SINGAPORE
SEMICONDUCTOR VOICE
Volume 6
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OUTLOOK 2020
A YEAR OF REBOUND & TRANSFORMATION

ACCELERATING INDUSTRY 4.0 TRANSFORMATION THROUGH YOUR PEOPLE IN 2020

ENERGY SAVING IN THE SEMICONDUCTOR INDUSTRY

THE SSLA 5TH RUN

SSIA
Singapore Semiconductor Industry Association

SSIA EVENTS CALENDAR 2020

JANUARY
- SSIA Semiconductor Lo Hei Dinner
- SSIA HR Roundtable

FEBRUARY
- SSLA Alumni Meet
- SSIA Environment, Health and Safety Workgroup

MARCH
- Semiconductor Week
  - Semiconductor Women Forum
  - Manufacturing Career Fair
  - Semiconductor Tech Forum
- Singapore Semiconductor Leadership Accelerator (Module 1)

APRIL
- Silicon Classic 2020
- Singapore Semiconductor Leadership Accelerator (Module 2)

MAY
- SSIA Automation Supplier Day

JULY
- SSIA HR Symposium
- SSIA HR Roundtable
- SSIA Semiconductor Industry Meet

AUGUST
- SSIA HR Conference
- SSIA Young Leadership Programme
- SSIA Environment, Health and Safety Workgroup

SEPTEMBER
- SSIA Summit & Semiconductor Dinner 2020

OCTOBER
- Industrial Transformation ASIA-Pacific (ITAP) 2020

NOVEMBER
- Electronics Industry Day 2020
- SSIA Annual General Meeting

Please contact us at **secretariat@ssia.org.sg** if you would like to be a **sponsor of SSIA events!**

For updates, please visit **www.ssia.org.sg/upcoming-ssia-events/** or **scan QR code**

FOREWORD BY EXECUTIVE DIRECTOR

On behalf of SSIA, I would like to wish all readers a Happy New Year! We have finally crossed into a new decade, and while we are reflecting on the past successes, we look forward to our future wondering what is installed for us. A new year is like a blank book and the pen is in our hands. It is our chance to write the story of our future. That is how SSIA will be writing our story to further develop and create a more vibrant semiconductor industry here in Singapore and the region, in line with the Electronics Industry Transformation Map (ITM).

The semiconductor industry has been facing a slow down over the past year, mostly due to the trade tension between the US and China. While we are unable to control the global geopolitics, companies here have been working hard on areas to keep their business sustainable in the long term – by investing in their talents, improving productivity and driving for innovation. SSIA will be conducting our annual industry survey in early February, and we seek your participation to help give us a clearer idea of how our industry is performing as well as areas of opportunity that SSIA can focus on.

Over the past year, SSIA have been focusing on developing the semiconductor workforce, targeting future, current and past talents. This remains our focus for this year. We will be launching a communication campaign that will encourage future talents to join us and further engage current talents in our industry. We are also working closely with our partners such as Singapore Polytechnics, NTUC LearningHub and NUS SCALE to help upgrade and upskill our current workforce so that companies in our industry can be ready for future trends, such as Industry 4.0.

The SSIA Board have also announced the formation of a Research and Development (R&D) committee to be headed by our Honorary Secretary,

Jerome Tjia. Innovation and R&D is one of the key pillars under the Electronics Industry Transformation Map (ITM). This initiative aims to advance the vibrancy of the R&D ecosystem in Singapore and the region. We will update more on the recommendations of this committee in the near future.

SSIA will be organizing bigger and more exciting events compared to last year, as part of our initiative to create a more vibrant semiconductor ecosystem. This year we would like to reach out to more companies and workforce of this industry. We are currently calling for support such as sponsorship for these events. To help companies understand our events better, we have divided the events into two major categories – workforce centric and technical and productivity centric. This allows companies with specific sponsorship interests to decide on which area or events they would like to sponsor. Do reach out to us to further discuss details of sponsorship. One major upcoming event will be the Semiconductor Week 2020. This inaugural annual event will be held at the end of March, with 3 major events coming together – Semiconductor Women Forum, Semiconductor Tech Forum and Semiconductor Career Fair. We are seeking support and sponsorship from the industry, so do write to us if you are interested.

This year also marks the last run of the Singapore Semiconductor Leadership Accelerator (SSLA) program. This leadership program, which will be held on 23rd March 2020, is part of the Singapore Semiconductor Vision 2020 (SSV 2020) to create a pool of leaders that can lead our industry into the future. Please sign up earlier as spaces are limited.

Finally, I would like to take this opportunity to wish all our Chinese readers Happy Chinese New Year! May this year be filled with good health, joy and prosperity!

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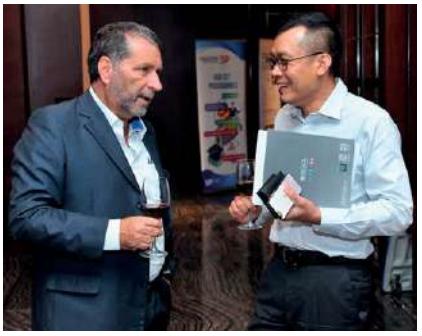
SSIA AGM 2019

Singapore Semiconductor Industry Association (SSIA) held its Annual General Meeting for 2019 at Mandarin Oriental on 28 November 2019. The attendance of over 100 members from 66 companies reflected the strong interest members have in keeping updated with SSIA's latest developments and initiatives. The AGM also provided an ideal platform for SSIA to meet with members, understand more about their companies and hear their views. As an Association supporting the semiconductor sector in Singapore, members present at the AGM were given a review of SSIA's key achievements during the past year, financial review as well as upcoming initiatives designed to continue driving the Electronics Industry Transformation Map (ITM) and add value to the semiconductor economy in Singapore. "It is SSIA's mission to create and sustain a highly competitive, leading-edge and vibrant Semiconductor industry in Singapore and the region. We will continue to strengthen the semiconductor ecosystem as made up of all its members, as I believe collaboration is key for the industry during the period of transformation. We will continue to provide different engaging platforms for the various segments of our members so that global players will have a stronger local base of partners while local players will have access to broader markets and more competitive practices," said Andrew Chong, SSIA Chairman, in his opening address to the members present. Partners from the IHL (Institute of Higher Learnings) including NUS School of Continuing and Lifelong Education, NTUC LearningHub, TUM Asia, Singapore Institute of Technology and Singapore Polytechnic also showcased their latest courses at the booths at the SSIA AGM. Workforce development will remain SSIA's focus in 2020, as companies recognise that talent development and retention are key enablers for productivity improvement and business transformation needed to remain globally competitive. SSIA will focus on developing both future and current talent in the industry. That was the key message shared

Andrew Chong, SSIA Chairman


Brian Tan, SSIA Treasurer




It's all cheers and smiles


Ang Wee Seng, SSIA Executive Director


Great catching up with one another

by SSIA Executive Director, Ang Wee Seng, in his updates to the members. Wee Seng also highlighted the upcoming Semiconductor Week from 24th to 27th March 2020 in his presentation. It is a week where 3 major activities will come together to offer a great outreach to the entire semiconductor eco-system here in Singapore and the region. The week will start with a Semiconductor Women's Forum, followed by a Technical Forum covering major technology trends of the industry and a huge career fair. Companies who are interested in participating in this exciting week of events can now register their interest on the SSIA website. "2019 has been an eventful year for SSIA. It is a year of transformation and discovery to ultimately serve and support the semiconductor industry here in Singapore better. We seek continuous support from our members in building a vibrant semiconductor industry here in Singapore in the coming year," said Wee Seng.


Over 100 members from 66 companies attended the SSIA AGM 2019

OPPORTUNITIES FOR THE SEMICONDUCTOR INDUSTRY IN 2020

Despite its downturn in 2019, economists agreed there is light on the horizon for the manufacturing sector, including the semiconductor industry in the coming year. According to the IHS Markit, the recovery of 2020 will come as welcome news to a semiconductor industry battered by the worst downturn in a decade. Following a 12.8 plunge in 2019, global semiconductor market revenue will rebound to 5.9 percent growth in 2020. The deployment of 5G will be the main factor propelling this recovery—not only because of the renewed growth it will bring to the wireless industry—but also due to the wider benefits the wireless technology will bestow on global businesses and economies. The World Semiconductor Trade Statistics also expected the worldwide semiconductor market will recover in 2020 with 5.9 percent growth, and Optoelectronics will contribute the highest growth followed by Logic.

"The industry remains resilient and cautiously optimistic that there will be a brighter year ahead due to the demand push by upcoming technologies such as 5G and the automotive sector. However, the uncertainty remains because of the US-China trade tension," said Singapore Semiconductor Industry Association Executive Director Ang Wee Seng.

"In Singapore, the semiconductor industry in Singapore will continue to grow in the next decade, at the same time, move up the value chain and shift into the advance R&D space. Singapore has the advantage of having strong support from research institutions, a huge community of talent pool and strong IP law. All these will position Singapore a good place for semiconductor companies to invest in their R&D initiatives as well as a competitive landscape in the semiconductor market."

SEMICONDUCTOR TRADEWINDS- NOVEMBER AND DECEMBER 2019

THE YEAR SO FAR

2019 has been a challenging year for the semiconductor industry with overall sales down in almost every sector. 2019 started with the industry in a deep slump caused by an oversupply of memory products and the ongoing trade war between US & China. By the end of Q1 overall sales were down 15.5%, with especially the memory sales being hard hit, down on average 33%. This was the first decline in year on year sales since 2016. The situation was further exasperated by the escalation of the trade war in May with additional tariffs implemented together with the US Trade Department adding Huawei and 70 of it's affiliates to the so-called "entity list." It meant that US companies and any companies with more than 20% US-originated technical content could not sell to Huawei, although the ban was immediately given a temporary 90-day general export license which was subsequently further extended twice.

By the end of Q2, the 1st half 2019 global semiconductor sales were down 18% compared to the same period a year ago. However, even by the end of Q2, some logic companies were starting to report increased revenue compared to Q1. Even though another round of additional tariffs was implemented in September, by the end of Q3, the first signs of recovery were in sight, driven by smartphones, 5G infrastructure and AI segments. Overall the market was still down, with global sales for the year to date down 14% compared to the same period a year ago but certain areas were up. Foundry TSMC reported all-time record quarterly revenues in Q3 driven by 7nm sales, and some logic segment companies reported increased revenues. In the equipment segment, sales were starting to recover, with overall sales up 12% in Q3 compared to Q2. Only the memory segment was still languishing in the doldrums. In October, the outcome of trade talks between US and China was positive, and a so-called "phase 1" agreement was on the cards, which prevented further tariff hikes and also new tariffs on smartphones and many electrical items amongst other items being implemented in December.

2019 - THE YEAR OF MERGERS AND ACQUISITIONS

2019 saw a significant increase in mergers and acquisitions. Some of the major ones of the year were:

In the IC segment, in March, Renesas completed its acquisition of US analogue mixed signal IC manufacturer IDT for US$6.7 billion, with the acquisition broadening Renesas's embedded solution products. Also in March, Nvidia agreed to buy Israel's computer networking supplier Mellanox for $6.8 billion fighting off competition from Intel. In June, Infineon agreed to acquire Cypress Semiconductors for $10.1 billion to broaden its product line. Other significant deals of the year were OnSemi acquiring Quantenna Comms for US$1.07 billion to strengthen the company's presence in industrial IoT and automotive markets. NXP bought Marvell's wifi business for US$1.76 billion in May to increase its connectivity profile, and Alphabet acquired Fitbit for US$2.1bililon to strengthen its position in the wearable market. Apple also made a couple of major acquisitions this year snapping up Intel's modem business for US$1billion to enable it to develop its own 5G solution, and also acquired Dialog's power management group for US$660 million.

In the Fab space, Globalfoundries CEO Jim Caufield completed his refocusing of the foundry by selling two fabs and a business unit. It sold its Singapore Fab 3E to Vanguard (VIS), together with its US East Fishkill fab to OnSemi, and sold its ASIC unit Avera to Marvel. Panasonic exited the semiconductor manufacturing business selling its chip business to Taiwan's Nuvoton for US$25 million. In the equipment sector Applied Materials acquired Japanese batch wafer tool manufacturer Kokusai Electric for US$2.2billion whilst two metrology companies Nanometrics and Rudolph Technology merged as equals in October to consolidate their position as a leading provider of advanced process control solutions to the semiconductor industry.

In the optoelectronics sector, II-VI finally complete it's US$2.2 billion acquisition of Finisar and while Cisco acquired two optoelectronics companies picking up Luxtera for $660 mililon and Acacia for US$2.6 billion. To end the year, in December, Austrian sensor manufacturer AMS acquired German LED and sensor manufacturer Osram for almost US$5.0 billion at the second attempt.

HOW THE 2019 ENDS

Global semiconductor sales in 2019 are now expected to end down around 12.5~13% compared to 2018, with total sales of around US$410~425 billion. Memory was the worst hit segment in 2019 and is expected to be down over 30% compared to 2018, followed by analog down around 8% and logic around 4%. For the foundry segment overall, it is expected to be flat for 2019 but TSMC is expected to outperform the market with sales expected to grow in single digits for 2019 as a whole.

Based on the overall global semiconductor sales, Intel is expected to retain its number 1 position followed by Samsung, due to the downturn in memory that has hit Samsung revenue this year.

In the equipment sector, global equipment sales are expected to end down around 10.5% in 2019 compared to 2018's historic peak, at around US$58 billion. Taiwan is expected to be the number 1 market for equipment sales in 2019 mainly due to strong capex spending from TSMC to support 7nm and below technologies.

Next Year The Year Of Recovery?

Looking ahead to next year, as long as the US-China trade war continues on its current more positive path, we should see a continuation of the upturn that we started to see in Q4 2019, and expect an even better year in 2020. Overall global semiconductor sales are expected to rise around 6% YoY in 2020. I would expect foundry to outperform the overall semiconductor market especially Taiwanese foundries which can benefit from the trade war by being able to support both China and US growth. Equipment sales are also expected to have a much better year with sales rising 5.5% in 2020 compared to 2019.

> **"Looking ahead to next year, as long as the US-China trade war continues on its current more positive path, we should see a continuation of the upturn that we started to see in Q4 2019, and expect an even better year in 2020."**

The main market drivers in 2020 are expected to be 5G infrastructure and smartphone segments as China, US and Europe all start to build or expand their networks. Artificial intelligence (AI) and Internet of Things (IoT) segments are also expected to continue to show very strong growth next year from datacenter and industrial applications. Although fully autonomous cars are now not expected to be on the roads as soon as hope and maybe two or more years away, the automotive sensor segment will continue to be a big growth area in 2020 as more and more sensors and higher levels of driver-assist are added to cars.

In terms of IC's products, memory is expected to show the biggest growth after it's dismal showing last year, with NAND expected to have round 20% growth followed by DRAM with 12% growth, with other IC's supporting 5G, AI, IoT and specialty automotive also showing good growth. The optoelectronics segment is also expected to show exceptional growth in 2020.

So I hope that 2020 will be the start of an industry-wide recovery that will last for many years, and the US-China trade war will be settled amicably so that the world will see better global trade relations.

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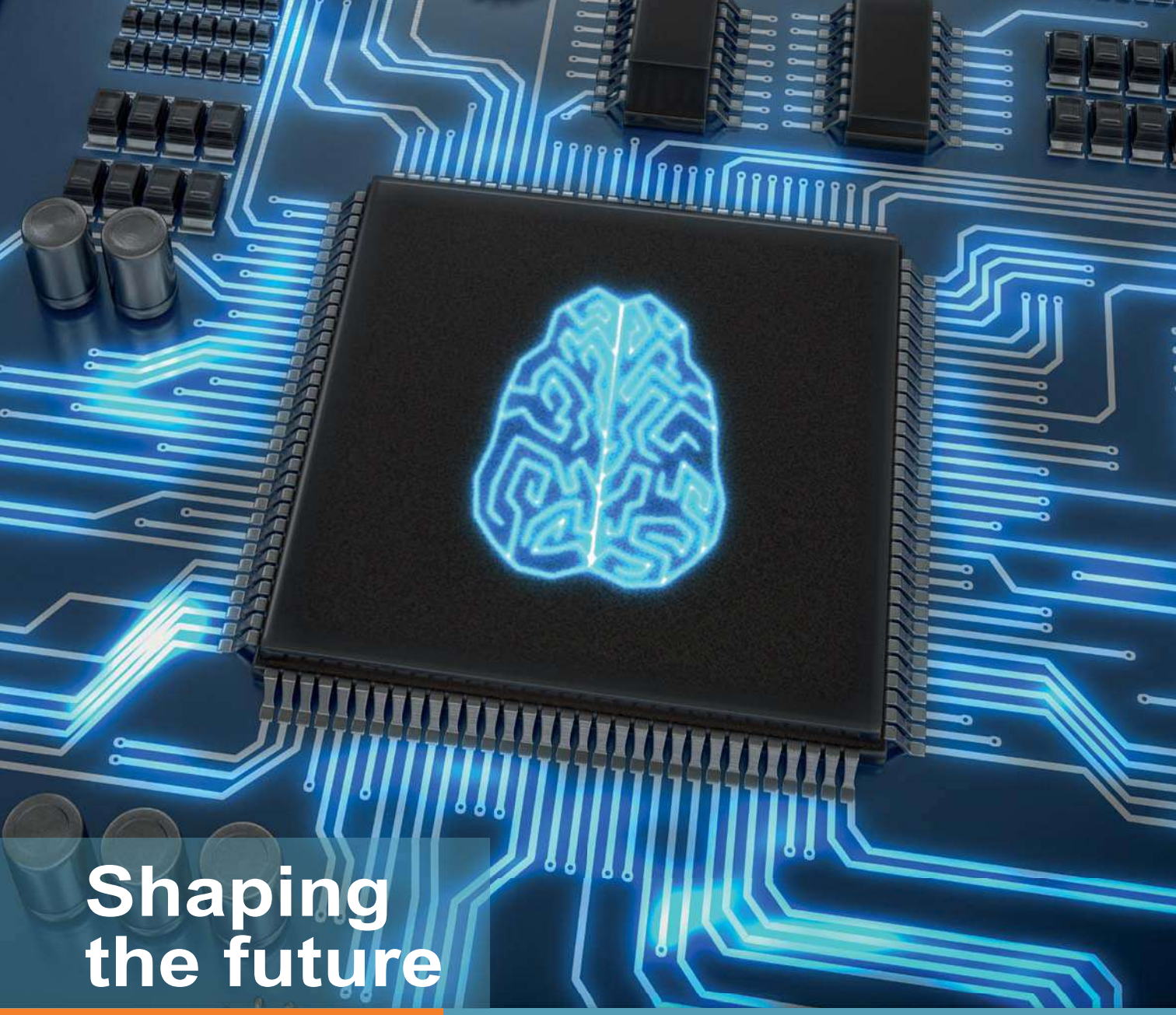

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ACCELERATING INDUSTRY 4.0 TRANSFORMATION THROUGH YOUR PEOPLE IN 2020

For Singapore's semiconductor industry to not just adapt to but thrive through the fourth industrial revolution (aka Industry 4.0), organisations need to think beyond how to best operationalise innovation (its "hardware" and "software") to facilitating the necessary cultural redesign ("heartware") required for sustainable change. To create workplaces where the collective behaviours of its people model those that are congruent with a growth-mindset - adaptable, resilient, purpose-driven and empowered to express their ideas, take calculated risks and innovate.

"Culture eats strategy for breakfast" – Peter Drucker

Results from a survey by Bain & Company showed that 68% of leaders acknowledge that culture is the cornerstone of its competitive edge, 9 out of 10 CEOs believe it's the most critical factor after business strategy, 3 in 4 say culture is changeable and they need to change it and yet only 10% succeed in doing so. In this article, we will share four key strategies that you should consider in planning and facilitating your cultural redesign initiatives to optimise buy-in, minimise resistance and effect lasting and meaningful change.

Strategy #1 – Start From The Top

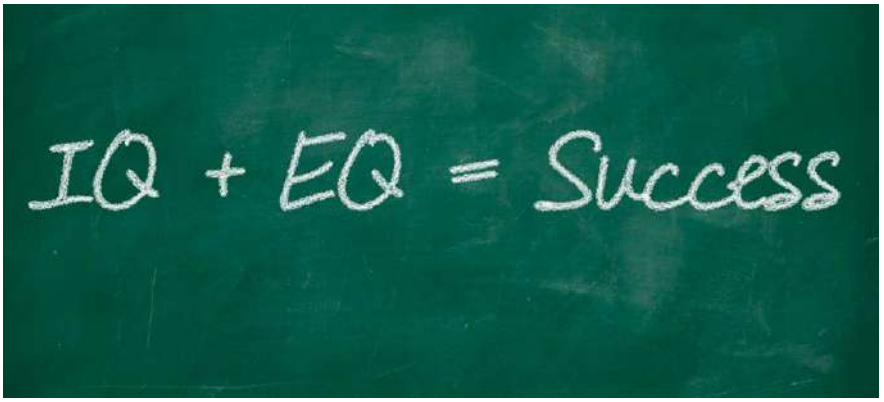
"People may doubt what you say, but they will always believe what you do"
– Lewis Case

When managers who are tasked

with the challenge to improve quality, innovate and elevate productivity face a wall of resistance from their people, there is too often a tendency to point their fingers at their people. Common laments include "people here don't speak up enough", "they just walked past the (quality) warning signs", "the old guard are resistant to change", "they don't follow SOPs". And yet, the most common feedback from their staff attending the cultural transformation workshops is "all our managers need to attend this".

Start your cultural redesign initiative by aligning your most senior leaders on the urgency for change, why the status quo is unacceptable, what the present and desired state of culture is and how the future state will benefit staff, customers and the organisation. Get their buy-in to be models of open-ness and humility and to share with their team "the change starts with me, hold me accountable, I welcome your feedback". Whilst culture takes time to shift, when managers are inspired to lead by example, the change in the way they lead and interact with their people is immediately felt. This fosters a level of healthy open-mindedness that will help you with your rollouts.

Follow up awareness sessions with training on what it takes to be a transformational leader, one skilled in helping inspire, engage, influence and promote innovation in their people. Much like driving, such skills are learned behaviours. Industry 4.0 and the quest to create the "perfect, autonomously automated factory" will challenge every organisation to lift their people's productivity levels and for them to do significantly more with considerably less. Given the finite number of hours to the day, the real opportunity lies in upskilling your managers and to turn them into leaders capable of turning dissatisfied and "satisfied" employees into "engaged" and "inspired" champions of your cause. Research by Bain & Company (Source: "Engaging your employees is good. But don't stop there", E. Garton & M. Mankins, Harvard Business Review, Dec. 2015) shows it takes two-and-a-quarter satisfied employees to produce at the same level as an inspired one!



Strategy #2 – Resource This Initiative The Way You Would For Your Most Important Project

Culture transformation is a marathon, not a sprint. It will typically take three to five years for a new set of core values and behaviours to be firmly entrenched and institutionalised. Just as you do with other significant initiatives, it needs to be treated like a project, with specific outcomes and deliverables, a project organisational structure with clearly defined roles and responsibilities, budget, milestones, timelines and resourced with talent who have a great combination of IQ and EQ. This says to your people that culture is a priority and that leaders care about how their people feel about coming to work and are committed to the journey.

Create a powerful change coalition comprising a group of passionate and trusted change champions who are empowered to plan and drive the transformation with the direction, support and joint sponsorship of the senior operations and HR leader and a steering committee comprising senior stakeholders from cross-functional groups.

Empower these change champions with the skills to model the behaviours reflective of the desired culture and to plan and implement an effective communications strategy that will take people through the four stages of behavioural change – awareness, interest, desire and habit. Given these change champions will typically come from your cohort of top talent, doing this has the added benefit of recognising and equipping them as the future leaders of your organisation.

Engage the services of a competent, experienced external change facilitator who shares your passion for culture change. Firstly, you stand to get an unbiased, unemotional, third-party view of how things actually are. Secondly, your staff will often accept the ideas of a credible external expert even more than those internally who they view as being "part of the problem we're looking to address".

Strategy #3 - Communicate To Create Focus And Move Hearts And Minds

"What you focus on expands".

If all people are seeing and hearing are tasks, shipment targets, deadlines, issues and excursions, they're not focusing on what's most important – the way they do what they do - the desired behaviours, best practice, vision and mission that will lead to a Quality and Innovation first culture. Supplement inspirational, result-oriented townhall presentations and workshops with a consistent stream of creative messaging – innovation fiestas, attention-grabbing posters, quizzes, audio visual presentations and interactive social media-type platforms that stimulate conversations, staff

recognition and ideas. Share success stories of how staff's ideas have been implemented and how this has made a difference. Showcase how your products are making a difference to the lives of the end-consumers and other internal stakeholders in the supply chain.

Break through "sacred cows" – if you are looking at creating a flatter, less hierarchical and more empowered workforce, ditch the "war room" setup that features the boardroom table reserved for senior managers with engineers and specialists sitting in the outer circle for a circle of chairs or cluster of tables. Get rid of that restroom that's reserved only for the SVP.

Empower your managers and change champions with effective public speaking, facilitation and story-telling skills. To facilitate behaviour change, you must first move hearts, then minds, a learned art. You want to have leaders who are skilled with the art of communicating in a way that "puts feelings first".

Strategy #4 - Plan And Celebrate Short-term Wins

Not many organisations and people have actually been through a culture transformation journey let alone a successful one. To strengthen belief, your initial awareness sessions should outline a clear call-to-action that includes small daily and weekly actions that staff can take to realise the desired culture.

"A journey of a thousand miles starts with that first step." – Lao Tzu

To create a more "empowering, innovative" culture, for instance, your call-to-action could be for each staff member to take 10 minutes once a week to raise a suggestion on what could be done to improve quality, yield or staff engagement. And another 10 minutes to recognise a colleague for behaviours that are aligned with your desired culture. Just as importantly, these rituals create the mind-set you seek ("I can make a difference through exercising my voice and being proactive), builds discipline and over time turns desired behaviours into habits. Research shows it takes between 21 and 66 days to turn a new practice into a habit.

A clear, specific, actionable plan helps the team get started. A simple yet powerful reward and recognition system that is regularly refreshed is what will accelerate and sustain positive momentum.

"People will naturally do more of what they associate great pleasure with".

Most organisations have a recognition system of one kind or another. **The key is to design it in a way that delivers a memorable, positive experience for the receiver.** A timely, unexpected and sincere pat in the back done publicly is much more memorable than a $50 award deposited into one's bank account. This requires both a mindset and skill-set change. The mentality of managers to focus on and celebrate what's working well and rather than dwell on disempowering fault-finding and the blame game. Warning letters and public rebukes, so often a feature of transactional "Industry 2.0" manufacturing management is often at the root of slow, passive and reactive cultures. The "5 Whys", designed to facilitate learning and continuous improvement has, through implementation that is incongruent with the intent of the principle only resulted in fear and learned helplessness. This fear of failure and the deep psychological wound that comes from the fear of rejection from "not being good enough" can be overcome with the help of empathetic servant leaders skilled with the art of coaching and giving feedback in a way that empowers the recipient to "fail and learn fast" and who willingly want to do what's right even more.

For Singapore to be a truly global powerhouse in semiconductor innovation and manufacturing, its leaders need to recognise that the "genius with a thousand followers" model of leadership is incompatible with the accelerated pace of change demanded by Industry 4.0. The mind-set and human operating system that took us where we are today will not take us to where we seek to be. The cultural redesign required for Industry 4.0 presents a significant opportunity to dramatically elevate innovation, big picture thinking, customer centricity and quality. But the greatest benefit we stand to gain by creating organisations with "a thousand leaders" lies with the consequent elevation of human consciousness, personal well-being and happiness at work – true nation building. The journey may be driven by the pragmatic need to stay relevant, and will be long and challenging, and from experience, possibly the most fulfilling, profound and meaningful of endeavours you and your team will undergo in your career.

ABOUT THE AUTHOR

Dominic Siow is the co-founder and principal consultant of EQ Strategist. Since 2006, he and his team have helped transform culture, develop leaders and deepen collaboration in over 136 organisations across the Asia Pacific region. This includes multi-year projects with semiconductor foundries to create a Quality-first and Innovation mindset and integrate diverse cultures. Born and bred in Malaysia, he has lived in Sydney, Australia since 1983. Prior to his present vocation, he worked in the IT industry for 19 years and held senior roles at IBM and grapeVINE Technologies. He is the author of the book "What's GREAT about this? How to be Resilient and Thrive through disruption and change".

www.eqstrategist.com

THE SEMICONDUCTOR INDUSTRY'S TONY STARK

It is the start of a new decade, one in which new technologies will continue to dramatically change the way people live, work and play.

From autonomous vehicles and quantum computing to next-generation 5G and AI, the future is being redefined.

At the core of this automation revolution is a quiet but critical driver, the microchip - the key enabler of modern technologies and technology-driven growth.

Over the last 50 years, semiconductors have underpinned Singapore's success. Today, we are writing a new future for the sector as we move up the value chain. Core to this new future are key investments, including in research and attracting passionate, driven and skilled school leavers and professionals into the sector.

As we enter 2020, Singapore Semiconductor Industry Association (SSIA) and the Economic Development Board (EDB) will embark on a campaign to tell the untold stories of the microchip and its heroes, from chipmakers to scientists, to inspire school leavers and showcase the current and future potential of the sector.

Tony Stark In the Semiconductor Industry

But We Need Your Help

Do we have our own Tony Stark?

Who are the creatives and geniuses in Singapore and around the world redefining how we work, and embracing new approaches and tools as they lead the way into the future?

Who are the role models in the sector that inspire you?

Who are the leaders and revolutionaries breaking new ground?

Help us find them – and tell their stories.

If you know or have read of someone worthy of being held up as a hero, drop us an email at secretariat@ssia.org.sg, telling us who they are, where they work, why you consider them a hero, and their contact information, if possible.

The wave of new technologies presents an inflection point for Singapore's semiconductor industry in 2020.

OPTIMISM IN SEMICONDUCTOR SECTOR

Expansion remains on the cards for the semiconductor industry in the long term, both globally and for Singapore, according to the boss of NexGen Wafer Systems. Chief executive Cheung Ting Kwan told The Straits Times that industry growth has been stable over the last decade and even with the slowing economy in the past year, it is forecast to continue its steady climb.

Mr Cheung's firm - a homegrown enterprise with 53 staff - develops and manufactures semiconductor wafer process equipment.

This equipment adds circuitry in a step-by-step process to semiconductor wafers in a wafer fab plant - a specialised factory where raw silicon and other materials are transformed into microchips that run everyday electronic devices.

Mr Cheung said: "For the last two years, our industry funding in China has slowed down for various political and economic reasons." This is a "big factor" in the decline of overall semiconductor revenue globally.

"For our customers outside of China, however, most remain pretty robust."
He added that his Singapore-based company is expecting a number of customers to increase their capital equipment investment next year.

"Some will be looking for an increase in production capacity; others will be (going) for the upgrade of existing production lines for newer products and technologies," he said.

Mr Cheung forecasts double-digit revenue growth next year, and for the following three to five years.

Technological Change

The consumer electronics industry is in the process of adopting 5G and Internet of Things. Consumer electronics tends to be more up and down in cycles, but when it is up, it drives very high volume very quickly.

Chok Yean Hung, Group Chief Executive officer at AEM Holdings

"With the slowdown in China and nationalism on the rise, we have seen European, American and Japanese companies putting more investment for manufacturing in their home countries again..."

"NexGen has established its footprint in these three areas, and we are in a good position to benefit," he said.

Beginning Of New Technological Cycle

According to World Semiconductor Trade Statistics, the global semiconductor market is expected to grow 5.9 per cent next year after an estimated 12.8 per cent decline this year.

Ang Wee Seng, SSIA Executive Director

The call echoes similar predictions by global industry association Semi and consultant International Data Corporation.

The upswing next year is tipped to be the beginning of a new technological cycle.
In a recent LinkedIn article, Microsoft president Brad Smith and senior communications director Carol Ann Browne wrote: "We enter a new decade with an increasing capability to rely on machines with computer vision, speech recognition and language translation, all powered by algorithms that recognise patterns within vast quantities of digital data stored in the cloud."

The 2020s will likely see new developments that will further transform the use of technology around the world, including the increasing use of quantum computing, digital data storage in the cloud and advanced connectivity through expansion of the 5G network, further empowering the Internet of Things and AI. The wave of these new technologies presents an inflection point for Singapore's semiconductor industry.
The wave of new technologies presents an inflection point for Singapore's semiconductor industry in 2020.

The sector contributes about 7 per cent to 8 per cent to the annual gross domestic product and supports around 35 per cent of the manufacturing workforce.

Mr Chok Yean Hung, group chief executive officer at Singapore-listed AEM Holdings, said that even though infrastructure, workforce skills and productivity will continue to be critical to competitiveness in the years ahead, low-cost labour alone will not be enough. "With a good pool of talents as a backbone, we should see Singapore's semiconductor industry evolving from labour-intensive value-add to technology-driven value-add with the heightening of automation and data-centric engineering riding on Industry 4.0," he said.

Mr Ang Wee Seng, executive director of Singapore Semiconductor Industry Association, said companies need to prepare for the demand spike.

"One way to address this surge is to ensure higher productivity in manufacturing lines, and this could be done by starting to implement productivity projects now, pushing for better automation, and ensuring the workforce is ready too," he said.

SOURCE OF CONTENTS:

Straits Times

Sue- Ann Tan
Optimism in semiconductor sector (DEC 27, 2019)

https://www.straitstimes.com/business/economy/optimism-in-semiconductor-sector

Sue- Ann Tan, Ovais Subhani
Factory output drops in Nov amid low demand (DEC 27, 2019)

https://www.straitstimes.com/business/economy/factory-output-drops-in-nov-amid-low-demand

CREATING A MORE VIBRANT SEMICONDUCTOR INDUSTRY

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SSIA
Singapore Semiconductor Industry Association

DENSELIGHT SEMICONDUCTORS TO EXPAND IN SINGAPORE AND CHINA FOLLOWING TRANSFER OF OWNERSHIP

Homegrown photonics integration technology company DenseLight Semiconductors (DenseLight or the Company) has begun a new chapter as an independent organisation, following its divestment by TSX Venture Exchange-listed POET Technologies Inc. (POET) to DenseLight Semiconductor Technology (Shanghai) Co., Ltd (DL Shanghai) for a total consideration of USD26 million. This comes three years after its acquisition by POET, during which it was able to expand its market presence in China and the US. The company recorded a year-on-year revenue growth of 29% in 2017 and 39% in 2018. It is on track to surpass this growth in 2019.

Advised by the China Prosper Group, DL Shanghai shareholders are a consortium of industry players and investors in technology and communications, including Dynax Semiconductors and other leading advanced electronic component, product and system companies in China.

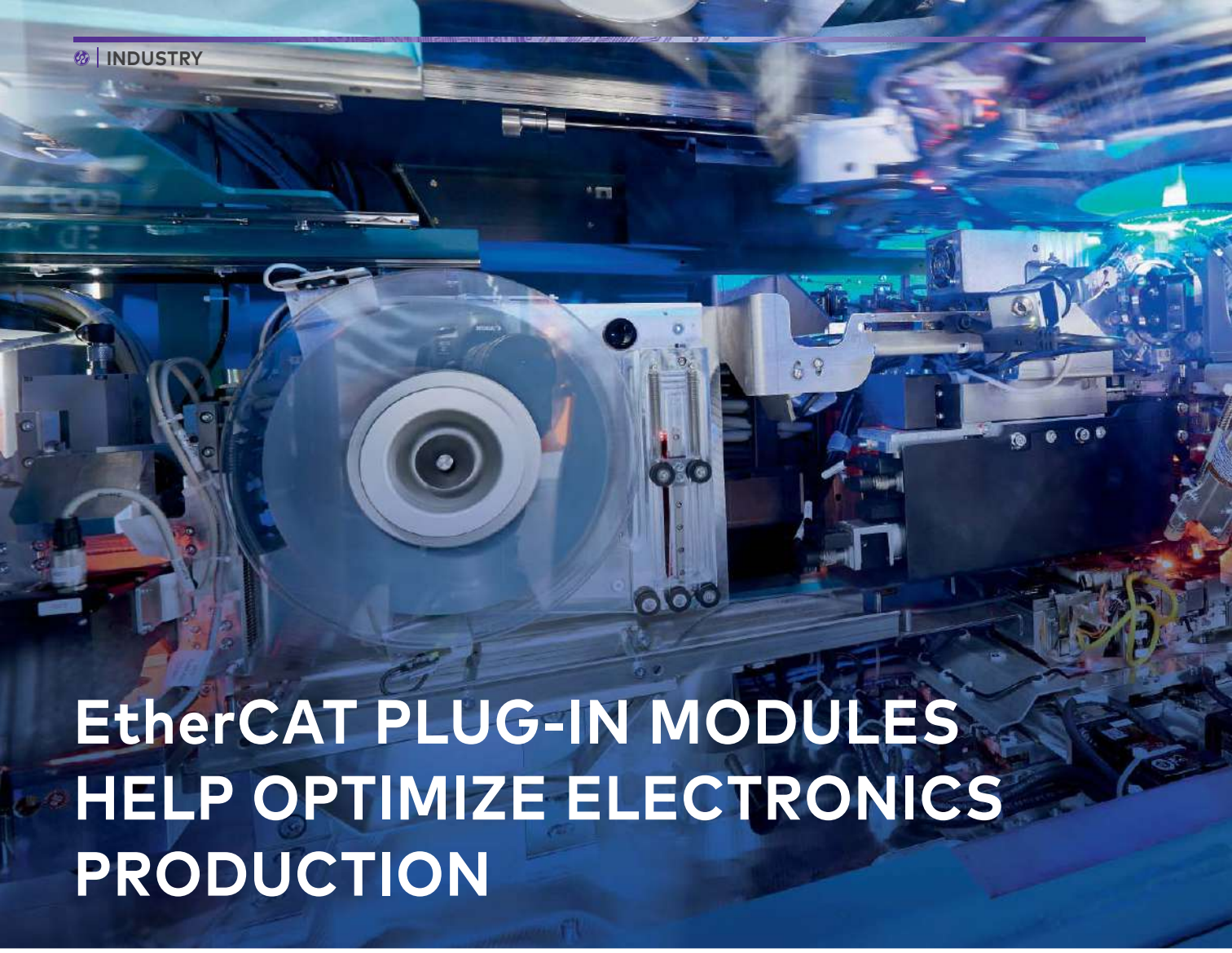
Commenting on the transaction, Rajan Rajgopal, President and CEO of DenseLight Semiconductors, said, "DenseLight was founded about 20 years ago from a breakthrough in photonics integration and is considered one of the pioneers in indium phosphide technology. Over the years, we have been working hard to realise our vision of becoming a global leader in providing innovative integrated photonics solutions that enable our customers to excel and win in the sensing and data communications markets. The support of our new shareholders brings us another step closer to realising this vision."

The change in DenseLight's ownership brings with it several positive implications. As part of the terms of the transaction, DenseLight and POET have also entered into a preferred supply and strategic cooperation agreement, which will see the Company maintaining an ongoing relationship with POET. The support of the new shareholders will afford DenseLight more resources to strengthen its balance sheet, and enhance its capabilities and talent pool. This will further enable the Company to expand its participation in the photonics value chain through further investments in Singapore and China. The expansion into China will bring DenseLight closer to a significant part of its customer base, and increase its flexibility and responsiveness in delivering customised solutions within a shorter time frame and at better value. DenseLight's management, which has been steering the company for nearly three years, will remain unchanged, and this will place it in a good position to deepen its existing relationship with customers and acquire new ones.

Following the transfer of ownership, plans in the pipeline will include the upgrade and expansion of its Singapore facility to support its commitment to its worldwide customer base, as well as the future construction of an assembly and testing facility, followed by a high-volume wafer fabrication plant, in China.

SOURCE OF CONTENTS:

DenseLight Semiconductors



EtherCAT PLUG-IN MODULES HELP OPTIMIZE ELECTRONICS PRODUCTION

Customer-specific I/O Level Promotes Highly Efficient Machine Construction

Customer-specific I/O Level Promotes Highly Efficient Machine Construction Mühlbauer GmbH & Co. KG based in Roding, Germany, builds specialized machines used in the fields of chip card and passport production as well as in the semiconductor industry. The EJ series EtherCAT plug-in modules, in conjunction with a customer-specific signal distribution board, ensure significant reductions in errors and the time required to manufacture machines. This also results in reduced manufacturing costs and accelerated delivery times for the new DS Merlin die-sorting system.

Martin Dimpfl, Head of Electronic Engineering in the automation division, explains: "The automation division at Mühlbauer focuses on machines for semiconductor finishing, RFID and tag manufacturing, ID card and passport production, personalization machines for documents and bank cards, as well as complex inspection systems. This includes the new DS Merlin die-sorting system, which can process up to 30,000 dies per hour – including complete vision inspection for possible defects.

In addition to the considerable increase in throughput from 20,000 to 30,000 chips/hour, simplified machine setup and operation, as well as improved wafer handling, it was also possible to reduce costs by 20 percent compared to the previous machine model. The standardization of the I/O system with EtherCAT plug-in modules from Beckhoff was a key contributing factor to these achievements."

In the DS Merlin, numerous complex processing workflows could be implemented in space-saving design.
Picture credits/Copyright:
Beckhoff Automation

The DS Merlin can process microchips up to a size of 0.2 x 0.4 mm and a thickness of 80 µm with maximum precision and speed. The respective wafer is measured, and the placement or size of the individual chips is recorded. The machine then automatically corrects the transfer of the semiconductor devices to the individual pick-and-place units. The advantage, Dimpfl says, is that "up to now, all this had to be implemented by the machine operator via teach-in. This whole effort has been eliminated."

Modular And Compact Machine Designs

The machine is divided into different function modules. The automatic wafer changer first transports the wafer onto a table and then transports the processed semiconductor wafers back into a wafer cassette.
The wafer table expands, rotates and moves the wafer during production. It then positions the wafer in such a way that the following die ejector (chip removal unit) can transfer the individual microchips to the upper of two inspection wheels, where the wafer film is held in position by a vacuum around the die ejector needle. All six microchip sides are 100 percent checked on the two inspection wheels. A counting module then positions, transports and seals the belt with the chips placed in it with the cover band and carries out final inspections. Once the desired quantity has been reached, the belt is cut off.

This advanced machine was designed to be highly modular and compact, says Dimpfl. "For this reason, four different signal distribution boards with EtherCAT plug-in modules are used in the DS Merlin, for example. The main reason for introducing the new I/O concept was the significantly reduced wiring effort. This has a very positive effect on error reduction and, above all, on manufacturing time and costs."

With up to 30,000 dies per hour, the DS Merlin die-sorting system from Mühlbauer can process significantly more semiconductor components than its predecessor model.
Picture credits: Beckhoff Automation

Maximum I/O Installation Efficiency Using EJ Modules And Custom-designed Boards

The four signal distribution boards are precisely matched to the Mühlbauer machine's requirements and, according to Martin Dimpfl, go far beyond simple I/O signal distribution. In addition to the EJ modules, EtherCAT Servo Drives for piezoelectric and piezo-ceramic motors, flashlight controllers and logic for vision applications, as well as the complete 24/48 V voltage distribution are also included. A total of 26 EtherCAT plug-in modules are used, with digital and analog inputs/outputs as well as an incremental encoder interface, stepper motor module and bus power supply unit. "Our goal was to minimize the wiring effort within the machine and to place the

signal distribution board as close to the respective components as possible. This results in an extremely compact design, and the complete wiring and testing of the unit can be carried out in the pre-assembly phase. Thus, the times for testing, production and commissioning are reduced throughout," Dimpfl points out.

"With the comprehensive product portfolio from Beckhoff, the right control solution is available for every machine process. In addition, EtherCAT plug-in modules add another advantage to the time savings and error reductions mentioned above. Through consistent support for EtherCAT communication, they can be easily combined with the wide range of available EtherCAT Terminals. This increases our flexibility immensely, as additional customer requirements – such as the integration of special sensors or special test systems – can be implemented quickly and easily based on the same basic machine," Dimpfl summarizes. The signal distribution board can also be designed and manufactured in-house by the customer, as a service from Beckhoff or via a third-party company.

Advantages Even For Small Series Production Starting At 10 Machines

As a specialized machine manufacturer, a modular system is indispensable for Mühlbauer because this is the only way to achieve the necessary standardization needed to use basic assemblies efficiently in different machine types, and to eliminate the need for a complete redesign for each machine. Martin Dimpfl explains: "According to our calculations, the use of EtherCAT plug-in modules – including the development of the signal distribution board – already returned the investment for a small series of around 10 machines per year. As the functionality of the boards is fully tested in advance, we achieve an enormous reduction of the error rate during assembly, resulting in smooth commissioning. In the case of the DS Merlin, this saves approximately 100 hours of installation time, plus additional time saved that was previously spent on troubleshooting and debugging. Accordingly, we will successively convert all relevant machine types in our portfolio in the future, which comprises more than 200 systems with more than 10 machines per year, to the Beckhoff EJ system."

ABOUT THE AUTHOR:

STEFAN ZIEGLER
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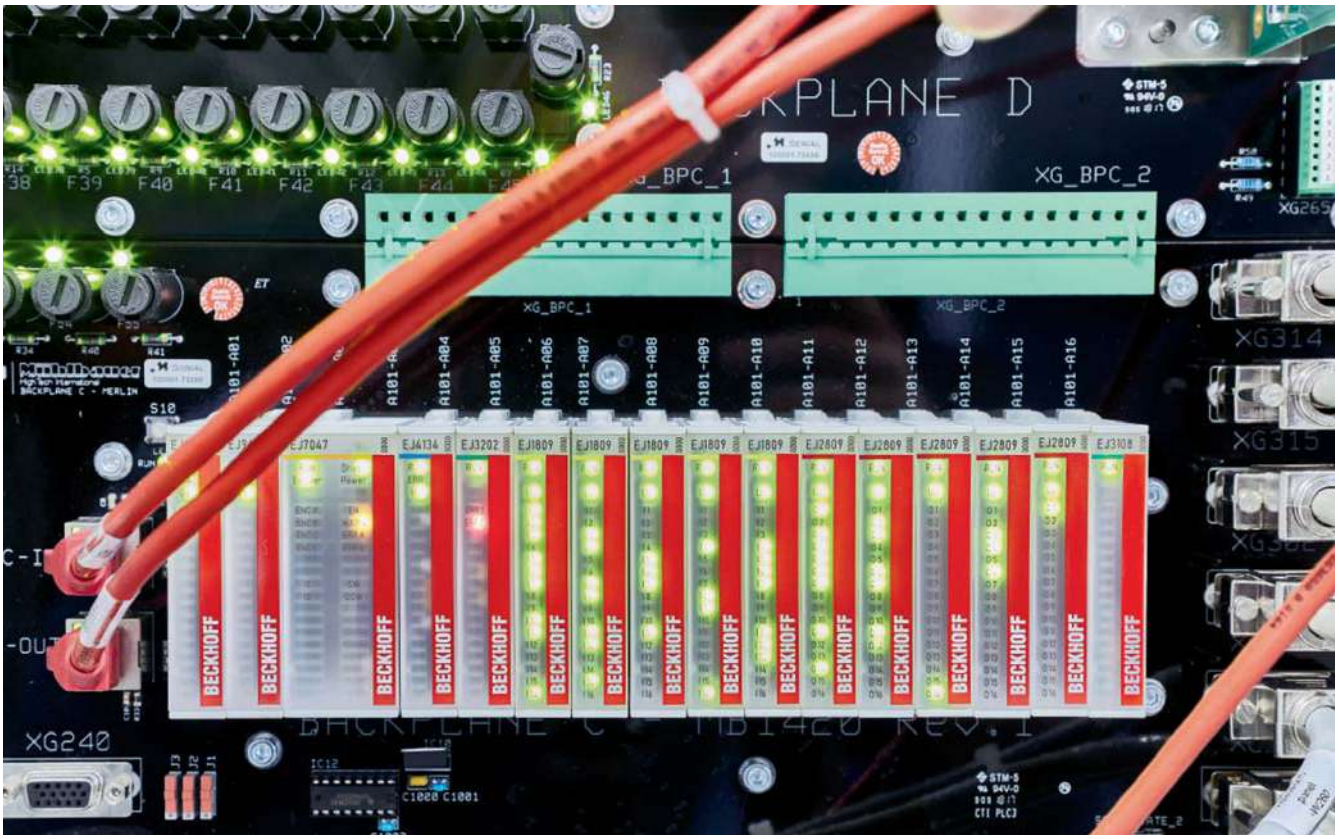

The EtherCAT plug-in modules from the EJ series can be used in combination with the appropriate signal distribution board to efficiently implement application-specific I/O systems. Picture credits: Beckhoff Automation

AN OVERVIEW OF FAILURE ANALYSIS AND RELIABILITY ASSESSMENT OF ADVANCED SEMICONDUCTOR TECHNOLOGY NODES IN SINGAPORE

Introduction

In today's advanced semiconductor technologies like sub-10nm FinFET, emerging memories like STT-MRAM and emerging new computing architectures like neuromorphic computation, failure analysis and reliability of such devices and circuits are challenging. Conventional approaches using optical means for fault isolation in integrated circuit failure analysis (ICFA) have reached their physical limit in isolating sub-14nm devices effectively for further in-depth failure analysis. Similarly, new methodologies and standards have to be established to provide comprehensive reliability assessment for emerging technologies like spin transfer torque magnetic random access memory (STT-MRAM) and neuromorphic computing circuits. As such, new ICFA techniques and reliability assessment methodologies have to be developed to ensure the state-of-the-art semiconductor technologies are adequately and appropriately analyzed and qualified in time to meet industrial demands.

Melting Pot of Expertise

In addition to our current contribution to the world semiconductor wafer and substrate fabrication and production, equipment manufacturing and packaging, Singapore has been playing a key role in the area of ICFA and reliability over the past 3 decades. Our ICFA and reliability scientists and researchers have contributed significantly to the scientific progress and technological advancements in ICFA and reliability, and have made their presence felt at the global stage. Besides representing their host institutions and companies in Singapore, as chair or members of advisory boards, organizing or technical committee at the world renowned semiconductor reliability / failure analysis related international conferences and meetings such as IEEE IEDM, IRPS, ECTC, ESREF, ISTFA, IPFA, EPTC etc., they have provided a significant imprint in the research and development of ICFA and reliability by contributing to scientific discovery and know-hows by publishing their research outcomes regularly, giving invited talks and conducting tutorials.

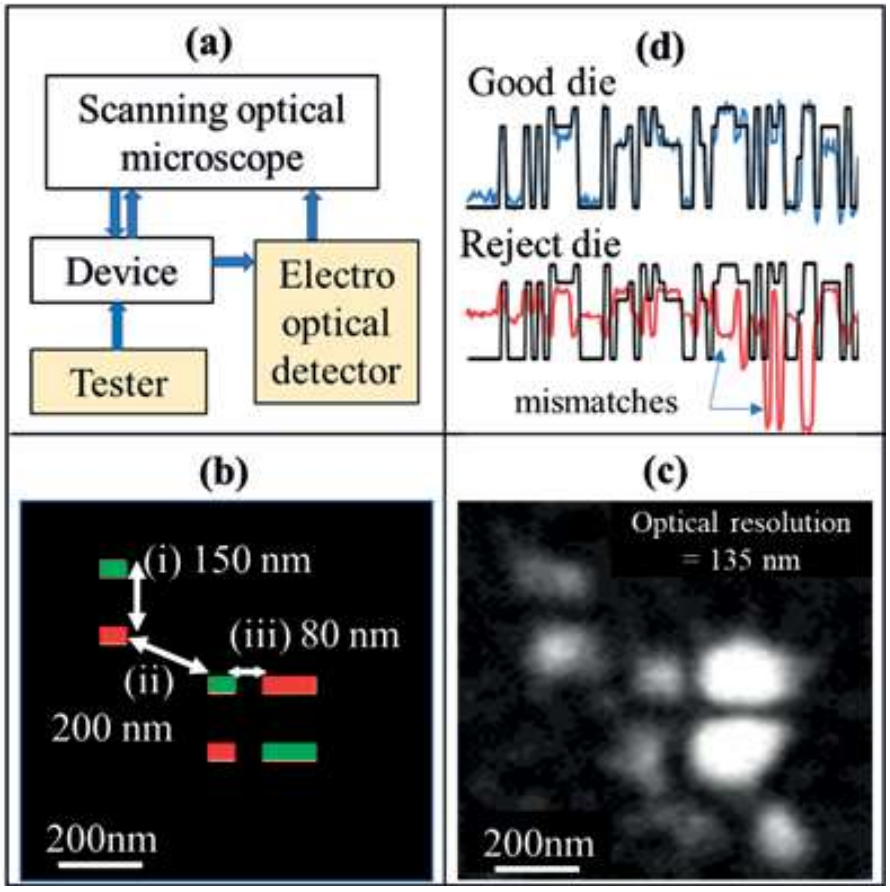

Figure 1 – (a) Schematic of the electrooptic prober. Electrical signals are supplied to the device with automated testers and electrooptic probing performed with the scanning optical microscope. (b) The layout of a sub-20 nm FinFET device under inspection. The distances between neighboring transistors are (i) 150 nm, (ii) 200 nm and (iii) 80 nm, respectively. (c) Micrograph shows electro-optic frequency mapping. The state-of-art tool's optical resolution is 135nm but can be seen to resolve better than 80nm electro-optically [1]. (d) Optical Fault Isolation on FinFETs performed with the aid of simulations using a newly developed fault isolation technique between AMD Singapore and SUTD. The simulations match signals from good dies (blue tracers) and mismatch with rejects (red traces), through which individual nanoscale transistor with defects can be isolated for root cause identification.

As early as 1989, an International

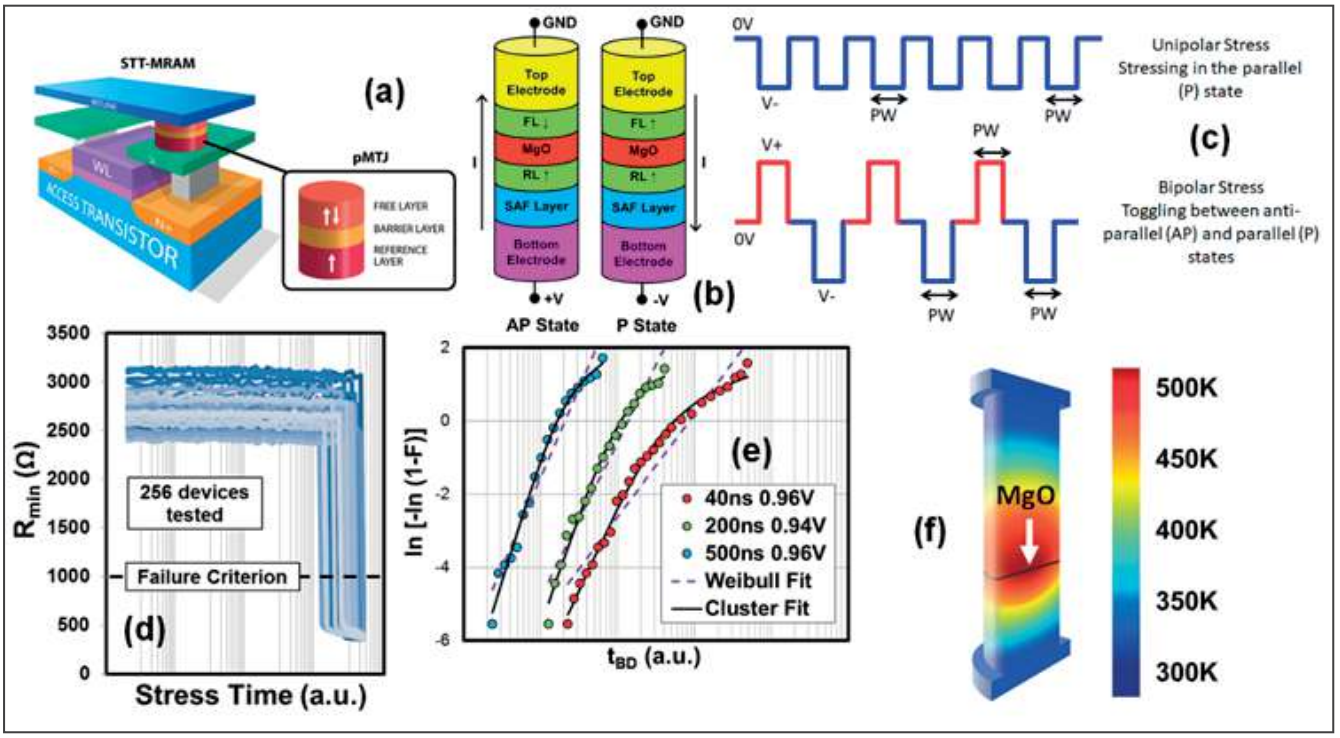

Figure 2 – (a) Advanced structure of STT-MRAM in series with the access transistor. (b) Detailed stack of the STT-MRAM with a complex sandwich of metal layers in the stack including free layer, reference layer, SAF layer etc. (c) Pulse voltage waveform used for unipolar and bipolar stressing of the MgO dielectric. (d) Trend of catastrophic drop in resistance of the parallel spin state for an array of 256 devices tested. (e) Plot showing the relevance of the defect clustering model for time to BD of MgO in comparison to the standard Weibull model and (f) Thermal simulations showing the self-heating effect in STT-MRAM devices which can enhance the local temperature by up to 150-200 °C [2, 3].

Symposium on the Physical and Failure Analysis of Integrated Circuits was started by an interest group of faculty members from NUS and industrial practitioners in Singapore. IPFA conference, organized by the IEEE Singapore EPS/EDS/Rel Chapter, has now evolved to be one of the world top 4 conferences and continues to be the premier semiconductor FA and Reliability conference in this region alternating between Singapore and Asia Pacific (China, Taiwan, India and Korea) which has significant footprint in semiconductor technology advancement. In conjunction with IPFA, a sister conference called Electronics Packaging Technology Conference (EPTC), which is also organized by the IEEE Singapore EPS/EDS/Rel Chapter, focusing on packaging covering key aspects of failure analysis of advanced packaging technologies started in 1997 and has become another anchor meeting in Asia Pacific annually for the packaging community. Both IPFA and EPTC draw in about 500 participants annually, illustrating the important role of Singapore in these critical domain areas of advanced semiconductor technologies.

Talent and Technology Development and "Center for Excellence"

Despite our small community of ICFA and reliability in Singapore, Singapore is able to contribute significantly to the technology and talent development of ICFA and reliability internationally. Many semiconductor companies including Infineon, Qualcomm, AMD and Xilinx have significant FA Lab presence in Singapore, even though the manufacturing and production are based elsewhere in the region. Through various collaborative platforms like Economic Development Board Singapore sponsored Industrial Postgraduate Program (IPP), semiconductor companies in Singapore have been actively recruiting talent and engaging in state-of-the-art research and development on ICFA and Reliability with universities including SUTD, NUS and NTU. This collaborative approach has generated significant technological intellectual properties for most advanced semiconductor technologies.

As a good example in ICFA, an electro-optical fault isolation technique has been successfully developed to resolve sub-14nm start-of-the-art devices by correlating the optical probe signal and that of an electrical response. Figure 1 shows one of the developed capabilities

between AMD Singapore and SUTD that the electro-optical response profiles of nano-scale FinFET devices are clearly distinguished and resolved for more advanced in-depth analysis. This fault isolation technique is the most advanced of its kind and together with simulated response profiles of the propagated signals, defective devices which are in a few tens of nanometers and are much smaller than the probed wavelength can be "spatially" resolved for root cause identification. Such achievement clearly shows that Singapore has the expertise, capabilities and advanced technologies to stay relevant and forefront at the international stage.

Another key example from a reliability domain is our recent work focusing on the reliability assessment of STT-MRAM which is a non-volatile data storage device that is poised to replace Flash, PCRAM and possibly RRAM in the near future due to its very high endurance and integration density. STT-MRAM comprises an ultra-thin MgO dielectric which is about 1 nm thick and the dielectric breakdown of this layer can cause catastrophic failure of the device and its array as well. Under another EDB-sponsored IPP collaboration between SUTD and GlobalFoundries Singapore, a project focusing on examining the 1nm MgO reliability in state-of-the-art STT-MRAM devices under various new operating conditions was developed. Several new findings have been reported recently from this IPP partnership which provided new reliability assessment methodologies for modelling and predicting polarity dependence TDDB and incorporating significant self-heating effect on area scaling in these nanoscale cylindrical devices as shown in Figure 2. Non-standard defect clustering model was formulated and applied to predict and extrapolate the time-to-failure of the STT-MRAM stacks at field use. The key results were presented at the recent IEEE IEDM and IRPS conferences in US and used for technology qualification. This example illustrates another very successful and unique tripartite partnership model among wafer fab industry (GlobalFoundries), government agency (i.e., EDB) and university (SUTD) in Singapore in advancing reliability research in advanced semiconductor technologies. Such tripartite partnership model is hardly seen elsewhere.

Looking Ahead

The aforementioned two examples show that Singapore ICFA and Reliability community is able to provide leadership in technological innovation and development of new ICFA techniques and reliability assessment methodologies to position Singapore as a hub or even a "Center for Excellence". With further initiatives from the government agency, industry and academia, we should aim to further leverage on such tripartite collaborations to spearhead new innovations in the ICFA and reliability domain by cross fertilization of ideas, enabled through a common efficient exchange of talent and resources through several education / research / training programs.

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ENERGY SAVING IN THE SEMICONDUCTOR INDUSTRY

Energy prices have been in the doldrums and will only increase. That is set to change. Significant savings can be reaped by changing current practices in HVAC and process cooling system maintenance, before the inevitable increase in energy costs.

The semiconductor industry is one of the biggest users of electricity. According to a 2018 McKinsey report, energy costs account for 5 to 30 percent of fab operating expenses. While energy efficiency has previously taken a backseat due to the low pricing climate, the inevitable uptick in electricity tariffs will have a significant impact on the bottom line.

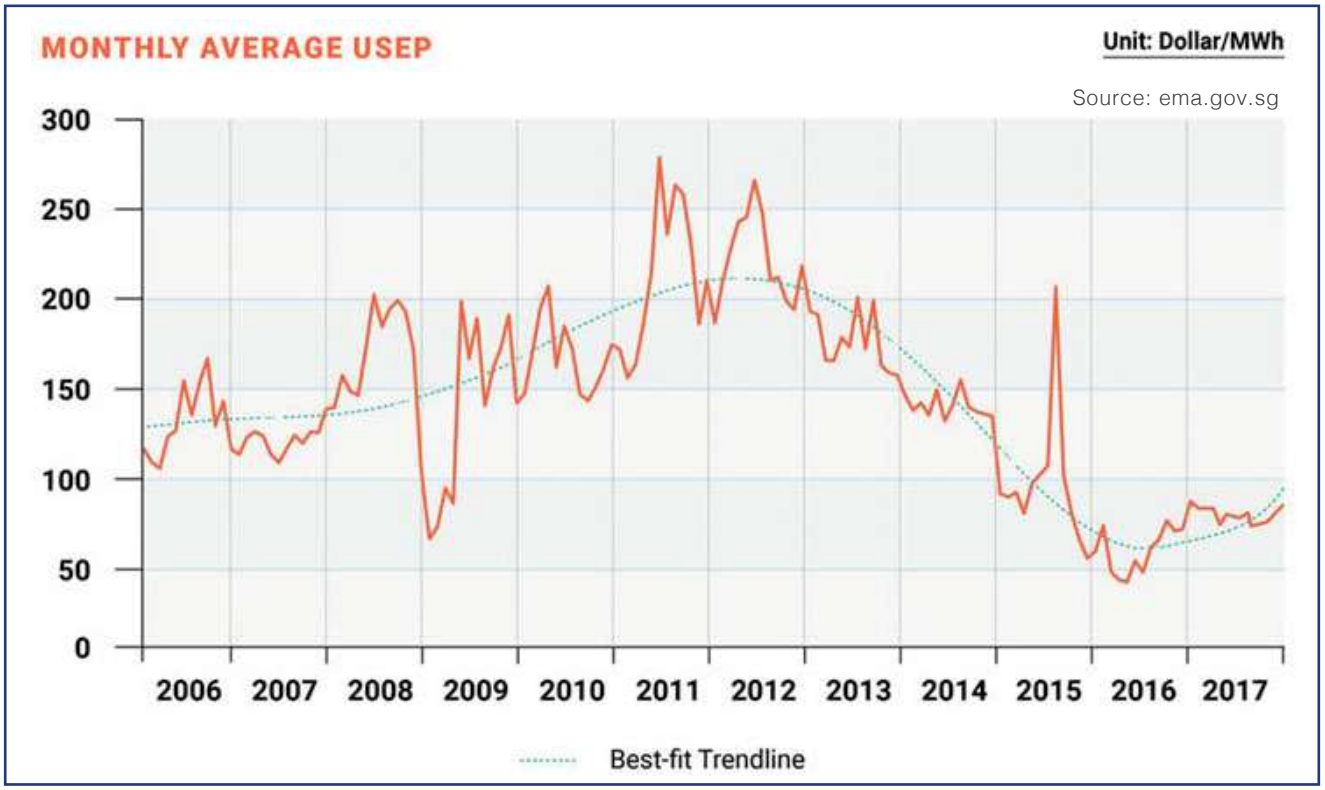
The graph 'Best-fit Trendline' illustrates the half-hourly energy price in the Singapore Wholesale Electricity Market over the last decade. We are clearly enjoying some of the lowest energy prices possible.

The historical low prices were a combination of significant generating capacity coming on-stream starting from 2013, together with declining oil prices. Electricity prices reached an all-time low in 2016 when oil prices were trading at US$ 26 per barrel.

According to a November 2019 Straits Time report, the peak supply capacity is now believed to be double its peak demand. Some reports even suggest that proceeds from electricity sales are not enough to cover costs of fuel, maintenance and financing.

As the energy market returns to equilibrium, and oil prices increase, energy prices will only further increase in the medium to longer term. Energy prices have already increased over 40% since the lows of 2016. This exerts downward pressure on bottom lines in the semiconductor industry, which are heavy users of energy.

Of the amount fabs spend on electricity, HVAC and process cooling makes up the bulk of this cost. Our experience in non-fab settings tells us that HVAC cooling costs typically make up between 60-70% of total power consumption in commercial settings, and 50-60% in other industrial settings. Because of this, facilities managers pay special attention to the chiller plant efficiency. The energy-efficiency of your chiller plant depends firstly on the efficiency built into your chiller plant, and secondly on the effectiveness of your maintenance regime to keep your chiller plant operating at peak efficiency.



Widely adopted industry practices typically use a combination of chemicals – to minimise building up of heat transfer-impeding scaling, corrosion and biofouling, throwing away water to manage mineral concentration, and mechanical methods to remove some of the inevitable scaling build-up.

Current practices, however, still cannot prevent a slow deterioration of system efficiency due to scaling build-up elsewhere in the system, at least until an annual shut down for cleaning happens.

Electrolysis – An Alternative & More Effective Way To Treat Cooling Tower Water

While chemical methods work by increasing the ability of water to hold more minerals, electrolysis method actively removes the culprits from the water. Not only does this prevent scaling, but it also allows for existing scales to dissolve back into the water, removing existing scales.

Chemical methods also typically require users to decide between trade-offs of scaling, corrosion and bacteria control. With electrolysis methods, there is no such trade-offs.

The Technical Principle

As water evaporates from cooling tower to remove heat, scaling mineral content is left behind. Beyond certain concentration, these minerals precipitates and forms scales on chiller and piping, robbing energy efficiency.

Because electrolysis directly removes scaling minerals in water, there is almost no need to throw away water for the purpose of keeping mineral concentrations low.

As such, electrolysis can improve COC to 60, from the current Gold Standard of 8 to 10. A six-fold increase. Cycle of Concentration (COC) is a measurement of how many times water can be used before it has to be blown down from the cooling tower.

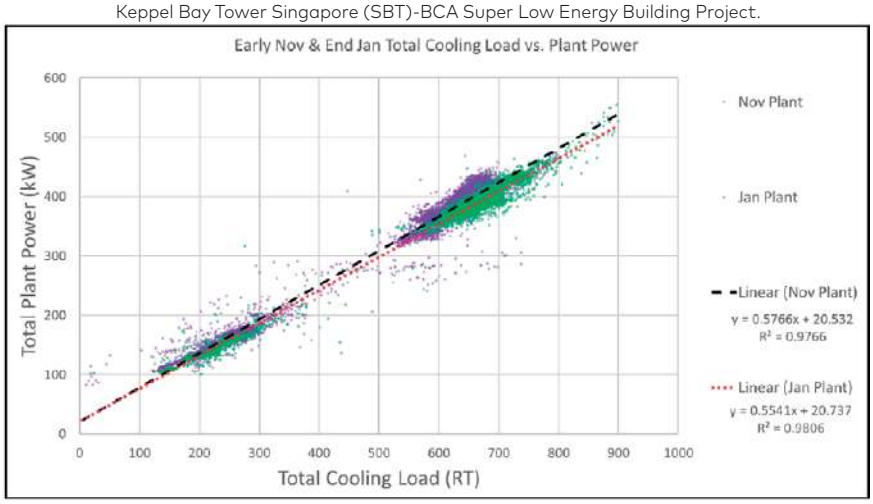
The product DeCalon (DCI) is one such product using electrolysis for targeting scaling. It is specifically designed to address inefficiencies in current standard practices for maintenance. Specifically, there are 3 savings DCI target: Energy, Water, Chemicals, while greatly simplifying maintenance.

Conclusion

Energy costs for HVAC and process cooling make up a substantial portion of operating costs. With energy costs at a historical low, it will only eat further into bottom lines as energy markets return to equilibrium.

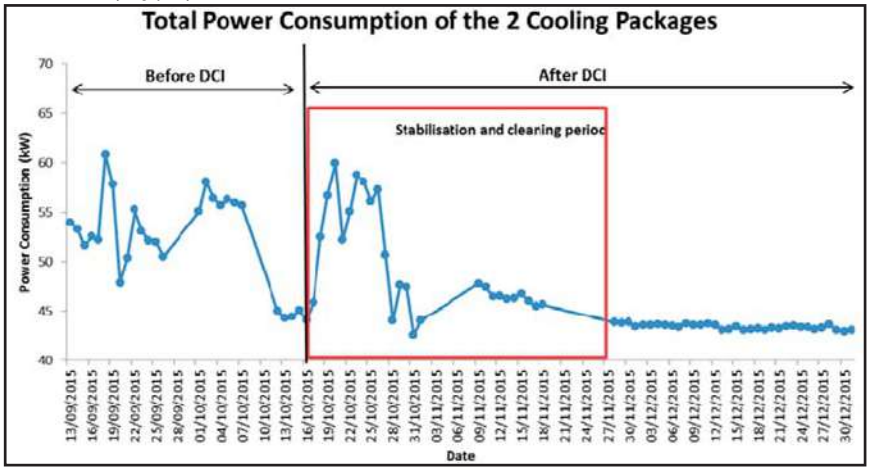
Field Results of Decalon

Keppel Bay Tower Singapore (SBT)-BCA Super Low Energy Building Project.



KBT Energy Consumption Trend Results: 1. Chiller Power saving: 4.0% @ 70% load (still improving); 2. Blowdown Water Saving: 81.4%; 3. Efficiency: 0.505 kW/RT, Nov'19 (baseline) and 0.485 kW/RT, Jan'19; 4. Bacteria Control (CFU/ml): Legionella: Not Detectable, Heterotrophic< 300, average)

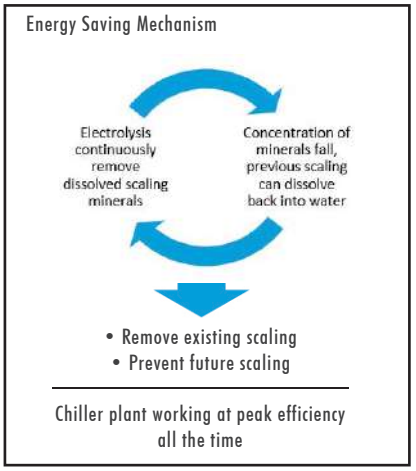
SimTech A*STAR (Singapore)



Results: Power Saving: 17.4%

SOURCE OF CONTENTS

Deston Plastics Pte Ltd (Authorised Distributor of DeCalon)
Contact person: Mr. LIM Wei Yang
weiyang.lim@deston.com.sg

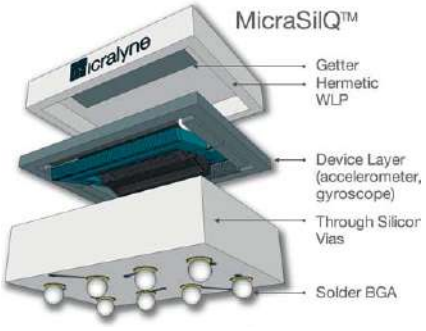


MOST EFFECTIVE TEST FLOWS ENABLED BY WAFER LEVEL TEST

REVOLUTION OF PACKAGING TECHNOLOGY IS SETTING CHALLENGES FOR MEMS TEST

Advanced packaging technologies like Wafer Level Chip Scale Packaging (WL-CSP) and System in Package (SiP), enabled by 3D stacking continue to evolve in the semiconductor industry. These new technologies are now enabling the sensor industry to take advantage of wafer level packaging technologies.

This doesn't mean just new package types but also provides challenges in test and calibration of sensors. Traditional JEDEC-tray based handling with multiple pick & place operations are facing limitations to handle miniature sensors, enabled by wafer level packaging. For magnetometers, package layout 0.8 mm x 0.8 mm is already common and other sensors are following in the same direction.



Principle of WL-CSP

Micralyne Inc. https://www.micralyne.com/technology-platforms/micrasilq/

There is a continuous need for high throughput and reduced cost of test. In the sensor industry, it is important to utilize the benefits of CSP not only in the packaging process but also in material handling and test.

To achieve the continuous need for cost reduction, high throughput and reliable operation new test methods are required.

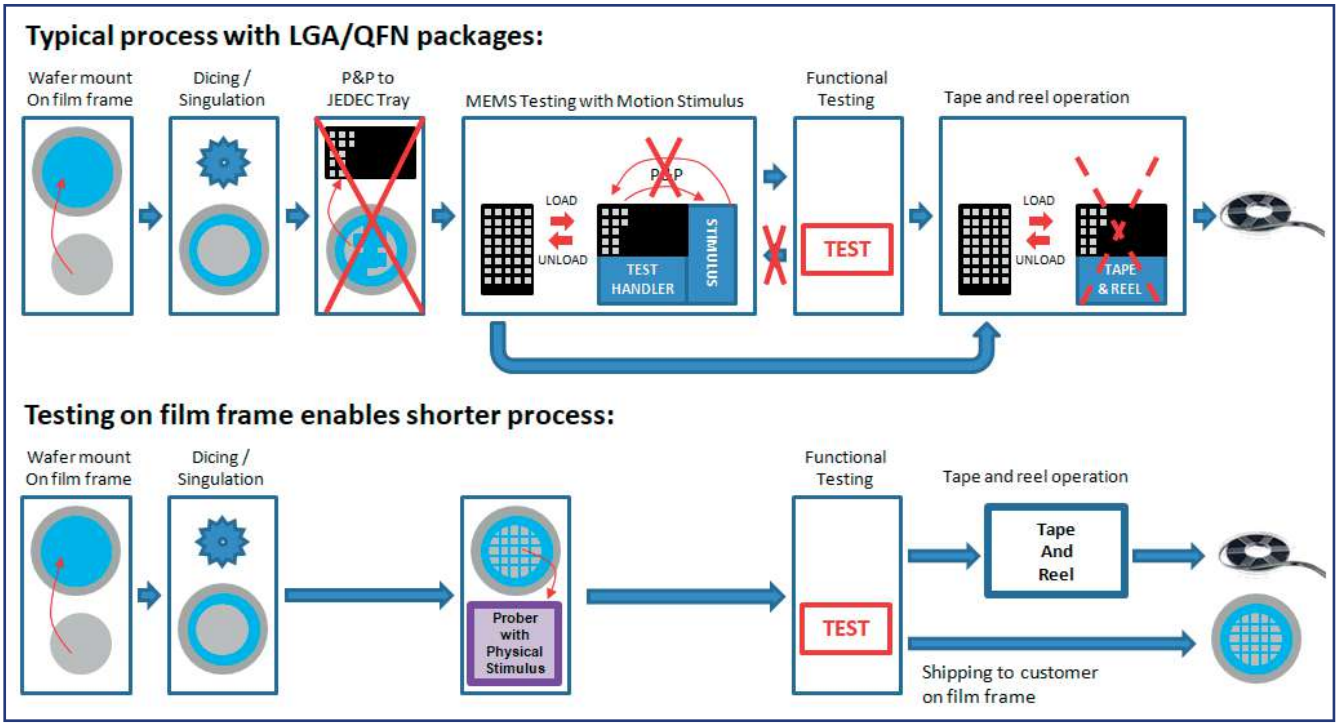
Why Not Just Use Common Wafer Prober?

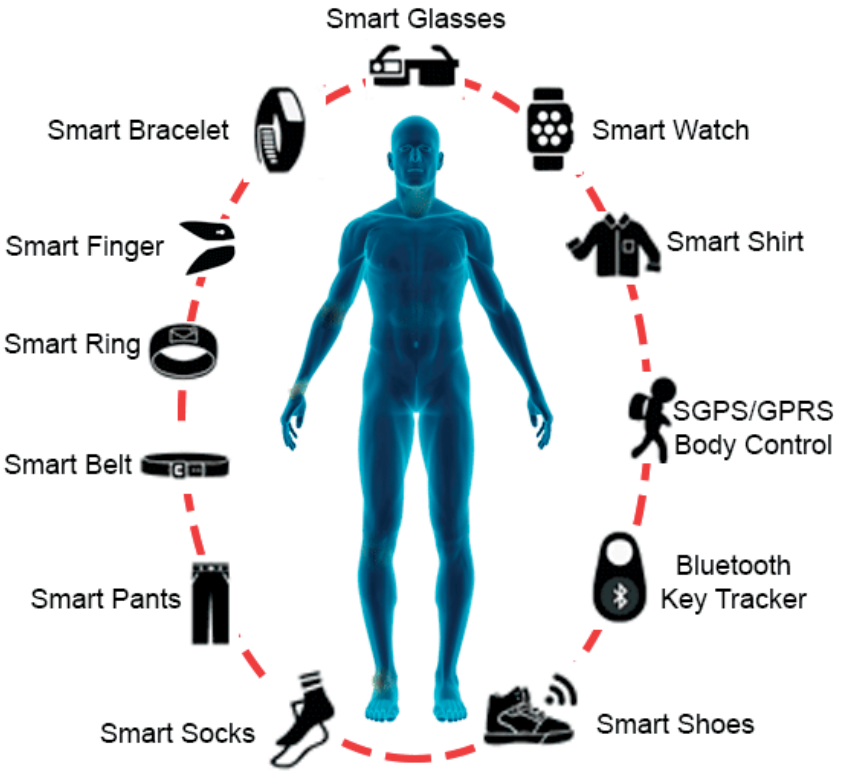
MEMS and other specialized semiconductor devices have been usually tested in wafer level only for basic behaviour. Functional test and especially trimming of sensors, needs accurate physical stimulus to make calibration possible.

For conventional packages, special stimulus units have been added to handlers to create the required test conditions. To test and calibrate CSP sensors at the wafer level without additional pick & place processes, stimulus should be combined within the wafer prober.

Two Decades Of Application-Specific Wafer Test Solutions

AEM, a global leader in providing





Applications for miniaturized sensors

Enabling Technologies for the Internet of Health Things. IEEE Access. PP. 1-1. 10.1109/ACCESS.2017.2789329.

Intelligent modular test solutions, is now able to leverage two decades of experience in MEMS testing through its acquisition of Afore . Afore has developed a range of temperature, environmental and motion test solutions that can be used in their modular application specific wafer probers.

Wafer Level Test Solution For Motion Sensors

Afore has brought to market KRONOS, to enable true wafer level test of accelerometers, gyroscopes and magnetometers.

KRONOS, wafer prober for motion sensors

KRONOS is built around a specialized wafer prober combined with a rate table featuring two rotating axes that enable 6 degrees of freedom (6DOF). The tester (ATE) is integrated on top of the probe card, which eliminates moving and, thereby, the wearing of cables.

Rotating axes with slip rings enable communicating and supplying power to the tester and prober. The axes also make infinite rotation enabling angular rates up to 750 deg/s without wearing any cables.

Magnetic Stimulus unit can be integrated on the probe card to enable true 9 DOF testing with one wafer insertion.

Afore - An AEM Company Providing Solutions For Specialized Application-Specific Wafer Probing

The need for wafer probing in special conditions is not limited to motion sensors. Afore has introduced environmental wafer prober AIOLOS. This allows systems to be configured with various environment and stimuli based on a standard platform.

Currently portfolio covers, but is not limited to, applications like pressure sensors, MEMS-resonators, IR-sensors and gas sensors. Any application where special environment like a high vacuum or pressurized atmosphere is needed.

Afore, partnering with Bluefors, brought to market in 2019 Cryogenic Wafer Prober with the capability to test 300 mm wafers with chuck temperature below 1K. This solution enables a giant leap in quantum computing development with full wafer level test capability instead of testing single chips on separate cryostats.

Cryogenic wafer prober, enabling quantum computing

Afore has the experience and and ability to customize for application specific wafer test requirements for a wide range of devices and package needs.

ABOUT THE AUTHOR

Ari Kuukkala
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Afore – an AEM Company
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Robot reception by MI Robotics

HUAWEI LAUNCHES SINGAPORE'S FIRST 5G-POWERED ARTIFICIAL INTELLIGENCE (AI) LAB

Huawei launches Singapore's first 5G-powered Artificial Intelligence (AI) lab equipped with AI, 5G and Cloud technology, at Changi Business Park. The lab boasts facilities that offer extensive 5G support, from Proof of Concepts (POCs) to free trials, with a 5G test-bed and Huawei's Cloud platform. It also supports AI enablement through offline AI developer kits, as well as Huawei's ModelArts AI Platform, to support AI R&D efforts.

"In response to the Singapore government's call for industry transformation, Huawei is extending its 5G, Cloud and AI capabilities to local government agencies, SMEs, and Institutes of Higher Learning, to help accelerate Singapore's 5G application and nation-wide intelligent transformation," said Nicholas Ma, Chief Executive of Huawei International.

Globally acknowledged to be the next big leap in mobile and wireless communications, 5G technology is widely touted to enable the development of new business models and advanced applications, fostering business innovation and spurring economic growth. Communities, businesses and industries are expected to benefit from the transformative impact that 5G enables. Singapore has earmarked S$40 million to build an open, inclusive 5G ecosystem, where the funds will be used to support 5G tech trials for enterprise use, create new open testbeds and for R&D in areas like cybersecurity for the next-generation mobile network, across six strategic clusters.

Huawei is launching its AI lab on the back of Singapore's National AI Strategy announced on 13 November, which maps out how Singapore will develop and use AI to transform the economy and improve people's lives. Through this lab, Huawei aims to nurture a flourishing

local AI ecosystem with its 5G, Cloud and Intelligent Computing capabilities, enabling Singapore's industry players, with a focus on local SMEs, to boost Singapore's AI capabilities towards its smart future, and digital economy.

Huawei is also launching its talent, innovation, and Singapore-China bridging programmes through this lab. In line with the three programmes, the lab includes trainings and workshops opportunities for hands-on practice, with testing and integration facilities, and serves as an open and advanced platform to industry players for ecosystem development and industry collaboration.

"At Huawei, we believe that AI and its solutions should be accessible to everyone, and that the convergence of AI, Cloud, and 5G, lays the foundation of the technology ecosystem for the digital economy of the future," said Neo Teck Guan, Chief Marketing Officer of Huawei Cloud Asia Pacific Region.

The lab launch programme includes artificial intelligence case studies by Huawei key customers DIGI and Ulearning, as well as the signing of five memorandum of understandings (MoU), between Huawei and several local institutions and companies across various industries – Nanyang Polytechnic; MI Robotic, Navinfo Datatech, OTSAW and Neolix Technologies; Shanghai Zhenhua Heavy Industries Company (ZPMC) and Shanghai Enfon Robotics Co; and local Augmented Reality and Virtual Reality (ARVR) companies, Hiverlab and Hellohold – to solidify Huawei's commitment in supporting 5G deployment and enablement towards industry transformation in Singapore.

Local AR company testing in AI lab

The programme also paired with a 5G technology panel discussion joined by a few of Huawei's partners – Neolix and the National University of Singapore (NUS), ZPMC and ST Engineering and SG Tech – to discuss 5G capabilities and solutions and how they will change industries and businesses, followed by an immersive technology workshop using the lab's facilities.

This launch marks another step towards Singapore's Smart Nation initiative and its potential of becoming a 5G hub for the region and the world.

SOURCE OF CONTENTS:

Huawei International Pte. Ltd.

5G environment speed testing

Local AR company testing in AI lab

PROVIDING RELIABLE LOGISTICS SERVICES TO THE SEMICONDUCTOR INDUSTRY

About Sin Chew Woodpaq

Sin Chew Woodpaq started off modestly as a small wooden crate manufacturer in the past, starting with only one truck initially. Over the years due to the changing business environment, the company has adapted to the challenges and transformed their business, gaining complementary abilities to evolve into one of the leading project logistics providers in Singapore as they are today.

Proven Experience In Wide Range of Industries

Sin Chew Woodpaq has an in-depth expertise and understanding of project logistics and a proven track record in a wide range of industries including Semiconductors, Oil and Gas, Manufacturing, Aerospace and Marine and Offshore. Through their many years of know-how, they have built up standard procedures and work processes to successfully overcome challenges and constraint in these projects.

Safety-First Approach

Safety has been at the heart of all operations of Sin Chew Woodpaq. They have an in-house safety committee that reviews safety protocols and procedures in the company. Besides, toolbox meetings will always be conducted before the start of every job to ensure the workers are aware of the job scopes and the safety aspects to look out for. Workers are also routinely sent for safety-related courses to strengthen their knowledge of the concept of safety. All of the equipment and tools are always certified and kept in an operational condition. These commitments have led to various local and international standards recognition such as BizSafe Star, ISO 9001:2015 and ISO 45001:2018.

Element Of Care & Customer-Centric

Sin Chew Woodpaq puts utmost care in handling customers' cargo at every stage of the job process as they value the trust placed by their customers. "We treat our customers as our partners in creating value in the logistics process and we work together with them to come up with the most optimum solutions for their needs. We provide our customers with a single point of contact to save the hassle and confusion of contacting multiple parties." said Jason Tee, General Manager of Sin Chew Woodpaq.

One-Stop Logistics Solution Customized Wooden Crating

Sin Chew Woodpaq provides customized wooden crating solutions for the semiconductor industry with our in-house production facility. They can customize the built of the wooden crate according to the dimension of customers' cargo and provide shock-absorbing crating solutions for the sensitive nature of the equipment to be transported.

Vacuum packing

Industrial Machinery Packing

The in-house packing team has an in-depth knowledge of industrial packing solutions for semiconductor equipment that is required. The company provides packaging materials such as desiccants and anti-static bags combined with vacuum sealing to absorb any moisture and prevent damages caused by electrostatic discharge.

Industrial Machinery Moving

Specialized moving equipment and tools are used to move semiconductor equipment for customers. The company is equipped with cleanroom attire and chromed plated pallet jacks and rollers for cleanroom environment. Various technologies are utilised such as the air float system and hydraulic lifter to move heavy equipment of a sensitive nature which makes work more efficient and safer for our employees.

Heavy Lifting & Moving

For equipment that weighs more than 100 tons such as transformers and marine equipment, specialized machinery such as jacking and skidding systems are used to aid in these operations.

Different packing solutions

Air float system

Transportation Service

With the fleet of vehicles such as lorry trucks, lorry crane, self-loader and prime movers, the company is able to provide a wide range of transport options for customers' needs, one of which is air-ride transportation for equipment that is sensitive in nature.

Warehousing

With a 12m high and 120,000 sq. ft integrated logistics and warehouse facility in Tuas, the company is able to accommodate cargo and materials of any scale for clients.

Material Treatment

Sin Chew Woodpaq provides ISPM15 treatment for wooden packing materials for their clients to conform to international export standards. This means that the wooden material is being treated through heat treatment or fumigation to prevent the transport of diseases and pest to export destinations.

With all of the above capabilities, Sin Chew Woodpaq is confident of being a trustworthy and reliable partner for the semiconductor industry, fulfilling each and every of their logistical needs.

Hydraulic Lifter

SOURCE OF CONTENTS

SIN CHEW WOODPAQ PTE LTD
Protecting & Positioning Businesses

www.sin-chew.com.sg
Contact: woodpaq@sin-chew.com.sg

CISCO ENTERS CHIP MARKET

In December 2019, Cisco announced details of the new silicon architecture as well as the full scope of the company's strategy to build an Internet for the future that will power the next decade of digital innovation. The strategy focuses on driving the development of three core technologies: silicon, optics, and software. Cisco says its technology strategy will push digital innovation beyond the performance, economic and power consumption limitations of current infrastructure.

Introducing Cisco Silicon One-Breakthrough Unified, Programmable Silicon Architecture

Cisco has introduced its latest innovation including Cisco Silicon OneTM, the industry's only networking silicon architecture of its kind. The new Cisco Silicon One will be the foundation of Cisco's routing portfolio going forward, with expected near-term performance availability up to 25 Terabits per second (Tbps). This is the industry's first networking chip designed to be universally adaptable across service provider and web-scale markets. Designed for both fixed and modular platforms, it can manage the most challenging requirements in a way that's never been done before. The first Cisco Silicon One 'Q100' model surpasses the 10 Tbps routing milestone for network bandwidth without sacrificing programmability, buffering, power efficiency, scale or feature flexibility.

Traditionally, multiple types of silicon with different capabilities are used across a network and even within a single device.

Developing new features and testing can be lengthy and expensive. Unified and programmable silicon will allow for network operators to greatly reduce costs of operations and reduce time-to-value for new services.

"We look forward to working with Cisco as it enters the high-end routing silicon space, collaborating to help meet the next generation of network demands for higher speeds and greater capacity," said Amin Vahdat, fellow and vice president of Systems Infrastructure, Google Cloud.

"Facebook has been a strong advocate for network disaggregation and open ecosystems, launching key industry initiatives such as the Open Compute Project and the Telecom Infrastructure Project to transform the networking industry," said Najam Ahmad, vice president, Network Engineering at Facebook. "Cisco's new Silicon One architecture is aligned with this vision, and we believe this model offers network operators diverse and flexible options through a disaggregated approach."

"Cisco is changing the economics of powering the Internet, innovating across hardware, software, optics and silicon to help its customers better manage the operational costs to function on a larger scale for the next phase of the Internet,"

Silicon One

said Ray Mota, CEO and principal analyst at ACG Research. "As we move to 2020, the timing of delivering operational efficiency will be vital."

Cisco 8000 Series Platform Powered by Cisco Silicon One

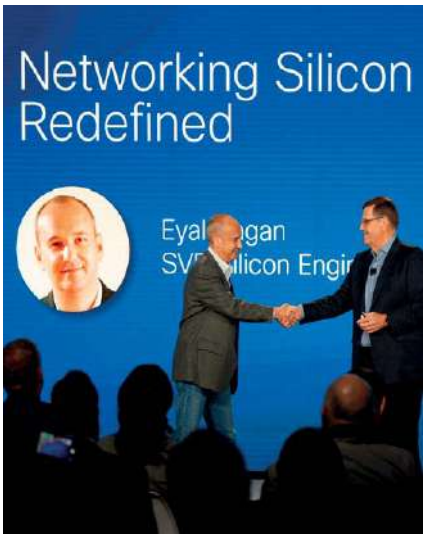
Cisco also announced a new router machine, Cisco 8000, designed to better serve as the backbone for 5G networks. It is engineered to help service providers and web-scale companies reduce the costs of building and operating mass-scale networks for the 5G, AI and IOT era.

Flexible Business Models

Cisco also announced plans to offer flexible consumption models first established with Cisco's Optics portfolio, followed by the disaggregation of the Cisco IOS-XR software, and now including Cisco Silicon One. This new model is highly adaptable and offers customers choice of components, white box, or integrated systems to build their networks.

SOURCE OF CONTENTS

Cisco



Cisco announced its full scope of the company's strategy in Dec 2019

A CHAT WITH THE SSIA SECRETARIAT TEAM MEMBER

THE STORY OF DELIA'S CAREER JOURNEY

Delia Cheung is currently the Project Manager of SSIA, overseeing projects of talent acquisition, Professional Conversion Program (PCP), student outreach and training for the industry. Before joining the Association, she has more than 15 years of experience in the semiconductor industry, working on yield engineering in GlobalFoundries. Voice Magazine chatted with her to know more about her story.

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

It started as a coincidence as semiconductor was beginning to boom in Singapore and my course offered 1 relevant subject during my final year. I took it up without knowing how much it would change my life. Our lecturer told us during the first lesson that what we were learning in school was technology more than 10 years ago, and that made me curious about the current technology back then. After graduation, I knew I wanted to get into the semiconductor industry and I was lucky to really get a job in the industry. I was very nervous about the interview as the interviewer was known to be an iron lady in the company. I was also worried about being not technically competent as I had only fundamental knowledge. Subsequently, other than skillset and knowledge, I found that a positive mindset and attitude are more important in this industry.

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

There were so many new things to learn. Every process was familiar yet different from what we learned in school. It still took lots of practice and stumbling along the way to be able to apply the knowledge onto work. I was fortunate to have met a very good mentor, Quek Pua San, during the start of my career. She was very willing to share and teach whatever she knew. Many times, I needed to stay late at work and she would stay to make sure I had someone to ask for any queries. She even fetched me home after I had missed the company bus.

Delia and her family

3. What ultimately led to your decision to leave the industry?

Despite all the excitement at work, I decided to prioritize family over career. I wanted to spend more time with both of my sons, and be more involved in the early part of their lives before the hectic life of school takes over. After much consideration, I eventually left the workforce to become a stay-home-mom to take care of my family and children.

4. How do you know about SSIA and why do you choose to join the Association?

In my 4 years of being a home manager aka housewife (haha...), I always kept in touch with my ex-colleagues. During

one of the gatherings, I met Wee Seng again when he joined SSIA. He needed a part-time staff in his office and I jumped at the chance and volunteered myself. It was something different yet familiar from what I have done for my past life and I wanted to start afresh.

5. What are the similarities and differences of working in a Wafer Fab and in a semiconductor trade association?

I get to work with many companies that I am familiar with but in a totally different perspective. Companies which used to be our competitors, customers, vendors and suppliers are now our working partners or members. The biggest difference is that I am not able to go into the clean room, which is the part I missed- lots of fond memories there.

6. What do you like most about your current job? What do you find challenging?

I meet more people from different companies and help them with their needs, especially in training and hiring. I was a hiring manager in Fab and I can understand the challenges of training, recruiting and retaining talents. The most challenging part is to create and market our different industry courses to cater to the needs of the industry, at the same time, get sufficient resources like instructors and funding.

> **"Companies which used to be our competitors, customers, vendors and suppliers are now our working partners or members. The biggest difference is that I am not able to go into the clean room, which is the part I missed — lots of fond memories."**

7. How will you see the future of the semiconductor industry in Singapore?

I am seeing an increasing focus on R&D and design sectors within this industry. We are going up the semiconductor supply chain, and we need to be ready for it. That is why SSIA, in particular with many agencies and IHLs, are here to support such transformation of the industry, especially in areas of workforce development and upskilling.

(Right) Delia, (left) Ang Wee Seng, Executive Director of SSIA, and the SSIA Team

Accelerating Semiconductor Innovation in the AI Era

There is little doubt that AI and Big Data will transform nearly every industry over the coming years – from healthcare and transportation to retail and entertainment. Along the way, exciting new opportunities for semiconductors will emerge. These opportunities require moving beyond general-purpose computing to specialized systems for new applications in the cloud and at the edge. Companies large and small are racing to develop platforms, algorithms, new architectures and other solutions to harness the incredible capabilities of AI and machine learning. It is an exciting time, but making each of those functions work in a high-performance, low-cost and low-energy manner presents a new set of challenges in crafting the underlying technology platforms. For example, energy consumption and thermal requirements take on new dimensions whether the task is cooling a cloud data center or fitting processors and sensors into a tiny IoT device. There is an incredible need to make computing a lot more efficient. Some say we need a 1,000x improvement in performance per watt in order for AI to reach its potential.

A new playbook for semiconductor design and manufacturing

The need for semiconductor innovation has never been greater. Yet at the same time, Moore's Law is becoming increasingly challenged. The two-dimensional scaling techniques that drove Moore's Law for the past 50 years are no longer delivering simultaneous improvements in performance, power and cost. In response to this, we are seeing the emergence of a new industry playbook for semiconductor design and manufacturing. This new playbook consists of a combination of approaches to drive innovation, specifically: new architectures, new materials, new 3D structures, new ways to continue shrinking transistors, and advanced packaging for heterogeneous designs.

New materials, advanced packaging

We are already seeing this new industry playbook being implemented today with the transition from planar to 3D NAND, the use of cobalt as a new material in the lower level wiring layers of advanced transistors to improve performance and power consumption, and with the emergence of new memory architectures like MRAM, ReRAM and PCRAM, which are based on new materials. Advanced packaging is another key area providing system solutions that bring logic and memory together for higher performance and lower power while also addressing form-factor requirements. For example, stacking DRAM chips together has brought about High Bandwidth Memory, which combined with logic in interposer designs has delivered major performance gains for AI computing.

Business-academic partnership

Accelerating semiconductor innovation in the AI era will require greater collaboration across the industry ecosystem. As the leader in materials engineering, Applied Materials is enabling the new playbook through its global R&D network, including several key capabilities in Singapore, where the company has operated since 1991. The Applied Materials–NUS Advanced Materials Corporate Lab helps speed up discovery and commercialization of new materials for production of next-generation semiconductors. In addition, the Applied Packaging Development Center is a fully integrated 300mm advanced wafer-level packaging lab jointly set up with the Institute of Microelectronics to help make chips and end-user devices smaller, faster and more power efficient. Applied Materials also has an R&D collaboration with Singapore Institute of Manufacturing Technology (SIMTech) that was formed in 2016 to develop key technologies in additive manufacturing.

Research: the way forward

As the complexity of chip manufacturing increases, Applied Materials will continue to focus on research and development of new materials and advanced packaging to enable semiconductor innovations in the AI era. With our strong research track record and state-of-the-art facilities, we are confident in our ability to help customers surmount fast-evolving technology challenges and drive the industry forward.

Learn more at www.appliedmaterials.com

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make possible

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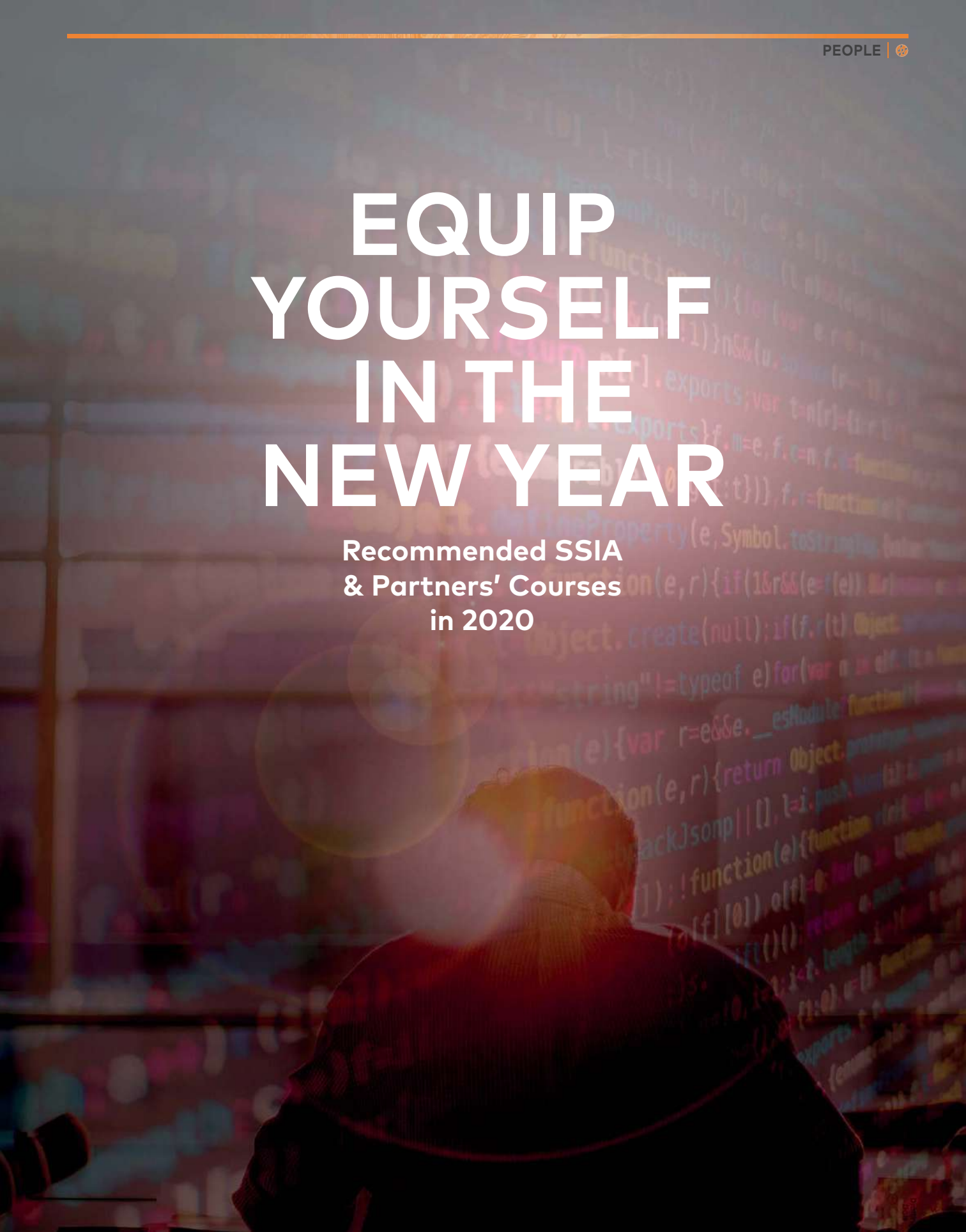


EQUIP YOURSELF IN THE NEW YEAR

Recommended SSIA & Partners' Courses in 2020

THE SINGAPORE SEMICONDUCTOR LEADERSHIP ACCELERATOR (SSLA) LAST RUN

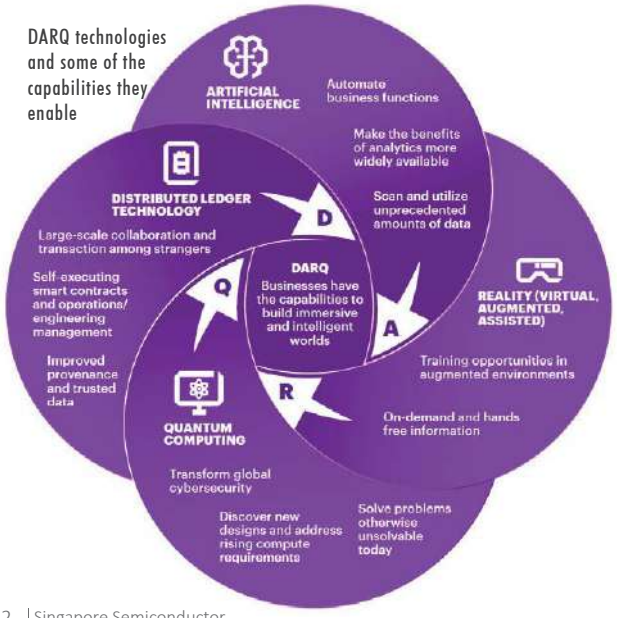
Tailor-made To Help Semiconductor Industry Leaders Thrive In The Digital Age

New technologies impact industries across the board. In the semiconductor industry, the very technologies disrupting the way companies operate are the same technologies they will use to create new products and businesses. Now is the time for semiconductor companies to take a strong position and proactively define the next generation of technology—in a dual role, as customer and producer. According to the 'Technology Vision 2019 for Semiconductor' report by Accenture, DARQ - Distributed ledger technology, artificial intelligence (AI), extended reality (XR) and quantum computing will be the next set of new technologies to spark a step change, letting businesses reimagine entire industries.

As a customer and producer of technology, leading semiconductor industry players are already meeting this duality head on. Those molding it to their advantage are using every tool at their disposal, from DARQ technologies and new talent sets to cybersecurity measures.

In the coming (5th) run of the Singapore Semiconductor Leadership Accelerator programme (SSLA) launched by Singapore Semiconductor Industry Association and Human Capital Leadership Institute, new content on DARQ technologies, industry 4.0, digitalisation and workforce 4.0 best and next practices will be included.

DARQ technologies and some of the capabilities they enable



Programme Details

Module 1 (4 days) – 23 - 26 Mar 2020
Module 2 (4 days) – 27 - 30 Apr 2020

Course Fee

- Singaporean Citizens @ $6,000/pax
- Singaporean PRs and foreigners @ $12,000/pax

Scan QR Code For Registration & Details:

https://ssia.org.sg/upcoming-ssia-events/singapore-semiconductor-leadership-accelerator-ssla-5th-run/

SSLA 5th Run Highlights

The Impact of Geo-Politics , Trade Wars and Supply Chains Challenges on the Semiconductor Industry
Alex Capri, Visiting Faculty, National University of Singapore

Leadership Agility
Bill Cornwell, Managing Director, Cascade Consulting

Enhancing Leadership Effectiveness through the FIRO-B insights
Irene Chia, Executive Director & OD Coach, Whitespace Management Consulting

The Leadership Mindset
Prof Adel Dimian, Professor & Consultant, Strategy & Innovation, Carroll College

Communication and Engaging with Impact
Stephen Krempl, CEO, Krempl Communications International

The Duality of Technology
Accenture Team

Human Capital Management Best Practices for Workforce 4.0 Change Management and Agility
Professor Tan Hwee Hoon, Associate Professor, Singapore Management University

SINGAPORE SEMICONDUCTOR LEADERSHIP ACCELERATOR PROGRAMME

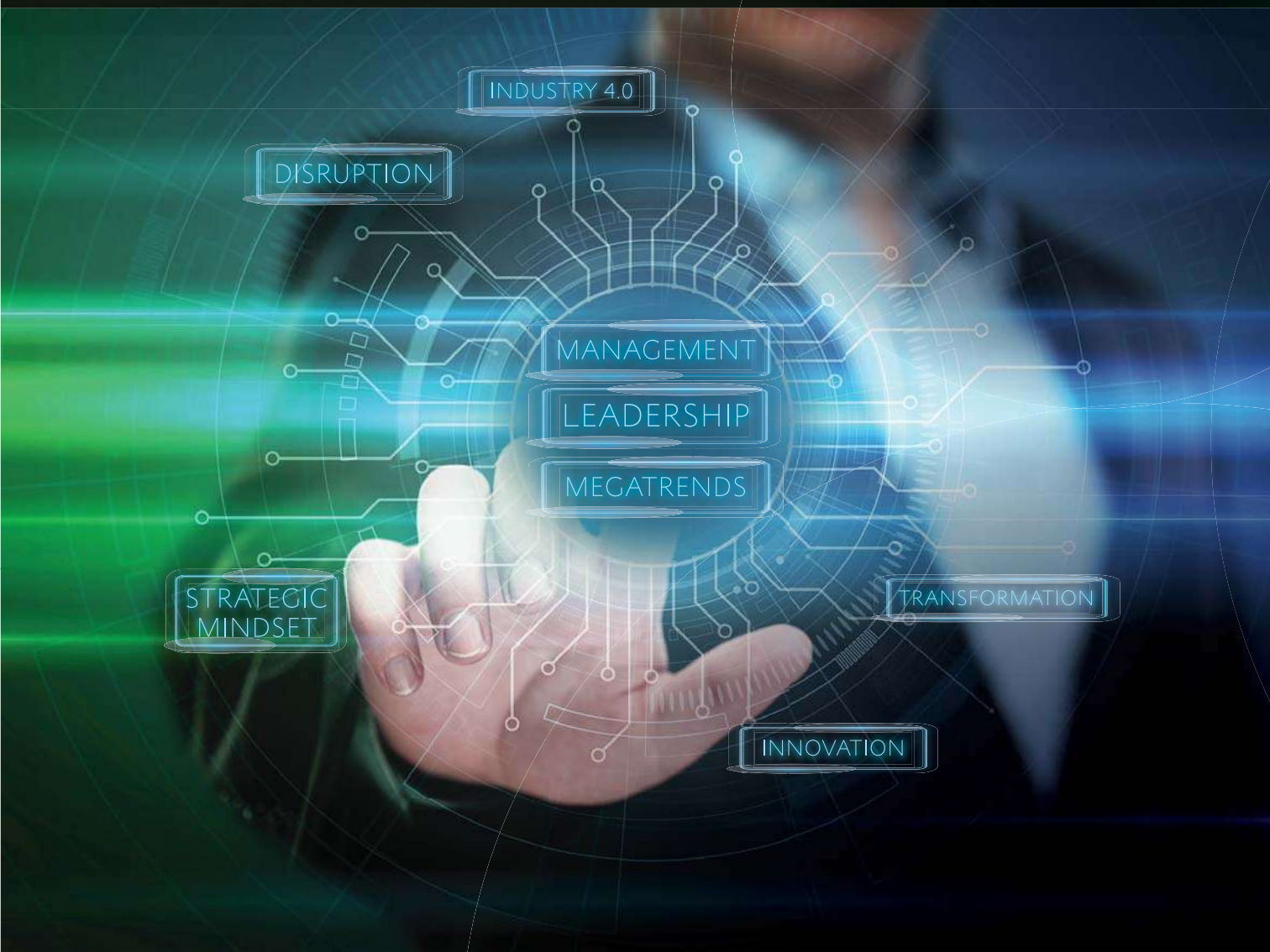
SKILLSfuture Leadership Development

Organizer:

SSIA
Singapore Semiconductor Industry Association

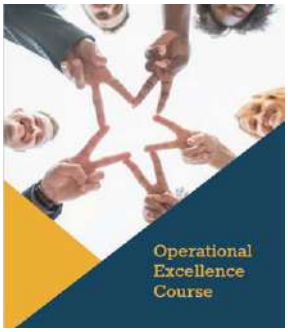
In partnership with:

human capital leadership institute



SSIA
Singapore Semiconductor Industry Association

Electronics & Semiconductor Industry Relevant Courses



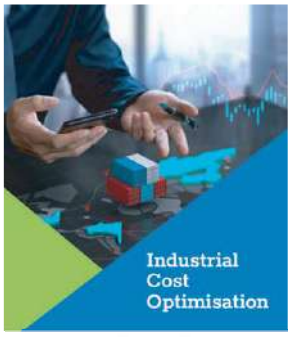
SSIA members: S$500
Non-SSIA members: S$700

Operational Excellence Course

Learn how to achieve operational excellence through project management methodologies, strong teamwork, solid execution, error avoidance, good communications and the right leadership traits.

Who should join?
Everyone in the semiconductor and electronics industry, especially those from process, product, NPI, R&D, FA teams

- Proven methodologies from MNCs with industry related case studies



SSIA members: S$500
Non-SSIA members: S$700

Industrial Cost Optimisation Course

To help everyone in the industry develop a cost optimisation culture through proven methodologies, which in turn will convert a good business to a great one.

Who should join?
Everyone in the semiconductor and electronics industry, especially those from engineering, accounting, human resource teams or suppliers

- Proven methodologies from MNCs with industry related case studies

SSIA members: S$500
Non-SSIA members: S$700

Semiconductor Fundamentals Course

By understanding the electronics eco-system and its basic knowledge, participants will have a better understanding on the different roles they play in this industry.

Who should join?
Semiconductor and electronics industry peers who have no prior background in microelectronics; those who want to know the whole manufacturing eco system in the industry

- Industry related case studies on process integration & defects

SSIA
Singapore Semiconductor Industry Association

TESTIMONIALS:

Operational Excellence Course

"I am interested in the topics of project management, risk management and the components leading to operational excellence. Overall, it is an effective and useful course to help me excel in my work."

- Tang Hui Ying, GlobalFoundries

"Having the right mindset is the most important factor to be excellent in work. The course has introduced many real-life examples to illustrate this and the operational excellence philosophy"

- Alvin Terrandano, GlobalFoundries

Industrial Cost Optimisation Course

"Cost Optimisation should be data driven and should be in everyone's DNA because 'In God we trust, all others must bring data'."

- Jo Ann Lee, Micron

"Good exposure and learning as participants are from different companies and background."

- Jeffio Tan, Hitachi Chemicals

Semiconductor Fundamentals Course

"All topics in the course are informative and interlinked. The course has equipped me with a good understanding of the wafer fabrication and some current processes on field."

- Chi Lai Ping, Disco Hi-Tec Singapore

"Well Done to the trainer! The course provided me with knowledge about the entire process flow from start to end. The learning is interactive, too!"

- Lim Tzu Tai, Avi-Tech Electronics Limited

MORE DETAILS: www.ssia.org.sg/upcoming-ssia-events/

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STAY AHEAD IN THE I4.0 TRANSFORMATION

New Courses At NUS SCALE

Job market continues to demand skills that blend technology, technicality and human, and opportunities in the innovation economy abound in the form of telemigrant and portfolio work, as well as B2B solutions. The three new courses offered by NUS SCALE help employees master new skills required in the industry 4.0.

Artificial Intelligence Begins With Me

This course 'Artificial Intelligence Begins With Me' is designed to teach you what Artificial Intelligence (AI) is, and what its applications are. Participants will learn about basic AI-related terms such as Machine Learning, Deep Learning, and Expert Systems which will play a key role in the future of technology and science. Participants will also learn the practical uses of AI in business and daily life as well as its diverse applications and possibilities, including AI as a career. In doing so, they will be able to appreciate the challenges of AI.

Scan QR code for details:

Blockchain, Digital Currencies, and Distributed Ledgers Starts from Here

Nowadays, Blockchain is a buzzword in a diverse set of businesses including, but not limited to, banking, social services, insurance, government, supply chain, and media, which are all interested in the way this distributed database facilitates reliable, online exchange of values.

It is claimed that Blockchain is a trustworthy, fast, and transparent database system, that underpins cryptocurrencies such as BitCoin, and inspires similar but more controllable distributed ledgers (DL).

The course 'Blockchain, Digital Currencies, and Distributed Ledgers Starts from Here' aims to equip learners with the knowledge and skills to acquire the concepts of Blockchain, digital currencies, and distributed ledger and apply them in their businesses. It also helps them understand the possible advantages of Blockchain, digital currencies, and distributed ledger while considering their applications to the businesses.

Scan QR code for details:

Managing Change and Developing a Change-Ready Team

What looks like resistance is often a lack of clarity – teams resist when they do not understand changes and this often leads to poorer performance, lower morale and a higher turnover. Being clear about the impact of change to your team is key to preparing them for it.

This course 'Managing Change and Developing a Change-Ready Team' is designed to support managers and business representatives who are currently undergoing or preparing their teams for business change. It provides a structured approach to help managers become more effective in managing and implementing change initiatives. Specifically, participants will be exposed to frameworks and processes that prepares and enables change, as well as techniques to lead and engage their teams during the transition period.

Scan QR code for details:

Course Registration:
NUS SCALE
https://scale.nus.edu.sg

SINGAPORE POLYTECHNIC NEW COURSE INTRODUCTION TO INDUSTRIAL FMEA

Failure Mode and Effects Analysis (FMEA) was developed such a long time ago in the late forties. Yet today it's still so widely applied in all kinds of industries. That only says that it is a useful and practical tool. In whatever industry, there lie different kinds of risks whenever a process fails. Besides, there are so many ways a process could fail. If we could gather all the company subject matter experts and put their heads together, and from all the historical experiences and academical researches, we could figure out all the possible ways how the process could fail, how they can impact the business, from worst situation to the least impact the failures could have. We can then step by step put in preventive measures so that they will never get into the way of our businesses and ruin the businesses.

With a good document, the FMEA could also become a good foundation of how we start all processes and an excellent knowledge pass down to newer employees. All lessons learned could be forgotten and those failures that were prevented could come back and harm the business if preventive actions were ignorantly removed as the result of poor training

or poor pass down to new employees.

As the FMEA involves a systematic way of preventive solutions, it deploys systematic project management skills as well as proper problem-solving skills such as PDCA and DMAIC. Normally FMEA needs to be completed before the start of new businesses or production. Therefore, it is always time-bounded, so as not to affect the delivery of the product to the market.

The objective of the course 'Introduction to Industrial FMEA' launched by Singapore Polytechnic is to equip the participants with the knowledge of FMEA, learn the step-by-step approach for identifying all possible failures in a design, a manufacturing process, equipment, or even a service. Participants will also have the opportunity to look at real-life case studies where they could learn how companies make proper risk assessments, prioritize the different critical levels of risk, and trigger necessary mitigation actions.

Introduction to Industrial FMEA

Dates: 13 March (1st run), 13 May (2nd run)

Duration: 8 hours

Course fee : $300

Trainer: Mr Chung Ching Thiam (Mr Chung has over 30 years of experience in the electronics and semiconductor industry. He had vast experience in semicon manufacturing as a Semiconductor Manufacturing Operation Director; led in new Wafer Fabs Start-up in Singapore, specializes in deployment of MES, CIM, Process Equipment selection, equipment and facility installation all the way to ramping up the Fabs to their full capacity.)

For details and registration, please email secretariat@ssia.org.sg

DigiPen (Singapore) - TRAINING TALENT FOR THE DIGITAL ECONOMY

Singapore is well on her way to becoming a Smart Nation with the rise of automation and Industry 4.0. To meet this need, more skilled engineers are needed in the electronics and info-communications technology (ICT) sectors.

As a specialized university that trains talent for the digital economy, this is where DigiPen (Singapore) comes in. It offers programs in the disciplines of computer science, UI/UX design, digital art, and systems engineering. Founded in North America in 1988, DigiPen (Singapore) is the Institute's first international campus and was set up in 2008 at the invitation of Singapore's Economic Development Board. In 2010, DigiPen partnered with Singapore Institute of Technology (SIT), the fifth Autonomous University in Singapore.

DigiPen (Singapore) offers five bachelor's degree programs, out of which three are jointly offered together with SIT. This consists of two degree programs in computer science and one in engineering – BS in Computer Science in Real-Time Interactive Simulation (BSCS RTIS), BS in Computer Science in Interactive Media and Game Development (BSCS IMGD), and BEng in Systems Engineering (ElectroMechanical Systems) (SEEMS). Graduates from all three programs are trained in computer science theory, physics, and mathematics. They are also strong programmers and developers who are able to apply their knowledge in the semiconductor industry thanks to DigiPen (Singapore)'s hands-on learning approach.

As part of the curricula, students from the BSCS RTIS, BSCS IMGD, and SEEMS programs have to undergo the Integrated Work Study Programme (IWSP). The IWSP is an uninterrupted, eight-month duration (two trimesters) work placement program that will provide students with unique learning opportunities, allowing them to integrate theory and practice in a professional work setting. In doing so, students develop deep specialist skills in their chosen fields. One of these pathways includes carving a meaningful career in the semiconductor industry.

An area where DigiPen (Singapore) graduates are poised to shine in is research and development (R&D). SEEMS graduates are able to work as firmware developers who can program system on chip (SoC) integrated circuits. Their knowledge of how hardware and software components integrate help them to easily develop, optimize, and program code on SoC integrated circuits. SEEMS graduates can also work in the process and fabrication of wafer chips as test or process engineers due to their extensive knowledge in handling complex mechanical and electromechanical systems.

First batch of SEEMS graduates

First batch of students from the AnT Program for Embedded Software Developer

Another area that DigiPen (Singapore) graduates can contribute in is the application of semiconductor chips for new technologies. For example, when it comes to virtual reality (VR), augmented reality (AR) and computer vision applications, the in-depth computer science knowledge that DigiPen (Singapore) graduates have allows them to easily work on converting software code or designs into physical electronic chips.

DigiPen (Singapore) also offers the Continuing Education Attach-and-Train (AnT) Program as an extension of its undergraduate degree programs. The AnT Program is a manpower development program supported by Workforce Singapore under their Professional Conversion Program (PCP) that aims to re-skill Singapore citizen or Singapore permanent resident professionals, managers, executives, and technicians (PMETs) for the digital economy.

There have been three AnT Programs so far, training talent in the areas of artificial intelligence, embedded software, and cybersecurity. The pilot run of the Continuing Education Attach-and-Train Program for Artificial Intelligence Software Developer concluded in early 2019 and there are two other AnT Programs currently running. The first batch of students from the AnT Program for Embedded Software Developer have successfully completed their six months of classroom teaching and are now doing their on-the-job training at the Partnering Companies – Continental Automotive Singapore, Government Technology Agency, MSI Global, or ST Engineering. Separately, the first batch of students from the Cybersecurity Software Developer program are in the midst of their classroom training.

The comprehensive and practical programs have caught the attention of many companies within the digital economy. To date, many DigiPen (Singapore) graduates have been employed in a variety of industries within the digital economy. They have been hired by companies such as Acronis Asia, Autodesk Asia, Continental Automotive Singapore, Fujitsu Asia, GovTech, and ST Engineering, to name a few.

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