schools, and universities.

In Singapore, local polytechnic schools and universities receive funding by way of STEM student scholarships and university STEM club workshops. In addition, Micron Singapore has contributed to STEM-related national Olympiads in informatics, mathematics, chemistry and physics. Micron Singapore also recognizes STEM educators by selecting science or computer science teachers for awards annually.

HUMAN SCIENCE COMBINES SCIENCE AND HUMANISM

Academics alone does not necessarily nurture compassionate students and members of society.By combining the Micron Give's emphasis on science scholars and community outreach, Micron Singapore has participated in community activities in which students and mentors work together, such as TOUCH

Community Services' Meals on Wheels. In this particular project, scholars and mentors delivered meals together to home-bound elderly.

Micron also partners with other businesses in the U.S. to support a study abroad scholarship programme which promotes greater mutual understanding and collaboration between next-generation Singaporeans and Americans. The study-abroad scholarships also enhance existing Singaporean and American university relationships and help to forge new ones.

MATCHING GIFTS DOUBLE MICRON TEAM MEMBER NON-PROFIT DONATIONS

The Micron Matching Gift Programme matches team member charitable donations dollar-for-dollar. This multiplying effect results in up to USD $2 million in contributions to qualified non-profit organizations and schools. Team members can make meaningful contributions to youth programmes, health, education, environment and other social causes throughout the world.

Micron President and CEO Sanjay Mehrotra rallied Micron global team members to donate 100,000 collective volunteer hours this year. Micron Singapore responded with a powerful 4-day Walk for Rice initiative. The programme saw 4380 team members walk to raise rice donations for 7,000 under-resourced families.

STRENGTHENED COMMUNITIES CAN IMPROVE QUALITY OF LIFE

Micron Gives contributes to and strengthens the quality of life in the local community. Micron Singapore provides team members paid time off to support important causes.

Micron also supports Special Olympics Singapore, an organization which promotes and provides sports training and athletic competitions for children and adults with intellectual disabilities. Through Micron's sponsorship and volunteer staffing of a regular bowling training programme for the disabled and the Charity Bowl Programme, bowling was introduced as a Special Olympics sporting activity in Singapore in 2012.

Micron Singapore has also empowered the community by supporting para athletics through the Singapore Disability Sports Council's (SDSC) Live the Dream Project since 2016. The programme helps para athletes live out their dreams by providing them with much needed resources to develop their skills in their chosen sports. Micron now supports the development of para athletes in track and field, football, badminton and table tennis.

As part of the Live the Dream Project, Micron sponsored the Micron Singapore World Para Bowling Tour Series in 2018. More than 50 visually and physically impaired athletes from eight nations in the Asia Pacific region participated in the SDSC-organized event. During the six-day event, a total of 138 Micron team members volunteered their time to serve as lane marshals and athlete liaison officers. The tournament required much collaboration (one of Micron's core values) between countries as well as between volunteers and athletes.

INTER-AGENCY COLLABORATION YIELDS SINGAPORE'S DISABILITY SPORTS MASTER PLAN

The Disability Sports Implementation Committee facilitates inter-agency collaboration to create a Master Plan to develop capabilities in and raise awareness of disability sports in Singapore. Micron was one of two private companies invited to participate in the committee.

CHARITY OF CHOICE—A SIGNATURE MICRON GIVES PROGRAMME

A signature element of Micron Gives is the Micron Charity of Choice programme where team members in the respective countries of operation vote on a local level to direct funds to a charitable organization in their region. Micron Singapore's Charity of Choice for 2018 is Club Rainbow, a local non-profit organization that supports children with chronic illnesses and their families. Apart from financial contribution from the company, Micron team members will also be involved as volunteers at Club Rainbow activities, such as the Dreamseeds Arts Fest, which celebrates the creative pursuits of Club Rainbow beneficiaries.

The CareHut programme by Care Community Services Society is another Micron Singapore Charity of Choice. CareHuts are school-based student care centers which provide after-school care and supervision to children from low-income and/or single-parent families. Micron is pleased to be providing lunch and refreshments for the primary school students in the CareHut at New Town Primary School. Micron team members will also engage the students through organized interactive activities such as sports and STEM-related programs.

Image Source: Micron

> ***"It is our privilege to be able to contribute to the Singapore community. These efforts reflect our company's focus on investing in our students and teachers, embracing diversity, and our long-term dedication to our Singapore team members. We look forward to working with our community partners to identify and support those programmes that will make a difference for many years to come."***
>
> **Chen Kok Sing, Micron Vice President and Singapore Country Manager.**

Singapore University of Technology and Design (SUTD)

DESIGNING TOMORROW'S TECHNOLOGY TODAY

SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

At SUTD, every student and researcher is, first and foremost, a designer. We design innovative, human-centric technological solutions for the betterment of society and for the future of mankind.

Our key strategic design focuses are:

Technology, urbanisation, economics, politics and demographics. These are just some of the factors that are driving rapid, exponential change around the world, characterised by a multi-faceted digital revolution that cuts across industry, society and the global economy.

As a research-intensive university, SUTD has developed strong research capabilities in both **human capital** and **physical infrastructure.** These are designed to contribute to Singapore's national priority of building an innovation-based economy and society across numerous economic sectors.

The research-based knowledge innovation engine of SUTD is thus nimble and responsive to major challenges in Singapore and around the world, seamlessly producing research outcomes with broad social and economic impacts.

THE EVOLUTION OF ENGINEERING EDUCATION

Engineering education has evolved significantly with the changes wrought by the first, second and third Industrial Revolutions. As the fourth Industrial Revolution continues to gather pace, new technologies, such as advanced robotics, machine learning/ artificial intelligence and data analytics, will continue to displace human labour in record numbers.

New jobs are thus required, jobs that require creative, innovative, personal and communication skills. These 'soft' skills will not diminish the need for technical skills – on the contrary, they are required to keep apace with the rapid rate of new technologies that are being adopted.

Concurrently, the world is entering a period where the demand for education and research will rise considerably. By 2050, half of traditional universities and colleges may no longer exist due to the mismatch between technical instruction and industry demand.

As a model for the universities of the future, SUTD provides **industry-oriented** programmes where industry partners play an active role in training future-ready graduates who can embrace and resolve increasingly complex multidisciplinary real-world problems.

For instance, SUTD works with key companies in the relevant industry sectors to co-develop courses with industrial relevance (students are required to intern with these companies to gain valuable experience before graduating) and to upskill these companies' employees for continuous learning to ensure that they stay relevant to the changing demands of the workplace. SUTD students with a keen interest and aptitude for entrepreneurial roles are offered infrastructure for incubation, guidance through mentorship and assistance to support them in their entrepreneurship journey. This provides encouragement for them to spin off companies to be part of the innovation ecosystem for these sectors.

Students and researchers are also imbued with creative thinking, problem-solving, social and emotional skills, as well as the mind-set, capacity and appetite for continuous and lifelong learning to stay relevant and respond adeptly to embrace the challenges of the new economy.

AN EAST-MEETS-WEST PHILOSOPHY TO EDUCATION AND RESEARCH

Innovation is at the heart of SUTD's design-centric pedagogy, which was established through strategic collaborations with two important partners – MIT from USA and Zhejiang University from China.

As a relatively small university (with a current student population of just under 2,000 undergraduate and graduate students), SUTD was designed from the very start to emphasise a **global perspective.**

SUTD is MIT's blueprint of future engineering education, learning and adopting best practices and novel thinking from top minds at MIT. From Zhejiang University, we learnt Chinese educational, cultural and historical perspectives through electives developed and taught by their faculty. A third of our faculty members come from USA and Europe, whilst a third are local Singaporeans and the remaining one third come from Asia.

SUTD's programmes are structured in terms of what the world needs, rather than being organised around traditional stores of knowledge production in departments or colleges. These are centred around four Pillars: Architecture and Sustainable Design (ASD), Engineering Product Development (EPD), Engineering Systems Design (ESD) and Information Systems Technology and Design (ISTD).

We combine these technical disciplines with education from the Humanities, Arts and Social Sciences (HASS) Cluster, resulting in what we call the **'Big-Design'** (or Big-D) philosophy, where technology is used to facilitate and enhance the design process of human-centric products and services from conceptualisation and development all the way to launch and market sustainability.

In SUTD, we have also created an agile, fluid network that identifies and pulls performers from the academic units to support the heart of SUTD's research network, which is a series of research centres pursuing transdisciplinary research across disciplines and stakeholders. These research centres are anchored by longer-term block funding to support basic and applied research to benefit SUTD, Singapore and beyond.

THE CHANGI INNOVATION ECOSYSTEM

Given our small size, SUTD has chosen to focus on key strategic sectors to emphasise over the next five years: **Aviation, Artificial Intelligence/Data Science, Healthcare** and **Future Cities**. In each sector, we will focus our research on applied problems to impact industry and society.

SUTD's close proximity to the Changi International Airport, Changi Business Park and the Changi General Hospital in the east of Singapore presents an excellent opportunity to actively develop the Changi Innovation Ecosystem, or INSPIRE@Changi (**IN**novative **S**olutioning **P**lus **I**nspired **Re**search).

INSPIRE@Changi will serve as a nexus for academia, industry anchors (LLEs and MNCs) and accelerators to form strategic partnerships and co-create programmes to advance research and create innovative enterprises for SUTD's key strategic sectors. SUTD's translational research facilities will enable large-scale prototyping and test-bedding that will uniquely underpin our efforts to be an agent for transformation in SUTD's key strategic sectors: Aviation, Artificial Intelligence/Data Science, Healthcare and Future Cities

LOOKING TO THE FUTURE

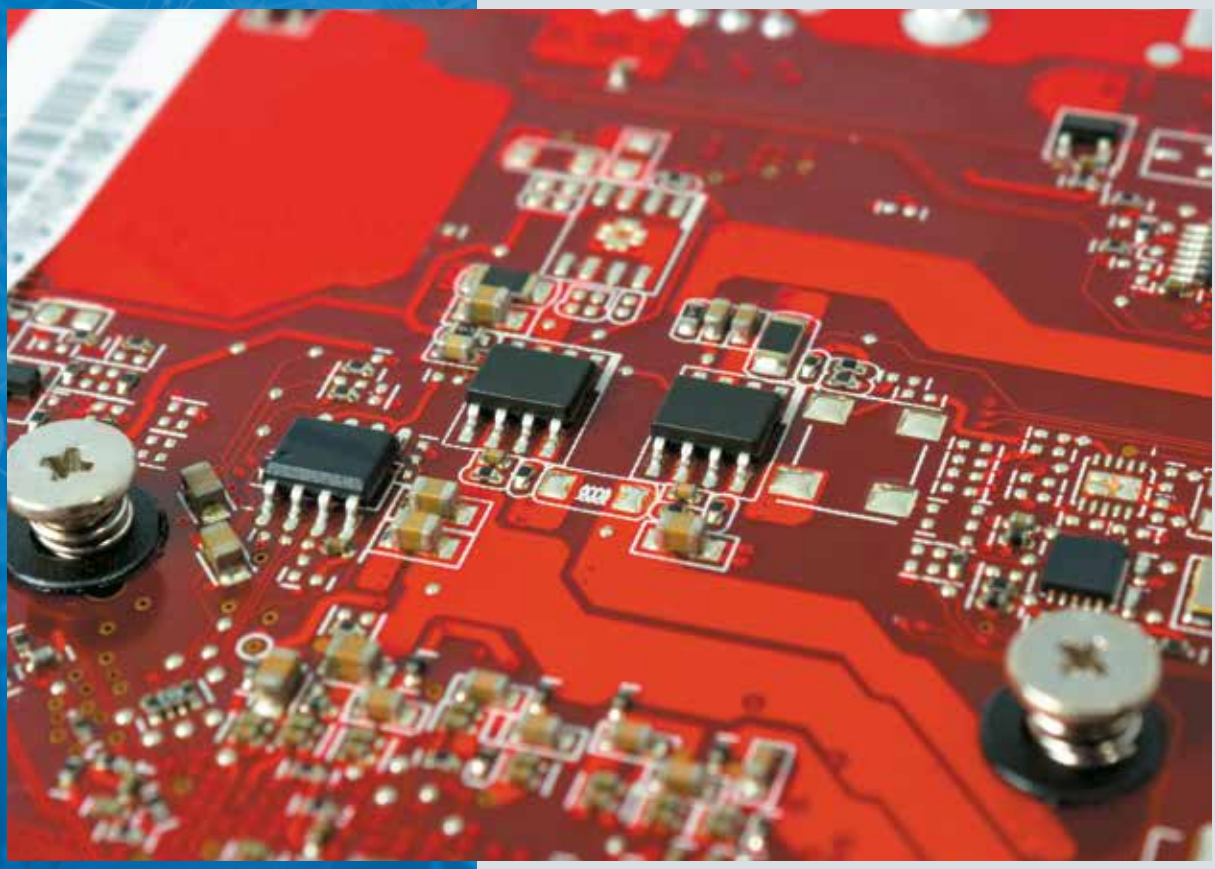
Underpinning this integrated, trans-domain partnership is SUTD's continual goal of engaging international universities and institutions that share similar visions and synergies in education, research and entrepreneurship and its key strategic sectors.

This networked alliance will promote seamless cooperation as well as co-sharing of ideas and leveraging of partner resources, producing a multiplier effect where companies and industry can leverage on human capital, physical infrastructure and other resources.

We at SUTD keep learning through collaborating with others and adapting their knowledge and best practices for our own needs. Our well-equipped infrastructure, resources and talents are what define us as a great global university founded on technology and design, but at the end of the day, our success will be decided by two factors: our ability to attract the best and the brightest people from around the world and our ability to nurture people of diverse skills and abilities.

All in all, SUTD's fundamental role in generating innovative research stems from our constant desire to look for, test and implement new ideas, often defying traditional wisdom in the process. ***Image Source: SUTD***

REALTEK



Realtek Semiconductor Corporation, located in the Hsinchu Science-based Industrial Park — Taiwan's 'Silicon Valley' — was founded in 1987. Since then, Realtek has delivered 30 years of profitable growth to become a world premier fabless IC design house, providing a range of solutions that enhance people's lives by linking Communications Network, Computer Peripheral, and Multimedia devices to form interconnected entertainment, business, and information tools.

Realtek culture is deeply rooted in 'Self-confidence and trust in people'. It breeds talented leaders who are passionate about sharing knowledge and experience with one another to inspire innovation and pursue growth of the company, as well as the individual.

Realtek Singapore was established in 2013, and has attracted talent from around the region due to the steady growth of the company, exciting career opportunities, and excellent quality of life in Singapore. In five years, Realtek Singapore has set itself up as the second full-function operation center outside Realtek Headquarters. Its rapid expansion manifested itself in the 2015 acquisition of Cortina Access, a world leading carrier gateway and 10G-PON solution provider. The solutions provided by Realtek Singapore are applicable to the global telecommunications market and Realtek is committed to enabling next generation high-speed communications networks in SEA led by Singapore.

Today, Realtek is well received for, among other things, its innovative work in IoT solutions, for which Realtek Singapore plays a pivotal role in product development. As IoT continues to evolve, Realtek sets her eyes on growing Realtek Singapore to become a center of excellence for IoT solutions for smart cities and multiple other applications.

SINGAPORE SEMICONDUCTOR50
SHAPING THE FUTURE

Over the next decade, A.I. and Big Data will transform almost every sector of the economy and be a major growth driver for electronics and semiconductors. By ensuring a constantly evolving ecosystem, Singapore has transformed from modest beginnings into a global innovation hub. Here, the world's most prominent chip and chip equipment makers work together to realise the potential of next generation technologies. The most exciting days for the industry, Singapore and Applied Materials are definitely ahead of us.

As a key contributor to Singapore's innovation economy, Applied Materials is proud to be part of this successful evolution with the semiconductor industry, working in close partnership with the local ecosystem. Our sales and service teams collaborate with customers to deliver materials engineering solutions that enable their success. In addition, our Singapore advanced manufacturing operations is responsible for almost half of our global semiconductor output. Our successful private-public partnerships have resulted in leading edge R&D around key inflections like advanced packaging, advanced materials, additive manufacturing and other disruptive technologies.

Longstanding and new partnerships alike continue to drive innovation that propel the industry forward in this rapidly evolving technological landscape. Together with our customers and partners, we remain committed to investing and building strong talent as well as driving the growth of the Singapore semiconductor industry.

Looking back on our past 50 years, we are proud of the milestones reached with our customers and partners. We are very excited about the future of the semiconductor industry as we scale greater heights together. Happy Golden Jubilee!

Brian Tan
Vice President (Applied Global Services)
Regional President (South East Asia)
Applied Materials

APPLIED MATERIALS®
make possible

Image Source: Applied Materials

AN ERA OF NEW TECHNOLOGY

We are living in an era of advanced technology influenced by robotics, artificial intelligence and Internet of Things (IoT).

Every part of our daily lives is related to smart devices which include tablets and smartphones to wearables, which are capable of performing communication and sensing functions. Various highly-developed gadgets, connected to the Internet, have changed the way we communicate, work, study, shop, play, and behave. Here are some of the ways our lives have been influenced by the latest technology:

TRACK YOUR PREFERENCES

We encounter artificial intelligence (AI) daily. Think of all those times where Facebook recommends a travel or dining place, or Amazon suggests a book. Those recommendations are based on algorithms that examine what we have bought or where we have travelled to. AI makes use of our past choices and preferences to introduce new services and products. Simple artificial intelligence filters our incoming emails and diverts spam.

All in all, SUTD's fundamental role in generating innovative research stems from our constant desire to look for, test and implement new ideas, often defying traditional wisdom in the process.

PERSONAL HEALTH

The availability of fitness-tracking technology has meant that people are generally becoming more conscious about their health. Wearables such as smartwatches provide better feedback about what is happening to our bodies so that we can improve our exercise regime. We can now track our sleeping patterns, nutritional balance, visits to the GP and check up on our work schedules. In sport, IoT devices and wearables focus on performance efficiency. We are able to track our progress, overall cardiovascular fitness level, power, agility, errors and any variables.

To get a top fitness tracker, be it an activity band, fitness watch or clip-on, we can select from Fitbit, Garmin, Xiaomi, Misfit or Polar. Selecting the right fitness tracker will depend on our individual needs and how active our lifestyle is. There are top fitness trackers to suit every budget and fitness level. Some people will look for wearables for step counting and reliable sleep tracking while others might want built-in GPS for running or a heart rate monitor to deliver advanced resting heart rate data.

IMPROVED HOME ENTERTAINMENT

In the past, our entertainment experiences were limited to just watching television and videotapes. Today, home entertainment has changed tremendously due to the rapid growth of the Internet, mobile connectivity, and social networks.

With the technological advancement, we enjoy improved home entertainment with different types of home entertainment ranging from smart TVs to Xbox units. The right appropriate smart TV can vastly improve our home entertainment, filling our living room with on-demand content from Netflix, Hulu, Amazon Prime, and other streaming companies. We can create an immersive, surround-sound experience in the living room or even watch free live video streams around the world such as the mouth of an active volcano. We can also do web-browsing on the wide-screen TV.

SMART HOMES

Smart, connected appliances are what we think of when we hear of IoT. We imagine an intelligent house programmed to save energy where heating systems will be synced with external temperature sensors and lights will come on as we enter a room. IoT will have a drastic effect on waste management. With the seamless integration of light, heat and air conditioning, we can save on utility bills.

With modern technology, the majority of the items that we have in our homes are automated, which makes our lives more organised, safer and effortless. The automated vacuum cleaner such as an iRobot maps and "remembers" a home layout, adapts to new items of different surfaces, cleans a room with the most efficient movement pattern, and docks itself to recharge its batteries.

The advanced technological solutions such as security cameras, automated door locks, and lighting control, ensure that our homes are now more secure than ever. With the Internet, we have an easy access to all sorts of information, news, and can shop online at any time of the day from the comfort of our own homes.

SMARTPHONE REVOLUTION

Smartphone and apps have changed the way we work, communicate and play. A decade ago, cell phones were used primarily for calling and sending texts. Today, smart phones can do everything from taking high-resolution pictures to watching pixel-perfect videos, paying bills, reading emails, creating documents, browsing the internet, playing graphic-intensive games and monitoring our movements. The presence of smartphones has simplified our lives immensely. People can now connect with their loved ones more frequently and easily.

HEALTHCARE

Technology is the driving force behind the huge improvements in healthcare. Most hospitals today have implemented modern technology which has significantly reduced the waiting time for patients and improved their well-being. Support from healthcare professionals for patients and caregivers can also be done remotely via an Internet-based videoconferencing service that works on consumer devices and can support one-to-one and multi-user interactions.

Hospitals have used assistive technology and robotics to improve the way the elderly and people with disabilities are treated. Automated guided vehicles (AGV) can transport food, documents, or linen and even move heavy items like beds. Data analytics can improve daily operations and reduce waiting times for patients. Robotics technology can help the patients to avoid bed sores. Robots can also help recovering stroke patients to exercise or keep early stage dementia patients occupied and alert them to take their medicine.

E-PAYMENT

Contactless payment through EZ-Link and concession cardholders are used to make payment in all NETS-enabled hawker centres. We enjoy the convenience and efficiency of e-payments which is swift and seamless.

With a widespread acceptance of contactless payment, there is a high usage of credit and debit cards, as well as a good level of mobile readiness with Apple Pay, Android Pay, and Samsung Pay being available as mobile payment modes in Singapore.

Consumers can use the recipient's mobile number and/or NRIC to perform secure peer-to-peer direct funds transfer across local banks. The PayNow service which is launched by the Association of Banks in Singapore (ABS) is now available on existing mobile banking apps and online banking systems of participating banks. The Government has also launched the Singapore Quick Response Code (SGQR) in September 2018, which combines multiple payment QR codes into a single SGQR label, making QR code-based mobile payments simple for both consumers and merchants.

With each passing day, technology is growing up leaps and bounds. The proper use of technology holds a bright future for us.

ABOUT THE AUTHOR

PATRICIA ANG has 18 years of extensive experience in corporate communications, media relations, event management and alumni relations. Her passion lies in writing. Patricia has written for marketing collaterals, newsletters, personality profiles, feature writings, magazines, corporate brochures, banners, website contents, yearbooks, online articles, annual reports, speeches and press releases.

anghweeshen@yahoo.com.sg

siltronic
perfect silicon solutions

SILTRONIC JOINS SSIA TO COMMEMORATE 50 YEARS OF SEMICONDUCTOR PRESENCE IN SINGAPORE

Singapore has been a center for high-tech and semiconductor companies for 50 years. Since 1990s, it has been the goal to make Singapore a key technology hub in Asia. This is also the reason why Siltronic decided about 20 years ago to build its own production facility in Singapore and benefit from the country's strategic position.

The subsidiary, Siltronic Singapore Pte. Ltd., was established in 1997 and 200 mm wafer production started in 1999. As the second international location, the Singapore site gave Siltronic an important presence in Asia's growing market, being close to its customers and thus represented a milestone for the company.

In 2006, the joint venture Siltronic Samsung Wafer Pte. Ltd. (SSW) was established together with Samsung Electronics Co. Ltd. The first joint venture between a semiconductor and a wafer manufacturer went on to build a new 300 mm wafer plant in Singapore.

After an extension in 2012, Siltronic recently celebrated the ground breaking for a new crystal-pulling hall. Siltronic's Singapore facility is among the most modern in the world, producing wafers with single wafer traceability using sophisticated information and automation technology.

> ***In Singapore, we operate one of the world's most advanced production facilities for high-quality 300 millimeter wafers***
>
> Dr Christoph von Plotho,
> CEO of Siltronic

Moving forward, Siltronic expects that its presence and engagement in Singapore will continue to enhance due to country's global connectivity, diverse talent pool and business-friendly environment. Siltronic is confident that it will be part of the next 50 years of semiconductor presence in Singapore.

Image Source: Siltronic

SILTRONIC'S SINGAPORE SITE IN TAMPINES INDUSTRIAL PARK.

SSIA
Singapore Semiconductor Industry Association

To connect with us
visit https://ssia.org.sg

What are the Benefits of SSIA membership?

- Knowledge sharing platform with government agencies
- Business networking opportunities
- Extensive market outreach and branding opportunities
- Leadership and master class trainings
- Priority in customised talent outreach programmes
- Priority access to industry benchmark data and directories

For more information about membership,

visit https://ssia.org.sg/join-us/

Be part of our community

If you are keen to participate and play an active role in this vibrant community with your content marketing or advertising campaign, please write to **secretariat@ssia.org.sg**. Alternatively you can call us at **+65 31091953**

60 PAYA LEBAR ROAD, #10-28
PAYA LEBAR SQUARE, SINGAPORE 409051
T: 3109 1953

PRICE $6.00