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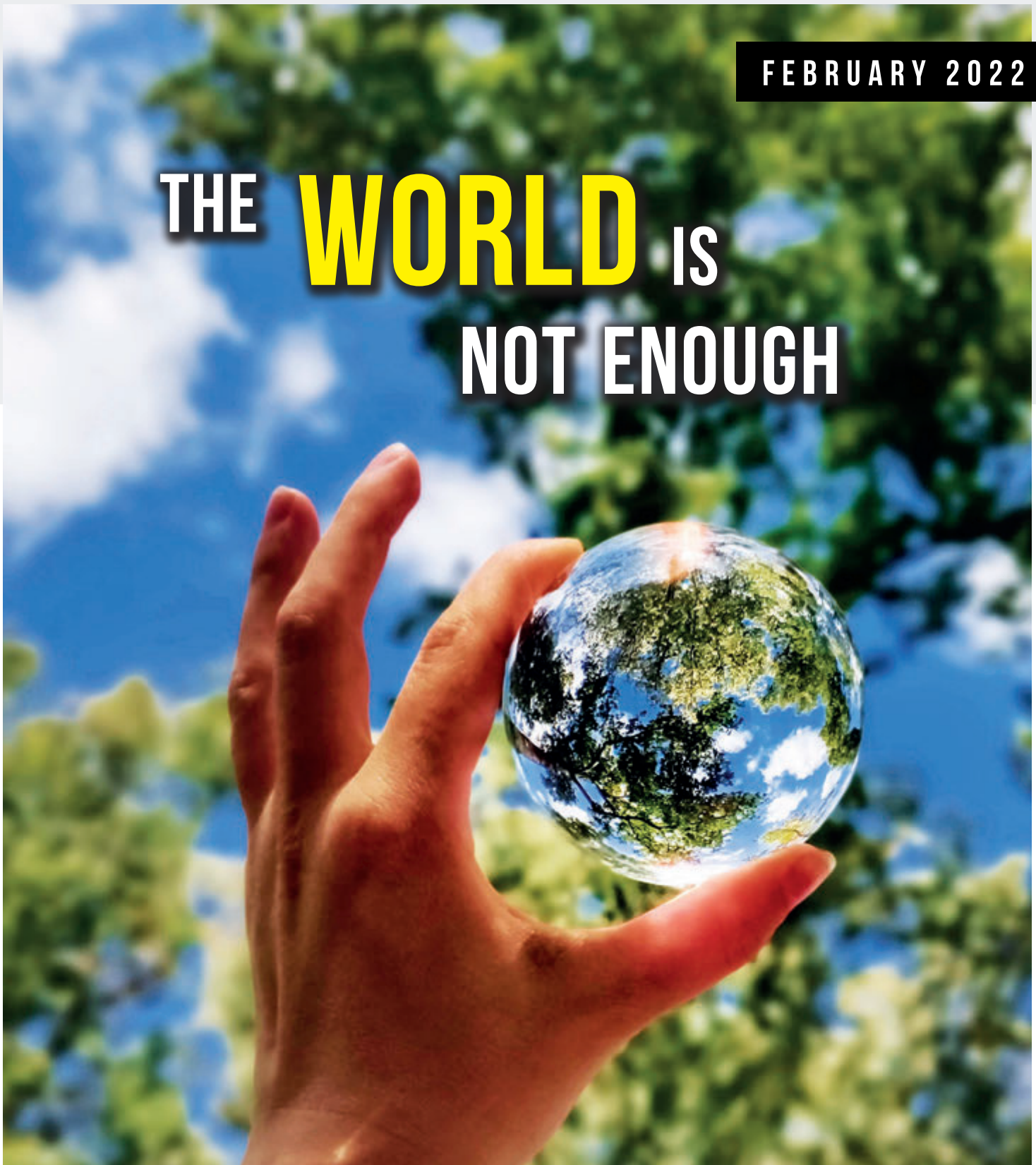

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THE WORLD IS NOT ENOUGH

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by Ir. Prof. Dr Leong Wai Yie
Chairman, Standing Committee On Information and Publications

COVER NOTE

UN Climate Change Conference

For two weeks last year, the UN Climate Change Conference in Glasgow (COP26) saw more than 120 world leaders and 40,000 delegates focused on all aspects of environmental change — the science, the arrangements, the political will to act and obvious signs of action.

Environmental change is expected to have a huge impact in Malaysia. Increasing temperatures are likely to cause heat waves every year. Variations in precipitation may also cause dry seasons and floods in different regions. The rise in ocean levels may see a few waterfront regions inundated. Environmental change can diminish Malaysia's economic development below 20% by 2050, assuming there's a 2°C increase in global temperatures.

In December 2012, 7 states were hit by floods. Over 125,000 were affected by the heavy rainfall. Kelantan, Terengganu, Pahang, Johor, Melaka, Negeri Sembilan and Sabah were impacted and 8,727 people took shelter in 128 relief centres.

In 2014, the International Renewable Energy Agency predicted that Malaysia will reach over 50% of its electricity production from renewables by 2030. In 2021, the government announced its goal of net zero emissions by 2050 in the 12th Malaysia Plan.

These initiatives need global participation and international cooperation by governments, including those in the most polluted areas. The public can also help by settling for better options with regards to source of energy, transportation and food. The most effective way for us to help in environmental changes is to make an aggregate and collective move. This implies constraining governments, corporations, legislatures and partnerships to change their directions, arrangements and strategic policies. ■

EDITOR'S NOTE

Ensuring A Better Tomorrow

This special issue on climate change is headed by the Editorial Board members. This month's theme, The World is Not Enough, is one of the titles in the 007 movie series. In it, James Bond said this family motto can be interpreted as nothing can satisfy whatever longings one have. It can also mean that humans can strive beyond their capabilities and that the world is not the limit for us to explore things beyond it.

by Ir. Prof. Dr Zuhaina binti Zakaria
Principal Bulletin Editor

As engineers, we need to push boundaries in combating climate change issues. We need to ask how we can give impact to this issue and help build a sustainable world. We must play an active role in embracing zero carbon emission in terms of chemical processes, construction, power generation etc. Previous generations had created many inventions to make this world a better place. Now it is crucial for us to ensure we will have a better tomorrow.

I hope you will enjoy reading this issue during the Chinese New Year holidays. On behalf of the Editorial Board, we wish our Chinese members prosperity, happiness and good health in the Tiger Year. ■

Living with
CLIMATE CHANGE HAZARD

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According to a United Nations' report, the current global temperature is 1°C higher than during the Industrial Revolution in 1880s (Figure 1) and in the latest Intergovernmental Panel on Climate Change (IPCC) 6th Assessment Report released in early August 2021, global temperature for the next 20 years is expected to reach or exceed an increase of 1.5°C and this warming rate will continue to increase.

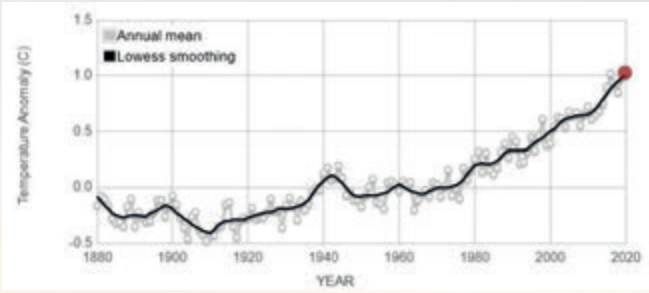

Figure 1: Increasing global temperature trend as reported by NASA, USA. (Source: NASA's Goddard Institute for Space Studies (GISS). Credit: NASA/GISS)

Without intervention, it is inevitable that the world will soon be facing challenges of increasing risk of extreme natural disasters compounded by global warming and local social-economic factors. This paper addresses important strategies to be considered for implementation by developing countries to reduce global warming.

To adapt to the effects of global warming, a number of technical solutions have been developed and implemented by various countries, especially those that help reduce the risk of flood disasters. Developed countries like Norway require the design of urban infrastructures, houses, buildings, roads and reinforced dykes to be climate proof. China and other countries too have reshaped their cities in town planning and development to accommodate the impact of climate changes.

These cities have adopted a new paradigm with emphasis on "green adaptation" methods. For example, polders and flooded plains are built at strategic locations upstream to prevent stormwater from flowing off too quickly to the downstream reaches. Reshaping cities to coexist with Nature requires adapting and merging the technical skills and expertise of disciplines such as hydrology, meteorology, geology and environmental chemistry with landscape architecture and urban planning.

Figure 2: Residual debris accumulated in residential houses after heavy downpours and flooding in Bad Münstereifel, Germany, July 19, 2021. REUTERS/Wolfgang Rattay/File Photo

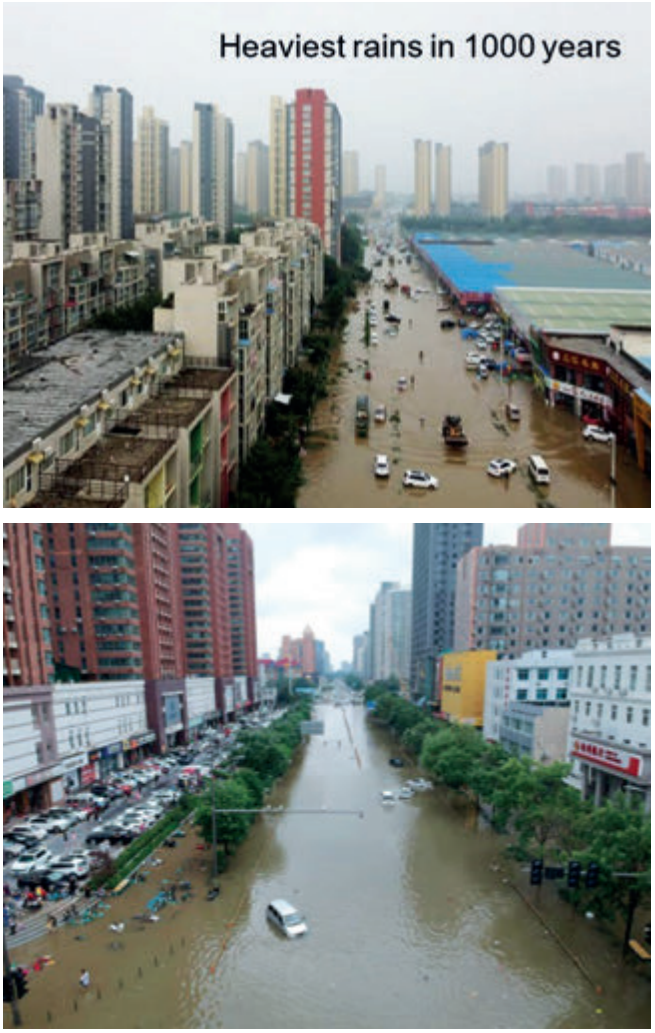

Figure 3: Aerial views of flooded roads following heavy rainfall in Zhengzhou, Henan province, July 21. China Daily via REUTERS/File Photo

Figures 2 and 3 show the devastating effects of extremely heavy rainfall in Bad Münstereifel, west Germany, and in Zhengzhou, central China, on property, livelihoods and lives.

There are generally two reasons why floods occur: Heavy rainfall of more than the average value in an area and inadequate river capacity to release the excess precipitation. Endo *et al.,* (2009) reported that the climate of South-East Asia had changed, with temperatures rising by 1°C and CO_2 levels rising by 410 parts per million. The intensity of rainfall (including for Malaysia) was also affected by an incremental trend of 10-40%. Atmospheric moisture conditions also increased correspondingly with rainfall intensity. Extreme increased spikes in rainfall would worsen the flood risk.

Based on a report by Thomson Reuters Trust Principles, the flood occurrences in China and Germany in July 2021 were attributed to unusually excessive rainfall; the accumulated rainfall over 3 days was equal to the average annual value. The derivative flooding totally devastated all existing flood defence works in both countries and caused the deaths of 25 people in Henan, China, 160 in Germany and 31 in Belgium. The public was outraged over the indecisiveness and false promises by the respective governments.

Abdullah *et al.,* (2021) noted that the rainfall had increased significantly and that the storm passage moved slower across the European countries. The flood water and the spillage from upstream dam releases overtopped river tributaries due to insufficient conveyance capacity.

Malaysia is also experiencing extreme weather conditions as a result of climate change. The country receives a mean annual rainfall of 2,940mm. Meanwhile, the trend of extreme drought alternating with extreme flooding is increasing at an alarming rate.

The Department of Irrigation & Drainage (DID) conducted research and studies on the impact of climate change in Study on Rainfall Change & Distribution in Malaysia, 2018 (Table 1). Alarming changes in rainfall magnitudes pose flood hazards and risks to low lying areas. Excessive changes in rainfall magnitudes between high and low affect livelihoods and threaten vulnerable properties. For example, during heavy rainfall in Kuala Lumpur in August 2021 (NST 2021) and in Titi Hayun, Kedah, in August 2021 (Star, 2021), excess water overflowed into residential areas. In the case of flooding in Kuala Lumpur, economic loss was significant as business and transportation activities were interrupted for days (DID, 2021).

The rainfall analysis (Figure 4) shows changes in the percentage of annual rainfall against the average annual rainfall in Malaysia. Areas shaded in brown signify sensitivity to changes in annual rainfall. The shaded areas will receive heavy and occasional rainfall annually or floods and drought. It is advised that these areas be provided with additional resources by the government, such as increased numbers of hydrological stations. These stations can be monitored using real-time systems, for example *https://publicinfobanjir.water.gov.my* and *https://infokemarau.water.gov.my*. In terms of water resources management, the need for flood reservoirs is essential because these ponds

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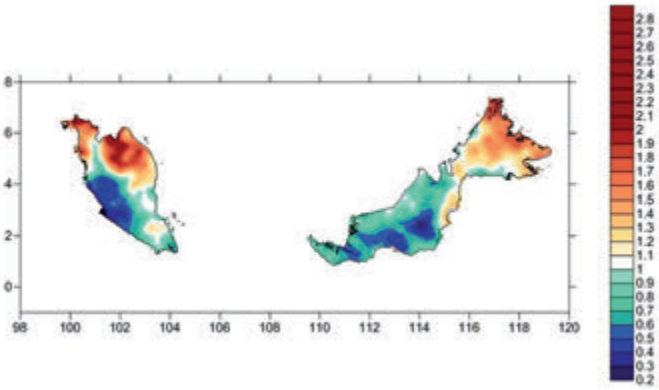

Figure 4: Increase in inter-annual variability

can act as additional water resources during a prolonged dry season.

In the last 30-50 years, traditional drainage and combined sewer system networks were built in cities to discharge rainwater and sewerage flow; in historical cities, these might even have been built 100 years ago. However, the existing sewage system networks can no longer function effectively under the threat of extreme tropical storms. The challenges lie in whether the drainage and sewer systems can be expanded or if additional space is available within the congested city landscape, such as parks and private gardens, to accommodate excess stormwater.

Creative solutions to provide green infrastructure for stormwater management are needed. Structures to drain stormwater into aquifers beneath the city can be integrated into the city's future plans to enhance infiltration and reduce the quantity and rate of stormwater release into rivers as well as drainage and sewer networks.

City planners and engineers can integrate green infrastructures into the city landscape to tackle flooding issues. They can harvest stormwater for water resources and provide additional city greenery as well as improve the natural landscape of cities. The green infrastructure can help improve resilience against flooding and drought as well as the quality of life. However, as with all landscape systems, be they natural or artificial, there is a limit to their carrying capacity. To ensure the sustainability of the engineering landscape, there must be sufficient quantity and quality of water which should also be within the carrying capacity of the water system; any excess will lead to flooding and insufficient amounts will lead to drought.

Extreme drought and flooding are disasters typical attributed to climate change. The most robust and adaptive solution to combat flooding and drought is natural storage as this will act with a "slow-release" function to reduce and slow down the amount of surface water flowing into the rivers. In the past, flood mitigation works were often designed with a specific objective: To move stormwater away from the city as quickly as possible. But these solutions are no longer effective or sustainable as downstream areas have also evolved into urbanised landscapes. The transferring of stormwater into urbanised downstream areas not only aggravates downstream flooding but the backwater effect will also potentially worsen the flooding conditions upstream.

It may be more prudent to retain the stormwater locally instead, allowing it to infiltrate into the soil as groundwater recharge. The natural storage can be used as a supplementary, alternative water source in the event of extreme drought. Greenery landscape such as green roofing, green walls and green side roads will create a new habitat for flora and fauna. A sustainable city environment will recirculate the freshwater resources as water supply and rehabilitate sewerage water into clean water through natural purification technologies.

According to a study by the DID, Malaysia in 2012, over 10% of the country is prone to flooding and a total of 5.677 million people live in these areas. City planning in flood prone areas should be integrated with the water cycle. A holistic city infrastructure conserves the major recirculation element of the water cycle system: Rainfall, infiltration, evaporation, evapotranspiration and the derivative surface runoff, and then water on ground. This process will recirculate repeatedly and naturally without deterioration in both quantity and quality. A sustainable water cycle in urban areas will provide the sponging function against increases in rainfall and surface runoff. To assist Nature, we should create more underground/surface storages for excess water flow during flooding and use these during dry periods. As for evaporation, we can maintain the volume of evaporation with natural ground cover. The increase in percentage of impervious surfaces in urban areas will increase the volume in surface runoff.

According to the Department of Meteorology Malaysia 2021, intensive precipitation occurs during the North-East Monsoon from November to March. There is relatively lesser precipitation during the South-West Monsoon from May to September. Storms can also happen during the inter-monsoon season, though with a lesser degree of magnitude.

Table 1 shows the variation of rainfall in Malaysia from 1978 to 2017. The 40-year rainfall data was further divided into 2 periods (1978-1988 and 1997-2017) for comparison. The +ve sign indicated an increase in variation. The data analysis showed that the increase in variation was more apparent in the months of January, March, June, August, October and December. A decreasing trend was observed in April, May, September and November while February and

Table 1: Mean monthly rainfall and percentage variation for Peninsular Malaysia (1999-2017 compared to 1978-1998). (Source: DID, 2018)

Jan	Feb	March	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
+46.4	0.0	+9.8	-4.7	-6.7	+2.9	0.0	+9.7	-4.7	+1.6	-4.3	+12.3

Figure 6: Climate Action Failure and Extreme Weather as the highest impact risk to the world economy. (Source: The Global Risk Report 2020)

July showed no changes. The monthly rainfall increased progressively (+9.7%) during the wet months (December to January) during the North-East Monsoon and decreased in the dry months (April to May), corresponding with the inter-monsoon season. Relatively lesser rainfall, approximately -4.7%, was seen during the South-West Monsoon months from May through September.

The study showed that high rainfall was seen in the East Coast states: Terengganu and Kelantan (northward region) in November and Johor and Pahang (southward region) in December.

The observed trends in Table 1 and Figure 4 are consistent with one another, indicating that some areas will be subjected to high variations of rainfall with frequent floods and droughts. The areas will be vulnerable if the infrastructures are not resilient enough to accommodate all the unprecedented extreme challenges.

Even though The Global Risk Report 2020 ranked the impact of rainfall as Number 4, the impact of rainfall-induced flooding is ranked 1st in the context of livelihood. The impact of extreme floods is also significant in the context of economic loss. At the World Economic Forum 2020, the report also categorised the existing climate action plan as "a failure".

In Figure 6, Climate Action Failure and Extreme Weather occupy the highest ranking on impact and likelihood in

The Global Risk Report which shows that, in view of the increasing number of extreme rainfall incidents, the world has agreed that climate action previously adopted by the world will not be successful. Thus, a revision is vital to improve the existing climate action plan. The immediate plan should integrate redesigning a country with water-resilient infrastructure to combat climate changes such as extreme precipitation and excessive drought. Urban or developed areas can also be renewed with more green spaces.

While improvement of building resilience, raising riverbanks and improving drainage may be able to mitigate severe flooding, an important activity that works directly to save lives is to improve weather forecast and hazard warning systems. This will provide the community and flood disaster agencies with ample lead time to notify potential flood victims and to relocate them to evacuation centres before it happens.

Centralised water-related disaster management centres set up in Malaysia and the United Kingdom to provide forecast and warning of floods in key locations have successfully helped to reduce the impact of tragedy. In Malaysia, the National Disaster Management Agency collaborates with DID and the Department of Meteorology for flood disaster prevention. The UK Environmental Agency (EA) has set up One Command & Control to provide a centralised systematic protocol for weather-related emergencies, disaster risk reduction, community-based monitoring of emergencies, safeguarding water resources and promoting climate resilience infrastructure.

To combat the threats caused by climate change, the public community and social political environment must be willing to embrace changes in routine lifestyles and holistic business model with natural environment. These changes are inevitable as the world population and economic development cannot afford to have unlimited growth on limited natural resources. Therefore, 3 sustainable criteria are critical in urbanised cities to accommodate future risks and hazards due to climate change.

The first criterion is the setting up of an analytical framework system to mitigate environmental risk due to climate change. A holistic and system-based management of climate-related disasters should be adopted in the framework system to regulate emergencies and disaster, such as areas with potential disaster hazards, flood spill-over consequences, vulnerabilities of infrastructure and blind spots in urban risks. The analytical frame system for disaster management is crucial to reduce weather-related environmental risks.

The second criterion is building up effective stakeholder participation. Stakeholders are encouraged to champion the vulnerable urban environment with innovative research and solution areas in disaster risk analysis, finance for climate change action and emergency response capabilities as well as strengthening collaboration among themselves such as public and private sectors, industries, scientists, politicians, etc.

The third criterion is to set up an effective communication system for risk management, improving the clarity and consistency of risk messaging as well as addressing misinformation, uncertainty in disaster situation and management irritation of the public. Ineffective communication will incapacitate attempts to create trust and align obligations between the public and private sectors, communities and households. At community and national levels, self-organised resilience can be improved via collaboration between private sectors such as technology, science and businesses, logistics and manufacturing etc.

New kinds of infrastructure public-private partnerships (PPPs) in communication should be explored for information dissemination on disaster management and prevention. Governments can play a role as regulatory agency to manage the public/internet users on disinformation; they should spur effective communication channels by involving the private sector in large scale climate-related issues. All climate risk affairs in the crisis management should be addressed collectively via an effective communication system between the government and the public/private sectors. ■

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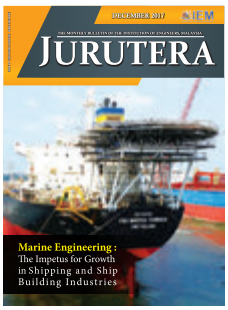

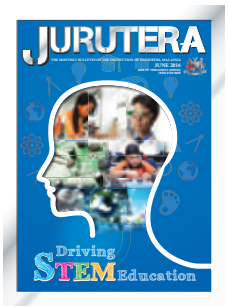

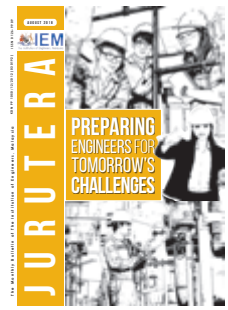

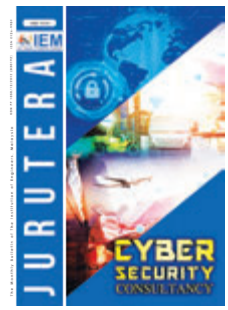

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Four Principles for Attaining Manufacturing Excellence

Written and Prepared by:

Ir. Dr Oh Seong Por

The Past Chairman of IEMNS and Director of Samsung SDI Energy (M). Sdn. Bhd. regularly contributes articles in Jurutera. He also serves on the Industrial Advisory Panel in University Malaya.

In the January issue of Jurutera, Ir. Dr Oh Seong Por introduced the 4 principles that companies can apply to attain manufacturing excellence. These are Safety, Good Housekeeping, Empowering Workers to Become Innovators and Standard Operating Procedures. Elaborating on Principle No. 2: Good Housekeeping, he referred to the 5S initiative – Seiri, Seiton, Seiso, Seiketsu and Shitsuke or Sort, Stabilise, Shine, Standardisation and Sustain – as an effective way to cultivate Good Housekeeping. We continue with Step 5.

Step 5. Sustain (Shitsuke)

Purpose. Sustain is about instilling discipline and habit in users, workers and other stakeholders so that they are equipped with the ability to perform 5S.

Method. A top-down management approach is essential to create the right discipline and habit. Careful strategy is required and must be executed across the organisation and progress must be monitored closely. Here are 3 important steps which must be incorporated in the Sustain strategy.

1. Leadership by example. This means the management must take the responsibility to lead and be committed to the 5S. Executives and managers must be visible enough to indulge in 5S activities together with their team (users/workers). It is also highly recommended that the 5S initiative be incorporated into the organisation's policy. These are crucial signals to all involved about the importance of 5S to the organisation and that participation by all members is inevitable. A continuous training programme is another effective way to instill the right habits for 5S activities.
2. Monitoring. This emphasises tracking and assessing overall 5S activities to ensure they are progressing in a direction that meets the objectives. An effective approach is to have the plant manager conduct a 5S audit, during which workers are given the opportunity to explain and demonstrate good improvements that have resulted from the 5S activities. This is a useful way to instill confidence and pride for having contributed to the organisation. The plant manager can reciprocate by giving praises. Indirectly it creates positive interactions between the plant manager and the workers. Figure 5 shows the basic audit check sheet and 5S progress tracking list.
3. Encouragement. This is a powerful way to develop internal passion to execute 5S to the best of one's ability. The management may reward the best team or contributor of the best improvement idea. Rewards serve as a form of appreciation and motivation to recipients. The best team and improvement ideas should be promoted and other workers are encouraged to benchmark. This will create a positive domino effect for members to stay committed and to continue to participate in the 5S movement. Figure 6 describes the Sustain steps and the overall interaction of the above 5 steps.

Principle No. 3: To Empower Workers As Innovators

During the Industrial Revolution, factory workers were told to park their brains at the door before entering the work place. This implied that workers were meant to do tasks according to instructions and were not allowed to think or question. Only the manager, supervisor, technician or engineer were allowed to think or make adjustments to work content.

Till today, there are plant managers or supervisors who still believe in this style of management. But human beings are blessed with brains and can do endless things when given the proper coaching, training and opportunity. In addition, there is always room for improvement in every work, process and product.

Team name :	Audit date :
Auditor :	

5S Movement	Point
S1-Sort (Necessary things only-tool, material, machine). Total	/15
-Only necessary things at workplace -Things in good condition (No damage / repair) -Things in right inventory (safety stock only)	
S2-Stabilize (Right location, visual management). Total	/20
-Things located correctly for easy retrieval -Things labeled for fast identification. No search involved -Location marked and visible enough for user to obey -Overall neatness status	
S3-Shine (Keep tip top condition / Prevention / Safety). Total	/30
-Cleaning things / areas and person in-charge identified. -Cleaning tools are available (rightly located / usable condition) -Cleaning materials and PPEs are readily available for users -Improvement ideas (better tools / method for cleaning) -Detect problems / corrective and preventive actions -Overall cleaning status	
S4-Standardization (Standard for S1, S2, S3)	/15
-Availability of standard for governing S1, S2, S3 activities -Appropriate visual aids are used -Accuracy of standard with right revision and rightly displayed	
S5-Sustain	/20
-Participation of team members (including leaders) -Best practice for overall 5S movement -Training and overall understanding of 5S. -Overall sustaining level	
Total point	/100
Rewarding of point. Range : 0 ~ 5. Worst : 0. Best : 5	

Team (Area) Name	Month Week 1	Week 2	Week 3	Week 4	Monthly Overall	Monthly Ranking
Assembly Line 1						
Assembly Line 2						
Assembly Line 3						
Engineering						
Warehouse						
Maintenance						
Quality Control						
Production Office						

Figure 5: Audit check sheet and 5S progress tracking list

Workers on the shopfloor are at the frontline, handling machines, materials and control processes. New recruits may be inexperienced and so need to work according to instructions initially but over time, they will pick up the know-how and may become experts in their work. When provided with the proper training and right empowerment, a worker may become an innovator who can contribute positive improvements to process, productivity and product quality. The target is not merely major improvements but rather, it's about getting all

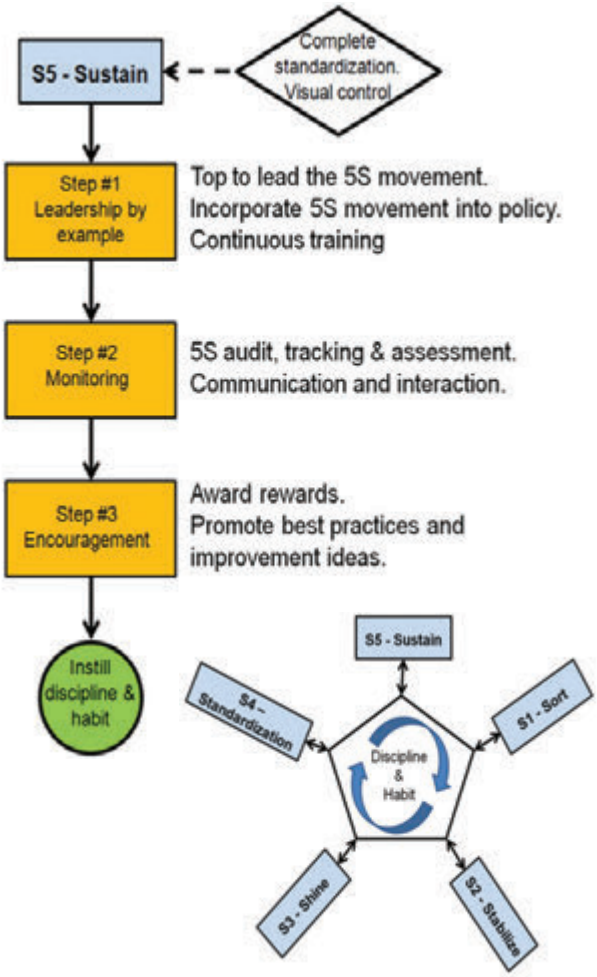

Figure 6: Sustain Step and Interaction of 5S (Sort-Stabilise-Shine-Standardisation-Sustain)

workers to participate in doing continuous incremental improvements. Eventually the summation of all these improvements will add value to the plant and strengthen its competitiveness.

In Toyota, it was reported that all levels of workers were cultivated to consistently contribute improvement actions or kaizen to increase work efficiency, eliminate waste, speed up work flow, enhance safety and upgrade quality. Workers were treated as valuable resources and innovators. Their passion to change for betterment became the driving force for Toyota to sustain the Top 5 car maker ranking in the world since 2000 and in 2020, it attained the best car maker position (www.investopedia.com)

To become innovators, workers must first be provided with basic knowledge on data collection, data analysis, data interpretation and root-cause finding skills. I recommend 7 Basic Problem Solving Tools, also known as the Magnificent 7, comprising check sheet, histogram, Pareto Chart, scatter diagram, process flowchart, cause and effect analysis (fishbone diagram) and process control chart. A brief description of each tool is given in Tables 1 and 2.

Does your workplace provide good ventilation for better Indoor Air Quality (IAQ)?

Ever since the pandemic, the rising awareness of air quality has been evident as lifestyles are being forced to change dramatically with people spending far more time indoors. This has led to many of us wondering whether the air we breathe can even be considered clean or healthy.

While conventional air conditioning focuses solely on cooling the air. DAIKIN goes the extra mile by providing a comprehensive answer for all air-quality concerns through the combination of air conditioning with advanced ventilation to achieve not just fresh but clean and healthy air.

Heat Reclaim Ventilator

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Heat Reclaim Ventilator with DX-Coil

A temperature adjustment function has been added to the Heat Reclaim Ventilator to better maintain comfort and lessen heat load caused by ventilation.

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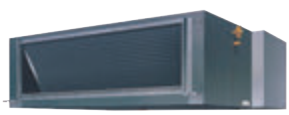

Outdoor-Air Processing Unit

Supplying outdoor fresh air by controlling discharge air temperature from the unit. Thereby maintaining comfort in the room and lessens heat load caused by ventilation.

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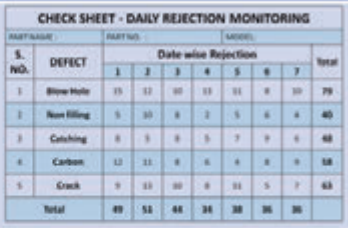
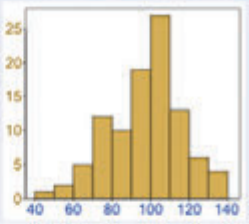
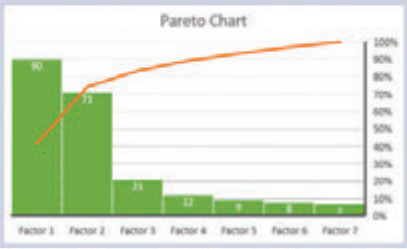
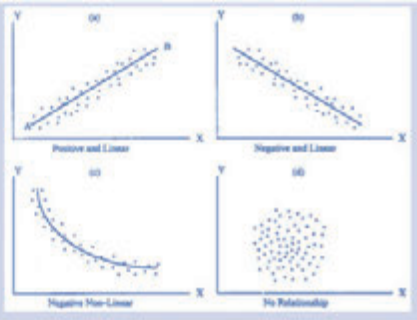
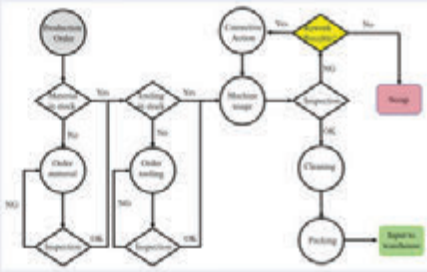
VRV Air Handling Unit

Daikin VRV AHU improves the indoor air quality with filtration of return air/outdoor air to deliver clean air. With large air volumes and high external static pressure, it is the ideal solution for buildings with large size space.

* Can be connected only to VRV

Table 1: Check Sheet, Histogram, Pareto Chart, Scatter Diagram and Process Flow Chart

No	Tool	Description	Example
1	Check Sheet	Check sheet is used to record data to serve specific purpose. The check sheet design, content and format will vary depending on the data being collected. Worker or user needs to be trained on the method of taking and recording data in the check sheet in order to obtain meaningful information.	
2	Histogram	Histogram is a bar graph that shows the distribution of collected or measured data. It shows the spread of overall data and the mode or the data (or occurrence) having the highest frequency.	
3	Pareto Chart	Pareto Chart is used to separate the vital few factors from the trivial many factors. It helps to identify the few factors which have the highest occurrence frequency that contribute the greatest result.	
4	Scatter Diagram	Scatter diagram is used to reveal the relationship between variables. Example, to determine any correlation between the water pressure when heating time. If the data of both variables shows correlation, it indicates there is possible relationship between pressure and heating time. The pattern in the scatter diagram needs further investigation to obtain the real conclusion.	
5	Process Flowchart	Process flowchart shows the sequential workflow of a process in graphical format. It can be used to analyse a process and identify potential problem.	

Improvement or innovation does not come by just providing knowledge or skills. Workers must be guided, motivated and ideas executed. One way to do it effectively is to form a focused team where the members come together to study, collect data, analyse, brainstorm and find solutions. Small Group Activity (SGA) can become the focused team. The team may consist of 10-12 persons of various levels and departments such as shopfloor operator, technician, engineer and supervisor. The feeling of ownership is intensified because multifunction team effort is put into practice to improve concerned issues. In addition, the solution provided through team effort is better standardised and sustained. This in turn, adds value to the company.

The management may assign or a team member may choose an issue to be resolved which may involve product quality, productivity, cost saving, safety issue, machine trouble or even working environment. Team members may use the tools learned, such as 7 basic problem analysis and solving tools to investigate, identify and eliminate root cause. The steps to execute SGA can be the PDCA (Plan-Do-Check-Action) cycle as shown in Figure 7.

Table 2: Cause & Effect Diagram and Process Control Chart

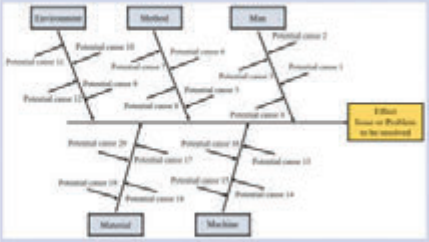
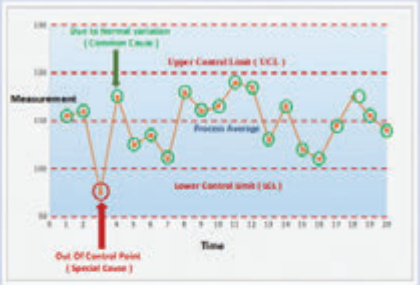
No	Tool	Description	Example
6	Cause & Effect Analysis (Fishbone Diagram)	Cause and Effect Diagram is a discovery tool that displays all the potential causes leading to specific issue under investigation. Users identify causes and categorize them normally into man, material, machine, method and environment through brainstorming session. Once completed identifying, users need to validate each potential causes and zero on the vital or highly suspected causes. Next, users invent the possible solutions to address the highly potential causes.	
7	Process Control Chart	Process Control Chart It displays the process behavior over a specific time frame. It helps to determine if the process is under control or facing run trend leading to possible instability. The chart has several key elements: CL – center line or the total average of the data UCL – upper control limit is defined by the equation average + 3 sigma LCL – lower control limit is defined by the equation average – 3 sigma. USL – upper spec limit defines the highest value of the process or product specification LSL – lower spec limit defines the smallest value of the process or product specification. If the data or graph falls within the region of LCL and UCL, then the process is under control or stable. Expect no defect or issue. Data that falls out of this region is considered unstable and needs investigation – special cause or common cause. Corrective action must be carried out. This is to prevent real problem when it becomes out from specifications.	

Figure 7: PDCA Cycle for SGA

Plan. Select an issue, either by the SGA team members or the management. Set the goal or expected condition. The goal must be measurable and precise so that actual improvement can be assessed and sustained. SGA members can proceed to collect data and conduct a study using the 7 basic problem analysis tools. Once the root cause is identified, potential solutions can be crafted through brainstorming sessions.

Do. Execute the invented solution.

Check. Collect data, monitor the situation and assess the effectiveness of the solution. There is the possibility to modify the execution plan such as adding a new-found solution or dropping ineffective invented solutions.

Action. Once the issue is resolved, all controlling items or parameters must be standardised and factored into the standard operating procedure. This is to ensure the improvement can be sustained and to prevent recurrence.

As described, the SGA is an on-going activity that leads to continuous incremental improvement through the participation of employees. Therefore, once the management adopts the right strategy, the results attained by SGA will progressively add value and strengthen the company's competitiveness.

Principle No. 4: Standard Operating Procedure

In a manufacturing plant, there are many tasks which need to be performed by workers. These tasks must be performed in a specific proven way so as to reduce variation which is the root cause of mistakes, trouble or defects. One effective and widely used approach is to establish a

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standard operating procedure (SOP). By definition, SOP is a document describing a set of step-by-step instructions to guide workers in performing and completing tasks smoothly to meet the desired target. Besides serving as work instructions, SOP also contributes other tangible benefits such as:

- Adherence of employees to the most efficient and effective way to go about a certain task.
- Enhancement of work safety when employees act according to the given work instructions.
- Supports good communication between upstream and downstream workers.
- Maintain organisational knowledge as work content, best practice and experiences gained are documented. It can become effective onboard training material for new employees.

Therefore, SOP can be viewed as a tool to add value to the company and as an important key to achieving manufacturing excellence.

The SOP must be drafted with great care by a team of experienced stakeholders who may be the knowledgeable manager, supervisor, engineer, technician or high-performance employee. There are a few steps that need to be considered when drafting SOP:

1. Identify the right stakeholders to draft the SOP.
2. Determine the purpose and goals of creating SOP.
3. Define the end user of SOP.
4. Identify the right instructions to be included in the SOP, e.g. step-by-step instructions to complete a task.
5. Decide on appropriate safety instructions such as PPE, tools, do and don't actions as well as precautionary steps.
6. Training for workers.

Changes in process, machine, material or customer expectation may cause revisions to be made to the SOP. Some common examples of what may affect SOP are existing manual process replaced by automation due to technology advancement, added or simplified process when product design is modified and present material replaced with alternative advanced material.

Therefore, the SOP must be revisited from time to time, depending on the need. In addition, it is necessary to review the SOP whenever a problem related to operations is encountered. Almost all operation-related problems can be traced to SOP. The 3P cycle may be applied when investigating the problem. They consist of the following:

1P: Is SOP available? If available, proceed to the next step. If not, then SOP must be established.

2P: Is the SOP perfect? If not (e.g. inaccurate, missing step, mistake), revise the SOP to address the imperfection that causes the problem. If SOP is perfect, then proceed to the next step.

3P. Is the SOP being adhered to? If a worker did not comply, then the worker must be held responsible. Retraining will be necessary. If the worker complies and yet the problem persists, investigate further to find the root cause and return to step 2P.

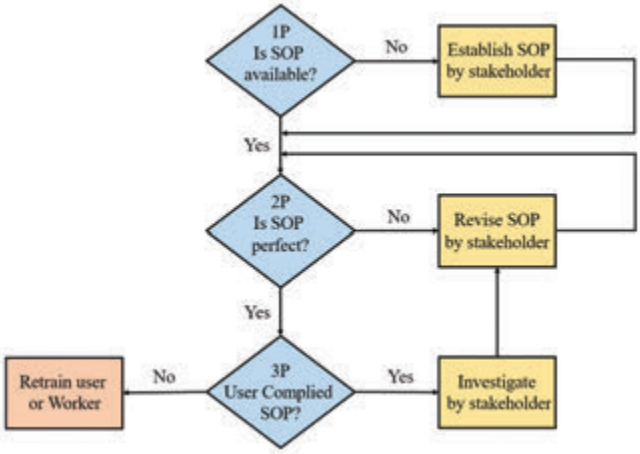

Figure 8: 3P Flow

Conclusion

The 4 vital principles provide the platform for a company to enhance its capability and to continue to be relevant in a highly competitive manufacturing environment. The acceptance by and consistent participation of workers are the key determinants of the outcome. The company leadership should capitalise on these principles and adopt them as working culture for the entire workforce. ■

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Engineers Should Be More Business Minded

Written and Prepared by:

Koon Yew Yin

Author of Malaysia: Road Map for Achieving Vision 2020 and New Road Map to A Developed Nation, Koon Yew Yin hopes to see Malaysia become a fully developed nation.

There are about 1,100 public listed companies in Malaysia and a large number of them are managed by engineers but less than 2% of them are financially controlled by engineers.

Most of the larger properties in towns and cities belong to entrepreneurs who are not engineers. Most of them do not even have a tertiary education. Nevertheless, all these properties would not have been constructed without engineers' contribution.

It is unfortunate that many engineers dare not take the risk to become entrepreneurs who can make more money. They are quite happy to accept monthly salaries. They think of their engineering degrees and diplomas as having free meal tickets for life.

I am a Chartered Civil Engineer and after practising my profession for only a few years, I became a fairly successful entrepreneur. Based on my experiences, I am writing this piece for the benefit of engineers. Here are a few reasons why I say engineers can be great entrepreneurs:

1. Engineers Can Solve Problems

The engineering field is filled with people who are trained to solve problems. New businesses erupt when there is a need to bring something that is missing into the market. Filling a void is perfect for someone who is capable of defining a problem. Engineers are trained to think logically and to follow a methodology to uncover useful solutions.

Yes, engineering brings value to consumers. This is also the basis for a successful business.

2. Engineers Are Optimistic

The world can be a very pessimistic place, especially since the economy is not always thriving. People tend to be sceptical when it comes to starting something new and undiscovered. But in engineering courses, students are taught to persist in the face of difficulty. An engineer always thinks positively and will persevere until the problem is solved. Even though it may take time, an engineer will find an answer. This is a key part of beginning a business.

An entrepreneur should never give up but instead should continue to move forward in the face of adversity. A person's mindset and approach can mean the difference between success and failure.

3. Engineers Can Build Trust

The business world is filled with ruthless people. Oftentimes, a business owner will lie to the public in order to get ahead. Instead of dealing with mistruths and being led down the wrong path, an engineer will tell the truth in a blunt manner.

This candour establishes trust with consumers. In this fashion, people with a background in engineering will have a positive influence on the business environment. Trust is a quality that is not easy to establish, but an engineer should have little problem.

4. Engineers Have Humility And A Yearning For Knowledge

The typical salesman must be strong in his convictions. This makes such a person low in humility. Having doubts or being unsure about something is viewed as a weakness.

On the other hand, an engineer tends to possess great humility. An engineer understands that no one holds all the answers. In the same way, an engineer is always willing to search for the solution to a problem, even one in the business world.

When a person is not afraid to learn and gain more knowledge, growth will occur. Growing is a key factor involved with developing a solid business. Being an entrepreneur means constantly striving to uncover the most amount of knowledge possible. After a new product or service is developed, an engineer must then identify the

best target market. Not every item will be a runaway success. If something is not working, it is important to not be afraid to stop and make changes.

Since an engineer may lack experience in marketing, there may be a process of trial and error. However, the great attitude of an engineer will not be curbed by the need to alter a business plan and move on. Not every entrepreneur has a background in engineering but having one can certainly be a positive influence.

An engineer will possess the necessary characteristics that make a new business successful. An engineer knows how to solve problems, stays positive, builds customer trust and will never stop learning new things. The business world is tough but with these traits, such a person is sure to succeed.

Do Engineering And Entrepreneurship Go Hand In Hand?

Entrepreneurship has been one of the most talked about and sought-after career paths. It has been glamorised in the recent years by young billionaires such as Mark Zuckerberg and Elon Musk.

At first glance, engineering and entrepreneurship may seem like very different paths without natural crossovers but take a closer look and you'll find that both career paths share many similar skills.

In fact, many great entrepreneurs and business leaders have an education and training in engineering. Bill Gates, Michael Bloomberg and Carlos Slim are just a few of the famous entrepreneurs who started their careers in engineering.

That was also how my college mates, Yap Lim Sen, Koh Boon Chor and Looi Kam Pak founded listed companies such as Mudajaya, Gamuda, IGB, Rubberex, and MBM Resources.

IEM SSIG's Comments:

So come on engineers in Malaysia, be bold and proactive in challenging the local business environment and you can become successful entrepreneurs like the ones mentioned by Mr. Koon. Let us build our entrepreneurial skills and help develop our nation with the humility and integrity typical of our profession, for the betterment our nation. ■

Upcoming Activities

Introduction to Design of Mechanical Services For Building - Part 1

Date	: 12 February 2022 (Saturday)
Time	: 9.00 a.m. – 1.00 p.m.
Venue	: Digital Platform
Approved CPD	: 2
Speaker	: Ir. Ts. Mohd Kamal Haziq

Introduction to Design of Mechanical Services For Building - Part 2

Date	: 19 February 2022 (Saturday)
Time	: 9.00 a.m. – 1.00 p.m.
Venue	: Digital Platform
Approved CPD	: 4
Speaker	: Ir. Ts. Mohd Kamal Haziq

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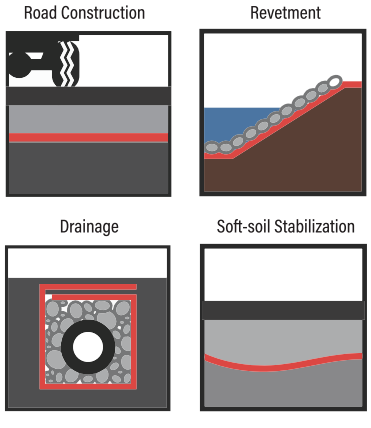

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History of Engineering Technologist & International Engineering Technologist Development in Malaysia

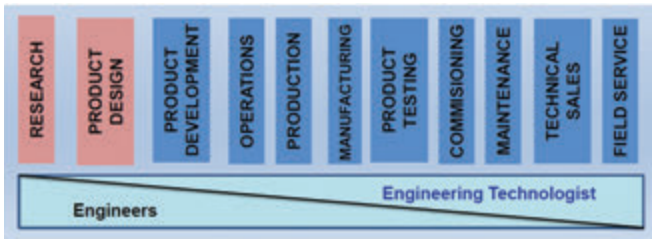
Written and Prepared by:

Ts. Lai Yung Yaw

A senior member of IEEE, he received the Incorporated Engineer from ECUK in 2012, the International Engineering Technologist and ASEAN Engineering Technologist in 2015.

What is an Engineering Technologist or Eng.Tech.? First, let us inspect the two root words. According to the Oxford Dictionary, engineering is "the activity of applying scientific knowledge to the design, building and control of machines, roads, bridges, electrical equipment, etc." and technologist means "an expert in a particular field of technology".

When we combine the 2 words to form Eng.Tech., it simply means "a specialist who implements technology within a field of engineering", as explained by Wikipedia. The International Engineering Alliance (IEA) also defines Eng.Tech. as "an engineering practitioner whose competence lies in the application of particular engineering technologies to a class of applications".



As you can see from above engineering spectrum, most jobs in Malaysia are considered the scope of work of an Eng.Tech., from product development to field services.

Another term we often hear is Application Engineer (AE), a term used mostly to refer to product or equipment vendors. Again AE falls under the scope of what an Eng. Tech. does. Generally, the term Eng.Tech. is not widely known in Malaysia though things have changed gradually in the past 10 years and the term is now increasingly accepted by society.

The term Eng.Tech. had its roots in Canada in the 1960s and it was later introduced to the United States. The position was also recognised in other countries such as the United Kingdom and some European countries albeit with a slightly different name but maintaining the term Engineer, e.g. Incorporated Engineer (UK) and State-Certified Engineer (Germany).

The term was standardised by the IEA in 1998 with an IEA document which stated that "a Technologist and Technician Working Group was proposed to investigate the development of a mutual recognition agreement for accredited programmes for engineering technologists and technicians".

The following table from the IEA website shows the development of the Sydney Accord (SA) working group, which saw the participation of engineering institutions from various countries.

Table 1: Sydney Accord Chairmen, Deputy-Chairmen and Secretariat

Period	Chairman	Affiliation	Secretariat
Ottawa Intent Working Group			
1998-2001	Barry Dobson	EngC	CCTT: Charles Brimley
Sydney Accord			
2001-2003	Barry Dobson	EngC	CCTT: Charles Brimley
2003-2005			ECSA: Terry Stidworthy
2005-2007			Engineers Ireland: Denis McGrath
2007-2011	Alex Chan Robin King (Deputy)	HKIE Engineers Australia	IEA Secretariat provided by IPENZ
2011-2015	Robin King David Holger (Deputy)	Engineers Australia ABET	
2015-	David Holger Ohyang Kwon (Deputy)	ABET ABEEK	

EngC - Engineering Council UK
CCTT - Canadian Council of Technicians & Technologists
HKIE - Hong Kong Institute of Engineers
ABET - Accreditation Board for Education & Technology, US
ABEEK - Accreditation Board for Engineering Education of (South) Korea
ECSA - Engineering Council of South Africa
IPENZ - Institution of Professional Engineers New Zealand

In June 2001, the Sydney Accord was signed in Thornybush, South Africa, by the following:

- Institution of Engineers, Australia (EA)
- Canadian Council of Technicians and Technologists (CCTT)
- Hong Kong Institution of Engineers (HKIE)
- Institution of Engineers Ireland (EI)
- Institution of Professional Engineers New Zealand (IPENZ)
- Engineering Council of South Africa (ECSA)
- Engineering Council, United Kingdom (EngC)

Following the signing of the Sydney Accord, more national organisations applied to be part of the Accord:

2009 - Accreditation Board for Education & Technology (ABET) US

2013 - Accreditation Board for Engineering Education of (South) Korea (ABEEK)

2014 - Institute of Engineering Education Taiwan (IEET)

2018 - Board of Engineers Malaysia (BEM)

A few countries were accepted as Provisional Signatories of the Sydney Accord; these countries were recognised as having appropriate systems and processes in place to develop towards becoming full signatories:

- Peru - Represented by Instituto de Calidad y Acreditacion de Programas de Computacion, Ingenieria y Tecnologia (ICACIT)
- Sri Lanka - Represented by Institution of Engineers Sri Lanka (IESL)

Launched in 2001, the Engineering Technologists Mobility Forum (ETMF) aims to develop formal standards for the mobility of engineering technologists. In 2013, the International Engineering Technologist Agreement (IETA) superseded the EMF. According to the IEA website, "IETA provides for the recognition of substantial equivalency of standards and quality assurance systems used to establish competency of engineering technologists for independent practice."

As of 2021, the following countries have been admitted into the IETA:

- Canada - Represented by Canadian Council of Technicians & Technologists (CCTT) (2001)
- Hong Kong, China - Represented by The Hong Kong Institution of Engineers (HKIE) (2001)
- Ireland - Represented by Engineers Ireland (EI) (2001)
- New Zealand - Represented by Engineering New Zealand (EngNZ) (2001)
- South Africa - Represented by Engineering Council South Africa (ECSA) (2001)
- United Kingdom - Represented by Engineering Council United Kingdom (ECUK) (2001)
- Australia - Represented by Engineers Australia (EA) (2018)

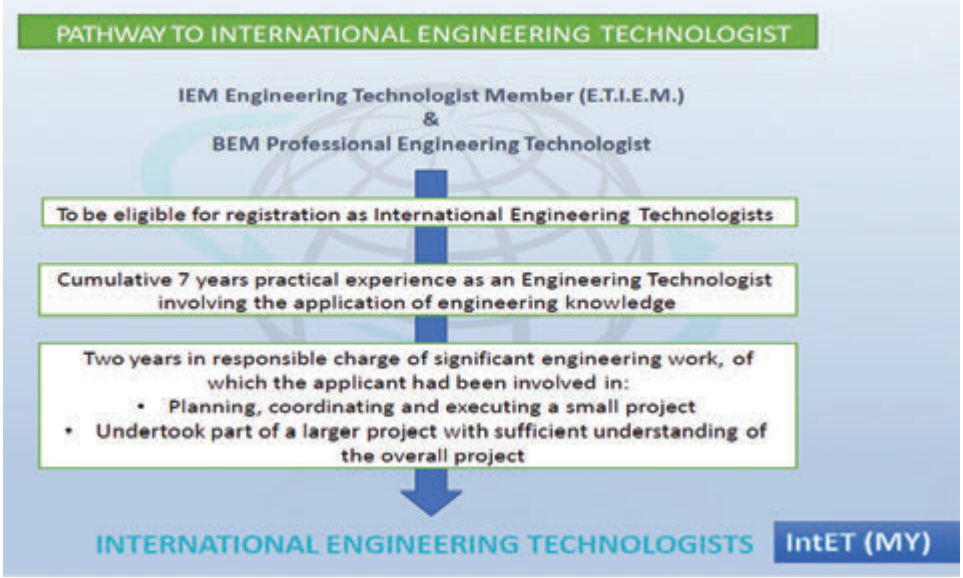
There are two things that we need to understand, namely **Sydney Accord** (SA) and **IETA**, which are meant for different purposes. The Sydney Accord is an accord for international mutual recognition for qualifications in the fields of engineering technology, which is more for academic accreditation in short.

On the other hand, IETA focuses on competency agreement and enables the registration for International Engineering Technologist (IntET). According to the IEA website, "through the International Engineering Technologists Agreement (IETA), the members aim to facilitate cross-border practice by experienced practising engineering technologists, by establishing a framework for their recognition based on confidence in the integrity of national assessment systems, secured through continuing mutual inspection and evaluation of those systems".

The general requirements for IntET registration are:

- An accredited degree recognised under the Sydney Accord.
- The competence for independent practice as an engineering technologist as exemplified by the International Engineering Alliance competency profile.
- At least 7 years post-graduate experience.
- At least 2 years responsibility for significant engineering work.
- Maintaining continuing professional development (CPD).

As you can see, engineering technologists have come a long way and are not new in the world of engineering. In Malaysia, the position of an engineering technologist was formalised when the Engineering Technology Accreditation Council (ETAC) was formed as a protem council in 2011 to provide accreditation of Engineering Technology programmes. This was followed by the amendment of the Registration of Engineers Act 1967 (REA) by the Board of Engineers Malaysia (BEM) to include Eng.Tech. as a registered person in the year 2015.



Through BEM, Malaysia successfully became a Sydney Accord signatory in 2018. In my opinion, the whole official process to get into the Sydney Accord took 7 years, counting from the start of ETAC. Of course, there was a lot of unseen effort and hard work in the formation of ETAC.

In principle, BEM has agreed to provide a professional pathway for Eng.Tech., which was already mentioned in multiple BEM webinars, where it will include Professional Eng.Tech. in the next REA amendment. The following shows the future pathway as proposed by BEM for Eng. Tech. to become a Professional Eng. Tech. after some form of assessment.

The Institution of Engineers Malaysia (IEM) has been admitted as a provisional IETA member in 2021 and this is certainly great news for engineering technologists in the country. Through IEM, the potential engineering technologist will be able to gain IntET(MY) status once they meet the general criteria mentioned above.

First, they have to register with IEM as Eng.Tech. Graduate Members and register with BEM as Eng.Tech. IEM has formed the Technologist & Technician Competency Assessment Board (TCAB) to provide an assessment system to assess Eng.Tech. Graduate Members in order for them to be upgraded to Eng.Tech. Member. As Eng.Tech. Members, they will be able to apply for IntET(MY) status after satisfying the required criteria from IETA.

IntET(MY) status can only be applied via IEM and registration with BEM alone is insufficient for acceptance. The following is the pathway to IntET(MY) status and highlights that registration with IEM is of paramount importance if one wishes to pursue a career as IntET(MY).

The benefit of becoming an IntET(MY) is obvious: One will enjoy greater mobility to practise in other IETA countries without having to go through the whole professional assessment in order to gain a professional licence to practise in those countries. In other words, it will make your migration process more straightforward because your degree and competency will be recognised in those countries.

In future, IEM will sign a lot of MOUs with other signatory bodies of IETA for mutual registration, just like those which allow a Professional Engineer from Malaysia to be admitted as a Chartered Engineer in Australia without going through the assessment process from the start.

In conclusion, it is highly recommended that those who are eligible should register with BEM as Eng.Tech. and with IEM as Eng.Tech. Graduate Members should do so as soon as possible in order to not miss the golden opportunity. Bear in mind that professional registrations take time and it will be a few months before one can be registered successfully.

On this note, I have a true story to share. I have a friend who graduated with an accredited degree but he has never bothered to register with BEM. One day, he applied for a job with an international company in Malaysia. He passed all the interviews and assessments and, in the final phase, the Human Resources personnel asked for his BEM registration certificate. Not knowing what to do, he called me to ask how he could register with BEM as quickly as possible. Unfortunately, the registration process took time and he was unable to meet the HR deadline. Eventually, he did not get his dream job.

Therefore, my advice to all the engineering technologist graduates is "let's not ask what you will get with professional registrations first but instead, get registered as soon as possible". Then when opportunities come a-knocking, you can present your professional registration on the spot and secure the job. ■

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Song at Sunset

Written and Prepared by:

Ir. Lau Tai Onn

*Retired civil engineer **Ir. Lau Tai Onn** has been a member of IEM Standing Committee on Information & Publications since 2005.*

In his poem, Song at Sunset, Walt Whitman, a 19th century American poet, wrote: "Splendor of ended day, floating and filling me! Hour prophetic — hour resuming the past! Inflating my throat — you, divine average! You, Earth and Life, till the last ray gleams, I sing…"

This picture of the sunset over the Straits of Melaka which I snapped in Port Dickson last October is a reflection of beautiful Nature and its sustainability, along with Whitman's poem.

Global warming and climate change are serious, perpetual issues that threaten the very existence of life on Earth. While mitigation of the problem is largely the responsibility of world leaders, we engineers can do our part with environmental-friendly designs, manufacturing, productions, constructions and the like which can help to reduce if not eliminate the emission of greenhouse gases.

A famous Chinese saying goes: "Sunset is charming, only that it is near dusk", metaphorically meaning that no matter how good a time it is, it won't last long. I sincerely hope this will not happen to our planet Earth and that the Song at Sunset will continue to be sung for eternity. ■

Increased Climate Action, Building Resilience & Lowering Emissions: Lessons Learned

Written and Prepared by:

Ir. Prof. Dr Leong Wai Yie

The 26th United Nations Climate Change Conference (COP26) and the 26th Conference of the Parties (COP) of the United Nations Climate Change Framework Convention (UNFCCC), were held from 31 October to 12 November 2021 at SEC Centre in Glasgow, Scotland, UK, under Chairman Alok Sharma.

The meeting was the 3rd COP to the Paris Agreement. According to the Paris Agreement, parties must make new national commitments every 5 years. This was the first time since COP21 that State parties were expected to promise to increase their ambitions to curb climate change.

A special session on Increased Climate Action, Building Resilience & Lowering Emissions: Lessons Learnt, was held on 6 Nov 2021, hosted by World Federation of Engineering Organisation (WFEO), Engineering Institute of Canada-Institut Canadien des Ingenieurs (EIC-ICI), and International Network of Women Engineers & Scientists (INWES).

The panellists included Davide Stronati (Chair of WFEO Committee on Engineering & Environment, Director of Sustainability, Nuclear Decommissioning Authority, representative of the Institution of Civil Engineers in the UK), Darrel Danyluk (Engineering Institute of Canada), Prof. Jianping Wu (Director of Tsinghua-Cambridge-MIT Future Transport Research Centre Tsinghua University), Milda Pladaite (Lead of Global Young Engineers Working Group on SDG 13, WFEO), Dr Dawn Bonfield (Past President of Women's Engineering Society), Ms. Gail Mattson (INWES, New York) and Dr Leong Wai Yie (Malaysia).

They discussed experiences and lessons learnt from the engagement of women and young engineers and the worldwide engineering profession, for increased action to reduce emissions and build the climate resilience of cities and communities, with an eye on the future.

At a discussion on how the effects of climate change could be felt, examples of active young engineers, female engineers and professional engineers around the world were presented. The panellists presented 17 studies from different regions. The report showed the involvement of young engineers, professionals and women in

The speakers: Davide Stronati, Prof. Jianping Wu, Milda Pladaite, Darrel Danyluk, Dawn Bonfield, Ir. Dr Leong Wai Yie and Gail Mattson

environmental engineering, natural resource conservation and management in the world. This had led to tighter and more sustainable mining rules, greater compliance, more transparency and more accountability. The best practices of WFEO projects were presented to highlight the achievement of climate-related efforts.

The United Nations had repeatedly recognised that the success of sustainable water resources management depended heavily on the participation of young people and women at all levels of decision-making and implementation. After her re-election, New Zealand Prime Minister Jacinda Ardern and her Cabinet declared a "climate emergency" and implemented plans to make the country's public sector carbon-neutral by 2025.

The panellists also highlighted funding issues and achievements of female-led grassroots leading climate initiatives. Furthermore, One Earth, a philanthropic organisation working to accelerate collective action to limit global average temperature rise of 1.5°C, was mentioned. One Earth recognises female-led grassroots like Women in Nature Network, WECAN International, Women for Wildlife, Indigenous Women`s Biodiversity Network, Women for Conservation and 5 women-led networks which transform the fight against climate change. Their efforts are now growing through peer-to-peer networks around the world. It should also be mentioned that without women's involvement, the Paris Agreement would not be what it is today.

The ASEAN State of Climate Change Report was presented to highlight ASEAN's commitment to addressing climate change, including through multisectoral dialogue and relevant activities involving key partners in various sectors, such as agriculture, forestry, energy, transport, disaster management and finance. Also mentioned were ASEAN Joint Statements on Climate Change to UNFCCC COPs attest to the region's aspirations and renewed commitments to contribute towards global climate targets.

The panellists concluded that younger engineers, professionals and women in science and engineering were needed to identify the issues, develop solutions and lead the essential efforts to address climate change. ■

Presenting the ASEAN State of Climate Change Report to highlight the ASEAN commitment to addressing climate change

Circular Economy Approach in Malaysia's Commitment Towards SDG 2030 Agenda

Written and Prepared by:

Ir. Ts. Wong Chee Fui

Sustainable Development Goals (SDGs) were the core agenda of 2030 for sustainable development as agreed by world leaders at the United Nations Conference on 25 September 2015. SDG is the continuity of the Millennium Development Goals (MDGs), with goals towards the 2030 Agenda in sustainable development in social, economy and environment with 17 SDG goals and 169 targets.

The 2030 Agenda is a global commitment towards more sustainable, resilient and inclusive development. In March 2020, the 51st United Nations Statistical Commission (UNSC) reviewed, updated and agreed on 247 indicators for the monitoring of the commitment towards the 2030 Agenda.

Malaysia has been involved in the development of the SDG since 2014. We are a member of the Working Group Sustainable Development Goals Indicators (WGSDGI) at ASEAN level and a Working Group Member on Geospatial Information (WGGI) for IAEG-SDG, where we contribute towards the SDG indicator development works.

The 17 SDG goals are aligned to Malaysia's national development plans and the 12th Malaysia Plan (12MP); one of the three 12MP themes is Advancing Sustainability which include advancing green growth, enhancing energy sustainability and transforming the water sector. This "whole nation" approach is essential for SDG's implementation, in line with the 2020 Agenda for Sustainable Development.

At the 13th Asia-Europe Summit (ASEM13) on 25 Nov 2021, Prime Minister Datuk Seri Ismail Sabri Yaakob stressed that our commitment to advancing a green growth agenda was essential to achieving economic empowerment, environmental sustainability and social inclusion. The government will execute a pragmatic and precise strategy to eradicate extreme poverty, hunger and inequality in its pursuit of a green and sustainable development. We are also committed to become a Net-Zero Greenhouse Gas Emission Nation by 2050, at the earliest.

However, there is a pressing call for action rather than mere words if we are to achieve the national commitments of the 2030 Agenda for Sustainable Development. Malaysia needs an overarching green policy framework that cuts across ministries, sectors and industries to address existing unsustainable practices that are threatening the planet and human health at an unprecedented scale.

The Academy Professor of Malaysia's Environment & Sustainability Cluster, headed by Professor Emeritus Datuk Dr Ibrahim Komoo, is currently drafting a White Paper to the government on the Environment Development & Sustainability Policy Framework which includes important principles for sustainability, covering environmental pollution, ecological services, natural heritage conservation, sustainable agriculture, mining, land development and environment-based SDGs.

The United Nations Environment Programme reveal that 60% of natural resources that provide food, water, energy and clean air, have been seriously degraded. One of the approaches for Malaysia towards achieving the SDG Goals is to adopt the Circular Economy, a concept that emphasises on returning resources to the environment and economic systems through reuse and waste prevention initiatives, thus reducing material loss. Circular Economy represents a systemic shift to long-term resilience that emphasises durability, reuse, repair, recycling and remanufacturing.

The Circular Economy is a holistic approach to dealing with everyday materials used as well as maximising usage and minimising waste which will end up in landfills. The adoption of the Circular Economy will increase efficiency and cost effectiveness, reduce dependency on natural resources, address environmental and climate change issues and establish a more innovative and competitive economy while creating new opportunities for green growth.

As a nation, we have made the commitment towards achieving the 2030 Agenda for Sustainable Development. We now need to push for action towards a Circular Economy and make sustainable developments a reality by putting our words into practice. ■

YES Chit Chat Sessions

Written and Prepared by:

Chuah Pei Lim

The Young Engineers Section (YES) Chit Chat Sessions is sharing sessions aimed at connecting young engineers, especially graduates and students. Each month, such sessions are planned where keynote speakers will share their thoughts on career development, volunteering experience and even the history of IEM YES.

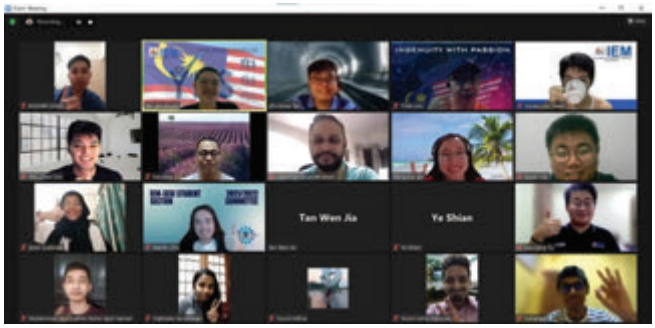
Chit-chat Session 1

Chit-chat Session 2

The first session was held on 7 September 2021. The topic was the experiences of life as a young engineer. The keynote speaker, Mr. Tan Zhi Howe, talked about his experiences working for companies in Singapore and managing his time between studying for his postgraduate course and working at the same time. Mr. Tan elaborated on skills and attitudes that young engineers should possess nowadays. The participants also had the chance to ask him about networking and time management skills.

The second YES Chit Chat Session was held on 10 September 2021. Speaker Ir. Yau Chau Fong, an experienced engineer, was past chairman of YES as well as an active member of the YES committee. He talked about his past experiences in YES and how the YES networks had helped him build his career. Ir. Yau also gave valuable suggestions to the current committee and the young engineer attendees. Participants also shared their thoughts and perspectives on recent engineering topics.

With these 2 first sessions, YES has achieved the objectives of the Chit Chat Sessions, which are to connect with the young talents and to listen to them. We have collected several suggestions for future Chit Chat Sessions to attract more young engineers and these will cover diverse topics on different engineering fields. ■



Chit-chat Session 1 (Group Photo)

Chit-chat Session 2 (Group Photo)

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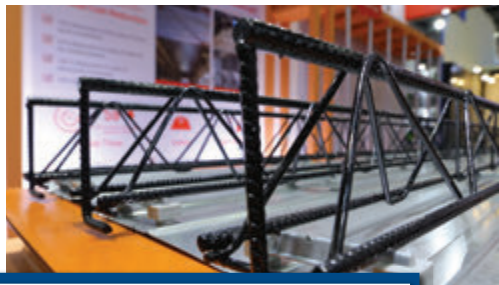

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Dear IEM members,

I am delighted to announce the launching of IEM's very own Mobile App (on 14 April 2021)! Named "IEMGo", this mobile app will enhance communication between IEM and its members. For a start, it will enable IEM members to connect to the IEM Community site for easy access to IEM Bulletin, IEM Journal, obtain information or first-hand announcements and to register for events. More features will be added in future to further enhance the app, such as providing job matching opportunities for members, enabling communication between IEM members and a host of other possibilities which we are exploring.

In fact, the need for IEM's very own mobile app was one of the feedbacks we obtained from members in our first survey carried out during the MCO last year. We are very excited to have accomplished this in just one year and without incurring any cost for IEM. On this note, I would like to thank Silverlake – the developer of IEMGo and IEM Secretariat for its relentless efforts to make the app a reality.

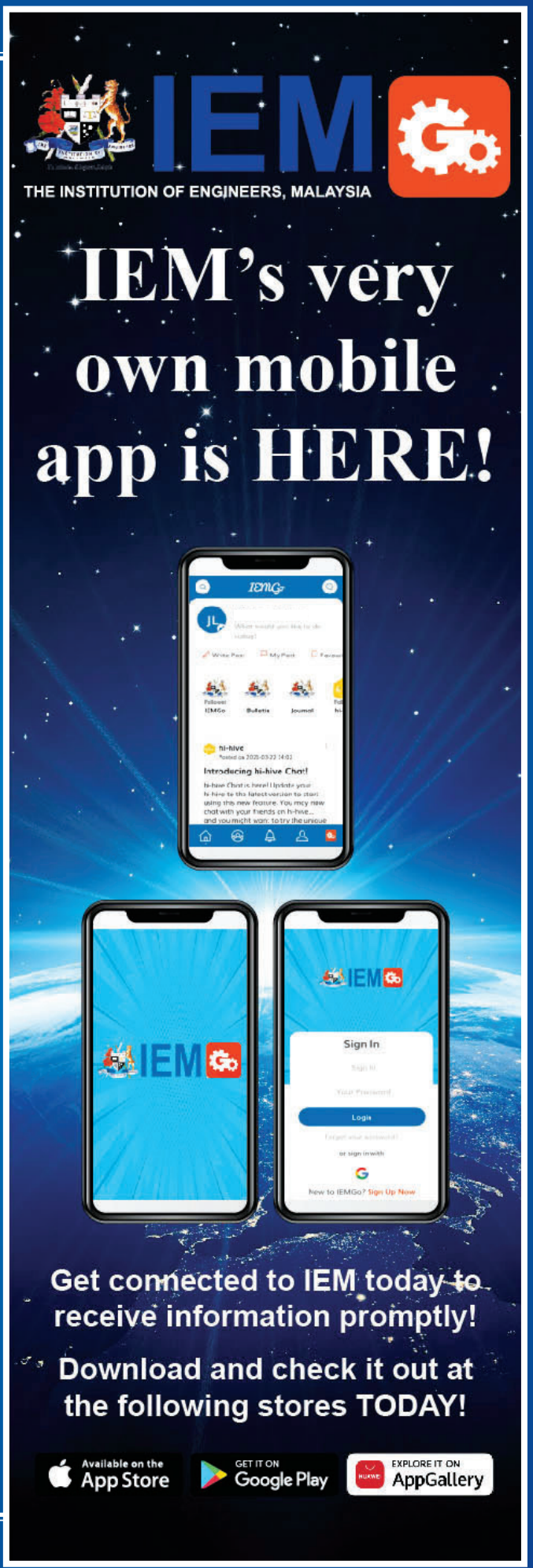
I hope all our members will join the community under IEMGo and make this project a success. You can download the app from Google Play Store, Apple App Store or Huawei App Gallery.

We will be sharing the steps on how to install IEMGo and how to make use of the app in our email blast, social media channels and website. Should you need further information, please contact our Secretariat staff for assistance.

Finally, I would like to express my appreciation to the IEM Council and Excomm, the respective Committees and Members for their support and I look forward to the success of IEMGo.

Thank you. Stay Safe and Stay Healthy.

Ir. Ong Ching Loon,
IEM President



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Form of Contract for Civil Engineering Works [CE 2011]

Did you Know? 15

CE 2011

on Monthly Report

states that it must incorporate
(a) salient features of Works
(b) 'S' Curves with corresponding actual physical and financial progress
(c) weather report
(d) plant utilisation
(e) manpower labour returns
(f) major items of Works completed
(g) list of all instructions issued
(h) other info/details that Engineer may reasonably require

Clause 14.8

Did you Know? 16

CE 2011

on the contents in Monthly Report

states that the contents do not constitute as notice which the Contractor is required to serve under the Contract.

Clause 14.9

Did you Know? 17

CE 2011

on Omission of Works

states that Engineer cannot omit and awarded the omitted works to any other persons and if so, the Contractor is entitled to claim for loss of profit.

Clause 51.2(4)

Did you Know? 18

CE 2011

on the new fair & reasonable rates

states that the Contractor can request for a fair and reasonable rates with reasons from the Engineer via a notice if the actual executed quantity in the Bill of Quantities for remeasured works is unreasonable/inapplicable.

Clause 52.1(2)

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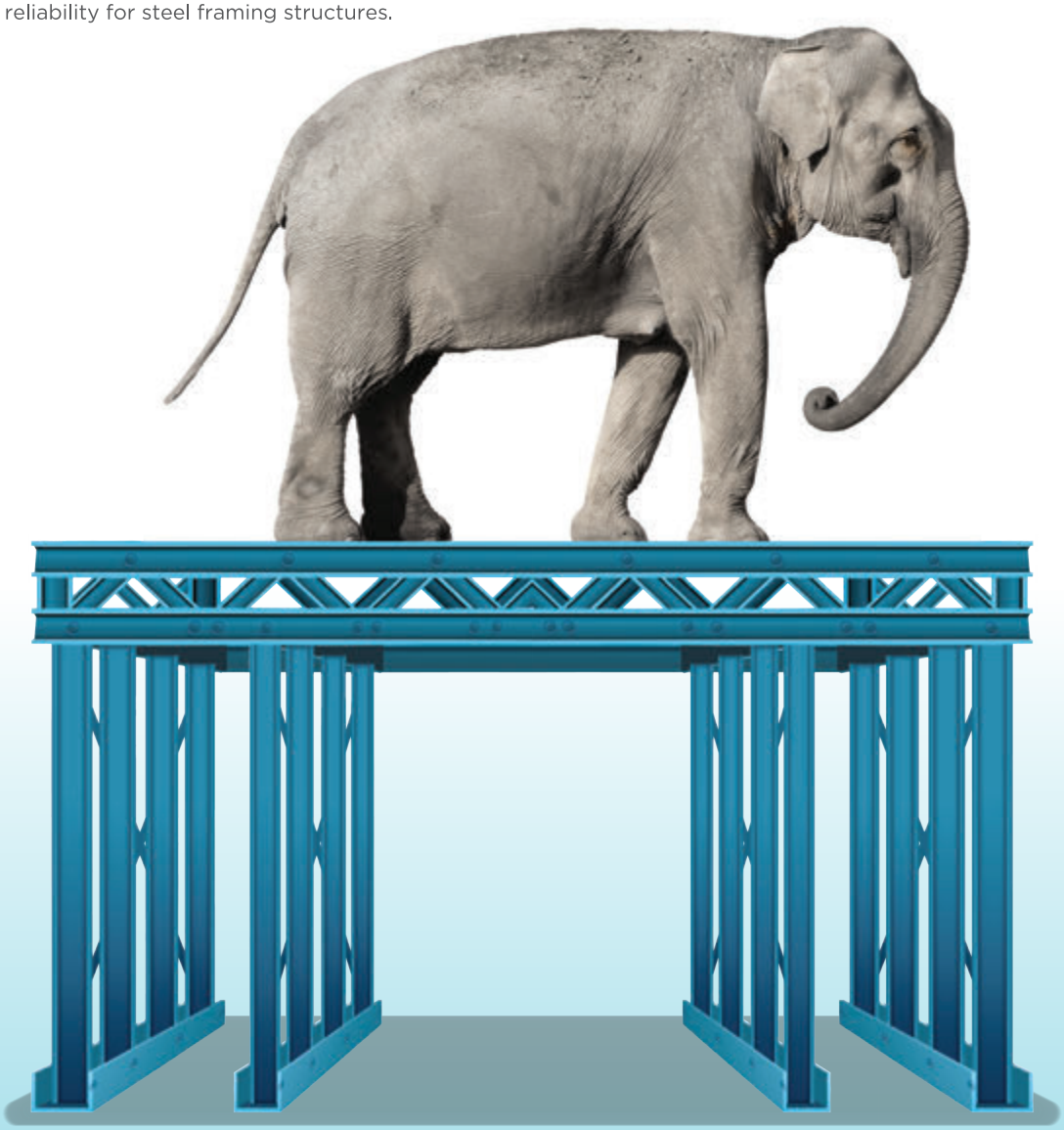

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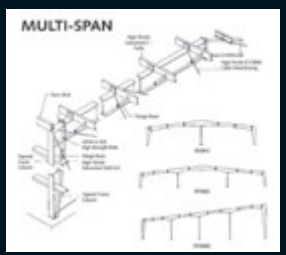

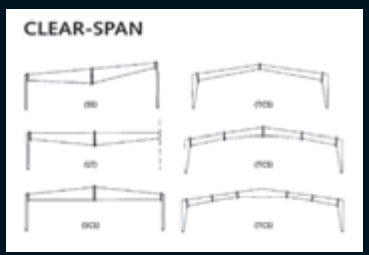

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	Clear-Span		
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(LT)	Straight Column Lean To	3m - 22m	2.4m - 9m
(SCS)	Straight Column Clear Span	6m - 22m	3m - 9m
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Kepada Semua Ahli,

SENARAI CALON-CALON YANG LAYAK MENDUDUKI TEMUDUGA PROFESIONAL TAHUN 2022

Berikut adalah senarai calon yang layak untuk menduduki Temuduga Profesional bagi tahun 2022.

Mengikut Undang-Undang Kecil IEM, Seksyen 3.8, nama-nama seperti tersenarai berikut diterbitkan sebagai calon-calon yang layak untuk menjadi Ahli Institusi, dengan syarat bahawa mereka lulus Temuduga Profesional tahun 2022.

Sekiranya terdapat Ahli Korporat yang mempunyai bantahan terhadap mana-mana calon yang didapati tidak sesuai untuk menduduki Temuduga Profesional, surat bantahan boleh dikemukakan kepada Setiausaha Kehormat, IEM. Surat bantahan hendaklah dikemukakan sebulan dari tarikh penerbitan dikeluarkan.

Ir. Dr David Chuah Joon Huang
Setiausaha Kehormat, IEM

PERMOHONAN BARU / PERPINDAHAN MENJADI AHLI KORPORAT

Nama	Kelayakan
KEJURUTERAAN BAHAN	
NURULAKMAL BINTI MOHD SHARIF	BE HONS (USM) (MATERIALS, 1996) PhD (WALES) (2002)
KEJURUTERAAN AWAM	
GAN KAK HOCK	BE HONS (UTAR) (CIVIL, 2013)
KHAIRUL NIZAM BIN MAT DENIN	BE HONS (UTM) (CIVIL, 2002)
MOHD ASRUL FARIZUL BIN AB ADZI	BE HONS (USM) (CIVIL, 2009)
MUHAMMAD KHAIRUL IKHWAN BIN KHAIRUDIN	BE HONS (RMIT) (CIVIL & INFRASTRUCTURE, 2014)
NUR AIDIL ADILA BINTI EDRUS	BE HONS (UTM) (CIVIL) (2015)
YONG THONG SENG	BE HONS (SHEFFIELD HALLAM) (CIVIL, 1998)
KEJURUTERAAN ELEKTRIKAL	
AMRULLAH FIRDAUS BIN ABDUL SHUKOR	BE HONS (UTeM) (ELECTRICAL (INDUSTRIAL POWER), 2012)
MOHD FATHI KAMAL BIN MOHD RIDZUAN	BE HONS (UTM) (ELECTRICAL, 2005)
MOHD SHAMSUL BIN ISMAIL	BE HONS (UTM) (ELECTRICAL, 2009)
KEJURUTERAAN ELEKTRONIK	
KHAIRUL AZHAR BIN RAMLI	BE HONS (UiTM) (ELECTRICAL, 2009)
KEJURUTERAAN MEKANIKAL	
MUSLI NIZAM BIN YAHYA	BE HONS (UTHM) (MECHANICAL, 2002) ME (UTHM) (MECHANICAL, 2006) PhD (OITA) (2012)
RINELDI BIN RISWAN	BE HONS (UTHM) (MECHANICAL, 2006)
SHAHLAN BIN MD NOR	BE HONS (UTM) (MECHANICAL, 2006)

PERPINDAHAN AHLI

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
80662	ENG WEI QI	BE HONS (UTM) (CIVIL, 2014)
112704	MOHD FAIZAL BIN MOHD NORDIN	BE HONS (UTM) (CIVIL, 2006)
39977	MOHD GHAZALI BIN SEMAIN	BE HONS (UiTM) (CIVIL, 2006)
28905	TAN CHEE LEE	BE HONS (UPM) (CIVIL, 2007)
KEJURUTERAAN ELEKTRIKAL		
64744	AHMAD SHAHRIR AZWAN BIN ZAKARIAH	BE HONS (UTM) (ELECTRICAL, 2012)
66517	LIM WEI HONG	BE HONS (MMU) (ELECTRICAL, 2015)
93780	MAHYARUDIN BIN MOHD	BE HONS (UTM) (ELECTRICAL - INSTRUMENTATION & CONTROL, 2008)
72676	MUHAMMAD JAMILUL NA'IM BIN MOKTHAR	BE HONS (UKM) (ELECTRICAL AND ELECTRONIC, 2015)
102377	MUHAMMAD SHAHRUL IZWAN BIN BISTAMAM	BSc (ALBERTA) (ELECTRICAL, 2015)
71116	NG CHEN KIAT	BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS, 2013)
KEJURUTERAAN MEKANIKAL		
71679	FOO YUN YEE	BE HONS (LEEDS) (MECHANICAL, 2012) MSc (LEEDS) (ADVANCED MECHANICAL, 2013)
96036	LIEW CHUAN ONN	BE HONS (UTAR) (MECHANICAL, 2013)
101997	LIM YEAN TIT	BE HONS (SUNDERLAND) (MECHANICAL, 2013)
58027	MOHD RIDHUAN BIN ISMAIL	BE HONS (UTHM) (MECHANICAL, 2006)
108283	MUHAMMAD NABIL BIN IMRAN	BSc (OHIO STATE) (MECHANICAL, 2016)
KEJURUTERAAN MEKATRONIK		
75257	MUHAMMAD RAZMI BIN RAZALI	BE HONS (UTeM) (MECHATRONICS, 2012) MSc (UTeM) (MECHATRONIC, 2016)
KEJURUTERAAN TELEKOMUNIKASI		
107629	SITI ZURAIDAH BINTI IBRAHIM	BE HONS (MALAYA) (TELECOMMUNICATION, 2004) ME (UTM) (ELECTRICAL - COMMUNICATION, 2008) PhD (QUEENSLAND) (ELECTRICAL, 2012)

Pengumuman yang ke-159

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NO.	NO. AHLI	NAMA
1	24079	DR MAH YAU SENG
2	37038	MR. CHAN YEW FAH
3	68942	MS. IZZATI FADHILAH BINTI ARBAIN
4	44615	Ir. MOHD KAFRI BIN ZAKARIA
5	29154	MR. MUHD ABDAI RATHOMY BIN ROMELI
6	15380	Ir. CHEE HOCK CHUANG
7	13295	Ir. TEH HAN HENG
8	09391	Ir. DR ISMAIL BIN ABDUL RAHMAN
9	35559	MS. SHARIFAH FATIMAH BINTI TUANKU HJ ABDULLAH
10	92139	MR. NGUI WEI LIANG
11	31733	MR. MOHD AZMI BIN JUSOH
12	03452	Ir. ABD. RAHIM BIN SHAMSUDIN
13	52447	MR. LENSUS ANAK MET
14	62058	MS. TAN LAI WAI
15	07448	TAN SRI Ir. HAMDAN BIN MOHAMAD
16	06869	Ir. GAN WEE PENG
17	19275	Ir. YAH KEM CHUI
18	27472	Ir. ABDUL RASHID BIN HUSSAIN
19	15356	Ir. CHOW CHEE HENG
20	27139	Ir. QUEK SWEE JIN
21	18156	Ir. BAHARIN BIN HASHIM
22	57548	MS. NURUL AZWANI BINTI MAHBOB
23	26497	MR. CHEW OOI TECK
24	14181	Ir. CHENG KEE HAUT
25	20916	Ir. ZULKIFLI BIN ABDUL SHUKOR
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No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
112857	PUVENDHARRAN BALACHANDRAN	ME HONS (HERIOT WATT UNI.)(CIVIL, 2020)
113115	LAW SHI TANG	ME HONS (NOTTINGHAM UNI.) (CIVIL, 2020)
112859	LEE JIE MIN	ME HONS (UNI. OF CAMBRIDGE) (CIVIL, STRUCTURAL & ENVIRONMENTAL, 2015)
KEJURUTERAAN BAHAN		
113129	Dr NATASHA BINTI AHMAD NAWAWI	BE HONS (IIUM) (MATERIALS, 2007) MSC (IIUM) (MATERIALS, 2010) PhD (UM) (DESIGN) (2017)
KEJURUTERAAN BIO-KIMIA		
113090	SHAREENA FAIRUZ BINTI ABDUL MANAF	BE HONS (IIUM) (BIOCHEMICAL - BIOTECHNOLOGY, 2008)
KEJURUTERAAN BIO-PERUBATAN		
113118	Dr KU PEI XUAN	BE HONS (UM) (BIOMEDICAL, 2011) PhD (UM) (BIOMECHANICS, 2016)
KEJURUTERAAN ELEKTRIKAL		
112711	LEE YAN KANG	BE (CARLETON UNI.) (ELECTRICAL, 2015)
112688	HIRYANIZAM BIN MD TAHIR	BE (UNI. OF NICE SOPHIA ANTIPOLIS)(ELECTRICITY & ELECTRONICS, 2011) ME (TONGJI UNI.) (COMMUNICATION & TRANSPORTATION, 2019)
112708	Dr LING TING YANG	BE HONS (SWINBURNE UNI. OF TECH.)(ELECTRICAL & ELECTRONIC, 2015) PhD (UNI. OF SOUTHAMPTON) (ENGINEERING, 2020)
113072	TAN KWANG SAN	BE HONS (THE UNI. OF ADELAIDE)(ELECTRICAL & ELECTRONIC, 2007)
112723	SARAH BINTI IBRAHIM	BE HONS (THE UNI. OF QUEENSLAND)(ELECTRICAL, 2016)
113121	ROBERT ANAK ENGKIAU	BE HONS (UiTM) (ELECTRICAL, 2004)
112809	MOHD RIZAL BIN ZAINON NAHAR	BE HONS (UiTM) (ELECTRICAL, 2013)
113146	MUHAMMAD IKHWAN HANIF BIN ISMAIL	BE HONS (UiTM) (ELECTRICAL, 2017)
112787	PREM KUMAR A/L M VASUDEVAN	BE HONS (UM) (ELECTRICAL, 1985)
112840	SHIREEN AIDA BINTI ZULKIFLI	BE HONS (UM) (ELECTRICAL, 2017)
113131	ASHVINI A/P BHUPALAN	BE HONS (UMS) (ELECTRICAL & ELECTRONICS, 2019)
112687	AZRINA BINTI PENDITA	BE HONS (UMS)(ELECTRICAL & ELECTRONIC, 2014)
112858	ISYRAQ FAIZZI BIN MOHAMMAD	BE HONS (UNIKL BMI) (ELECTRICAL, 2018)
113123	MUHAMMAD AMIN BIN ABDUL RAHMAN	BE HONS (UniMAP) (ELECTRICAL, 2019)
113127	SYED MOHD ZULFADHLI BIN SYED ADNAN	BE HONS (UniMAP) (INDUSTRIAL ELECTRONIC, 2009) ME (UTM) (ELECTRICAL POWER, 2020)
112716	SYED MOHD SAIFULLAH BIN SAYED ABD RAHMAN	BE HONS (UNISEL) (ELECTRICAL, 2011)
113133	MUHAMMAD NABIL BIN HAZLI	BE HONS (UNITEN) (ELECTRICAL POWER, 2018)
113113	MUHAMMAD SYAZWAN BIN ZAWAWI	BE HONS (UNITEN) (ELECTRICAL POWER, 2020)
112863	JOEL PRAVEEN MAKENTHIRAN	BE HONS (UNITEN) (ELECTRICAL POWER, 2012)
112727	MOHAMAD AFIQ BIN ZUHAL	BE HONS (UNITEN) (ELECTRICAL POWER, 2013)
112810	MUHAMAD KHAIRIN BIN ABDUL HAMID	BE HONS (UNITEN) (ELECTRICAL POWER, 2014)
112702	GOH KUEN LUEN	BE HONS (UNITEN) (ELECTRICAL POWER, 2015) MSc (NTU)(POWER, 2016)
112685	PRAGASH A/L CELVAKUMARAN	BE HONS (UNITEN) (ELECTRICAL POWER, 2016)
112867	ABDULLAH AFHAM BIN ZUBIR	BE HONS (UNITEN) (ELECTRICAL POWER, 2019)
113091	ERMAN BIN RAMLI	BE HONS (UPM) (ELECTRICAL & ELECTRONICS, 2003)
112881	YAP JIAN AUN, SHAUN	BE HONS (UPM)(ELECTRICAL & ELECTRONIC, 2019)
112888	MUHAMMAD SYUKRI BIN KHAIRUDIN	BE HONS (UPNM) (ELECTRICAL & ELECTRONIC-POWER, 2016)
112701	LEVINATH GANESAN	BE HONS (USM) (ELECTRICAL, 2017)
112709	LI HAO YANG	BE HONS (UTAR) (ELECTRICAL & ELECTRONIC, 2020)
112839	DINESHKUMAR A/L MARIMUTHU	BE HONS (UTeM) (ELECTRICAL, 2018)
112878	SITI AISYAH BINTI KIFFLEE	BE HONS (UTeM) (ELECTRICAL, 2019)
112728	MUHAMMAD MUFAZZAL BIN MUSTAFFA	BE HONS (UTeM) (ELECTRICAL-INDUSTRIAL POWER, 2012)
112882	WONG KOK HONG	BE HONS (UTeM) (ELECTRONICS-COMPUTER, 2011) CONVERSION (UNITEN) (ELECTRICAL, 2016)
113125	SUMARDIN PRATAMA	BE HONS (UTHM) (ELECTRICAL, 2019)
112844	Dr SHAHNURRIMAN BIN ABDUL RAHMAN	BE HONS (UTM) (ELECTRICAL, 2010) ME (ELECTRICAL POWER, 2012) PhD (MANCHESTER UNI.) (ELECTRICAL & ELECTRONIC, 2019)
112843	MOHD HANIF BIN MOHD ROHANI	BE HONS (UTM) (ELECTRICAL, 2018)
113141	MOHD HALMY BIN MOHD TAHIR	BE HONS (UTM) (ELECTRICAL. 2020)
112856	HAININ BIN HAMIDIN	BE HONS (UTM) (ELECTRICAL, 2019)
112847	MASTURA BINTI OMAR	BE HONS (UTP) (ELECTRICAL & ELECTRONICS, 2009) MSc (UKM) (MICROELECTRONISC, 2013)
112845	WONG LIAN SAN, CHRISTOPHER	BE HONS (UTP) (ELECTRICAL & ELECTRONICS, 2018)
112862	KHAIRUNNISHA BINTI KAMAL	BE HONS (UTP)(ELECTRICAL & ELECTRONICS, 2019)
112835	TUAN MOHD AFIF BIN T MOHD TARMIZI	BE.Tech.(HONS.)(UniKL BMI) (ELECTRICAL, 2013) BEM GE REGISTRATION BRIDGING COURSE (UniKL BET) (ELECTRICAL, 2020)
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113134	MUHAMMAD HAFIYFIY BIN SAFRI	BE (QUEENSLAND UNI.) (ELECTRICAL, 2015)
112692	ASWINDRAN GHANASEHARAN	BE HONS (APU) (ELECTRONIC ENGINEERING WITH INFO TECH., 2016)
112852	MUHAMMAD FAKHRUDDIN BIN NORDIN	BE HONS (IIUM) (COMMUNICATION, 2015)
112713	TAN LIANG TEK	BE HONS (MMU) (ELECTRONIC-COMPUTER, 2008)
112724	ABDUL SYUKUR BIN ABDUL RAHMAN	BE HONS (THE UNI. OF SHEFFIELD)(ELECTRONIC-COMMUNICATIONS, 2005) ME(UNI. OF MALAYA) (INDUSTRIAL ELECTRONICS & CONTROL, 2019)
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112693	SITI KHAIRUNNISA BINTI NAZMAN	BE HONS (UMP) (ELECTRONIC, 2016)
112722	CHEAH CHAW YANG	BE HONS (UniMAP)(BIO-MEDICAL ELECTRONICS, 2015)
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112703	THEN CHUNG JEW	BE HONS (UTM)(ELECTRIC-MEDICAL ELECTRONICS, 2010)
113143	AHMAD ZAMANI BIN JUSOH	BSC (HANYANG UNI) (ELECTRONIC, 1999)
113094	ZAINAL ARIFFIN BIN ABDUL RAHMAN	BSC (VIRGINIA POLY. INST. STATE UNI.) (ELECTRICAL, 2016)
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112720	NUR ZAWANI BINTI ROSMAN	BE HONS (UTP)(CHEMICAL, 2019)
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113102	CHEW SHEE JIA	ME HONS (HERIOT-WATT UNI) (CHEMICAL WITH OIL & GAS TECH., 2019)
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112883	ONG CHUAN SNEAH	BE HONS (NTU) (MECHANICAL, 2016)
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112824	BADRUL IDHAM BIN BAHARUDIN	BE HONS (UiTM) (MECHANICAL, 2019)
112836	KAMARUZ DANIAL BIN KAMARUZZAMAN	BE HONS (UiTM) (MECHANICAL, 2019)
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113071	MUHAMMAD NAZRI BIN OTHMAN	BE HONS (UiTM) (MECHANICAL, 2016)
113100	AHMAD RAZIQIN BIN RAZAOB @ RAZAB	BE HONS (UKM) (MECHANICAL, 2018)
112745	ANG ENG HUAT	BE HONS (UM) (MECHANICAL, 1981)
112710	CLEMENT PAKIAM A/L TOBIAS X'AVIER	BE HONS (UM)(MECHANICAL, 1987)

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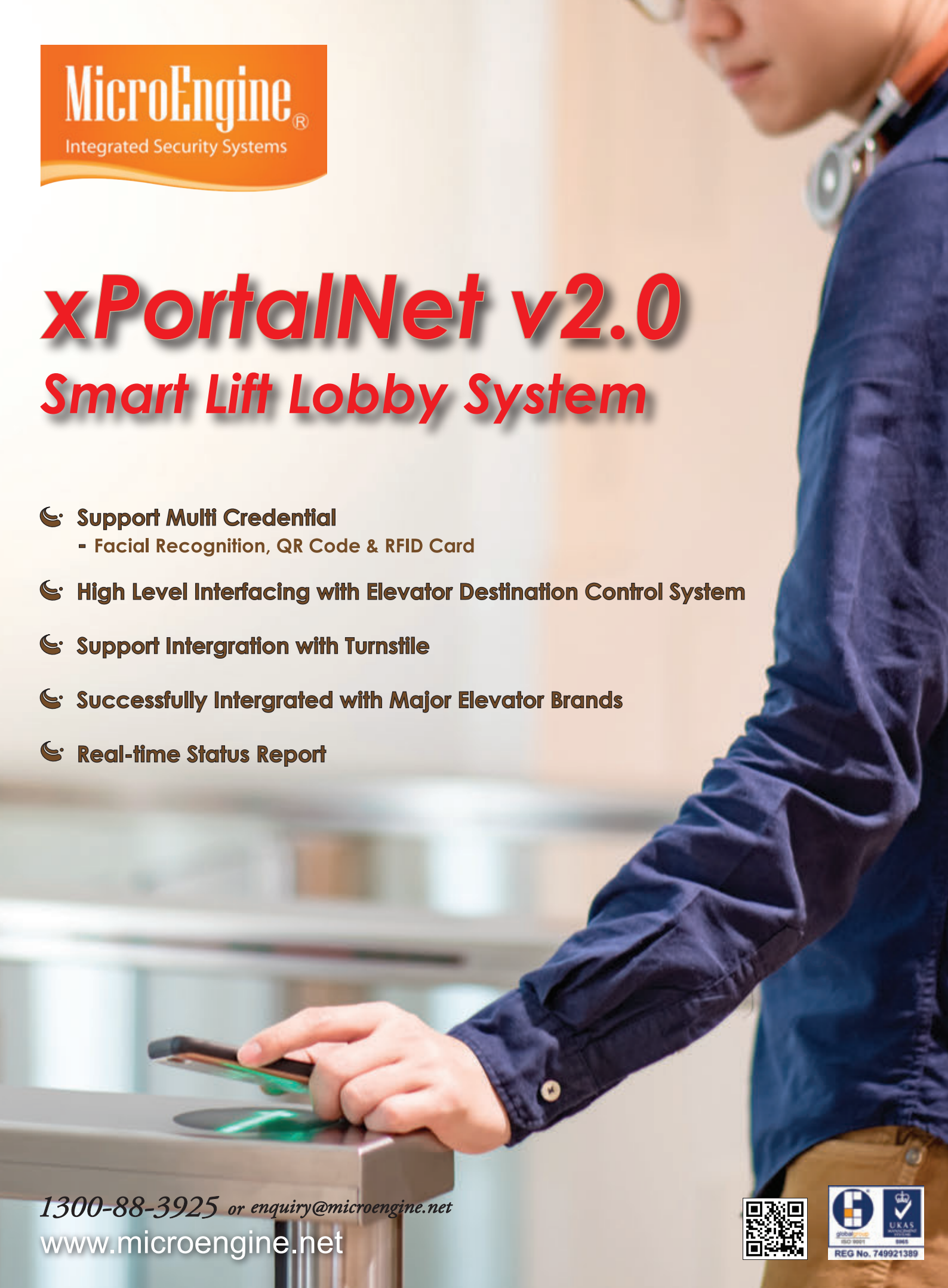

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