SINGAPORE SEMICONDUCTOR VOICE

Volume 8

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BEYOND COVID-19: NAVIGATING THROUGH A NEW ECONOMY

WHAT COULD SMEs DO BEYOND TEMPORARY CRISIS MANAGEMENT

AUTOMATION SUPPLIER DAY

EFFECTIVE TEMPERATURE CONTROL SOLUTION FOR HIGH PARALLELISM IC TEST SYSTEM

SSIA
Singapore Semiconductor Industry Association

FOREWORD BY EXECUTIVE DIRECTOR

The last few months has been an unprecedented time for the industry, and for a trade association like SSIA. The COVID-19 pandemic is changing the industry. At the same time, SSIA is also transforming to adapt to the new norm and to better represent the semiconductor industry in the fight against the COVID-19.

One of our roles is to gather insights on the impacts of the COVID-19 crisis across the industry. In March 2020 and just weeks before the Circuit Breaker was activated, we conducted an industry-wide pulse survey covering several sectors from the semiconductor industry. Many companies have responded on the impact of COVID-19 and the challenges they would face should the situation escalate. Based on their concerns on sustaining business operations, SSIA has written to the government seeking their support to recognize the semiconductor operations and its supply chain as essential should the COVID-19 situation escalate. We are relieved and thankful that the Singapore government has recognized the semiconductor industry as an essential business under the Circuit Breaker measures.

Keeping our members updated is our focus, too. We have set up a bulletin page in our website posting daily announcements and latest initiatives launched by the government and agencies, to help our industry understand what support is available.

Imperial College is predicting that this outbreak will continue for at least another 12 to 18 months. Some research studies have estimated the situation to prolong till 2022. Even the crisis has passed, we will not be returning to an old norm but entering a new 'post-COVID-19' era instead. It is now a good opportunity for SSIA as well as businesses to reshape the organization to adapt to this new era. I believe our industry will come out stronger from the pandemic.

We can see the continuing higher demand for semiconductor and electronics solutions from our industry, from personal gadgets to storage cloud solutions, which are all supported by the tiny chips. There is also the upcoming 5G technology that will further fuel the businesses in our industry. The semiconductor industry is definitely going to have a key role to play in our social and economic recovery.

We will be launching a series of initiatives to help companies focus on productivity improvement and most importantly, to stay competitive by innovating their product and services. SSIA is going to drive the Electronics Industry Transformation Map in a new way - through online platforms. Please stay tuned to our updates on our website and social media platforms. SSIA Automation Supplier Day will be one of these initiatives. This business matching platform helps companies engage with one another, and we are going to run this event virtually this year. Do check out more details at SSIA website. Besides this event, we will organize more virtual gatherings to help bridge the companies with government agencies and supporting institutions.

One area of focus, and even more so now during this pandemic, is workforce development. We continue to encourage both companies and the workers themselves to upgrade and upskill. SSIA has partnered with various institutions, such as Singapore Polytechnic, NTUC LearningHub and NUS SCALE, to offer the different courses to our workforce. SSIA has also started organizing industry relevant courses such as Cost Optimization, Basic Semiconductor Processes and many more. Do check out our websites for more details.

Last but not least, I would like to thank AEM and Workforce Singapore for sponsoring this issue. SSIA is working our best to execute initiatives to support our industry. In the meantime, we also seek companies' support by sponsoring our events and magazine, to help accomplish our mission. Please contact us if you are keen to be our sponsor and build your company's visibility through our platforms.

Please enjoy reading this magazine. You can reach out to us if you would like to utilize this platform to reach the masses. Finally, I wish you safe and good health. See you at the next virtual event!

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SSIA-NTUC U SME INTERACTIVE ONLINE SHARING

Singapore Semiconductor Industry Association (SSIA) together with NTUC U SME, organized an interactive webinar on 14 May 2020. It was a productive session where NTUC U SME, NTUC LearningHub, SkillsFuture SG and Employment & Employability Institute (e2i), shared the government's initiatives to support our businesses, especially with regards to our workforce. Over 90 representatives from around 50 companies joined the sharing session.

Industry Pulse Survey by SSIA

The session started with the opening remarks given by Ang Wee Seng, Executive Director of SSIA. He shared on SSIA's support for their members with focus areas on manpower, business matching and improving productivity through innovation and upskilling during the COVID-19 crisis. SSIA had also written to the Singapore government seeking their support to recognize the semiconductor operations and its supply chain as essential businesses should the COVID-19 situation escalate, just before we entered the circuit breaker period. Besides, Wee Seng also shared the survey results of the industry pulse survey conducted in March 2020, in which majority of the over 30 respondents expressed major concerns about the impact of COVID-19 to their supply chain, both globally and locally. The other areas of concerns were manpower and logistic/ freight support due to the various lockdown across the world. This was especially worst for manufacturing plants.

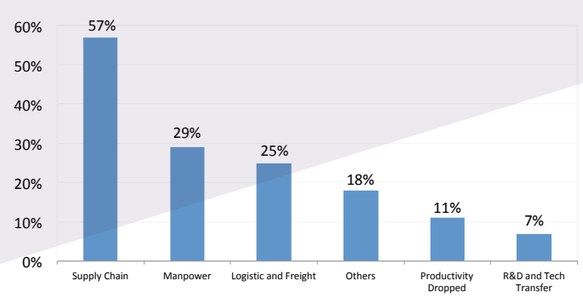
"SSIA will continue to promote upgrading and upskilling of workforce. We will be rolling out different industry relevant courses and partnered courses for the industry peers," said Wee Seng.

NTUC's Support to Companies

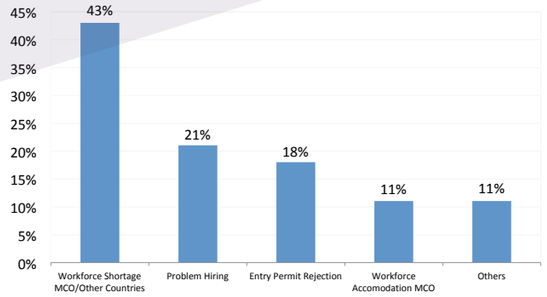
Mr. Yeo Guat Kwang, Assistant Director-General of NTUC, said in his opening remarks, "It is an unprecedented period for most industries. Companies are encouraged to speak to U SME on their industry challenges so that NTUC can render the necessary support for them." He also reminded participants to sign up for NTUC membership to enjoy its benefits and hope that companies will continue to leverage support from the government and NTUC initiatives as means to retain their employees.

Various Schemes to Help Companies Tide Through the COVID-19 Crisis

During the session, representatives from NTUC U SME, NTUC LearningHub, Skillsfuture Singapore and e2i introduced the latest initiatives including fundings, grants and training courses specially launched to cope with the challenges faced by companies amid the COVID-19 situation.



*COVID-19 Impact to Current Business**



*Manpower Concern from the Semiconductor Industry**

*Based on the industry pulse survey results conducted by SSIA in Mar 2020

INITIATIVES INTRODUCED BY THE PRESENTING AGENCIES

Sharing by NTUC U SME
- Operation & Technology Roadmap (OTR)
- $30K NETF Collaborative Fund (NCF)
- Updates on Job support scheme

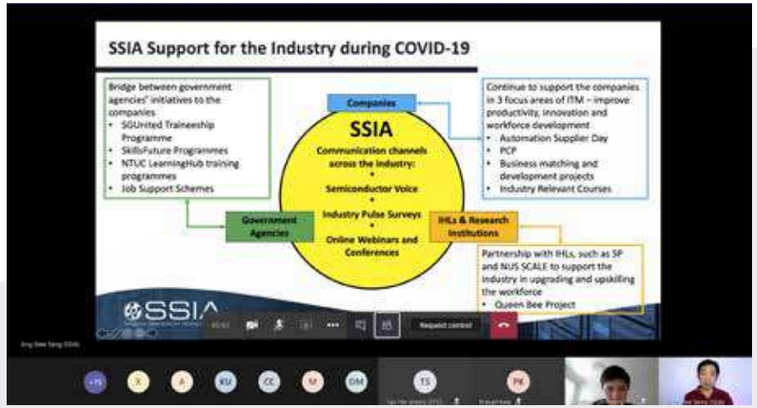
Sharing by NTUC LearningHub
- SSG Funding
- Enhanced Absentee Payroll (AP)
- Virtual Live Class (VLC) and new NTUC LHub Courses

Sharing by Skillsfuture Singapore
- Skillsfuture Enterprise Credit
- Work Study Programmes (WSP)
- Additional Support for Sectors Affected by the COVID-19 Pandemic

Sharing by Employment and Employability Institute (e2i)
- Enhanced Work-life Grant (WLG)

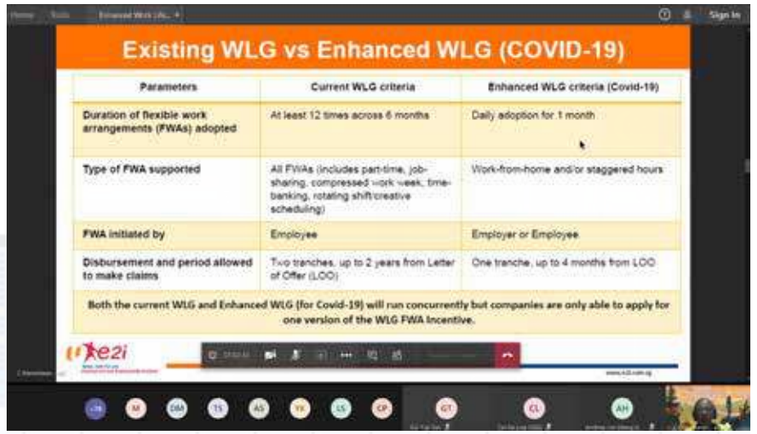
Presenters
1. Mr Clemence Boey from NTUC U SME
2. Ms Tan Gui Yue from NTUC LearningHub
3. Ms Cecilia Low from SSG
4. Mr Mano from e2i

Scan the QR code to access presentations of the sharing session



SSIA's initiatives to support the industry during COVID-19

(Top left) Andrew Lim (Assistant Manager of U SME), (Top right) Ang Wee Seng (Executive Director of SSIA) and (Bottom right) Yeo Guat Kwang (Assistant Director-General of NTUC)



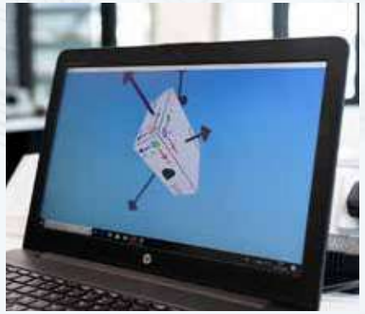
Some of the schemes presented during the sharing session

SSIA R&D COMMITTEE FORMED TO ADVANCE A VIBRANT R&D ECOSYSTEM

Under the RIE2020 Plan supported by National Research Foundation, the Singapore government has prioritised research funding in four technology domains or verticals where Singapore has developed a competitive advantage in research excellence or meets national needs, create more space for our future developments: and ensure that our seniors live active, meaningful, healthy lives. One of these areas is Advanced Manufacturing and Engineering. Since 2016, the Government has set aside S$19 billion over 2016 - 2020 for research, innovation and enterprise activities, to support and translate research, to leverage science and technology to address national challenges, and build up the innovation and technology-adaptation capacity of our companies to drive economic growth through value creation.

Envisioning the Future R&D Landscape

Singapore Semiconductor Industry Association (SSIA) is a key partner



in driving the Electronics Industry Transformation Map (ITM), in which Innovation and R&D are key enablers and the core to diversification. Therefore, it is one of its missions to advance a vibrant R&D ecosystem in Singapore. Recently, SSIA Board has formed the R&D Committee chaired by its Secretary, Jerome Tjia. The Committee will look into the current R&D landscape, the missing gaps, and opportunities in Singapore. It will also envision what the future landscape will be. The Committee is conducting a survey with industry peers to better understand the ecosystem and challenges in the R&D arena of the industry. Based on the results, the committee will then make the necessary recommendation to the Board and government agencies, and the findings will be crucial in defining the necessary support to help grow the R&D landscape in Singapore.

Companies who are interested to participate in the survey, please scan the following QR code.

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INDUSTRIAL COST OPTIMIZATION

On 26 - 27 May 2020, SSIA launched its first online training course during the circuit breaker period. Mr Chung Ching Thiam (CT), who has had 35 years of experience in the Semiconductor industry, introduced how companies can optimize its materials spending, equipment maintenance spending as well as the energy required for production.

Break out sessions were arranged to allow participants to interact with each other and shared various cost optimization methodologies used in their organizations. The course has helped deepen their understanding in cost optimization, ensuring they are well informed on the different applications and refreshed on the know-hows and latest development in the industry.

Contents shared in the course are based on technical engineering data analysis and statistical evidence. Many companies are moving away from the conventional cost cutting and cost reduction measures during a market downturn as such "desperate and urgent" measures more often than not have an unfavorable impact on businesses in the long run. Instead, companies are recommended to cautiously select their cost optimization methodologies, as cost-saving tactics may not be a 'one-size-fits-all' solution. Different companies may require different sets of cost optimization or saving tactics. This will ensure a more systematic, holistic, sustainable and effective bussiness model, with positive impact on the business in the long run.

CT also shared his personal experience on the best practices of reducing necessary spending, optimizing the cost saving and things to look out for when implementing cost-savings methodologies. He recommended businesses to encourage all their staff to voice out their ideas to help the leaders find a simple yet effective method to optimize cost efficiently.

Please contact Daphne at daphne@ssia.org.sg for enquiries on other training courses or customizable in-house training courses catered to your organizational needs.

Scan the QR code for details on upcoming training courses

Participants interacting in one of the break out room session

Scoreboard of the in-class quiz

A quiz on participant's understanding of the course at the end

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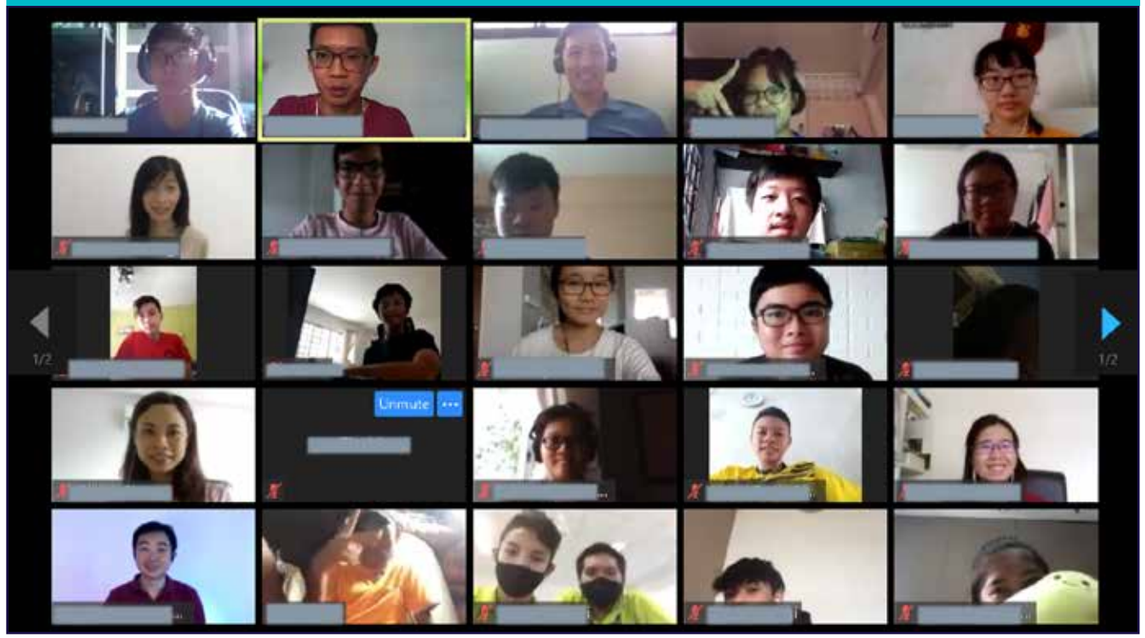
AN ONLINE CAREER TALK WITH SPRINGFIELD SECONDARY



SSIA has been invited to career talks hosted by different schools and institutes to share the development and prospects of the engineering and semiconductor industry. With the current COVID-19 situation, the career talks have gone online. Nonetheless, it does not lower the curiosity and enthusiasm of students about joining the industry

'Meeting' the Springfield Secondary Students

SSIA Executive Director Ang Wee Seng was invited to an online school talk by Springfield Secondary School on 6 May 2020. Over 30 secondary school students participated in this online session. Wee Seng shared the development of the semiconductor industry in Singapore, how SSIA has been supporting the industry as well as his personal career story. Students were interested to know about the prospects and real challenges in the field of engineering. Some of them felt they had an interest in the engineering field, but did not know how to proceed on from here. They also raised questions regarding the qualifications required, the career progression, and the satisfaction from the job. Some of them also asked how to get their parents' support to join the industry.

Follow Your Passion

One of the students asked Wee Seng, "If the path of engineering does not work out for our students, are there any relevant pathways or job opportunities that the industry can offer?" Wee Seng encouraged the students to 'follow their passion'. Having the mindset to discover and develop solutions will be a prerequisite to join the semiconductor and engineering field, and there will be tremendous opportunities ahead for them.

Eddie Chong, the ECG Coordinator of the Springfield Secondary School, thanked SSIA for speaking at the career talk. "It is a good sharing to motivate our students who may be at a loss now when it comes to charting their own career path," said Eddie.

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CAREER PREPARATORY WEBINARS FOR PCP CANDIDATES

When it comes to job search, a good resume is paramount. After that, acing a job interview also has as much to do with the way the candidates prepare. To help candidates of the SSIA Professional Conversion Programme (PCP) better prepare themselves during the job search process, NTUC's e2i (Employment and Employability Institute) and SSIA co-organized two career preparatory webinars 'Win the Search' and 'Win the Interview' on 8 May and 12 May 2020 respectively.

Winston Chue, Instructor of the two webinars and Chief Executive of Quest Discovery Academy, shared with participants the techniques to customize an effective resume and create an effective LinkedIn account for better visibility in the 'Win the Search' webinar. Participants got the chance of working on their resume on the spot as well as a 1-to-1 consultation with Winston. In the 'Win the Interview' webinar, Winston gave advice on how to prepare for the challenging questions at job interviews and crafting an elevator pitch.

Participants were engaged in the webinars, especially during the breakout sessions. They raised different questions about building their resumes and preparing before job interviews. Questions included, what kind of personal details should they include in the resume, and if age is a concern amongst hiring companies.

"Knowing is not equivalent to doing. Go out, practice and do it right. Be clear of what you are to do. Don't give up. There is always a silver lining out there," said Winston when asked about the key takeways he wanted the participants to get after the webinars. "I noticed that most of the participants have a lot of potential in them, akin to a precious stone. Some needs slightly more work, like re-shaping and cutting - to bring out the beauty in them. While others just need polishing to bring out the glitter in them. Most importantly, the participants are willing to set aside time at home to invest in themselves to learn the tips and tricks of the current employment trends."

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e2i
Better Jobs For Life
Employment and Employability Institute

BEYOND COVID-19: NAVIGATING THROUGH A NEW ECONOMY

BEYOND COVID-19: NAVIGATING THROUGH THE NEW ECONOMY

While businesses are coping with the challenges evolved from the disruptions brought by the COVID-19 pandemic, it is inevitable that they also need to transform to navigate the new normal in their industries at the same time.

As the impact of COVID-19 continues to reverberate, individuals and companies have shifted their focus and resources in various ways to support their new ways of living, families, businesses and staff to adapt to this challenging time. All these changes will become the new normal and shape the new economy after the pandemic.

According to a report by Mckinsey on 'Coronavirus: Implications for the semiconductor industry' published in April 2020, they expected demand to decline by 5 to 15 percent for the semiconductor industry as a whole this year compared to 2019. Breaking down this projection by major end markets—PC or server, wireless communication, wired communication, consumer electronics, automotive, and industrial applications—showed that demand shifts vary greatly, with steep declines anticipated for some markets and gains expected in others. These differences can be explained by the diversity of underlying trends that affect demand for semiconductors, and the varying impact of macroeconomic forces on each end market.

Mckinsey suggested companies must quickly move from strategic plans to action, as market dynamics in the semiconductor industry are rapidly changing. As semiconductor players adapt to these changes and journey toward the next normal via bold and timely moves, they can help their businesses thrive.

WHAT SMEs COULD DO BEYOND TEMPORARY CRISIS MANAGEMENT

Pivot your strategy and take these steps to help increase your chances of thriving in a post-Covid world.

It's not the first time we're experiencing the impact of a global financial crisis. Yet, our coping strategies survive only as long as the crisis survives and then it's back to business as usual. While SMEs do their best to firefight the effects of Covid-19, perhaps one of the worst outbreaks in history, it's also a good time to think about how to future-proof businesses for a post-Covid world.

Given that SMEs are a key pillar of the Singapore economy, contributing 48% of its GDP, employing about 65% of its workforce and constituting 99% of all its enterprises, it's quite clear the nation depends on them. And while the government has offered a slew of budget measures amounting to S$55 billion including rental waivers, wage support, tax support, rebates, and more, SMEs must still innovate in a way that best suits their unique business models.

Singapore Business Federation CEO, Ho Meng Kit said: "We urge our companies to make full use of these measures not only to ride out the crisis with confidence in the near to medium term, but also to relook at their business strategy and retrain and retain their workers to prepare for the eventual recovery."

Here are some strategies to consider, if you haven't already, when it comes to future-proofing your business.

Digitalise!

If you've been putting off automation, now's the time to kickstart your digital transformation journey. IMDA's Go Digital programme provides

industry specific measures in an easy-to-action format. You don't have to invest in high-end solutions that may break the bank. Simple steps to automate processes can also help improve productivity and turnover. To make adoption easier, you can tap on the Productivity Solutions Grant (PSG) which, thanks to the Supplementary Budget 2020, has maximum funding support levels raised to 80% from April 1 to Dec 2020.

An inspiring example of a local business that transformed its fortune early in the game by going digital is Ademco Security. When it adopted cloud and wireless systems over 10 years ago, the industry questioned managing director Toby Koh's decision. But it's that decision that placed the company well ahead of its competition. "In a case like the Covid-19 right now, every single one of my team can work from home," said Koh.

Bring In the Cash

While there are several finance options available like Enterprise Singapore's SME Working Capital Loan and Temporary Bridging Loan, SMEs can still find opportunities to generate more cash, independently.

Collect what's due: The survey of 200 finance and business managers, conducted by RIABU, shows late payments are a growing problem. More than 82% of Singapore finance managers surveyed say late payments are an urgent issue for them, with 61% saying the situation is getting worse. To survive the Covid crisis, companies need to make urgent changes to the way they collect payments. Rather than assuming customers have an avoidance mindset, or that it could damage relationships by asking for payments, or making collection just the finance department's problem, companies need to build on their relationship with their customers by smoothening out any kinks in their collection processes and, more importantly, by making collection everyone's responsibility in the company.

Tap on customer loyalty: Just because it isn't business as usual, it doesn't mean customers have stopped caring about the small businesses they've also depended on. Now's the time to cash in on customer loyalty and look for innovative ways to garner their support and build on the relationship. After all, those are the things that endure. The Projector, Singapore's only commercial arthouse cinema, for example, has a fiercely loyal customer base. In an effort to keep them invested in the brand and generate cashflow for the business, it successfully launched an online merchandising campaign to urge supporters to buy memberships, bags, movie and venue-hire vouchers, and adopt-a-seat plans.

Anthony Yeoh, the chef-owner of local eatery Summer Hill, shared he's been moved by the support of his "amazing" customers. "Our regulars turned up for us in a big way during our 'Fried Chicken Weekend', it brought a tear to my eye," he said. "They supported, yes with their dollars and ordered their takeaways. But they also stopped to ask

how we were and made it a point to tell us they weren't going to let us shut down."

Don't Just Retain, Reskill

Another key differentiator, apart from digital transformation, that could determine the future of SMEs is workforce management. Given how expensive it can be to rehire and retrain, many companies are choosing to retain staff and, with the support of the Solidarity Budget, it becomes a little bit easier.

However, with the mindset of being future-proof, take stock of the kind of talent you need in your organisation for future survival. Do your employees have an open, adaptable and can-do attitude in this uncertain business climate? Do they have the right skills to cope with organisational changes?

Manpower Minister Josephine Teo acknowledges that it can be tough for employers to think about training employees when they have cashflow pressures, but she believes, "It is the smarter thing to do because when the recovery comes you want to be able to catch it quite quickly." To support SMEs in this regard, Workforce Singapore's Adapt and Grow programme provides wage subsidies and helps plug capability gaps through training and development.

Build Networks

Use this rare downtime to build your network with likeminded people from your industry and gain insights and innovative ideas on how they are planning for their future. Reconnect with a LinkedIn contact for a virtual coffee, set up a virtual group discussion via the meetup app, or make use of the DBS business class app specially designed for SMEs to connect directly with a network of industry experts, venture capitalists, entrepreneurs, and DBS SME Specialists.
While the Covid crisis has had devastating effects, SMEs need to put on their creative hats and think of ways to come out stronger rather than giving in. Tapping in on trends, reskilling, relooking at age-old ways of doing things, and strengthening relationships and networks, are strategies that could help your business not just thrive in a post-Covid world but be ready for when the next crisis hits.

Receive hiring tips from MyCareersFuture.sg by signing up for our monthly e-newsletters.

https://go.gov.sg/ssia-edm

Looking to hire? Post your job on MyCareersFuture.sg and tap on our 500,000-strong talent pool of Singaporeans.

https://go.gov.sg/ssia-mcf

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NTUC LHUB and GO1 LAUNCH OVER 100 FREE ONLINE COURSES

– No Better Time For Upskilling

NTUC LearningHub (NTUC LHUB) has partnered with GO1, the world's largest compliance, professional development and general training platform funded by Microsoft's venture arm and SEEK, to offer learners completely free online courses nationwide during the 'Circuit Breaker' period. With more learners contending with the growing impact of COVID-19, this move will enable all learners in Singapore to gain access to over 100 handpicked courses.

The library of free courses offered on the GO1 platform features some of the most in-demand Worker 4.0 skillsets under Adaptive Skills – such as Change Management, Business Management, Leadership and Innovation – and Technology Skills – such as Data Analytics, Python Coding, Blockchain and Cloud. Creative courses such as Adobe Photoshop and Graphic Design will also be offered.

Bite-sized Learning

The courses will be in 'microlearning' format, designed for bite-sized learning with each course duration ranging from nine minutes to seven hours. Learners will be able to choose courses according to their interests and learn at their own pace and schedules. The platform also allows learners to track their learning progress and receive personalised recommendations.

"The 'Circuit Breaker' period is an opportune one for workers in Singapore to make good use of time to upgrade skillsets. We believe that learning should never stop, so we remain committed to driving Singapore's workforce forward in our transformation journey, especially through changing times. Our mission to make learning accessible to all workers has never been so pertinent and urgent than in the present," says NTUC LHUB CEO Kwek Kok Kwong.

In addition, as a growing number of foreign workers are being affected by the COVID-19 outbreak, NTUC LHUB is aiming to provide relevant Workplace Safety and Health (WSH) courses for foreign workers, to support them as they tide through this period. Commenting on this partnership and initiative, GO1 co-founder Vu Tran says, "During this 'Circuit Breaker' period, and even through unprecedented challenges, it is important that we continue to expand our knowledge and horizons. NTUC LearningHub is spurring Singaporeans to learn any time, anywhere, and on any device by going the extra mile with this initiative."

To gain access to the platform, visit https://ntuc.mygo1.com or scan the following QR code to register for a free account.

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NTUC LearningHub

SUPPLY CHAIN RESILIENCE IS CRITICAL FOR THE SEMICONDUCTOR INDUSTRY

How the Covid-19 Crisis Has Changed the Development of the Industry

The global semiconductor industry has been the focus for the last 2 years. Overnight, the deciding factor to make the investment for Assembly and Test (in-house or outsourced) changed from just "Low Cost" to how to diversify the supply chain globally. Regions such as SE Asia, Taiwan and Mexico suddenly come into focus for the Western Semiconductor companies. With the arrival of COVID-19, another consideration entered the picture. Supply chain resilience in the time of a pandemic situation is equally critical. It is fresh on every semiconductor executive's mind when China implemented locked down in late January, which resulted in a massive supply chain disruption. As COVID-19 continued to spread to the rest of the world, the supply disruption is felt across all levels.

Countries which maintain a balanced approach of flattening the curve of infection while ensuring global supply chain are impacted as minimal as possible now found themselves as a possible destination for these semiconductor companies. While cost is important, the another variable in the equation is the ability to continue manufacturing albeit a lower capacity in time of pandemic. I have spoken to some semiconductor companies whose manufacturing is centralized in one country and is now moving rapidly to diversify their risk. Some of the options open to them include:

1. Tapping into OSATs in a different country
2. Identifying countries that demonstrated resilience during the COVID-19 pandemic

Outlook of the Industry and New Growth Factors

COVID-19 pandemic and the rise of 5G are going to change the outlook of the semiconductor industry. And possibly, change for the better. Let me elaborate each of these points.

While the landscape of the supply chain movement has changed dramatically, SE Asia, Taiwan and Mexico are major beneficiaries as western companies look to establish another supply chain outside of China. At the same time, China has increased their investment in semiconductor exponentially so that they can over time reduce their reliance on other countries. You will see the investment made to drive the semiconductor industry in China spill over to the neighboring regions. Hence, the overall market is set to increase and SE Asia is uniquely positioned to capitalize on the opportunities created by the Western companies as well as from the Chinese companies.

5G is the next big technology. Countries are ramping up their investment to build the 5G infrastructure and gain leadership positions. Billions of dollar will be spent in the next 5 years to set up base stations. As UE manufacturer beginning mass production and as more 5G devices enter the market to drive applications in IIOT, Smart Mobility, Smart Cities and etc. These will be a key driver in the industry.

COVID-19 is going to change the world and the way we work and interact with one another. Telecommuting may become a norm and the usage of web conferencing will be more prevalent as a result of the COVID-19 and the need to work remotely. This is going to lead to an increase demand for a more robust core network. Technology such as 400G and Silicon photonics are going to be a key enabler in this area.

Companies should be agile, adaptable and resilience to stay relevant to these new trends.

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SERVITISATION, MANUFACTURING AND INDUSTRY 4.0: A POST-COVID SEMICONDUCTOR SUPPLY STRATEGY

2020 began as a year poised for rapid transformation in the global semiconductor industry. Investments in new fab construction were initially expected to leapfrog by US$12 billion to nearly US$50 billion. SEMI's World Fab Forecast report reveals that China aims to generate additional capacity dedicated to foundries followed by Europe and the Middle East with fab developments valued at over US$11 billion.

Today, US-listed firms accounts for 48% of the global market, while China, in 2018 alone, was responsible for 20% of global revenue. The trade war between these two powerhouses prompted a partial decoupling with multinationals shifting production to other countries — particularly, Vietnam (Source: New York Times).

Undeniably, the ongoing challenges from the coronavirus have perhaps become the tipping point, accelerating the need for alternative sources - against the backdrop of evolving geopolitics, increased protectionism and rise of smart cities and niche technologies (beyond Moore's law). The new imperative is for fab nations, greenfield or transformation project owners to rethink the traditional approach to fab development, costing an average of US$3 – $5 billion today.

Next-gen Smart Fabs Shift Focus to OpEx Efficiencies

The advent of Industry 4.0 and digitalisation gives way for Smart Fabs and mature site optimisation that focuses on capital expenditure (CapEx) to drive continuous improvements in operational expenditure (OpEx). These considerations are the cornerstones to ensuring supply chain integration through Cost and Revenue programmes.

Beginning with the digitalisation of design and construction processes to asset-based servitisation (spare parts, product repairs, maintenance, overhauls, equipment training, etc), leverages IoT sensors and solutions for real-time data to optimise OpEx efficiencies (cleanroom control, preventive maintenance capabilities, etc).

Aside to achieving site reliability, Smart Fabs enable business viability, allowing for product customisation to meet market needs with different technologies and products. This includes the ability to mix CMOS production with emerging technologies such as Silicon Photonics (SiPh), Gallium Nitride (GaN), and Micro-electromechanical system (MEMS).

"Servitisation" as a Competitive Advantage

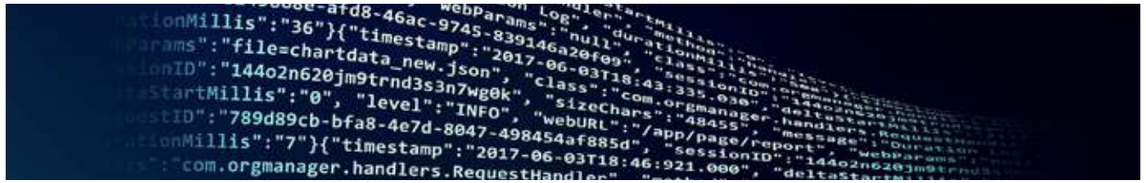
Product-based strategies drove efforts in technological innovation, quality improvement and costs reduction.

As manufacturers look to differentiate by transforming their business model from product-dominant to customer- and market-centric, "servitisation" is rapidly gaining traction.

The servitisation model in turnkey and greenfield projects provides public and private stakeholders with an opportunity to capitalise on key specialisations to ensure venture's viability alongside national aspirations. To meet the demand, Innovative Global Solutions & Services (IGSS) has developed a "Build-Operate-Manage-Transfer (BOMT)" programme to guide semiconductor manufacturers in their servitisation journey, starting with tool refurbishment, real estate management and other forms of capital expenditure. In operating expenditure, the BOMT programme leverages Industry 4.0 and IoT technology to enable services such as process control and product quality.
As production becomes highly automated, servitisation can become a high-margin revenue stream and key source of employment, particularly in advanced "last mile" development support in the pre-fabrication stages. These include consultancy, R&D, as well as design and prototyping.

Business and operation sustainability address underutilisation challenges

The pursuit of operational sustainability goals is a key aspect to consider. Running fabs is a resource-heavy endeavour and the industry is under tremendous pressure to mitigate operation impact. Fabs are also expected to decrease greenhouse gas emissions. Industry players are incorporating relevant



operational strategies as they align themselves with international movements such as the United Nations Sustainable Development Goals (SDGs).

Tapping into servitisation measures and Big Data from IoT / analytics technologies, manufacturers can use assets longer to create less waste, implement optimised electrical distribution architectures, as well as other physical infrastructure that capitalises on the promise of Industry 4.0.

In Singapore's Context

Boosting capabilities in quality, variability, productivity and reliability, digitised supply chains have shown to deliver annual growth by 3% (Source: The secret world of semiconductor, FedEx Singapore). Moreover, the shift towards alternative source solution strategies, in tandem with Singapore's Smart Nation goals in itself provides the demand for semiconductor technologies in applications such as mobility, healthcare, AI, 5G, etc, bodes well for the nation and industry players. A growing school of thought is how digitalisation might just be a key solution to balancing the need for physical distancing and business continuity, in the new normal.

ABOUT THE AUTHOR

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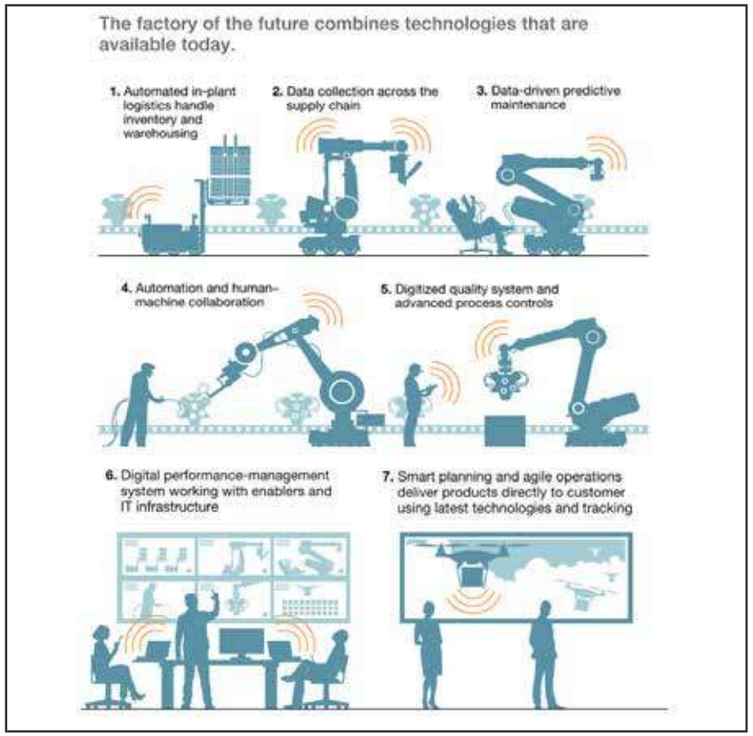

Image Source: McKinsey & Company

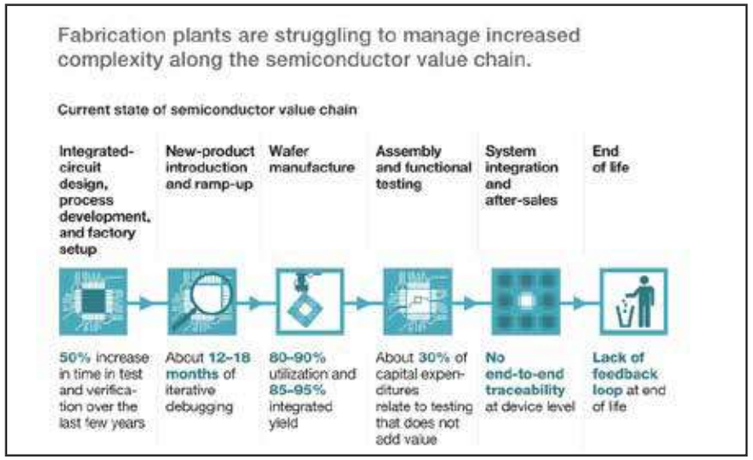

Image Source: McKinsey & Company

AUTOMATION SUPPLIER DAY SPEAKERS

Kevin Lee
Head (AI Advisory and Adoption)
AI Singapore

Claus Kleilein
Director, Global Sales
Fabmatics GmbH

Michelle Phua
Co-Founder & Director of Operations
Innowave Tech Pte Ltd

Mike Feng
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Kulicke & Soffa

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NEC Asia Pacific Pte Ltd

Ricco Walter
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SYSTEMA Automation Singapore Pte Ltd

Bringing End Users And Suppliers Together To Explore Technology and Business Collaboration Opportunities

Automation Supplier Day is SSIA's annual flagship event to encourage business matching among local and foreign companies in our semiconductor ecosystem. This year's theme will be on "**Expanding Business Opportunities with Industry 4.0**", with special focus on areas of advanced manufacturing and energy and water savings solutions. This event helps end users speak on their business needs, and the general trend of the industry, at the same time, allow solution providers to showcase their solutions and ultimately to promote business matching.

This year, the Automation Supplier Day will be riding on a zoom online platform on **9 & 10 July 2020**, providing unique opportunities to showcase disruptive trends in advanced manufacturing and best practices of advanced end users of automation solutions in the electronics and semiconductor industry. The event allows end users & suppliers to explore technology and business collaboration opportunities through innovative sharing, virtual exhibitions as well as business matching sessions.

Event highlights include presentations to provide insights on how to leverage artificial intelligence, IoT, big data analytics and machine learning to intelligently improve manufacturing performance and showcase supplier's capability in terms of product and services.

Scan the QR code for latest updates on our website

KULICKE & SOFFA'S DIGITAL TRANSFORMATION TOWARDS SMART MANUFACTURING

Leveraging The Power Of Data To Leapfrog Performances
Changing Mindset Towards Using Data And Data Analytics To Make Decisions

Problems and Challenges

Our story begins with a familiar conundrum shared by many companies in the semiconductor industry who have grown rapidly throughout the years: Our employees could potentially become a limiting factor to keep pace with such high-growth trajectory, because many employees are not trained in using data and data analytics to improve business performances and many are still holding on to conventional practices and processes.

Digital Transformation

We embarked on this journey with a strong belief that the way we collect, analyze and use data have huge impact on an individual's and organization's behavior. These behaviors will have a strong influence on the way teams and individuals collaborate and solve problems which will result in a significant improvement in the overall business performances.

Our journey began with a series of value stream mapping (VSM) workshops to review existing operations flow and processes to identify what is needed to "stop" and "start". Our management team also played a vital role in these VSM workshops by prioritizing the business goals while the operations team aligned Key Performance Indicators (KPI)s as leading indicators for these goals. The teams focused on connecting the dots between process and decision making.

External Data Sources

Figure 1 illustrates the architecture that enables K&S to receive data from various global suppliers. Critical process parameters are systematically captured by suppliers and automatically sent to K&S's servers at regular intervals.

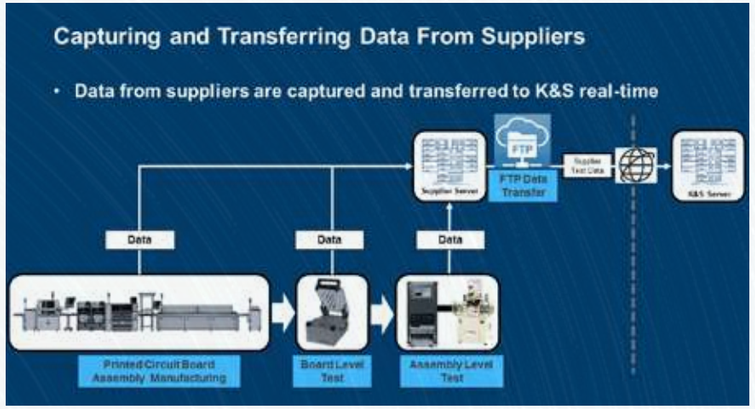

Figure 1

In-House Data Sources

Data from our in-house processes are captured using an organically developed Manufacturing Execution System (MES). This MES system enables our line technicians to use portable tablets to pull test flow travelers and work instructions from the server, communicate directly with the machines to run automated test scripts. Test results and data from the machine are automatically uploaded from the machines into the servers in real-time. The MES ensures that the data captured are structured and "cleaned" before sending it to the server.

Developing Data Analytics Infrastructure

Various data sources are structured and stored in our centralized database. This database links the ERP system with data from internal processes and data from our global suppliers.

Developing Data-Driven Decision Making Mindset

Our managers and engineers use the data in the centralized database to create KPIs and link these KPIs to the business goals set by our management team. Off-the-shelf data visualization software such as Tableau is used to create user-friendly and real-time dashboards, allowing stakeholders from multiple functional teams to access and monitor data.

We held regular operations meetings to bring about managers, leads and engineers from various teams: customer quality, supplier quality, manufacturing engineering and test engineering to collaborate and solve problems or to explore new ideas. The data visualization software powered our KPI dashboards and these KPI dashboards are the focal point of the meetings. These KPI dashboards provide a concise overall operational picture.

Our quarterly goals setting exercises have also been transformed into a data-driven process. Figure 2 is an example of a "Waterfall" dashboard used to visualize all the failures captured by the production line in a quarter. Managers use this dashboard to set priorities for teams. Teams provide their updates and status directly on the dashboard. Such dashboards are reviewed regularly to identify showstoppers.

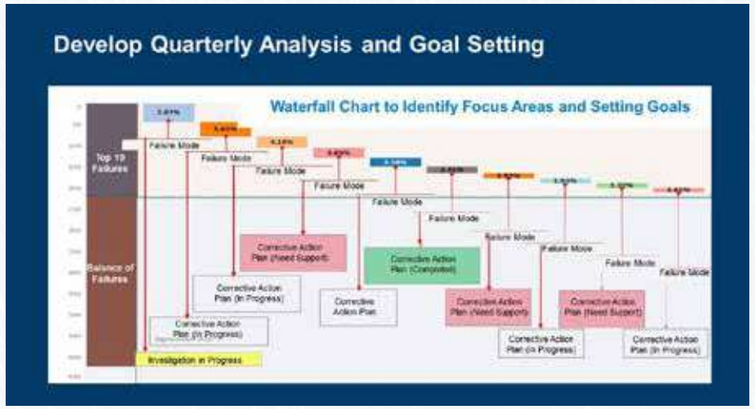

Figure 2

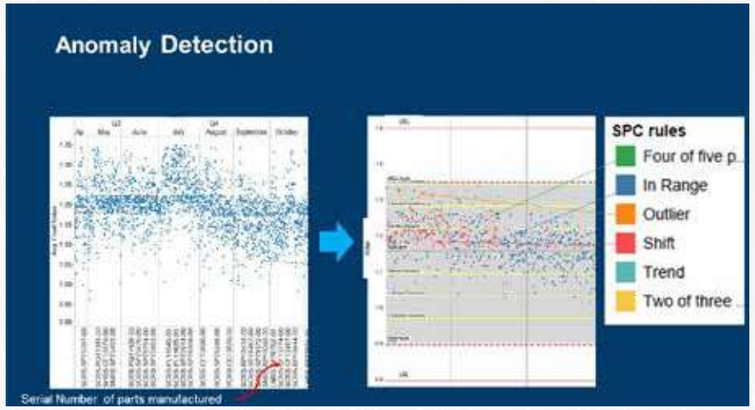

Figure 3

We have observed that employees are much more proactive in taking ownership and fostering closer collaboration among stakeholders in solving problems. We believe the data-driven culture has allowed our employees across functional teams to rely more heavily on data as the foundation for their collaborations and making decisions. Our line managers also have a much clearer and concise picture of the problems and are more confident in prioritizing and committing resources to fix the problems.

Data Monitoring and Anomaly Detection

We upgraded the database to a "Cloud" based data storage solution. This change addresses the limitations in data security, data latency and connectivity inherent from using the in-house server system. The upgraded "Cloud" solution (Data Warehousing) also includes the capability to carry out large scale automated data monitoring of critical parameters.

The move towards data monitoring came about to address the need for process owners to painstakingly spending a lot of time to meticulously comb through a huge amount of the critical parameters coming in from suppliers and in-house processes to detect out-of-control situations and trends. We invested heavily in "Anomaly Detection". The data from suppliers and in-house processes are automatically sent to the "Cloud" server. A series of automated algorithms developed by our data engineers were inserted into the data streams thereby allowing the algorithm to detect anomalies, trends and out of specifications automatically.

Alerts will be automatically sent to the process owners and/or suppliers once anomalies are flagged by the algorithms. Figure 3 illustrates a series of anomalies detected by the algorithms - the anomalies were color coded for easy visualization. With this new upgrade, the system will trigger suppliers and process owners to act early and prevent defective materials from flowing into K&S. Similarly the anomaly detection methodology is also applied to our in-house processes to prevent defective products from flowing to our customers, thereby saving time, avoiding costly recalls and increase customer's satisfaction.

5 tips to be shared	
1	Identify and define the problems along with a set of long-term goals. Create KPIs and link these KPIs to the business goals
2	Develop subject-matter-experts to work on solving the problems. Use VSM to have a better understanding of the problems
3	Take a balanced approach between "Bottom-Up" and "Top Down" - senior management's role is to coach and provide guidance, manger's role is to set clear and concise KPIs, and the subject matter experts are empowered to apply analytics tools to solve problems
4	Develop a systematic data collection plan. Organize, structure and centralize data sources to make data ready for analysis
5	Introduce data visualization tools to link multiple databases, creates user-friendly dashboards and for making decisions. Develop a long-term digital roadmap to engage senior management for their support

Key Lessons Learned

Over time, we have observed that employees are much more proactive in taking ownership and fostering closer collaboration in solving problems. The new data-driven decision-making process and anomaly detection capability have also allowed K&S's operations to free up resources dealing with repetitive tasks, and we have since channeled those freed up resources to focus on innovating new solutions.

ABOUT THE AUTHORS

TK Loh, Wint Kyi Phyu, Vivian Soong and Koh Dong Yang
Kulicke & Soffa

THERE ARE NO SHORTCUTS: EVOLUTIONARY STEPS TO SMARTER MANUFACTURING

Talkin' bout a Revolution?

For many manufacturers, the path to building a Smart Factory is still confusing because of information overload and the lack of an overall digital transformation strategy. Amidst the excitement related to Industry 4.0, new technologies are being applied in manufacturing environments at a high pace, including IoT platforms, big data, machine learning and Autonomous Intelligent Vehicles (AIVs), among others.

As with any extensive company-wide transformation, trying to achieve the end goal too quickly can lead to wasted time and money. In order to overcome this challenge, manufacturers should view this transformation as a step-by-step approach allowing to progress through a natural evolution.

It All Starts with Integration

The Smart Factory evolution must be built on automating the collection of data from machines and processes, and transforming that data into immediate insights.

At the current stage, data is often available but difficult to use for decision making or implementing improvements. The data is in siloed systems, requiring manual work to integrate and translate into useful information. Problem solving at this level is possible but extremely time-consuming. But as the competitive landscape of manufacturing changed, and demand for mass customization increased, the industry has reached a point where these manual processes are no longer efficient.

Data integration alone can be a challenging task. The selection and proper enrichment of relevant data is, in many cases, not just a technical problem but requires a detailed and in-depth knowledge of the manufacturing steps to be analyzed and optimized. Even worse, critical data sources aren't available due to lack of equipment integration for legacy tools, incomplete product quality monitoring, or deficiencies in material tracking. Eliminating these gaps in connectivity should be accompanied by the responsibility to "encapsulate" all the complexity caused by the different interfaces, and finally isolate those details from the higher processing layers.

With comprehensive integration of all the disparate data sources into one single version of truth - in one location and always available - problem solving becomes almost frictionless.

Spice up Manufacturing with Automation

A key enabler of highly automated manufacturing for the high tech industries is a factory-level automation architecture that supervises, coordinates and orchestrates the several factory systems such as MES, Dispatching and SPC as well as Process, Metrology and Logistics Equipment. This automation architecture reacts to different factory events that the systems generate (e.g. job completed; new order arrived; equipment down), keeps track of the state of every activity in the factory and handles errors and exceptions. Like it or not, the handling of errors and exceptions presents the greatest challenge, as the cost of automating the error handling can be prohibitively expensive.

Although in general the new technologies like AI and ML can be implemented in parallel to existing tracking and control software, the overall value these create is nothing but a fraction of what they could achieve if the solutions were conceived in combination to leverage each other's capabilities. The companies that are best positioned to survive and thrive in the future are the ones that embark on the journey toward full automation, taking decisive steps, but one step at a time.

Transform from Reactive to Proactive

Building on a solid automation architecture, the adding of new technologies such as Machine Learning and Artificial Intelligence becomes feasible and beneficial. One key to successful real-time factory monitoring and optimization is not merely the presentation of the current state, but to relate the current state to the historical context. Historical data analysis provides context and reveals deviations such as unexpected process time, uncommon material accumulations, or issues with material transport. Combined with swift control actions upon every new data point collected, manufacturing operations can shift from reactive problem solving to proactive analysis and improvements.

Digital maturity requires nothing less than a holistic, mid- to long-term digitalization strategy, originating from the business strategy. There are no shortcuts that can move a manufacturer from Industry 3.0 to 4.0.

SOURCE OF CONTENTS

SYSTEMA Art of Automation

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HOLDING OUT FOR A HERO-CLOSING AUTOMATION GAPS WITH MOBILE ROBOTS FROM GERMANY

Mobile Robots are the perfect match to fabwide OHT-system to automate low-throughput-areas (Picture Source: Globalfoundries)

The "Internet of Things" and the growing digitalization in all areas of life continuously increase the demand for semiconductors. Not only the rising complexity in manufacturing, but also declining availability of experienced production staff pose a new set of questions for Fab owners. Singapore's semiconductor industry is facing the challenge of developing from a labour-intensive to a technology-oriented value creation, in which pushing for better automation is of central importance to ensure productivity and competitiveness.

Automated material handling processes in today's semiconductor factories are mainly based on standard transport systems. In 300mm Fabs these are almost entirely overhead hoist transport systems (OHT), whereas in 200mm environments (and those with smaller wafer diameters) the lots are either moved completely manually or with roller-based conveyor systems. All these standard solutions for lot transport are designed for high throughput in low product mix, but lack the necessary flexibility in terms of layout and scalability. If production requirements change, existing standard transport systems can only be adapted at great expense due to extensive work on the infrastructure, e.g. rigid rail systems.

Mobile Robot HERO®FAB 300 handles in different heights from 200 to 1,500mm

Fully free-moving platform: Ultimate maneuverability thanks omni-directional drive technology

A large automation gap opens up especially in low throughput areas (like test or quality assurance), in areas with lower ceiling heights and in spaces that were not originally intended for production. And just imagine the integrated handling of non-productive material like test wafers, opening up completely new perspectives in efficiency!

Special solution: Mobile Robot for Wet Transport

Smart Manufacturing Requires Flexible Automation

A promising solution to overcome the limitations described above is the introduction of Autonomous Intelligent Vehicles [AIV], which combine an autonomous material transport with automated tool loading. These mobile robots are capable of independently transporting high-value payloads (e.g. wafers, reticles) to any destination in the factory without the need for adding mechanical infrastructure. The absence of any rails, magnetic strips, and laser markers enables unbeatable flexibility in the layout of the production machinery (which is constantly changing due to fast technology and product change cycles) and scalability in terms of the required throughput. This makes these autonomous systems the ideal companions to meet the challenges of Industry 4.0 in semiconductor factories.

The German automation specialist Fabmatics is one of the pioneers in developing safe and reliable mobile robots for the use in ultraclean production environments. Founded in 1991, the company has been successfully implementing customer-specific automation projects for more than 25 years. Companies like BOSCH, Infineon, Globalfoundries, Siltronic and Taiwanese Foundries trust in the mobile handling systems from Fabmatics, called HERO and SCOUT. On top of this, the German experts tackle the most challenging customer requests like wet transport. Fabmatics developed a very unconventional, completely new mobile robot which is equipped with an "aquarium" of 60 litre capacity to transport wafers to polishing machines and to load/unload them without allowing the liquid to spatter out.

In the **"Advanced Manufacturing" Webinar of the SSIA Automation Supplier Day on July 9, 2020**, Fabmatics will speak about possible applications of mobile robots and share their 25 years of experience on further ways to close automation gaps in 300 and 200mm Fabs.

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FABMATICS Automate your success

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PREPARING YOUR BUSINESS FOR EXCELLENCE DURING CRISIS

The New "Normal" – Important Lessons for Business Continuity and Competitiveness

The recent pandemic has ushered in dramatic changes in consumer behavior and corporate culture. In the midst of market uncertainty, companies can rise to the challenge by proactively preparing themselves.

Health and Safety at Work

Access control with facial recognition, temperature reading even with mask on

To support institutional efforts in contact tracing, companies are expected to measure the temperature of people entering their premises, which can cause considerable delays.

Businesses can utilize automated solutions that can instantaneously identify and take the temperature of employees. Ideally, it should also take attendance, integrate with payroll systems, and alert stakeholders when somebody with a fever is detected.

To further improve safety and security, a more comprehensive solution is needed - one capable of tracking and monitoring everybody within your premise. Information such as paths history, personnel count, identities and purpose of visit will be crucial to various decision making, including maximizing space, improving layout efficiency, and understanding customer needs.

Closing the Distance

Perhaps a silver lining to 2020 is the realization that employees can perform multiple functions from home - but physical distancing comes with its own problems.

One of the thorniest is for teams and individuals to remain productive while keeping morale up. Technology can overcome aspects of this lack of physical interaction, but it shouldn't be limited to mere voice and video conferencing. Companies can, for example, utilize widescreen 4K conferencing panels with real-time screen interactivity to provide an immersive and productive experience for their teams.

Industrial solutions can also be found in the exciting world of augmented reality (AR) glasses. Not only do they markedly improve work quality and safety by allowing vendors, supervisors, and operators to work together, they also vastly reduce costs by eliminating the need to be at the same location - or even the same country!

Depict application of AR glasses

Traditionally, deploying a corporate VPN involves significant expertise, time, and money. It is time for businesses to be able to solve this problem affordably and efficiently.

Workforce Efficiency

Depending on human labour will limit the quality of output; it is simply impossible for people to perform at levels necessary to eliminate the cost of non-conformance. Artificial intelligence will allow us to overcome this. As businesses attempt to step into and excel in the next industrial revolution, solutions that combine automation, computer vision, and machine learning will be increasingly valuable.

One of these solutions is the use of Industrial IoT sensors. By deploying a wide array of sensors across production lines and facilities, companies can obtain critical data that goes a long way to improve product quality and reduce waste. Although no longer in its infancy, IIoT is still extremely under-utilized as lack of experience and expertise continue to be a significant barrier.

Artificial intelligence is also deployed in modern manufacturing through image analysis and fault detection. To nurture a zero-defect culture, product defects need to be quickly and easily identified without being subjected to human error and inadequacies. Data from these identifications can then be used to further improve process quality.

We stand on the brink of a technological revolution that will fundamentally alter the way we live, work, and relate to one another. Businesses will need all the technological advantages they can muster to not only survive, but excel - and we are here to help.

Powered by Artificial Intelligence, Driven by Innovation

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NEC VISUAL INSPECTION SYSTEM

- NEW WAY OF VISUAL INSPECTION BY DEEP LEARNING

Advances in artificial intelligence and deep learning technologies have recently enabled automated visual inspection systems that can outperform previous human or m achine vision processes.

Based on half a century of AI research, the NEC Visual Inspection System enables manufacturers to accurately identify defects and dramatically reduce costs with an efficient solution that can be easily and affordably deployed. The system utilizes a deep learning one-class classification architecture that allows it to be trained using only images of non-defective components, as opposed to architectures that require images of both good and defective parts to learn the classifiers. This has significant advantages in many industrial settings, especially where defect rates are already low.

Virtually all manufacturing processes include some kind of method for identifying flawed components. Many manufacturers still rely completely on human inspection, as automated visual inspection has previously been too inaccurate, slow, and expensive. Where AI automation has been deployed, it has generally required large investments of money, time, and expert resources.

NEC AI Visual Inspection System

Effective and Cost-Efficient Solution for Optimal Quality Control Operations

The NEC Visual Inspection System provides many valuable benefits for manufacturers:

- **Reduced inspection cost**: New installations often pay for themselves within 12 months, through cost savings
- **Easy to deploy**: Minimal hardware requirements, and simple integration
- **Secure**: No dependence on cloud technologies
- **Fast to train**: Optimized neural networks learn to distinguish good and bad parts quickly
- **Easy Training with images of good parts only**: "One Class" classification deep learning algorithms do not require images of defective components in order to be trained.
- Consistent, accurate inspection, as compared with human inspectors

These simplifications include:

- No need for manually programed rule
- No need to find and categorize defect types
- No need to collect images of defective parts

While deployment requirements vary from site to site, generally the necessary hardware includes only computing and data storage, standard commercial cameras, and standard commercial lighting.

The deployment process occurs in three phases:

1. **Capture Images**: Capture images of "good" parts to be used to train the one-class deep learning model.
2. **Train and Test the Deep Learning Model**: Using the image of good parts, the software will develop a model containing the classes and recognition algorithms necessary to recognize defective parts. Then the model can be tested to verify that false positive rates and false negative rates are within target limits.
3. **Deploy to Production Line**: When the system has been trained and tested, it can be deployed to the production line.

The NEC Visual Inspection System's simplified deployment with flexible interface and reduced need for manual inspectors makes it an effective and cost-efficient solution for optimal quality control operations.

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sg.nec.com
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ENTERPRISE SINGAPORE (ESG) DRIVES DEMAND-LED INNOVATION IN SEMICONDUCTOR INDUSTRY

Around 2,200 tonnes of waste incineration ash and non-incinerable waste (NIW) is sent from Singapore to the Semakau Landfill (SL) daily.

To reduce the disposal of NIW to Semakau Landfill and recover value from the NIW, the National Environment Agency (NEA) has launched the NIW Grant Call (19 March to 30 July 2020) to solicit research and development (R&D) proposal under its Closing the Waste Loop Initiative.

Managing Calcium Fluoride Sludge

One source of Singapore's NIW was identified to be calcium fluoride sludge, which is generated from hydrogen fluoride waste water treatment in the semiconductor industry. Managing calcium fluoride sludge has been an issue for the semiconductor industry and the sludge is currently channelled to the landfill as there are no economically viable or innovative solutions to process or repurpose the sludge. Innovation can address this gap.

Enterprise Singapore (ESG) supports open innovation on sustainability. Sustainability can be a good catalyst for new ideas and business opportunities for the semiconductor industry. Reducing the volume of calcium fluoride sludge can whittle down waste disposal costs in the long haul. Repurposing the sludge may reduce raw material costs or even generate revenue from the sale of the sludge. This calls for semiconductor companies to partner solution providers to co-innovate so as to materialise the benefits.

A Collaboration Between ESG and SSIA

Singapore has a vibrant ecosystem of companies that develop, testbed and commercialise solutions to serve our national water needs, and overseas demand. Today, there are more than 25 research institutes and over 200 companies involved in this sector, including project developers, technology providers, engineering, procurement and construction (EPC) players, and consultants.

As the government agency championing enterprise development ESG drives demand-led open innovation by facilitating partnerships between end-users and local companies to develop solutions. ESG partnered SSIA to engage members to embrace innovation by putting up challenge statements and seek innovative solutions to reduce the NIW generated. 7 end-users and 14 solution providers with relevant capabilities and track record were identified based on the challenge statements.

Efforts to support innovation continues even during Circuit Breaker through 20 matching sessions facilitated online from April to May 2020. Through such partnerships, companies would be able to tap a bigger talent pool of ideas and talents across industries and develop solutions quickly.

Solutions providers too would be able to develop competitive business models based on new products and solutions.

For details, please visit https://www.nea.gov.sg/programmes-grants/grants-and-awards/closing-the-waste-loop-initiative or scan the QR code below

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Enterprise Singapore

EFFECTIVE TEMPERATURE CONTROL SOLUTION FOR HIGH PARALLELISM IC TEST SYSTEM

Temperature Control is Getting Significance in IC Test Flow

Semiconductor technology is evolving fast. About every 2 years, IC manufacturers introduce products with new process node. Today, 7nm product is becoming the norm and 5nm is on its way to be the next mainstream offering.

From the test aspect, these products with increasing transistor density making it more vulnerable to temperature related defects. This puts pressure on mission critical devices that need to undergo extreme temperature test in order to screen out temperature-related defects. A reliable temperature control system would be essential to ensure accurate screening.

As the production volume of semiconductor on the rising trend alongside with the expected demand in 5G and IOT market, there are opportunities where a cost effective temperature control solution can do a significant saving in semiconductor test.

AEM sees the key for these needs is a **Scalable Active Thermal Control System**.

Contact-based Active Temperature Control Offers Better Accuracy

Contact-based Active Thermal Control (ATC) is one of the methods that offer accurate temperature control on the DUT over chamber-based convection method.

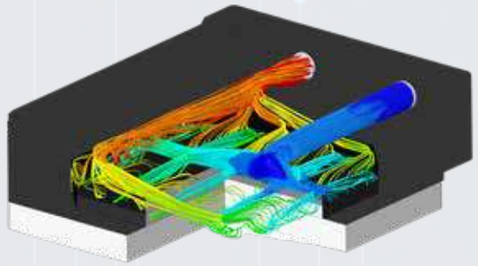
Temperature control on the DUT using chamber-based method is challenging in ensuring all the DUT are maintained within a tight tolerance of temperature. This is especially obvious in a large size chamber as the air flow is hardly to be even in all the corners. A higher parallelism will lead to higher temperature variations across the DUT arrays.

Whereas in contact based active thermal control, it has a temperature control mechanism for individual DUT to ensure uniform test temperature is applied across all DUTs. This instilled confidence in IC manufacturers to guarantee the temperature margin they have on their product.

While there are many methods the industry uses in contact based ATC, AEM thinks liquid cool is the most sensible method for its capability to handle high thermal load, temperature control accuracy, and scalability.

In AEM's contact-based thermal control solution, the DUT is engaged by a highly efficient heating & cooling device. It can be designed in a very compact form with a low manufacturing cost thanks to the micro-structure design (patent pending) that is able to maximize the wetted surface area of the heat exchanger. The micro-structure is also engineered to further enhance the heat exchange efficiency by breaking the boundary layer of fluid flow which often is the limitation of a straight channel cooling block.

The compact form factor of this cooling mechanism enables the scalable Active Thermal Control solution of AEM's AMPS system, which is architected to house up to 480 sites within a single handler. It also enables high parallelism test for high power devices in a compact space.



AEM's compact heat exchanger design with microstructure to maximize wetted area

How We Make Contact-based ATC Solution Cost Effective?

We often measure the cost effectiveness of various solutions in two aspects.

Initial cost per test site – the cost of a new system and the infrastructure required.

Running cost per unit – Part re-placement, power consumption, and other consumable items.

AEM's ATC solution is engineered to support a large scale test system. In our many-testers-one-handler concept, the infrastructure is built to support multiple testers with asynchronous capability. The high parallelism helped mitigate the one-time cost of the infrastructure across many sites. The more test sites in a system, the lower cost per unit tested.

By doing it at large scale, the running cost per unit can be kept low through centralizing the cooling of liquid. And re-circulating of the cooling fluid is the reason of low consumable cost.

The compact ATC solution enables AEM AMPS handler's high socket parallelism

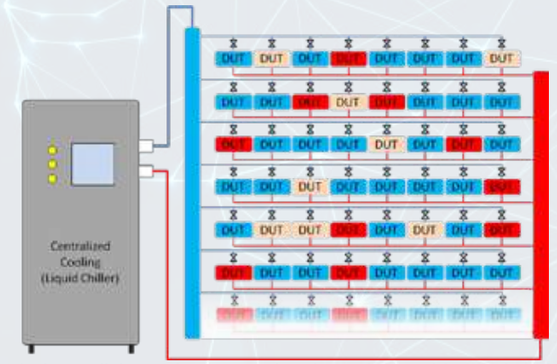
Not Just a Regular Temperature Control System

AEM ATC system is designed to support 100s of DUTs with test temperature range from -40C to +125C. With each DUT at independent Active Thermal Control, the asynchronous characteristic of the system makes efficient use of the centralized cooling of liquid for responsive temperature control. With the tri-temp capability to support wide range of temperature, it enables multiple tests within a single insertion.

Gain a Competitive Edge in the Semiconductor Test Market

As the industry is advancing towards more complex IC design with mission critical needs, the cost of test is expected to rise with more devices require stringent test condition with temperature control. IC manufacturers will need a highly controllable and cost-effective thermal control solution to gain an edge in this ever competitive market.

AEM is bringing this solution to the market to helps IC manufacturer in optimizing the cost of their test process.



AEM's Massively Parallel Asynchronous Active Thermal Control System handles 100s of DUTs simultaneously with each at different temperature.

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BEYOND COVID-19: NAVIGATING THROUGH A NEW ECONOMY

SEMICONDUCTOR TRADEWINDS – MARCH AND APRIL 2020

Hard-hit Economy

As we enter May, we find we are living in un-precedented times with the global economy on the rocks due to the economic impact of the COVID-19 pandemic. The virus has spread to more than 212 countries in the world and with over 3.4 million confirmed cases worldwide over 240,000 deaths directly attributed to COVID-19, governments have been forced to react to stop the spread and impose some sort of restriction from strict lockdowns and shutting down of industries to increased testing and social distancing restrictions. By April 2020, almost a third of the world's population were impacted by these restrictions and this has had a severe economic impact as businesses shut, supply chains break down as well as peoples consumer spending reduces.

The IMF predicts that even a short-lived outbreak will cause a 3% contraction of the world's GDP (gross domestic product), lowering GDP in over 170 countries, and is predicting that Asia Pacific region will have zero growth in 2020 for the first time in 60 years. The US' GDP is estimated to have shrunk -4.8% in Q1 2020, according to the Department of Commerce in US. Similarly, Europe's GDP is estimated to have shrunk -3.8% in Q1 compared to last quarter, and Q2 could be even worse despite countries trying to lift some restrictions. Frances' GDP is estimated to have shrunk -5.8% in Q1, the largest decline since records began in 1949 and the German government has said that it is on track for the worst recession since World War 2. In Asia, China, the first country to be hit, has reported that Q1 GDP contracted -6.8% in Q1, with industrial production dropping -8.4% compared to a year ago and retail sales falling -19%.

Many governments around the world are facing the difficult decision of how to keep their economies running at the same time not endangering their citizens by allowing the pandemic to grow further out of control and possibly prolonging the pandemic.

Growth in Data centre and Networking Sectors

In many countries, the lockdowns have severely impacted businesses with only essential services allowed to work and shops and restaurants ordered to close. In most countries, semiconductor companies have been defined as essential services and allowed to continue but difficulties have arisen over the supply chain and logistics.

With many people staying at home, the world has gone online like never before, with a surge of around 30% in internet traffic which has benefitted data centre and networking sectors. The memory semiconductor sector is expected to be one of the bright spots in 2020 as demand for memory surges.

Automotive and Smartphones

Due to government restrictions on travelers, worldwide flights were down 70% at the beginning of Q2, with Asian and European flights down 80 to 90%. With people working from home, car travel has plummeted to very low levels in most countries, and roads and city centres are empty. One positive side of this reduction is that world pollution levels have dropped to levels not seen in many years.

All this has led to the major end markets for semiconductors being severely impacted. Almost all automakers have announced temporary shutdowns in plants worldwide in March or April, though some factories are re-opening. Production losses in Europe alone were estimated to be over 2 million motor vehicles by the end of April. The loss of this production capacity will impact the semiconductor automotive supply chain in the coming months, with sales of global light vehicles expected to be down over 20% this year to around 70 million vehicles assuming the pandemic eases in the first half of 2020.

Smartphones have been a major market and fueled a lot of the growth in the semiconductor market for the last few years. However, according to the analysis by market research company Canalys, worldwide smartphone shipments were estimated to have dropped -13% to around 295 million compared to a year ago. It is the first time they have dropped to less than 300 million in a quarter since 2014, with all the top 3 smartphone manufacturers, Samsung, Huawei and Apple showing sharp declines.

Whilst consumer demand for laptops increased in Q1 due to the increase in home working, wordwide PC shipments were actually down around 10% in Q1 compared to a year ago due to delays in production and logistics. The spike in demand in Q1 is not expected to continue for the rest of the year, with Q2 demand expected to be significantly down.

Market Forecasts

The COVID-19 outbreak has seen market analysts to significantly decrease their forecasts for semiconductor sales in 2020, with almost everybody predicting a contraction in the industry for the second year running of between 1 to 4%. IC insights recently predicted that for the first time there will be a back-to-back decline in annual IC volume shipments in 2020, with a fall of 4% expected in 2020 following a 6% decline in unit shipments last year in 2019.

Whilst the outlook may not be positive, many of the major semiconductor companies did manage to have a good quarter in Q1, with many companies showing growth as the supply chain is slow to react. Also, there is a feeling that many companies are still ordering to ensure their inventories are full to de-risk supply chain issues and to allow them to react quickly to a restart of the market. Of the top 10 semiconductor companies worldwide, the memory manufacturers, foundries and OSATs generally reported improved revenue compared to a year ago but are forecasting the coming quarters to be down, whilst amongst the broader semiconductor companies the first quarter was mixed but all are forecasting next quarter to be down or giving no guidance due to the uncertainty caused by COVID-19.

Samsung reported revenue of US$46 billion, a -7.6% revenue decline from the previous quarter but was up 5.6% compared to a year ago as memory sales improved on solid server and PC demand. They forecasted a further decline in Q2 due to COVID-19, and uncertainty in 2nd half. Intel reported a 23% yoy growth in revenue in Q1 at US$19.83 million, and are predicting around a 9% decline in Q2, and declined to give a

guidance for the full year due to COVID-19 uncertainties. Leading foundry TSMC reported Q1 revenue of US$10.3 billion, a 42% yoy revenue growth but down -2% on last quarter, with revenue from smartphones dropping 9%. TSMC is forecasting revenue will be flat in Q2. Memory manufacturer SK Hynix, was up 239% from last quarter but was down -41% year on year, as server demand offset weakness from the smartphone market, and they are predicting demand volatility if the outbreak is prolonged.

Amongst the broader semiconductor market companies, Broadcom reported early in March and reported revenue of US$4.2 billion from its semiconductor solutions division, down 4% year on year and down 8% quarter on quarter. Broadcom also withdrew its full-year guidance due to uncertainty over COVID-19 outbreak and reported disruptions to its supply chain. Qualcomm reported fiscal Q2 revenue of US$5.21 billion, 6.6% up on a year ago, and expects a midpoint revenue of US$4.8 billion in FQ3. Qualcomm said it expected smartphone shipments to be down 30% compared to its previous forecast but they still kept its full-year forecast of around 200million 5G deliveries for the full year. Texas Instruments revenue was down -7% yoy at US$3.33 billion and citing uncertainty caused by COVID-19, forecasted next quarter revenue down at US$2.9 billion.

Equipment makers ASML and LAM Research both reported good orders but reduced revenue due to supply and production problems caused by COVID-19.

Other Company News

Air Liquide has announced it will invest about US$215 million to build new production capacities in Taiwan in Hsinchu and Tainan with production in the second quarter of 2021.

Samsung is determined to complete expansion of its 2nd chip factory in Xian, China despite the COVID-19 outbreak and sent 200 South Korean engineers and workers in April to China via chartered plane.

Taiwan's Foxconn has signed an agreement in April with Qingdao government in China to build a test and assembly plant. Production will start next year and be at full capacity by 2025.

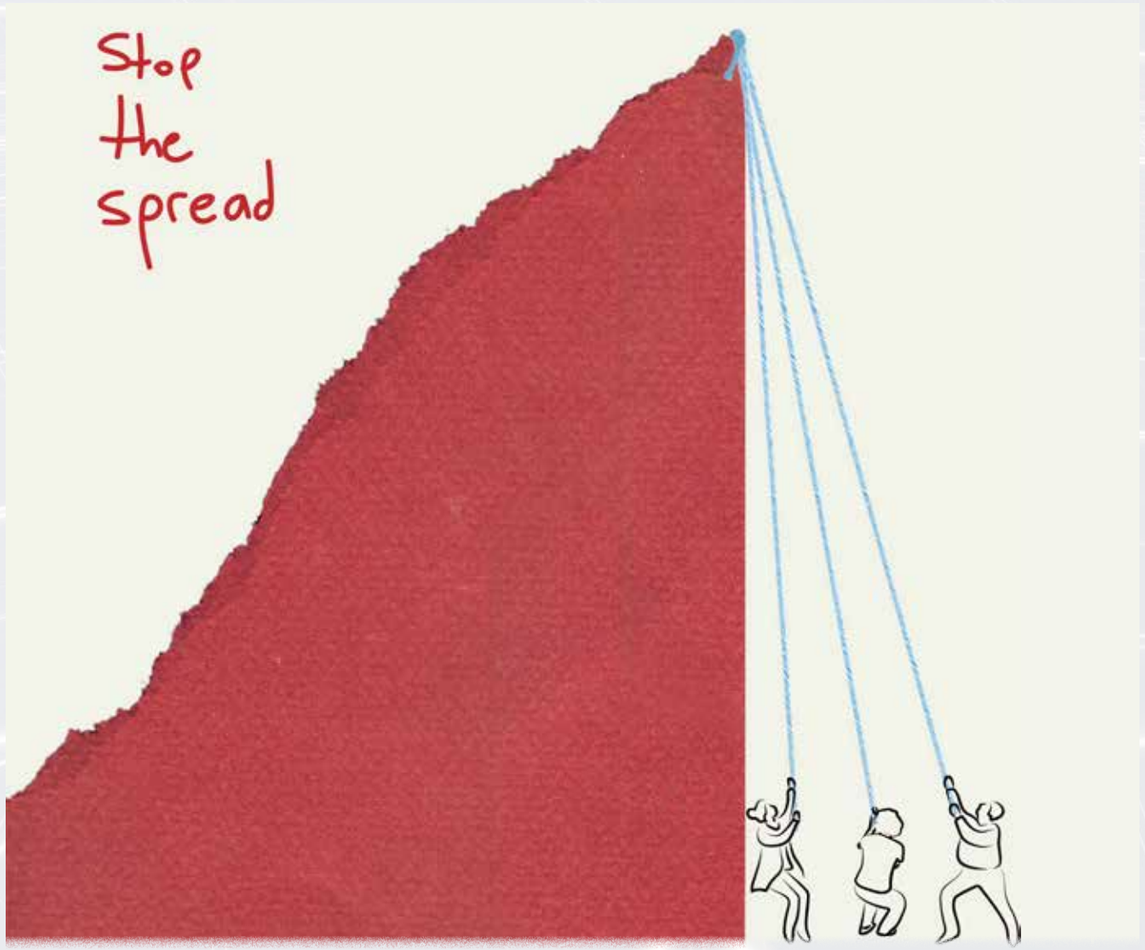
MagnaChip announced in March it would be selling off its foundry services and manufacturing facility for $435 million to a financial consortium including SK Hynix.

Infineon completed its acquisition of Cypress Semiconductor in mid-April after receiving approval for the US government.

STMicroelectronics has announced it will acquire a majority stake in French Gallium Nitride device designer and manufacturer Exagan.

In March U.S. printer maker Xerox announced has dropped its $35 billion hostile cash-and-stock bid for HP after COVID-19 impacted it's take over campaign.

NXP has announced that Kurt Sievers will replace Rick Clemmer as president and CEO in Q2. Rick Clemmer has been CEO since 2009 will remain as strategic



advisor to the company.

The Outlook

Whilst there is light at the end of the tunnel as countries start to open up their economies, the short-term outlook for the semiconductor segment is not very positive with most companies expecting next quarter to be worse due to the impact of COVID-19. How long it will take for the economy to get back to normal is still unclear. As well as lifting internal restrictions, countries will need to open borders so that people that have been furloughed and made redundant can return to work for the global economy to get fully back to normal. This will probably take quite some time as governments walk the tightrope between economic recovery and re-occurrence of the outbreak unless a vaccine is found quickly. In the short term, companies will be carefully looking at their bottom line.

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Mark Dyson
Head of Global Subcon Manufacturing
Osram Optoelectronics

HIGH GRADE PROJECT MANAGEMENT
– THE STORY OF DEMCON

In the hightech industry, project management is key. That's why technology developer and producer Demcon, headquartered in the Netherlands, sets great store in providing project management at a high level, executed by highly skilled project managers from very diverse backgrounds. As one result of the company's commitment to drawing upon the specific expertise and interests of its employees, women at Demcon make major contributions in a wide range of disciplines, including key engineering positions, production/assembly, QA/RA and project management.

One year ago, Demcon established an office in Singapore, as a gateway to Southeast Asia for business development and to provide engineering services to the semiconductor and other hightech industries. Demcon (700 employees) develops, produces and supplies technology and innovative products, from locations in the Netherlands, Germany and Singapore. The company was born out of the founders' passion for combining creativity and technical skills aimed at solving complex issues of a technological and social nature. Demcon has a strong foothold in the semiconductor industry and has been serving world-leading customers in the front-end industry for over 20 years. Medical systems, including respiratory modules, are another long-time focus area. Recently, Demcon managed to develop and realise – within one month – a complete ventilation system for treatment of COVID-19 patients in the ICU.

Women Engineers in the Company - Broad Education

Ivana Sersic Vollenbroek

Ivana Sersic Vollenbroek is one of the female project managers at Demcon. Sersic studied physics and astronomy at the University College in Utrecht, which provided her with a broad academic education, then obtained her PhD in nanophotonics in Amsterdam. Before a postdoc in nano-opto-electro-mechanical sensor development, she worked for five years at Shell as a reservoir engineer, specialising in metering strategies and sensing technologies for oil recovery. She joined Demcon in early 2019 because of its challenging engineering projects and inspiring working environment. She became a project manager in hightech systems and was also offered the opportunity to start business development in photonics.

Multi-disciplinary

Currently, her main project is the multi-disciplinary development of a qualification tool for an advanced position module of a lithography system. "As a project manager, I need to have at least a basic understanding

Detail of qualification tool for position module

of all disciplines, including the ones I have no background in." At Demcon, Sersic can pursue her various interests and further develop a broad skill set. As a bonus, Demcon allows its employees, men and women alike, to work four days a week. "Naturally, my drive is to work more than the nominal hours over these four days, but this arrangement suits my family well, now that our second child is on its way."

Ivana Sersic Vollenbroek: "It's my job to translate the customer's requirements into Demcon's deliverables, and to guide my team in adopting the customer's specific way of working while preserving their own creativity."

Dedicated Team

Her colleague, Josée Kleibeuker, studied chemistry, did a PhD in physics and spent several years as a postdoc at the University of Cambridge, UK, during which she had two babies. In Cambridge, she oversaw the acquisition, design and installation of a €1 million plus, state-of-the-art vacuum system for growing and analysing new materials. "Definition of specs, alignment of internal stakeholders and communication with the supplier. Yes, this was kind of anticipating a future job as a project manager." Returning to the Netherlands, she was hired by Demcon. "A company where I could work with a dedicated team to achieve a common goal. I appreciate the open culture and the bright people, driven by their passion for technology and sense of responsibility."

From Concept to Deliverable

Josée Kleibeuker

When Kleibeuker joined Demcon in 2016, she was the only female project manager; now the team is more balanced. Praising Demcon as a flexible employer, which facilitates young fathers and mothers equally in taking up their family responsibilities, she is now ready to act as an informal role model. In hightech systems, she aspires to manage large, challenging projects from concept to deliverable.

"As a project manager, I facilitate the collaboration between our engineers and their counterparts at the customer." said Kleibeuker.

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DEMCON

www.demcon.com

IBM, IMDA, M1 AND SAMSUNG TO KICKSTART 5G TRIALS FOR THE MANUFACTURING SECTOR

Growing The 5G Ecosystem, Creating New Applications and Business Use-Cases

The Infocomm Media Development Authority (IMDA) has partnered with IBM, M1 Limited and Samsung to roll out Singapore's first 5G Industry 4.0 trial, to demonstrate the transformative impact of 5G for enterprises and drive the next bound of Singapore's digital economy. The trial will look at ways that 5G connectivity can improve the control of robotic arms and other smart devices on factory floors. It will be an innovation model that allows for development, testing and benchmarking of 5G-enabled solutions that can be applied across various industries.

3 Main Areas of the Partnership This partnership consists of the following areas:

• 5G Innovation: The trial aims to design, develop, test and benchmark 5G-enabled industry 4.0 solutions that can be applied across various industries.

• 5G Solution Showcase: Solutions developed will be featured at IBM's Industry 4.0 Studio 5G Solutions Showcase. The showcase will feature Industry 4.0 solutions powered by 5G and leveraging capabilities such as Internet-of-Things (IoT) and Artificial Intelligence.

• 5G Solutions Roll-out: IBM and Samsung will evaluate successful solutions developed during the project for possible use in their operations in a broad range of markets and sectors.

Manufacturing as Focus

5G's capabilities such as faster data transfer and more-rapid response times, when coupled with other transformative technologies like AI, can enable significant improvements to manufacturing processes. The project will test 5G-enabled use cases for manufacturing, focusing on three main areas:

• Automated visual inspection using AI for image recognition and video analytics;

• Improved equipment monitoring and predictive maintenance using AI-enabled acoustic insights; and

• Assembly and debugging using augmented reality to improve productivity and quality

Lowering Cost for Edge Device

Apart from providing a strong foundation for Industry IoT and automation, 5G would also reduce the cost of processing by shifting the load from the edge device to centralised systems. This reduces the requirement and cost for edge device thus making the application more cost effective. IMDA launched its $40 million fund with the National Research Foundation in June 2019 to accelerate the rollout of 5G technology in six strategic clusters including smart manufacturing.

"For us to sustain global competitiveness in the manufacturing domain, it's about leveraging technology to enable new business models and innovation," said IMDA's Chief Executive Tan Kiat How in a CNA interview.

The IBM Industry 4.0 Studio will be launched in June and located at Changi Business Park. Interested businesses can contact representatives of IBM, IMDA, M1 and SAMSUNG to visit the studio and view the solutions. The trial at the Industry 4.0 Studio will commence in Q2, 2020 and will be conducted at IBM Singapore's Centre of Competency (CoC) for Smart Factory Operating Model for sharing of ideas and best practices.

Successful 5G-enabled Industry 4.0 use-cases developed from this trial could be demonstrated for manufacturing enterprises and applied to production, service, quality control, and testing across a broad range of industries.

A Partnership to Seed Singapore's 5G Capabilities

IBM will implement and test Industry 4.0 use cases that will leverage IBM's AI, IoT, edge, and augmented reality technologies, and network architecture built on IBM systems using open solutions infrastructure from Red Hat. "This collaboration will seed Singapore's 5G capabilities and strengthen its position as a leading industrial innovation hub, and move us closer in fulfilling our Industry 4.0 vision," said Martin Chee, Managing Director, IBM Singapore. Red Hat.
"This is an incredibly exciting opportunity for us to collaborate withleading industry players to develop, test and roll-out innovative 5G-enabled industry 4.0 solutions that will enhance smart manufacturing processes," said KC Choi, Executive Vice President & Global Head of B2B Business, Samsung Electronics.

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Press Release from Infocomm Media Development Authority (IMDA)

WISDOM OF THE MENTOR – INSIGHTS OF LEADERSHIP

This article is the second in the series, and this one is about the wisdom of a Mentor.

John Bittleston is Founder Mentor & Executive Chairman of Terrific Mentors International. I have known John for a long time; he is an accomplished businessman, author, and columnist. His career spans nearly 70 years of Marketing, Advertising, Public Relations, and International Management Business Mentor and Career Coach to over 20,000 clients.

John shared three mentorship situations that he recommends to his mentees to reflect on. Here is the first one he shared, Purpose is Liberating, not Binding. "People with purpose know their destination, understand what could deflect them from it, and appreciate that the journey is more important than the arrival. When we wake up each morning and our feet touch the floor, we should know our purpose for the next five to ten years. He went on to say, "It's our purpose so we can change it. However, the less we do, the greater the chance of us achieving it."

What can we learn from this?
– Clarity of Purpose

As a leader, especially in these turbulent times, clarity of purpose is even more critical to driving you through 2020 and beyond. If it was a "culture change" that you want to create within your organization just because everyone is not in the office now, do you drop the idea? We all have to live with the short-term realities and constraints. If you do decide to change your goals, know that whatever you choose, it always takes more time, energy, and effort than you anticipated to get it accomplished. Well-achieved LESS is better than half-achieved MORE.

So how are you doing this?

Do you have a clear purpose that guides you?

How do you keep focused on them even in these chaotic times?

Which few do you want to complete and get acknowledged?

In the second mentorship situation, John shared, "GIVING is more urgent than getting for most people. However, few people recognize the power they wield when they give. It has nothing to do with money but everything to do with time and care. The giving boss is all-powerful, so is the giving spouse. The outward sign of giving is caring. Businesses that care for their employees get work 10x from them. People who care get rewarded 10x for doing so.

What can we learn from this?
– Give Key People More Time

So who do you need to give more time to in 2020? A team member, a peer, maybe your supervisor? (She/He is human too). If you don't plan and schedule it, it won't happen. If you are someone who always is the one who is helping to put the numerous fires out – then you will surely never have the time to make it happen. Choose a few key people this year and enjoy the 10x return.

So how are you doing this?

Do you have a few people in mind you need to give more time?

How do you still stay connected to them even when if you can't meet face to face?

How do you keep focused on your customers when you can't meet with them face to face?

In the third mentorship situation, John shared; "Stature is the outward sign of confidence. To have one without the other is to waste the opportunity to excel. All good leaders know this. Just like good orchestra conductors, they balance their confidence with enough stature to demonstrate control. The stature of a great person is barely visible until it is lost. Then it becomes overbearing and phony. Real stature is the sunlight on a flower. You notice the flower."

What can we learn from this?
– Brand Stature and Confidence

As a leader, you must know how to balance stature and confidence delicately. How will you help others get things done - and shine without being overbearing? How much does your presence help or hinder your colleagues or subordinates from achieving even more? How do you really know? Your colleagues seldom tell you. If you can figure out this balance, you are gold. Increase your STATURE in 2020 and have a GREAT year.

So how are you going to do this?

Have you have been too overbearing at times?

Who can give you honest feedback on this point?

If you are one who needs to increase your stature, what are you going to do?

If you have a group that needs to learn visibility strategies and techniques with senior management, view our online program and classroom options, at www.kremplcommunications.com or contact us at stephen.krempl@kremplcommunications.com.

ABOUT THE AUTHOR

Stephen Krempl
CEO of Krempl Communications International. Facilitator, Author, Global Speaker, and Coach. He has helped thousands of leaders in over 30+ countries through his programs W3 Winning in the Work World and GEM Global Executive Mindset both classroom and online programs have helped individuals Stand Out and get noticed in their organizations.

NUS OFFERS 1,000 TRAINEESHIPS & JOBS TO GRADUATES

"Here I am, with degree in hand! I have cleared the last hurdle and reached the finish line! After a decade of school to prepare for entry into the workforce, I am eager to be a contributor to family and society. I want to find my niche in the world. I want to join the workforce... but where are the doors I can open?"

Entering the workforce in the year 2020, amidst a global economic slowdown in the wake of a pandemic, is anything but business as usual. Whilst cash-strapped companies may pause hiring, new employment opportunities could arise from this crisis. Even as there is no certainty how we will emerge, we still have to prepare for tomorrow today.

NUS Resilience & Growth Initiative

With this in mind, the National University of Singapore (NUS) has launched the NUS Resilience & Growth (R&G) Initiative to support their newly-minted graduates in the transition from student to adult learners and contributors to the nation and economy. These development opportunities will provide graduates an edge in a competitive job market, as well as allow them to develop professionally.

Graduates from Year 2020

Three initiatives are specifically designed for full-time undergraduate students who are conferred their first degrees in year 2020.

Firstly, 200 full-time positions that span roles in NUS' central administration, faculties and schools, research institutes and centres, and the National University Health System are open for application by fresh graduates. Secondly, they may apply for 800 paid traineeship positions in four distinct tracks – executive and professional, education, research, and entrepreneurship. Thirdly, they will be awarded four virtual vouchers that they can apply to a catalogue of 150 specially curated courses and around 30 certificate courses. The four vouchers will provide the equivalent of 26 training days altogether.

The list of courses offered share a common feature – they impart knowledge and skills necessary for today's workplace. Regardless of vocation, competency in data literacy, data analytics, business and management, professional communication and writing skills is essential and a differentiator in the workplace. To support students, market-relevant certificates in small business management for entrepreneurs, finance and accounting for executives, public policy and administration, as well as AI, Computing Foundations and machine learning will be offered.

Of these certificates, the Graduate and Executive Certificates are also open for public registration, and the Professional Certificates will be made available to the public at a later stage.

NUS Resilience & Growth (R&G) Innovation Challenge

As the world grapples with the COVID-19 crisis, NUS is funding up to 115 innovative projects initiated by recent graduates to mark its 115th anniversary, as part of the NUS R&G Innovation Challenge.

Open to the classes of 2018, 2019 and 2020, participants are challenged to sketch out what a post-pandemic world could look like, to show the way forward and help shape a better future for humankind under three themes: Make Our People Better; Make Our Society Better; and Make the World Better.

NUS is setting aside $6 million to support ideas and proposals arising from the Challenge.

Rising Above

History has shown us time and again that tough times don't last. This too shall pass. But now is the time to prepare for what is to come, for knowledge and learning remain the way to a brighter future.

For more information on the NUS Resilience and Growth Initiative, visit **https://scale.nus.edu.sg/nus-resilience-growth-2020**

Always be curious.

SOURCE OF CONTENTS
The National University of Singapore

A CHAT WITH THE SSIA SECRETARIAT TEAM MEMBER

THE STORY OF GILLIAN'S CAREER JOURNEY

Gillian is the Marketing and Communication Manager of SSIA leading the branding and communications initiatives of the Organisation. She has over 15 years of experience in PR, communications and marketing with experience in leading B2B and B2C marketing communications strategies in a wide range of businesses in Singapore, Hong Kong and Malaysia.

Snapshots taken when Gillian was a News Reporter back in Hong Kong

1. Can you tell us about your career journey? What first got you into the semiconductor industry?

I started working in TV news station in Hong Kong during college and became a news reporter for TV documentary programs after I graduated. I decided to pursue a career in PR/comms after a few years in the media as I was more interested in developing good stories from a company's standpoint. My family and I have relocated to Singapore since 2016. I joined SSIA in 2019 as the Marketing and Communications Manager, and it is the first role that has exposed me to the semiconductor world.

2. What are the similarities and differences between your previous roles and the role in a semiconductor trade association?

The work of a trade association, particularly in SSIA, is fast-paced and dynamic – much more than I had expected before I joined the Association. It is challenging but fulfilling to work in the Association with our Executive Director, Wee Seng, always leading us to tease out new perspectives and ideas to advocate for the semiconductor industry.

Working at SSIA has also provided me with opportunities to engage with different people such as our members, business leaders, government agencies and peers from other trade associations. It's an interesting and exhilarating time.

3. What were your biggest challenges and excitements as an employee in the semiconductor industry? How did you deal with these?

There are many technical terms that I have never learned before joining the semiconductor industry. I still remember the difficulty in figuring out the context of my first few meetings at SSIA since I found it hard to understand the terminologies and the whole semiconductor manufacturing process. Thanks to Wee Seng and my SSIA colleagues, they have never hesitated to answer my every single question about the industry, which has helped me to adapt and function in a new environment faster.

Being the Editor of the Voice magazine is also a challenge at the same time excitement. I am thrilled to have received many informative and insightful stories from companies across the industry. Having launched eight issues so far, I feel happy that the magazine has been well-recognized with its mission 'by the industry, for the industry'. Nonetheless, catching the editorial deadline and getting sponsorship for every issue are always not easy.

4. What do you enjoy most about

I enjoy working with the SSIA Secretariat team. Although we are a lean team, we always make challenging tasks possible by working out the synergy between team members. I also felt rewarded when some SSIA members told us how our initiatives had made a positive difference in their workforce and business development.

5. How do you see the changes in marketing and communications after the COVID-19 crisis?

COVID-19 has changed the marketing and communications landscape overnight. In-person marketing events and conferences, which used to be the effective channels to convey marketing messages to companies, especially in the B2B sector, are being cancelled or postponed. Relevant and useful content is the key now. People in the marketing and communications field will need to be creative on how to continue engaging their target audience without an in-person engagement and revisit their marketing strategies.

For SSIA, we strive to offer relevant content and support to the companies in the industry. We have converted some of our events to online platforms. Most importantly, regardless of the format of the initiatives, we remain to stay relevant to the industry by providing useful information as well as practical support which the semiconductor industry in Singapore needs most during this crisis period.

6. How do you see the changes in the semiconductor industry in Singapore in the recent 10 years?

Semiconductor is the backbone to the connected world, and it is particularly true when people now consume digital contents more than ever before due to the COVID-19 pandemic. The demand for semiconductor and electronics solutions from personal gadgets to cloud storage, and even to high-tech medical equipment will be increasing. These growth factors will stimulate the growth of the industry in the coming years.

I believe the research and development sector of the industry will grow at the same time as it enables technology changes and innovation. This is why SSIA has launched the R&D Committee to help advance the R&D ecosystem here in Singapore. With these new demands and industry trends, it is also crucial to upskill the workforce and recruit new talent for the industry. As such, it is one of SSIA's mission to grow the talent pool for the semiconductor industry in Singapore.

Gillian (Left) working with Sharlyn, Emcee of the SSIA Semiconductor Dinner 2019

> *"Most importantly, regardless of the format of the initiatives, we remain to stay relevant to the industry by providing useful information as well as practical support which the semiconductor industry in Singapore needs most during this crisis period."*

Gillian (3rd from the left) and the SSIA Secretariat Team

NGEE ANN POLYTECHNIC OFFERS SUPPORT FOR THIS YEAR'S FULL-TIME DIPLOMA GRADUATES HIT BY COVID-19 CRISIS

Career Jumpstart' Support Package Includes Close To 400 Employment & Learning Opportunities

In the month of May, over 4,500 Ngee Ann Polytechnic (NP) students will be graduating amid a global pandemic, and venturing into uncharted waters. Extraordinary situations like these call for extraordinary efforts.

As the economic consequences of Covid-19 have been unprecedented, NP is stepping forward to help its graduating students mitigate the challenges ahead with Career Jumpstart, a graduation support package that includes gainful employment and learning opportunities.

The launch of GoSchool is one of the initiatives the polytechnic has worked on to help its Class of 2020 graduates kickstart their careers. Serving as a career springboard for IT graduates, GoSchool has secured to-date about 150 job placement opportunities and apprenticeships to meet the talent demand of its hiring partners such as Shopee, FoodPanda and Zalora.
There are also close to 80 campus job placements NP has curated for the graduating cohort. These range from web content development and digital marketing communications positions, to research assistant and administrative support roles. Besides providing the fresh graduates with gainful employment in today's challenging economic climate, these campus jobs will also help them acquire relevant skillsets, which will enhance their employability and prepare them for the eventual upturn of the economy.

Another pathway for their fresh graduates to gain a head-start in careers related to their diplomas is to pursue Work-study Programmes (WSP). To-date, NP has compiled a potential list of over 150 WSP placements for them to embark on a rewarding career while deepening their professional skills and knowledge at the same time. They will also gain recognised certification of their skills upon completion of the programme.

One example of a WSP is the **Startup Talent Factory programme**, a 9 to 12- month place-and-train programme that provides opportunities for fresh graduates to work in a startup and pick up emerging skills. There are currently 30 potential placements under this programme.

COVID-19 has upended businesses, driving both large companies and Small and Medium Enterprises (SMEs) to adjust their strategies and accelerate digital transformation. In light of this, the polytechnic is also collaborating with some industry partners to digitalise key processes in SMEs to allow them to work and grow their business from home. For a start, the initiative is targeting to digitalise 10 SMEs in its pilot phase, with the potential to scale it to over 100 SMEs. NP's School of InfoComm Technology will run a series of short courses to upskill interested non-tech diploma graduates to work on these digitalisation projects.

To create more learning opportunities, NP is also gifting this year's graduating cohort1 with **two complimentary CET programmes** to equip them with both professional and life skills. They can choose one programme from its Masters Collective series and pursue a SkillsFuture Series Short Course or a Post-Diploma Certificate (PDC).
In addition, the polytechnic will avail its education and career guidance (ECG) counselling to help fresh graduates in their career preparation and transition to the working world.

"Our students are graduating in uncertain times and their initiation into the working world has been overshadowed by an unprecedented upheaval. The impetus for these initiatives is to empower our Class of 2020 to face the future confidently. It is our hope that these support measures we have curated will give them an edge in this challenging climate and inspire a passion for continued learning," said Mr Clarence Ti, Principal of Ngee Ann Polytechnic.

Visit www.np.edu.sg/careerjumpstart for details of the support package for NP's Class of 2020.

For more details on Work-Study Programme (WSP), visit https://www.np.edu.sg/lifelonglearning/Pages/Work-Study-Programme.aspx

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NGEE ANN POLYTECHNIC

http://www.np.edu.sg

SUTD FIRST INDUSTRY WORKSHOP 2020

What Makes University-Industry Collaboration Succeed?

FIRST is the Singapore University of Technology and Design (SUTD)'s signature event where the School brings and connects people from various industries together to explore collaboration. The FIRST Industry Workshop aims to foster and expand industry-academia ties by showcasing relevant research capabilities with industry-relevant applications, reinforcing SUTD's role as a vital anchor within a vibrant ecosystem of partnerships between academia, industry and the Government. The theme for the FIRST Industry Workshop 2020 will be "What Makes University-Industry Collaboration Succeed?" and will be held on 22 July 2020.

Since its inception in 2016, the FIRST Industry Workshop has gone from strength to strength – the 2019 edition saw over 800 attendees (about 700 of whom were from industry). Participants appreciated the insights and experiences shared by the Keynote Speaker and Forum Panelists and viewed our graduate-level research projects on display. It has also served as a business networking platform for companies to reach more clients and customers while they were showcasing their products in the exhibition, and eventually attained business growth and increased revenues.

This year, the event will go fully virtual. SUTD has invited Dr Bicky Bhangu (President, SE Asia, Pacific & South Korea, Rolls-Royce) and Mr Nicholas Ma (Chief Executive Officer, Huawei International Pte Ltd), as the distinguished keynote speakers for the morning session of the event. This will be followed by the Forum Panel Discussion.

The Research Competition Poster Exhibition, Industry Spotlight and Research Centre/Lab Showcase will be held in the afternoon session.

Register here at https://ez-rsvp.com/e/sutdfirst2020 or scan the QR code shown below.

Do visit FIRST website for more details of the annual event, https://sutd.edu.sg/first.

Event Programme 22 July 2020

Time	Programme
9.30am	**Opening Address** (Live streaming) Prof Yeo Kiat Seng (Associate Provost, Research & International Relations, SUTD)
9.45am	**Keynote Address** (Live streaming) Dr Bicky Bhangu (President, SE Asia, Pacific & South Korea, Rolls-Royce)
10.15am	**Keynote Address** (Live streaming) Mr Nicholas Ma (CEO, Huawei International Pte Ltd)
10.45am	**Forum Panel Discussion** (Live streaming)
12.00pm	**Break**
1.00 pm	**Research Competition/ Poster Showcase** (Online showcase)
2.00pm	**Industry Spotlight** (Live streaming)
3.00pm	**Research Centre/Lab Showcase** (Online showcase)

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