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COVER STORY:

Dell Technologies launches Global Innovation Hub in Singapore



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Launch of the
Dell Technologies Global Innovation Hub

Singapore, 22 February 2021

PLUS

DIGITALISATION: Emerging technologies and automation are the next wave of innovations

SUSTAINABILITY: World Engineering Day 2021: developing engineering for sustainable development and a low-carbon economy

FACILITY MANAGEMENT: Smart Facility Management with Prescriptive Analytics

Railway & Transport



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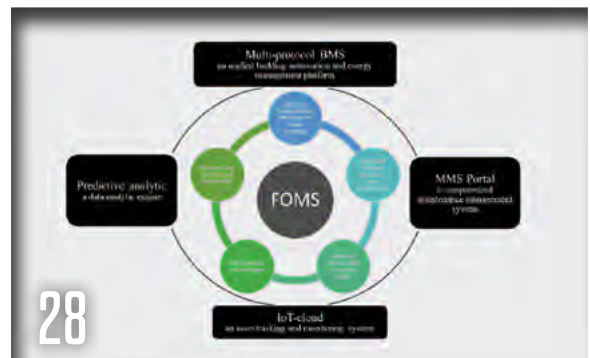
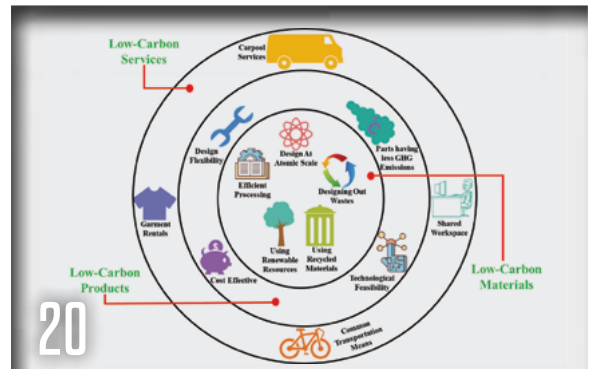
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ENERGY AND CLIMATE LEADERS

PLEDGE CLEAN ENERGY ACTION

Top international energy and climate leaders from more than 40 countries took part in the IEA-COP26 Net Zero Summit on 31 March 2021 to identify how to work together to reduce global greenhouse gas emissions and meet the goals of the Paris Agreement.

The Net Zero Summit, co-hosted by Fatih Birol, Executive Director, IEA (International Energy Agency) and Alok Sharma, President, COP26, brought together high-level representatives of energy and climate ministries from countries and regions, including Australia, Brazil, China, Colombia, the European Union, France, Germany, India, Indonesia, Italy, Japan, South Africa, the UK and many others. Participants from a broad cross-section of civil society groups, private companies and government institutions also took part in the discussions.

The summit is a critical milestone on the road to COP26 in Glasgow, UK, in November. It brought together representatives of countries covering more than 80% of global GDP, population and emissions. Key participants included Zhang Jianhua, China's Minister of Energy; Frans Timmermans, Executive Vice-President of the European Commission; Raj Kumar Singh, India's Minister of Power, New and Renewable Energy; John Kerry, US Presidential Special Envoy for Climate; Amani Abou-Zeid, African Union Commissioner for Infrastructure and Energy; and Ngozi Okonjo-Iweala, Director-General of the World Trade Organization.

"It is time for the world to move from a decade of climate change deliberation to a decade of delivery. The UK strongly encourages countries to endorse the IEA's seven principles for achieving net zero. Today's summit clearly showed willingness from governments, civil society and businesses to work together in each emitting sector to make this happen and keep the 1.5°C target within reach", said Alok Sharma, President, COP26.

"This should not be viewed as a shouldering of a burden, but more a sharing of an opportunity. By working together, we can accelerate progress, create jobs and prosperity, and protect our planet for future generations", he added.

"Our Net Zero Summit made clear that the vast majority of the world agrees on the gravity of the climate crisis and the urgency of immediate actions to put global emissions on track towards net zero. But it also underscored the need for greater international collaboration to drive the rapid global deployment of clean technologies across all the key sectors of the economy", said Fatih Birol, Executive Director, IEA.

"No country can do this alone. If we want the transition to clean energy to happen quickly, the world's major economies have to work much more effectively and closely together. The summit's Key Principles show what needs to happen, and I offer the IEA's full support for the UK COP26 Presidency's efforts to strengthen

the international cooperation mechanisms that will accelerate our transition to net zero", he added.

Many IEA member governments supported the Seven Key Principles presented by the IEA at the summit to guide the implementation of net zero commitments. The principles cover essential areas such as the need for sustainable recoveries from the COVID-19 crisis, the critical importance of implementable emissions reduction roadmaps for the current decade, and the development of stronger mechanisms for international coordination to accelerate innovation and deployment in each major emitting sector of the global economy. The principles also address issues such as technology collaboration, best-practice sharing, investment tracking, ensuring people-centred transitions, and integrating energy security and affordability into net zero plans.

To support stronger government actions, on 18 May, the IEA will publish the first comprehensive roadmap for the global energy sector to reach net-zero emissions by 2050. Requested by the COP26 Presidency as a key input, the roadmap will set out a pathway for what is needed from governments, companies, investors and citizens, to put global emissions on a path in line with a temperature rise of 1.5°C. The roadmap will help decision-makers to prioritise urgent action in the lead-up to Glasgow.

A related event that took place was the Climate and Development Ministerial, hosted by COP26 President Alok Sharma and UK Foreign Secretary Dominic Raab, which focused on countries that are most vulnerable to the impacts of climate change and helping them set the international agenda in the run-up to COP26 in November. The global gathering brought together countries and partners to build consensus and practical solutions on key issues such as responding to climate impacts, fiscal space and debt, and climate finance.

GLOBAL CO₂ EMISSIONS ARE SET FOR BIG INCREASE

A new IEA report shows global energy-related carbon dioxide (CO₂) emissions are on course to surge by 1.5 billion tonnes in 2021, driven by a strong rebound in demand for coal in electricity generation.

This rise in CO₂ emissions would reverse most of last year's decline caused by the COVID-19 pandemic.

It would also represent the biggest annual rise in emissions since 2010, during the carbon-intensive recovery from the global financial crisis.

The IEA's Global Energy Review 2021 estimates that CO₂ emissions will increase by almost 5% this year to 33 billion tonnes.

SINGAPORE GREEN PLAN

2030 CHARTS AMBITIOUS TARGETS

On 10 February 2021, the Government unveiled the Singapore Green Plan 2030, a whole-of-nation movement to advance Singapore's national agenda on sustainable development. The Green Plan charts ambitious and concrete targets over the next 10 years, strengthening Singapore's commitments under the UN's 2030 Sustainable Development Agenda and the Paris Agreement, and positioning Singapore to achieve its long-term net-zero emissions aspiration as soon as viable.

Spearheaded by five ministries - the Ministries of Education, National Development, Sustainability and the Environment, Trade and Industry, and Transport - and supported by the whole of Government, the Green Plan builds on the sustainability efforts of preceding decades. The comprehensive plan will strengthen Singapore's economic, climate and resource resilience, improve the living environment of Singaporeans, and bring new business and job opportunities. It will influence all aspects of our lives, from how we live to how we work and play, as we strive together as a nation to make Singapore a greener and more liveable home.

COMPREHENSIVE PLAN

The Green Plan has five key pillars:

- **City in Nature:** to create a green, liveable and sustainable home for Singaporeans.
- **Sustainable Living:** to make reducing carbon emissions, keeping our environment clean, and saving resources and energy, a way of life in Singapore.
- **Energy Reset:** to use cleaner energy and increase our energy efficiency, to lower our carbon footprint.
- **Green Economy:** to seek green growth opportunities to create new jobs, transform our industries, and harness sustainability as a competitive advantage.
- **Resilient Future:** to build up Singapore's climate resilience and enhance our food security.

Realising these sustainability goals will require a multi-stakeholder whole-of-nation effort. This will be enabled by a Green Government, with the public sector leading in environmental sustainability, and Green Citizenry, where individuals, communities and businesses play their part.

The Green Plan will strengthen existing national sustainability efforts and mitigation measures with several new initiatives and targets. These include:

- A new Enterprise Sustainability Programme to help

Singapore enterprises to develop capabilities in sustainability.

- Requiring all new car registrations to be cleaner-energy models from 2030, and more than doubling the targeted number of electric vehicles (EVs) charging points by 2030, from 28,000 to 60,000.
- Raising the sustainability standards of our buildings through the next edition of the Singapore Green Building Masterplan.
- Building on our 2030 aim to reduce the waste sent to our landfill by 30%, we will work on achieving a 20% reduction by 2026.
- Working towards a two-thirds reduction of net carbon emissions from the schools sector by 2030, and aiming for at least 20% of our schools to be carbon-neutral by 2030 for a start, with the rest of the schools to follow thereafter.

The Green Plan will be supported by the Eco Stewardship Programme in schools, to strengthen the inculcation of informed, responsible and sustainability-conscious mindsets and habits in our young.

Building a city of green possibilities in partnership with Singaporeans

The Green Plan is a living plan which will evolve as we develop and refine our strategies, taking into account technological developments, and as part of a continuous national engagement process. The Green Plan has incorporated comments by participants in the recent Emerging Stronger Conversations. A key priority of the Green Plan is mobilising and empowering the Public, Private and People sectors to co-create solutions for sustainability. In the spirit of Singapore Together, the ministries will work together with Singaporeans and partners to co-create solutions and realise the Green Plan.

The ministries will actively involve the public and other partners to further develop ideas and undertake relevant initiatives, as part of this national engagement process. For a start, the ministries will embark on a series of Green Plan Conversations this year, hosted by the ministers overseeing the Green Plan, to seek the views of Singaporeans and to explore potential partnerships. Other engagements will also be planned through the year. Ideas generated from these engagements can be taken up through existing or new collaborative platforms, such as the Alliances for Action. The SGD 50 million SG Eco Fund will also support community-led projects that advance environmental sustainability in Singapore.

SG GREEN PLAN

The Singapore Green Plan 2030 is a national sustainability movement which seeks to rally bold and collective action to tackle climate change

City in Nature

Green, Liveable and Sustainable Home for Singaporeans

- Plant 1 million more trees, and have every household within a 10-minute walk from a park by 2030
- Develop over 130 ha of new parks, and enhance around 170 ha of existing parks with more lush vegetation and natural landscapes by end-2026
- Add 1000ha of green spaces by 2035

Green Government

Public sector will lead by example

- Be exemplary in taking sustainability action, including to peak public sector carbon emissions around 2025, ahead of national target
- Encourage and enable citizens and businesses to adopt sustainability practices, such as through green procurement

Sustainable Living

Strengthen Green Efforts in Schools

- Introduce an Eco Stewardship Programme to enhance environmental education in all schools
- Work towards two-thirds reduction of net carbon emissions from schools sector by 2030
- At least 20% of schools to be carbon neutral by 2030

Green Commutes

- 75% of trips during peak periods to be on mass public transport by 2030
- Triple cycling path network to 1,320km by 2030, from 460km in 2020
- Expand rail network to 360km by early 2030s, from around 230km today

Green Citizenry:

Reduce waste and consumption

- Reduce amount of waste to landfill per capita per day by 20% by 2026, and 30% by 2030
- Reduce household water consumption to 130 litres per capita per day

Energy Reset

Cleaner-energy Vehicles

- New diesel car and taxi registrations to cease from 2025, with all new car and taxi registrations to be of cleaner-energy models from 2030
- Further revise road tax structure to bring down road tax for mass-market electric cars
- Target 60,000 electric vehicle (EV) charging points by 2030, with 7 EV-Ready Towns by 2025

Greener Infrastructure & Buildings

- Green 80% of Singapore's buildings (by Gross Floor Area) by 2030
- 80% of new buildings (by Gross Floor Area) to be Super Low Energy buildings from 2030
- Best-in-class green buildings to see 80% improvement in energy efficiency (over 2005 levels) by 2030

Sustainable Towns & Districts

- Reduce energy consumption in HDB towns by 15% by 2030

Green Energy

- Quadruple solar energy deployment to 1.5 gigawatt-peak by 2025
- Tap on cleaner electricity imports, increase R&D on renewable energy and emerging low-carbon technologies



It is a living plan which will evolve as we work with Singaporeans and partners from all sectors to co-create solutions for sustainability. Let's work together to make Singapore a green and liveable home.

Green Economy

Sustainability as New Engine of Jobs and Growth

- ✔ New Enterprise Sustainability Programme to help local enterprises adopt sustainability practices
- ✔ Develop Singapore to be a carbon services hub, and a leading centre for green finance in Asia and globally
- ✔ Develop Jurong Island to be a sustainable energy and chemicals park
- ✔ Leverage opportunities in sustainable industries to create good jobs for Singaporeans

New Investments to be Carbon and Energy Efficient

- ✔ Seek new investments to be among the best-in-class in energy/carbon efficiency

Resilient Future

Safeguarding our Coastlines against Rising Sea Levels

- ✔ S\$5b dedicated to coastal and drainage flood protection measures
- ✔ Formulation of coastal protection plans for City-East Coast, North-West Coast (Lim Chu Kang and Sungei Kadut) and Jurong Island by 2030

Safeguarding Food Security

- ✔ Produce 30% of our nutritional needs locally and sustainably by 2030, through developing land and sea space and skilled workers, funding support, and promoting R&D

Keeping Singapore Cool

- ✔ Moderate the rise in urban heat, such as with cool paint and by increasing greenery

Jointly led by:



www.GreenPlan.gov.sg

The Singapore Green Plan 2030 is a whole-of-nation movement to advance Singapore's national agenda on sustainable development. Infographic: Ministries of Education, National Development, Sustainability and the Environment, Trade and Industry, and Transport.

SOUTH BEACH SECURES

SGD 1.22 BILLION GREEN LOAN

South Beach Consortium (SBC) has secured a five-year green loan totalling SGD 1.22 billion - one of Singapore's largest green loans to-date. It is provided by a group of lenders comprising DBS, UOB, Maybank, SMBC and OCBC. DBS is the lead green advisor and UOB is the green advisor.

Proceeds from the green loan will be used for the refinancing of the South Beach mixed-use development - a double Green Mark Platinum project - in alignment with the City Developments Limited (CDL) Sustainable Finance Framework. This framework was developed and adopted when CDL's SDG Innovation Loan was launched in 2019. It demonstrates how CDL and its group entities intend to fund projects or innovations that will deliver social and environmental benefits to support the group's business strategy and vision. The framework also stipulates how the financing proceeds are to be applied to eligible projects.

Ms Yiong Yim Ming, CDL Group Chief Financial Officer, said, "Since CDL issued the first green bond by a Singapore company in 2017, we have continued to advance on sustainable financing initiatives. By doing so, we are channelling capital to achieve better environmental outcomes and aligning with the expectations of the investment community for more sustainable developments. Including this green loan obtained by South Beach, CDL has secured over SGD 2.5 billion of sustainable financing in the form of a green bond, green loans and a sustainability-linked loan to-date. As a green developer advocate, we are heartened that our strong sustainability track record enables CDL to tap the fast-growing sustainable financing pool to benefit our joint-venture projects, sharing our green vision of a low-carbon future with our like-minded partners".

South Beach was built with sustainability in mind. The CDL-led consortium which won the site tender back in 2007 was evaluated through a 'two-envelope' system that emphasised the quality of the developer's concept. The consortium had proposed to adopt an environmental design and green technology to create a distinctive, high-quality development that fits in well with Singapore's tropical climate and urban context.

Ms Samantha Tan, General Manager of South Beach Consortium, said, "From inception, South Beach was designed to exemplify Singapore's ideal of a 'City in a Garden' and with the intention to embody top design and environmental sustainability. The Green Loan is a strong testament to South Beach's efforts in driving the green built environment movement and further cements South Beach as one of Singapore's

most sustainable and energy-efficient mixed-use development".

SOUTH BEACH

The mega South Beach complex is a joint-venture between CDL and IOI Properties Group Berhad. Strategically located on a part of Beach Road, that borders Singapore's Central Business District, the mixed-use development seamlessly integrated four conserved military buildings with two towers to collectively generate 510,000 ft² of Grade A office space, 190 luxury residences, the 634-room JW Marriott Singapore South Beach, and an array of dining and lifestyle establishments. It is also seamlessly connected to two underground MRT stations - Esplanade and City Hall Interchange.



South Beach is a mixed-use development that is strategically located on a part of Beach Road, that borders Singapore's Central Business District.

Conceived by world-renowned architectural firm Foster + Partners, South Beach's iconic architecture blends innovative form with environmental sustainability to create a distinctive, high-quality development that fits in with Singapore's tropical climate and urban context.

One of South Beach's unique eco-friendly features is its state-of-the-art microclimatic canopy that extends throughout the development. The canopy, engineered to harvest rainwater and fitted with photovoltaic cells to convert solar energy into electricity, also serves the added purpose of providing pedestrians beneath it with a naturally ventilated shelter that protects them from the worst of the city's tropical climate. The development's green efforts are further supported by its good orientation, high-performance glass façade and extensive sky gardens which help to absorb heat and maintain a high level of thermal comfort throughout the day. In addition, energy- and water-efficient fittings and certified green label building

materials all contribute to South Beach's commitment to being one of Singapore's most environmentally conscious developments.

South Beach, which blends innovative form with environmentally conscious design and ingenious green technologies, has been honoured with two Green Mark Platinum Awards (Residential and Commercial) by the Building and Construction Authority of Singapore. It also received the prestigious FIABCI Singapore Awards, topping the Sustainable Development category; and also gained recognition at the ASEAN Energy Awards 2019 - becoming the sole Singapore winner of the 'Energy Efficient Buildings Awards' in the New and Existing Building category.

Most recently, South Beach was awarded the highest industry honour of 5-stars in the Best Mixed-Use Development (Singapore) category at the Asia Pacific Property Awards 2020/2021. Another milestone was reached when South Beach was recertified to Green Mark Platinum Standards in February 2021.

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AECO ENERGY LAUNCHES OPERATIONS

TO SERVE SINGAPORE'S ELECTRICITY MARKET

AECO Energy, a new entrant to Singapore's electricity sector, recently announced the launch of its operations. The company is expected to deliver customer-centric offerings in the electricity and renewable energy markets.

With over 12 years of experience in delivering open market electricity services and solutions to businesses in Australia, under the Power Choice brand, AECO Energy is bringing its second generation of services and technology to Singapore, for the first time.

AECO's second generation delivers on two major offerings.

Firstly, it will deliver the 'last mile' of value in the Singapore Open Electricity Market (OEM) value chain by providing innovative services to assist businesses to manage, plan and make better buying decisions.

AECO has a customer-centric mission to use its low-cost, proven technology and expert-led services to enable better business decisions within a complex electricity market with multiple providers and opaque medium- to long-term pricing information. This comes against the backdrop of Singapore's maturing OEM, which gives businesses and consumers the freedom to choose their electricity providers.

AECO Energy's technology platform, MarketPro, with its electricity futures market simulator, Rate Watch, delivers business and electricity efficiency and empowers businesses through relevant and timely pricing information, while also helping Singapore businesses make better buying decisions via automated tenders and reverse auctions.

Moreover, for businesses who do not have the capability and capacity to manage and purchase their own electricity, AECO Energy Portfolio delivers scalable buying power with a fully-managed contract management and purchasing aggregation service for small, medium and large businesses.

Mr Alan Jones, CEO, Chairman & Founder, AECO Energy, said, "We are incredibly excited and humbled to be joining Singapore's dynamic energy scene with our low-cost, high-value products and services. Our mission is clear. Just like Amazon is revolutionising the 'last mile' of product supply chains with its same day delivery, we are also delivering the 'last mile' of the value chain in Singapore's OEM, that enables more businesses to make better purchasing decisions, increase business profitability and help to grow all of Singapore's economy".

Secondly, with increasing emphasis placed by SGX-listed entities, enterprises and multinational corporations

(MNCs), on sustainability, AECO (through its SustainPro offering) will bring, for the first time in Singapore, the benefit of AECO's direct relationship with generators of International Renewable Certificates (I-REC). This gives Southeast Asian markets the benefit of medium- to long-term low-cost and structured REC solutions to meet renewable energy targets and sustainability goals. This translates to more profits by providing more predictable costs for businesses in meeting their sustainability and renewable energy goals.

"As a specialised company, unburdened with corporate overheads and distractions from Singapore's local market participants, we can offer companies who are based anywhere in Southeast Asia, sustainability and renewable energy solutions that span markets and countries at a lower and more predictable price. We are honoured to play our part to bring sustainability and increased renewable energy throughout the world and to do so while benefitting our customers' cost structures", continued Mr Jones.

AECO Energy is introducing three offerings as part of its electricity management solutions:

- **MarketPro:** Businesses can optimise costs and seize market opportunities with exclusive access to customised market price information through AECO Energy's integrated online procurement and management platform equipped with Rate Watch, a market simulation and automated procurement technology.
- **Portfolio:** Businesses get exclusive access to economies of scale with better buying power through professional and expert-managed energy procurement portfolios overseen by AECO Energy experts. This allows enterprises to focus on their core business while AECO Energy experts will fully-manage their electricity contracts and make better buying decisions on their behalf.
- **SustainPro:** SustainPro focuses on helping businesses meet their sustainability goals at the lowest cost. AECO Energy offers lower costs on the procurement of Renewable Energy Certificates (RECs) and tailored REC supply solutions designed to meet transition needs towards a more sustainable business.

"With the understanding that business needs are unique for every organisation, our energy experts will work closely with customers here in Singapore to help them reduce costs, drive efficiency and make better buying decisions. By providing technology-enabled, insights-driven energy technology solutions, we want to create a profound impact on our customers' businesses to better position them for sustainable growth in the long term", Mr Jones said.

BARCO INAUGURATES

NEW SINGAPORE OFFICE

Barco, a global leader in professional visualisation and collaboration technology, recently announced that it has inaugurated its new office in Greater Southern Waterfront, Singapore.

This is the company's headquarters for its Asia Pacific operations and is designed and furnished with the latest video technology to accommodate the new normal of hybrid working. It also features Barco's new Experience Centre which is a state-of-the-art technology centre showcasing the company's latest audio-visual and collaboration solutions with full interactivity. Barco has also started plans to transform demonstration centres into Barco Experience Centres across the world.

The Experience Centre gives visitors an insight into all of Barco's solutions and technological innovations, across markets and industries. These include visualisation solutions ranging from LED displays and LCD videowalls, to video collaboration tools and image processors. The new office space reflects the trend towards optimising available space with an open working concept, to create smaller, more multi-purpose areas for a collaborative mobile workforce.

Given that most meetings are now video-enabled, Barco's facilities in the new office cater to the Bring Your Own Meeting (BYOM) trend. Employees can benefit from the available audio and video peripherals of the meeting space to boost the meeting experience for all participants. These facilities include more huddle spaces fully equipped with Barco's video-conferencing tools such as weConnect and Clickshare solutions. The office also serves as a showroom, providing compelling experiences for visitors and customers alike.

Changes in workstyles resulting from the pandemic have shown that telecommuting and hybrid workplaces are the future for organisations. Barco believes that traditional offices, cubicles and meeting rooms will be replaced by a customer lounge with hot desks, and a virtual classroom that can be transformed into meeting areas. Today, as enterprises look to establish a new normal of working, following the pandemic, technology is becoming increasingly critical in ensuring that the hybrid workplace, learning or presentation environment is truly collaborative, inclusive and flexible.

Barco has been preparing for the digital future of work before the pandemic, but COVID-19 accelerated the transformation - pushing enterprises to adopt a truly hybrid model of remote and in-office work and increase business resilience by embracing workplace transformation at unprecedented speed.

Barco's decision to launch an Experience Centre outside of Europe will serve to drive workplace transformation



The Experience Centre at Barco's new office in Singapore.

across numerous industries and grow its presence in Singapore and the region. Through its Experience Centre and new HQ office, organisations can enjoy an immersive, interactive experience of the full ecosystem of the next generation of collaboration and visualisation tools, designed for the new hybrid world.

"Barco has always been committed to enabling bright outcomes for our customers. We are excited at the launch of our new facilities and we believe they will help organisations adapt to the new environment of hybrid meetings and workplaces", said Mr Olivier Croly, Senior Vice President for APAC at Barco.

"As a result of the pandemic, business and technology vendors including Barco are now selling their solutions virtually. This means it is challenging to demonstrate the capabilities of our products fully and solutions, especially our high-resolution projectors and diagnostic imaging screens. Now, our partners will be able to use the Experience Centre for live demos for customers", said Mr Gan Ta Loong, Managing Director, Barco SEA and Vice President Immersive Experience, Barco APAC.

As companies navigate the learning curve, Barco has also seen an increase in demand for remote working and hybrid learning solutions such as weConnect and ClickShare Conference that help people continue to collaborate, communicate, and operate.

"Barco is committed to creating the workplace of the future, leveraging on visualisation solutions delivering exceptional experiences and enabling bright outcomes for customers", added Mr Gan.

Barco has been focused on strengthening its presence in the Asia Pacific region as organisations seek to implement meeting and learning solutions that improve collaboration and productivity.

LENLEASE APPOINTS

NEW ASIA CEO AND CHIEF PEOPLE OFFICER

Lendlease recently announced the appointment of Justin Gabbani as the group’s Chief Executive Officer, Asia, based in Singapore, as well as Deborah (Deb) Yates as its Chief People Officer, based in Sydney, Australia.

The appointment of Justin Gabbani to his new position follows the elevation, in February 2021, of the current Asia CEO, Tony Lombardo, to the role of Group Chief Executive Officer Designate. Deb Yates’s appointment as Chief People Officer follows the resignation of Group Head of People & Culture, Alex Christie.

Justin joined Lendlease in 2003 and most recently held the role of Chief Financial Officer, Asia. In this position, he was responsible for key functions across Asia, including finance, investment & capital markets, research, and strategy.

Prior to this role, Justin held the role of Head of Investment & Capital Markets (Asia and Europe) responsible for investments, capital raising, investor relations, product development and research across both Asia and Europe. During his time with Lendlease, Justin has held various roles in the Investment Management and Development businesses.

Justin commences his new role on 1 June 2021.

Deb joins Lendlease as the Group’s Chief People Officer following a 25-year career working across all areas of HR. In her current role as KPMG’s National Managing Partner for People and Corporate Affairs, Deb has led its people strategy with a particular focus on creating a mentally healthy culture that empowers people to successfully execute the organisation’s strategy.

Prior to joining KPMG, Deb was Chief HR Officer at Reckitt Benckiser, a FTSE Top 15 company with more than 40,000 employees across 60 countries. Her responsibilities included leading the talent agenda, culture and major projects including integrating significant acquisitions. Deb’s career with Reckitt Benckiser began in Australia and took her to the Netherlands, the US and the UK.



Justin Gabbani



Deborah (Deb) Yates

THE NET ZERO ASSET MANAGERS INITIATIVE GROWS TO 87 INVESTORS MANAGING USD 37 TRILLION

More of the world’s largest asset managers announced recently that they are joining the Net Zero Asset Managers initiative, a clear sign that the global movement for a net-zero emissions economy is growing stronger and more determined. The 14 new signatories, who collectively manage nearly USD 5 trillion in assets, and include the world’s third largest asset manager, State Street Global Advisors, join 73 other signatories in committing to reach net zero greenhouse gas emissions by 2050 or sooner and to set interim targets for 2030.

Launched in December 2020 with 30 signatories, the global initiative has now grown to include 87 signatories with nearly USD 37 trillion in assets under management, representing nearly 40% of the total assets under management across the globe. The number of signatories has nearly tripled and the total assets under management have quadrupled since the launch.

With State Street Global Advisors announcing its commitment, the three largest asset managers in the world are now signatories to the initiative. BlackRock and Vanguard announced their participation in March 2021.

The asset managers have committed to set interim targets for 2030, consistent with a fair share of the 50%

global reduction in emissions identified as a requirement in the IPCC special report to limit increase in global temperatures to no more than 1.5°C. They will be asked to submit an interim target, within a year of joining the initiative, for the proportion of assets to be managed in line with reaching net-zero emissions by 2050 or sooner.

Signatories will also commit to transparent and rigorous accountability. They will annually report progress in accordance with the Task Force for Climate-related Financial Disclosures (TCFD) recommendations, including in implementing a climate action plan and ensuring their plans are based on a robust methodology, consistent with the Race to Zero criteria, and on action being taken in line with the commitments.

The Net Zero Asset Managers initiative is managed globally by six founding partner investor networks - Asia Investor Group on Climate Change (AIGCC), CDP, Ceres, Investor Group on Climate Change (IGCC), Institutional Investors Group on Climate Change (IIGCC) and Principles for Responsible Investment (PRI). In turn, the initiative is endorsed by The Investor Agenda, of which the investor networks are all founding partners, along with the United Nations Environment Programme Finance Initiative (UNEP FI).

SCHNEIDER ELECTRIC RECOGNISED FOR

RENEWABLE ENERGY LEADERSHIP IN ASIA

The Center for Resource Solutions (CRS), has recognised Schneider Electric, a global leader in the digital transformation of energy management and automation, for its leadership in building renewable energy markets and green power procurement in Asia.

“We are proud to honour Schneider Electric at the Renewable Energy Markets Asia Awards in recognition of its efforts in providing access to clean electricity throughout Asia. By investing in environmentally sustainable companies that provide clean energy to communities that lack a reliable supply, Schneider Electric is doing its part to ensure equal access to energy throughout the region”, said Ms Jennifer Martin, Executive Director, CRS.

With the renewable energy landscape in Asia moving faster than ever before, Schneider Electric’s Energy and Sustainability Services division has recently established an office in Singapore to provide advisory services to companies with Asian operations. The trend towards decarbonisation, coupled with Southeast Asia’s (SEA) thirst for innovation, is the driving force behind the company’s expansion plans in this region.

While urbanisation, industrialisation and digitisation generate an increasing demand for energy, many businesses and countries are also looking to reduce their carbon footprint while complying with green regulations, with the most recent sustainability initiative being the Singapore Green Plan. This intersection of needs and regulations is where the company’s Energy and Sustainability Services division will thrive as businesses source for experts who can help them navigate these new waters.

“Singapore is a prime location for us to access the SEA region as we can tap on the local government’s push for sustainability, while reaching out to operations that may be built in other ASEAN cities. We are committed to helping businesses meet their sustainability goals and that is why you can expect to see more of us as we plan to keep investing in this part of the world”, said Mr Jackson Seng, Energy and Sustainability Services Leader, EAJ Region, Schneider Electric.

Schneider Electric is also a market leader in commercial solutions to digitise operations, minimise energy usage and emissions, and maximise renewable energy utilisation. With Singapore’s push to establish more green buildings and increase adoption of electric vehicles (EV), the company’s solutions in these areas will help to back the country’s Green Plan.

Yoon Young Kim, Cluster President, Singapore, Malaysia, Brunei, Schneider Electric, said, “With

the EV market looking to expand rapidly around the globe, our e-mobility offerings provide an end-to-end solution for EV charging infrastructures that increase efficiency, resiliency and sustainability. We want to use this knowledge and expertise to support Singapore’s goal of having 60,000 EV charging points by 2030”.

Schneider’s goal is to help its customers save 800 million tons of CO₂, between 2021 and 2025. The Energy and Sustainability Services division has advised on more than 100 direct and virtual PPA transactions for a total of more than 9000 megawatts globally as well as the brokerage of nearly 100 million megawatt-hours of energy attribute certificates, making Schneider Electric the world’s largest advisor on corporate renewable energy procurement.

Schneider Electric was recognised during the Renewable Energy Markets Asia Awards, by CRS, based on its commitments to a clean energy transition. In its own operations, Schneider Electric has pledged to achieve carbon neutrality by 2025 and net-zero CO₂ emissions by 2030. Last year, renewable energy powered 80% of Schneider Electric’s operations, up from just 2% in 2017. This increase is the result of a strategy to maximise the adoption of onsite capacity, PPAs and certificates. Over a three-year period, the company has equipped 15 industrial sites in China with onsite solar generation, with plans for three more to be commissioned in 2021.

The Renewable Energy Markets Asia Awards were presented virtually on 9 March 2021, during CRS’ inaugural Renewable Energy Markets (REM) Asia conference.

CRS is a US-based nonprofit with global impact, developing expert responses to climate change issues.

The goal of the REM Asia conference is to support the growth of renewable markets in Asia, focusing on corporate sourcing through green tariffs, certificates, and power purchase agreements (PPAs). This event will help leading industry players throughout Asian renewable energy markets to network, learn and plan for the future of the region.

The acknowledgment from CRS follows the recognition, in 2020, of Schneider Electric as the Climate Group’s RE100 first Clean Energy Trailblazer, acknowledging the company’s drive to help decarbonise the world by accelerating the adoption of renewable energy. In January of this year, Schneider Electric was ranked the world’s most sustainable corporation by Corporate Knights, a media and research company focused on corporate sustainability performance.

HVAC TECHNOLOGY FROM LG EARNS

INTERNATIONAL CERTIFICATIONS FOR INDOOR AIR QUALITY

Commercial air-conditioning technology from LG Electronics has garnered a number of accolades from trusted international organisations, for its ability to improve Indoor Air Quality.

Certifications from Intertek, TÜV Rheinland and Underwriters Laboratories (UL) awarded to the LG DUAL Vane Cassette system confirm the effectiveness of LG HVAC solutions in delivering clean air.

The LG DUAL Vane Cassette is said to be the world's first HVAC solution to receive UL's GREENGUARD Gold Certification for low volatile organic compound (VOC) emissions.

LG DUAL Vane Cassette was also certified by Intertek for removing more than 99.9% of bacteria from indoor air, including *Escherichia coli* KCCM 11234, *Staphylococcus aureus* KCCM 40050 and *Pseudomonas aeruginosa* KCCM 11321.

The product's air purification capabilities are due to LG Plasmaster Ionizer+ technology which is deployed to generate over 3 million ion clusters that attract and carry away allergens and bacteria. For these reasons, LG DUAL Vane Cassette is recommended for use in schools and healthcare facilities where air quality is of utmost priority.

Further, the LG DUAL Vane Cassette was certified by TÜV Rheinland for removing 99.9% of ultrafine dust measuring 50 nanometers in up to 35 minutes and 99.9% of ultrafine dust measuring 100 nanometers in up to 41 minutes. The product was also certified for reducing up to 99.9% of *Staphylococcus epidermidis* bacteria in 60 minutes and up to 99.4% of Phi-X174 virus in 30 minutes. Tests were conducted in a 60 m³ chamber.

The LG DUAL Vane Cassette's air-cleansing and allergen-removing capabilities have also been certified by the British Allergy Foundation.

LG's DUAL Vane Cassette is an effective and versatile system air-conditioning product featuring two vanes that help to deliver strong airflow and wide, even coverage. With six different modes, users can tailor airflow direction and strength to any space or to suit their own individual preferences.

"These trusted certifications attest to the importance LG places on prioritising its customers' well-being. HVAC plays a central role in making indoor environments comfortable and safer for their occupants and LG will continue to deliver solutions that meet the highest international standards for healthy operation and effective performance", said Mr James Lee, Executive Vice President and Head of LG's Air Solution Business.

NEW INDUSTRIAL FAN LINE INTRODUCED IN SINGAPORE

Hunter Industrial Fans, the industrial division of US-based Hunter Fan Company, launched its international fan line known as 'DDI'. The DDI is a high volume, low speed (HVLS) industrial fan built for powerful air circulation. The HVLS fan is designed for simplicity while providing significant airflow due to its custom-built, direct-drive motor and three aerodynamically efficient blades.

"Hunter Industrial has grown significantly over the last six years, and we are proud to offer a product that meets the demand for our international customers across the globe. The DDI fan will offer competitive pricing with unmatched performance in the industry", said Mr Mark D'Agostino, Senior Vice President and General Manager, Hunter Industrial.

Available in two sizes, with 20 ft and 24 ft diameters, the DDI fan is recommended for any facility that needs significant air movement in large spaces, such as warehouses, manufacturing centres, or dock and door areas.

"We have seen an increased demand for an international product line that is reliable, easy to install and affordable. DDI is the solution, and I look forward to partnering with companies across the world to meet their facilities' needs", said Mr Borja Chavarri, International Director of Sales, Hunter Industrial.

The DDI fan features a five-year warranty on the motor and electronic control and a Limited Lifetime Warranty on all other components.



The DDI fan is recommended for any facility that needs significant air movement in large spaces.

KWR WATER RESEARCH INSTITUTE CONFERS HONORARY

FELLOWSHIP ON PUB'S MR HARRY SEAH

KWR Water Research Institute recently announced that it has conferred its Honorary Fellowship on Mr Harry Seah, Deputy Chief Executive (Operations), PUB, Singapore's National Water Agency, for his contribution in driving international collaboration in water science and management.



Mr Harry Seah. Image: PUB, Singapore's National Water Agency.

The Honorary Fellowship Award was officially conferred on Mr Seah by Prof Dragan Savić, CEO of KWR Water Research Institute, in a virtual award ceremony held on 4 March 2021.

“Over the years, Mr Seah has been an inspirational leader and driving force for setting up international research and innovation programmes. His ability to connect research stakeholders from various countries has been instrumental in developing international collaborations. With his knowledge of the water sector, he has been able to build bridges between science and practical application, together with research, to achieve broad societal goals. Under Mr Seah's direction, PUB has also played an important role in nurturing strategic partnerships involving KWR, such as the Global Water Research Coalition and Watershare. As an early adopter of Watershare's vision, Mr Seah opened the doors of the Singapore water hub to other Asian countries. With his constructive attitude and engagement, he is a source of energy and motivation for all water science enthusiasts and particularly supportive of early- and mid-career professionals”, said Prof Savić.

“I am deeply honoured to accept this appointment as the KWR Honorary Fellow 2019 and grateful for the privilege to work alongside like-minded world-renowned institutions in water science and innovation. We look forward to continued collaborations with KWR and the international water science community to share best practices and exchange knowledge in water research so as to serve the water needs of society”, said Mr Seah.

KWR Honorary Fellowship

Since 2015, KWR has been awarding an Honorary Fellowship annually to individuals who make outstanding contribution to the research community and society. These individuals include managers, scientists or proprietors within KWR's national and international network.

Mr Seah is the fifth recipient of the Honorary Fellow award, following Martien den Blanken, Joan Rose, Willy Verstraete and Ad van Wijk. An Honorary Fellow is appointed for life and is a source of knowledge, expertise, and experience that supports the ambition and collective values that KWR upholds.

KWR Water Research Institute

KWR Water Research Institute generates knowledge to enable the water sector to operate water-wisely in an urbanised society. Its scientific findings and the resulting practical innovations worldwide contribute to a sustainable water provision in the urban water cycle.

JOINT-VENTURE TO OFFER DIGITAL SOLUTIONS IN THE FIELD OF WATER

The SUEZ and Schneider Electric groups have announced the creation of a leader in digital water to develop and market a joint offering of innovative digital solutions for the management of the water cycle. This joint-venture will support municipal water operators as well as industrial players in the acceleration of their digital transformations, by providing them with a unique range of software solutions for planning, operation, maintenance, and optimisation of the water treatment infrastructure.

This joint-venture, to be created once all the authorisations from the relevant competition authorities have been received, will leverage SUEZ's expertise in water and its experience in digital solutions, as well as the know-how of Schneider Electric in the development of software which provides digital solutions for water, energy management and automation.

The offering of this new entity, specialising in software solutions designed specifically for digital water, will provide customers with access to an application software database to optimise installations and networks, and enhance their performance, resilience, and sustainability - thereby reducing leaks, optimising network performance, generating energy savings, extending the lifespans of installations, preserving natural environments, improving the environmental footprint of water systems etc.

DEBURRINGEXPO 2021

TO BE HELD IN GERMANY

DeburringEXPO 2021, the Leading Trade Fair for Deburring Technology and Precision Surface Finishing, and the 4th edition in the series, will be held from 12 to 14 October 2021 in Karlsruhe, Germany.

With an improvement in the business climate and in the order situation, the event will offer a platform for an exchange of ideas in the fields of deburring technology and precision surface finishing.

Demand is rising in many industry sectors such as machinery manufacturing, medical and pharmaceuticals technology, tool-making, metrology, precision engineering, sensor and drive technology, as well as in the automotive industry. This trend is being driven by exports and other factors. As a result, investments that were put on hold last year are back on the agenda once again.

Issues such as deburring, edge rounding and the production of precision surface finishes also play an important role in this regard. Stricter as well as changing requirements must also be met in some cases during the production and reconditioning of products in these work steps.

DeburringEXPO 2021 will provide an overview of the current state-of-the-art, developments and trends, processes and methods, as well as quality assurance and services.

“DeburringEXPO is an important trade fair for 4MI GmbH, where we can present our solutions expertise in the field of flow grinding. And thus there is no doubt that we will exhibit again - and we are already looking forward to it now because we have found that although video conferencing is useful for discussing and clarifying numerous issues, it cannot replace face-to-face meetings at a trade fair, to which visitors also bring parts and drawings”, said Dr-Ing Detlef Botke, CTO at 4MI GmbH. 4MI is one of the companies exhibiting at DeburringEXPO 2021.

“Participation at DeburringEXPO is a must for us as manufacturers of solutions for mass finishing and shot blasting technology, as well as post-processing of additively manufactured parts. We meet up with our customers at the trade fair in a targeted fashion and we are looking forward to exchanging ideas again personally after months of exclusively virtual contact. Beyond this, participation at the trade fair provides us with an ideal opportunity for gaining a concentrated overview of what is happening in the market, as well as current and future focal points in various industry sectors and their latest developments”, said Daniel Hund, Marketing Manager, Rösler Oberflächentechnik GmbH which will also be exhibiting at DeburringEXPO 2021.

Furthermore, the exhibitor list includes numerous other solution providers for deburring, rounding and the production of precision surface finishes.

“We have been experiencing a significant increase in demand for booth floor space since the end of February. Consequently, we are quite confident that we will be able to hold DeburringEXPO in October 2021 on a scale comparable to the event in 2019 - of course, in compliance with relevant protective measures and with a hygiene concept that offers exhibitors and visitors the greatest possible safety”, said Hartmut Herdin, Managing Director, fairXperts GmbH & Co KG, organisers of the event.



The exhibitors at DeburringEXPO offer solutions for efficiently and reliably fulfilling the requirements of changing markets and industries. Image: fairXperts GmbH & Co KG.



DeburringEXPO provides visitors with the opportunity of gathering information, through personal meetings, about a broad range of technologies for deburring, rounding and the production of precision surface finishes. Image: fairXperts GmbH & Co KG.

Supplementary programme addressing requirements of user industries

The exhibitors' presentations at the upcoming event will also be augmented by a supplementary programme adapted to the current, complex requirements of the user industries.

A theme park covering 'Automated Deburring with Industrial Robots', organised together with collaboration partner Robofunktion GmbH, will fully demonstrate the possibilities of robot-automated surface treatment - from the feeding of components to position detection, handling, burr detection by means of camera or sensor technology, and the deburring process with integrated tool change, right on up to quality assurance and final component storage in workpiece carriers.

In particular, where metallic components are concerned, additive manufacturing (AM) is being used to an ever greater extent in series production. However, surface finishing remains a challenge in this respect.

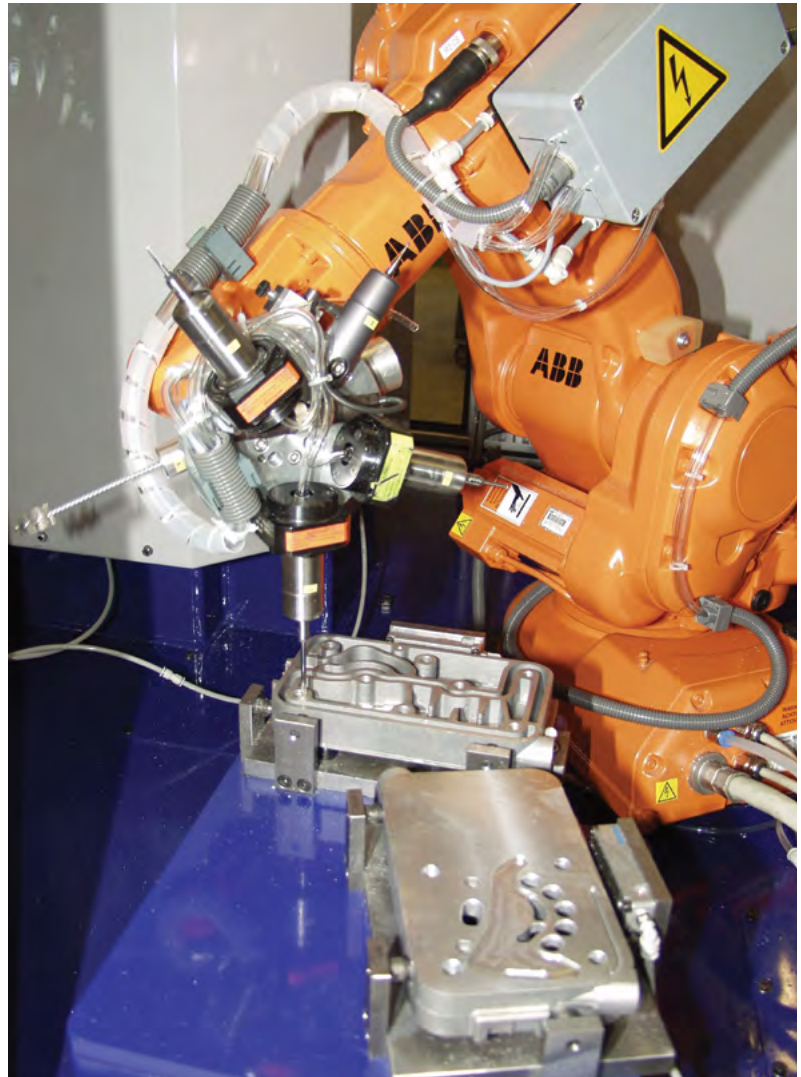
Automated solutions which ensure reliably reproducible results will be presented at DeburringEXPO 2021 in a concentrated format at the theme park for 'AM Parts Finishing'.

More and more attention is being focused on component cleaning in production and reconditioning. Ever stricter requirements must be met in terms of both particulate and film-like contamination in order to assure the quality of downstream processes such as coating, welding, bonding and assembly. Thus, cleaning processes which are laid out to fulfil actual requirements are indispensable after deburring or precision surface finishing. The 'Cleaning After Deburring' theme park is dedicated to this issue.

Knowledge as 'added value'

The integrated three-day expert forum at DeburringEXPO is also in demand as a source of knowledge. Solutions for actual applications, as well as current developments, trends and future strategies will be at the centre of attention at the simultaneously interpreted presentations (in German and English).

Further information on the event can be obtained from www.deburring-expo.com.



The significance of automated deburring with industrial robots is growing as automation and digitalisation progressively advance. The theme park on 'Automated Deburring with Industrial Robots' will fully demonstrate the possibilities of robot-automated surface treatment. Image: Heinz Berger Maschinenfabrik GmbH & Co KG.



Post-processing of additively manufactured metal components remains a challenge. The theme park for 'AM Parts Finishing' will present automated solutions which ensure reproducible results. Image: fairXperts GmbH & Co KG.

DELL TECHNOLOGIES LAUNCHES

GLOBAL INNOVATION HUB IN SINGAPORE

The creation of job opportunities in emerging technologies is among several benefits.

Dell Technologies recently announced an investment of USD 50 million (approximately SGD 66 million) over three years, since 2019, in the establishment of a Global Innovation Hub (GIH) in Singapore. Of that planned investment, USD 23 million (approximately SGD 30 million) will be invested this year. Supported by Digital Industry Singapore (DISG), these investments will go towards accelerating developments in digital experiences and research & development (R&D) capabilities.

Mr Chan Chun Sing, Minister for Trade & Industry, Singapore, was the Guest-of-Honour at the official launch of the GIH.

The GIH is launched under the 'Digital Future - Made in Singapore' initiative by Dell Technologies, to fast-track the adoption of digital solutions and drive digital innovations developed in Singapore, that would enable partners and customers globally to be future-ready. A first-of-its-kind innovation centre situated outside of the company's global headquarters in the US, the GIH will focus on advancing multiple growth areas for digital transformation, including augmented/mixed reality, data analytics, cloud-native architecture, cybersecurity and edge-computing. It is also home to a specialised team responsible for enhancing user experiences through innovation.

In addition, the GIH houses existing R&D facilities in Singapore like the Singapore Design Centre - responsible for global product design and development of key product categories such as monitors and client peripherals. It also includes a hardware prototyping lab dedicated to product design and innovation, and an Artificial Intelligence (AI) Experience Zone - a catalyst for understanding and adoption of AI.

The establishment of this hub has created more than 160 job opportunities in emerging technologies in Singapore. Diverse R&D innovators comprising designers, developers and strategists will be recruited and the hiring process will be completed by this year. All new hires for the GIH are based in Singapore and will drive R&D programmes for customers and partners worldwide.

Mr Amit Midha, President, Asia Pacific & Japan and Global Digital Cities, Dell Technologies, said, "Singapore is globally recognised as an internationally vibrant business, technology and thriving R&D hub. Our 'Digital Future - Made in Singapore' initiative further supports Singapore's unique standing by driving digital innovations developed in Singapore to the world. We are very excited to unveil our global innovation hub, as part of this initiative, that will allow us to ideate, experiment and co-create meaningful digital solutions for our global customer and partner ecosystem. The Dell Technologies Global Innovation Hub in Singapore supported by talented local professionals will allow us to further contribute to the



Dell Technologies has launched a Global Innovation Hub in Singapore.



Mr Amit Midha, President, Asia Pacific & Japan and Global Digital Cities, Dell Technologies, presenting the welcome address, at the launch of the GIH.



Mr Chan Chun Sing, Minister for Trade & Industry, delivering his opening remarks.

country's growth and develop innovative products and solutions in emerging technologies to serve the wider regional and global markets".

Last year, the Singapore Government announced an investment of SGD 25 billion into its next five-year plan for research, innovation and enterprise (RIE 2025) to meet a broader spectrum of national needs and build a knowledge-based and innovation-driven economy and society.

"Dell Technologies' Global Innovation Hub speaks to the company's confidence in Singapore as an attractive R&D location, with access to talent and a vibrant ecosystem of partners here and in the region. Dell Technologies will create meaningful jobs for Singaporeans across design, strategy, research and product development. These in turn support our efforts in building a Smart Nation and a strong digital economy", said Mr Ang Chin Tah, Vice President and Head, DISG.

Over the past two decades, Dell Technologies has been proactively enabling businesses and communities in Singapore. Having started as a PC-maker, Dell Technologies has since evolved to become one of the largest global technology companies with deep expertise across

edge-computing, 5G, cloud, security, Artificial Intelligence and Machine Learning. Today, the company drives digital transformation initiatives for companies of all sizes via its comprehensive product portfolio.

The launch of the GIH and a move to leverage local talent continue the momentum by Dell Technologies to upskill and train more than 3,000 fresh graduates, mid-career professionals and students in Singapore to be future-ready, and also includes a collaboration with Singapore Management University for its students to benefit from a curriculum on cloud-native and emerging technologies.

Added Mr Midha, “The world needs technology now more than ever. In encouraging the adoption of digital solutions and new technologies, strengthening our product and process innovation system, and engaging the talent pipeline, we believe that we are paving the path for a more resilient, progressive, inclusive and sustainable economy”.



The Cloud Native Architecture team at Dell Technologies sharing with Mr Chan Chun Sing on how it performs high value digital transformation work with strategic partners.

DELL TECHNOLOGIES LAUNCHES SINGAPORE TECH SKILLS ACCELERATOR INITIATIVE

Dell Technologies also announced the launch of a tech skills accelerator initiative to empower up to 3,000 fresh graduates, mid-career professionals and students in Singapore with knowledge and skills in cloud computing, data protection and management, data science, and big data analytics, over the next two years. The two-part initiative comprises a training and enablement opportunity for Singapore-based Dell Technologies’ partner and customer firms, and a collaboration with the Singapore Management University on a cloud-native focused curriculum for its students.

Delivered by Dell Technologies Academy, the new initiative aims to meet the growing demand for tech talent and push the frontiers for digital transformation in Singapore. Participants will benefit from an accelerated and immersive learning approach with coaches and peers.

According to Dell Technologies Digital Transformation Index 2020, data privacy and cybersecurity concerns are amongst the top challenges faced by organisations in Singapore, followed by the inability to extract insights from data and/or information overload, as well as the lack of the right in-house skillsets and expertise.

Opportunities for fresh graduates and mid-career professionals

To deepen skillsets required for the data era, Dell Technologies Skills Up is a five-week training session available to 1,000 employees at Singapore-based Dell Technologies’ partner and customer firms enrolled in either the SGUnited Traineeship or Mid-career Pathways programme.

The sessions will equip individuals with relevant skills for job roles such as Data Protection and

Management Engineer, Data Analyst, and Converged Cloud Infrastructure Engineer. At the end of the programme, all participants will be evaluated on their technical proficiency and awarded industry-recognised certifications such as the Dell Certified Associate upon passing the examination.

Getting Future Ready is a flexible eight-week programme piloted by VMware, that offers structured learning paths towards emerging cloud-native job roles and opportunities.

Together, Dell Technologies Skills Up and Getting Future Ready will train up to 2,000 fresh graduates and mid-career professionals in Singapore. Both programmes will benefit tech talent across Dell Technologies’ partner and customer ecosystems.

New collaboration between Dell Technologies and SMU

Besides creating opportunities to develop existing talent, Dell Technologies has also announced a collaboration with Singapore Management University (SMU) to incorporate cloud-native technologies and content into their curriculum that will be followed by over 1,000 students.

Undergraduate students from the SMU School of Computing and Information Systems will undergo classroom-based training and experience hands-on lab sessions to gain practical technical skills in cloud-native practices and technologies.

Led by VMware, Dell Technologies will also be mentoring final-year students on cloud-native projects, and participating in guest lectures and technical workshops to deepen the students’ cloud-native skills.

EMERGING TECHNOLOGIES AND AUTOMATION ARE THE NEXT WAVE OF INNOVATIONS

by James McKew, Regional Director Asia-Pacific, Universal Robots



Mr James McKew

Cobots prove their value in manufacturing.

Since the introduction of robots on the General Motors line in the early 1960s, the world has seen a revolution in automated manufacturing. Today, there are myriad applications for industrial robots across many industries, which has led to major growth in the robotics sector.

According to Singapore's Infocomm Media Development Authority, the country has 658 industrial robots per 10,000 workers, as of 2019, marking the second-highest robot density in the world. As Singapore remains Asia-Pacific's most innovative nation, its Government will spend around SGD 24 billion over the next three years to help businesses build an innovation ecosystem.

While the entire industrial robot sector has seen growth over time, the most exciting and fastest-growing segment belongs to collaboration robots (cobots). Now, automation and cobots are highly utilised and these technological solutions have become popular among manufacturers.

WHAT ARE THE TECHNOLOGIES USED FOR AUTOMATION?

The success of the automation industry is dependent on a variety of hardware and software technologies. While machines are capable of completing a number of tasks in businesses or on factory floors, they need to be combined with the correct software and end-effectors, in order to be truly effective. Here are three types of automation in use today.

Robotics

Traditional industrial robots are large machines that require safety fencing or caging. Expensive to purchase and operate, these traditional robots are difficult to program and tend to be geared towards a single purpose. No surprise then, that the industrial sector is increasingly interested in cobots automating manufacturing. Cobots are smaller and more flexible than traditional industrial robots. Cobots can be deployed alongside human employees on a variety of tasks, from machine tending and quality inspection to packaging and palletising.

Modelling and simulation

Using technology and automation effectively requires planning and an understanding of the final product. Manufacturers rely on modelling and simulation to gain a better perspective of how their products should function. This makes it simpler to adapt and change designs, plan for potential issues, and visualise the outcome.

Simulation software is widely used when deploying traditional industrial robots, driven by the high cost and low flexibility of traditional robotics systems.

While cobots can be modelled in simulation software, for the vast majority of cobot deployments, this step simply is not necessary - instead of spending hours modelling the application, cobot users can simply choose an appropriate end-effector, perform a safety assessment and then move the cobot into position to test its performance.

Computer vision

Computer vision technology can be used across many industries to help guide robots and inspect products. Computer vision is incredibly accurate and can be used to identify even the smallest imperfections. Vision systems and sensors can also be used for part location and metrology applications.

OnRobot Eyes, for example is a vision system with a 2.5D camera that can be mounted on a Universal Robots cobot wrist, or externally. Eyes provides rapid, one-picture calibration and part recognition, and programming is intuitive and fast through URCap software that runs on the Universal Robots teach pendant.

WHY IS AUTOMATION AND TECHNOLOGY SO ATTRACTIVE TO MANUFACTURERS?

There are many aspects of manufacturing that can be improved by the introduction of technology and automation.

Solving labour shortages

Labour shortages pose a very real threat to the success of manufacturing industries. Some areas of the world are seeing their current workforce reach retirement age without the presence of younger workers to take over their roles. This has important consequences, as there are not enough people to fill the hours needed for effective production. Additionally, older workers may not be able to complete strenuous, repetitive, or fine-motor tasks as effectively as they used to.

Automation can solve these problems. In areas where there is simply not enough human labour available, for example, manufacturers can deploy a cobot. And because cobots and humans can safely occupy the same workspace, cobots enable companies supplement the capabilities of existing staff. Instead of replacing human workers, cobots can take over the repetitive and dangerous

tasks, freeing humans to work on higher value jobs. Since workers with little or no previous robotics experience can easily train to use a cobot from Universal Robots, deploying cobots also provides upskilling opportunities as workers move from performing repetitive jobs, such as quality inspection and machine tending to programming cobots and monitoring their performance.

Increasing production

Automation can help companies streamline production processes, leading to increased production and improved quality outcomes. Whether deployed on assembling, welding, sanding, inspection or other tasks, cobots can operate quickly, reliably and consistently. Unlike their human counterparts, robotic workers can function round-the-clock, 365 days a year, which enables companies to increase output by implementing extra shifts and/or lights-out production.

Lowering long-term costs

A primary benefit of automation is the lower cost of production over time, due to improvements in production processes. They also are more precise and efficient, which leads to less wasted material. Additionally, when robots take over dangerous tasks from human workers, there are fewer costs associated with workplace injuries.

UR cobots, from Universal Robots, are a flexible, one-time solution designed to meet a wide range of industrial needs. They are designed to be user-friendly, which means that in most cases, programming and troubleshooting UR cobots can be performed by the end user.



Employing a cobot has helped Koyo Electronics Industries, a Japan-based manufacturer, to improve quality.

Improved quality

Robotics and automation technology are able to guarantee a level of quality that human labour cannot match. Even the most experienced and precise human workers will introduce some degree of error, such as overtightening or misaligning screws or failing to apply an even coat of paint over a large surface. In all cases, automation dramatically reduces the amount of error.

Successful application

For example, Japan-based manufacturer, Koyo Electronics Industries, a member of the JTEKT group which boasts the world's top share in automotive steering bearings, has installed a UR3 cobot, from Universal Robots, to improve quality. Koyo Electronics Industries has been consistently involved in the development, manufacturing, and sales of electronic equipment. In the production of products that require strict quality, the challenge is how to increase productivity according to increase in demand.

“At the beginning of implementation, we made certain adjustments such as speed reduction as the staff was afraid of moving the robot at high speeds. As the cobot works with higher accuracy and stability than humans, the quality of the work improved as a result”, said Mr Atsushi Fujita, Chief in the Production Technology Department.

SUMMARY

There are few physical production processes that cannot be eased or solved with the introduction of automation. The manufacturing industry is adapting each year by integrating AI, robotics, edge devices and sensors into their processes. For Singapore to remain relevant in a competitive environment, the Government will continue to enhance its investments and embrace the use of automation and robotic technology.

The most exciting and fastest-growing segment of the industrial robotics market is collaborative robots. Cobots provide fast ROI, are easy to deploy, and are safe to operate around humans, without fencing (upon risk assessment).

Universal Robots pioneered - and remains at the forefront of - the collaborative robot movement.

WORLD ENGINEERING DAY 2021:

DEVELOPING ENGINEERING FOR SUSTAINABLE DEVELOPMENT AND A LOW-CARBON ECONOMY

by Professor Seeram Ramakrishna, FEng, Everest Chair; Editor-in-Chief, Materials Circular Economy Journal; UNESCO Global Expert Group member on the Universities & the 2030 Agenda; and Chairman, Sustainable Manufacturing Technical Committee, IES



Professor Seeram Ramakrishna

Some of the strategies formulated to address climate change are presented against a background of the urgent need to take action.

Introduction



WED Logo. The occasion was formally proclaimed by the UNESCO General Conference at its 40th session in November 2019.

The World Engineering Day for Sustainable Development is celebrated worldwide on 4 March every year. As an Engineering Professor and Chair of Sustainable Manufacturing TC at The Institution of Engineers, Singapore (IES), it is my privilege and honour to pen my thoughts on further development of the engineering field for sustainable development as well as for transitioning of the world’s linear economies into circular economies or low-carbon economies (Lerwen and Seeram Ramakrishna, 2021).

This is in line with the chosen theme of World Engineering Day 2021 (WED2021) - ‘Engineering for A Healthy Planet’, which recognises the efforts of engineers and the necessity of diverting such efforts towards sustainable development.

Recent surveys elicit perceptions such as green washing by businesses, companies and governments; embellishment by companies and organisations of environmental, social and governance (ESG) reports; Exclusion of sustainability considerations by engineers, designers and innovators while generating solutions, services and products for the market; sinister business practices known as designed and predetermined

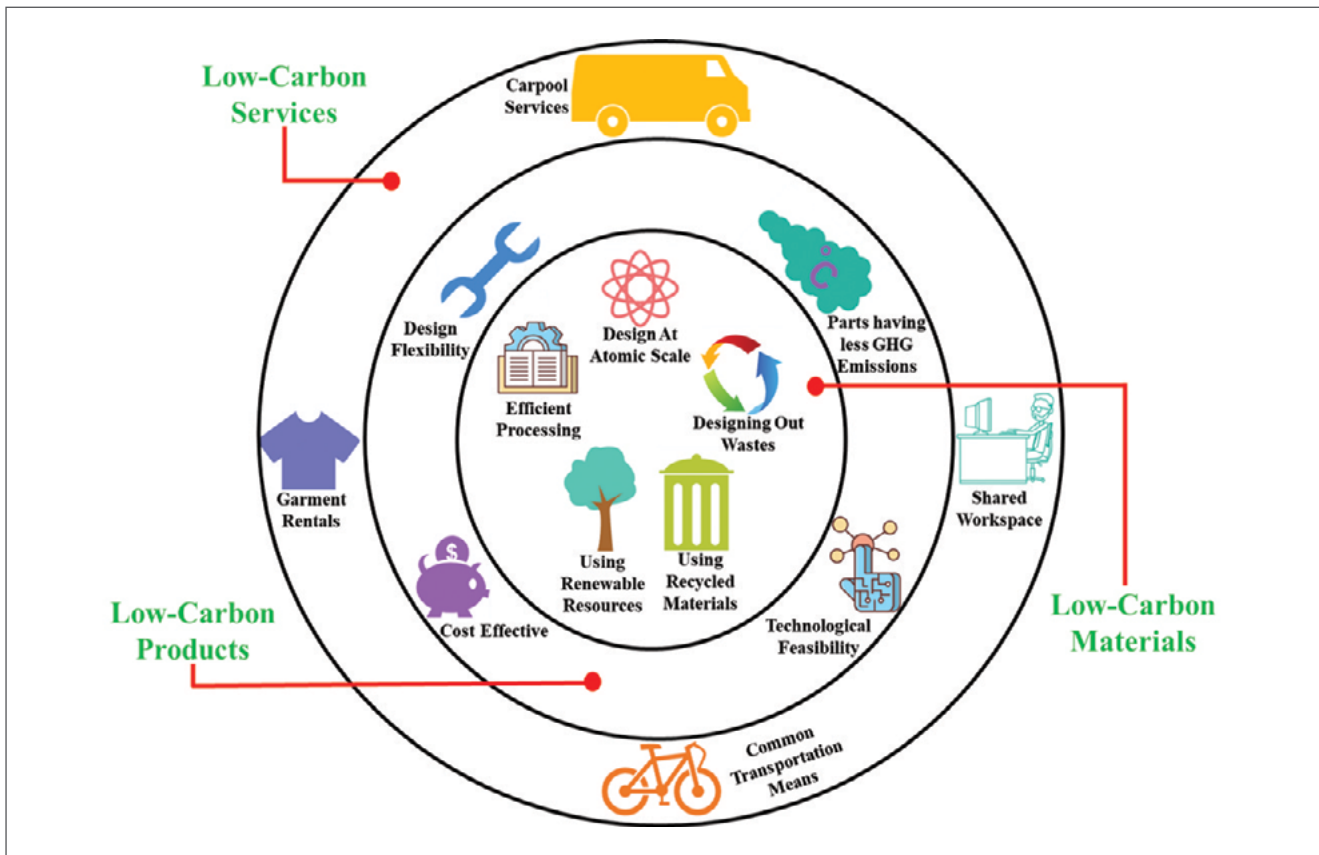


Human activities have caused undue stress on the environment. Image: PIXNIO.

obsolescence; the perception that sustainability considerations lead to increased business costs; and prioritising by human beings of convenience and consumerism over sustainability, thus leading to resources depletion and adversely impacting the environment.

For example, according to an estimate, the global human-made mass now exceeds the total biomass on Planet Earth (Ihacham et al, 2020). In other words, excessive human activities have caused undue stress on the Earth’s environment and ecosystem. They underscore the importance of reimagining all human actions with responsibility to the Earth and all its beings. This includes reimagining all products and services through the lens of sustainability.

Recognising that human behaviour can be tuned, by inculcating values and habits in human beings at a younger age, more than 7,000 higher and further education institutions from around the world declared a



Sustainable practices cut across all sectors of society and the development of solutions involves integrating knowledge and systems from multiple disciplines. Image: Professor Seeram Ramakrishna.

climate emergency in 2019, and pledged to implement the following three-point plan (UN Environment, 2021):

- Firstly, committing to going carbon-neutral by 2030, or 2050 at the very latest.
- Secondly, mobilising more resources for action-oriented climate change research and skills creation.
- Thirdly, increasing the delivery of environmental and sustainability education across curricula as well as campus and community outreach programmes.

It is to be noted that innovative engineering and technology solutions are just as important, as changing human behaviour, in ensuring a healthy planet.

Hence, the estimated more than 25 million engineers around the world are critical for achieving the UN Sustainable Development Goals (SDGs). Moreover, they need to embrace the culture and mind-set of developing and implementing sustainability solutions ubiquitously so as to mitigate and adapt to climate change and its outcomes of extreme weather events such as floods, forest fires, drought, rising temperatures, rising sea levels and erratic seasons.

In addition, engineers should team up with other stakeholders to make low-carbon products and services, as the 'new normal'.

Sustainability cuts across all sectors of society. Scientific research and adequate prior preparations

have shown how the detrimental consequences of extreme weather and climate change can be avoided. It is to be recognised that generating sustainability solutions requires interdisciplinary, transdisciplinary, multidisciplinary, cross-disciplinary and co-production approaches, instead of the current practice of mono-disciplinary pursuits (Elena Rodriguez-Falcon, 2021; Jose and Ramakrishna, 2021; Norström et al, 2021). In addition, engineering education should provide deeper hands-on experience in doing the actual projects with sustainability considerations as opposed to students merely listening to lectures and reading text books. It is also important to infuse ethics and humanities into the engineering projects and education.

UN Sustainable Development Goal, SDG 11, is about sustainable cities and communities. About half of the world's population now lives in cities, and by 2050, nearly two-thirds of all humans are projected to live in cities. Cities contribute about 80% of the global GDP. They are responsible for 70% of global carbon emissions and energy consumption. Hence sustainable development cannot be realised without paying significant attention to urban communities (UNDP, 2021).

Comprehensive actions by all the stakeholders in cities are necessary for transitioning to sustainable cities and communities. Examples are helpful to convince the climate-risk sceptics who are reluctant to make difficult ecological choices.

Hence, let us take the example of Singapore, which is an island city-state with minimal agriculture and home to more than 5.7 million residents (Ghomi et al, 2021).

Singapore

Singapore is among the world's leading places in terms of the healthy life-span, per capita income, PISA (Program for International Student Assessment) Score coordinated by OECD (Organization for Economic Cooperation and Development), location of world-class universities, number of researchers per million population, internet speed, economic competitiveness, innovation index, entrepreneurial index, employment rate (low unemployment), density of greenery, modern sanitation (covers 100% of the population), and collection & treatment of waste water (100%).

As a signatory of the Paris Agreement, Singapore has adopted a range of strategies to reduce carbon emissions across all sectors of the economy, which include the following:

- Improving energy efficiency.
- Reducing carbon emissions from power generation.
- Developing and deploying cutting-edge low-carbon technologies.
- Collective action by government agencies, individuals, businesses and the community.

In addition, the 'smart nation' programme is aimed at universal access to secure and high-speed information and communication technologies.

Not satisfied with its own progress and with deep understanding of diverse climate risks which include rising sea levels and temperatures, on 10 February 2021, Singapore responded with the Singapore Green Plan 2030, to recover from the fallout of COVID-19 and to chart an even more sustainable future.

Five key pillars of the proposed green plan are:

- City in Nature - Increase the nature parks' land area by over 50% from the 2020 baseline.
- Sustainable Living- Reduce waste sent to the landfill per capita per day by 30%, by 2030. At least one in five schools to be carbon-neutral by 2030, and the rest to follow thereafter. Infrastructure to facilitate less carbon-intensive mobility of people. In other words, developing sustainable, resilient and inclusive infrastructures.
- Energy Reset - Increase use of solar energy five-fold by 2030. Power all water treatment systems with solar energy, by 2021, while reducing the energy consumption of desalination. Diversify electricity supply with clean electricity imports. Green 80% of Singapore's buildings, by 2030. All new car registrations to be cleaner-energy models, by 2030, as determined by the life cycle sustainability analysis.
- Green Economy - Transform the petrochemical complex into a sustainable energy and chemicals park, by 2030, so as to align and upgrade the industrial value

chain and infrastructures for sustainability. Make industrial production processes and energy usage greener and improve energy & resources efficiency. In other words, promote sustainable and inclusive industrialisation. Singapore to be a carbon services hub and a leading centre for green finance and sustainability-themed securities in Asia, which increases availability and access to financial services and markets. This also facilitates sustainable infrastructure development for developing countries.

- Resilient Future - Complete formulation of engineering design and implementation plans for coastal adaptation to mitigate rising sea levels, by 2030. Mitigation targets against the urban heat island effect to be determined from studies. Meet 30% of Singapore food and nutritional needs through locally produced food. It is a sustainable solution to overcome broken supply chains caused by the COVID-19 measures of countries.

In other words, Singapore is seeking to harness sustainability and a low-carbon economy as a competitive advantage in the years ahead.

Green Singapore will lead the way for new life styles.

Future directions for the world

According to a survey, consumer attitudes are changing and more than 70% of global consumers say that they would definitely or probably change their habits to reduce their impact on the environment (Nielsen Report, 2020). ESG-rated companies recorded better performance than the average S&P 500 company.

Building on this backdrop, engineering research and innovation efforts are to be aimed at low-carbon alternatives so as to help companies to upgrade industrial technologies with better sustainability credentials and adopt sustainable practices. Such efforts will boost local technology expertise as well as industrial diversification.

This includes developing new sustainability solutions for packaging, low-carbon design of products & services, materials selection & substitution with renewables, waste management (reduction, refurbishment, reuse, recycling, upcycling, remanufacturing, recovery of resources & valorisation), urban farming, and conservation of resources.

New technologies, such as carbon capture, utilisation and storage as well as low-carbon hydrogen, are to be test bedded and scaled up. Many governments have taken a simplified approach of advocating electric vehicles (EVs) as an expedient green transport policy. It is important to conduct a systematic and transparent life cycle sustainability analysis so as to determine which transport vehicles are truly cleaner and greener models. Design thinking for sustainability should pervade all products, services and businesses.

In other words, design thinking should be embraced, with end-of-life management in mind and to ensure durability and ease of maintenance & repair.

Moreover, engineering solutions are essential to progress the UN SDGs with the aim of:

- Providing clean water, clean energy, clean air and nutritional food for all humans.
- Designing, developing and deploying resilient infrastructure to mitigate extreme weather events and climate change.
- Implementing sustainable economic development infrastructures such as transportation systems, dams, waste management, water supply and sanitation, power supply and digital networks, in all countries.

Epilogue

In a hard way, various governments around the world have realised that they cannot eradicate the COVID-19 pandemic by just eliminating it in their respective countries. Each and every country needs to work in concert with others to eradicate the disease. Likewise, climate change and environmental degradation are concerns for everyone, which need to be mitigated at the very source as well as globally.

COVID-19 is an acute problem. Human beings engineered vaccines within nine months, by employing science and technology advances. Climate change and environmental degradation are problems accumulated over years. Hence, much more sustained efforts have to be made by all nations while harnessing the science, engineering and technology.

The ongoing COVID-19 crisis reinforces the critical importance of adequate prior preparations for effectively dealing with the challenges. Among them is the impact of climate change on life on Planet Earth, and no country is capable of mitigating climate risks alone. Such aspects have been overlooked by all countries regardless of their stage of development. Henceforth, all countries have to sincerely embrace sustainability and a low-carbon economy or circular economy agenda, while cooperating with each other. All countries need to progress on the SDGs for a more prosperous, equitable and resilient future, for all, and to engineer a healthy planet.

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SUSTAINABILITY: THE IMPACT ON OUR FUTURE LIVES

FRIDAY 14 MAY 2021 | 9AM – 1PM

To commemorate the theme for this year's World Engineering Day and celebrate the contribution of engineering in advancing sustainable development around the world, IES is organising the **Charles Rudd Distinguished Public Lectures**, which will be focused on **Sustainability: the Impact on our Future World**.

To register for the 2021 Charles Rudd Distinguished Public Lecture, scan the QR code below:



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PUSH FOR GREENER BUILDINGS AND NEW SUPPORT SCHEME TO BOOST TRANSFORMATION EFFORTS

Initiatives announced for creating a sustainable and stronger Built Environment sector.

The Ministry of National Development announced several key initiatives during its Committee of Supply debate held on 4 March 2021. These initiatives will further accelerate the transformation of the Built Environment (BE) sector and position the sector to emerge stronger and more resilient post-COVID-19.

The initiatives include a refreshed Singapore Green Building Masterplan to steer Singapore's buildings towards higher sustainability standards, the introduction of a new Growth and Transformation Scheme that adopts a value chain approach to transform the BE sector and the extension of the Construction Productivity and Capability Fund to provide continued support for the sector to transform as the sector recovers from COVID-19.

SINGAPORE GREEN BUILDING MASTERPLAN: "80-80-80 IN 2030"

The Singapore Green Building Masterplan (SGBMP) is an action plan that sets out Singapore's environmental sustainability ambitions for the Built Environment. It is part of the Singapore Green Plan 2030.

Since January 2020, the Building and Construction Authority (BCA) and the Singapore Green Building Council (SGBC) have engaged over 5,000 stakeholders to co-create the next edition of the SGBMP. Titled 'Build Our Green Future Together', the 4th edition of the SGBMP seeks to foster a leading green BE sector which can lower its carbon footprint and provide a healthy, liveable and sustainable Built Environment for all. The SGBMP targets are as follows:

Stepping up the pace to green 80% of our buildings by 2030

- The earlier editions of the Green Building Masterplan had set a target of greening 80% of Singapore's buildings (by gross floor area, GFA) by 2030. As of end-2020, 43% of Singapore's buildings have been greened.
- To step up the greening of buildings, BCA will identify all buildings in the building energy performance data that it publishes, starting with commercial buildings in the second half of 2021. Owners of existing buildings will be able to benchmark their buildings' energy performance against similar building types and take the necessary steps to improve energy performance.
- In order to future-proof our building stock, BCA will also raise the minimum energy performance requirements for new buildings and existing buildings that undergo major retrofit, to be 50% and 40% more

energy-efficient compared to 2005 levels, respectively. The current requirements are for new and existing buildings to be 30% and 25% more energy-efficient respectively, compared to 2005 levels.

This is comparable to the current Green Mark Platinum standards. BCA will also be reviewing the Green Mark scheme to raise the standards accordingly.

80% of new developments by GFA to be Super Low Energy (SLE) buildings from 2030

- Since 2006, the public sector has been taking the lead on environmental sustainability by requiring new public sector buildings to attain Green Mark certification, including Green Mark Platinum for new buildings with air-conditioned area exceeding 5,000 m².
- Under the GreenGov.SG initiative, the Government will take the lead in bringing Super Low Energy buildings into the mainstream. BCA will also be exploring further measures to drive adoption of Super Low Energy buildings in the private sector.

Achieving 80% improvement in energy efficiency for best-in-class green buildings by 2030

- Today, best-in-class buildings are able to achieve more than 65% improvement in energy efficiency over 2005 levels.
- BCA aims to raise this figure to 80% by 2030 through the Green Buildings Innovation Cluster (GBIC) programme. Established in 2014, GBIC supports the development and deployment of green building solutions with high potential to be widely adopted. GBIC has supported more than 60 innovative technologies to-date, and BCA is looking into enhancing funding support for the programme.

ADOPTING A VALUE-CHAIN APPROACH TO SUPPORT INDUSTRY TRANSFORMATION

A new Growth and Transformation Scheme (GTS), which adopts a value chain approach to industry transformation, will be introduced to support the formation of strategic alliances among progressive developers, builders and consultants across the construction value-chain. Each alliance will need to develop a minimum three-year business and transformation plan outlining strategies and initiatives to achieve transformation outcomes.

These outcomes include demonstrating how productivity savings will be reaped through the use of Design for Manufacturing and Assembly (DfMA) and Integrated Digital Delivery (IDD) technologies, and outlining how

sustainability outcomes, capability building, workforce development, business growth and strategic collaboration will be delivered. This value chain approach, in which alliance members will be collectively responsible for the transformation outcomes, is intended to help alliance members forge long-term partnerships, reap mutual benefits and build up capabilities through knowledge sharing and transfer.

The Construction Productivity and Capability Fund (CPCF) was first introduced in 2010. It offers various incentives to help firms adopt productive technologies and develop their workforce to raise construction productivity. About SGD 850 million was set aside for the CPCF, and BCA has disbursed close to two-thirds of the funding allocated to-date.

Previously due to expire in March 2021, the CPCF will be extended for another year. This will provide continued support for the industry to transform as the industry recovers from COVID-19. BCA will also maintain 80% funding support for the Productivity Innovation Project (PIP) scheme from January 2021 until March 2022. BCA had previously raised the funding quantum for PIP from

70% to 80% from 1 April to 31 December 2020.

Maintaining this higher level of support until March 2022 will encourage firms to pursue longer term transformation despite the current challenges due to COVID-19.

ENHANCING THE BUILDABILITY FRAMEWORK

Under the Buildability Framework, projects are required to meet minimum Buildable Design Scores (B-scores) through the adoption of labour-efficient designs and technologies. BCA has enhanced these requirements periodically to champion the use of more productive technologies, such as DfMA.

To accelerate the adoption of DfMA technologies, BCA will raise the minimum B-scores for all industrial, commercial and institutional building projects with GFA of at least 25,000 m² from April 2022. This follows BCA's raising of the requirements for large non-landed residential buildings in 2019, and is part of BCA's efforts to establish DfMA as the default building method for all large building projects, to promote more productive construction methods.

GREATER CLIMATE AMBITION URGED

In late February 2021, UN Climate Change published the Initial NDC Synthesis Report, showing that nations must redouble efforts and submit stronger, more ambitious national climate action plans in 2021 if they are to achieve the Paris Agreement goal of limiting global temperature rise by 2°C - ideally 1.5°C - by the end of the century.

"2021 is a make or break year to confront the global climate emergency. The science is clear, to limit global temperature rise to 1.5°C, we must cut global emissions by 45% by 2030 from 2010 levels. Today's interim report from the UNFCCC is a red alert for our planet. It shows governments are nowhere close to the level of ambition needed to limit climate change to 1.5°C and meet the goals of the Paris Agreement. The major emitters must step up with much more ambitious emissions reductions targets for 2030 in their Nationally Determined Contributions well before the November UN Climate Conference in Glasgow", said UN Secretary-General António Guterres.

"Now is the time. The global coalition committed to net-zero emissions by 2050 is growing, across governments, businesses, investors, cities, regions and civil society. COVID-19 recovery plans offer the opportunity to build back greener and cleaner. Decision-makers must walk the talk. Long-term commitments must be matched by immediate actions to launch the decade of transformation that people and planet so desperately need", he added.

The report was requested by Parties to the Paris Agreement to measure the progress of national

climate action plans - known as NDCs - ahead of COP26 this November in Glasgow, UK. Covering submissions up to 31 December 2020, it shows 75 Parties have communicated a new or updated NDC, representing approximately 30% of global greenhouse gas emissions.

"This report shows that current levels of climate ambition are very far from putting us on a pathway that will meet our Paris Agreement goals. While we acknowledge the recent political shift in momentum towards stronger climate action throughout the world, decisions to accelerate and broaden climate action everywhere must be taken now. This underlines why COP 26 must be the moment when we get on track towards a green, clean, healthy and prosperous world", said Patricia Espinosa, Executive Secretary of UN Climate Change.

The report shows that while the majority of nations represented increased their individual levels of ambition to reduce emissions, their combined impact puts them on a path to achieve a less than 1% reduction by 2030 compared to 2010 levels. The Intergovernmental Panel on Climate Change, by contrast, has indicated that emission reduction ranges to meet the 1.5°C temperature goal should be around 45%.

Ms Espinosa clarified that the Synthesis Report is a 'snapshot, not a full picture' of the NDCs. She indicated that a second report will be released prior to COP26.

HDB LAUNCHES SIXTH SOLARNOVA TENDER

WITH SMART ELECTRICAL SUB-METERS TO OPTIMISE ENERGY USE

Going beyond just harnessing solar energy.

The Housing & Development Board (HDB) has called the sixth solar leasing tender under the SolarNova programme, led jointly with the Singapore Economic Development Board (EDB). The latest tender, with a solar capacity of 70 megawatt-peak (MWp), aggregates public sector demand for the installation of solar panels across 1,198 HDB blocks and 57 government sites. As part of this tender, vendors will be required to install smart electrical sub-meters at HDB blocks to track energy usage.

Including this SolarNova tender, HDB has committed a total solar capacity of 330 MWp for 6,901 HDB blocks. This is equivalent to powering 82,500 4-room flats with solar energy, potentially reducing carbon emissions by 198,000 tonnes per year and helping to mitigate the effects of climate change.

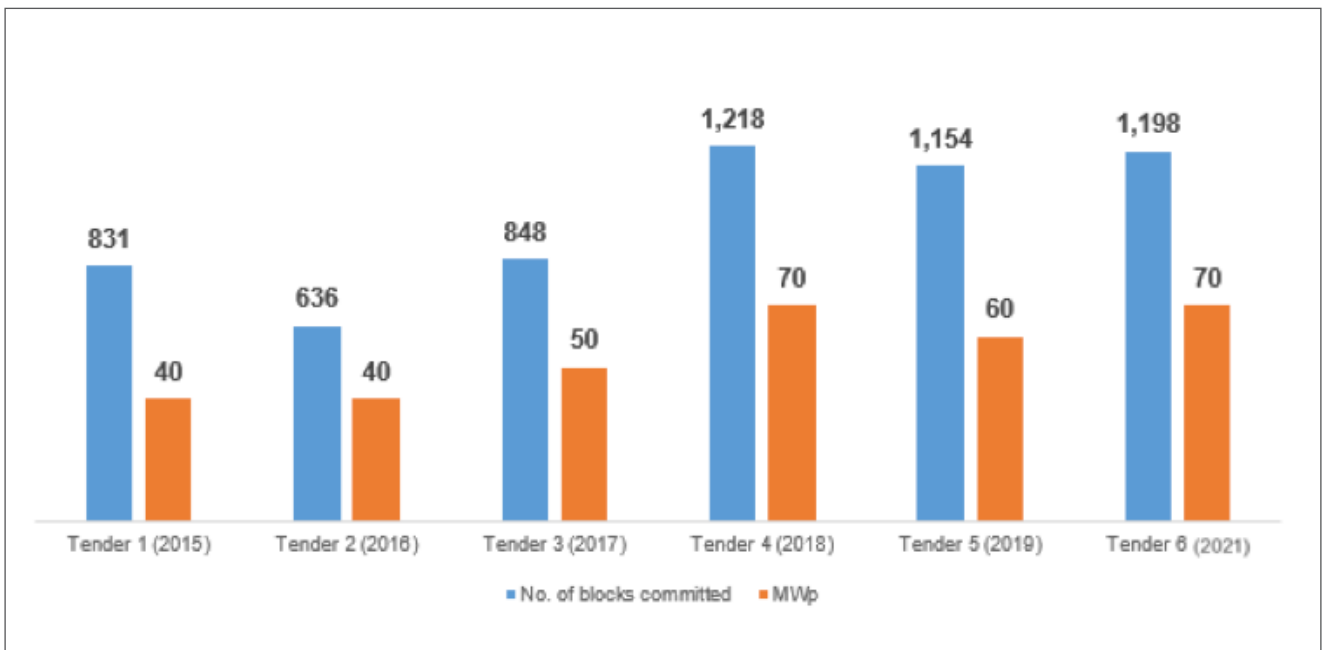
Having achieved the earlier solar target of 220 MWp, HDB had, in 2019 announced a new solar target of 540 MWp by 2030. This new target could potentially generate 648 GWh of green energy annually, contributing towards the national solar targets of 1.5 gigawatt-peak (GWp) by 2025, and 2 GWp by 2030 as set out under the Singapore Green Plan. It is also in line with the HDB Green Towns Programme to harness green energy and bring sustainable living to all HDB towns.

Sixth SolarNova tender optimises energy use with smart data

Under the SolarNova programme, solar energy that is harnessed is first used to power common services (e.g. lifts, lights and water pumps) in HDB estates in the day, with excess energy channelled to the electrical grid. On average, HDB blocks are able to achieve net-zero energy consumption at common areas.

As part of this sixth SolarNova tender, vendors will be required to install smart electrical sub-meters at HDB blocks. The meters will enable HDB and the Town Councils to monitor and analyse energy consumption patterns and the performance of common services at each block. With the data, Town Councils can compare energy usage across HDB blocks, and track the demand and supply of energy for individual blocks in the estate. The data collected will help the Town Councils to optimise maintenance cycles of common services, as well as detect anomalies such as equipment faults. This is in line with HDB's efforts to harness smart technologies to develop Smart Estates, one of the key pillars of the Smart HDB Town Framework.

Smart technologies such as sensors collecting and analysing estate data, will provide information and



Overview of SolarNova tenders launched.

insights that can help improve estate services by integrating, managing, and interpreting data from various sources.

HDB’s Chief Executive Officer, Mr Tan Meng Dui said, “With the experience gained from implementing solar systems over the last 10 years, HDB has gone beyond harnessing green energy to optimising the consumption of solar energy and making our housing estates more energy-efficient. As new innovations and solutions emerge, HDB will continue to strengthen our solar capabilities and expand our installed capacity,

as part of the national effort to develop greener and more sustainable towns, while reducing Singapore’s carbon footprint”.

The sixth SolarNova tender involves the participation of four agencies, namely Ministry of Education; Ministry of Home Affairs; Ministry of National Development; and PUB, Singapore’s National Water Agency. The solar leasing tender will close on 7 May 2021 and is targeted to be awarded in 4Q 2021. Installation of the solar photovoltaic (PV) systems is expected to be completed by 2Q 2024.

| Government Organisations | Solar Capacity | Sites |
|--------------------------|----------------|------------------|
| HDB | 49.200 MWp | 1,198 HDB blocks |
| MOE | 13.002 MWp | 40 schools |
| PUB | 7.172 MWp | 13 sites |
| MND | 491.76 kWp | 2 sites |
| MHA | 145.60 kWp | 2 sites |
| Total | 70 MWp | |

The sixth solar leasing tender, with a solar capacity of 70 megawatt-peak (MWp), aggregates public sector demand for the installation of solar panels across 1,198 HDB blocks and 57 government sites.



Including this SolarNova tender, HDB has committed a total solar capacity of 330 MWp for 6,901 HDB blocks.

SMART FACILITY MANAGEMENT

WITH PRESCRIPTIVE ANALYTICS

by Professor Er Meng Joo and Dr Tan Yen Kheng, Electronics and Computer Engineering Technical Committee, The Institution of Engineers, Singapore (IES)

Benefits can be derived in terms of manpower utilisation as well as energy- and cost-savings.

1. INTRODUCTION

With the advent and rise of Big Data Analytics (BDA) and AI-enabled Machine Learning, more sophisticated data gathering and processing tools have become available to building owners and managers, but the operational challenge of interfacing and integrating a complex system of deployed third-party sensors and controllers throughout a multi-layered facility eco-system still remains a daunting and largely unresolved problem for these stakeholders. The problem really lies in both the massive, experienced manpower requirement for continuously tracking downtime, maintenance records and work orders, and the fragmented nature of the data that can be obtained. It is all the more difficult when the data comes from siloed building systems. The answer to solve this predicament and to avoid cost overruns lies in applied intelligence on the digital platform.

With the development of the Internet of Things (IoT) and BDA, Smart Buildings provide the client with much convenience. The continuous development of smart facilities also promotes the progress of smart buildings. How to provide a high quality indoor environment and asset security according to clients' requirements and environmental conditions is now a hot research topic.

This article provides a literature review of smart facility management with prescriptive analytics. It is organised as follows:

In Section 2, an overview of Facility Management (FM) in Smart Buildings where the concepts of 'hard services' and 'soft services' are interwoven is presented. FM is particularly important because it provides an optimal guarantee of the effective use of energy and resources.

Section 3 divides the scope of the analysis of the large data set into four levels.

Section 4 presents a real-time Intelligent Building Management System and the components therein.

Section 5 presents three smart strategies.

Section 6 summarises the conclusions drawn.

2. FACILITY MANAGEMENT IN SMART BUILDINGS

The subject of FM activity in the modern concept of Building Management is very wide and is expanding (in the case of Smart Buildings). In general, technical asset

management, coordination and integrated management of direct support services for building users are included [1]. The FM area can be grouped according to the client's requirements, and they can be included together into the two groups mutually intertwined, as depicted in Figure 1.

- a) Hard Services: These relate to the space and infrastructure, i.e. space management, space utilisation, management and optimisation of the workplace, technical management of buildings, energy management, waste management, as well as indoor and outdoor cleaning.
- b) Soft Services: These relate to the people and the organisation, i.e. health, hygiene, safety and security, internal services (boarding, reception, meeting rooms, secretarial services etc), ICT, internal logistics (archive services, internal mail, mail service, transport services, car service etc).

The International Facility Management Association (IFMA) states that FM includes the principles of business administration, architecture, humanities and technical sciences. The aim of IFMA is to achieve long-term sustainability in the use of the building, which encompasses optimal arrangement and use of the interior space, ensuring a functional building and efficient functioning of technical equipment, quality of the internal environment and the fulfillment of other user needs.

Last but not least, the objective of FM is to achieve a high-quality indoor environment while ensuring maximum efficiency of the energy and resources spent on the operation of the building. In principle, there is no difference between a residential building, administrative building, industrial building and a complex building. What is essential is the quality support of the primary activity of the client (subject of business) through efficient use of his assets. The Facility Manager should take responsibility for these requirements, as early as possible, in the project preparation phase of a new building or refurbishment of an existing building. It should therefore be part of the design team's objectives and actively influence the emerging project.

In the case of the lifecycle of a Smart Building, the goal remains the same, but the level of responsibility is greater in the functioning of the operating systems in a

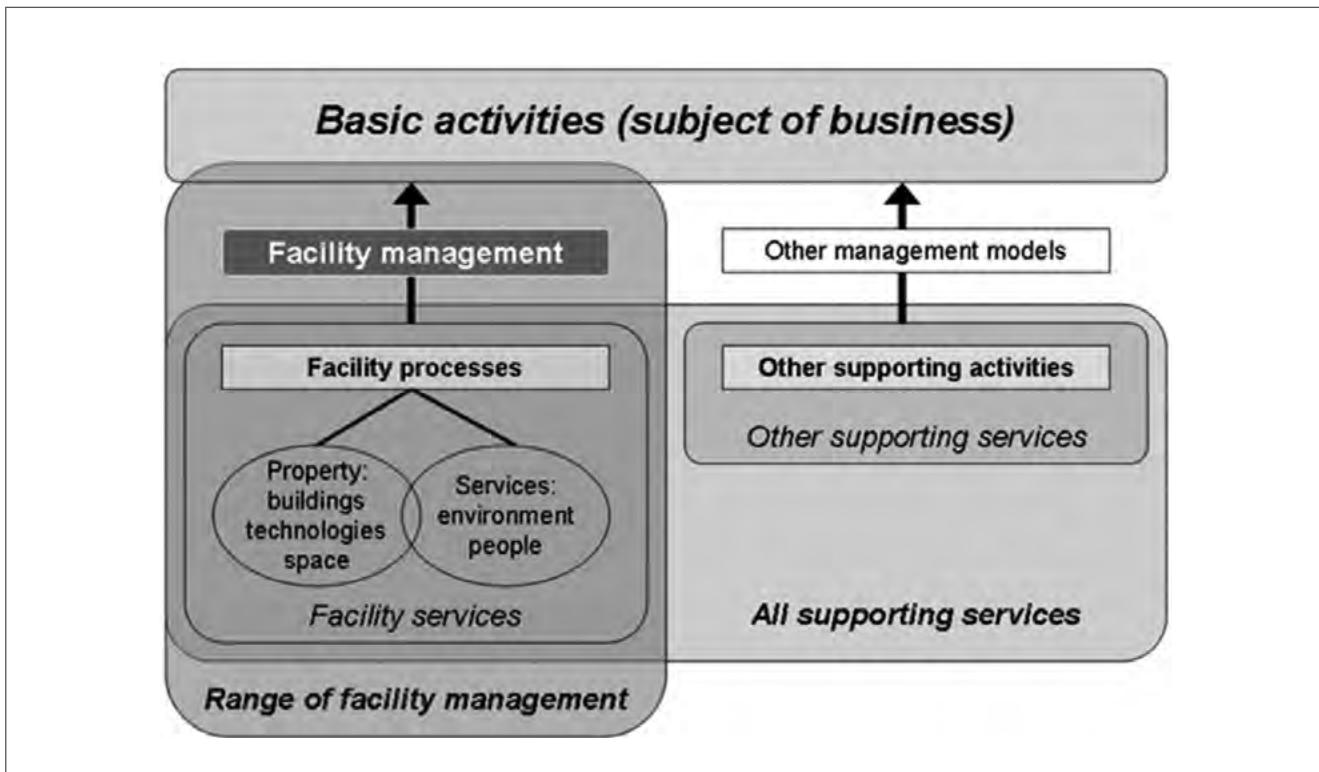


Figure 1: Structure and activities of FM and other supporting services. (Source: the authors, modified from [1]).

Smart Building compared to that in a standard building, especially in terms of high flexibility and usefulness of the building, superior quality of the indoor environment and high operational efficiency. The technologies that provide these parameters can number into the hundreds, and their network is considerably larger and more specialised when compared to that in a standard building. However, in the event of a failure in one of the technologies, the usability and security of the entire building is compromised - such failure is not necessarily fatal for a standard building.

In addition to the quantifiable economic consequences of such an event, however, this can also be associated with non-financial impacts, such as loss of reputation for the owner.

With regard to the range of a Smart Building’s FM services, it is clear that the Facility Manager is not an individual person, but a team of professionals under a manager who is directly responsible to the owner or CEO. Based on past experiences with the management of Smart Buildings and their complexity, it is quite common to see the requirements of a lay proprietor of a building being contrary to the views of the Facility Manager. As a result, the Facility Manager’s responsibility must be not only to prove the team’s high professional standing, but also display the ability to defend the interests of the owner and the Facility Manager’s own opinions.

3. DATA ANALYTICS

Although the development of IoT has enhanced data collection, the question remains on how the data can be

properly processed to provide the right information for the right purpose at the right time [2]. BDA has become a key base for competitiveness, productivity growth and innovation, because in a big data environment, data sets are much larger and can be too complex for traditional data analytics software. Therefore, it is a challenge to analyse the content of these gigantic, continuous data streams, and additionally to build more robust and intelligent learning systems [3].

The analytics consists of two main areas: Business Intelligence (BI) and Advanced Analytics (AA). With regard to the analysis horizon, a distinction can be made between four levels [4]:

- Descriptive: What happened? (BI)
- Diagnostic: Why did it happen? (BI)
- Predictive: What will happen? (AA)
- Prescriptive: What to do? (AA)

BI focuses on reporting and queries. AA, also called business analytics, goes beyond business intelligence by using sophisticated modelling techniques to predict future events or discover patterns that otherwise cannot be identified. AA is about optimising, correlating and predicting the next best action. AA is divided into two parts, namely, Predictive Analytics and Prescriptive Analytics [4].

Predictive Analytics

Predictive Analytics is part of today’s Facilities-Optimised Management System (FOMS) that uses historical building data to predict future events. This is supported

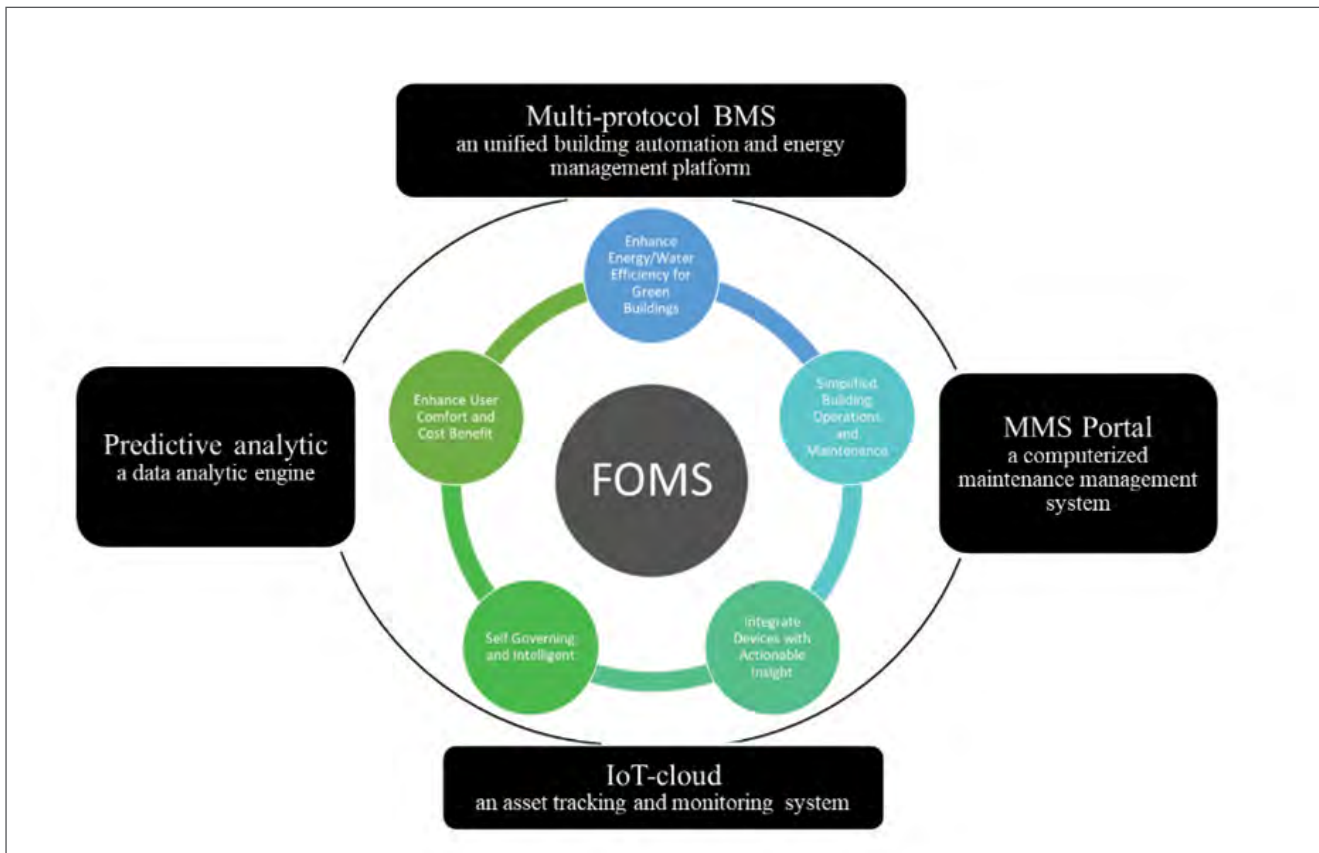


Figure 2: Facilities-Optimised Management System (FOMS).

by a common and collaborative platform, as illustrated in Figure 2, with real-time information and seamless connectivity across all stakeholders and supporting systems such as air-conditioning and lighting [10]. This smart FM system is already minimising the allocation of manpower and time resources.

Prescriptive Analytics

Prescriptive Analytics serves to determine a sequence of decisions to obtain a desired result and generally answers the question "What do I have to do to achieve a desired goal?" [5]. This ensures an adaptive, autonomous, time-based and optimal decision and recommends the best approach to achieve specific key performance indicators [6].

On the fly, autonomous adjustments within the predictive FOMS are enabled by the prescriptive analytics calculation engine. This engine is connected to the pre-built reference models of various building subsystem equipment (e.g. chillers, other HVAC equipment etc), that will identify and determine the risk of failure, isolate unwanted ops, and prescribe timely rates for maintenance and fixes.

Prescriptive systems have two important characteristics. First, they deliver realisable results in the form of recommendations for action. Secondly, the quality of the recommended activity is reviewed with regard to its correctness [7].

The current literature suggests that Prescriptive Analytics is divided into three planning levels at which companies use data-driven decision-making systems. This classification of decision-making follows the analysis of [8]:

- Decision-making at the enterprise level
- Decision-making at departmental level
- Decision-making at the individual level

Within the classification of decision-making at the individual level, one topic of interest is Intelligent Building Management with the help of Prescriptive Analytics [8]. Ultimately, this will lead to quicker actionable insights and improved outcomes, both operationally and financially.

4. REAL-TIME BUILDING MANAGEMENT

Figure 3 is a Real-time Building Management System which shows the main components of a typical Integrated Building Management System, namely the environmental module, system model module and management module. By integrating Machine Learning with model-based control techniques, one can obtain a high-fidelity model of the Building Management tasks and the environment. Also, the integrated structure allows run-time reconfiguration and adaptation in response to the changing system model, specifications, occupant-related parameters and operating conditions in an uncertain environment.

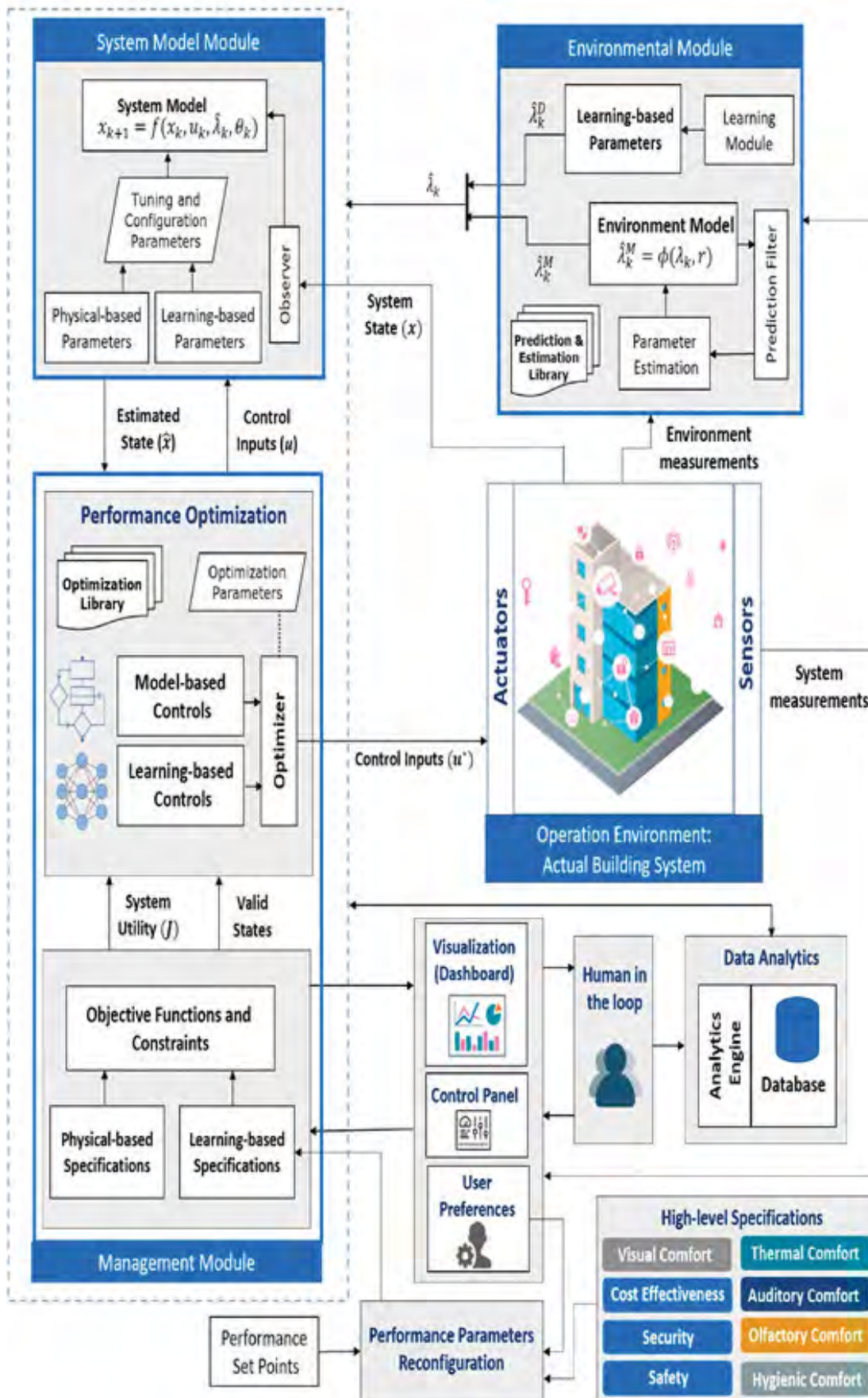


Figure 3: Real-time Building Management System [9].

In the environmental module, environment variables, such as climatic conditions, are predicted through environment models or learning algorithms. The predicted environment variables are represented by a vector, $\hat{\lambda}_k$, as follows:

$$\hat{\lambda}_k = \begin{bmatrix} \hat{\lambda}_k^M \\ \hat{\lambda}_k^D \end{bmatrix} \quad (1)$$

where $\hat{\lambda}_k^M$ denotes the variables estimated using an environment model (e.g. the Kalman filter estimation method), and $\hat{\lambda}_k^D$ denotes the variables learned using data analytics and Machine Learning algorithms. An environment model is given by

$$\hat{\lambda}_{k+1}^M = \varphi(\hat{\lambda}_k^M, \theta_k^o, r) \quad (2)$$

where $\hat{\lambda}_k^M \in \Lambda_k^M$ is the environment variable, θ_k^o is the parameter of the environment model that needs to be learned, and r denotes a set of previously observed variables. The environment inputs and the building's historical data are sampled and fed into the prediction filter. The model parameters, θ_k^o , are updated in the prediction filters such as ARIMA modelling and Kalman filtering [9, 10]. The predicted environmental parameters obtained in this module cannot be controlled, but they are used for updating the formulation in the system module and management module.

The dynamics of Smart Building components, e.g. thermal models, humidity models, ventilation models and occupant behaviour models, are defined in the system module. The general representation of a system model is as follows:

$$\hat{x}_{k+1} = f(x_k, u_k, \hat{\lambda}_{k+1}, \theta_k) \quad (3)$$

where x_k and u_k are the state variables and control inputs of the system, respectively. The term \hat{x}_k is the predicted state variable, $\hat{\lambda}_{k+1}$ is the predicted environmental variable, and θ_k denotes model parameters that need to be learned. For example, for the linear system governed by $\dot{x}_{k+1} = Ax_k + Bu_k$, θ_k , matrices A and B contain parameters that need to be learned (i.e. $\theta_k = [A^T B^T]^T$). The system model can be tuned through model-based forecasting strategies or Machine Learning. The estimated state values generated at each time instant are injected into the management module.

The management module consists of two blocks, namely, the optimisation block and the objective function block. In this module, an objective function, containing the system's performance specifications (in terms of security, safety, cost-effectiveness and comfort criteria) and its operating constraints, is formulated. Some of the system's specifications (such as energy consumption) are modelled in mathematical terms, and some other requirements (such as perception of comfort by occupants) are learned using Machine Learning approaches. The set-point cost function for formulating

the building's performance specifications is given by

$$J(x_k, u_{k-1}) = \|x_k - x_k^*\|_P^2 + \|u_{k-1}\|_Q^2 + \|\Delta u_{k-1}\|_R^2 \quad (4)$$

where x^* is the desired operating state (such as desired comfort criteria or thermal condition), Δu_{k-1} denotes changes in the control inputs and P , Q and R are the weighting matrices. In the objective function (4), the first term expresses the set-point regulation problem (for example, regulating the indoor temperature), and the second and third terms denote the cost of control inputs and their changes (for example, the cost of lighting energy), respectively.

The operating constraints define the feasible domain on both the state variables and control inputs. The constraints are governed by

$$\psi(x_k) \leq 0, U(x_k) \subseteq U \quad (5)$$

where $U(x_k)$ denotes the admissible input set in state x and $\psi(x_k)$ represents the reachable states. Depending on the type of state variables (e.g. comfort criteria, thermal conditions), control inputs and hardware limitations, specific operating constraints are defined. Considering the system constraints and objective functions, the optimal control inputs are generated through a learning-based and model-based optimiser. Control inputs are then injected into the actual building system to minimise the operating costs, so as to meet the desired performance metrics.

5. THREE SMART STRATEGIES

Once you understand the goals of your analytics project, the next step is to further develop a value proposition. To sign off on spending money to procure an analytics solution, the Facility Manager typically needs to understand not only how existing problems can be solved, but also how much money can be saved and/or what value can be gained. It is not difficult to understand how implementing smart strategies will save a building enormous amount of money. Here are some lessons learned from past projects on how to most clearly convey the value of analytics.

Keep it simple and reliable

Create 'win themes' or short summary sentences for the three most important parts of your value proposition below.

- Shift from a reactive to a proactive maintenance mindset. One benefit is to reduce the amount of time it takes to diagnose issues and shift that time to fixing the things that are broken. Analytics does not reduce maintenance hours. It shifts where the labour is used, from low-value activities like searching for issues to high-value activities like fixing issues. More importantly, analytics uses existing, unused data from the digitally controlled mechanical and electrical systems of the buildings to make better decisions. Analytics also makes it possible to prioritise the maintenance backlog, based on the true cost of issues.

- Reduce energy consumption by 5% with simple payback within one year. The US Department of Energy studied the outcomes of Facility Managers implementing analytics solutions in their buildings in 2017. The study, 'Synthesis of Year One Outcomes in Smart Energy Analytics Campaign', yielded highly promising results. It said, "Campaign participants have made improvements to their buildings, achieving a median energy saving of 5 percent ... with less than a one-year simple payback".

Analytics makes it possible to identify previously unknown energy-saving opportunities. The solutions also track previous energy-saving initiatives and verify that true energy-saving was achieved. If energy-saving targets are not being met, one can take corrective action to correct energy waste quickly and with greater visibility. Moreover, analytics enables monitoring-based commissioning, measurement and verification.

The first step to improving occupants' comfort is to obtain the raw data. Synthesising the data with analytics allows the facility staff to pinpoint comfort issues and move towards fixing the causes. For example, temperature control can be improved by understanding the operation of equipment over long periods of time. Analytics strategy provides a means to perform better investigation into the operation of the mechanical equipment. It also makes it possible to identify potential hot and cold calls before they happen, by locating previously unknown mechanical issues, and to identify root causes of problems that do occur, not just the symptoms.

Build a broad team and incorporate all stakeholders

Many analytics projects move forward for one or two of the aforementioned reasons. However, this is an opportunity to build a consensus across the entire FM organisation regarding the fact that new technology and organisational change are valuable. New technology comes with essential skillsets such as:

- Real-time tracking and monitoring capabilities - understanding the IoT-cloud platform, asset identification and tagging and a systematic approach to building assets.
- Unified Building Management System (BMS) - introducing the unified building automation and energy management platform, wireless and wired connectivity as well as interconnections among various building sub-systems.
- Maintenance Management System (MMS) deployment - designing a computerised maintenance plan, schedule work order and IT-enabled MMS that is paperless!
- Data analytic skill - processing building subsystems data, derive information (e.g. on energy and money savings), produce actionable insights that are very much needed for these analytics projects and for the FM team to deliver in an effective and efficient manner. Many times, analytics projects can have a good ROI when only taking the potential energy savings into

account. For this reason, it might be worthwhile to bring in those members of an organisation responsible for sustainable operation of the facility or energy spend, to gather their inputs and guidance during early planning and decision-making. Furthermore, because an analytics project will involve installing software and transferring operational/equipment data between computers, the IT and cyber security team should be involved at the onset. The earlier these individuals are involved in the process, the more likely the project will not be shelved or sunk at the last minute when someone is blindsided.

Define clear and measurable goals for the project

Take your best estimate at a ROI. Setting clear goals for the project, one that can be easily measured at a later milestone, is an important part of the planning process. Targets should include tracking of maintenance work order and a means of quantifying occupant comfort. Analytics projects, like many other types of projects, should have a quantifiable ROI. Typically, an analytics project will pay for itself in less than three years. The estimated cost savings should be verified during the project.

Once the project gets the green light, there are still many hurdles to be overcome. To avoid problems, it is important to create an unbiased team early. It may be tempting to pick a favourite software early in the planning, in order to have a tangible end-result to help get stakeholders on board. However, there is a very wide range of analytics software options available on the market - some that you can customise yourself and some that cannot be changed. Some focus on energy while others are better at identifying operational issues. Some are hosted in the cloud, and others are installed on a server in the facility. All these factors must be understood by all parties involved prior to a decision being made.

To understand the options you have, it is essential to know the market well. A comprehensive list of Fault Detection & Diagnostics (FDD) software and service providers is listed on the Smart Energy Analytics Campaign website. The list is long, and all providers are not created equally. However, this is a good place to begin researching all the options that are on the market today.

6. CONCLUSION

Although Smart Buildings can provide convenience to the client, they need a professional team equipped with essential skillsets to manage the facility, before it is designed. According to the complexity of a smart facility, it is necessary to ensure effective and efficient operation of the facility's functions, maximise the use of energy and resources, and have a reasonable maintenance plan in case of failures.

This article discussed the related contents of FM with prescriptive analytics and put forward a suggestion to develop an integrated FOMS framework as a base for prescriptive automation.

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COLLABORATION FOR DESIGN AND CONSTRUCTION AS WELL AS OPERATION OF BUILDINGS AND SPACES

In early December 2020, Johnson Controls, a global leader for smart and sustainable buildings, and Microsoft announced a global collaboration to digitally transform how buildings and spaces are conceived, built and managed. Microsoft also announced the general availability of Microsoft Azure Digital Twins.

As a key partner for Azure Digital Twins, Johnson Control's OpenBlue Digital Twin is a comprehensive platform that will support the entire ecosystem of building and device management technologies with digital cloud technologies.

Johnson Controls is a Microsoft partner leveraging several Azure services including Active Directory Services, Azure Data Lake, Access Control and Time Series Insights. Microsoft's Azure Digital Twins is the newest Azure platform service integrated into Johnson Controls OpenBlue platform that aims to enable the creation of next-generation IoT-connected solutions that will model the real world. Johnson Control's platform turns the physical world into computable objects that will enable customers to create detailed digital versions of physical buildings, assets and systems.

Digital twins are digital replicas of physical entities capable of providing an in-depth analysis of data and the potential to monitor systems to mitigate risks, manage issues and utilise simulations to test future solutions. The use of digital twins plays an important role in helping technicians identify the root cause of issues, thereby accelerating problem-solving. Additionally, building managers are able to support COVID-19 safety and security protocols, while ensuring efficient use of energy and other facility resources.

Azure Digital Twins enables the creation of knowledge graphs based on digital models of entire

environments, whether they are buildings, factories, farms, energy networks, railways, stadiums or entire cities. These digital models empower property managers with actionable insights that drive better products, optimise operations, reduce costs and create breakthrough customer experiences.

OpenBlue Digital Twin is a platform purpose-built with smart buildings and spaces in mind, enabling and unifying all aspects of an intelligent building - security, employee experience, facilities management, sustainability and more. The open platform's open system seamlessly integrates with existing building infrastructure, regardless of brand, make or model.

Among the numerous pilots currently under development is an ambitious effort at National University of Singapore (NUS). As part of the university's ongoing efforts to create a smart, safe and sustainable campus for students and staff, the new alliance's complementary products and services are coming together to test the foundations of a Digital Twin-powered operations platform. The data-driven platform will enable integrated building management across the campus and serve as the foundation for energy and space optimisation, predictive maintenance, and unmanned operations.

Working with Microsoft, Johnson Controls will address how people can return to work to maximise space while operating facilities safely, to achieve:

- Energy optimisation.
- Access control and safety.
- Collaboration for facility managers.
- Workspace optimisation.

KEYSIGHT LAUNCHES PORTFOLIO

OF LAB BENCH PRODUCTS

Keysight Technologies Inc, a leading technology company that delivers advanced design and validation solutions to help accelerate innovation, has launched a portfolio of Smart Bench Essentials (SBE) lab bench products that deliver the power of four instruments, including a triple-output power supply, an arbitrary function generator, a digital multimeter and an oscilloscope, through one powerful graphical interface offering integrated data management and analysis capabilities.

General test labs, as well as university teaching labs, need test instruments that are connected to each other, connected to the lab, connected to the cloud and connected to innovation. These differentiated connections enable customers to accelerate insights, whether in learning, teaching or troubleshooting.

Keysight's SBE lab bench products are reliable and capable instruments developed for the design and testing of products in manufacturing and R&D, and offer a compact and stackable design that is ideal for small manufacturing businesses.

Keysight's SBE lab bench products are also ideal for modern university teaching labs that require an enhanced environment conducive to sharing and maximising learning. Remote learning technology is the new normal accelerated by the recent COVID-19 pandemic. Most universities find it difficult to adapt to this new environment and seek a blended learning experience with the right technologies.

Keysight's PathWave BenchVue application software complements the SBE, enabling customers to configure instruments quickly, while operating on the same PC screen to evaluate the device under test. It stores data on a PC and exports it in standard readable formats for post-analysis work and report generation.

Keysight's SBE series also offers the optional PathWave Remote Access Lab software and the PathWave Lab Manager software to enhance lab experience and productivity. Keysight's PathWave Remote Access Lab software enables university teaching labs to transition to online learning seamlessly. It allows students to remotely access the lab setup and perform lab work through the web browser. Keysight's PathWave Lab Manager software works seamlessly with the SBE series instruments to manage lab assets effectively and productively.

Keysight's SBE series is a combination of hardware and software that accelerates an educator's teaching experience and students' learning experience, as well as improves an electronic design and manufacturing engineer's ability to analyse and troubleshoot products, delivering several key benefits:

- Elegantly integrated, it enables users to focus on insights and core innovation, and not on managing instruments.
- It becomes possible to configure, control and monitor multiple instruments from a single screen.
- Testing, analysis and sharing lab instruments and data can be done remotely from anywhere, thereby facilitating learning during the pandemic and global access to remote instrumentation.
- Automation of common tasks can be achieved, from test set-up and data collection, to report generation.
- It provides the ability to centrally manage an entire lab of instruments and configuration to maximise productivity.

KeysightCare

Keysight's SBE lab bench products include built-in KeysightCare Technical Support. Customers benefit from the following:

- A technical response within two business days.
- Access to the online knowledge centre, 24x7, containing decades of R&D expertise in thousands of technical articles and programming examples.
- Tracking of support cases for faster response, at the self-service web portal.



Keysight Smart Bench Essentials instruments with intuitive colour display and button layouts.



Keysight's four Smart Bench Essentials Series instruments with PathWave BenchVue software.

MAJOR VERSION UPDATE OF

ROBOMASTER ROBOTIC SOFTWARE NOW AVAILABLE

Hypertherm, a US-based manufacturer of industrial cutting systems and software, recently announced the release of Robotmaster Version 7.4.

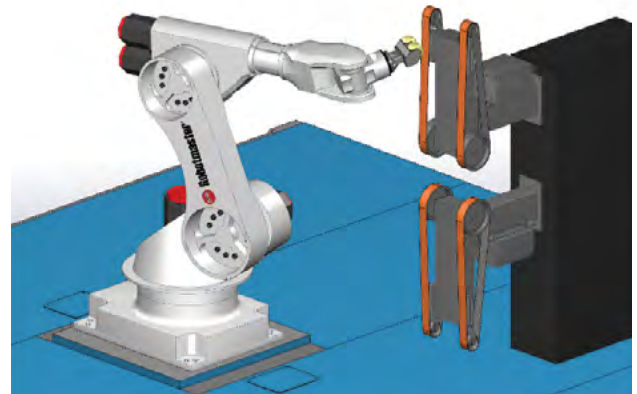
This newly released offline robot programming software version contains several enhancements designed to further simplify robotic programming, including:

- Major enhancements to the Remote Tool Center Point (RTCP) that allow for an improved end-user experience and exploit the full capabilities of any robotic cell.
- Additions to the surface paths with added strategies and advanced tools for applications such as polishing, grinding, deburring and more. The surface paths are designed to tie-in with the enhancements to RTCP or traditional configurations for robotic finishing.
- Faster processing times when saving, loading, and calculating jobs, plus improved real-time feedback during simulation, for faster part programming times.
- Enhancement to the Robotmaster Interactive Simulation Environment (RISE), delivering a more realistic simulation for external axes, along with tools to better control motion between the robot and external axes.

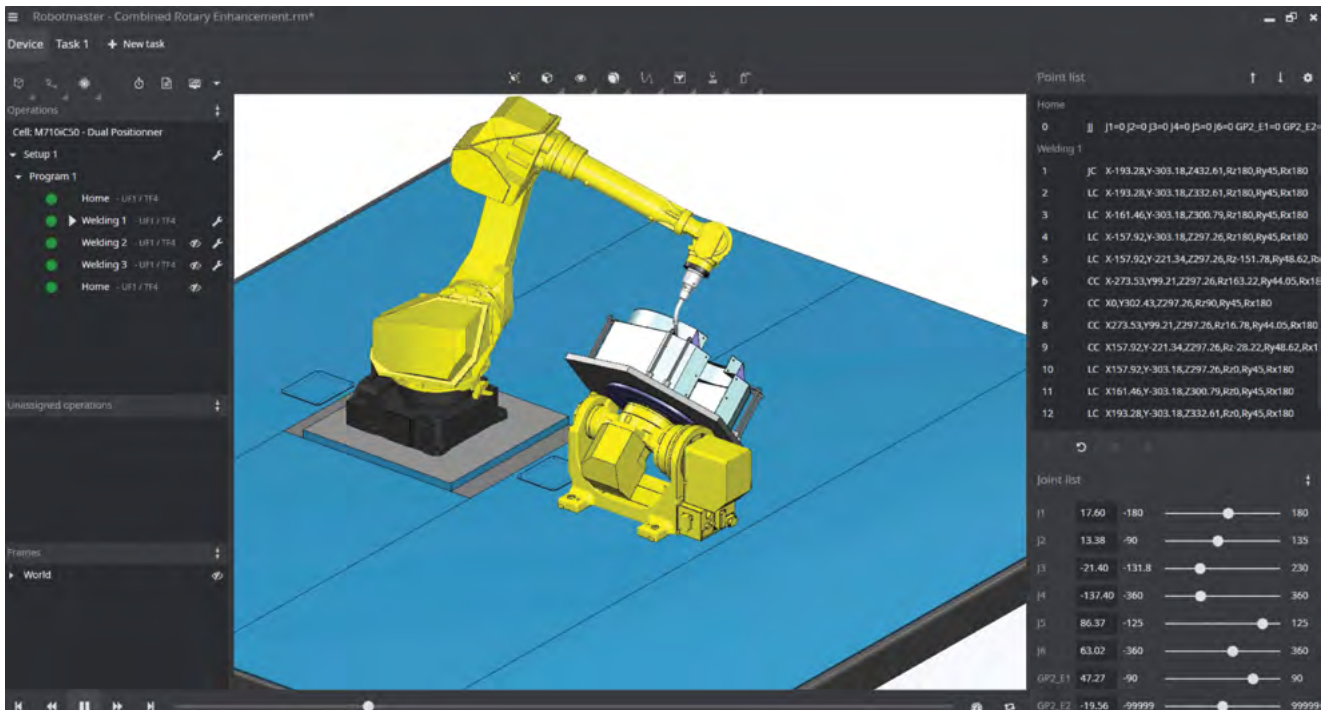
“With Robotmaster V7.4 we have responded to our customer base with features and enhancements that we believe take a big step forward. Take the RTCP improvements as an example. These will allow users to realise more value from their robotic cell investment”,

explained Garen Cakmak, Leader of Hypertherm’s Robotic Software team.

Building upon the redesigned V7 architecture, first introduced in 2018, Robotmaster uses integrated CAD/CAM functionality to make robotic programming easy and intuitive for everyone, even first-time users. The software is used by a wide range of industries to program robots for tasks that include surfacing, 3D milling, additive manufacturing, welding, painting, and more.



Major enhancements to the Remote Tool Center Point (RTCP) allow for an improved end-user experience and exploit the full capabilities of any robotic cell.



Enhancements to the Robotmaster Interactive Simulation Environment (RISE) delivers a more realistic simulation for external axes, along with tools to better control motion between the robot and external axes.

RAISING THE BAR

FOR AUTOMATED MICROCHIP TESTING

esmo group (esmo), a full-service systems integrator that provides innovative and advanced engineering services, has rolled out upgrades and additional features for the talos 2021 system. First launched in 2019, the talos engineering handler is a reliable and easy-to-use handling system for semiconductor test applications, and is esmo's solution to the industry's need to cost-effectively test increasingly compact and complex devices within a shorter period of time.

At the core of the talos engineer handler is its active thermal control system (ATC), which allows manufacturers to carry out multiple test temperature cycles and achieve the highest temperature accuracy.

"Our talos engineering handler provides semiconductor companies with the most stringent quality control and assurance, ensuring products are tested to specification. A highly flexible and cost-effective test system, the talos platform helps manufacturers achieve faster time-to-yield with higher overall equipment efficiency. Furthermore, its remote control and monitoring feature also allows customers to remotely manage and conduct device handling", said Joseph Weinberger, Business Unit Manager (Semicon), esmo.

The talos system supports the testing of devices with any site pitch dimension, which allows semiconductor companies to use already existing production load boards and sockets seamlessly. Its tray or tube loading and unloading feature also makes it possible for manufacturers to run the talos system in a mixed media operation. As such, loading trays, tubes, and tapes can be combined with their unloading counterparts, and devices can even be sorted from one media to another, such as from tube to tray.

Designed to meet both test and production floor requirements, the talos handling system features an accurate pick-and-place robot system and a standard docking interface that is compatible with all testers. The talos can also be employed as a basic, kit-less test handler, or as an advanced test handling system with its expansive selection of optional modules.

Key features of the talos include the following:

- -60°C to +175°C (-76°F to +347°F) device testing temperature with ATC - temperature is measured and controlled at the contact plunger to ensure highest accuracy levels.
- Junction regulation option available - users can control the device's core temperature, compensating power dissipation for highest temperature accuracy.
- Low test time - minimal adjustment and conversion efforts required.
- High contact force of 450 N and above.
- Multiple automated test cycles at different temperatures within a short time-frame.
- High system uptimes and power-on times achievable at lower maintenance costs.
- Compact test cell footprint (in combination with esmo's phoenix cart).
- It is a moveable and modular system.
- Remote control available via Ethernet.

The talos handling system is available globally.



Upgrades and additional features have been rolled out for the talos 2021 system. The talos engineering handler is a reliable and easy-to-use handling system for semiconductor test applications.

THE AUTOGLIDE

5 SYSTEM FROM IGUS

The goal behind the development of the autoglide 5 from igus was to be able to guide energy and data transmission over long distances at a low cost. The new energy chain system is specifically designed for horizontal use in intralogistics and on crane systems. A special feature of the product is that the energy supply can be quickly installed, as it does not require a guide trough. Instead, it lies on a steel wire rope held in place by the e-chain contour.

Many users rely on busbar systems for power and data transmission in tight, compact spaces and for fast lane movements, for example, in storage and retrieval units. Their major disadvantage is that they are expensive to maintain, can only be used for power transmission as standard and must be cleaned regularly to avoid contact faults.

igus has now developed the autoglide 5 to be able to safely guide horizontal cables at speeds of up to 4m/s and up to 80 m travel distance even without a trough.

According to the company, the autoglide 5 can easily be installed in the aisle on a rope or a profile. Its attractive features include a low price, an 88% shorter installation time compared to trough systems and its maintenance-free operation. Thus the new energy supply offers a real alternative to busbar systems.

Guiding energy and data safely even without a trough

To install the autoglide 5, the intralogistics technician needs only the supplied metal rope which he stretches on the aisle floor. Alternatively, guidance via a plastic rope or a profile is also possible.

The e-chain can travel safely on the rope, because the igus developers have come up with a special guide concept. The underside of the chain links has a guide element in the middle, so that the energy chain can rest safely on the rope. For wear-resistant and precise gliding of the upper run of the chain on the lower run, the engineers relied on the igus autoglide elements. This system consists of comb-like injection-moulded crossbars that prevent the energy chain from sliding out. This allows the user to dispense with a guide trough completely.

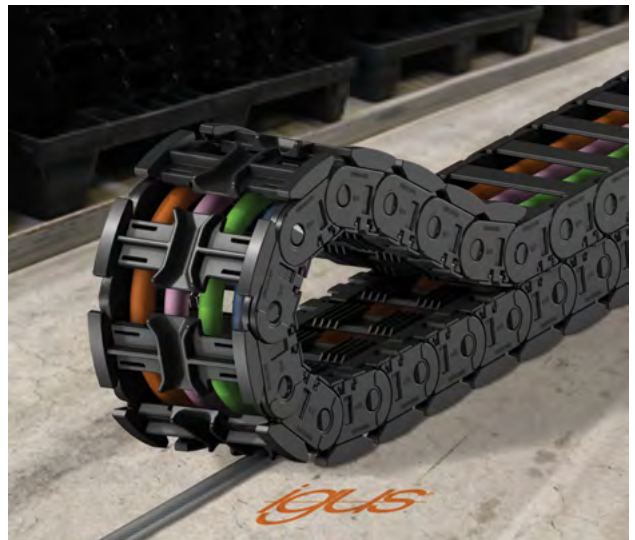
Durable and maintenance-free energy supply system

Busbar systems, or the contacts of the pantograph, are very susceptible to wear and need be replaced after only one to two years.

With the autoglide 5, igus has developed a durable and maintenance-free energy supply system made of high-performance polymers. igus is currently testing the long service life of the new energy chain in its own 3,800 m² test laboratory.

In the laboratory, the autoglide 5 has already demonstrated its quiet operation. At a speed of 2 m/sec, the measured value was 63 dB(A). Another advantage is that unlike the busbar system, the autoglide 5 has no open contacts and therefore the aisle is easy to clean.

igus offers the energy chain system already fully harnessed as a readychain with flexible chainflex cables.



The autoglide 5 contributes to safe, quickly installed and cost-effective energy supply over long distances. Image: igus GmbH.



According to igus, compared to a trough system, the autoglide 5 requires 88% less installation time. Image: igus GmbH.

SINGAPORE'S INAUGURAL RAILWAY STANDARDS LAUNCHED

On 23 March 2021, the IES Standards Development Organisation (IES-SDO) launched Singapore's inaugural railway standards, achieving a significant milestone in efforts to enhance the overall safety, reliability and productivity of the nation's railway services.

Under the national standardisation programme administered by Enterprise Singapore and supported by the Singapore Standards Council, a Technical Committee on Railway Systems (TCRS) was formed last year to look into potential areas of standardisation.

A total of 17 working groups (WG) were formed to develop standards in the areas of asset management, maintenance, safety and security, and service. These WGs consist of individuals from LTA, railway operators, industry stakeholders and academia.

At a hybrid event held at Shangri-La Hotel, Transport Minister Ong Ye Kung launched the first three Technical References: Terminology and abbreviations on the Permanent Way, maintenance regime of the Permanent Way, and terminology for asset management of rail network assets.

The launch was attended by representatives from LTA and the railway operators.

Mr Ong offered his congratulations for the results from two years' worth of effort, and said: "Whenever you have standards, it reflects pride, professionalism, and it is a milestone for any industry." He noted that the industry had its work cut out for it, with plans to develop 60 standards in five years.

Ms Choy Sauw Kook, Director-General (Quality & Excellence), Enterprise Singapore, added: "Once

completed, the Singapore Railway Standards will improve the railway system interoperability, product quality and service consistency."

The rail industry will benefit from standardisation in three ways:

- Enhancing consistency and interoperability through alignment, which would contribute to the building of a robust ecosystem to support the rail industry;
- Advancing competency amongst rail engineers and local businesses as they adopt the standards and align to best practices; and
- Continuous improvement as developers, designers and engineers work together to create and implement innovations to enhance the rail network.

Dr Richard Kwok, co-chair of the TCRS, said: "We have come a long way since the TCRS was formed, and there are many other standards in the pipeline undergoing robust deliberations. The three inaugural standards launched today signal the collective effort by the industry to achieve greater railway safety and reliability."

In the future, these standards could be good benchmarks for the regional and international rail industry, enabling Singapore to strengthen its global leadership position in this sector.

At the launch, Mr Ong also presented certificates of appreciation to the convenors of the working groups which completed the three standards. He also witnessed the launch of "The Learning Journey of the Singapore Railway Standards", a commemorative book developed by IES-SDO and SMRT to chronicle highlights in the railway standards development journey.



During the launch event, certificates of appreciation were presented to the convenors of the WGs which completed the three standards. (Back row, L-R): Ms Choy Sauw Kook; Mr Robert Chew, Chairman, Singapore Standards Council; and Mr Vincent Phang, Chairman, Trade and Connectivity Standards Committee. (Front row, L-R): Dr Richard Kwok; Mr Ong Ye Kung; Mr Lim Bock Aeng and Mr Ang Hang Guan. Mr Lim and Mr Ang are the co-convenors of the WG for TR 86 : 2021 Terminology for asset management for rail network assets.

MR DALSON CHUNG

ELECTED AS DEPUTY PRESIDENT OF IES

IES is pleased to announce that Mr Dalson Chung has been elected to the position of Deputy President.

Mr Chung currently serves as the Vice President of the Professional Engagement Group, Deputy Chair of the International Outreach Committee, Co-Chair of the World Engineers Summit 2021 Organising Committee, and Chair of the Annual Dinner Organising Committee.

He has contributed to IES in various other capacities over the past eight years as well, such as chairing the Environmental and Water Engineering Technical Committee, leading the Sustainability and Smart Nation Clusters, and serving on the Engineering Accreditation Board, Chartered Engineer Board and IES Academy Management Board.

He is currently the Director for Industry Development and Promotion at the National Environment Agency.

The new appointment will take effect after the 2021 AGM. Mr Chung will subsequently take over as the 29th President of IES after the 2022 AGM.



UPCOMING IES COURSES & EVENTS

| Date and Time | Course/Event Name | CPD Points Awarded |
|--------------------------------|--|---|
| 10 – 12 May 9.00am – 6.00pm | IES Preparation Course – A Comprehensive and Instructional Three-Days Training Course on SS638 | TBC |
| 11 – 12 May 1.00pm – 6.20pm | [WEBINAR] Structural Concrete Works in Building and Civil Engineering Projects and Common WSH Hazards & Risk Management 2.0 at Construction Sites (4th Run) | 9 SDU 2 STU (Safety) 6 STU (Struct) 9 PDU (PE, CEng) |
| 14 May 9.00am – 1.15pm | [WEBINAR] Noise Pollution and Vector-Borne Diseases as Environmental Health Concerns from Construction Sites (7th Run) | 2 STU (Safety) 4 PDU (PE) 4 SDU |
| 14 May 9.00am – 1.00pm | IES Charles Rudd Distinguished Public Lectures 2021 | 2 STU (Struct) 3 PDU (PE, CEng) |
| 20 – 21 May 9.00am – 6.20pm | [HYBRID] Piling Works, Design & Testing Following Eurocodes and Safety & Your Legal Obligations (2nd Run) | 9 SDU 2 STU (Safety) 6 STU (Struct) 9 PDU (PE, CEng) |

Correct as at 26 April 2021. CPD points in **green have been approved by the relevant authorities, while those in **red** are pending approval. For more information, visit our website at ies.org.sg and click on "Events and Courses Listing" under the "Events and Courses" tab in the main menu.*

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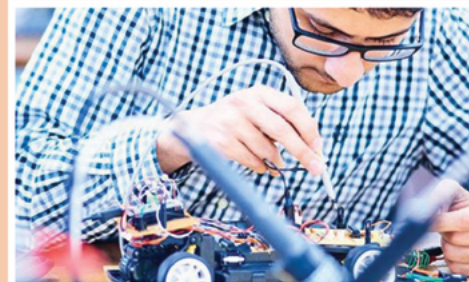


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