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THE SINGAPORE ENGINEER

August 2022 | MCI (P) 056/03/2022

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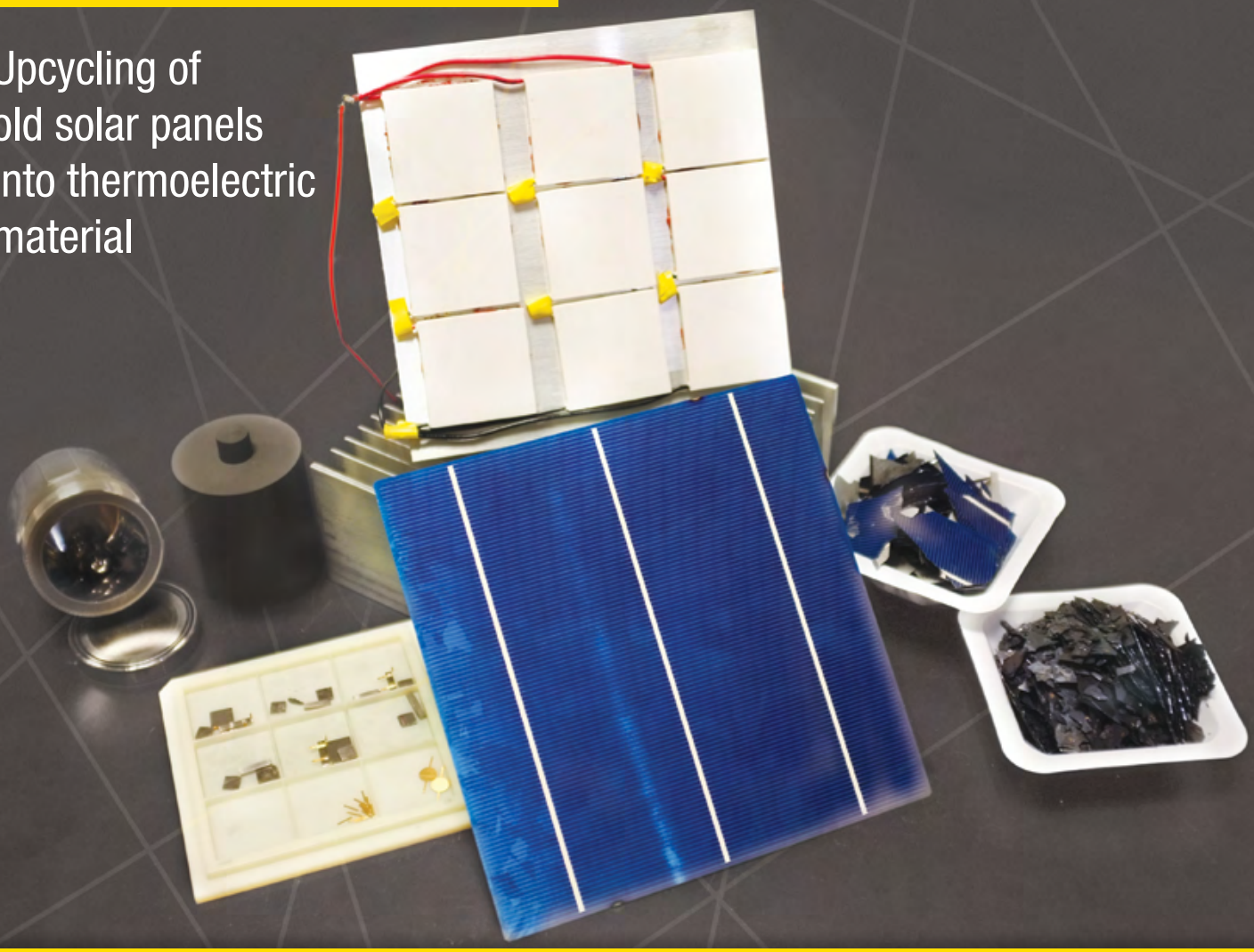

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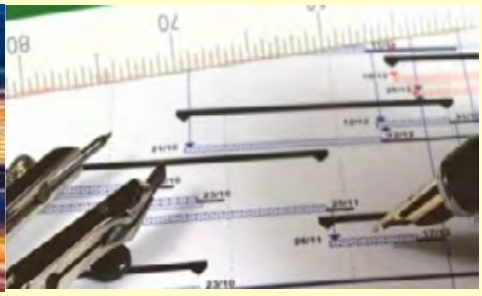

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19 SEPTEMBER MONDAY | 9.00 AM–5.00 PM	
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Welcome Address Minister for Manpower	
Opening Address Chairman, Workplace Safety and Health Council	
Keynote Address Chairman, Public Service Commission	
Plenary 1 | Amazing Race in Changing Times	
Symposium 1 Beyond Keeping Afloat	**Symposium 2** Speak Up! Psychologically Safe Workplaces
Plenary 2 | Accountability = Response-ability	

20 SEPTEMBER TUESDAY | 9.00 AM–5.30 PM	
Symposium 3 Ahoy! All Aboard	**Symposium 4** Dial Up Your Development
Plenary 3 | Change Does Not Need Your Permission	
Symposium 5 SafeEntry in the Future of Work	**Symposium 6** I WSH To Take Action
Plenary 4	
Closing Address	

*Programme is accurate as at 1 August 2022.

To see the full 2-day Conference programme and listing of our distinguished speakers and moderators, visit the **Conference Website**.

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For enquiries and more information on the Conference, please email to **enquiry@singaporewshconference.sg**

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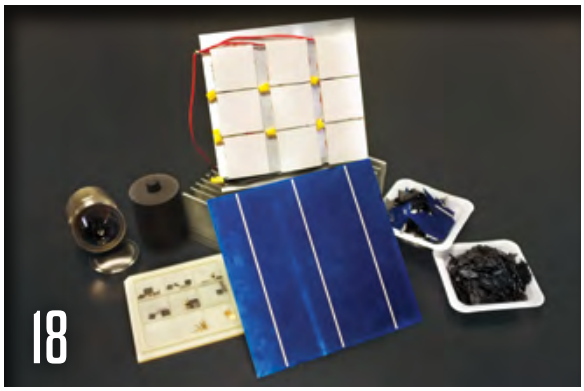

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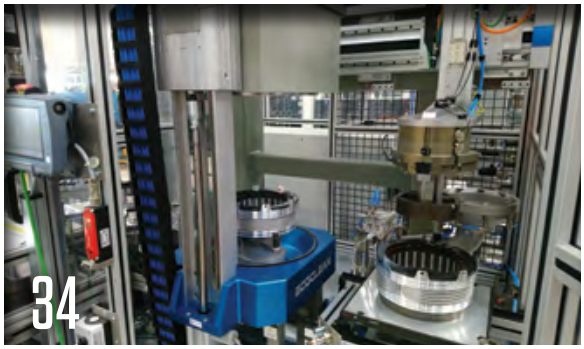

REGULAR SECTIONS

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City of Vienna celebrated at the Lee Kuan Yew World City Prize Award Ceremony

The Lee Kuan Yew World City Prize 2020 was presented to the city of Vienna, on 1 August 2022, by Mdm Halimah Yacob, President of the Republic of Singapore.

In celebration of its 10th anniversary, the Lee Kuan Yew World City Prize Award Ceremony and Banquet was held at the Istana this year, hosting an audience comprising international industry leaders, mayors, and city leaders.

Vienna, the capital of Austria, was recognised for having sustained the highest quality of life for its people. By planning ahead and making sustained efforts to address the challenges of climate change, the city has successfully built, innovated, and enhanced its infrastructure to meet modern needs, whilst retaining its distinctive identity as a capital of culture, music, and history. The Mayor and Governor of Vienna, Dr Michael Ludwig, received the Prize on behalf of the city.

Jointly organised by the Urban Redevelopment Authority and the Centre for Liveable Cities, the Lee Kuan Yew World City Prize honours outstanding achievements and contributions to the creation of liveable, vibrant, and sustainable urban communities around the world.

The Lee Kuan Yew World City Prize Award Ceremony and Banquet was one of the key highlights of the World Cities Summit 2022, held at the Sands Expo and Convention Centre, Marina Bay Sands, Singapore, from 31 July to 3 August 2022.

Dr Michael Ludwig, Mayor and Governor of Vienna, Austria, receives the Lee Kuan Yew World City Prize 2020, on behalf of the city of Vienna, from Mdm Halimah Yacob, President of the Republic of Singapore. Applauding the prize winner are Dr Cheong Koon Hean, Chairman of the Lee Kuan Yew World City Prize Nominating Committee and Mr Danny Teoh, Chairman of Keppel Corporation.

SIT partners SP Group to boost capabilities of power engineering personnel

Singapore Institute of Technology (SIT) and SP Group (SP) are collaborating to enhance the capabilities of the power engineering workforce in Singapore. Through a three-year endeavour, SIT and SP will focus on upskilling and reskilling of SP's employees. Both organisations signed a Memorandum of Understanding (MoU) recently, at Energy Innovation 2022, organised by the Energy Market Authority (EMA).

As Singapore advances towards a sustainable energy future and fulfils its Smart Nation ambitions, it is crucial that local talents gain knowledge and skills relevant to the evolving energy sector.

To grow the engineering talent pipeline and skillsets for the energy sector, the SIT-SP partnership seeks to provide continuous skills upgrading pathways for SP employees, through a full-time undergraduate degree programme in Electrical Power Engineering (EPE). Students will benefit from the Integrated Work Study Programme (IWSP) and Capstone Projects which put theory into practice in real work situations. SIT and SP will provide students with workplace learning opportunities and innovation projects that address emerging needs of the energy industry.

As a start, a pioneer cohort of SP employees will undertake a full-time, three-year undergraduate degree programme in EPE, at SIT, starting in September 2022. The degree programme, jointly offered by SIT and Newcastle University, is customised to provide students with a holistic approach to learning, while experiencing hands-on, industry-focused activities.

As part of the pioneer cohort, five SP employees will be onboarded as full-time students at SIT, where they will get to apply existing practices from the workplace, and hone their skills through actual work exposure made possible by SIT's unique applied learning pedagogy. SP will be sponsoring their studies as they pursue their career aspirations and grow their engineering capabilities.

This MoU is an extension of the ongoing partnership between SIT and SP over the past few years – which currently includes SP's investment in Singapore's first experimental, multi-energy microgrid at SIT's future campus in the Punggol Digital District.

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NEA and SLA to collaborate on enhancing weather monitoring and forecasting

The National Environment Agency (NEA) and the Singapore Land Authority (SLA) have signed a Memorandum of Understanding (MoU) to develop the use of Global Navigation Satellite System (GNSS) data obtained from SLA's Singapore Satellite Positioning Reference Network (SiReNT) to enable NEA to better monitor island-wide atmospheric moisture. The five-year collaboration is aimed at benefitting Singapore with additional data for weather monitoring, as well as facilitating exploratory studies for weather forecasting.

Mr Luke Goh, Chief Executive, National Environment Agency (NEA) (second from left) and Mr Colin Low, CEO of Singapore Land Authority (SLA) (second from right) signed the Memorandum of Understanding to share Global Navigation Satellite System (GNSS)-derived moisture data for weather monitoring application, at the World Cities Summit 2022. The signing was witnessed by Ms Koh Li-Na, Assistant Chief Executive, NEA (first from left) and Mr Bryan Chew, Assistant Chief Executive, SLA (first from right). Image: Singapore Land Authority (SLA).

Meteorological observations are vital for forecasting the weather, monitoring the climate, and producing timely warnings of hazardous weather events. Meteorological Service Singapore (MSS) routinely collects a range of observational data such as on temperature, wind and moisture, from ground-based and airborne sensors. At MSS's Upper Air Observatory (UAO), sensors attached to a weather balloon are routinely released, twice a day, to obtain measurements of these weather elements at different heights of the atmosphere. In 2019, MSS installed a GNSS reference station at UAO to derive continuous estimates of moisture in a column of the atmosphere, known as the integrated precipitable water vapour, to supplement the sounding data obtained from the weather balloon.

The GNSS Reference Station on Sultan Shoal (SSTS). Image: Singapore Land Authority (SLA).

Under the MoU, MSS's GNSS station will be integrated into SiReNT, and enable MSS to obtain islandwide, continuous and near real-time atmospheric moisture readings. This non-conventional moisture data will augment MSS's existing observation network data, providing higher resolution and more frequent observation data, which allows for investigative studies into potential applications for weather forecasting.

The collaboration will also expand SLA's SiReNT station network which currently comprises nine reference stations spread across Singapore. With the addition of NEA's GNSS base receiver station at UAO that will be incorporated into SiReNT, together with two upcoming additional coastal SiReNT reference stations, the network will be expanded to 12 stations. The SiReNT system can correct positional errors in GNSS signals and produce precise positioning data of up to 3 cm in accuracy. The SiReNT technology supports innovation in diverse industrial applications, such as in autonomous vehicles, construction automation and logistics, and monitoring of land height and sea-level changes in Singapore. The expansion of stations, by the end of 2022, will further improve stability of services and applications in various key industries currently supported by SiReNT. It can also be further leveraged for novel uses in climate-related scientific studies.

SunGreenH2 raises SGD 2 million

Singapore-based cleantech company, SunGreenH2, announced recently that it has raised SGD 2 million in a seed funding round led by SGInnovate. This news comes alongside the announcement of a grant award the company recently received, as part of the SGD 8 million partnership between the Energy Market Authority (EMA) and Shell in Singapore.

SunGreenH2 is on a mission to unlock low-cost green hydrogen production. A carbon-free alternative to fossil-fuel manufactured hydrogen, green hydrogen uses clean energy sources like wind and solar to power electrolysis, the process that splits water into pure hydrogen and oxygen. The major bottleneck for green hydrogen production today is that most electrolyser systems are either energy-inefficient or rely too heavily on precious metals like iridium and platinum which are loaded into catalytic electrodes, a key component of electrolysis systems.

SunGreenH2's technology utilises unique proprietary nanostructured electrodes that dramatically increase available surface area for water contact, during the splitting reaction, for a given size of active area, increasing current density output by almost 2x, while lowering precious metal loadings and energy use. In this case, reducing the use of platinum group metals by an order of magnitude lower than the current industry standard means the materials can be scaled up sustainably from a mass-manufacturing perspective. The technology is applicable to almost all commercially available electrolysers today, offering a much-needed pathway to lowering green hydrogen cost for wide-scale adoption in industry and for other promising applications which cannot directly be electrified with renewables.

Singtel partners Lendlease to transform Comcentre

Singtel recently announced that it is partnering global real estate group, Lendlease, to redevelop its Comcentre headquarters into a world class sustainable workplace, featuring the latest smart building and digital technologies, and with an estimated gross development value upon completion of SGD 3 billion.

The redeveloped Comcentre will be designed by a renowned team of architects including New York-based Kohn Pedersen Fox. The development will be built in line with carbon neutral construction principles.

Singtel and Lendlease have agreed to enter into a joint venture for the redevelopment, where Lendlease will subscribe to 49% of the shares of the joint venture company in 2024 and Singtel will hold 51%. The joint venture company will pay SGD 1.63 billion to Singtel for the land cost of the development, in or around 2024. Singtel will be responsible for the differential premium payable on the redevelopment.

Singtel Group CEO, Mr Yuen Kuan Moon, said, "The redevelopment of Comcentre is in line with our capital recycling strategy to unlock the latent value of our assets and invest the proceeds in growth areas where we can achieve higher returns. This is a strategic move that will further strengthen our financial position, bring about an exciting next-generation workplace for our employees, and contribute to the rejuvenation of the Orchard Road precinct".

Lendlease will provide development, construction and ongoing property and asset management services, complementing the digital and technology leadership skills of Singtel.

Lendlease Global CEO and Managing Director, Mr Tony Lombardo, said, "People around the world are increasingly demanding their workplaces operate more sustainably while incorporating the very latest smart building and digital technologies. That is exactly what the new Comcentre stands to be. Singapore is, undoubtedly, one of the world's great cities and we stand ready to work alongside Singtel to create one of the world's great workplaces".

View of the new Comcentre from Eber Road: Artist's impression.

The arrival area at the new Comcentre: Artist's impression.

The development is expected to have a total gross floor area in excess of 110,000 m², comprising two 20-storey buildings with premium grade/Grade A office space, with views of the CBD and the surrounding Orchard precinct. At ground level, a large sheltered arcade and vibrant urban space will offer almost 3,000 m² of F&B, lifestyle and retail space, including Singtel's new flagship store. The proposed design also includes an elevated rooftop park featuring a 300-person auditorium, a running and walking track and an integrated wellness hub.

As anchor tenant, Singtel is expected to occupy about 30% of the total space, inclusive of Singtel infrastructure, in the new development. The redevelopment's dynamic people-centric design is focused on providing a healthy and digitally enhanced workplace.

The new development is expected to be completed in 2028.

Arup launches Centre for Climate Action in Cities

Arup, a global design, engineering and advisory business, recently launched the Centre for Climate Action in Cities (CCAC), in Singapore.

Ms Grace Fu, Minister for Sustainability and the Environment, was the Guest-of-Honour at the launch, together with Ms Jacqueline Poh, Managing Director of the Singapore Economic Development Board (EDB).

Arup's goal is to develop a truly sustainable built environment. It works with leading private and government organisations to address challenges related to climate change, such as decarbonisation, city resilience, green and circular buildings, coastal resilience, and retrofitting or reuse of existing assets.

Supported by the EDB, the CCAC leverages Arup's heritage as a design-led consultancy, its end-to-end capabilities, from strategy to implementation, and network of partnerships, to deliver sustainable, equitable and resilient outcomes in Asia.

Mr Tan Yoong Heng, Arup's Singapore Country Leader, said, "This decade is a critical window of opportunity to rapidly decarbonise our cities and mitigate the impacts of climate change. Using Singapore as the hub for the region, the CCAC will provide innovative climate solutions for cities and organisations to achieve their sustainable urban development goals".

From its operations in Singapore, Arup will be deepening its capabilities in energy, waste and circularity, climate adaptation and water, over the next three years. Through the CCAC, Arup will help private and government organisations navigate risks, identify opportunities, strengthen organisational resilience and implement changes, in response to the climate emergency.

Mr Chintan Raveshia, Arup's CCAC Lead, said, "Cities are responsible for more than two-thirds of global emissions and will need to be the focal point of climate action. The population of urban areas in Asia is predicted to increase to 3.5 billion by 2050. We will need to balance urban demands such as providing homes and infrastructure, while ensuring that this growth does not compromise our environment".

At the launch in Singapore of Arup's Centre for Climate Action in Cities are, from left to right, Kerryn Coker, Co-Chair of Arup in Australasia; Ms Grace Fu, Minister for Sustainability and the Environment; Ms Jacqueline Poh, Managing Director of EDB; and Mr Tan Yoong Heng, Arup's Singapore Country Leader.

Ms Jacqueline Poh, Managing Director of EDB, said, "As cities accelerate their decarbonisation plans, demand for sustainability solutions will continue to grow. Arup's Centre for Climate Action in Cities will help to address this need by building Singapore's capabilities in design, engineering and advisory services, helping companies and governments across the region develop more comprehensive sustainability roadmaps. We look forward to partnering Arup to strengthen our suite of offerings in carbon services".

Enhancing pro-audio education

d&b audiotechnik Asia-Pacific has signed a Memorandum of Understanding (MoU) with Singapore's Republic Polytechnic (RP) to collaborate on a range of initiatives to enhance education, training and career opportunities. The company is part of d&b audiotechnik GmbH & Co KG, a leader in sound reinforcement systems in installed and mobile applications.

The MoU will see leaders from the d&b Education & Application Support, Research & Development, and Design teams work with RP's School of Technology for the Arts, to deliver a range of student-focused education programmes, internships and consultancy services.

RP's School of Technology for the Arts offers a diverse range of diploma courses in the creative industry, nurturing the next generation of creative audio technicians and designers. As part of the MoU, d&b will conduct workshops at RP, invite students to d&b workshops, provide input to student courses, and explore a range of system design and software enhancements. The company will also share innovations in the d&b portfolio of products, demonstrating their benefits in real-world applications. In addition, d&b will assist in developing and delivering Pre-Employment Training and Continuing Education Training.

OTSAW Digital opens its Global Headquarters in Singapore

OTSAW Digital Pte Ltd (OTSAW), a technology innovator, at the forefront of robotic technologies and cutting-edge artificial intelligence, recently opened its Global Headquarters at JTC Space @ Tampines North.

Mr Heng Swee Keat, Deputy Prime Minister and Co-ordinating Minister for Economic Policies was the Guest-of-Honour at the opening ceremony.

OTSAW first started its journey in Singapore and Silicon Valley, back in 2015. The company embarked on a business strategy review, in 2020, to identify opportunities in the robotics value chain, with the support of Enterprise Singapore (EnterpriseSG). Today, its global team operates beyond Singapore, in even Boston and Munich. The total staff strength is expected to increase to more than 100 employees in Singapore alone. Presently, OTSAW has direct customers in more than 20 countries and over 600 robots deployed worldwide. With EnterpriseSG's in-market advisory and assistance, OTSAW will be looking to expand the deployment of its robotics solutions to more markets in EU and US.

Mr Ling Ting Ming, Founder and Chief Executive Officer of OTSAW, said, "The rate of change that I have seen over the last five years is something unprecedented. We are living in another paradigm shift and it is a different world today post-pandemic. OTSAW has developed smart robotic solutions for multiple industries to help businesses boost productivity, reduce reliance on manpower and automate processes in the realms of Security, Delivery and Cleaning".

OTSAW's Global Headquarters occupies two levels at JTC Space @ Tampines North, with a floor area of approximately 20,000 ft². This new facility houses OTSAW's factory for final assembly of its robots.

Mr Heng Swee Keat, Deputy Prime Minister and Co-ordinating Minister for Economic Policies (third from left) was the Guest-of-Honour at the Official Opening of OTSAW Digital's Global Headquarters.

Camello, a last-mile delivery robot, was developed by OTSAW to disrupt and transform the current logistical process. It has a 100-litre compartment volume which can carry up to 20 kg and is also equipped with UV-C LED to prevent cross-contamination between different users.

The unit also houses an Experiential Centre which showcases the entire range of OTSAW's products.

Mr Cheang Tick Kei, Director of Precision Engineering and Advanced Manufacturing Cluster, JTC, said, "Robotic manufacturers like OTSAW present exciting possibilities for Singapore's urban environment. We are happy to support OTSAW's growth journey by providing a platform to testbed pioneering technologies and scale up production, in our industrial estates. We hope to foster a strong spirit of collaboration and allow innovations to flourish among our industry ecosystem".

The demand for Global Autonomous Mobility Robots (AMRs) and Automated Guided Vehicles (AGVs) is projected to increase sharply in the years ahead. This is due to a shortage of manpower for labour-intensive jobs.

HIMA signs MoU with NUS ChBE to enhance education in functional safety and security

HIMA, a leading provider of safety-related automation solutions, recently signed a Memorandum of Understanding (MoU) with the Department of Chemical and Biomolecular Engineering (ChBE) under the National University of Singapore's College of Design and Engineering (NUS CDE). The partnership will contribute towards nurturing competent engineers in the field of functional safety and security.

The MoU was signed by Mr Friedhelm Best, Vice-President Asia Pacific, HIMA and Associate Professor Chai Kah Hin, Vice Dean of Masters' Programmes and Lifelong Learning at NUS CDE.

As Singapore continues to push towards advanced manufacturing, HIMA and NUS CDE recognise the need for future engineers to be equipped with adequate skills and a strong foundation in functional safety and security.

"The Asia Pacific region has always been an important core market for us. For more than 30 years, we have been expanding in Asia. Our recently launched Customer Solutions Center in Singapore is a testimony to our continued commitment to this region, to support regional societal initiatives, and to nurture industries with safety and security competencies. We are proud to call Singapore home and we are committed to continue serving Singapore and the Asia Pacific, moving forward", said Mr Jörg de la Motte, CEO, HIMA.

Establishing a partnership between HIMA and NUS ChBE

As Singapore has solidified its reputation as a regional education hub, HIMA will assist in shaping and nurturing young engineering talents in the Asia Pacific region. Under the new partnership, HIMA and NUS ChBE will proactively organise activities to promote educational excellence in functional safety.

After the signing of the MoU are, from left, Mr Jörg de la Motte, CEO, HIMA; Associate Professor Chai Kah Hin, Vice Dean of Masters' Programmes and Lifelong Learning at NUS CDE; Mr Friedhelm Best, Vice-President Asia Pacific, HIMA and Associate Professor Ivan Sin, Programme Chair for Masters of Science in Safety, Health & Environmental Technology at NUS CDE.

HIMA and NUS ChBE will collaborate in the following areas:

- Organising training sessions and seminars to enhance education in functional safety and security.
- Enabling NUS ChBE students to observe the actual operations within critical infrastructures, at the HIMA Customer Solutions Center.
- Jointly developing use cases to demonstrate how functional safety will assist Singapore's transition towards advanced manufacturing.
- Enabling NUS ChBE students to gain practical industry experience through internship opportunities offered by HIMA.
- Jointly pursuing research on the potential of safe low-carbon hydrogen technology pathways.

"We are delighted to announce our collaboration with NUS Department of Chemical and Biomolecular Engineering. Together, we hope to improve functional safety and security knowledge to enhance engineering education. We foresee HIMA performing a pivotal role in energising young engineers for future STEM career opportunities and further supporting the nation's growth in advanced manufacturing", said Mr Friedhelm Best, Vice-President Asia Pacific, HIMA.

"We are honoured to partner HIMA, a world-leading specialist in safety-related automation, to develop field-worthy solutions and upskill the next generation of engineers. Our collaboration with HIMA will create meaningful opportunities for our students. Together with HIMA, we look forward to building a stronger pipeline of engineering talents", said Associate Professor Chai Kah Hin, Vice Dean of Masters' Programmes and Lifelong Learning at NUS CDE.

"The knowledge and skills that our students gain in the classroom, along with the hands-on opportunities offered by HIMA, will empower students with the confidence and competencies to solve complex real-world problems. This exciting collaboration with HIMA will better prepare our students for their engineering careers", said Associate Professor Ivan Sin, Programme Chair for Master of Science in Safety, Health & Environmental Technology at NUS CDE.

SGS and Siemens join forces to provide sustainability consulting in Southeast Asia

SGS and Siemens Pte Ltd have signed a Memorandum of Understanding (MoU) to provide sustainability consulting to companies in Southeast Asia. The partners will advise companies and help them to audit and measure their Environmental, Social and Governance (ESG) efforts. They will also provide recommendations to help businesses become more sustainable, safe and efficient.

ESG has become more important to businesses, investors, policymakers and consumers, among other key stakeholders, over the last few years. It is a way to safeguard businesses from future risks, preserve the environment, reduce costs, forge trust among customers and even attract talent.

SGS is a leading international testing, inspection and certification company. It has been a leader in sustainability and ESG services for over 30 years. With involvement in all major industries, the company has the technical expertise and logistical capabilities to ensure realistic sustainability outcomes. SGS also has experience in using widely used protocols and standards like the Greenhouse Gas (GHG) Protocol and ISO 14064.

Signing the MoU are, from left, Mr Sascha Stolar, Head of Finance and Vice President of Smart Infrastructure Regional Solutions & Services, Southeast Asia, Siemens Pte Ltd and Mr Allan Jayaravin, Managing Director of SGS Singapore.

Siemens is a focused technology company with a large environmental portfolio that helps tackle challenges in the areas of environmental protection, decarbonisation, health and safety. It has been providing sustainability consulting services to many enterprise customers in Singapore on their decarbonisation journeys and Science Based Target initiatives to help in limiting global warming to 1.5°C.

"SGS is extremely dedicated to adding value to society. One way we do this is by helping other companies improve their sustainability performance, so they can have a positive impact on society. Our partnership with Siemens is a perfect match of expertise and, together, we bring holistic sustainability solutions to customers", said Mr Allan Jayaravin, Managing Director of SGS Singapore.

"As a technology company, we are driven by the aspiration to address the world's most profound challenges by leveraging the convergence of digitalisation and sustainability. We have the expertise to combine the real and digital worlds. Together, with SGS, we will be able to help our customers drive high-value, sustainable growth", said Mr Sascha Stolar, Head of Finance and Vice President of Smart Infrastructure Regional Solutions & Services, Southeast Asia, Siemens Pte Ltd.

Green hydrogen is a key to unlocking energy security in Europe

Siemens Gamesa recently released a white paper, 'Unlocking European Energy Security', outlining the energy supply challenges facing Europe and the actions needed to bring about stability and energy security, while addressing the climate emergency and delivering decarbonisation.

Geopolitical events have elevated energy security to the forefront of European governments' concerns, both in terms of securing independent supply and securing predictable prices for the consumer.

In the years to the EU's 2050 deadline for climate neutrality, renewable energy and green hydrogen will be of pivotal importance. In delivering energy security with clean, affordable and domestically produced clean energy and fuels, large-scale decarbonisation is possible.

Five levers hold the key to achieving this objective:

- Increasing the volume of renewable energy produced in Europe.
- Initiating green hydrogen infrastructure for transportation and distribution and developing a stable hydrogen trading market.
- Innovating storage solutions for continuity and predictability of supply and introducing legislation to enable sector coupling to balance electricity demand and green hydrogen production.
- Introducing legislative and regulatory tools to create a market for EU-generated green hydrogen with guaranteed cost comparison against fossil fuel-based imports.
- Industrialising the scale of production of electrolysers to meet the demand in Europe.

Stuttgart to host exhibition on industrial parts and surface cleaning in October 2022

parts2clean 2022, the leading international trade fair for industrial parts and surface cleaning, and the 19th edition of the event, will be staged from 11 to 13 October 2022, at the Stuttgart Exhibition Center, Germany.

The event will highlight the major changes in industrial parts and surface cleaning technologies in all sectors of industry, including automotive engineering and suppliers, mechanical engineering and sensor technologies, aerospace engineering, energy technologies and the semiconductor supply industry.

New and modified products as well as technologies for the manufacture of industrial parts and for surface cleaning require new adapted solutions. This is also the case with the recycling of raw materials and the remanufacturing of products, which are becoming increasingly important due to a shortage of raw materials and the need to conserve resources.

Added to this are trends like digitisation and AI, as well as stricter regulatory requirements and climate protection objectives.

"parts2clean addresses all these challenges. Every segment of industrial cleaning technology and all of the relevant suppliers are represented at this flagship fair which offers a comprehensive overview of trends, technologies, procedures and processes", said Mr Hendrik Engelking, Global Director at Deutsche Messe, organisers of the event.

Cross-sector solutions and a wide variety of materials

With its cross-industry offerings and broad range of materials on display, parts2clean enables users from all sectors of manufacturing, as well as from reconditioning and recycling, to learn about the latest cutting-edge solutions for industrial cleaning technology and directly compare the various technologies – from wet chemical processes, energy-efficient drying solutions, cleaning containers and workpiece carriers to technologies for dry cleaning such as those based on CO_2 snow blasting, plasma, laser, vibration and compressed air processes. Other areas include the control, monitoring and inspection of cleaning, rinsing and drying processes.

parts2clean 2022 is the leading international trade fair for industrial parts and surface cleaning.

Innovative solutions will also be presented in the areas of cleaning automation, including parts handling, developments for the intelligent integration of cleaning processes into connected manufacturing environments and cloud solutions. There will also be a focus on cleanliness-compliant manufacturing environments such as cleanrooms.

Knowledge transfer at bilingual forum

The simultaneously translated (German and English) presentations by well-known speakers from the fields of science, research and industry, at a three-day specialist forum, will provide added value to parts2clean 2022.

The presentations this year will once again be streamed live on the event website.

(More information may be obtained from www.parts2clean.com. Please also see Pages 34 to 35)

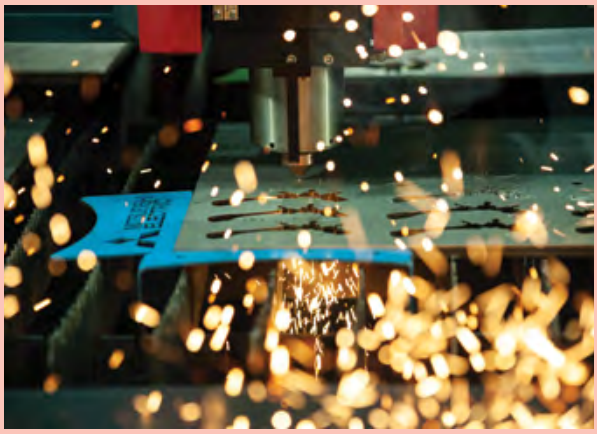
ISA announces 2022 Automation and Leadership Conference

The International Society of Automation (ISA) has announced that its 2022 Automation and Leadership Conference will be held from 7 to 9 November 2022, in Galveston, Texas, USA.

Attendees may participate in person or virtually, and will have opportunities to interact and network with ISA leadership and subject-matter experts from the US, Canada, Middle East, Brazil, Malaysia, Spain, and India.

In addition to conference sessions, attendees can visit exhibitor booths and attend the ISA Honors and Awards Gala.

Trade show for the sheet metal working community to highlight smart solutions



After four years, the sheet metal working community will be meeting at EuroBLECH 2022, the 26th International Sheet Metal Working Technology Exhibition. The event will be held from 25 to 28 October 2022, at the Hanover Exhibition Grounds in Germany.

Four months ahead of the show, around 1,300 exhibitors from 39 countries had already confirmed their participation at the world's leading trade exhibition for the sheet metal working industry. The countries represented by the exhibitors are mainly Germany, Italy, Turkey, China, Switzerland, the Netherlands, Spain, Belgium, Poland, Austria, Portugal and the US. Exhibiting companies have already secured a net exhibition space of 88,600 m².

"A lot of innovations have been developed in the past few years, with a focus on cost and resource efficiency. While digitalisation and Industry 4.0 were topics only large companies were highlighting at the previous EuroBLECH, these key drivers have now reached the factories of small and medium-sized companies, too. Exhibitors at this year's event will present everything they have on offer to innovate and digitalise the manufacturing process, along the entire sheet metal working technology chain", said Ms Evelyn Warwick, Event Director of EuroBLECH, on behalf of the organiser, Mack-Brooks Exhibitions.

"All these developments are reflected in this year's motto for EuroBLECH, 'Your gateway to a smarter future'. The event will offer everyone in the community the opportu-

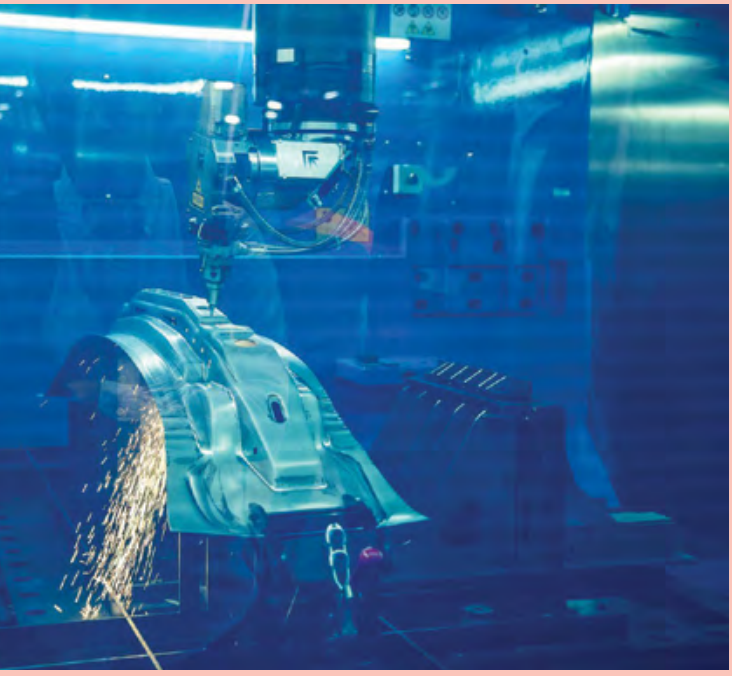
Exhibits at previous editions of EuroBLECH.

nity to come together and see what the future of sheet metal working looks like. EuroBLECH offers its visitors the possibility to find solutions for the recent challenges in the industry and connects them with businesses from all over the world to help them integrate the latest machinery and software into their manufacturing process", she added.

EuroBLECH attracts design engineers, production managers, quality managers, buyers, manufacturers, technical directors and experts from associations and R&D, who are keen to discover the latest trends and machinery in sheet metal working. Visitors to this year's show can expect to see a complete spectrum of intelligent solutions and innovative machinery for sheet metal working. There will also be numerous live demonstrations of the products on display at the exhibition stands.

"With international travel restrictions to enter Germany from abroad fully lifted, we cannot wait to welcome back our international audience to the world's leading sheet metal working technology exhibition. Our exhibitors are already busy preparing for their participation in the long-awaited return of the show in October. Equally, we are getting a lot of requests from visitors planning their trip and visa", said Ms Warwick.

The EuroBLECH 2022 exhibition profile includes 15 technology sectors, covering the entire sheet metal working technology chain – sheet metal, semi-finished and finished products, handling, separation, forming, flexible sheet metal working, tube/section processing, joining, welding, additive manufacturing, surface treatment, processing of hybrid structures, tools, quality control, CAD/CAM/CIM systems, factory and warehouse equipment as well as R&D.



Singapore International Energy Week 2022 to be held in October

Organised by Energy Market Authority (EMA), Singapore International Energy Week (SIEW) 2022 will be held, from 25 to 28 October 2022, at Sands Expo and Convention Centre, Marina Bay Sands, Singapore.

'A Resilient and Sustainable Energy Future' is the theme for SIEW 2022. The theme reflects how the global energy community has accelerated the pursuit of a greener future. Following the 26th United Nations Climate Change Conference of the Parties (COP26) last year, there is a strong momentum for countries to do more to decarbonise their economies and ride the green wave, to reduce emissions.

Recent events have also shown how sensitive energy markets are to geopolitical events, pushing energy security to the forefront of the global agenda. Asia, which accounts for almost half of the global energy demand, urgently needs to accelerate the deployment of renewables, fortify grid infrastructure, strengthen supply chain resilience of key fuels and develop regional interconnections to enhance security, while keeping electricity accessible and affordable. Massive investments into regional grid connections, green infrastructure, electrification, green financing, technologies and supply chains for hydrogen, and carbon capture, utilisation and storage (CCUS), are needed to support the clean energy transition.

Against this backdrop, SIEW 2022 will discuss how the global energy community can ensure secure, diverse and resilient energy supply even as the world undergoes an energy transition. There will also be a focus on how governments and industries will work together to catalyse regional grid development and global supply chains for low carbon solutions such as hydrogen and CCUS, and advance the development of renewable energy solutions such as geothermal and nuclear.

SIEW 2022 will also address the creation of an enabling environment to enhance innovation, research & development, and global collaboration, in energy transition. The event will also discuss the opportunities and challenges, as the region scales up investments for a green economy, and the roles that investors and financiers can play.

The SIEW 2022 theme was announced at the hybrid Global Launch event featuring speakers from the International Energy Agency (IEA), International Renewable Energy Agency (IRENA), Siemens Energy, Sembcorp and SMBC. It also saw the launch of the Southeast Asia Energy Outlook 2022 report by IEA, and the World Energy Transition Outlook report by IRENA.

Highlights at SIEW 2022

SIEW 2022 marks the 15th edition of Asia's premier energy event. To commemorate this milestone, SIEW is launching a new podcast series, 'SIEWCast'. The SIEWCast series will feature energy thought leaders sharing their views on the energy transition through to 2050, as well as their strategic insights into our energy future.

SIEW will also feature exciting elements to welcome more delegates back, in-person. Attendees can expect a line-up of exhibitions, networking receptions and a SIEW 15th Anniversary showcase this year, to enhance their onsite experience. Also this year, SIEW will introduce Techtables to complement the successful Thinktank Roundtable series. SIEW Techtables will focus discussions on the latest energy innovations and technologies.

SIEW's anchor events, the SIEW Opening Keynote Address and the Singapore Energy Summit, will also bring together energy ministers, industry captains and international organisation chiefs to address timely topics to set the scene for discussion across the week, including on (i) Securing a Sustainable and Resilient Energy Future, (ii) Accelerating Low-Carbon Solutions and (iii) Mobilising Greener Financing for Energy Infrastructure.

Singapore will also partner international energy organisations to host key events. These include (i) the Singapore-IEA Ministerial Roundtable that will focus on Energy Security in a Low Carbon World and (ii) the 2nd Singapore-IRENA High-level Forum on energy investments, green financing and the launch of the end-user electrification report.

SIEW 2022 will also welcome the return of the Asia Clean Energy Summit (ACES), Asian Downstream Summit (ADS), Future of the Grid, and LNG and Hydrogen Gas Markets Asia as partner events.

More information on SIEW 2022 can be obtained at https://www.siew.gov.sg. Registration is now open.

The latest solutions for the glass and façade industry to be presented

GLASSTECH ASIA
FENESTRATION ASIA
26-28 October 2022 · Singapore

Glasstech and Fenestration Asia 2022 will be held at the Sands Expo and Convention Centre, Marina Bay Sands, Singapore, from 26 to 28 October 2022.

It will be the first physical event to be held in Singapore, in three years, for the glass and façade industry.

"It has been over three years since the last edition of Glasstech and Fenestration Asia enabled the regional industry to, learn, network, and grow together. Now, more than ever, as Southeast Asia emerges from the grip of COVID-19, it is important for the industry to come together in one place and share, showcase and explore solutions to address the challenges the industry now faces. Glasstech and Fenestration Asia 2022 will ensure this occurs", said Mr Michael Wilton, CEO & Managing Director of MMI Asia, organisers of the event.

At Glasstech and Fenestration Asia 2022, leading suppliers of glass manufacturing machinery and façade equipment and technologies will present their latest technologies and solutions to key regional industry buyers.

Also, key associations including the Malaysia Glass Association, Singapore Glass Association, Vietnam Glass Association, Philippines Chambers of Glass & Aluminium, Flat Glass Alliance of the Philippines, Safety Glass Processors Association of Malaysia, Indonesia Flat Glass Association, Glass Manufacturing Association of the Federation of Thai Industries, Thai Plate Glass Industry Association, Malaysian Façade Industry Association, Society of Interior Designers Singapore, Singapore Green Building Council, and Malaysia Green Building Council, will all attend the event with delegations.

This is in addition to the Indonesian Façade Association, PERAFI, that Glasstech Asia has a continuing relationship with, providing quarterly webinars to the industry.

"Glasstech Asia is an integral part of Southeast Asia's glass network. Every year, glass professionals and businesses in the region look forward to congregating to exchange ideas and information. The exhibition and conference raise the level and add to the vibrancy of the glass industry", said Mr Gan Pay Yap, Chairman of Singapore Glass Association.

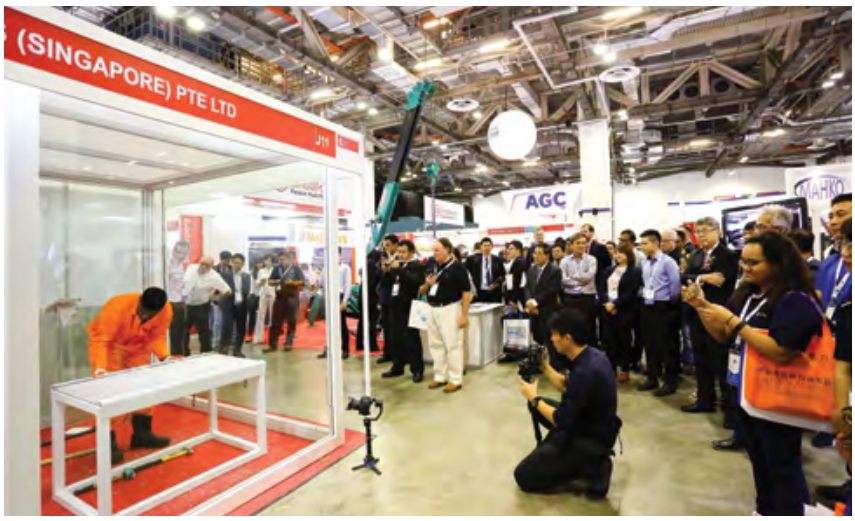
"As an ardent supporter of Glasstech Asia and after a long, three-year wait, MGA is finally able to be part of this annual event again. With the relaxing of the COVID protocols and markets opening, we anticipate the regional industries to gradually regain their footing and capitalise on new opportunities in the new post-COVID environment. This event will provide an excellent platform for regional industries to engage, network and keep abreast of the latest technologies and solutions, to meet the challenges of the industry", said Mr Joe Lam, Chairman of Malaysia Glass Association.

In addition to regional groups, key suppliers displaying their machinery, technologies, equipment, knowhow and solutions, include major international companies like Guardian Glass, Hegla, Dow and Shin-Etsu, all of whom are taking significant space on the show floor.

The exhibition will be complemented by a strong conference programme. The highlight of the conference will be a keynote presentation from Dato Dr Ken Yeang of TR Hamzah & Yeang Sdn Bhd.

The event will also include the official Glasstech and SGA Gala Dinner, the Networking Evening and the 'International Year of the Glass Display'.

(More information on the event may be obtained from https://glasstechasia.com.sg/)



Visitors viewing a live demonstration at a previous in-person Glasstech Asia exhibition. Image: Glasstech Asia.

Upcycling of old solar panels into thermoelectric material

A Singapore team develops new technology.

A team of scientists from the Agency for Science, Technology and Research (A*STAR) and Nanyang Technological University, Singapore (NTU Singapore) has developed technology that can turn old solar panels into a new high-performance energy-harvesting thermoelectric material which harvests heat and converts it into electricity.

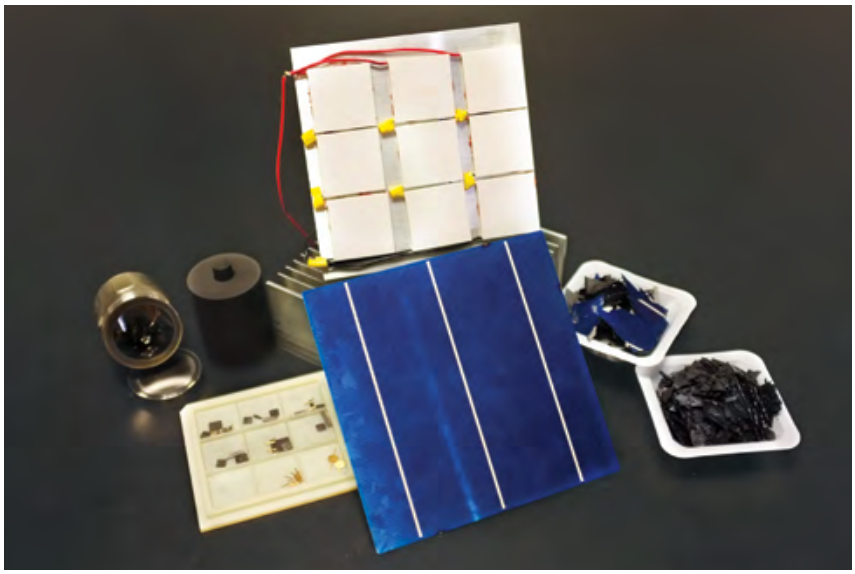
The joint study was published in the scientific journal, Advanced Materials, in March 2022.

With the increased use of renewable solar energy over the last few decades, and a limited lifespan of 30 years for solar panels, the global waste generated by the silicon from expired solar panels is projected to hit 8 million tonnes by 2030 and 80 million tonnes by 2050 [1].

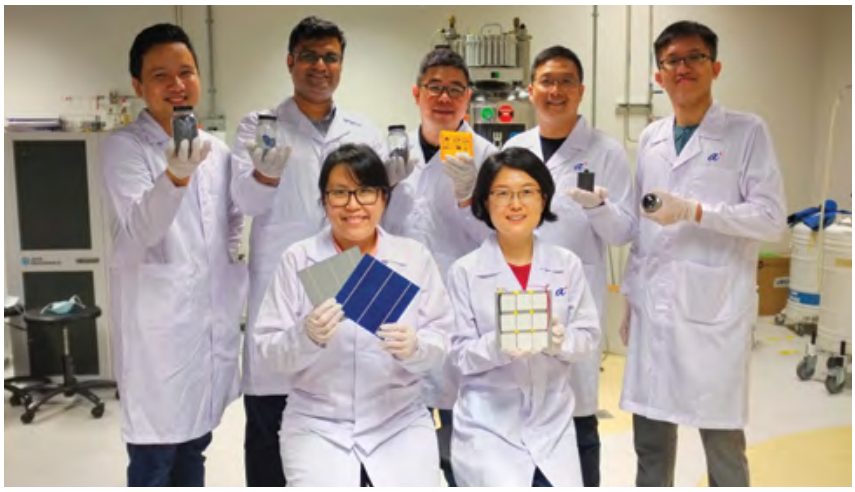
Solar panels are made up of solar cells which contain a complex mix of various materials such as aluminium, copper, silver, lead, plastic and silicon. Separating such materials and recycling each of them in a unique way is a complex and costly process. Currently, recycling approaches recover mainly the glass and metallic support structures from the solar panels.

Silicon, which makes up 90% of solar cells, normally ends up in landfills. Recycled silicon has impurities and defects that prevent the production of functional solar cells. Therefore, it is difficult to recycle silicon from solar panels, at the end of their life-span, and use it in the production of new solar cells or as an input for other silicon-based technological processes.

The A*STAR-NTU Singapore team turned this limitation into opportunity, by developing technology to transform expired solar cells into enhanced thermoelectric material. This technology capitalises on the contrasting properties of thermoelectrics, where the presence of impurities and defects enhances rather than diminishes performance.



Old solar panels (shown at the bottom of the image) can be upcycled into valuable heat-harvesting materials such as thermoelectric modules (shown at the top of the image).



*The team of scientists from A*STAR and NTU Singapore that developed technology to convert old solar panels into a new thermoelectric material comprises, clockwise, from top left, Tay Yeow Boon, NTU Singapore; Associate Professor Nripan Mathews, NTU Singapore; Dr Ady Suwardi, A*STAR; Dr Jing Wu, A*STAR; Tan Yi Xian, A*STAR; Dr Cao Jing, A*STAR; and Dr Sim Ying, NTU Singapore.*

Scientists from A*STAR's Institute of Materials Research and Engineering (IMRE) and Institute of High Performance Computing (IHPC), led by Dr Ady Suwardi, Deputy Head of the Soft Materials research department at IMRE, contributed their expertise in material properties and computational modelling, respectively, to determine the optimal composition of materials.

Scientists from NTU Singapore's Singapore CEA Alliance for Research in Circular Economy (SCARCE), led by Associate Professor Nripan Mathews, leveraged their expertise in extracting valuable materials from solar waste to develop the technologies required for recovery of silicon from solar panel waste.

To impart thermoelectric characteristics such as power conversion and cooling efficiency to waste silicon and to enhance the performance of the upcycled silicon-based thermoelectrics, the team first pulverised solar cells into fine powder using ball milling technology. Next, phosphorus and germanium powder were added to alter their original properties before the powder combination was processed under high heat and temperature using spark plasma sintering.

After evaluating the electrical property of various combinations, the team produced a sample offering the most optimised thermoelectric performance, with a thermoelectric figure of merit (zT) of 0.45 at 873 K – the highest amongst elemental silicon thermoelectrics.

"This study demonstrates that thermoelectrics is a fertile ground for upcycling defect- and impurity-sensitive semiconductors", said Dr Ady Suwardi, Team Lead, from IMRE.

"Our goal is to create sustainable materials, extend the life cycle of various products and reduce waste to cultivate a circular economy, and we can only do this through partnership with institutes of higher learning and other collaborators from the local R&D ecosystem", added Dr Jing Wu, Scientist, from IMRE, who was co-corresponding author of the paper, together with Dr Suwardi.

"Furthermore, this project demonstrates the concept of phononic engineering, an efficient and useful approach that offers full control of the thermal conductivity of solids", said Dr Gang Zhang, Senior Scientist from IHPC.

Co-corresponding author, NTU Associate Professor Mathews, who is also the Cluster Director of Renewables & Low-Carbon Generation (Solar) at the Energy Research Institute @NTU (ERI@N), said, "Advanced technologies to tackle the growing solar e-waste problem need to be urgently developed due to the massive scale of solar photovoltaics being installed worldwide. As a part of the SCARCE research centre supported by the National Environmental Agency (NEA), we are working on a variety of innovations that can turn trash to treasure, thus opening new economic growth areas for waste management and recycling".

"Leveraging our resource recovery techniques and in collaboration with A*STAR, we have proven that it can yield valuable materials that are of high-quality and useful in the manufacturing of renewable energy components, which in this case, is the development of a high-performance thermoelectric material that can harvest heat and turn it into electricity", he added

This effort highlighted the intertwined research by SCARCE, whereby silicon recovered from solar panel waste is being upcycled by A*STAR into silicon-based thermoelectrics for harvesting of electricity from heat. The team will also look to pilot the technology for large-scale upcycling of waste silicon which can be used for high-temperature energy harvesting applications such as converting heat generated from industrial waste processes into electricity.

This research collaboration signifies NTU's commitment to its 2025 Strategic Plan, where sustainability and innovation for a circular economy are key pillars. It also supports the NTU Sustainability Manifesto which charts the university's course for sustainability, carbon neutrality and societal impact.

This initiative is also in line with A*STAR's efforts to develop sustainable solutions for energy efficiency and waste management.

References

[1] G A Heath, T J Silverman, M Kempe, M Deceglie, D Ravikumar, T Remo, H Cui, P Sinha, C Libby, S Shaw, Nat Energy 2020, 5, 502.

Solar PV recycling market to be worth USD 2.7 billion by 2030

The demand for recycled solar photovoltaic (PV) panel components is set to skyrocket in the coming years, as the number of installations surges and the threat of a supply bottleneck looms.

Analysis by Rystad Energy shows that recyclable materials from PV panels at the end of their lifespan will be worth more than USD 2.7 billion in 2030, up from only USD 170 million this year. This trend will only accelerate in the following decades and the value of recyclable materials is projected to approach USD 80 billion by 2050.

Rystad Energy is an independent energy research and business intelligence company providing data, tools, analytics and consultancy services to the global energy industry.

PV recycling is still in its infancy, but is seen as an essential element of the energy transition, with solar PV waste projected to grow to 27 million tonnes per annum by 2040. Rystad Energy's forecasts show that recovered materials from retired panels could make up 6% of solar PV investments by 2040, compared to only 0.08% today.

Demand for the materials and minerals used in solar PV is set to climb with the energy transition, with higher prices a likely result. The International Energy Agency's net-zero emissions scenario targets 40% of the world's power in 2050 being generated by solar energy but Rystad Energy predicts it will reach 53%.

Enabling a predictive maintenance regime for lifts in Singapore

This would mean reduced downtime and improved reliability of lifts and higher manpower productivity.

Lift service contractors are currently required to maintain lifts at least once a month. This is typically based on preventive maintenance regimes. The advent of Remote Monitoring & Diagnostics (RM&D) technology, leveraging sensors and algorithms to analyse data collected by these sensors (popularly known as Artificial Intelligence or AI), has enabled a shift toward predictive maintenance regimes.

JTC's RM&D trials

Since 2018, JTC has been bringing lift manufacturers and technology partners together, to develop new RM&D solutions. JTC embarked on a pilot trial, with lift companies, KONE and Schindler, and third-party RM&D solutions provider, TÜV SÜD, that involved 174 lifts in JTC's CleanTech Park and one-north. This is part of JTC's plans to digitalise the built environment sector by using smart solutions in facilities management.

The trial focused on the proof-of-concept of the RM&D solution, and testing to determine whether lift faults can be accurately detected, diagnosed and predicted. When the diagnostics algorithms learn and analyse the data from the sensors, a higher level of accuracy can be achieved.

The trials achieved promising results. The RM&D solution achieved an accuracy rate of 85% in predicting lift faults, allowing predictive maintenance to be carried out to prevent lift faults from occurring, and reducing the likelihood of lift breakdowns. This meant that lift users were able to benefit from reduced downtime and improved reliability of the lifts. The RM&D solution also increased manpower productivity by 25%, for example, by reducing the time needed for a lift engineer / technician to repair faults. The Building and Construction Authority (BCA) observed that there were no safety issues during the trials. Riding on this success, JTC will be rolling out RM&D solutions to another 180 lifts over the next two years.

Mr Heah Soon Poh, JTC's Assistant CEO, Engineering & Operations Group, said, "The current lift maintenance model relies heavily on manpower and is not sustainable in the long run. By working with lift manufacturers and technology partners, we were able to develop a new lift maintenance model and demonstrate how it can accurately predict lift faults, while improving productivity in lift maintenance. Such trials are critical to fast-track industry-wide adoption and support Singapore's push for smart facilities management".

Regulatory sandbox for lifts equipped with RM&D solutions

To support the implementation of RM&D in the industry, BCA has developed a Code of Practice for Design and Performance of Remote Monitoring & Diagnostics Solution for Lifts (COP) for RM&D in Singapore, and will make changes to the Building Maintenance and Strata Management (Lift, Escalator and Building Maintenance) Regulations 2016, to implement a regulatory sandbox for lifts equipped with a compliant RM&D solution. A compliant RM&D solution is one that is able to meet the requirements under the COP.

Under the regulatory sandbox, from 1st August 2022, a lift owner, together with the lift service contractor and RM&D solution provider, can apply to BCA for lifts equipped with compliant RM&D solutions to be allowed a longer maintenance interval. This means the lifts will have to be maintained at least once every three months. Lift service contractors will also need to maintain the lifts, in accordance with the recommendations of the RM&D solution.

BCA has developed the COP in consultation with the local lift industry and has incorporated insights from the pilot trials with JTC and its partners. The COP is the first of its kind in the world and was endorsed by a panel of local and overseas experts, at an inaugural virtual roundtable, on RM&D in March 2021.

BCA will closely monitor lifts in the regulatory sandbox to ensure that lift owners and contractors carry out their duties and responsibilities in maintaining the lifts, and that there are no safety issues.

Higher-value jobs for locals

Mr Kelvin Wong, CEO of BCA, commented, "Jobs under the RM&D regime will be much more engaging. Lift technicians will need to be highly skilled and competent in both lift maintenance and using cutting-edge analytical tools. New technologies are transforming jobs in the built environment sector. Lift maintenance technicians shall command a higher value-add, as the workforce becomes leaner and more competent in the long run".

The adoption of RM&D solutions is also aligned with the Lift Progressive Wage Model (PWM) which charts out career progression pathways, sustainable wage increases and targeted training for the lift industry. Under the PWM, lift technicians could progress to a supervisory role, leading their own team of technicians or become a specialist in their field. Moving forward, adoption of the PWM will be made a mandatory registration requirement for all lift and escalator maintenance firms.

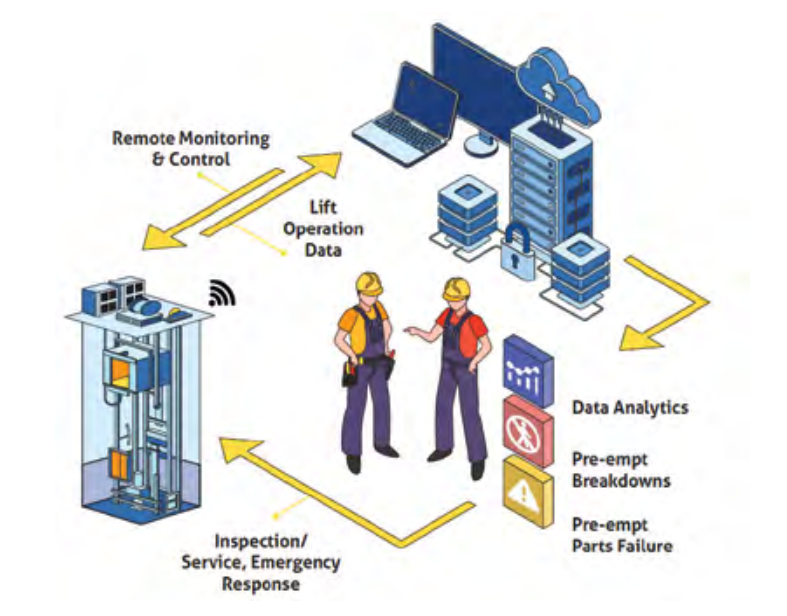
Remote Monitoring & Diagnostics solutions

A Remote Monitoring & Diagnostics (RM&D) solution for lifts refers to a system that continuously collects and performs analysis of the data collected, for detection, diagnosis and prediction of issues in lifts that require maintenance. Such advanced technology has the potential to improve lift safety and reliability, reduce reliance on manpower as well as provide an attractive job proposition for Singaporeans. To incentivise the adoption of RM&D, BCA is looking at allowing a longer maintenance interval for lifts equipped with RM&D solutions, under a dedicated RM&D regulatory regime.

The following are examples of parameters that can be monitored and that enable the acquisition of information on them:

- Lift movement
- Position
- Car and landing calls
- Lift status
- Door motion
- Lift faults

More sophisticated systems allow users to obtain other information such as the total hours of maintenance per unit, total cumulative breakdowns, total cumulative repair hours and failure rates, and possess features that improve the systems' capabilities to detect, diagnose and predict issues in lifts that require maintenance.



The application of Remote Monitoring & Diagnostics (RM&D) technology helps to reduce downtime and increase the reliability of the lifts.

Maintenance regime for approved RM&D lifts

Currently, all lifts must be maintained at least once every month. Lift service contractors must meet 20 prescribed lift maintenance outcomes during the monthly maintenance.

With effect from 1 August 2022, a lift owner, together with the RM&D solution provider and lift service contractor, may apply to BCA to allow their lifts, installed with an RM&D solution, to be maintained at three-month intervals. BCA would require the following information to assess the application:

- Performance data of the lifts (including maintenance findings detected by the RM&D solution and servicing records) for at least six months.
- Documentation demonstrating that the RM&D solution is compliant with the Code of Practice for Design and Performance of Remote Monitoring & Diagnostics Solution for Lifts (COP).

Upon written approval of the application, the lift service contractor may carry out maintenance works at three-month intervals. The contractor will also need to maintain the lift, in accordance with the recommendations of the RM&D solution. The Commissioner of Buildings (COB) may also impose other conditions for the approval.

1. Door open control
2. Door protective devices
3. Lift car and landing doors (gaps)
4. Lift car emergency alarm
5. Lift car intercom
6. Emergency power supply for Lighting & ventilation
7. Movement of lift car
8. Housekeeping
9. Lift machine and drive
10. Brakes of lift machine and drive
11. Direct current machine
12. Governor
13. Main ropes and compensation ropes
14. Compensation rope and sheave tie-down and tensioning
15. Buffer
16. Controller and electrical system
17. Guide shoes or rollers of lift car and counterweight
18. Safety gears
19. All lift parts (for corrosion and wear)
20. Stopping or level accuracy

Prescribed lift maintenance outcomes during monthly maintenance.

Advancing digital innovation in the management of buildings

The aim is to achieve the optimisation of outcomes.

Combining 137 years of domain knowledge in the built environment industry with cutting-edge digital technology, Johnson Controls is now delivering impactful sustainability, new experiences as well as safety and security, through OpenBlue – a complete suite of connected solutions.

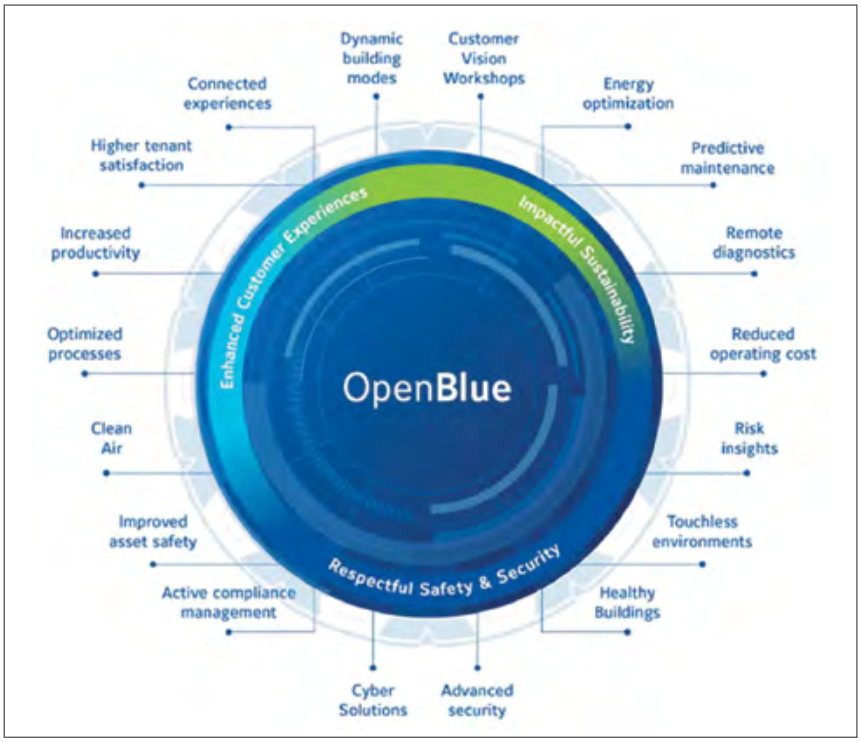
The company has one of the largest portfolios of technologies and solutions for buildings in the world, including Building Automation Systems (BAS); Heating, Ventilation, Air-Conditioning and Refrigeration (HVAC&R) systems; as well as fire protection and security systems.

OpenBlue

Launched in 2020, OpenBlue was designed with agility, flexibility and scalability in mind, to enable disparate building systems to work together and communicate with one another. It comprises a catalogue of both software and connected products that use technology to connect, predict, manage and optimise building operation and business outcomes.

OpenBlue stretches across the company's entire portfolio and spans industry verticals, solution suites, software and technology, and beyond. This includes energy-efficient YORK chillers connected to the OpenBlue cloud with AI, thus allowing for remote diagnostics and predictive maintenance; as well as comprehensive packages to deliver a broad set of outcomes, such as OpenBlue Healthy Buildings and OpenBlue Net Zero Buildings.

The digital innovation in the company is advanced by OpenBlue Innovation Centers across the world, working round-the-clock and showcasing how advanced technologies are creating smart buildings of the future. The network is expanding and now, Johnson Controls has nine OpenBlue Innovation Centers, including in Cork, Ireland; Pune, India; San Jose, USA; Singapore; and Wuxi, China. All of the centres are designed for seamless, expeditious collaboration between expert teams.



OpenBlue's complete suite of connected solutions. Image: Johnson Controls.

OpenBlue Innovation Center in NUS SDE4. Image: Johnson Controls.

OpenBlue Innovation Center in Singapore

The OpenBlue Innovation Center in Singapore is a key node in this global network, leveraging the rich ecosystem of innovators in Singapore and the region. In collabo-

ration with National University of Singapore (NUS) and Singapore Economic Development Board (EDB), the centre was launched in 2020 with four key pillars:

- Solution innovation and co-creation
- Platform and solution engineering
- Research and innovation
- Ecosystem orchestration

Located at SDE4 in NUS, the 240 m² centre is a living laboratory for a new breed of customisable, contact-free applications built on OpenBlue. The centre is packed with sensors to measure temperature, humidity, Indoor Air Quality (IAQ) and occupancy levels, and other parameters, within facilities. It deploys Johnson Controls Metasys Building Automation System and will have the OpenBlue Enterprise Manager (OBEM) software, enabling SDE4 to further reduce its carbon footprint.

The digital twin of the centre serves as a model and showcase for integrated operations. Through both third-party and Johnson Controls solutions, the digital twin provides real-time data on a slew of key wellness and environmental parameters, when it fully integrates with OBEM. This will offer more insights on IAQ and wellness, further supporting the joint research by Johnson Controls and NUS on occupant experience.

The centre has brought together academics, students, industry leaders, small and medium-sized enterprises and start-ups, to innovate. Some of the achievements to-date include:

- About 300 use-cases developed in the areas of sustainability, digitalisation and wellness, through co-innovation and design workshops with industry players.
- Encouraging ecosystem partners by showcasing their work. Seven startup solutions have been deployed in the centre.
- A research collaboration agreement signed with NUS, in 2021, with the joint commitment to invest SGD 5 million for research in the Built Environment sector.
- The training of 34 mid-career individuals on 'Digital Transformation in the Built Environment', in collaboration with SkillsFuture Singapore. Four of the trainees have secured full-time employment in Johnson Controls.
- Scaling up solutions to other parts of NUS, e.g. the School of Medicine.

Multi-award winning SDE4

Opened in January 2019, SDE4, was developed by the School of Design and Environment at NUS, the institutional organisation that promotes design, sustainability and education in Southeast Asia.

SDE4 is the first new-build net-zero energy building in Singapore. It is designed as a 8,500 m², six-storey, multi-disciplinary space by Serie + Multiply Architects with Surbana Jurong.

SDE4 is the first new-build net-zero energy building in Singapore and the winner of several awards, including the following:

- Award 2022, The World's 6 Most Beautiful Buildings That Redefine Sustainable Architecture
- Award of Excellence at the International Federation of Landscape Architects Awards Ceremony
- Winner 2020 Architecture MasterPrize under the Institutional Architecture category
- Winner Blueprint Awards 2019, Best Public Use Project with Public Funding
- Winner Global Sustainability Award (Bangkok) 2018
- Winner IFI Design Distinction Award - Gold (International Federation of Interior Architects / Designers (IFI)) 2018
- GOLD in the Learning category of IFI's Global Awards Program (IFI GAP) 2018
- Merit for DGNB Award Klimapositiv (German Green Building Council) 2019
- Merit for 2019 SILA Awards for NUS SDE4's Landscape works

An exterior view of SDE4. Image: NUS College of Design and Engineering and Serie Architects / Rory Gardiner.

Achieving digital transformation and a green economy

Johnson Controls has a sizeable installed base in Singapore, with around 40% of commercial buildings carrying the company's solutions or using its services, to-date. Large property developers, major banks and many mission-critical facilities are among the customers.

The company also recognises the need to nurture more talents for the digital transformation of the Built Environment. The company has been appointed by SkillsFuture Singapore (SSG) as the SkillsFuture Queen Bee in the Built Environment sector. Over a three-year period, commencing in 2022, Johnson Controls will mentor small and medium-sized enterprises (SMEs) in the sector to develop digital capabilities to transform their businesses and kickstart their sustainability journeys. Since 2021, Johnson Controls has been collaborating with Ngee Ann Polytechnic to run the SGUnited Mid-Career Pathways Programme on digital transformation in the Built Environment – another initiative under SkillsFuture Singapore.

Singapore is also a focal market in Asia Pacific, for the company's most advanced offerings such as the OpenBlue Net Zero Buildings, a turnkey solution.

Benefits offered by an outcome-based chiller service

Mr Yulizar Rachmat

Mr Yulizar Rachmat, Director, PSA Services, Asia Pacific at Johnson Controls elaborates on the features of the OpenBlue Planned Service Agreement.

The Singapore Engineer (TSE): Could you provide an overview of the main features of the OpenBlue Planned Service Agreement?

Mr Yulizar Rachmat (YR): OpenBlue is a complete suite of connected solutions, that combines Johnson Controls' years of building expertise and progressive technology to deliver impactful sustainability, new experiences and effective safety and security. OpenBlue features a suite of tailored, AI-powered service solutions like remote diagnostics, predictive maintenance, compliance monitoring and advanced risk assessment.

By using OpenBlue to power our Planned Service Agreement (PSA), we redefine the traditional break-and-fix maintenance service. From scheduling reactive maintenance visits or servicing, we shift into a need-based proactive approach. The solutions under OpenBlue PSA are tailored to meet the needs of every customer, based on their unique requirements.

The services that we provide under our OpenBlue PSA include monitoring chillers round-the-clock, diagnosing chiller operating conditions, predicting faults and improving system availability, as well as generating detailed automated reports, periodically, to inform our customers of the health of their chiller assets. Our platform also allows for expert recommendations backed by continuous trends and AI-based analytics when, previously, we could provide insights or recommendations based only on snapshot conditions at the time of the visit.

TSE: When was it introduced in the Asia Pacific region and what has the response been thus far? Could you specifically mention some of the benefits to customers?

YR: Johnson Controls' OpenBlue PSA was launched in the Asia Pacific region last year, to customers across various industries, from healthcare, data centres, and commercial real estate to critical applications and education. To-date, we have served more than 650 customers with proactive monitoring of more than 2,000 chillers connected on OpenBlue – which is five times more than when the transformation journey started last year.

For customers, our OpenBlue platform improves their chiller equipment reliability and performance, as well as increases the energy efficiency of chillers and the productivity of their technicians.

By leveraging the data gathered, we deliver several outcomes for the benefit of our customers. These include the following:

- Providing greater visibility of the equipment's performance, through monitoring the health of chillers.
- Tracking the performance of the whole chiller system and individual assets.
- Quickly detecting and attending to anomalies affecting chiller performance.
- Providing quick responses to emergencies and spotting deteriorating conditions within a chiller plant before they turn into problems.
- Generating in-depth insights on equipment performance and the health of chillers, that enable building owners and facilities managers to make data-driven decisions for budget planning.

TSE: Is the OpenBlue PSA concept equally relevant to both existing and new chiller installations?

YR: At the core of our OpenBlue PSA concept is the infusion of digital capabilities to redefine the whole notion of traditional break-and-fix maintenance services. This concept is applicable to both new and existing installations. The key enabler is chiller connectivity through the cloud with cyber-secured connection. This is what makes it possible to remotely monitor chillers round-the-clock, diagnose chiller operating conditions, predict faults and improve system availability. While new chillers are natively connectable, older generation chillers should be assessed for compatibility.

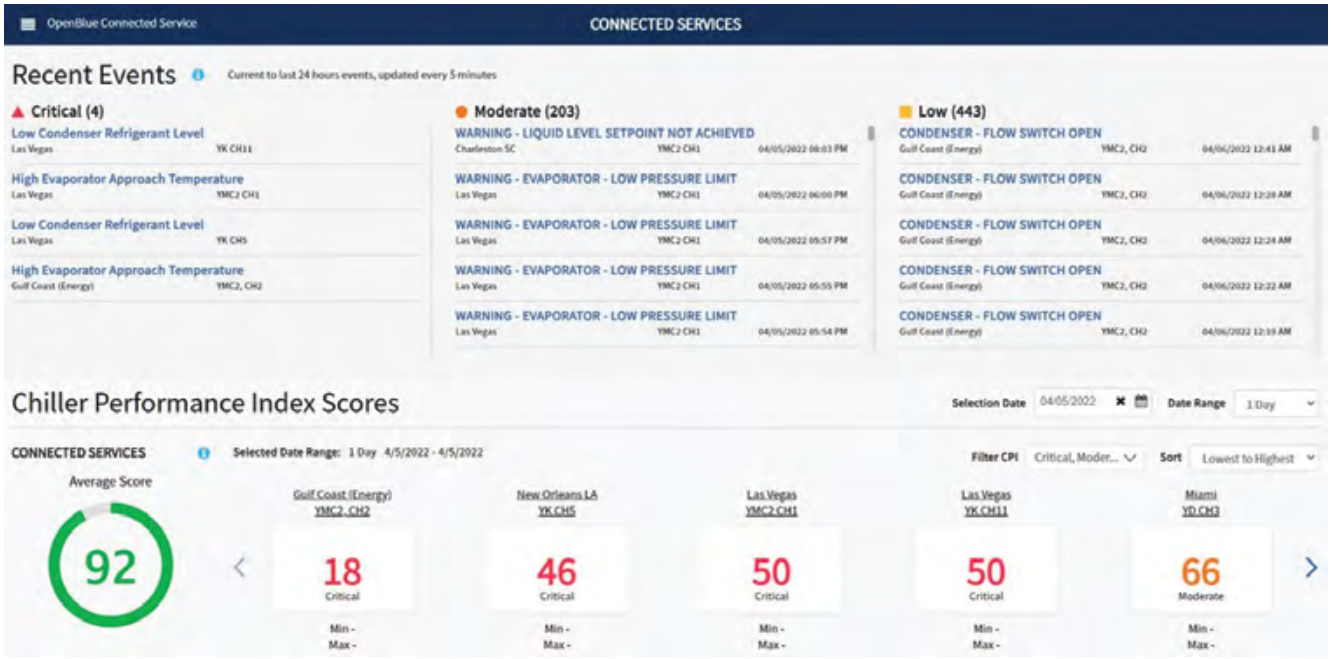
TSE: Could you comment on the integration of data from different equipment and operating systems?

YR: Our award-winning OpenBlue digital platform is designed to be the 'single pane of glass' that pulls and makes sense of high volumes of operating data from various building sensors and systems. This enables building operators to manage their operations more systematically, delivering buildings that have intelligence to support our customers with extended asset life and uptime, greater visibility of operations, enhanced performance analytics, improved energy conservation, proactive planning processes and optimised total cost of ownership.

TSE: Could you provide some details of a successful installation?

YR: One of our customers in Singapore, in the commercial office building and data centre space, had to meet the Guaranteed Energy Savings Performance (GESP) goal, failing which they would be required to pay an annual penalty.

Our OpenBlue Connected Chillers solution, which uses predictive maintenance techniques, was able to minimise the generation of



A customer dashboard for OpenBlue Connected Services.

alerts and alarms by the customer's four chillers. We also shared the trend graphs with the customer, to showcase the improvement in tube cleaning and other upgrades.

After several years of high consumption (that was more than the contracted values), our team managed to improve the efficiency and meet the guaranteed kW/RT performance.

The use of Johnson Controls digital solutions allowed us to not only improve the performance but also prove that the sub-optimal chiller plant performance, in previous years, was due to operating conditions outside of our control, such as a lower part-load than what the chiller plant was designed for and the condition of the cooling tower.

TSE: How can OpenBlue PSA help to reduce the carbon footprint in the operation of buildings?

YR: Our OpenBlue platform gathers enormous amounts of data and applies Artificial Intelligence (AI) to address the challenges of energy efficiency and optimisation. By tapping on the data amassed from our chiller service, we can optimise the use of resources and thereby help to reduce the carbon footprint.

Our data allows for remote monitoring and analysis, providing a before-and-after comparison, especially after the chiller equipment is retrofitted or upgraded. This allows customers to easily access the information on efficiency gains, on a single dashboard.

A preventive and predictive approach for the maintenance of chillers is expected to replace the traditional break-and-fix model.

Every hour that a chiller operates with poor energy efficiency, it consumes more electrical energy, thereby increasing its carbon footprint. If multiple chillers are operating with poor energy efficiency, the increase in the building's carbon footprint is significant.

With OpenBlue PSA, our care for customers' chillers is no longer based only on the amount of time our technicians and engineers are physically on-site. It is a 24/7 solution, as the chiller data is being monitored round-the-clock through our platform, enabling deteriorating trends to be predicted and alerted. Any alarms will also be assessed and responded to, immediately, to keep the chillers operating efficiently.

TSE: How do you see the response from the industry to the provision of advanced chiller services?

YR: In the medium- to long-term, we expect more customers to shift from the traditional break-and-fix model to a more preventive and predictive, outcome-based approach, to meet their needs and demands more effectively.

Images by Johnson Controls

Energy-efficient and water-efficient smart solutions for the built environment

Mr Kenth Hvid Nielsen

Mr Kenth Hvid Nielsen, Regional Managing Director, APAC, Commercial Buildings, Grundfos, highlights some of the approaches to reduce the increasing carbon footprint.

The Singapore Engineer (TSE): Could you provide an overview of the built environment in Southeast Asia, from the point of view of sustainability and resilience?

Mr Kenth Hvid Nielsen (KHN): Southeast Asia is currently undergoing rapid industrialisation and urbanisation. Notably, the region's urban population is expected to grow by another 100 million people by 2030 [1], and medium-sized cities are projected to account for 40% of such growth [2]. This growth will drive up new build demand, with nearly half of new construction globally expected to come from the region by 2040.

With such significant urban expansion, we will see the built environment contribute an even greater carbon footprint than it currently creates, if we continue business as usual. Construction's impact on the region's global warming is demonstrated by how ASEAN's buildings sector accounted for 24% of energy-related carbon emissions in 2019 [3]. Additionally, the built environment sector is responsible for more greenhouse gas emissions than any other sector of the economy.

Southeast Asian nations are also at various stages of economic development, with access to different energy resources and with different energy requirements. They also have varying regulatory frameworks for energy efficiency in the building industry. There is room for progress to meet the region's rising energy demand in a greener and more sustainable way.

TSE: What are the main challenges faced by the built environment in this region, in achieving sustainable operations?

KHN: For Southeast Asia, urban cooling is one of the key challenges, as the industry is looking to achieve greater sustainability. The region depends heavily on cooling technologies, particularly air conditioning, to stay comfortable, as the weather in Southeast Asia is predominantly hot and humid.

However, conventional cooling systems in buildings are unsustainable in today's climate crisis as they consume large amounts of energy, usually derived from fossil fuels, thereby aggravating climate change. This high energy use can be attributed to various performance inefficiencies such as the over-pumping of chilled water supply throughout a building. In fact, temperature control is one of the most energy-intensive functions in commercial buildings, with heating, ventilation, and air conditioning (HVAC) systems accounting for up to 40% of total energy used [4].

In addition, as one of the most vulnerable regions to climate change, Southeast Asia is threatened by rising temperatures, with more than 1 billion people in the region projected to live in areas experiencing extreme heat waves by 2050 [5].

Faced with rising heat and humidity levels, cooling in buildings will only play a bigger role. Existing projections indicate that electricity demand in ASEAN would double to 2,000 tera-watt hours (TWH) by 2040 [6], with most of this growth coming from residential and commercial buildings, largely for cooling. A 'business as usual' approach will only set the region up for an environmental crisis, when it is already vulnerable to the impacts of extreme weather and poor air quality.

As we address the cyclical issue of urban cooling, it is imperative for us to examine how we can reduce the impact of our built environment, while ensuring our urban spaces can still adapt to the conditions of a warming climate. In particular, we need to pay more attention to the model and network of pumps used in buildings, which can go a long way in meeting sustainability and energy efficiency standards.

TSE: What are your thoughts on how industry and academia can collaborate, to reduce the carbon footprint in the built environment sector?

KHN: We believe that strategic partnerships such as those between industry and educational institutions play a key role in accelerating our sustainability efforts, through sharing and building on each other's knowledge and expertise to move the commercial building industry forward.

For Grundfos, we work together with our partners to successfully co-develop innovative sustainable solutions by tapping into our extensive network and industry knowledge to ensure they are equipped with the necessary resources and industry opportunities.

TSE: What are the objectives of the MoU between Grundfos and Ngee Ann Polytechnic?

KHN: The MoU between Grundfos and Ngee Ann Polytechnic (NP) is a three-year partnership focused on sustainability education and talent

development, aimed at supporting the resilience and sustainability of the built environment across Southeast Asia.

Grundfos and NP will work to champion sustainable urbanisation in the region by co-developing energy and water efficient smart solutions for the built environment, as well as through initiatives focused on UN Sustainability Development Goals such as SDG6 (clean water and sanitation) and SDG13 (sustainable consumption and production patterns) for climate action. These solutions will be subsequently implemented across the NP campus as well as Grundfos' facilities.

We recognise that educational institutions such as NP are best placed to take the lead in driving sustainability innovations, as youths have shown a growing passion for sustainability issues, as well as new and exciting ways of thinking. Through our partnership with NP, we hope to foster growth and development among our younger generations, and spur innovative thinking that has the potential to advance Singapore and the region's sustainability trajectory.

TSE: What are some of the solutions from Grundfos for sustainable building operations?

KHN: Energy-efficient solutions play a key role in achieving sustainable operations in buildings and reducing the impact of our built environment. To address the urgent need for sustainable cooling solutions for the building sector, we launched Grundfos Distributed Pumping in Asia, back in 2019 – a ground-breaking distributed pumping approach which uses intelligent decentralised pumping to reduce energy consumption.

A first in the region, the system is capable of operating in optimised conditions, at any time, by intuitively regulating the water flow, based on feedback from temperature sensors, to meet the exact requirements of different building zones and intelligently delivering the right flow at all times. On top of reducing energy consumption and operational costs, the new system achieves comfort for users of the building by ensuring a consistent building temperature at all times.

After the signing of the MoU between Grundfos, a global leader in advanced pump solutions and water technology, and Ngee Ann Polytechnic are, from left, Mr Jason Tang Chih Wei, Director of Environmental & Water Technology Centre of Innovation (EWTCOI), Ngee Ann Polytechnic; and Mr Kenth Hvid Nielsen, Regional Managing Director, APAC, Commercial Buildings, Grundfos. The three-year partnership will see both parties collaborate to co-develop energy- and water-efficient smart solutions, whilst also focusing on talent development and sustainability education. The partnership thereby seeks to contribute to a more resilient and sustainable built environment across Southeast Asia.

Grundfos' Distributed Pumping System has met the cooling needs reliably across Southeast Asia over the past two years. In October 2021, Grundfos launched its Distributed Pumping System in Thailand, supporting the country's efforts to achieve its Net Zero Carbon Emissions target and its Paris Agreement commitments.

Prior to that, Grundfos also worked closely with NP's Environmental & Water Technology Centre of Innovation (EWTCOI) to retrofit the HVAC system, designed for one of the campus buildings (Block 22), with its Distributed Pumping solution. The new solution helped achieve a 54% pump system kWh energy savings as well as a significant reduction in operational costs.

Beyond developing innovative sustainable solutions, we also recognise that there are still barriers when it comes to adoption and scaling such solutions across the sector. In response, we recently partnered with Barghest Building Performance (BBP), a Singapore-based energy efficiency technology provider, with the aim of delivering and scaling a revolutionary energy-efficient digital solution across Southeast Asia. The novel solution can help reduce energy consumption of cooling systems by up to 40%, meeting the region's urgent need for sustainable cooling solutions.

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The net zero blueprint for green factories

by Anders Dellblad, Manager of Sustainable Supply, Sandvik Coromant

There are ways to make factories leaner and greener.

The manufacturing industry will be at the forefront of turning COP26's pledges into reality. As British naturalist, David Attenborough, pointed out at the event, "A new industrial revolution, powered by millions of sustainable innovations, is essential and is indeed already beginning". So many areas of a plant can be made greener, so where should manufacturers start?

Industry is responsible for 23% of global emissions and represents the second-highest source of emissions after energy generation systems, according to Energy and Climate Intelligence Unit, a non-governmental organisation (NGO). At COP26, a decisive moment to spur industrial decarbonisation, several decisions were made to improve the sustainability of manufacturing and achieve the net-zero emissions goal.

Milestone initiatives include the establishment of green shipping corridors, which would create zero-emission maritime routes between two ports to lessen the environmental impact of transport and logistics, and more than 40 nations pledging to shift away from a reliance on coal in the next two decades. Changes, such as this, will undoubtedly make a positive impact on industry's sustainability status. However, manufacturers must also look closer to home if they are to make their own processes more environment-friendly.

Inside the factory walls

Many areas of a manufacturing facility can impact its sustainability credentials. In November 2021, the International Energy Agency (IEA) reported that, while direct industrial carbon dioxide (CO_2) emissions declined 1.6% to 8.7 gigatons in 2020, they still accounted for 26% of global emissions. Growth in energy consumption over the past decade has been largely driven by the rise in energy-intensive industry subsectors, such as chemicals, iron and steel, aluminum, cement and pulp & paper, among others, with the processing and development of materials proving a large contributor to energy use.

Another area of inefficiency industry simply cannot gloss over is the amount of waste it produces. Industrial waste makes up half of all waste generated globally. Manufacturing, which makes up more than half of the world's Gross World Product (GWP) annually, is just one stream of industrial waste, but it is the biggest, and the fastest growing. However, it has been estimated that manufacturing waste amounts to 10% of GWP every year, or USD 8 trillion.

Here, we are not just talking about product waste, like the number of scrapped components due to a worn out tool. Its magnitude spreads further into every area of manufacturing, from research & development to machinery and products.

These statistics paint a bleak picture for manufacturing. However, it does not mean that all hope is lost. It would be naïve to say that manufacturing will, one day, generate zero waste. There will always be product faults and haphazard equipment operation somewhere down the line. What manufacturers need to work on, however, is limiting these problems, by taking more informed decisions over their plant.

Lean and green

The term 'green factories' was coined a few years' ago. It describes a manufacturing plant that is equipped with eco-friendly design and manufacturing processes that reduce greenhouse gas emission, environmental pollution and energy consumption. In other words, a green factory is a greener workplace with greener processes to produce greener products.

'Green' is not a hollow word. For a facility to be a truly green factory, it must display tangible ways to drive sustainable practices within the factory, the supply chain and across its customer base.

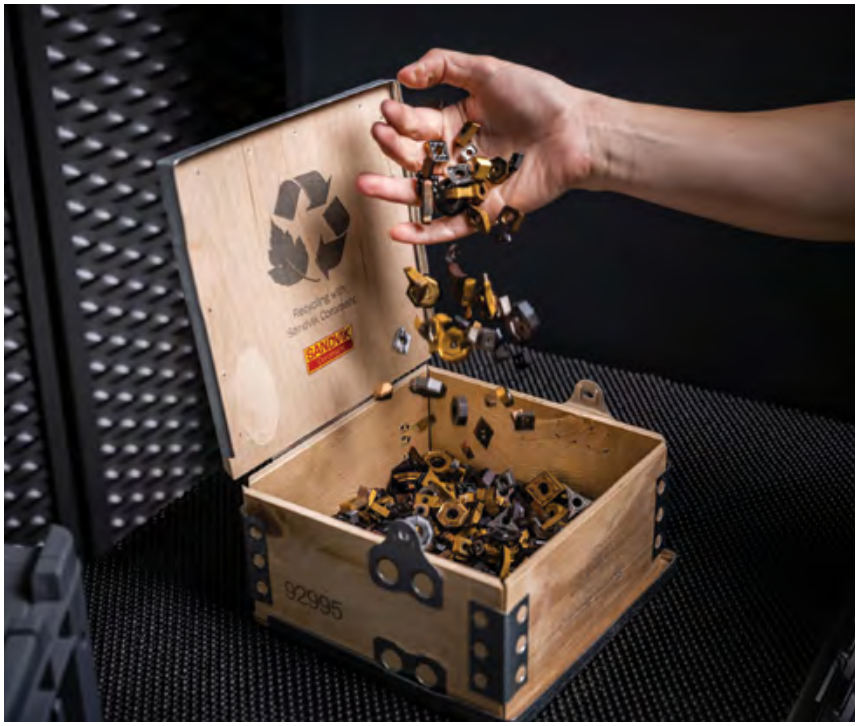
For example, a company looking to build a green factory may invest in measures that reduce scrap rates and machine idling time, by optimising the factory floor layout, or it may take steps to generate, use and recover heat more efficiently, like installing high-efficiency burners that also recover waste heat. It may also want to minimise the distances that parts travel across the supply chain, as mentioned in COP26's green corridors proposal, or convert its waste into reusable material.

There is no checklist for what makes a green factory. In reality, there are many sustainable steps a company can take to make its operations greener, such as the adoption of a robust recycling programme or energy-efficient heating. But there is a catch to having so many sustainable avenues to explore. Plant managers may be spoiled for choice and unable to decide which solutions are best for their factory. After all, no two plants are the same.

The only way of tangibly evaluating a company's sustainability performance is to keep track of all its factories and facilities around the world. Manufacturers require a reliable source of data that can serve as a reference point for developing a green strategy.

Sustainability in a single tool

Sandvik Coromant has developed a green factories and sustainable



Sandvik Coromant recycles carbide inserts.

facilities assessment tool. It covers the entire manufacturing chain, assessing a range of factors, from CO_2 emissions and waste to production, resources and the working environment. Launched in 2019, the tool was first rolled out across 16 of Sandvik Coromant's global manufacturing facilities, with the ambition of using it across every site in the future.

Part of Sandvik, a global industrial engineering group, Sandvik Coromant is at the forefront of manufacturing tools, machining solutions and knowledge that drive industry standards and innovations demanded by the metalworking industry.

The facility assessment tool's functionality is divided into six different dimensions – health and safety; resources; working environment; emissions and waste; site, building and infrastructure; and production. Each dimension is graded on the facility's current performance and its status is attached to key performance indicators (KPIs) to monitor its improvement.

For example, if a facility finds its manufacturing processes waste a lot of water, it may want to invest in liquid waste treatment equipment that separates pure water from the waste so it can be used again. This is exactly what Sandvik Coromant's Langfang site in China did in 2020, recovering 69 tons of water from the unit's manufacturing waste.

The tool is far more than just a straightforward collection of data. It provides highlights, risks and other decision-making suggestions that provide thorough insights into a plant's areas of inefficiency. Areas including water use and wastewater, surplus heating, use of raw materials, machine running times and even the use of paper cups can all be tracked, and calculations made, to facilitate data-led, measurable steps towards more sustainable manufacturing.

If manufacturing is to power the new industrial revolution, it will need to take a holistic approach to sustainability, combining actions from 'shop floor to top floor'. At Sandvik Coromant, we believe all manufacturers need to create data-led, informed goals to boost the sustainability of their facilities.

That is why we will be offering our green factories tool externally, in 2022, to help all manufacturers to become leaner and greener.

Sandvik commits to the Science Based Targets initiative

In December 2021, Sandvik announced that it has committed to set targets in line with the Science Based Targets initiative (SBTi), consistent with the Paris Agreement. This is a natural step in the company's sustainable business strategy, where a big difference can be made through its customer offerings, such as battery-electric mining equipment, productivity-enhancing manufacturing and machining solutions, and energy-efficient rock processing solutions.

Sandvik already has ambitious sustainability targets for 2030, having made a commitment to reach a 50% reduction of greenhouse gas emissions. By joining the SBTi, the company will seek to get its sustainability targets validated against science-based criteria.

"Sustainability is an integrated part of Sandvik's strategy and of crucial importance for the society around us as well as for business. We constantly work with customers and suppliers to develop more productive, safer and more sustainable solutions, and setting science-based targets underlines our firm determination to reduce greenhouse gas emissions through our products and our operations", said Stefan Widing, President and CEO of Sandvik.

The SBTi is a partnership between the Carbon Disclosure Project, UN Global Compact, World Resources Institute and the World Wide Fund for Nature. The requirements of SBTi include halving greenhouse gas emissions by 2030 – and dropping to net zero by 2050, at the latest.

Ensuring post-pandemic well-being and productivity

Mr Jitender Khurana, Country Head and Managing Director of Signify Singapore, explains how lighting can help improve work and sleep patterns, as we emerge from a disruptive two years.

Mr Jitender Khurana

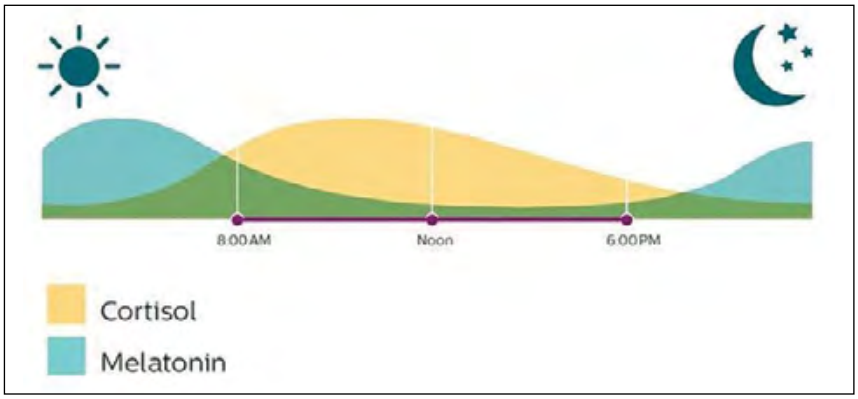
The Singapore Engineer (TSE): Could you elaborate on the concept of circadian rhythm and on how lighting impacts it?

Mr Jitender Khurana (JK): 'Circadian rhythm' refers to our daily physical, mental and behaviour changes that happen over a perpetual 24-hour cycle. This rhythm has been imprinted in our body for ages by the earth's rotation which creates day and night, light and darkness. In particular, circadian rhythm also denotes our sleep-wake cycle, body temperature, vitality and resting pattern, in a typical 24-hour cycle.

Growing scientific evidence shows that light plays an important role in how we feel and behave. The sleep-wake cycle is an important circadian rhythm that determines how the body clock in our brain responds to light as a signal to wake up, and darkness as a signal to rest. Two important hormones are involved here – cortisol that is triggered by light to help us meet daily stress and stay alert, and melatonin that is triggered by the darkness of the night to help us unwind and sleep.

TSE: How has COVID-19 affected Singaporeans' circadian rhythm and, in turn, their sleep and well-being?

JK: During the peak period of COVID-19, many Singaporeans struggled with sleep issues. A survey showed that only 23% of respondents in Singapore felt they had sufficient sleep, compared to the global average of 30%. In fact, the term 'Coronasomnia' was coined to describe the phenomenon – a combination of 'coronavirus' and 'insomnia'. Coronasomnia is closely linked to imbalances in our circadian rhythm, caused by changes imposed by COVID-19.



Cortisol is triggered by light while melatonin is triggered by darkness.

A central factor driving this misalignment was home confinement and lack of daylight. Due to the lockdown and limitation in social activities, we had to spend significantly more time indoors, away from natural light which is vital to our health.

During the pandemic, many of us spent a lot more time on our electronic devices, for work, study, games, entertainment, social media and other activities. Such increased exposure to light at night confused and upset our biological clock, affecting our moods and behaviour.

TSE: What are the top five tips for improving one's circadian rhythm?

JK: We can cultivate healthy habits and routines to maintain our circadian rhythm. Here are a few tips:

- Follow a consistent sleep schedule every night.
- Exercise during some part of the day.
- Avoid caffeine in the evening.
- Limit light exposure and minimise the use of laptops, phones, tablets and other devices with screens, after about 8 pm and minimise watching TV after 10 pm.
- Keep our homes and work interiors well-lit during the day, in bluish-white cool colours, and change to warmer and dimmer lights by night, to tell our body it is time to rest.

TSE: What are the benefits in adopting 'Circadian Lighting'?

JK: Circadian lighting, sometimes also referred to as Human-Centric Lighting (HCL), has a beneficial impact on our circadian rhythm and improves the way we live and work. By adopting circadian lighting, we enjoy better sleep quality and immune systems, higher productivity as well as improved memory, cognitive functions, metabolic functions and moods. Circadian lighting involves a gradual change in the 'colour temperature' of light, to options such as cool, natural white and warm light, as well as in the brightness level, at pre-programmed times of the day, to optimise alertness, and stimulate rest and sleep at night.

TSE: Could you describe the developments in the science and business of circadian lighting?

JK: Technological advancements in lighting have made it easy and affordable to replicate outdoor daylight patterns in indoor settings.

Currently, circadian lighting systems are built using three approaches – illuminance-tuning, colour-tuning and time-tuning. Light-emitting diodes that are capable of all these three functions are called 'tunable LEDs'.

Circadian lighting systems from reputable companies make use of lighting products with long lifespans and which are manufactured from sustainable materials and processes that limit waste, facilitate recycling and contribute to the circular economy.

TSE: Can circadian lighting be incorporated in homes?

JK: Circadian lighting was considered expensive and difficult to create with the older generation of bulbs and tubes. With the advent of tunable LEDs, it is now easy, convenient and affordable to pre-programme them at home, such that they can be turned on and off, and can function with the required brightness and colours, at specific times of the day and night.

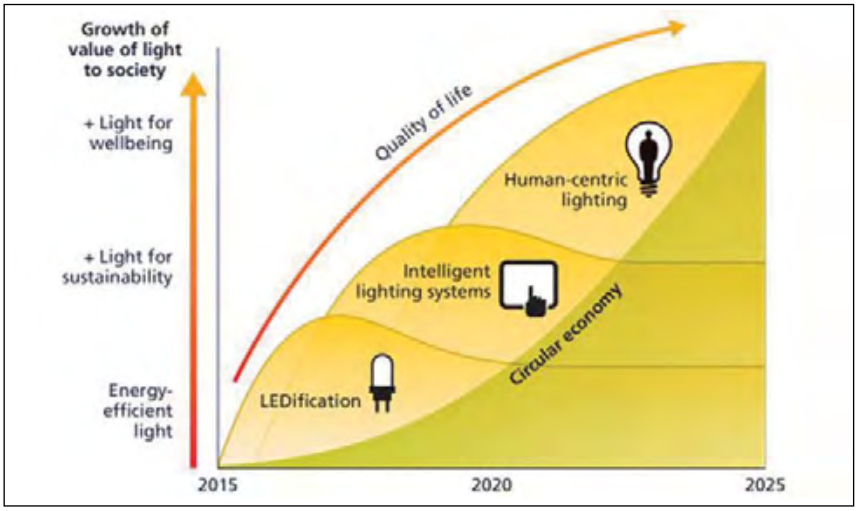
TSE: Can circadian lighting be integrated into workspaces in Singapore? How can it benefit employees and companies?

JK: Circadian lighting systems have been proven to help people to be alert, stay focused or be steady and calm. In the WELL Building Standard (a global rating system designed to enhance health and well-being at the workplace), lighting is a key certification requirement.

As more employees return to work, circadian lighting will support and enhance their productivity and well-being. The inspiring work environment created will also help to attract and retain talent.

Singapore's Building and Construction Authority (BCA) introduced the latest Green Mark regulations, GM 2021, last year. In GM 2021, low power density (in Watts/m²) is a basic requirement for buildings to obtain the Green Mark Gold^{Plus}, Platinum or Super Low Energy Building rating. In addition, there are the Badges of Honour, awarded for health and well-being, resilience, reduction of whole-life carbon emissions, smart controls and other areas. For the Health and Wellness

Circadian lighting installation on the ground floor of the Signify offices in Eindhoven, Netherlands. Circadian lighting supports and enhances the productivity of employees.



With increasing understanding of its benefits and the resolution of price-related and other issues, the demand for circadian lighting is expected to grow.

badge, circadian lighting, together with a high Colour Rendering Index, provides 2.5 points out of the 10 points required. This is a substantial contribution to the Green Mark certification, at minimum investment.

TSE: How do you see the future of circadian lighting?

JK: Circadian lighting got off to a slow start, hampered by the previous generation of lamp technology, high prices of systems, issues in adjusting lighting settings and lack of standardised protocols. But all these issues have been resolved, helping circadian lighting to go mainstream with a growing global market estimated to reach USD 3.91 billion by 2024.

Businesses and institutions now use circadian lighting to enhance their care and support of employees to increase their productivity, goodwill and loyalty. Hotels use it to help guests adjust to their new time zones and overcome jet lag. Hospitals and care facilities harness circadian lighting to simulate daylight rhythms to help patients and residents sleep better, recover faster and feel healthier.

TSE: Any other information that you would like to provide?

JK: A variety of indoor applications can benefit from tunable LEDs and circadian lighting. As we revert to normal work conditions, facility managers and home owners can adopt these solutions to create healthier and better workplaces, health care facilities and homes.

All images by Signify

The way forward

by Jim Falteisek, Senior Vice President, 3M Asia Corporate Affairs and Managing Director, 3M Korea

Mr Jim Falteisek

An independent study conducted across 11 countries has shown that the pandemic has changed our lives.

There is no doubt that the COVID-19 pandemic has ushered in a new paradigm. While countries come out of lockdowns, and jobs, schools and universities return to physical formats, our lives have been forever changed.

Naturally, 3M was curious about how the pandemic has fundamentally transformed, and will continue to transform, life as we know it. Thus, we commissioned an independent study amongst 22,000 adults across 11 different countries – France, Brazil, China, Mexico, Canada, Japan, Germany, UK, USA, India and South Korea.

We uncovered a few important facts.

The rise of hyper-health-consciousness

We are now more health-conscious than ever. Unsurprisingly, living through a pandemic has changed the way people view health. According to 3M Futures, 76% of people globally agreed that the pandemic made them more conscious of their personal health.

This is the same, closer to home. A local survey of 1,000 Singaporeans found that 2 in 3 people are more motivated to adopt healthier lifestyles, now, than before COVID-19, and are generally exercising more and eating healthier.

The pandemic has even affected how we think about public spaces, with 77% agreeing that public spaces need to be re-designed, to be more health conscious.

This includes offices. The pandemic has overturned our idea of workplace interiors, and companies are facing the two-pronged challenge of creating spaces that invoke a sense of 'community' and still protect the health and well-being of their employees. Besides pushing for more sustainable solutions, our next step, ultimately, is the integration of upcoming technologies to 'future-proof' and best serve employees.

A digital existence

When countries entered lockdowns, virtual substitutes quickly took over.

This has brought about divided opinions. Although more than 64% preferred to work from home, with a similar proportion (58%) of respondents willing to try new technological advancements such as sustainable homes and all-electric vehicles, others would rather minimise the role of devices in their lives.

As many as 77% noted that they had better interactions with friends and family, in person, than when using technology and online platforms. Seven in 10 people also favoured hobbies that allow them to unplug from their devices. Another 75% highlighted that too much screen time is a health issue that should be addressed.

An AI-infused future

An AI-infused future is already dawning upon us. Globally, 63% believe that cutting-edge AI advancements, like driverless vehicles, will be a part of our lives in the next 10 years. 55% are also willing to accept a ride from a self-driving car.

People are excited about AI and new technologies, but continue to question their ethics and implications.

The pandemic has made people more health-conscious and changed their perception of public spaces.

Despite this excitement, we continue to question the ethics and implications in the use of AI, and want more transparency on how technology is being used in society. To truly harness the power of AI and data, without compromising privacy, governments need to design ways that allow for safe sharing of quality data.

Specifically, in Singapore, the government's view is to push for more investment in platforms for secure exchange of data between different parties.

Companies will also need to evolve speedily, to handle the complexity of using data and AI in a principled and ethical way. Governing bodies will have to understand the breadth and depth of data, and its potential uses, now and in the future; and the trade-offs between the high benefits that data could provide and the cost of using the data without governance.

Sustainability as an expectation

When it comes to sustainability, we are also urging businesses to walk the talk. Three-quarters of respondents, worldwide, demand transparency from brands that claim sustainable commitments. We also believe businesses should be green and sustainable.

Singapore's national plan aims to advance sustainable development by 2030, but will it be fast enough?

Around the world, most people (73%) are willing to live in sustainable homes, but most do not think society will prioritise sustainable living in the near term. In fact, 40% feel that renewable energy will not become a major part of their cities within the next decade.

Governments will therefore need to find faster ways to implement green policies and practices.

Public-private partnerships are key. To encourage and enable more companies to go green, Singapore's Ministry of Sustainability and Environment and National Environment Agency are offering grants to sustainability endeavours. As at January 2022, the grants have supported nearly 30 projects that seek to reduce annual carbon emissions by an estimated 1,600 tonnes.

3M is also stepping up to the plate. Having committed to ensuring that every new product, being commercialised from 2019 onwards, demonstrates how it drives impact for the greater good, we work every day to design solutions that do more with less materials, and advance our manufacturing processes. On the consumer front, we are developing ways to reduce user touchpoints which often lead to waste, and finding digital avenues, where possible, to reduce environmental costs.

IN SUMMARY

For better or for worse, the pandemic has fundamentally changed the way we live, interact, and work. We had to radically change or reimagine systems and processes. to make them more flexible, convenient and versatile.

This new paradigm has produced challenges, yet has created new opportunities for innovation in science, technology and design, to support a different way forward. Governments, corporate partners and different stakeholders will need to work quickly to adapt to these changes and find ways to leverage these new trends.

New platform explores cutting-edge science and technology trends

Earlier this year, 3M launched 3M Futures, a new platform showcasing five global science and technology trends shaping the world today and in the future. They are Augmented Reality (AR) and Virtual Reality (VR), Artificial Intelligence (AI), Sustainable Materials, The New Paradigm – A Pandemic Aware World, and Equity – Through Science and Technology.

The platform explores each topic alongside commentary and perspectives from 3M experts, scientists, engineers and designers at the forefront of their fields. 3M Futures also features data from global, third-party research conducted across 11 countries to understand perceptions of these top science, technology and design trends. The countries are France, Brazil, China, Mexico, Canada, Japan, Germany, UK, USA, India and South Korea.

Global science and technology trends in 2022

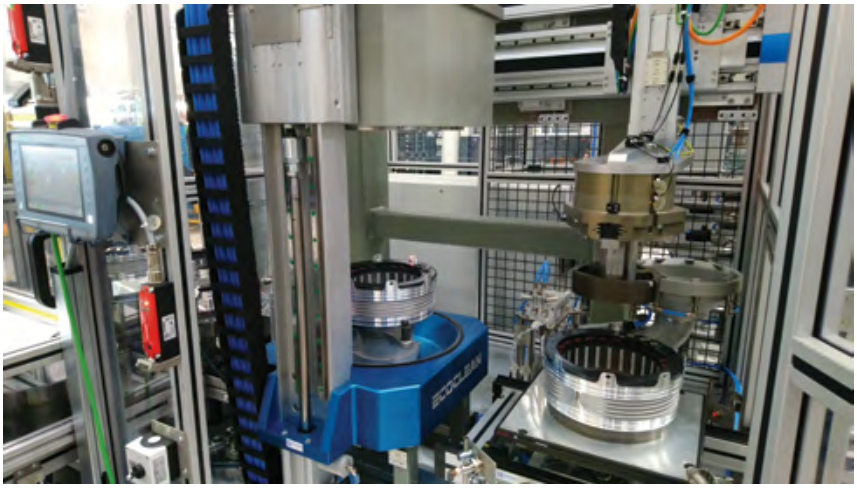
- Augmented Reality (AR) and Virtual Reality (VR): Mixed reality is already changing the way we live, work and entertain – the metaverse is poised to change our perceptions of reality.
- Artificial Intelligence (AI): Artificial Intelligence and Machine Learning are revolutionising everything, from entertainment to business, but require conversations about broader implications and ethics.
- Sustainable Materials: The circular economy is introducing innovation in material science and design, while disrupting industry, to usher in a more sustainable future.
- The New Paradigm – A Pandemic Aware World: The pandemic has created a paradigm shift in how we interact. From telemedicine and health-conscious design to remote work, the new abnormal is here to stay.
- Equity – Through Science and Technology: The greatest innovation comes from diverse thinkers. Equity, representation and equal access to science and technology learning, like minority representation and STEM in youth, are paramount to solving the challenges of today and tomorrow.

Electric mobility presents new challenges for cleaning

by Doris Schulz, Journalist, Korntal, Germany

The new parts and components, as well as manufacturing processes required, have to meet new specifications.

The development of new vehicles for electric mobility is not only leading to new and changed requirements in the automotive and supplier industry, it is also having an impact on industrial parts cleaning. In addition to particulate contamination, filmic-chemical contamination due to the surface requirements of downstream processes, such as bonding, welding and sealing, has also become an important factor. Also, greater focus is being placed on the technical cleanliness of production and assembly lines as well as production equipment, in order to eliminate re-contamination and cross-contamination.



Dry cleaning solutions, such as compressed air cleaning, are used to remove impurities from pre-processes, such as the removal of metallic and non-metallic particles during the final assembly of stators, for example. Image: Ecoclean/ZF.

Systems in the electric vehicle that require high levels of cleanliness

An electric motor, an energy system in the form of a traction battery or fuel cell, and power electronics are the three essential components that distinguish an electric vehicle from one with an internal combustion engine. There are specific cleanliness challenges with each of these systems.

In the case of the electric motor, the first requirement is technically clean production of each individual component, such as the stator, the rotor and the housing. To achieve this, for the most part, wet-chemical solutions can meet even extremely demanding particulate cleanliness specifications.

However, cleanliness problems often arise during the final assembly of stators, for example, in the form of metallic and non-metallic particles from pre-processes. Dry cleaning solutions are required for their removal, which can be easily integrated into the assembly line, even retroactively if required, and enable effective, automated individual part cleaning in the production cycle. The cleanliness of the production equipment, such as handling systems and grippers, should also be considered, in order to prevent re-contamination.

Clean manufacturing for energy systems

The traction battery, in the form of lithium-ion batteries, is the preferred energy system in electric vehicles today. Cleaning processes can be integrated into the series production of the batteries before, or after, various manufacturing steps. This begins in the production of the electrodes, with the cleaning of the substrate before coating; continues with the cleaning of the electrode sheets after separation by punching or laser cutting; and ends in battery pack assembly, with the preparation of the adhesive surfaces of the battery pack cover after the modules have been integrated.

Clean contact points are crucial in the electrical connection of the battery cells for high energy density and the safe functioning of the battery. CO_2 snow blasting technology, which can be integrated into the bonding process, can be used for cleaning. Image: acp systems.

The interconnection of the cells, by electrically connecting the contact surfaces with the arrester, e.g. by

ultrasonic bonding, is considered to be a safety-driven process in battery module production. Joint areas contaminated with particles and filmic residues can lead to insufficient contacting, resulting in high contact resistance values and overheating as a consequence. When assembling battery cells into battery packs and integrating them into the battery tray, particles, several hundred micrometres in size, can critically affect their functioning.

The manufacture of fuel cells also places high cleanliness requirements on processes, production equipment and the environment. The central component of a fuel cell is the bipolar plate which consists of an anode and a cathode made of thin stainless-steel sheets, among other materials. The production steps are forming, cutting, joining and coating. Since the starting material may be contaminated and residues from machining remain, from the first three processes, several cleaning steps may be required. This is because particles, just a few tens of micrometres thick, can cause leaks.

A clean room for production of the power electronics

The power electronics is located in a housing between the battery and the electric motor, and are, in effect, the control centre of the electric vehicle. The inverter is the component that converts the direct current from the battery into alternating current, as required by the electric motor. The electronic assemblies installed in the power electronics, such as semiconductors and electromechanical components, place extremely demanding cleanliness requirements on the production and assembly environment. Due to the high voltages and currents occurring during operation and the resulting power generation, not only can metallic particles become a problem, but also fibres which can absorb moisture. A clean room is required for many applications.

Complex thermal management is also required in electric vehicles. It is responsible for maintaining the battery, motor and power electronics, at different temperature levels, as well as for airconditioning the interior. The components must meet high cleanliness requirements to facilitate the sophisticated management of the heat flows generated in the electric vehicle.

Cleanliness of sensory components

Whether for surveillance tasks or assistance systems or autonomous driving, the demand for high-quality optical and optoelectronic systems, such as camera-based sensors, is growing. Whether these systems can function, without errors, under all conditions and temperatures, depends on the particulate and filmic cleanliness of the optics and electronic components as well as the housing parts. Here, particles as small as a few micrometres and the finest filmic layers, as well as outgassing from components, can lead to the attenuation of signals and incorrect information.

More lightweight structural components for increased range

Range is a key criterion for electric cars, so the weight of structural components is highly relevant. On the other hand, it also requires the chassis to be rigid and strong. This results in the increased use of lightweight materials such as aluminum and hybrid materials. At the same time, joining technologies are also changing – there is more bonding and welding. The surfaces must be prepared for these joining processes, in an optimally coordinated way. Depending on the material and joining process, this may also involve the removal of filmic contaminants that have been incorporated into the surface by machining and forming. The selection of the right cleaning process – wet chemical, possibly combined with an increase in surface roughness, or a partial treatment of the joints directly before or integrated into the joining process – has a significant influence on the quality of the joint.

Electric mobility is creating new and changed tasks for OEMs and suppliers in the field of component cleaning. To come to an optimal and economical solution, the cleaning task should not be considered in isolation, but rather looked at in the entire production chain, along with the cleanliness of the production equipment and the environment. This often requires a process-oriented rethink.

(Solutions to challenges in industrial parts cleaning will be presented at parts2clean 2022, the leading international fair for industrial parts and surface cleaning, scheduled to be held from 11 to 13 October 2022, at the Stuttgart Exhibition Grounds, Germany. Please also see Page 13)

Clean manufacturing is necessary in the production of components for the power electronics, energy management and thermal management systems for electrical vehicles. Image: LPW Reinigungssysteme.

For cleaning, using the turntable system, car body parts, up to 2,200 mm long, e.g. extruded profiles, are fixed vertically and positioned precisely.
Image: BvL Oberflächentechnik.

The importance of Operational Technology security

Mr Joe Sarno, Senior Vice President International Sales – Emerging & APJ, Fortinet, and Mr Emmanuel Miranda, Business Development Director, Operational Technology, Fortinet, talk about the increasing challenges and how they can be addressed.

Mr Joe Sarno

Mr Emmanuel Miranda

The Singapore Engineer (TSE): Could you describe the features of the growing cyber threat landscape and Fortinet's response?

Joe Sarno (JS): We founded Fortinet in 2000 and started rolling out products in 2002-2003. We had solutions with aspects of technology that was available for the Information Technology (IT) world. Five or six years ago, we started to see an increase in cybersecurity threats within the areas of Operational Technology (OT) and critical infrastructure.

That was a time when we started to see a lot of these startups for the visibility part of cybersecurity. Companies, like Claroty, were getting consolidated or bought by bigger companies. Basically, we saw the startups which we were looking at, giving visibility to the OT network. OT networks have grown in the last 40-50 years, exponentially. Many of these OT infrastructures did not even know what control systems had been installed, because there was no need to control them, and nobody could really give them an idea of the topology of the networks.

What we are seeing with the startups is that they build technology that are able to understand exactly the topology of the network. So, the first thing was the discovery of the current status of the network. And this was something pretty new to them. They discovered pieces of their network's control system and HMIs they did not know existed.

The second thing in controlling visibility was baseline behaviour. By drawing a baseline, they could state the purpose of building the OT network or Critical Infrastructure (CI) network and how it works. They were able to obtain a clear understanding of how the OT on the CI network was functioning. That is good information. The trend was increasing. This was when Fortinet came in – it was about five or six years ago.

We detect threats and stop threats. That also means that visibility and behaviour analysis are pegged to the next-generation firewall, so that we can understand what a threat is and block it. We joined forces and created an integration between visibility and behaviour, and the ability to detect and block threats. And this is how everything started, five or six years ago.

Now, it is a huge business for Fortinet, and we are seeing so many problems coming out of international OT networks.

And what is driving this is the necessity for board member visibility. We are seeing board members and CEOs ask for more data from the OT network. With the network, nobody would understand or even know what was happening, but now, the CEO and board members want more information and more data analytics. This has opened up a whole world of internet companies. Unfortunately, there was no built-in security. We are here to help and protect these systems.

Emmanuel Miranda (EM): In the region, the drivers are more or less the same, when implementing cybersecurity. Business constraints is the first most important driver. The second is digitalisation. This is particularly applicable to the manufacturing sector. The third is compliance.

TSE: How can we prevent cyber intrusions and cyber attacks and how can we respond to them, when they have occurred?

EM: In terms of understanding an attack, basically, we have to find three vectors. The first one is the external vector. The second one is internal – employees and contractors. And the third vector is the supply chain. For example, someone in the supply chain can get attacked via the ERP (Enterprise Resource Planning) software that they do not own. Some countries include the contractor under the supply chain attack vector.

There are two things to be considered when we talk about the external vector. One is the direct attack on OT. We support our customers by telling them how to respond to an attack and how to recover from it.

The second one is an attack on IT that is going to impact OT directly.

If you just secure your IT and do not secure your OT, you are going to have problems. On the other hand, if you strengthen the OT side and do not secure the IT, you run into problems.

And that is why Fortinet uses the concept of 'mesh architecture' to protect both the IT and OT sides.

What do we do? You need to have a plan. You need to have a strategy. There are a couple of things we do. The first thing we talk about is threat detection and protec-

tion, with the next generation of technology.

You could, first of all, protect the North-South communication, that is, the OT to IT and IT to OT communication.

The other thing, maybe the more important one, when we are talking about ransomware, is East-West micro-segmentation. The objective is to limit the lateral movements of the hackers within the IT environment.

We also need to have visibility. It is good to see the network and you need to have a look at the endpoints, as well, since most of the breaches take place at the endpoints.

One more thing that is important for preventing ransomware attacks is to make sure that you have access to threat intelligence to make sure that systems are up-to-date, in terms of signatures and vulnerabilities.

We are on top of the trends that are telling us to get more visibility, through dashboards, to understand what is happening on the networks. We now have a new feature that enables us to show clients what is happening on the network, if there is a cyber attack.

To summarise, the important requirements are threat detection ability, protection and visibility.

JS: The human element is still a very key factor in all of this, because the majority of ransomware incidents happen because of human errors. To address this, we help to build cybersecurity awareness within companies and businesses.

TSE: What is your strategy for Fortinet's growth in the region?

JS: Not only have we been building better and more capable technology for the OT and consumer space, we have also been increasing the knowledge base. We have eight levels of training in Fortinet, for partners, end-users and customers.

We have a shortage of 4 million people in the area of cybersecurity. So, we are trying our best to train as many people as possible, by providing training programmes, for anybody who wishes to get trained on Fortinet products.

Foreseeing the need for specific training is the first thing. The other thing is that we have been increasing our capacity, in terms of people. They need to come with an OT background, from sectors such as oil & gas, power generation, transportation, manufacturing, or utilities.

We are a big company but we still have the mindset of a new startup. We like to listen to customers, get their feedback, and implement new solutions and new technologies to help them mitigate cyber threats.

New global OT and cybersecurity report

Fortinet recently released the 2022 State of Operational Technology and Cybersecurity Report. Based on a detailed survey conducted in March 2022 of more than 500 global operational technology (OT) professionals, the report's data highlights the current state of OT security and provides a roadmap to better secure OT organisations.

The need to improve OT security is underscored in the report which found that 93% of OT organisations experienced an intrusion in the past year and 78% of them experienced more than three intrusions.

Elimination of air-gapping

Traditionally, security was not as critical a consideration when programmable logic controllers (PLCs) – the brains of any industrial control system (ICS) or OT network – were designed. PLCs never verified the authenticity of message senders, and controller communications had zero encryption capability. Previously, there was no need for these security measures because an organisation's OT network was always air-gapped from their IT network.

Now, however, the situation is quite different. OT and IT networks have converged and industrial processes have been digitised. While there are benefits from the integration of these two types of networks, this new connectivity has also made OT networks vulnerable to cyberattacks. IT/OT interconnectedness has allowed threat actors to attack the cyber-physical systems of no-longer air-gapped OT environments, resulting in many serious incidents.

Best practices for protecting OT

According to the report, some of the key best practices for OT organisations are the following:

- Employing solutions that offer centralised visibility of all OT activities.
- Consolidating security vendors and solutions.
- Deploying network access control (NAC) technology.

The Platform Approach

The 2022 report shows that there are widespread gaps in industrial systems' security, and there are numerous areas in need of improvement. Since cybersecurity must now fully span both the IT and OT network environments to be effective, Fortinet believes that a mesh platform approach is essential for keeping industrial organisations secure. With the centralised visibility that a mesh platform offers, OT vulnerabilities and risks can be plugged and today's sophisticated threats can be repelled.

The ABLOY Keyless Access Controller

Finland-headquartered Abloy Oy and ASSA ABLOY Global Solutions recently announced their jointly developed, new ABLOY Keyless Access Controller. With the controller, businesses can upgrade their doors to be keyless – making most electric locks and other electronic door locking devices work with a digital key on a mobile app, instead of a physical credential. The controller not only works with ABLOY products but also with hardware of any brand using compatible wiring.

Relying on continuous power, this small device is optimally installed inside a cabinet or behind a door and is therefore difficult to manipulate from the outside.

The controller is operated with the ABLOY mobile app on the user's mobile phone over a Bluetooth Low Energy connection. The device is compatible with numerous electric lock types, such as electromechanical, electric, magnetic, motor and cabinet locks, and also with alarm systems, door strikes, latches, actuators, as well as automatic or manual garages, sliding and roll-up doors, gates and lifts.

The controller is the latest extension to the ABLOY portfolio of keyless access solutions for professional use. Used in combination with other locking products available, it brings more access management options to different operating environments.

The controller expands the solution range of two product families, tailored to the different needs of critical infrastructure, on the one hand, and more conventional business, on the other:

- The ABLOY BEAT controller can be used for critical infrastructure protection, in sectors such as water, energy, telecom, transportation and logistics.
- The ABLOY CUMULUS controller is designed for commercial real estate and public spaces. Application areas include parcel deliveries, cash-in-transit, office spaces and construction, for example.

The controller can be managed with ASSA ABLOY Global Solutions' CIPE Manager, ABLOY OS INCEDO or by integrating with a third-party system. The solution offers well documented application programming interfaces (APIs) and mobile software development kits (SDKs) for easy integration with partner solutions. The controller tracks usage and records opening and locking events automatically. The records can be accessed in the management system used by the organisation.

The respective controller versions will be supplied, in stages, to selected markets globally, by regional ABLOY Critical Infrastructure and ABLOY sales units.

Product specifications

- Body material: high heat-resistant acrylonitrile butadiene styrene (ABS) plastic
- Size: 50 mm x 50 mm x 32 mm
- Operating temperature: -30°C to 60°C
- Connectivity: Bluetooth Low Energy; range up to 50 m
- Wiring: one device per controller; 12 V - 24 V powered

With the ABLOY Keyless Access Controller, businesses can upgrade their doors to be keyless – making most electric locks and other electronic door locking devices work with a digital key on a mobile app, instead of a physical credential.

Relying on continuous power, the access controller is a small device that is optimally installed inside a cabinet or behind a door and is therefore difficult to manipulate from the outside.

Optimised version of the LED installation beacon 240 Multicolour

WERMA Signaltechnik now offers an optimised version of the established and successful LED installation beacon 240 Multicolour. The compact beacon combines up to seven colours in one beacon (red, yellow, green, white, blue, purple and turquoise) and now also has IP69K protection rating as well as UL approval.

In contrast to the CE-mark, UL certification is not required by law. However, WERMA Signaltechnik has decided to certify the LED installation beacon 240 in accordance with UL standards. This means that the product can be used worldwide and guarantees product safety, globally. This approval plays an important role in the North American market, in particular, and is one of the most important marks of conformity here. This is because the UL certification mark stands for the proven conformity of a product with the safety regulations of USA and Canada.

The IP69K standard is the highest protection class for electrical equipment, guaranteeing protection against solid objects, liquids, steam and dust. Water penetration is not possible, even at short distances, high pressure and high temperatures. This makes it suitable for applications involving high-pressure systems.

Common application examples can be found in the mobile machinery, food processing, pharmaceutical and petrochemical industries, where all equipment must meet washdown requirements and is regularly exposed to high-pressure water jets.

The LED installation beacon 240 combines a large, bright illuminated surface with good visibility and robustness. It has a diameter of 55 mm and rises 46 mm above the surface when installed. It is therefore a good choice if installation space is limited.

Thanks to the seven colours, it can be used in a variety of ways. It can signal malfunctions or statuses at the control console of a machine, in the machine housing or on control cabinets, for example. Owing to its compact size, it is also suitable for automation applications and large plants with numerous process stages.

The LEDs radiate powerful light all around, so the signal is clearly visible from all angles. And thanks to the frosted dome, the light effect is pleasant and homogenous. Despite all these features, the installation beacon is efficient and needs only 40 mA to 130 mA, depending on the variant.

The beacon can also be supplied in combination with an attention-grabbing buzzer. The buzzer emits a 3,400 Hz pulse tone signal with a volume of 85 dB.

Thanks to the M30 installation size, the signal device can be easily mounted. Bit-encoded controlling allows the three basic colours – green, yellow and red – to be displayed, using just two PLC outputs. With additional outputs, blue, turquoise, violet and white can also be activated.

The beacon is maintenance-free and has a service life of up to 50,000 hours.

The LED installation beacon 240 Multicolour combines up to seven colours in one beacon.

IES APPOINTED AS SKILLS DEVELOPMENT PARTNER FOR ENGINEERING SECTOR

IES, together with four other trade associations and chambers and professional bodies, was appointed by SkillsFuture Singapore (SSG) as a Skills Development Partner (SDP) on 4 August 2022.

The partnership was cemented with the signing of a Memorandum of Understanding between IES and SSG, witnessed by Minister of State for Education and Manpower, Ms Gan Siow Huang, at the Lifelong Learning Institute in Paya Lebar.

As the SDP for the engineering sector, IES will assist SSG in reaching out to the workforce and industry stakeholders to identify necessary skills more responsively, better link skills development with ongoing job transformation and redesign trends, and help companies better recognise employees' skills acquisition and mastery.

The Institution's strong links to the industry, academia, and the government will facilitate this process.

SSG will support this effort through structured training programmes and offer potential personnel attachments with them, so as to equip IES, and other SDPs, with the knowledge to conduct the required research and analysis, and use relevant data tools to extract skills insights.

The agency will also help to nurture dedicated skills development specialists who will plan and execute activities related to the SDP programme.

IES President Dalson Chung remarked, "IES is privileged to be selected by SSG as one of the Skills Development Partners. This underscores the importance of engineering professionals and IES' role in building up engineering competencies in Singapore's next stage of growth.

"As the national society of engineers in Singapore, IES has prioritised skills upgrading and recognition for the engineering workforce through the IES Academy and the IES Chartership Programme for engineers, engineering technologists, and technicians. We look forward to building on this strong foundation, in partnership with SSG and industry players, to develop future-ready engineering talents to drive Singapore's transformation."

Joining IES as SDPs for their respective sectors were: The Institute for Human Resource Professionals, Singapore Chinese Chamber of Commerce & Industry, Singapore Computer Society, and SGTech.

IES (extreme left), alongside four other trade associations and chambers and professional bodies, was appointed as a SkillsFuture Singapore Skills Development Partner on 4 August 2022. The MOU signing ceremony was witnessed by Minister of State for Education and Manpower, Ms Gan Siow Huang (standing, 3rd from left). Photo: SSG

THE HEART & VOICE OF ENGINEERS

IES Membership

1) Professional Development

- Eligible for Chartered Engineers Certification Application (subject to registration criteria and conditions)
- Enjoy preferential rates for IES conferences, seminars and workshops
- Enjoy 10% to 15% discount for IES Academy Courses (T&Cs apply)

2) International Affiliations

- Interaction with overseas engineering institutions in joint programmes

3) Networking

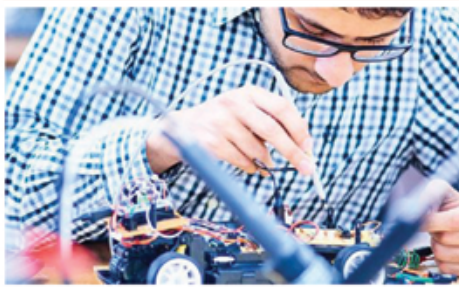
- Exclusive FREE Members' Night (T&Cs apply)
- Enjoy preferential rates for networking activities
- Join our Sports Interest Groups
- Join our Social Events

4) Communication

- Enjoy free subscription of IES weekly e-Newsletter
- Free monthly e-zine – The Singapore Engineer
- Free Annual IES Directory containing the business contacts of all members
- Get the latest updates on government regulations and the activities of allied institutions

5) Others

- Enjoy special rate for IES professional Indemnity Insurance Schemes
- Enjoy exclusive merchant benefits
- Free parking in IES premises
- Get a 5% discount off your membership subscription when you pay by GIRO (T&Cs apply)



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