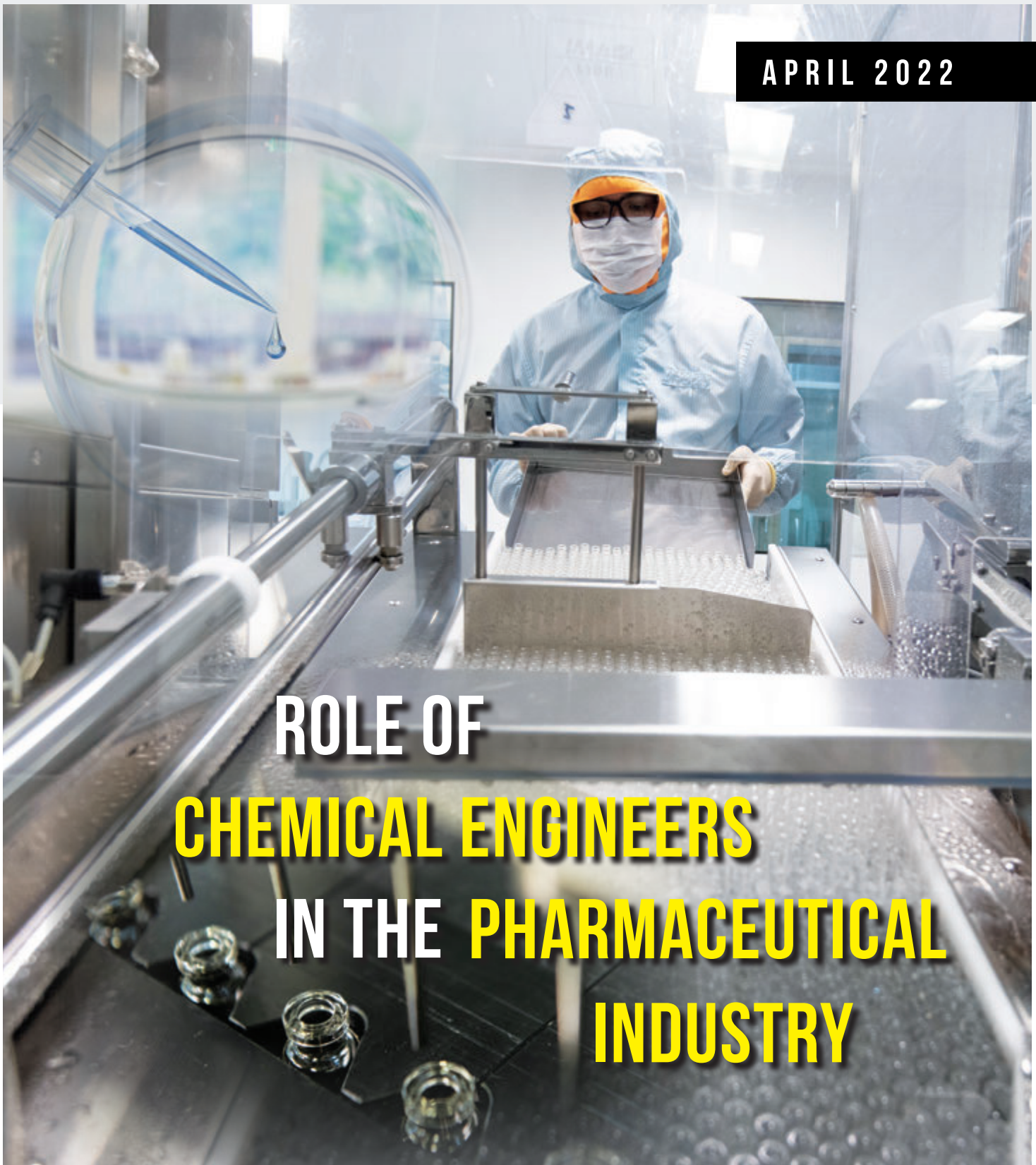
IEM
The Institution of Engineers, Malaysia

Jurutera

THE MONTHLY BULLETIN OF THE INSTITUTION OF ENGINEERS, MALAYSIA



APRIL 2022

ROLE OF CHEMICAL ENGINEERS IN THE PHARMACEUTICAL INDUSTRY

KDN PP 1050/12/2012 (030192) ISSN 0126-9909

IEM *JURUTERA* Monthly Bulletin

Introductory Rate for New Advertisers

RM 3,200*/page (NP RM4,900)

Full-Page, Full-Colour Advertisement

- This one-time-only special rate offer is for new advertisers.
- Space availability is subject to booking on a first-come-first-served basis.
- Clients will provide ready-to-print artwork in PDF format with 300dpi.
  Full page: 210mm x 285mm, 5mm extra bleed sizes for 4-sided with crop mark.
- Advertising space must be utilised before 30 June 2022.
- *Please note that the above rate will be subjected to 6% SST. For overseas advertisers, an additional 25% will be charged.
- Rate shown above excludes 15% advertising agency commission.
- Payment term: Full advance payment.
- Artwork submission deadline is on (or before) the 1st week of the prior month of publication.
- After the material deadline, no cancellation or alteration to the advertisement will be entertained.
- Any cancellation after signing the advertising order will result in a 50% penalty charge.
- The publisher reserves the right to edit, revise or reject any advertisement deemed unsuitable or inappropriate.

Circulation & Readership Profile

JURUTERA **has an estimated readership of 200,000 professionals. Our esteemed readership consists of certified engineers, decision making corporate leaders, CEOs, government officials, project directors, entrepreneurs, project consultants, engineering consulting firms and companies involved with engineering products and services.**

Name of Company: _____

Address: _____

Tel: _____ Fax: _____ Contact Person (s): _____

Email Address: _____

Publication month/s: _____

_____ _____

Company's Stamp & Authorised Signature Date

For enquiries, please contact:

dimensionpublishing
The Choice of Professionals
Authorised Publisher: The Institution of Engineers, Malaysia (IEM) - JURUTERA

Dimension Publishing Sdn Bhd [199701034233 (449732-T)]

Level 18-01-02, PJX-HM Shah Tower, No. 16A, Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia.

+603 7493 1049
+603 7493 1047
info@dimensionpublishing.com

Joseph How : +6011 1234 8181
Shirley Tham : +6016 283 3013

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.

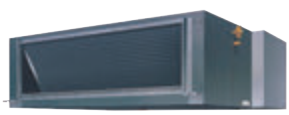
Heat Reclaim Ventilator

Daikin's unique heat exchange element realizes efficient heat exchange between outdoor air and exhaust air. High external static pressure enables flexible installation.

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.

* Can be connected only to VRV



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.

* Can be connected only to VRV

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

Network Cameras
Featuring Live Guard Function

4K

ColorVu Technology

AcuSense Technology

Vivid Color 24/7 & Active Deterrence

SCAN TO LEARN MORE

HIKVISION (MALAYSIA) SDN. BHD.

301, Level 3 of Menara LGB, No. 1 Jalan Wan Kadir,
Taman Tun Dr. Ismail, 60000 Kuala Lumpur
T: 03-2722 4000
F: 03-2722 4022
Email: sales.my@hikvision.com
Technical: support.my@hikvision.com

@HikvisionMalaysia @HikvisionAPAC @Hikvision_Malaysia

HIKVISION®

www.hikvision.com

Jurutera

Number 04, APRIL 2022 IEM Registered on 1 May 1959

THE INSTITUTION OF ENGINEERS, MALAYSIA
Bangunan Ingenieur, Lots 60 & 62, Jalan 52/4, P.O. Box 223, (Jalan Sultan),
46720 Petaling Jaya, Selangor Darul Ehsan.
Tel: 603-7968 4001/4002 Fax: 603-7957 7678
E-mail: sec@iem.org.my Homepage: http://www.myiem.org.my

Contents

PROJECT MANAGEMENT

CREATIVE MANAGEMENT

AD SPACE MANAGEMENT

PRINT MANAGEMENT

MAILING MANAGEMENT

EXPLORE OUR FULL SET OF PROFESSIONAL & INTEGRATED

PUBLISHING MANAGEMENT SERVICES

- Annual Reports
- Booklets
- Brochures
- Buntings
- Business Cards
- CD / DVD Replications
- Calendars
- Cards & Invitations
- Certificates
- Custom Printings
- Envelopes
- Folders
- NCR Bill Books
- Notepads
- Leaflets
- Letterheads
- Paper Bags
- Posters
- Stickers
- Others

For enquiries, please contact:

dimensionpublishing
The Choice of Professionals

Authorised Publisher: The Institution of Engineers, Malaysia (IEM) - JURUTERA

Dimension Publishing Sdn Bhd [199701034233 (449732-T)]

Level 18-01-02, PJX-HM Shah Tower,
No. 16A, Persiaran Barat, 46050 Petaling Jaya,
Selangor Darul Ehsan, Malaysia.

+603 7493 1049
+603 7493 1047
info@dimensionpublishing.com

Joseph How : +6011 1234 8181
Shirley Tham : +6016 283 3013

DIMENSION PUBLISHING SDN. BHD. [199701034233 (449732-T)]
Level 18-01-02, PJX-HM Shah Tower, No. 16A, Persiaran Barat,
46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia.
Tel: +(603) 7493 1049 Fax: +(603) 7493 1047
E-mail: info@dimensionpublishing.com
Website: www.dimensionpublishing.com

CHAIRMAN
ROBERT MEBRUER

CEO/PUBLISHER
PATRICK LEUNG

GENERAL MANAGER
SHIRLEY THAM • *shirley@dimensionpublishing.com*

HEAD OF MARKETING & BUSINESS DEVELOPMENT
JOSEPH HOW • *joseph@dimensionpublishing.com*

PRODUCTION EDITOR
TAN BEE HONG • *bee@dimensionpublishing.com*

CONTRIBUTING WRITERS
PUTRI ZANINA • *putri@dimensionpublishing.com*
HANNA SHEIKH MOKHTAR • *hanna@dimensionpublishing.com*

SENIOR GRAPHIC DESIGNER
SUMATHI MANOKARAN • *sumathi@dimensionpublishing.com*

GRAPHIC DESIGNER
SOFIA • *sofia@dimensionpublishing.com*

ADVERTISING CONSULTANTS
THAM CHOON KIT • *ckit@dimensionpublishing.com*

ACCOUNTS CUM ADMIN EXECUTIVE
YEN YIN • *yenyin@dimensionpublishing.com*

For advertisement placements and subscriptions, please contact:

DIMENSION PUBLISHING SDN. BHD. [199701034233 (449732-T)]
Level 18-01-02, PJX-HM Shah Tower, No.16A, Persiaran Barat,
46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia.
Tel: +(603) 7493 1049 Fax: +(603) 7493 1047
E-mail: info@dimensionpublishing.com

Subscription Department
E-mail: info@dimensionpublishing.com

JURUTERA is published and printed monthly by
Dimension Publishing Sdn. Bhd.

JURUTERA MONTHLY CIRCULATION: OVER 50,000 MEMBERS

Submission or placement of articles in JURUTERA could be made to the:-

Chief Editor
THE INSTITUTION OF ENGINEERS, MALAYSIA (IEM)
Bangunan Ingenieur, Lots 60 & 62,
Jalan 52/4, P.O. Box 223 (Jalan Sultan),
46720 Petaling Jaya, Selangor.
Tel: +(603) 7968 4001/4002 Fax: +(603) 7957 7678
E-mail: pub@iem.org.my or sec@iem.org.my
IEM Website: http://www.myiem.org.my

by Ir. Lee Teck Lii
Chairman,Chemical Engineering Technical Division, IEM

COVER NOTE

Role of Chemical Engineers

What is Chemical Engineering?

Chemical Engineering is one of the important pieces of puzzles in our quest to improve our daily lives. It plays important roles in all types of industries. Since industries require raw materials in their processes, can you think of an industry that doesn't involve knowledge of Chemical Engineering? In fact, almost all industries require raw materials.

In the upstream, chemical engineers are responsible for extracting and processing of raw materials. However, this is just one of the major contributions of Chemical Engineering. In the downstream, chemical engineers help to improve the yield of process, reduce negative impacts on the environment and ensure safety in health and social care.

Chemical engineers are spearheading the whole process design to increase the sustainability of the industries. The importance of Chemical Engineering cannot be denied. Nowadays, with most of us talking about the 4th Industrial Revolution and focusing on cyber systems, Internet of Things, Smart Technologies, etc., is Chemical Engineering still important? The answer is a definite YES although Chemical Engineering tends to play its important roles behind the scenes.

Let us collaborate and innovate further to create greater value and impact! ■

EDITOR'S NOTE

Essential Roles Of Chemical Engineering

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

April is here and we are into the second quarter of the year. From April 1, Malaysia entered the transition to endemic phase of Covid-19 in view of high vaccination and low hospitalisation rates. Nevertheless, we will still need to comply with standard operating procedures (SOP) even though these have been eased by the government.

On the subject of vaccination, this month's cover story touches on the importance of Chemical Engineering in the pharmaceutical industry. In fact, chemical engineering plays an essential role in many engineering processes as elaborated in the other articles.

The Editorial Board would like to wish our Muslim readers all the blessings of the holy month, Ramadan Mubarak! ■

Importance of Chemical Engineering in Pharmaceutical Industry


RAININ
LifeScience

Trained as a biochemical engineer, Dr Badarulhisam Abdul Rahman is head of Research & Development at Pharmaniaga, spearheading product development activities such as product formulation, process scale up, technology transfer and the establishment of new manufacturing facilities. His most recent project was the manufacture of Coronovac Covid-19 vaccine, in collaboration with Sinovac Biotech Ltd., Beijing, China. He received his PhD from Johns Hopkins University, USA, and MSc and Advanced Diploma from the University College of London (University of London), UK.

Many types of industries, including the pharmaceutical industry, have a need for chemical engineers. They are involved in various stages of pharmaceutical product development, from designing, manufacturing and controlling to optimisation of products and processes. IEM Chemical Engineering Technical Division's Advisor Ir. Dr Chong Chien Hwa, Deputy Chairman Ir. Dr Teow Yeit Haan and Secretary/ Treasurer Ir. Prof. Dr Dominic Foo Chwan Yee talk to Dr Badarulhisam bin Abdul Rahman, the Head of R&D at Pharmaniaga Berhad, to find out how relevant chemical engineering is to the pharmaceutical industry and what it takes for engineers and students in this sector to advance in their chosen career.

The knowledge and expertise of chemical engineers are crucial for many different industries, including healthcare, food/food processing, energy, environmental science and manufacturing. The core technical skills of chemical engineers include designing and developing manufacturing processes and equipment, product conceptualisation, research and development (R&D), improving, troubleshooting and innovating manufacturing processes and equipment, scaling up production capabilities, product testing and standards compliance as well as product manufacturing, packaging and labelling. In addition, chemical engineers should have good analytical skills and the ability to apply their knowledge in science, mathematics and computer in new product and process design, development and manufacturing as well as resource and management skills.

The healthcare field itself is vast and the pharmaceutical industry is a part of it, with its own specialised needs that give rise to the field of pharmaceutical engineering. It is a sub-specialisation that requires chemical engineers to have the skills and knowledge to produce medicines and other pharmaceutical products which include new medicines, synthetic versions of existing medicines, or those that use bacteria, animal and plant cells for the understanding of diseases and their pathways, as well as human responses to drugs.

Hence, the pharmaceutical industry offers ample job opportunities for chemical engineers. Noting the many different positions available in the industry and the various possible applications of the knowledge and skills of chemical engineers to the pharmaceutical sector, Ir. Dr Chong, Ir. Dr Teow and Ir. Prof. Dr Dominic Foo held an online discussion with Dr Badarulhisam Abdul Rahman, the Head of R&D at Pharmaniaga Berhad, to explore the subject matter in greater detail.

Pharmaniaga Berhad, one of the largest listed integrated pharmaceutical companies in Malaysia, is involved in the entire pharmaceutical value chain, from research and development and the manufacture of generic drugs, medical devices and over-the-counter products to logistics and distribution, sales and marketing as well as a retail pharmacy. Through its wholly-owned subsidiary, Pharmaniaga LifeScience Sdn. Bhd. (PLS), Pharmaniaga became the first pharmaceutical company in Malaysia to fill and finish a vaccine for humans.

Meeting the Need for Chemical Engineers

With Pharmaniaga at the forefront of Malaysia's pharmaceutical industry, it is an excellent example, first and foremost, for chemical engineers and fresh graduates to have a better understanding of the different positions available in the industry. Ir. Dr Chong starts by asking about the different positions that fresh graduates typically hold and the main qualities that the industry looks for, apart from good academic results.

Dr Badarulhisam says Pharmaniaga has operations in R&D, manufacturing, logistics and distribution and commercial. "When it comes to where we can place chemical engineers in Pharmaniaga, we have various

SIKA SOLUTIONS FOR INDUSTRIALISED BUILDING SYSTEM (IBS)

Sika offers widest solution and product ranges to cater for various application fields:

- Waterproofing
- Grouting and fixing
- Concrete repair - infill mortar
- Joint sealing
- Excellent surface finish

WISH TO KNOW MORE?
Contact our Refurbishment specialist
Steven Ng at +012 606 2198

SIKA KIMIA SDN BHD
No.9, Jalan Timur, 46000 Petaling Jaya, Selangor Darul Ehsan
Phone: +603 7957 0111 · Fax: +603-79567291
www.sika.com.my

BUILDING TRUST

positions for students at undergraduate level or those holding Master's Degrees and PhDs. We do hire fresh graduates too. In R&D we need chemical engineers in process development, optimisation and skill-up. We also have a technical service team with chemical engineers who understand the science and process behind technical systems and build into them. They will be involved in plant design, construction, validation, qualification and operations.

"At the manufacturing plant, we have chemical engineers who support us throughout our operations, focusing on process efficiency and cycle, optimisation and waste reduction. Another crucial department is the Engineering Department, which supports the entire Manufacturing Division. Chemical engineers look after all plant utilities such as boilers, compressors, gases and deal with clean room, water treatment, water desalination and distillation. They also manage waste and rinse waste from the plants which are channelled to the waste treatment plant, in line with the environmental act.

"We may from time to time, upgrade our facilities, depending on equipment output, increase in capacity and the process cycle. Chemical engineers look at the capacity of product output, not just of a particular machine but also its integration with various utilities, such as the water needed to wash, steam, clean and sterilise as well as gases for new production speed. They look into the purging of waste, power, clean room design and the innovation works which require system design, up until the facility is audited and ready to operate."

Securing Chemical Engineering Jobs

Commenting on the hiring of fresh graduates, Ir. Dr Chong notes that most human resource managers or CEOs look for good academic results. Apart from this, there surely must be other qualities required to secure jobs as chemical engineers. So, what does the pharmaceutical industry look for in fresh graduates?

"In the pharmaceutical industry, we have facilities and processes, so candidates should be able to provide ideas that relate to these and possess a certain level of maturity. They must be able to communicate well and convince the interviewers that they are eager and willing to learn. If they are hired, they will be placed under probation. Good employees are independent and resourceful, especially nowadays when they have access to all kinds of references and guidelines freely available on the Internet. Thus, the hand-holding approach should be kept to a minimum. Graduates must be very resourceful, hardworking, eager to learn, willing to take on additional roles, put in extra effort and be a team player. We expect recruits to be fast learners and be able to take on challenges," says Dr Badarulhisam.

Enhancing Chemical Engineering Curriculum

To help prepare chemical engineering students who are keen to go into the pharmaceutical industry, Ir. Dr Chong enquires about the relevance of the current academic curriculum and if new elements should be included.

Dr Badarulhisam feels that the basic chemical engineering curriculum is sufficient as it has all the core subjects required. "The fundamentals are solid. However, there is a new requirement for graduates to be accredited with the relevant professional engineering bodies, leaving limited alternative subjects offered by universities. If chemical engineering graduates want to have better chances of growing their career in the pharmaceutical industry, it will be good for them to gain knowledge about bio-processing and pharmaceutical engineering. These two are subjects that can be introduced into the curriculum," he says.

"Another subject to include will be Quality Management System. In the pharmaceutical industry, it is important to have a full understanding of quality systems, such as Good Manufacturing Practices (GMP), International Council on Harmonisation (ICH) on product development and International Standards under the International

Organisation for Standardisation (ISO) in order to ensure product safety, quality and efficacy."

To enter the industry, he says it is also good if students have a flavour of the elements of science, biotechnology and various quality systems.

Collaboration of Engineers in COVID-19 Project

As chemical engineers work closely with mechanical and electrical engineers, Ir. Dr Chong asks if there is an example of a project that they have worked on together and the challenges they face.

"The best example is a project carried out during the pandemic when we modified our manufacturing plant in Puchong. Initially the plant was meant to produce sterilised injectables in vials as this particular facility was meant to manufacture small molecule drugs. However, because of the pandemic, we had to retrofit our plant accordingly to meet current needs via the technology transfer from Sinovac Biotech Ltd (Sinovac) of China," explains Dr Badarulhisam.

Pharmaniaga had actually embarked on a collaboration with Sinovac in 2018, before the COVID-19 pandemic hit. When it broke out in late 2019 and the World Health Organisation (WHO) officially declared it a pandemic in March 2020, YB. Khairy Jamaluddin, the then Minister of Science, visited the Pharmaniaga facility and immediately realised that it was capable of producing the vaccine for COVID-19. The issue at that time was to have quick access to the vaccine.

"When the pandemic broke out, Sinovac quickly developed the vaccine. At that time, our dedicated vaccine plant was not yet ready but we immediately made some minor modifications to convert the existing production line for a chemical-based drug into one for vaccines or biotech drugs. In the pharmaceutical industry, we call it drug substance and drug product. Drug product is a finished product that is readily available for patients and is to be taken orally or injected. But the production of the drug substance involves growing the virus that will go through a series of bioprocessing to kill it before it is put into a vaccine formula. This process is done in Beijing, China, where they have three manufacturing plants supplying vaccines around the world," he says, adding that Pharmaniaga then immediately modified its existing plants to produce the Sinovac vaccine locally in collaboration with the Sinovac headquarters in Beijing.

"Our mechanical engineers had to look at the mechanical aspects of the process capabilities – mixing, cooling the vaccine, handling and the connection. It was a good collaboration between our mechanical engineers and chemical engineers, who were also supported by pharmacists and scientists. There is also the entire process, from bulk handling, closing, inspection and labelling up until the release of the vaccine," he says. The team of engineers also looked at the system integration and took care of the GMP aspect.

Once the modification was done, all the processes were proposed to the National Pharmaceutical Regulatory Agency (NPRA), the regulatory authority under the Ministry of Health Malaysia, and inspections were carried out. With the right capabilities and resources in place, Pharmaniaga was ready to embark on the "fill-and-finish" manufacturing of the Sinovac vaccine, a project that the Pharmaniaga Group undertook through PLS.

Product Quality, Safety & Efficacy

Touching on product certification, Dr Badarulhisam explains that in the pharmaceutical industry, there are three things that are of utmost importance – quality, safety and efficacy.

Product quality must be controlled in the manufacturing plant until the product reaches the patients. In this case, temperature control is very important, from the temperature of the raw ingredients delivered to the warehouse, right through the entire manufacturing process (including all sorts of tests to confirm that the protein in the vaccine substance can elicit an immune response in humans) up to the release of the vaccine for distribution.

"The Sinovac COVID-19 vaccine is easy to handle as refrigeration is only kept at 2° - 8° Celsius in cold storage. We do not face any problem in managing it as we have more than 25 years' experience in handling the storage and delivery of various common types of vaccines for children and adults," he says.

Industry 4.0/5.0 in Pharmaceutical Industry

Touching on the importance of data, Ir. Dr Chong brings up the subject of Industry 4.0/5.0, which is very much data-driven, including making predictions and decisions based on data collated and analysed. He asks if Industry 4.0/5.0 is being implemented in the pharmaceutical industry and what role a chemical engineer would play in the implementation.

In response, Dr Badarulhisam says Pharmaniaga is moving towards digitalisation and automation, which is a big part of Industry 4.0/5.0. He adds that there is electronic data record capture under the Food & Drug Administration (FDA) in the USA and only non-paper records (electronic

data record) are accepted. At the FDA, everything must be electronically captured to ensure evidence cannot be tampered with. Malaysia, however, still accepts paper-based documents.

As for IoT applications in the plants, Dr Badarulhisam says: "Any interruption in electricity supply will affect storage in cold rooms. If there is a problem, we have an alert system that will notify us immediately via our mobile phones. All data are recorded, which is all part of regulatory requirements, including the requirement that storage must be made at pre-determined temperatures. Any deviation will be recorded and investigated. If the product fails, we have to remove it. Our production management includes the installation of CCTV systems in the computer which allow us to look at the system, check the temperature, humidity and take the necessary actions based on the data derived."

Ir. Dr Chong asks if chemical engineers are involved in digitalisation projects, such as making various IoTs and what the requirements are for graduates as well as the knowledge they need to face the challenges of Industry 4.0/5.0.

Dr Badarulhisam agreed that in the pharmaceutical industry and most other industries, data science or programming knowledge may come in useful for maintenance.

Ir. Dr Chong mentioned Petronas, which has invested in Industry 4.0 technologies and uses Big Data to make predictions, from safety perspectives to plant operations. Dr Badarulhisam says Pharmaniaga also has Big Data obtained through data mining from its manufacturing, distribution and market consumption based on usage in the entire country.

"From the chemical engineering perspective, it may not be fully implemented yet but we are doing it from our strategic and logistic perspective rather than from the operations of our plants," he adds.

Ir. Dr Chong says Petronas also uses Big Data to improve its plant performance. Dr Badarulhisam says: "In the oil and gas industry, safety is of the utmost importance. For pharmaceutical industry, the risks are different. We focus on product safety and product quality, the testing of our products and the control of our various processes."

Sustainability Practices of the Pharmaceutical Industry

Ir. Dr Chong then brings up the subject of sustainability practices in the pharmaceutical industry. He asks: "What are the industry players embarking on which aligns with the United Nations Sustainable Development Goals (SDGs), including that of vaccine development?"

Dr Badarulhisam explains: "As a public-listed company, Pharmaniaga is obliged to have our own sustainability report which is published annually. We comply with the Global Reporting Initiative (GRI), which is a modular system of inter-connected standards, as well as the UN's 17 SDGs. We have our own priority SDGs (11 out of the 17 SDGs), encompassing economic, environmental and social aspects.

"In terms of business, Pharmaniaga is moving into bio-pharma, vaccines and niche pharmaceutical products. More importantly, when it comes to the financial aspect, we highly support the element of governance with our stand on anti-bribery. Now we are embarking on a long-term programme to support bribery-free governance. Environmentally, we are very strong and we are moving into renewable energy, solar panels and conservation programmes with state parks in the country. We are complying with all environmental aspects, such as those concerning air emission and wastewater and we conform to relevant standards, including ISO 9001 international standard which specifies requirements for a quality management system (QMS) and which are occupational health and safety standard (OHSAS) compliant. All our manufacturing plants are certified."

In addition, he emphasises that, as a government-linked company, Pharmaniaga also has the responsibility to serve and protect the nation by contributing to society and helping the less fortunate. "Our top priority is to ensure people have access to medication and treatment at affordable prices as well as to make high quality drugs affordable and accessible without compromising on accessibility, safety and efficacy," he says. "We can lower costs by manufacturing locally and ensuring distribution to the entire country through our logistics arm. One example is the case of Sinovac COVID-19 vaccine; we are proud that we have delivered almost 50% of the vaccine requirement for adult Malaysians ahead of schedule. With these measures, the price becomes more affordable. That is part of our sustainable programme."

Other than having environmental control, Dr Badarulhisam also mentions Pharmaniaga's focus on green energy. The company conducts energy audits which involve chemical engineers. It started auditing manufacturing plants in the country in 2017, in collaboration with the Ministry of Energy & Natural Resources. He says the audit includes checking and retrofitting chillers and compressors and changing fluorescent lights to environmental-friendly LED lights in the effort to encourage green practices and environmental conservation among those in the manufacturing sector.

Conclusion

There are plenty of opportunities for chemical engineers to establish themselves in the pharmaceutical industry. They can be involved in every stage of pharmaceutical product development, including steps to ensure that products, especially medicines, are produced correctly and in accordance with relevant standards as well as meet the integrity and efficacy of all pharmaceutical products. Their roles will also include optimising existing pharmaceutical facilities and processes as well as introducing innovations to ensure a high standard of efficiency, consistency and safety. ■

Delivering KRAs by a *"Pandemic"* President

MOU signing with Johor Centre for Construction Development (JCCD)

Ir. Ong presenting the 62nd Presidential Address entitled "IEM Connects"

As we enter the month of April, it is the time for change of guards again in IEM. The session of 2021 / 2022 is coming to an end, and with that it's time for us to recount the success which the team had achieved. Despite the fact that the world was grappling with the global pandemic for a huge portion of the past 2 years, IEM still managed to achieve quite a lot, thanks to the contribution of our dedicated Council members, office bearers, loyal members and hardworking secretariat team.

It felt like a blink of the eye since I took over the presidency of IEM in July 2020 at the AGM which was postponed for three months due to the pandemic. At that time, everyone was optimistic that we would be entering the recovery stage of the pandemic. With that in mind, my first Presidential Address focused on the major task of "Augmenting IEM" with the intention to bring IEM to another level through various initiatives comprising the following Strategic Goals:

1. To accentuate the branding of IEM
2. To position IEM as the essential technical hub nationally and internationally
3. To increase member value and engagement and
4. To adopt the new normal

To accentuate the branding of IEM, I had given myself two goals. The first was the introduction of IEM CONVENTION & ENGINEER, which would be a convention and engineering exhibition rolled into one. IEM had been organising exhibitions and conferences over the years, but these were normally more discipline specific. ENGINEER however intends to bring all the disciplines in one venue at the same time and with a dedicated brand name. I felt this was a very good idea as IEM normally arranged exhibitions centred on the major disciplines while the smaller disciplines such as water resources, chemical, engineering education, building services etc. did not have much opportunity to be showcased. ENGINEER would provide that opportunity for them.

I am really exhilarated to report that the inaugural ENGINEER exhibition, an event of IEM Convention, was successfully held on 16-19 March 2022 at Kuala Lumpur Convention Centre after several postponements. Jointly organised by IEM and C.I.S Network, this IEM flagship multi-discipline exhibition was envisaged to kickstart the industry after the pandemic and to introduce new frontiers in technological solutions that would set the pace for the whole industry. The four-day event, officiated by Y.B. Datuk Arthur Joseph Kurup, Deputy Minister of Works (representing the Senior Minister of Works)

IEM Convention & ENGINEER2022 - Its a FIRST and Its a WRAP!

received a total of 5,247 visitors. Besides the exhibition, IEM Technical Divisions also took the opportunity to organise 4 consecutive symposiums in conjunction with the IEM Convention, namely:

- ASEAN Electrotechnical Symposium: Standards Drive Sustainable Development Goals (16-17 March) was officiated by CEO of Suruhanjaya Tenaga, Encik Abdul Razib bin Dawood, with 150 participants.
- Water Hazards and Security – IR 4.0 Forum (18 March) was officiated by Y.Bhg. Dato' Seri Ir. Dr Zaini Ujang, Secretary General of Ministry of Environment & Water who also delivered a keynote address on the theme of the forum.
- ASEAN Engineering Digital Transformation Summit 2022 Discusses Digital Disruption and the Global Engineering Agenda (18 March) was officiated by Prof. Dr Shahbaz Khan, Director of UNESCO Beijing and Representative to China, DPRK, Japan, Mongolia and Republic of Korea.
- Project Management Symposium or PROMAC (19 March) was officiated by Y.Bhg. Datuk Ir. Mohamad Zulkefly bin Sulaiman, Director General of JKR.

Other events included Sembang Chillex, IEM Fellow and Engineering Awards Ceremony and AER, APEC/IPE Certificates Presentation Ceremony.

In addition to ENGINEER, another branding exercise completed was the introduction of IEM's very own mobile application, IEMGo. After various discussions starting from my term as Deputy President, the mobile app was finally completed and launched in April 2021. IEMGo will ultimately act as the "real-time" bridge between IEM and the members with information and updates posted promptly. We are still in the midst of improving and enhancing the features to make it more user friendly and beneficial to IEM members. Besides being a source of information, IEMGo will also be another source of income for IEM through advertisements posted in the app. There are now around 34,000 members auto registered with the app.

These additional income sources, from ENGINEER and IEMGo, will allow IEM to have greater flexibility to look into better facilities and improved services for our members.

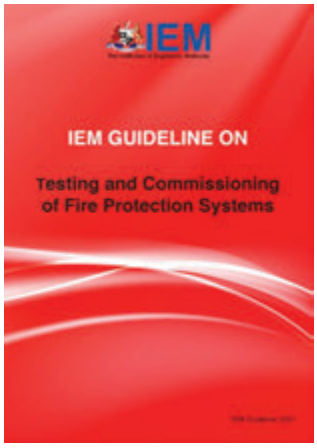
On engagements with local authorities or government agencies, we have done extremely well, with the inking of Memorandums of Understanding with Malaysia Association of Local Authorities (MALA), Johor Centre for Construction Development (JCCD) and the Penang Skills Development Centre (PSDC). These MoUs provide opportunities for IEM members, be they from the Headquarters or the Branches, to support the local authorities to create the synergy where 1 + 1 can be greater than 2. Joint activities such as knowledge sharing and technical support will definitely further public interest, ultimately benefitting a wider segment of Malaysians as well as the country.

Being a congregation of all who are involved in the engineering industry, IEM has embraced another two groups of engineering personnel with the introduction of new membership grades for engineering technologists and engineering technicians, to provide our expertise to help the government come up with better solutions to problems or crisis facing the country or the people. The global pandemic, recent natural disasters such as tornadoes, tremors, strong winds etc., remind us of how vulnerable and weak mankind is in the face of these calamities. In fact, we in Malaysia have been awakened to the fact that we are not really in a safe haven where there are no destructive natural disasters. Engineers should therefore be at the forefront to help the country be more prepared to face these disasters. IEM, through its Position Paper Committees, has embarked on various initiatives to study and develop possible solutions as references for the government in decision making. Position Papers that have been completed or are in the pipeline include Mitigation of Flash Floods, Human Capacity Building, Development of Smart Manufacturing Guidelines, Carbon Pricing and Water Supply Resilience. Over the last 20 months of my presidency, I have worked with the Position Paper Committees to produce these papers, some of which have already been submitted to the relevant Ministries.

Besides the Position Papers, one of my KRA was also for IEM to establish guidelines, best practices for reference or use by the industry. I am very pleased that with the efforts of the Fire Advisory Board and the Disaster Risk Reduction Advisory Board, we have produced and launched 2 new guidelines: IEM Guidelines on Testing & Commissioning of Fire Protection Systems and IEM Guidelines on Flood Abatement Equipment – Engineering Guide of Designation, Testing and Documentation. Another guideline that is completed and awaiting Council approval is the IEM Guideline on the Prevention

Exhibitors at ENGINEER2022 - 1st Malaysia Engineering Exhibition and Conference 2022

IEMGo - IEM's very own Mobile App launches in 2021



& Control of Dengue. The issues addressed by the three sets of guidelines are very prominent issues in Malaysia – fire, flood and dengue. We hope that engineers and the industry will make full use of these guidelines which have been prepared after due research and study.

Another achievement which I, personally, am extremely proud of is the success of IEM webinars. Since the start of the Covid-19 pandemic, we have managed to shift all IEM common activities such as technical talks, seminars, courses and even technical visits to an online platform within one month of the MCO. From April 2020 to the end of February 2022, the various Technical Divisions, Special Interest Groups and Sections have conducted 539 webinars, offering a total of 1,226.5 CPD hours. This translates to more than 23 webinars every month! This awesome achievement would not have been successful without the relentless efforts of our Technical Divisions, Special Interest Groups and Sections as well as the IT Secretariat.

Besides online activities and meetings, we also completed the first ever e-balloting exercise in April 2021. This move enabled IEM to save approximately RM30,000 in expenses. The e-Jurutera and e-Journal were also launched, putting IEM into the league of professional bodies which are moving towards digitalisation; by not printing the bulletin and journal, we are also contributing towards saving the environment.

IEM is like a big family and we care for one another. In order to understand better how the members had been coping with the impact of the pandemic, the Special Committee on Covid-19 conducted a total of 7 surveys to find out whether members had been impacted by pay cuts or retrenchment, or whether the various government aid packages were beneficial. Based on the feedback received, IEM had written to the government to present our proposals and suggestions. Such information was also circulated to members through various circulars posted via email blasts and social media platforms. All in all, a total of 26 circulars were issued which also included important news regarding government policies or announcements for the benefit of all. No doubt the pandemic has given many of us, both employees and employers, a hard time, but I am confident that the worst is over. By transitioning into the endemic stage, it is everyone's hope that the economic outlook will improve in time and everyone will do well again.

For those who are job-hunting, don't forget to visit the Job Gallery on our IEM website.

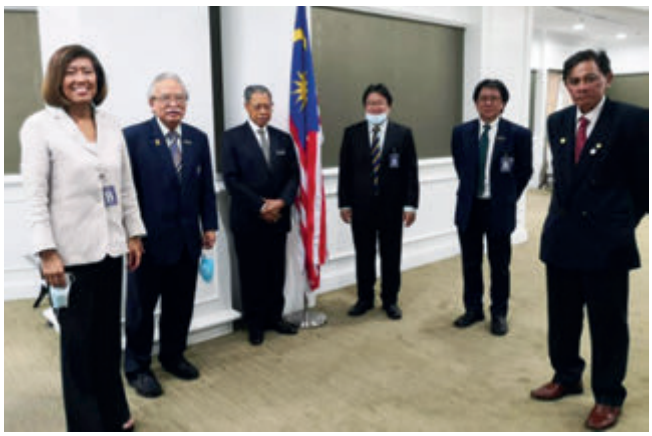
In addition, IEM's status as Authorised Member of the APEC and International Professional Engineers Agreement (IPEA) has been renewed for another six years. We have also been accepted as a Provisional Member of the International Agreement for Engineering Technologists (IETA) and the Agreement for International Engineering Technicians (AIET) in June 2021 and we are embarking on getting full member status this year.

With all these initiatives, we hope to provide IEM members with plenty of exciting opportunities at home and abroad!

Last but not least, I am very thankful that I have managed to achieve most of what I have set out to deliver as per my two presidential addresses and KRAs. My utmost appreciation goes to everyone in IEM, including the Council, the committee members as well as movers and shakers of Sessions 2020/2021, 2021/2022 at both IEM Headquarters and Branches and the IEM Secretariat. With your dedication and meaningful contribution, we have managed to overcome this challenging roller coaster ride. Please continue with your hard work to assist the incoming President and Deputy President in this uphill battle.

I would also like to extend my appreciation to IEM members who had been with IEM through thick and thin, who paid your subscriptions diligently and who sent in comments for our improvement, be it criticism or praise. I wish all of you the best of health and prosperity.

Do stay safe and may God bless you! ■



IEM invited to meetings with the Ministries

Webinar on Development & Implementation of AI-Driven Live Advisory for LNG Plant Start-up

Written and Prepared by:

Ir. Dr Chong Chien Hwa
Advisor, Chemical Engineering
Technical Division (2021-2022)

Ir. Dr Chan Tuck Leong and Mr. Lee Kian Seng led a PETRONAS team to develop an AI-driven live advisory named Stellar, an acronym for start-up excellence live advisory. The aim is to capture tacit knowledge to enable the consistent and smooth start-up of LNG trains at the Petronas LNG complex. With the advance of technology and Industry 4.0 through machine learning, errors can be detected to improve system and process via optimisation using end-to-end information streams.

Inconsistent start-up performances occurred due to different approaches used by individual operators, vendors and engineers based on individual experiences and tacit knowledge. This usually resulted in hiccups, costly mistakes and is time consuming due to human error, lack of scrutinisation, management pressure, lack of experiences or familiarity for new colleagues, lack of discussions and analysis due to time constraint of the project execution or delays.

Mr. Lee said the project is intended to optimise the start-up scheduling optimisation to produce more LNG. Stellar can provide real-time recommendations for parameters adjustments in response to actual plant conditions and has been successfully implemented at Malaysia LNG Tiga Sdn. Bhd. (MLNG TIGA) for Trains 7 and 8 and at Petronas LNG 9 Sdn. Bhd. (PL9SB) for Train 9 at the

Figure 1: Ir. Dr Chan and Mr. Lee's team at MLNG, PETRONAS
Front row (from left): Yeap Xin Wei, Iskandar Khalek, Laga Jenggi, Lee Kian Seng and Elaine Khoo
Back row (from left): Nirman Syah, Saifuddin Zulkaple, Hafiz Maamor, Kelvin Kho and Lee Yong Xian

LNG plant train at PETRONAS LNG complex. The machine-learning algorithm was designed using 3.4 billion data points from 1,862 sensors over the past 20 years from all start-up executions. It also included tacit knowledge from skilled operators and engineers. This solution ensures that the handover process becomes more sustainable knowledge retention when there is new turnover/change of operators and engineers who are new to the plant.

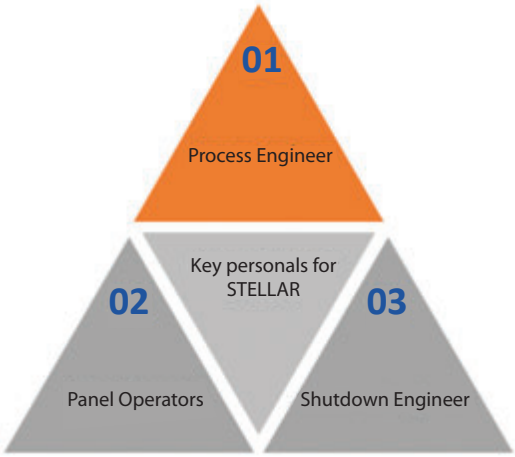


Figure 2: Key personnel for Stellar system

The key personnel for the Stellar system are process engineer, panel operators and shutdown engineer of PETRONAS (Figure 2). The overall Stellar Pod Members consist of business owner, results owner, area manager, process technologist, process engineer, advanced process control engineer, shutdown/turnaround team, technical trade specialist, panel operator, software developer, data scientist and product manager.

At the pre-AGM talk, Mr. Lee Kian Seng presented an overview process of the LNG production (Figure 3). The process began with a start-up of a pre-cool down process to build an AI solution. The decision was made after discussions with operators and SMEs involved in the system. A typical pain point with deviation from the planned schedule was identified. Applicable to all 9 trains, the process involved cooling from ambient temperatures to as low as -30oC. The first step is natural gas mixed refrigerant LNG system preparation followed by main cryogenic heat exchanger pre-cool down and final cooling. The analytics approach used to churn out sensible and actionable insights for the development of Stellar is divided into three stages: Historical start-ups profile generation, statistical & machine learning and discussion with SMEs. In the first stage, pre-cool down duration and past performance for all start-ups were generated. The duration and performance of each step were then identified and a summary of features for each start-up was generated.

Figures 4(a) and 4(b) show the Machine Learning Model development process and statistical and machine learning analysis. At the first layer, historical and live data collected are flow rates, valve openings, pressure and temperatures. Historical data is processed by predictive model and the live data optimised by the operating parameter recommendation model. According to Figure 4(b), the statistical and machine learning analyses are divided into correlation studies, pair plot analyses as well as supervised and unsupervised learning. A predictive modelling tool is used to identify and quantify key variables contributing to the start-up performance. Clustering of profiles helps identify hidden relationships and anomaly detection for historical data in generating start-up profiles.

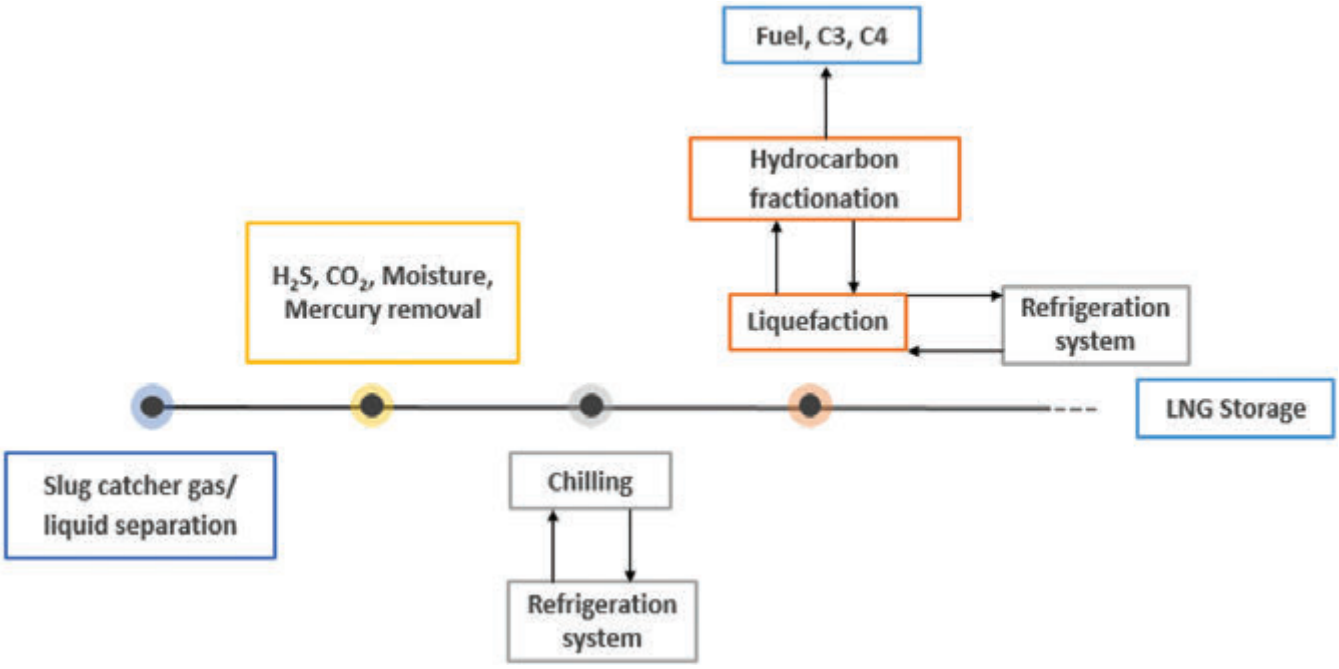


Figure 3: The LNG production process

At the last stage, a meeting is held with SMEs to formulate hypotheses and to discuss the findings and validate the feasibility of controlling identified parameters to assess whether the adjustment is replicable. At the implementation stage, recommendation and predication for instance control parameters adjustment, temperature, etc. is implemented. The overall process has 6 agile sprints from data collection until the scale up stage.

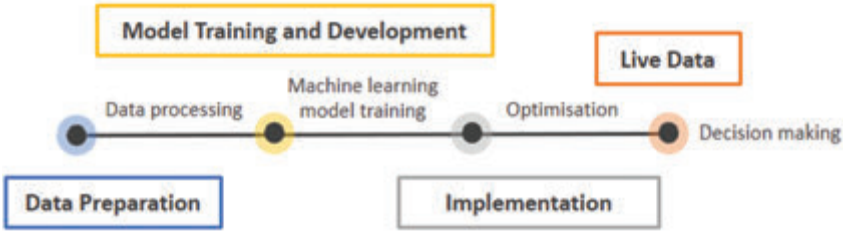


Figure 4(a): Machine Learning Model development layers and process

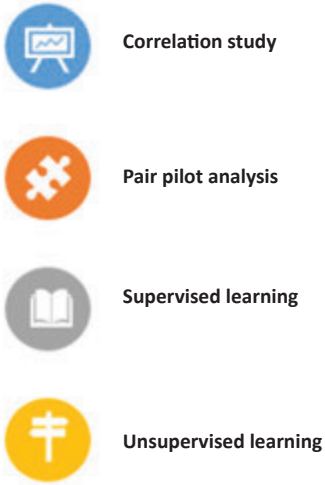


Figure 4(b): Statistical and machine learning analysis

Three key aspects of Stellar have been validated through the start-ups to deal with unexpected process challenges to validate the robustness of the solution to get the optimum results even with unplanned conditions and are capable of retaining and capitalising on the tacit knowledge with actual results. The pre-AGM talk ended at 11am. ■

Upcoming Activities

WEBINAR - Talk on "Nanotechnology for Circular Economy: A Case for Hydrogen Production"

Date	: 13 April 2022 (Wednesday)
Time	: 3.00 p.m. – 5.00 p.m.
Venue	: Digital Platform
Approved CPD	: 2
Speaker	: Ts. Dr Mohamed Shuaib Mohamed Saheed

SCHWEITZER ENGINEERING LABORATORIES

SIMPRO®

SEL Axion® Bay Controller

Comprehensive bay control and monitoring with an intuitive touchscreen interface and flexible design.

Key Features and Benefits

- Reliable local control and monitoring of multiple substation bays from a single device
- Intuitive user interface with a 7-inch, 800 × 480 color touchscreen display
- Modular design with a variety of analog and digital I/O options for flexible, economical deployments
- Easy system integration with a range of industry-standard protocols, including IEC 61850, DNP3, and Modbus
- Simple configuration and custom bay screen design with ACSELERATOR RTAC® SEL-5033 and integrated ACSELERATOR® Bay Screen Builder Software

Exclusive Distributor For Schweitzer Engineering Laboratories, Inc., U.S.A.
SIMPRO ENGINEERING SDN. BHD. 199701015320 (430817-D)
58, Plaza Puchong, Jalan Puchong Mesra 1, 58200 Kuala Lumpur, Malaysia.
+603 8075 2801 info@simpro.com.my www.simpro.com.my

Implementation of Process Failure Mode and Effect Analysis (PFMEA) in Chemical Manufacturing Industry

Written and Prepared by:

Ts. Vincent Khaw Wei Chuen

Ts. Vincent Khaw leads the process and continual improvement project at Henkel (Shah Alam). He is 2021/2022 session committee member for CETD, IEM. He holds a BEng in Chemical Engineering and is registered with Board of Engineers Malaysia (BEM), Institution of Chemical Engineers (IChemE, UK) and Malaysia Board of Technologist (MBOT).

The Failure Mode & Effect Analysis (FMEA), developed by US Military in the 1950s, was later adopted by NASA in the 1960s before it was rolled out to the private sector by Ford Motor to be used as a high-level tool for analysing the life-cycle of a product. The objective of the FMEA is to define and analyse processes to determine potential threats to the entire product realisation process and to review its components, assembly and subsystems. Its benefits and limitations include:

1. To provide clarity of potential risks to product quality via qualitative assessment of defects within scope
2. To document preventive and detection actions to reduce failure
3. Targeting for single-point
4. Requires team level experience and knowledge and
5. Not suitable for safety risk assessment.

FMEA is divided into Design FMEA (DFMEA) and Process FMEA (PFMEA). The PFMEA structure consists of two sections: Initial assessment and risk analysis. It is noted that the key inputs to PFMEA are from the existing process map or cause & effect (C&E) matrix with output aimed at corrective action to reduce the possibility or severity of an identified potential failure.

The initial assessment section consists of process step, potential failure mode, potential failure effects, potential cause, current process control and the 3 major ratings (severity, occurrence and detection). The process step can be obtained from the process map or C&E matrix and set as the basis for the analysis. The failure mode is defined as potential defect of the process or product which will result in the product failing to meet customer requirements or design intent. Following that is failure effect which represents the output of the defect on the product or immediate process. Once the cause and type of the potential failure are known, the team can then identify the potential cause, with corresponding control to mitigate or eliminate the known failure. Once this is done, the team can proceed to give a rating for each process step and calculate the risk priority number (RPN) which will give a clear idea on which potential failure needs to be prioritised, with a ranking from low to high.

The second section of the PFMEA allows the team to document the recommended actions and action outcome to further enhance control over the potential failure should the existing RPN fall below the acceptable level. To eliminate potential failure, the team is required to review the design of a product or process and this can take up a lot of resources and time. It is more common to reduce the occurrence or to enhance the detection to ensure the potential failure is under control with minimum capital investment. Following that, the team can review the rating after action is implemented and then evaluate the effectiveness of the action over the next 3, 6 and 9 months before updating the new RPN for that potential failure.

In recent years, a new structure of FMEA was co-developed by the Automotive Industry of Action Group (USA) and the German Association of the Automotive Industry (Germany). Known as AIAG-VDA FMEA, its objective was to further enhance the credibility of FMEA and to improve its overall structure to better reflect development in the technology industry.

Table 1 shows an example constructed with reference to the AIAG-VDA PFMEA handbook that is based on a 7-Step Approach: Planning & preparation, structure analysis, function analysis, failure analysis, risk analysis, optimisation and results documentation. On top of that,

Structure Analysis			
Process Item	**Process Step 2**	**4M element**	**Impact to Product**
Filter Changing	1. Full PPE must be worn: Leather apron, heat resistance gloves, face shield & safety goggles.	Man (Operator)	Avoid contamination to product
	2. Check new filter bag: cleanliness & size of filter.	Man (Operator)	
	3a. Stop the pump by switching off the panel switch and removing the key from the panel. Both pumps from HM 5 and HM 6 must be off. Put both the keys into the pocket.	Man (Operator)	
	3b. Stop the pump by pressing the Stop Button and obtain the key situated at the Stop Button.	Man (Operator)	
	4. Close the valve before the filter.	Man (Operator)	
	5. Open the drain valve at the bottom of the filter. Let the product drains out completely.	Man (Operator)	
	6. Open both locks on the filter cover. Open front and back holding part of the filter housing.	Man (Operator)	
	7. Unscrew cover and open it.	Man (Operator)	
	8. Remove old filter bag and pour balance into carton box.	Man (Operator)	
	9. Wind the new filter bag and place it into the housing.	Man (Operator)	
	10. Close cover, front & back holding parts. Then lock both padlocks on the filter housing.	Man (Operator)	
	11. Close the drain valve under the filter.	Man (Operator)	
	12. Open the valve before the filter.	Man (Operator)	
	13a. Unlock the panel switch for both pump panels with keys attached.	Man (Operator)	
	13b. Put the key back by the Stop button and turn on the pump.	Man (Operator)	

Table 1: Example of AIAG-VDA FMEA – 2nd Step Structure Analysis for filter change

there is a structured guideline on the rating and the replacement of RPN with action priority (AP).

In summary, it is important to implement the PFMEA for new product development or for modification of an existing production line in the chemical manufacturing process to identify potential failures and to prepare mitigation actions in order to minimise the financial impact on the product or customer. ■

UPCOMING ACTIVITIES

WEBINAR - Talk on "Nanocellulose: Surface Functionalization and Their Application"

Date	: 18 May 2022 (Wednesday)
Time	: 6.00 p.m. – 8.00 p.m.
Venue	: Digital Platform
Approved CPD	: 2
Speaker	: Assoc. Prof. Dr Sam Sung Ting

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.

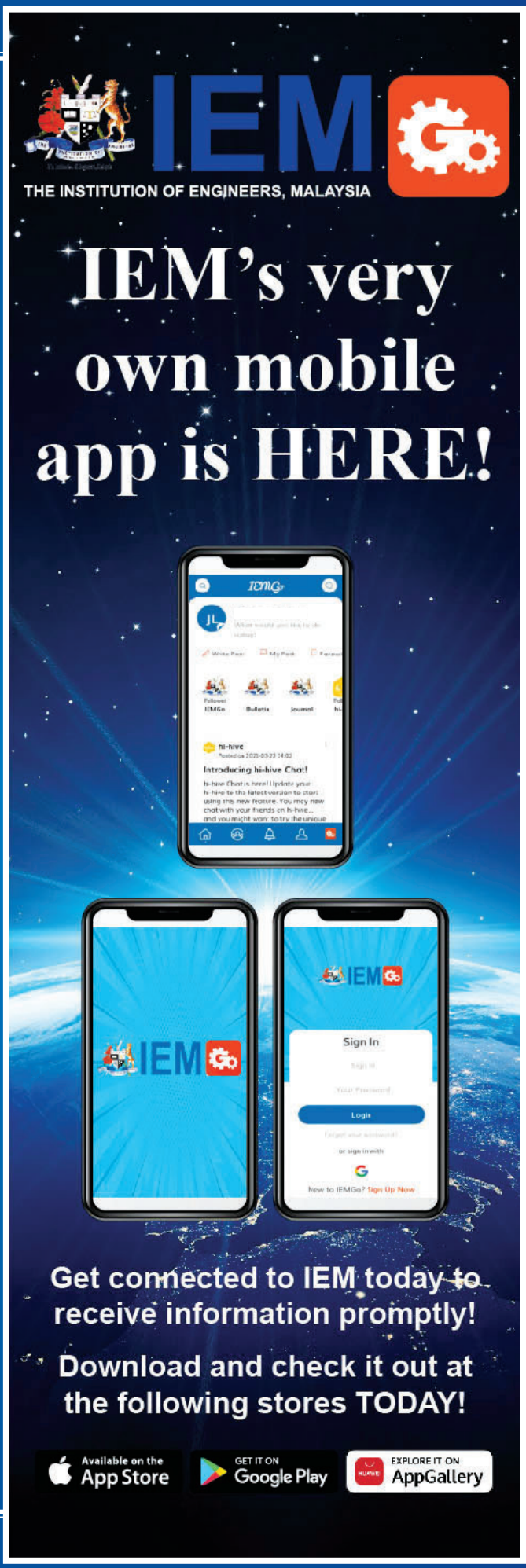
I hope all our members will join the community under IEMGo and make this project a success. You can download the app from Google Play Store, Apple App Store or Huawei App Gallery.

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



Taman Negara: A National Heritage Worth Protecting

Written and Prepared by:

Ir. Dr Oh Seong Por

The Past Chairman of IEMNS and Director of Samsung SDI Energy (M) Sdn. Bhd.

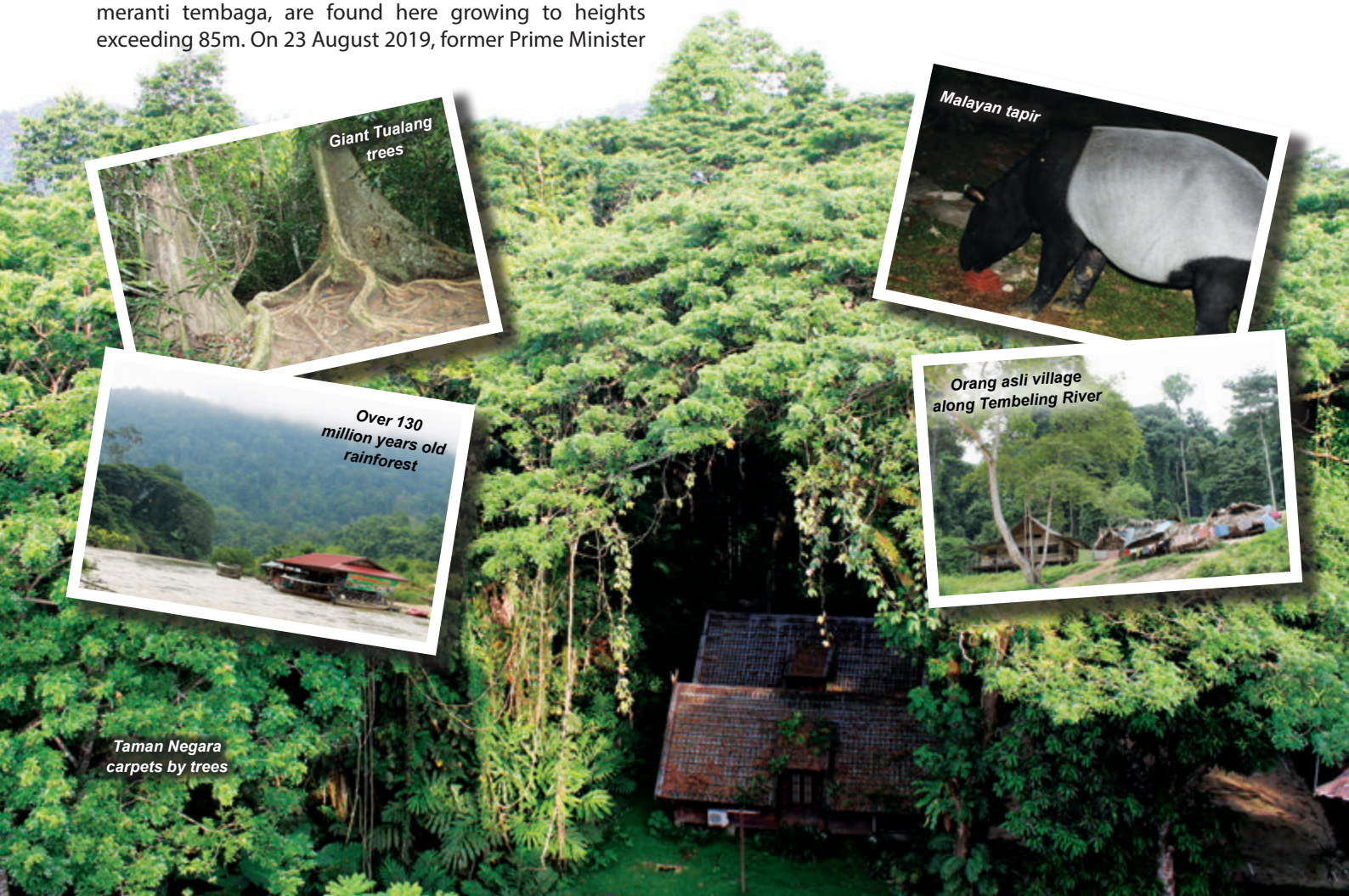
Established in 1938, Taman Negara is the national park in Peninsular Malaysia. It spans three states (Pahang, Terengganu and Kelantan) with a total area of 4,343 sq. km. It is covered with thick rainforest estimated to be more than 130 million years old.

The park is home to about 200 species of mammals (e.g. tiger, elephant, leopard, sun bear, water buffalo, Malayan tapir, Sumatran rhino and gaur), 100 types of snakes, 500 varieties of birds (e.g. argus, red junglefowl and Malayan peacock peasant), 150,000 kinds of insects and 250 species of freshwater fish.

With plenty of sunlight and rain available, the park is densely carpeted with an estimated 280 species of trees per hectare. Some of the "hardwood with good engineering value" species such as tualang, merbau and meranti tembaga, are found here growing to heights exceeding 85m. On 23 August 2019, former Prime Minister Tun Dr Mahathir declared the merbau or Malacca Teak as our national tree. The world's largest flower, rafflesia, is also found here.

The park is home to a few thousand orang asli, mainly of the Batek clan; they stay along the banks of the Tembeling River.

Before the Covid-19 pandemic, my family and I made a trip to Taman Negara. We were really excited to spot large mammals such as tapir, wild boar, deer and monkeys. I was also fascinated by the giant tualang tree. Its deep and widespread buttress roots help to extract crucial minerals for its growth and provide firm support for the tree to reach heights of over 80m over many decades. There is no doubt that Taman Negara must continue to be protected and preserved for future generations. ■



ATOM SERIES MINI VRF

MODERN ELEGANCE IN HOME SWEET HOME

Maximum Space Usability

All Flaring Connection Without Welding

Minimum Drill Hole on Wall

Wide Selection Range of IDUs

Sole Distributor:

Midea Scott & English Electronics Sdn Bhd (194517-X)

No. 16, Jalan Chan Sow Lin, 55200 Kuala Lumpur Tel: 03-9221 1033 Fax: 03-9221 7204 / 03-9221 1434 / 03-9221 3509

- **PENANG** No. 35, Jalan Perniagaan Gemilang 1, Pusat Perniagaan Gemilang, 14000 Bukit Mertajam, Pulau Pinang. Tel: 04-548 3938 Fax: 04-548 9698
- **JOHOR** No. 25, Jalan Seri Impian 1, Taman Impian Emas, 81300 Skudai, Johor. Tel: 07-562 4898 Fax: 07-557 7898
- **PERAK** No. 38, Persiaran Perindustrian Pengkalan 10, Kawasan Perindustrian Pengkalan, 31500 Lahat, Perak. Tel: 05-323 2529 Fax: 05-323 2529
- **PAHANG** No. 258, Ground Floor, Jalan Air Putih, Taman Air Putih Mewah, 25350 Kuantan, Pahang Darul Makmur. Tel: 09-560 6668 Fax: 09-09-560 5050
- **MALACCA** No. 385-L, Taman Peringgit Jaya, 75400 Peringgit, Melaka. Tel: 06-292 1940 Fax: 06-286 7107
- **KOTA BHARU** PT 1436, Ground Floor, Taman Koperatif, Tanjung Chat, 15300 Kota Bharu, Kelantan. Tel/Fax: 09-743 1202
- **SABAH** Inanam Suria Commercial Centre, Lot B, Unit 0-9, Unit 1-9, Ground Floor and First Floor, 88450, Kota Kinabalu, Sabah. Tel: 088-421 428 Fax: 088-431 427
- **SARAWAK** 1st Floor , Lot 8517, Stutong Commercial Centre, Jalan Stutong, 93350 Kuching, Sarawak. Tel: 082-363 167 Fax: 082-366 167

Midea Malaysia

midea_malaysia

my.midea.com

Malaysia CHEM-E Car Competition 2021

Written and Prepared by:

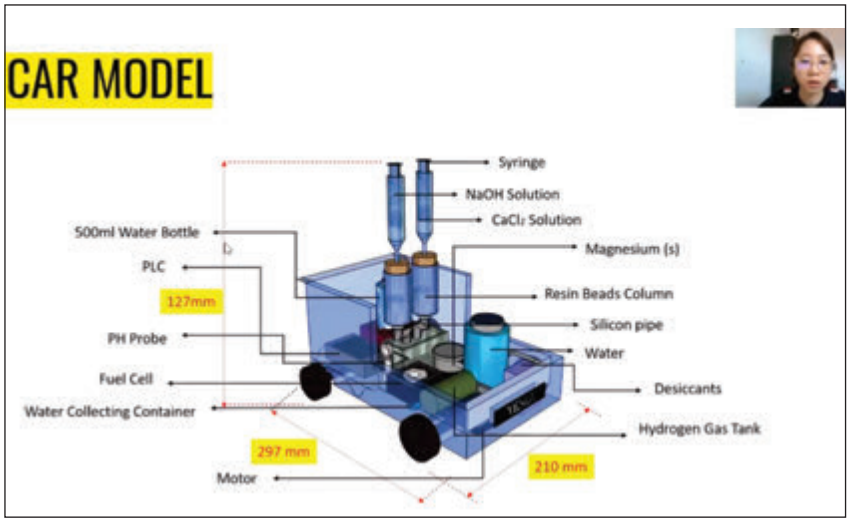
Mohd Fauzi Zanil

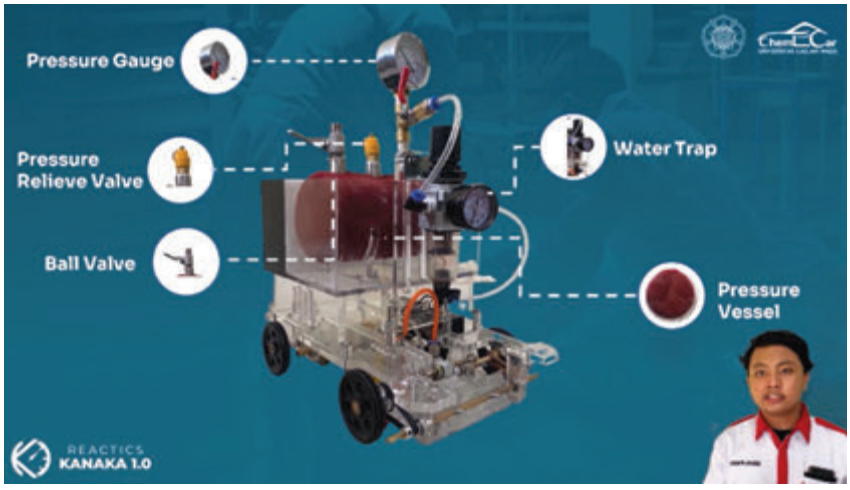
This year, the Malaysia Chem-E Car Competition was organised by the Chemical Engineering Technical Division (CETD) and hosted by USCI University on 23 September 2021. Officiating at the event was Ir. Lee Teck Lii, Chairman of Chemical Engineering Technical Division.

The aim of the competition was to challenge students from institutions of higher learning to design and construct a shoebox-sized car that was powered by a chemical energy source. The car should be able to carry a certain load of water over a given distance, hit a ball or bowling pins and then stop autonomously.

The competition consisted of 3 parts: Pre-recorded video, Quiz and Q&A. The pre-recorded video was based on the following criteria:

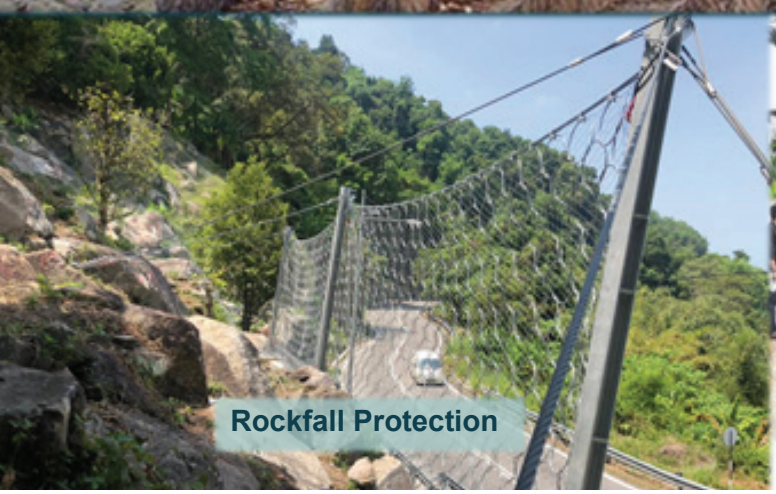
1. Description of the chemical reactions, power source and stopping mechanism.
2. Design creativity and unique features of the vehicle, including the strategy to score a "goal" or hit the bowling pins when momentum is transferred from the car to the ball.
3. Environmental and safety features.
4. Economic aspects.
5. Quality of the presentation, including the slides.

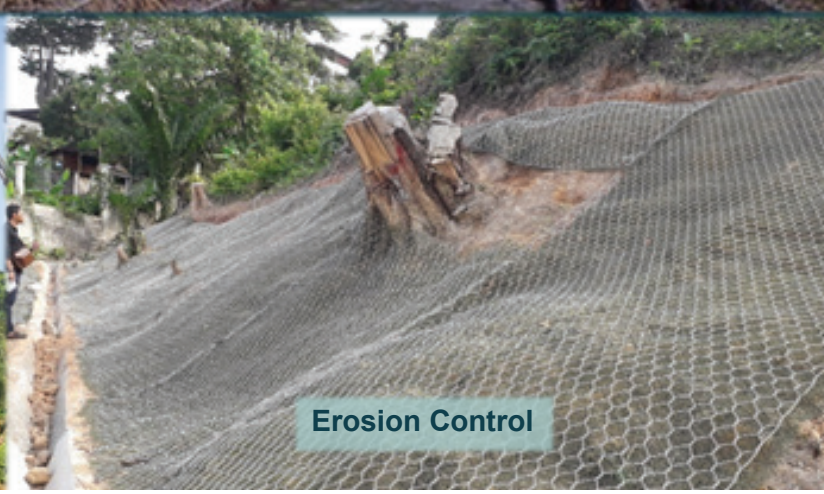




Pre-recorded video competition

Throughout the years, Maccaferri has been constantly evolving and contributing innovative solutions in **Erosion Control**, **Retaining Walls**, **Basal Reinforcement, Soil Stabilisation**, **Rockfall Protections**, and various other applications. We have extended our product range significantly over the last decade, enabling us to offer an unrivalled range of solutions to the environment. Maccaferris' knowledge and experience enable us to offer clients tailored solutions, optimising value, and achieving cost efficiency.





MACCAFERRI

Maccaferri (Malaysia) Sdn. Bhd.

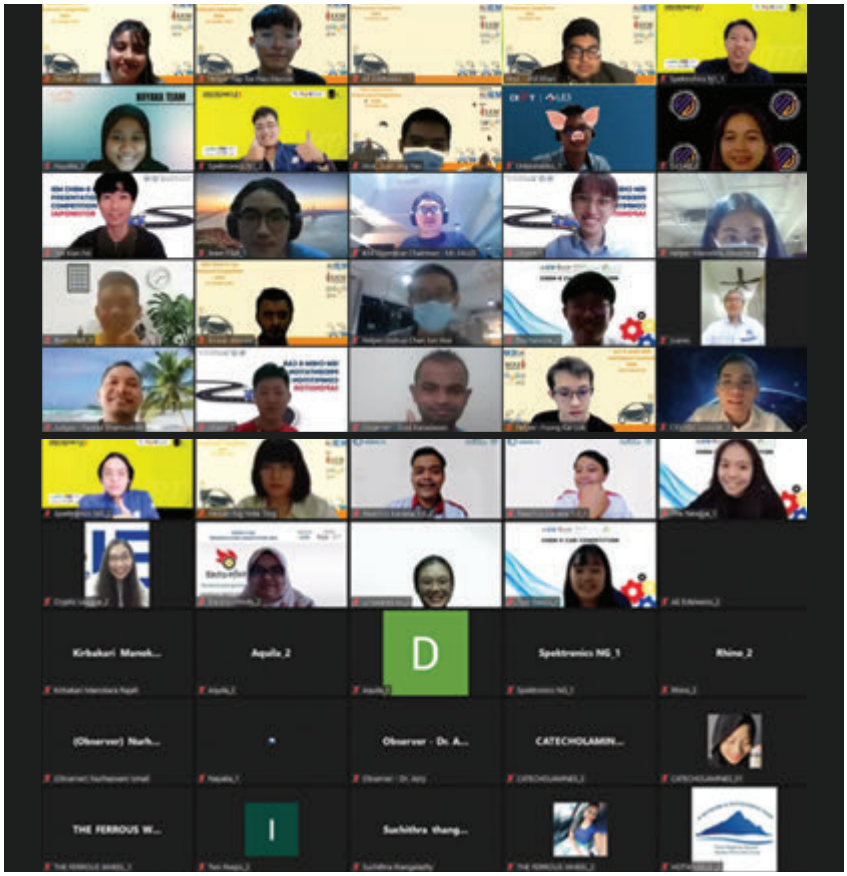
Unit 511, Block G, Phileo Damansara 1, No. 9, Jalan 16/11,
Off Jalan Damansara, 46350 Petaling Jaya, Selangor Darul Ehsan, Malaysia.
Tel: +60-3 7955 7800 Fax: +60-37955 7801 E-mail: info.my@maccaferri.com

PoliMac®

Engineering a Better Solution

A total of 27 teams from 13 institutions of higher learning, including 4 from Indonesia, participated in the event. The winners are listed below: ■

Ranking	University	Team	Names of Team Members
1	Universiti Gadjah Mada	Reactics Kanaka	Mayradaffa Adyudya Muhammad Ilham Fajri
2	Institut Teknologi Sepuluh Nopember Surabaya	Spektronics N1	Wahyu Febianto Muhammad Rafli Revansyah
3	Universiti Teknologi PETRONAS	Two Peeps	Peggy Lu Shuet Fong Ivy Lim Zhi Yu
4	Institut Teknologi Sepuluh Nopember Surabaya	Spektronics Ng	Bernardus Krisna Brata Abdul Quddus Al Kahfi
5	Xiamen University Malaysia	Ohana	Ee Jin An Jocelyn Lim Jean Yi
6	Universiti Teknologi PETRONAS	The Newbie	Koo Wai Yee Tung Wei Lam
7	UCSI University	Unbeatable	Ooi Chong Xuen Tee Zhi Xuan
8	Universitas Indonesia	Nayaka	Darrell Sanjaya Dyah Nurcahyani
9	UniKL MICET	Electro - Infinity	Hanisah binti Md Sarif Bharathi A/P Vijiandran
10	Universitas Indonesia	Rhino	Juliandri Triyantoko



Participants from 13 institutions

Subscribe to IEM's Publications Now!

Yes! I would like to be a subscriber of The Institution of Engineers, Malaysia's publications

Name: _____

Mailing Address: _____

_____ Country: _____

Company/Institution: _____

Title: _____

Telephone No: _____ Fax: _____ Email: _____

☐ New Subscriber ☐ Renewal

Please commence my subscription from: _____(month/year) Signature: _____

To start your subscription of IEM's publications, complete this form and mail it back to the address below. For faster processing, fax it to: +603 7493 1047. Thank you.

What is your primary job title?

- ☐ Corporate Management (including chairman, president, proprietor, partner, director, vice president, general manager, division manager, import/export manager, other corporate title)
- ☐ Management (including project/contract/equipment/service/transport district manager, clerk of works, other technical or operating manager)
- ☐ Engineering/Design (including chief engineer, chief designer, civil/highway/mechanical/planning engineer, other engineering/design title)
- ☐ Buying/Purchasing (including chief buyer, buyer, purchasing officer, other buying/purchasing title)
- ☐ Titles allied to the field (architect, consultant, surveyor, research and development professor, lecturer, supervisor, superintendent, inspector or other allied title)
- ☐ Others (please specify) _____

What type of organisation do you work in? *(Tick one box only)*

- ☐ Contractor
- ☐ Sub-contractor specialist
- ☐ Design and build contractor
- ☐ Consulting engineering/architectural/quantity surveying practice
- ☐ Mining/quarrying/aggregate production company
- ☐ Petroleum producer
- ☐ International/national authorities
- ☐ National/regional/local government
- ☐ Public utilities (electricity, gas, water, deck and harbour, other)
- ☐ Manufacturer
- ☐ Distributor/importer/agent
- ☐ Construction department of large industrial/Commercial concern
- ☐ Association/education establishment/research
- ☐ Construction equipment hire/rental company
- ☐ Project/construction management consultancy
- ☐ Others (please specify) _____

What are the main activities of your organisation? *(Tick all that apply)*

Constructions of:

- ☐ Roads/bridges
- ☐ Dams/reservoirs/irrigation
- ☐ Harbours/offshore structures
- ☐ Foundations/tunnels
- ☐ Pipelines/refineries
- ☐ Structures/steel work
- ☐ Building (commercial, industrial)
- ☐ Housing
- ☐ Construction management
- ☐ Deep mining

Manufacturer of:

- ☐ Construction equipment
- ☐ Cement
- ☐ Other construction materials
- ☐ Distribution
- ☐ Construction equipment
- ☐ Construction materials
- ☐ Hire/rental of construction equipment
- ☐ Design
- ☐ Earth-moving/open cast mining
- ☐ Aggregate production

☐ Others (Please specify) _____

Rate *(Please tick)*

- ☐ **RM360.00** - 12 issues of JURUTERA
- ☐ **RM84.00** - 2 issues IEM Journal (Half-yearly)

Terms and Conditions:

1) The subscription is to be prepaid.
2) Please make cheque payable to **Dimension Publishing Sdn. Bhd.**
3) Subscriptions are not refundable.
4) Magazine/s will be sent to the mailing address given.
5) Students are entitled for a 20% discount from the above subscription rate.
6) Students must submit a photocopy of the student identification card together with the payment.
7) The above rate is inclusive of delivery charges and applicable in Malaysia only.
8) Additional delivery charges will apply to overseas subscribers.

For subscription enquiries, please contact +603-7493 1049 or email to info@dimensionpublishing.com.

dimensionpublishing
The Choice of Professionals

DIMENSION PUBLISHING SDN. BHD. (449732-T)
Level 18-01-02, PJX-HM Shah Tower, No. 16A, Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel +603 7493 1049 **Fax** +603 7493 1047 **Website** www.dimensionpublishing.com

Updated May 2018

9th IEM Chemical Engineering Design Competition

Written and Prepared by:

Dr Ang Wei Lun

The 9th IEM Chemical Engineering Design Competition 2020/2021 was conducted via virtual platform on 29 May 2021. This year, there were 16 participating teams comprising chemical engineering undergraduates from both public and private higher institutions, namely Heriot-Watt University Malaysia, International Islamic University Malaysia (IIUM), University of Nottingham Malaysia, Universiti Kebangsaan Malaysia (UKM), Universiti Malaysia Pahang (UMP), Universiti Malaysia Sabah (UMS) and Universiti Putra Malaysia (UPM).

This year's theme, Production of Raw Material for Alcohol or Non-Alcohol Hand Sanitiser, was set in response to the increasing demand for alcoholic and non-alcoholic hand sanitisers because of the COVID-19 pandemic. The pandemic has heightened hygiene awareness among the general public in everyday life and now, it is anticipated that the use of hand sanitisers will remain the norm even when the pandemic is over.

With this case scenario, students had to design and propose an economically and commercially viable production plant of hand sanitiser raw material. They were required to make a reasonable assumption in setting the production rate, based on appropriate considerations such as market demand, feedstock availability, safety and health, etc. Sustainability aspects also had to be considered as part of the design criteria in support of the government's sustainable development initiative.

It was hoped that the design competition would create opportunities for future chemical engineers to enhance their design competency and to exchange ideas pertaining to the profession with practising engineers.

The participating teams had to submit their Progress Report & Final Design reports to be evaluated by judges selected from the industry and academia. The shortlisted teams would then submit their Management Reports and present their design reports to the judges during the final session. A webinar was also organised for the students where speakers from the industry were invited to deliver talks on topics related to the design competition. These included Managing Differences between Process Safety & Occupational Safety, Feasibility Study & Technology Selection, Risk & Opportunities for Industries in Addressing the Effects of Climate Change and Process Engineering Design Overview.

Photos taken during the 9th IEM Chemical Engineering Design Competition 2020/2021

In the final session, 10 finalist teams from UKM, UMS, Heriot-Watt University Malaysia, University of Nottingham Malaysia, UMP and UPM pitched their business ideas. The 1st Prize went to the team from University of Nottingham Malaysia which took home RM1,000 in cash. The 2nd Prize of RM500 went to the UKM team and the 3rd Prize of RM300 went to the UPM team. A second team from UKM won the consolation prize of RM200. ■

Bio-Slope Stabilisation: From Research to Practice in Thailand

Written and Prepared by:

Ir. Dr Gue Chang Shin

It was an honour for the Geotechnical Engineering Technical Division (GETD) of IEM to have Dr Apiniti Jotisankasa, Associate Professor at Bangkok's Kasetsart University and the current Secretary General of Thai Geotechnical Society, deliver a webinar titled Bio-Slope Stabilisation: From Research to Practice in Thailand on 12 November 2021. There were 92 participants.

Dr Apiniti said slope failure and erosion have become more severe due to climate change and the increase in infrastructure development. So, conventional "hard" engineering solutions may not always provide the best outcomes. A hybrid approach, involving the use of plants and structures, which mobilises soil bioengineering technology may be more appropriate.

Soil bioengineering technology utilises sound engineering practices in conjunction with integrated ecological principles to protect slopes and the environment. This is in line with some of the United Nations' Sustainable Development Goals (SDG), particularly Goal 9 (building resilient infrastructures, promoting inclusive and sustainable industrialisation and fostering innovation), and Goal 15 (to protect, restore and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation as well as halt biodiversity loss).

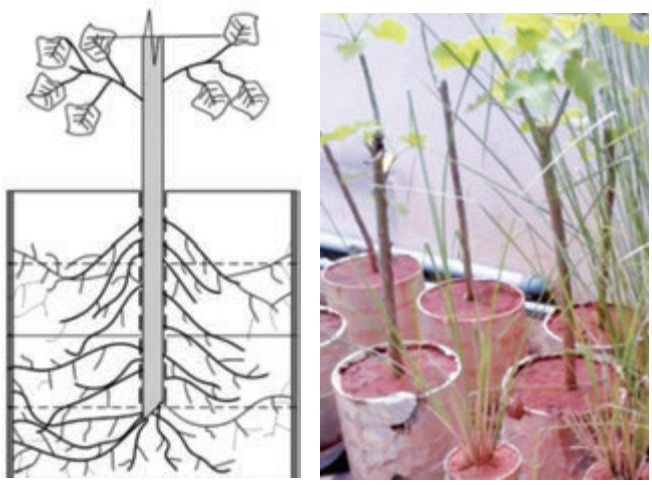


Figure 1: Live stake (Dr Apiniti's slide)

He introduced some modern soil bioengineering techniques employed in Thailand, such as the vetiver grass system, erosion control blanket, erosion control logs and flapped soil bags. Vetiver grass system is used for erosion prevention and shallow stabilisation. Dr Apiniti also explained the use of live stakes (Figure 1) and live poles, a technique that involves inserting and tamping of easily rootable woody cuttings (typically 12mm to 38mm in diameter and 0.6-0.9m in length) into the ground. Live pole is the term used to describe a bigger version of the live stake, typically 50mm in diameter and installed at a depth of about 1.0m into a pre-drilled hole.

Dr Apiniti raised some important research questions based on practical considerations. These included the species that could be used for live stakes, the method for quantifying the impact of vegetation on slope stability in the field and in the laboratory as well as the resulting effect on slope stability due to changes in the plant over a long period of time. He then presented various research findings from laboratory and field work which answered these questions.

Some key characteristics studied included growth rate, planting method, root-soil mechanics, time-dependent root reinforcement and the influence of suction and root concentration on the hydraulic behaviour of the soil. Advanced methods such as numerical simulations, including the adoption of a probabilistic framework for slope stability analyses in view of the spatial variability, and advanced laboratory tests, were carried out in the research. Various case studies were also presented to showcase that bio-slope stabilisation measures had been successfully implemented.

Figure 2: Flapped soil bags with live stakes and micro-piles (Dr Apiniti's slide)

In conclusion, Dr Apiniti said the vetiver grass system was cost-effective and that the erosion control blanket with clay sodding performed well and was resilient to erosion. Live stakes of pioneer, fast-growing species were effective, especially when used with flapped soil bags with traditional geo-structures such as gabion walls and micro-piles. (Figure 2 shows an example of flapped soil bags with live stakes and micro-piles).

However, placement timing was very important for successful application. Fundamental research on root-permeated soil mechanics was necessary to understand the evolution of bioengineered slopes with time. Soil bioengineering was suitable for community involvement in social development with the use of appropriate technology. ■

63rd ANNUAL GENERAL MEETING

(VIRTUAL MEETING)

16th APRIL 2022
SATURDAY
9.00 AM - 11.00 AM

PRE-REGISTRATION IS REQUIRED
NO WALK-IN ALLOWED
PLEASE REGISTER TO ATTEND THE MEETING BY SCANNING THIS QR CODE

SCAN ME

The AGENDA for the virtual Annual General Meeting is as follows:-

1. **Welcome Address by the President for Session 2021/2022.**
2. **Presentation of Honorary Secretary Report Session 2021/2022.**
3. **Presentation of Financial Statements for the year ended 31 December 2021.**
4. **Presentation of Results of Election for Council Session 2022/2023.**
5. **Presidential Address 2022/2023.**

Print Service

Special Promotion

Flyer / Leaflet
Art Paper *(Full Color)*

A4	**105gsm**		
	500pcs	RM	130
	1000pcs	RM	160
	128gsm		
	500pcs	RM	160
	1000pcs	RM	190
A5	**105gsm**		
	500pcs	RM	100
	1000pcs	RM	130
	128gsm		
	500pcs	RM	130
	1000pcs	RM	160

- Annual Reports
- Booklets
- Brochures
- Buntings
- Business Cards
- CD / DVD Replications
- Calendars
- Cards & Invitations
- Certificates
- Custom Printings
- Envelopes
- Folders
- NCR Bill Books
- Notepads
- Leaflets
- Letterheads
- Paper Bags
- Posters
- Stickers
- Others

dimensionpublishing
The Choice of Professionals

Authorised Publisher: The Institution of Engineers, Malaysia (IEM) - JURUTERA

For other quantity and material, please contact:

Joseph How (+6) 011 1234 8181
Shirley Tham (+6) 016 283 3013

Print Service

Special Promotion

Business Card - 54mm x 90mm
Gloss / Matt Art Card *(Full Color)*

260gsm

200pcs	RM 40
300pcs	RM 50

310gsm

200pcs	RM 50
300pcs	RM 60

- Annual Reports
- Booklets
- Brochures
- Buntings
- Business Cards
- CD / DVD Replications
- Calendars
- Cards & Invitations
- Certificates
- Custom Printings
- Envelopes
- Folders
- NCR Bill Books
- Notepads
- Leaflets
- Letterheads
- Paper Bags
- Posters
- Stickers
- Others

dimensionpublishing
The Choice of Professionals
Authorised Publisher: The Institution of Engineers, Malaysia (IEM) - JURUTERA

For other quantity and material, please contact:

Joseph How (+6) 011 1234 8181
Shirley Tham (+6) 016 283 3013

Green Building Certification for Healthcare Facility

Written and Prepared by:

Ir. Shamila Ariaratnam

Three technical divisions – Electrical Engineering, Building Services and Environmental Engineering – jointly organised a webinar talk on Green Building (GB) Certification (Operation & Maintenance) For Healthcare Facility on 16 November 2021. There were 76 participants.

The speakers from Medivest Sdn. Bhd. were its Deputy General Manager, Ts. Muhamad Nasrul Othman, and its Manager of Sustainability Program Department, Ts. Amir Zulkhairi Ahmad Bangi.

Ts. Nasrul started by outlining the various GB certifications sought for from the ASEAN Energy Management Scheme (AEMAS), a regional ASEAN initiative developed and supported by the highest energy authorities and agencies of ASEAN, Voluntary Sustainable Energy Low Carbon Building Assessment GreenPASS a voluntary and industry driven initiative by the Sustainable Energy Development Authority (SEDA) to National Energy Awards (NEA) which recognises the excellent achievements and best practices of local institutions and organisations in driving the sustainable energy agenda of the Ministry of Energy and Natural Resources, ASEAN Energy Awards (AEA) and Leadership in Energy & Environmental Design (LEED).

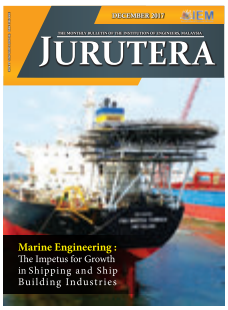
Although it had been a long and challenging journey, it was one that fulfilled the Ministry of Health's aspirations for hospitals to comply with GB certifications.

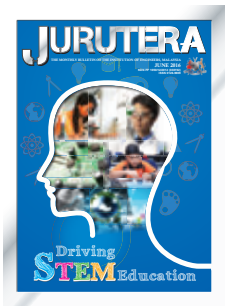
Then Ts. Amir took over, giving us the definition of GB and listed some of the sustainability rating tool systems employed around the world and in Malaysia. He also highlighted the differences between the different rating tools in Malaysia and the weightage for major sustainability themes among Malaysian GB rating tools. Energy efficiency always took prominence, followed by site planning and management while transportation was the lowest contributor of the five rating tools.

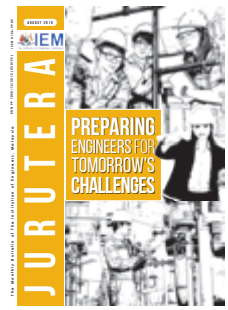
As for LEED, the rating system helps building owners and operators to be environmentally responsible and to use resources efficiently. Medivest Sdn. Bhd.'s LEED accreditation journey started in 2019 and was concluded in 2021 when it received platinum certification. Data for the certification came from energy and water consumption, transportation survey, material purchasing and minimum requirements of ASHRAE Standard 62.1:2010. Ts. Amir then focused on the individual innovative projects that were implemented to realise the assessment ratings.

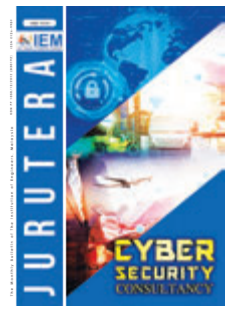
In conclusion, the speakers asserted that recertification is necessary, not only for continued recognition, but also to ensure that data is upkept and buildings are functioning as intended. Applying LEED will assist organisations to consolidate and establish the right data and benchmark it against international industry players. In addition, after facing many certifications, the speakers acknowledged that data availability and maintaining the existing data is of utmost importance. ■

Advertise with us !









For advertisement placements and subscriptions, please contact:

Dimension Publishing Sdn. Bhd. [199701034233 (449732-T)]

+603-7493 1049 info@dimensionpublishing.com

IEM
The Institution of Engineers, Malaysia

For advertising enquiries, please contact:

dimensionpublishing
The Choice of Professionals

Dimension Publishing Sdn. Bhd.
[199701034233 (449732-T)]

Level 18-01-02, PJX-HM Shah Tower,
No. 16A, Persiaran Barat,
46050 Petaling Jaya,
Selangor Darul Ehsan, Malaysia.

Joseph How : +6011 1234 8181
Shirley Tham : +6016 283 3013

+603 7493 1049

+603 7493 1047

info@dimensionpublishing.com

THE MONTHLY BULLETIN OF THE INSTITUTION OF ENGINEERS, MALAYSIA

JURUTERA

Circulation and Readership Profile

JURUTERA has an estimated readership of **200,000** professionals. Our esteemed readership consists of certified engineers, decision making corporate leaders, CEOs, government officials, project directors, entrepreneurs, project consultants, engineering consulting firms and companies involved with engineering products and services.

Advertising Benefits

Our business partners can be assured that their products and services will be given the circulation and exposure they deserve, thus maintaining a sustained advertising presence to our core readers of decision-making engineers and technical experts. Our website offers an even wider market reach, with added international presence, aided by our international affiliation with official engineering bodies all over the world. Our online and offline advertising features such as banner advertising, article sponsorship and direct e-mail announcements have proven to be successful marketing strategies that will set the businesses of our partners apart from their competition.

ADVERTISING RATES

	PRICES PER INSERTION IN RINGGIT MALAYSIA (RM)				
SPECIFIED POSITION (Full Colour Ad)	**1 INSERTION**	**3 INSERTIONS**	**6 INSERTIONS**	**9 INSERTIONS**	**12 INSERTIONS**
Outside Back Cover (OBC)	7,800	7,050	6,750	6,450	6,150
Inside Front Cover (IFC)	7,250	6,650	6,350	6,050	5,750
Inside Back Cover (IBC)	6,750	6,250	5,950	5,650	5,350
Page 1	6,650	6,150	5,850	5,550	5,250
Facing Inside Back Cover (FIBC)	6,150	5,850	5,550	5,250	4,950
Facing Cover Note (FCN)	5,850	5,300	5,100	4,900	4,700
Facing Contents Page (FCP)	5,700	5,150	4,950	4,750	4,550
Centre Spread	11,200	9,500	9,000	8,500	8,000
ROP Full Page	4,900	4,500	4,300	4,100	3,900
ROP Half Page	2,900	2,650	2,550	2,450	2,350
ROP 1/3 Column	2,200	2,000	1,900	1,850	1,800
ROP 1/4 Page	1,950	1,750	1,650	1,600	1,550

Special Position: +15%
Overseas Advertiser: +25% (Full Advance Payment Required)
All prices shown above exclude Computer to Plate (CTP) charges

****Please note that the above prices will be subjected to SST***
****Advertising rates displayed do not include 15% advertising agency commission***

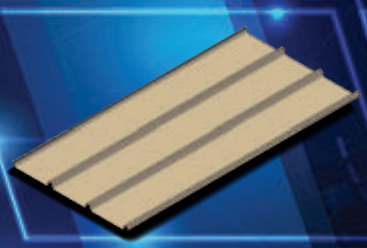
LYSAGHT

Is Your Building Design BIM-Ready?

An unstoppable trend is brewing: the BIM adoption in architectural design and project management for greater design clarity, better foresight, and accuracy. It may soon become part of the design or regulatory compliance requirements too.

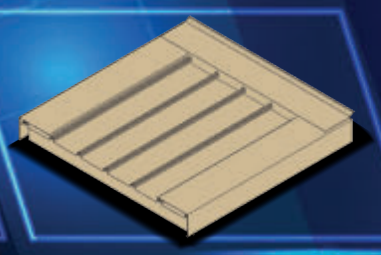
Be ahead of this paradigm shift with Lysaght BIM objects, download Lysaght BIM objects for free today:

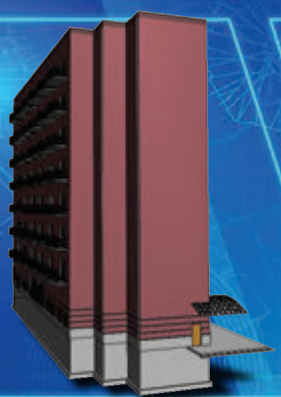
Single-layer metal cladding BIM objects



Performance-driven built-up systems

With essential flashing and capping detailing





Revit model without Lysaght BIM object

Revit model with Lysaght BIM object

To download:

Or visit our website at:
www.lysaghtasean.com

BLUESCOPE LYSAGHT

lysaght.malaysia@bluescope.com / lysaght.singapore@bluescope.com

facebook.com/lysaghtMYBN / facebook.com/lysaghtsg

Machine Vision: The Fundamentals & Image Acquisition

Written and Prepared by:

Ir. Dr Bhuvendhraa Rudrusamy
Assistant Professor @ Heriot-Watt University Malaysia & IEM Council Member

Nyan Shu Qi
President, HWUM-IEM SS

Foo Ee-Herng
Vice-President, HWUM-IEM SS

On 18 and 21 October 2021, Heriot-Watt University Malaysia – The Institution of Engineers Malaysia Student Section (HWUM-IEM SS) organised a webinar series on machine vision titled "Fundamentals" and "Image Acquisition" respectively. The two speakers were Senior R&D Managers at ViTrox Corporation Berhad. Some 60 students from various disciplines attended the workshops which were aimed at showing how computers or machines were used to see an application such as automated inspection in the manufacturing industry to identify defects and assure quality.

The Fundamentals

Image Acquisition

The first speaker, Mr. Wong Shin Jie, introduced the fundamentals of machine vision. He shared an overview of machine vision, from capturing the image and storing it on a drive to digitalising the image, transmitting it to the application on the computer, reproducing the image into an appropriate data format, analysing and learning the data as well as using it to facilitate the manufacturing process. He also demonstrated a variety of vision-based applications.

The second speaker, Ms. Ooi Ling Ching, introduced the image acquisition of machine vision. She talked about the fundamentals of optics as well as the importance of lighting techniques and methods to capture the information of an object. It was interesting to note that lighting would determine the quality of image acquisition which accelerated the overall machine vision performance.

Apart from sharing machine vision technology, the speakers also talked about the future demand and challenges of this application. They conducted a Kahoot session to increase the engagement between the participants and ViTrox staff members, with a visit to ViTrox as the prize. The workshop ended with a presentation of certificates of appreciation to the speakers. ■

Participants during the workshop

Tarikh: 9 Mac 2022

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 AWAM	
FAUZI BIN ABDUL RAHMAN	BE HONS (MALAYA) (CIVIL, 2005)
SAMSULNIZAM BIN ZULKAPLI	BE HONS (USM) (CIVIL, 2004) ME (UTM) (ENGINEERING MANAGEMENT, 2014)
KEJURUTERAAN KIMIA	
NG LAW YONG	BE HONS (UKM) (CHEMICAL, 2009) MSc (UKM) (CHEMICAL & PROCESS, 2011) PhD (UKM) (CHEMICAL & PROCESS, 2015)
KEJURUTERAAN ELEKTRIKAL	
AHMAD ZAINAL AZRAL BIN ABD AZIZ	BE HONS (USM) (ELECTRICAL, 2010)
HALMI BIN RUSMAN	BE HONS (UiTM) (ELECTRICAL, 2008)
MELVIN LONG	BE HONS (UTHM) (ELECTRICAL, 2010)
MOHD LATIF BIN MD KADIR	BE HONS (UiTM) (ELECTRICAL, 2007)
KEJURUTERAAN MEKANIKAL	
AHMAD SUKRI BIN SAAD	BSc (HONS (MEMPHIS STATE UNIVERSITY) (MECHANICAL, 1989)
MOHAMAD ZAKI BIN MAHATHIR	BE HONS (UTeM) (MECHANICAL (STRUCTURE & MATERIAL), 2008) ME (UMS) (OIL & GAS, 2018)

PERMOHONAN BARU / PERPINDAHAN MENJADI AHLI KORPORAT

Nama	Kelayakan
KEJURUTERAAN AWAM	
MUHAMMAD IKRAM BIN ISHAK	BE HONS (UTM) (CIVIL, 2009)
PUBALAN A/L KANDIAH	BE HONS (UKM) (CIVIL & STRUCTURE, 1998)
KEJURUTERAAN ELEKTRIKAL	
NORHAISAM BIN ISMAIL	BE HONS (UTeM) (ELECTRICAL (ELECTRONIC POWER & DRIVE), 2007) ME (UTM) (ELECTRICAL POWER, 2021)

PERPINDAHAN AHLI

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
106112	FELICIA ANAK MICHAEL MULOK	BE HONS (UTHM) (CIVIL - CONSTRUCTION, 2006)
89992	HEW WENG SAN	BE HONS (UNITEN) (CIVIL, 2013)
112595	HO EE WEE, WILLIAM	BE HONS (SWINBURNE) (CIVIL, 2012)
113101	LEE SU KIN, JESSICA	BE HONS (UNIMAS) (CIVIL, 2012)
69784	LEONG GEOK TENG	BE HONS (UNIMAS) (CIVIL, 2017) ME (UNIMAS) (2019)
95859	LIM SHIANG JIE	BE HONS (UTAR) (CIVIL, 2011)
42524	OON TENG HUI	BE HONS (QUEENSLAND) (CIVIL, 2007)
85499	QUAH KEN YONG	BE HONS (UTHM) (CIVIL, 2011)
105239	ROSLEE BIN ISMAIL	BE HONS (UNISEL) (CIVIL, 2009)
72353	TAN XIAN HUI	BE HONS (NEW SOUTH WALES) (CIVIL, 2013)
KEJURUTERAAN KIMIA		
66060	KHAW WEI CHUEN	BE HONS (TAYLOR'S) (CHEMICAL, 2017)
33710	SELVA NATHAN A/L SASITHARAN	BE HONS (MALAYA) (CHEMICAL, 2005) MPhil (UTM) (CHEMICAL, 2020)
KEJURUTERAAN ELEKTRIKAL		
93859	LIM YIN KIN	BE HONS (LIVERPOOL JOHN MOORES) (ELECTRONICS AND CONTROL SYSTEMS, 2012) MSc (NEWCASTLE UPON TYNE) (ELECTRICAL POWER, 2016)
51563	MUHAMMAD IKHSAN KHAMIL BIN MOHD SAFARI	BE HONS (UiTM) (ELECTRICAL, 2012)
89685	NOORNADIAH BINTI ALIPAH	BE HONS (UNISEL) (ELECTRICAL, 2012)
91011	RAJKIRAN SINGH A/L GURBACHAN SINGH	BE HONS (UNITEN) (ELECTRICAL POWER, 2012) ME (UNITEN) (ELECTRICAL, 2016)
52966	RICKSON BIN LIMANIS	BE HONS (UMS) (ELECTRICAL & ELECTRONICS, 2014)
28743	RIJALUR RAHIMI BIN MOHD ROSELI	BE HONS (UTHM) (ELECTRICAL, 2010)
29802	ROSLI BIN ABDULLAH	BE HONS (UTM) (ELECTRICAL, 2007)
KEJURUTERAAN MEKANIKAL		
89538	SIOW PING CHUAN	BE HONS (UMS) (MECHANICAL, 2007) ME (UMS) (MECHANICAL, 2010) PhD (UKM) (MECHANICAL & MATERIALS, 2016)

PERMOHONAN BARU / PERPINDAHAN MENJADI AHLI KORPORAT

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
22138	ABDUL SAMAD BIN ABDUL RAHMAN	BE HONS (UTM) (CIVIL, 1997) MSc (UiTM) (CIVIL (GEOTECHNIQUE), 2008) PhD (UiTM) (CIVIL, 2020)
101050	MA CHI HANG	BE HONS (SOUTHAMPTON) (CIVIL, 2010) MSc (SOUTHAMPTON) (CIVIL, 2012)

CONGRATULATIONS

Heartiest congratulations to
Ir. Prof. Dr Leong Wai Yie
for winning the WFEO GREE Women in Engineering Award 2021.

Pengumuman yang ke-161

SENARAI PENDERMA KEPADA WISMA DANA BANGUNAN IEM

Institusi mengucapkan terima kasih kepada semua yang telah memberikan sumbangan kepada tabung Bangunan Wisma IEM. Ahli-ahli IEM dan pembaca yang ingin memberikan sumbangan boleh berbuat demikian dengan memuat turun borang di laman web IEM http://www.iem.org.my atau menghubungi secretariat di +603-7968 4001 / 5518 untuk maklumat lanjut. Senarai penyumbang untuk bulan Februari 2022 adalah seperti jadual di bawah:

NO.	NO. AHLI	NAMA
1	40010	MR. TERRENCE SELVIN A/L ABRAHAM PATTU
2	84901	Ir. MUHAMMAD KHUZAIFAH BIN HASSAN
3	26609	MR. MOHAMAD AZHAR BIN ABU BAKAR
4	07504	Ir. CHEO WEE WAH
5	10801	MR. BOEY WEI LUN
6	14849	Ir. MOHD FADZIL BIN MOHD TAP
7	15793	MR. CHANG CHEE CHEONG
8	88509	MR. LEE CHUN HOONG
9	22654	MR. SREE GANESH A/L NARAYANAN
10	112326	MR. SIVA BALAN DARAMAKODAY
11	94216	EN. MUSTAZA BIN ZAWAWI
12	10911	Ir. BOON KUAT KHIN @ VOON KUAT KHIN
13	107795	MR. CHUNDANG KEDU
14	43599	MR. ZAKARIA BIN AWANG
15	04054	Ir. GOH YOON WAH
16	37963	MR. MOK BOON YEN
17	70395	MR. MOHAMED RAHIM BIN MALEK
18	12458	DATO' Ir. NOR HISHAM BIN MOHD. GHAZALI
19	50708	MR. MOHAMMAD HAFIZ BIN ZAKARIA
20	18269	Ir. CHONG SHU PHIN
21	12224	Ir. LOW HAN GUAN, DEN
22	09949	Ir. KHOO KOON TAI
23	12010	Ir. CHIENG SIE YII, CLARENCE
24	15958	Ir. SAW HOW TEONG

PERMOHONAN BARU / PEMINDAHAN AHLI

Persidangan Majlis IEM yang ke-**425** pada **29 Mac 2021** telah meluluskan sebanyak **292** ahli untuk permohonan baru dan permindahan ahli. Berikut adalah senarai ahli mengikut disiplin kejuruteraan:

DISIPLIN	GRED KEAHLIAN									
	FELO	SENIOR	AHLI	SENIOR GRADUATE	SISWAZAH	"INCORPORATED"	"AFFILIATE"	"ASSOCIATE"	SISWA	JUMLAH
Automotif									10	10
Perkhidmatan Bangunan			2					1		3
Kimia			6	2	14				9	31
Awam	3	1	13	5	48			1	16	87
Komputer					1					1
Elektrikal & Elektronik									2	2
Elektrikal			6	1	23	1			7	39
Elektronik			3	1	18	1			2	25
Alam Sekitar			1		1				1	3
Industri									2	2
Pembuatan					2				1	3
Marin					1					1
Bahan				1	1				1	3
Mekanikal			10	1	33	1		1	25	71
Mekatronik			1	1		1				3
Petroleum					2				1	3
Struktur & Awam									1	1
Sistem Mekanikal									1	1
Pengurusan Infrastruktur									3	3
JUMLAH	5	1	42	11	144	4	0	3	82	292

Senarai nama ahli dan kelayakan adalah seperti di bawah. Institusi mengucapkan tahniah kepada ahli yang telah berjaya.

Ir. Dr David Chuah Joon Huang

Setiausaha Kehormat, Institusi Jurutera Malaysia, Sesi 2020/2021

PERMINDAHAN AHLI KEPADA AHLI FELLOW

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
19071	WAN NAZARI BIN WAN JUSOH	BE HONS (MALAYA) (CIVIL, 1986)
15803	LI THANG FAI	BE HONS (MALAYA) (CIVIL, 1988)
30662	NG SOON CHING	BE HONS (UTM) (CIVIL, 2005) MSc (UTM) (CONSTRUCTION MANAGEMENT, 2006) PhD (UTAR) (2012)
KEJURUTERAAN ELEKTRIKAL		
21559	MUHAMMAD ARKAM BIN CHE MUNAAIM	BE HONS (UTM) (ELECTRICAL, 2000) MSc (USM) (BUILDING TECHNOLOGY, 2010) PhD (USM) (ENERGY CONSERVATION, 2014)
KEJURUTERAAN MEKANIKAL		
36800	PUVANESAN A/L MARIAPPAN	BE HONS (MMU) (MECHANICAL, 2007)

PEMINDAHAN KEPADA AHLI "SENIOR"

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
26431	TAOFIG BIN SAMAT	BE HONS (UKM) (CIVIL & STRUCTURAL, 1999)

PEMINDAHAN AHLI KEPADA AHLI KORPORAT

No. Ahli	Nama	Kelayakan
KEJURUTERAAN ALAM SEKITAR		
43664	LAW HONG KWANG	BE HONS (MALAYA) (ENVIRONMENT, 2008)
KEJURUTERAAN AWAM		
17697	AHMAD TARMIZI BIN MAT TAIB	BE HONS (UiTM) (CIVIL, 2000)
70261	LING JEN HUA	BE HONS (UTM) (CIVIL, 2006) ME (UTM) (CIVIL-STRUCTURE, 2008) PhD (UTM) (CIVIL, 2011)
26620	MUHAMMAD YAZID BIN OMAR	BE HONS (MALAYA) (CIVIL, 2006)
41069	NGIEN SU KONG	BE HONS (UTM) (CIVIL, 2006) MSc (CARDIFF) (WATER, 2008) PhD (UTM) (CIVIL, 2012)
14230	SOO HUA MING	BE HONS (NUS) (CIVIL, 1989) MSC (NUS) (CIVIL, 1992)
39204	WAI SOON HAN	BE HONS (UTM) (CIVIL, 2008) MSc (UTM) (CONSTRUCTION MANAGEMENT, 2009) PhD (UTM) (CIVIL, 2013)
KEJURUTERAAN ELEKTRIKAL		
48462	HAFIZI BISRULHAFI BIN MOHAMAD ZIN	BE HONS (UTM) (ELECTRICAL, 2007)
107808	MARCO P. KISSOL	BE HONS (UTHM) (ELECTRICAL, 2010)
62095	MUHAMMAD FADZLY BIN ABDUL MALEK	BE HONS (UTP) (ELECTRICAL & ELECTRONICS, 2016)
KEJURUTERAAN ELEKTRONIK		
87500	LAU CHEE YONG	BE HONS (UTM) (ELECTRICAL-ELECTRONICS, 2011) PhD (UTM) (BIOMEDICAL, 2015)
43948	NIK MOHD ZARIFIE BIN HASHIM	BE (FUKUI) (ELECTRICAL & ELECTRONICS, 2006) ME (FUKUI) (ELECTRICAL & ELECTRONICS, 2008)
79050	ZURIATI BINTI JANIN	BE HONS (UiTM) (ELECTRICAL, 1996) MSc (UPM) (REMOTE SENSING & GEOGRAPHIC INFORMATION SYSTEMS, 2001)
KEJURUTERAAN KIMIA		
107594	KHONG LAI YEE	BE (UKM) (CHEMICAL & PROCESS, 1992)
31964	TOH PEY YI	BE HONS (USM) 9CHEMICAL, 2009) PhD (USM) (2015)
KEJURUTERAAN MEKANIKAL		
50213	CHIENG HENG MING	BE HONS (UTAR) (MECHANICAL, 2010)
76190	MARK OVINIS	BE HONS (UTM) (MATERIALS, 1999) ME (TEXAS A & M) (MECHANICAL, 2003) PhD (LOUGHBOROUGH) (2011)
72719	MOHD AZLAN BIN ISMAIL	BE HONS (UMS) (MECHANICAL, 2007) ME Prac (WOLLONGONG) (MECHANICAL, 2009) PhD (UNIMAS) (2016)
50137	MOHD FAIZAL BIN FAUZAN	BE HONS (NOTTINGHAM) (MECHANICAL, 2008) ME (MALAYA) (MECHANICAL, 2011) PhD (MALAYA) (2015)
95818	PERABU A/L MOORTY	BE (UMP) (MECHANICAL, 2013)
66120	THIRUSELVAM A/L VELLOO	BE HONS (UNITEN) (MECHANICAL, 2013)
KEJURUTERAAN PERKHIDMATAN BANGUNAN		
66530	MUHAMAD NAZRI BIN MOHD RIFFIN	BE HONS (UTHM) (MECHANICAL, 2010)
71617	NAGENTRAU A/L MUNIANDY	BE HONS (UTHM) (MECHANICAL, 2014)

PEMINDAHAN KEPADA AHLI (MELALUI PEPERIKSAAN PENILAIAN PROFESIONAL)

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
56636	AHMAD FAISAL BIN MOHD GHAZALI	BE HONS (UTM) (CIVIL, 2013) ME (UTM) (CIVIL-STRUCTURE, 2016)
19884	ILANCHELVAN A/L POLANIPPAN	BSc HONS (UTM) (CIVIL, 2001) ME (UTM) (GEOTECHNICS, 2020)
41070	NORASPALELA BINTI ABDULLAH	BE HONS (UiTM) (CIVIL, 2008)
75261	SHAHIRON BIN SHAHIDAN	BE HONS (UNISEL) (CIVIL, 2007) ME (UPM) (STRUCTURAL AND CONSTRUCTIONS, 2010) PhD (USM) (2014)
KEJURUTERAAN ELEKTRIKAL		
28991	LEE WAI YIN	BE HONS (UTP) (ELECTRICAL & ELECTRONICS, 2004)
KEJURUTERAAN KIMIA		
34815	CHAN YEN SAN	BE HONS (UTM) (CHEMICAL-BIOPROCESS, 2010) PhD (USM) (2014)

32600	NG KOK SUM	BE HONS (UTM) (CHEMICAL, 2006) PhD (NOTTINGHAM) (2009)

KEJURUTERAAN MEKANIKAL

43670	MURRALITHARAN A/L RAJANDRAN	BE HONS (UNITEN) (MECHANICAL, 2009)

PERMOHONAN MENJADI AHLI KORPORAT

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
114362	INTAN NOR ZULIANA BINTI BAHARUDDIN	BE HONS (UTM) (CIVIL, 2006) MSc (UiTM) (CIVIL-GEOTECHNIQUE, 2010)
114677	PET ROYSTON BIN PAULUS TINUS	BE HONS (UiTM) (CIVIL, 2013)
KEJURUTERAAN ELEKTRIKAL		
114679	SELAMAT WONG TONG MEAN	BE HONS (LIVERPOOL JOHN MOORES) (ELECTRICAL & ELECTRONIC, 1997)
114361	WAN MOHD HAFIZ BIN WAN SALIM	BSc (ALBERTA) (ELECTRICAL, 2014)
KEJURUTERAAN KIMIA		
114360	ANA FARALIZA BINTI MOHAMED PUAD	BE HONS (UTP) (CHEMICAL, 2005)
114680	MOHD HAZUWAN BIN CHE ISHAK	BE HONS (UTM) (CHEMICAL-POLYMER, 2008) ME (UTM) (PETROLEUM, 2015)
KEJURUTERAAN MEKANIKAL		
114674	GAN JET HONG, MELVIN	BE (SHINSHU) (FUNCTIONAL MACHINERY & MECHANICS, 2011) ME (SHINSHU) (FUNCTIONAL MACHINERY & MECHANICS, 2013) PhD (SHINSHU) (2015)
114673	LEE FEI FEI, CINDY	BE HONS (UNIMAS) (MECHANICAL, 2011)
114676	NG HAN PEI	BE HONS (UPM) (AEROSPACE, 2012) ME (MALAYA) (MECHANICAL, 2016)
KEJURUTERAAN MEKATRONIK		
114678	MOHD ARI NAZRUL BIN ABD RAHMAN	BE HONS (UniMAP) (MECHATRONICS, 2007)

PERMOHONAN MENJADI AHLI (MELALUI PEPERIKSAAN PENILAIAN PROFESIONAL)

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
114675	HASNIDA BINTI ABDUL RAZAK	BE HONS (UTM) (CIVIL, 1996)

PEMINDAHAN KEPADA AHLI 'SENIOR GRADUATE'

No. Ahli	Nama	Kelayakan
KEJURUTERAAN KIMIA		
30845	WOON KOK SIN	BE HONS (UTM) (CHEMICAL, 2010) PhD (HONG KONG UNI. OF SCIENCE & TECH.) (ENVIRONMENTAL, 2015)
KEJURUTERAAN MEKANIKAL		
42169	TAY CHEN CHIANG	BE HONS (SWINBURNE) (MECHANICAL, 2010) ME (SWINBURNE) (2013) PhD (UNIMAS) (2018)

PERMOHONAN KEPADA AHLI 'SENIOR GRADUATE'

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
114369	KIEW SUNG TECK, DAVID	BE HONS (QUEENSLAND UNI. OF TECH.) (CIVIL, 2005)
114373	MOHD MUKHLIS BIN ABD GHAFAR	BE HONS (UiTM) (CIVIL, 2010)
114368	RASHID BIN SUWANDI	BE HONS (UTM) (CIVIL, 1990)
114688	SELVARAJA A/L MARAPPAN	BE HONS (UNITEN) (CIVIL, 2007)
114687	SUHAFENDI BIN SULONG	BE HONS (UiTM) (CIVIL, 2007)
KEJURUTERAAN ELEKTRIKAL		
114372	SASHINDRAN A/L VILIAM	BE HONS (UTHM) (ELECTRICAL, 2010)
KEJURUTERAAN ELEKTRONIK		
36236	MOHD KHAIRUL AZIZAT BIN JOHARI	BE HONS (UTM) (ELECTRICAL-MECHATRONIC, 2010)
KEJURUTERAAN KIMIA		
114370	ZAIZUL AZIZI BIN ZAMAN	BE HONS (MELBOURNE) (CHEMICAL, 2005)
KEJURUTERAAN MEKATRONIK		
114371	CHEW CHIN SIANG, DAVID	BE HONS (THE UNI. OF SOUTHERN QUEENSLAND) (MECHATRONIC, 2004)

PERMINDAHAN KEPADA AHLI SISWAZAH

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
94418	ABDUL RAHMAN BIN MOHD RAHIM	BE HONS (UTM) (CIVIL, 2018)
33157	AHMAD FADZIL BIN JOBLI	BE HONS (UiTM) (CIVIL, 2010) ME (UiTM) (CIVIL, 2014)
68871	AMIERUL HAFIZIE BIN AHMAD YUSOFF	BE HONS (UiTM) (CIVIL, 2017)
43703	CHONG YEE SEM, JARON	BE HONS (SWINBURNE UNI. OF TECH.) (CIVIL, 2012)
45563	Dr CHUA YIE SUE	BE HONS (USM) (CIVIL, 2012) PHD (NATIONAL UNI. OF SINGAPORE) (2017)
27885	Dr ZUL FAHMI BIN MOHAMED JAAFAR	BE HONS (USM) (CIVIL, 2008) MSC (USM) (CIVIL, 2012) PHD (MISSISSIPPI UNI.) (CIVIL, 2019)
68926	HANIS SHAKIRA BINTI AZMAN	BE HONS (UiTM) (CIVIL, 2017)
54774	HERMAN SHAH BIN HERMAN	BE HONS (UTHM) (CIVIL, 2016)
44480	HERNEY BINTI ABDULLAH	BE HONS (UiTM) (CIVIL, 2011)
60604	HO KAH KIT	BE HONS (UTAR) (CIVIL, 2013)
105497	MOHAMMAD NAZMI AFFNAN BIN MOHD JOHAR	BE HONS (IUKL) (CIVIL, 2019)
103623	MOHD REZANAJUIB BIN RAMLI	BE HONS (UTM) (CIVIL, 2020)
33218	MOHD RHAZEF BIN CHE SORI	BE HONS (UiTM) (CIVIL, 2010)
90315	MUHAMMAD AQIL BIN GHAZALI	BE HONS (UM) (CIVIL, 2020)
87261	NG CHEE KHENG	BE HONS (MONASH UNI) (CIVIL, 2020)
83011	NURUL AFIQAH BINTI RAMLI	BE HONS (UTHM) (CIVIL, 2019)
99073	RUDISON ANAK SERING	BE HONS (SWINBURNE UNI. OF TECH.) (CIVIL, 2019)
KEJURUTERAAN ELEKTRIKAL		
82495	TING SIAW YIENG	BE HONS (UTHM) (ELECTRICAL, 2019)
KEJURUTERAAN ELEKTRONIK		
62545	AHMAD SHAUQI BIN MOKHTAR	BE HONS (UTHM) (ELECTRONIC, 2017)
102111	AMR ADEL MOUSA MOHAMED HASSAN	BE HONS (SEGi UNI) (ELECTRICAL & ELECTRONICS, 2020)
40258	AUGUSTINE JOHN GOTTE	BE HONS (UTM) (ELECTRICAL - MECHATRONICS, 2013)
78949	MUHAMAD NAZRIN BIN AB SOTA	BE HONS (USIM) (ELECTRONICS, 2018)
68429	ONG THIAN YEEK	BE HONS (UMP) (ELECTRICAL - ELECTRONICS, 2015)
54143	PAWITHRA A/P VIJIYA	BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS, 2013) ME (UNITEN) (COMMUNICATION SYSTEMS. 2018)
94068	SHAHRULAZLAN BIN CHE ABDUL GHANI	BE HONS (UMP) (ELECTRICAL - ELECTRONICS, 2020)
KEJURUTERAAN KIMIA		
35991	Dr NUR 'IZZATI BINTI ISMAIL	BE HONS (UTM) (CHEMICAL, 2012) PhD (UKM) (CHEMICAL & PROCESS, 2018)
99121	LAW KAI WEN, ANDY	BE HONS (SWINBURNE UNI. OF TECH.) (CHEMICAL, 2020)
46934	MA UMAIRA SUHADDHA BINTI ZAINAL ABIDIN	BE HONS (UMP)(CHEMICAL-BIOTECHNOLOGY, 2012) MSc (UTP)(CHEMICAL, 2018)
84083	PRISCILLA LAVANIA STEPHEN PAUL	BE HONS (UTM) (CHEMICAL, 2019)
87935	TAN DING HOWE	BE HONS (UCSI UNI) (CHEMICAL, 2018)
KEJURUTERAAN MEKANIKAL		
35365	ABDUL LATIF BIN AZIS	BE HONS (UiTM) (MECHANICAL, 2013)
88469	AZMAL HUSAIN BIN SEENI MOHD	BE HONS (UM) (MECHANICAL, 2019)
95935	CHIN SIN YEE	BE HONS (UM) (MECHANICAL, 2019)
63560	DINESRAJ A/L NADARAJAN	BE HONS (UTHM) (MECHANICAL, 2017)
75663	MOHD FITRI ADAM BIN MOHD ISMAIL	BE HONS (UiTM) (MECHANICAL, 2017)
83591	MUHAMAD SYAZWAN BIN ABDUL KADIR	BE HONS (UTeM) (MECHANICAL, 2019)
75659	MUHAMMAD FIKRI BIN ABDUL RAHIM	BE HONS (UiTM) (MECHANICAL, 2017)
79828	MUHAMMAD IRFAN SYAFIQ BIN MOHD ANUAR	BE HONS (UNITEN) (MECHANICAL, 2018)
KEJURUTERAAN PEMBUATAN		
60174	ANAS MUJAHID BIN MOHAMMAD KHAIR	BE HONS (UTeM) (MANUFACTURING DESIGN, 2013)

PERMOHONAN MENJADI AHLI SISWAZAH

No. Ahli	Nama	Kelayakan
KEJURUTERAAN ALAM SEKITAR		
114714	LIEW WEN HONG	BE HONS (UM) (ENVIRONMENTAL, 2019)
KEJURUTERAAN AWAM		
114691	LEE YUN CHEE	BE HONS (CURTIN UNI. OF TECH.) (CIVIL & CONSTRUCTION, 2009)
114702	LOO SHWU YING	BE HONS (INTI INTERNATIONAL UNI.) (CIVIL, 2019)
114393	LEE YI FUNG	BE HONS (IUKL) (CIVIL, 2019)
114383	NORAIMI BINTI AHMAD	BE HONS (KUiTTHO) (CIVIL, 2003)
114703	ANIS SAMIRA BINTI KAMARUDIN	BE HONS (UiTM) (CIVIL - INFRASTRUCTURE, 2019)
114396	MIMI SHUHAIDAH BT YUSOF	BE HONS (UiTM) (CIVIL, 2009) MSC (UiTM) (CIVIL-ENVIRONMENTAL, 2014)
114414	GILBERT THOMAS LAING JOK	BE HONS (UiTM) (CIVIL, 2011)
114392	ZULKHAIRI BIN AHMED	BE HONS (UiTM) (CIVIL, 2011)
114374	MOHD AFIQ AZINUDDIN BIN TAYIB	BE HONS (UiTM) (CIVIL, 2017) MSC (UiTM) (CONSTRUCTION, 2019)
114693	SITI NUR KHALILA BINTI ZULKARNAIN	BE HONS (UiTM) (CIVIL, 2019)
114382	AIMAN HAKIMI BIN AHMAD ZAIM	BE HONS (UMP) (CIVIL, 2017)
114408	CHUNG KHANG HOW, ERIC	BE HONS (UMS) (CIVIL, 2016)
114421	TAN KAH YEAT	BE HONS (UNI. OF NEWCASTLE UPON TYNE) (CIVIL & STRUCTURAL, 2018) MSc (UNI. OF NEWCASTLE UPON TYNE)(STRUCTURAL, 2019)
114385	MOHAMMAD MAHLIL BIN MD SALEH	BE HONS (UNITEN) (CIVIL, 2013)
114719	MUHAMAD SHAFIQ BIN ZAKARIAH	BE HONS (UNITEN) (CIVIL, 2016)
114391	MUHAMMAD KHUZAIMI BIN AZIZ	BE HONS (USM) (CIVIL, 2019)
114395	Dr NAJEEHA BINTI MOHD APANDI	BE HONS (UTHM) (CIVIL, 2012) ME (UTHM) (CIVIL, 2014) PHD (UTHM) (CIVIL, 2019)
114690	NG SWEE SIANG	BE HONS (UTM) (CIVIL, 2000) ME (UTM) (ENVIRONMENTAL, 2003)
114384	MAHAINDRAN A/L KRISTNAN	BE HONS (UTM) (CIVIL, 2004)
114717	Dr ERWAN HAFIZI BIN KASIMAN	BE HONS (UTM) (CIVIL, 2008) ME (UTM) (CIVIL - HYDRAUL, 2012) PhD (IMPERIAL COLLEGE LONDON) (2018)
114376	MOHD HIZIR BIN HALIS	BE HONS (UTM) (CIVIL, 2010)
114422	MUHAMMAD MUSADDIQ BIN ABD MANAP	BE HONS (UTM)(CIVIL, 2016)
114729	TAN BAN BAN HOCK, GRAHAM	BE HONS (UTP) (CIVIL, 2013)
114721	MUHAMMAD HAFIZ BIN ZULKAFLY BIN ZULKAFLY	BE HONS (UTP) (CIVIL, 2017)
114704	LEE ZHENG YUE	BSc (IOWA STATE UNI OF SCIENCE & TECH.) (CIVIL, 2019)
114402	Dr MANAL MOHSEN ABOOD ALBAYATI	BSc (UNI. TECH. BAGHDAD) (BUILDING & CONSTRUCTION, 1985) MSc (UPM) (WATER RESOURCES, 2006) PhD (UPM) WATER RESOURCES, 2013)

114415	LIM SHEN CHEE, ADRIAN	ME HONS (HERIOT-WATT UNI) (CIVIL, 2020)
114365	LIM KENT KHAI	ME HONS (MANCHESTER UNI) (CIVIL & STRUCTURAL, 2018)
114375	LAU LEE YEO	ME HONS (NOTTINGHAM UNI.) (CIVIL, 2014)
114397	SUNG HON KONG, BRANDON	ME HONS (NOTTINGHAM UNI.) (CIVIL, 2020)
114692	CHENG HONG NANG	ME HONS (SHEFFIELD UNI.) (CIVIL, 2020)

KEJURUTERAAN BAHAN

114387	Dr SYAZWANI BINTI MOHD ZAKI	BE HONS (IIUM) (MATERIALS, 2010) MSC (USM) (MATERIALS, 2014) PHD (MANCHESTER UNI) (MATERIALS, 2019)

KEJURUTERAAN ELEKTRIKAL

114731	LOO PIN LIKH	BE HONS (BRADFORD UNI) (ELECTRICAL & ELECTRONICS, 2014) ME (UTAR) (ELECTRICAL, 2020)
114709	MOHD ASRI BIN ARSHAD	BE HONS (MIDDLESEX UNI) (ELECTRONIC, 1997)
114715	MOHAMMED HUSSEIN SALEH MOHAMMED HARAM	BE HONS (MMU) (ELECTRICAL, 2019)
114400	AHMAD FAISAL BIN AHMAD FUAD	BE HONS (RMIT) (ELECTRONIC & COMMUNICATION, 2012)
114424	Dr KOW KEN WENG	BE HONS (THE UNI. OF NOTTINGHAM)(ELECTRICAL & ELECTRONICS, 2014) ME (UNITEN) (ELECTRICAL, 2019) PhD (THE UNI. OF NOTTINGHAM)(2020)
114736	MOHD TAJUDDIN BIN ISMAIL	BE HONS (UiTM) (ELECTRICAL, 2008)
114705	MOHD HAFIZI BIN YUSOF@ ABD TALIB	BE HONS (UiTM) (ELECTRICAL, 2009)
114413	WAN IQMAL FAEZY BIN WAN ZALNIDZAM	BE HONS (UiTM) (ELECTRICAL, 2017)
114398	Dr HADI GUNA	BE HONS (UKM) (ELECTRICAL & ELECTRONIC, 2008) MSC (UKM) (ELECTRICAL, ELECTRONIC & SYSTEM, 2011) PHD (UKM) (ELECTRICAL, ELECTRONIC & SYSTEM, 2019)
114390	PATRICK ANDRA TAWANG @ ANDRA TAWANG	BE HONS (UM) (ELECTRICAL, 2004)
114706	HIU FU SHUN	BE HONS (UMS) (ELECTRICAL & ELECTRONICS, 2016)
114388	MOHD FADZIL BIN MOHD DAUD	BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS, 2010)
114713	CHANG JIING FENG, KELLY	BE HONS (UNITEN) (ELECTRICAL POWER, 2015)
114423	MUHAMMAD FARIS ISKANDAR BIN SHUHAIMI	BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS, 2019)
114710	MUHAMMAD ADIB ZUFAR BIN RUSLI	BE HONS (UTM) (ELECTRICAL - INSTRUMENTATION & CONTROL, 2015)
114401	ZULKARNAIN BIN HASSAN	BE HONS (UTM) (ELECTRICAL, 2016)
114389	MOHD HAZIQ BIN MOHD YUNUS	BE HONS (UTP) (ELECTRICAL & ELECTRONICS, 2015)
114689	MUHAMAD AIZUDDIN BIN MOHD KAMEL	BE HONS (UTP) (ELECTRICAL & ELECTRONICS, 2016)
114732	MUHAMMAD AIZAT BIN MUHAMMAD AZMAN	BE HONS (UTP) (ELECTRICAL & ELECTRONICS, 2020)
114724	LEE KAE SHYUAN	BSc (BUFFALO, NEW YORK) (ELECTRICAL, 2004)
114404	KHOO SHEN MI	BSC (PURDUE UNI) (ELECTRICAL, 2018)
114364	MOHD ASSHAHRIN BIN ABDUL RAHMAN	ME HONS (THE UNI. OF BIRMINGHAM)(ELECTRONIC & ELECTRICAL, 1998)

KEJURUTERAAN ELEKTRONIK

114419	Dr WAN WARDATUL AMANI BINTI WAN SALIM	BE (UNI. OF MINNESOTA) (ELECTRICAL, 2001) MSc(UNI. OF MINNESOTA) (ELECTRICAL, 2003) PhD(PURDUE UNI.)(2009)
114363	SAMUELARTHUR A/L ANTHONY	BE HONS (IUKL) (ELECTRONICS, 2020)
114406	KHOO BOO WOOI	BE HONS (LIVERPOOL JOHN MOORES UNI.) (ELECTRONICS & CONTROL SYSTEMS, 2005) ME (MMU) (TELECOMMUNICATIONS, 2018)
114418	Dr KANG CHIA CHAO	BE HONS (NORTHUMBRIA UNI.) (ELECTRICAL & ELECTRONIC, 2008) MSC (USM) (ELECTRONIC SYSTEMS DESIGN, 2011) PHD (USM) (MICROWAVES & SATELITE SYSTEMS, 2016)
114379	SYARIFAH AZUANI BINTI SEYD MAH AZIZ	BE HONS (UiTM) (ELECTRICAL, 2008)
114707	AHMAD SYAZWAN BIN YUSOF	BE HONS (UiTM) (ELECTRONICS -INSTRUMENTATION, 2014)
114722	Dr NG WEI JIANG	BE HONS (UNI. OF EAST LONDON) (ELECTRICAL & ELECTRONIC, 2013) MSc (HERIOT-WATT UNI.) (RENEWABLE ENERGY, 2014) PhD (NOTTINGHAM UNI.) (2020)
112891	PHAN TAY HIN	BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS, 2004)
114378	MOHD FAREEZ BIN MOHD YUSOFF	BE HONS (UTM) (BIO-MEDICAL, 2012)
114726	SUYAMPRAKAS KANNAN	BE HONS (UTM) (ELECTRICAL - ELECTRONIC, 2010 ME (UTM) (ELECTRICAL POWER, 2018)
114735	SANIZAN BIN HANIF	BE HONS (UTM) (ELECTRICAL - ELECTRONICS, 2005)

KEJURUTERAAN KIMIA

114409	Dr NORZILAH BINTI ABDUL HALIF	BE (UM) (CHEMICAL, 2003) MESc (UM) (2006) MSc (UNIMAP) (ENGR. & MATHEMATICS, 2019 PhD (ENGR. & MATERIAL SCIENCE, 2012)
114399	MUHAMMAD ALIFF BIN MUHAMMAD SOHAIMI	BE HONS (UiTM) (CHEMICAL, 2018)
114734	CHIN YOU TONG	BE HONS (UM) (CHEMICAL, 2008)
114377	AHMAD ILYAS BIN RUSHDAN	BE HONS (UPM) (CHEMICAL, 2016)
114723	Dr NORAZWAN BIN MD NOR	BE HONS (USM) (CHEMICAL. 2009) MSc (USM) (CHEMICAL, 2012) PhD (UM) (HEALTH, SAFETY & ENVIRONMENT, 2018)
114405	Dr NUHA BINTI AWANG	BE HONS (UTM) (CHEMICAL-POLYMER, 2010) ME (UTM) (POLYMER, 2013) PhD (UTM) (GAS ENGR., 2017)
114700	ANG CHIN YEW	BSc (IOWA STATE UNI OF SCIENCE & TECH.) (CHEIMICAL, 2012)
114697	AKMAL RAFIQ BIN ARIFFEN	ME HONS (HERIOT-WATT UNI) (CHEMICAL - OIL & GAS)
114725	NUR AMALINA BINTI SAMSUDIN	ME HONS (IMPERIAL COLLEGE LONDON) (CHEMICAL, 2018)

KEJURUTERAAN KOMPUTER

114733	TAN CHEE KANG	BE HONS (UPM) (COMPUTER SYSTEM & COMMUNICATIONS, 2001)

KEJURUTERAAN MARIN

114381	MOHAMMAD NAIM BIN JASMI	BE HONS (UTM) (MECHANICAL - MARINE TECH., 2009)

KEJURUTERAAN PEMBUATAN

114412	ONG HUEIH LI	BE HONS (UNIMAP) (MANUFACTURING, 2012)

KEJURUTERAAN MEKANIKAL

114699	AHMAD MUNAWWAR BIN ABDUL RAHMAN	BE HONS (UM) (MECHANICAL, 2015)
114681	ALIF ZACHARY BIN ZULKIFLI	BE HONS (UNITEN) (MECHANICAL, 2017)
114718	ALIFF BIN AB TAHIR	BE HONS (KUiTTHO) (MECHANICAL, 2005)
114416	AMIRUL FIKRY BIN SAMSUDIN	BE HONS (UTM) (MECHANICAL - AERONAUTICS, 2018)
114720	ASHRUL RIEZAL BIN ASBAR	BE HONS (UTHM) (MECHANICAL, 2007)
114407	DOMINIC ANAK CHARLIES	BE HONS (UNIMAS) (MECHANICAL & MANUFACTURING SYSTEM, 2004)
114716	ESHVINDER SINGH MANN	BE HONS (SEGI UNI.) (MECHANICAL, 2019)
114712	JOEL JOBELSON SOH - ANDU	ME HONS (SOUTHAMPTON UNI.) (MECHANICAL, 2018)
114728	KER TZE SHENG	BE HONS (CURTIN UNI) (MECHANICAL, 2016)
114386	LIM CHIEN PENG, JEFFREY	ME HONS (NOTTINGHAM UNI) (MECHANICAL, 2015)
114694	LIM KOK THONG	BE HONS (UTeM) (MECHANICAL - STRUCTURE & MATERIAL, 2016)
114698	LIM WEI YEE	BE HONS (UM) (MECHANICAL, 1988)
114711	MANIRAJA A/L SAHADEVEN	BE HONS (UNITEN) (MECHANICAL, 2007)
114394	MOHAMMAD TAUFIQ HAIQAL BIN MOHAMMAD MUSA	BE HONS (USM) (MECHANICAL, 2019)
114411	MUHAMAD AZEEM BIN SUHAIMI	BE HONS (UiTM) (MECHANICAL, 2019)
114403	MUHAMMAD AMIRUL AQRAM BIN ABU BAKAR	BE HONS (UPNM) (MECHANICAL, 2017)
114701	MUHAMMAD AZIM BIN MAHAYUDDIN	BE HONS (UNITEN) (MECHANICAL, 2020)
114420	MUHAMMAD SYAHMI BIN JAJULI	BE HONS (UTP) (MECHANICAL, 2017)
114696	NOR HASBULLAH BIN IBRAHIM	BE HONS (UTHM) (MECHANICAL, 2012) MSc (UTM) (INDUSTRIAL, 2018)
114417	NURHAFEEZAN BIN MALIK	BE HONS (UTP) (MECHANICAL, 2010)
114380	P SHASHI KUMAR PARAMESWARAN	BE HONS (UM) (MECHANICAL, 1999)
114359	RAVIVARMAN SELVARAM	BE HONS (UNITEN) (MECHANICAL, 2015)
114730	TAMILARASU MANIAM	BE HONS (UTHM) (MECHANICAL, 2012)
114410	WAN ABDUL HADI BIN WAN HUSSIN	BE HONS (IIUM) (MECHANICAL - AUTOMOTIVE, 2012)
114708	YAP JIA JUN	ME HONS (NOTTINGHAM UNI) (MECHANICAL, 2016)

KEJURUTERAAN PETROLEUM

114695	MUHAMMAD HAZIQ BIN HAMZAH	BE HONS (UTP) (PETROLEUM, 2016)
114727	THOMAS AARUL A/L NARAYANAN	BE HONS (UTP) (PETROLEUM, 2019)

PERMOHONAN MENJADI AHLI 'INCORPORATED'

No. Ahli	Nama	Kelayakan
KEJURUTERAAN ELEKTRONIK		
114366	ARAVINDNACHAN BALAIKERISNAN	BE HONS (NOTTINGHAM UNI) (ELECTRICAL & ELECTRONIC, 2005)
KEJURUTERAAN ELEKTRIKAL		
114683	TIMOTHY MARK A/L A.L. NELSON	BE HONS (SHEFFIELD HALLAM UNI) (ELECTRONICS SYSTEMS, 2005)
KEJURUTERAAN MEKANIKAL		
114682	MOHD FUAD BIN ZAMRI	BE TECH HONS (UNIKL-MIAT) (MECHANICAL, 2019)
KEJURUTERAAN MEKATRONIK		
114367	WAN MUHAMMAD HAKIM BIN WAN MOHTAR	BE TECH HONS (UNIKL) (MECHATRONICS, 2018)

PERMOHONAN MENJADI AHLI 'ASSOCIATE'

No. Ahli	Nama	Kelayakan
KEJURUTERAAN BUILDING SERVICES		
114684	BALAMUNI A/L MALAYSIAN	DIPL. Tech.(POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH)(BUILDING SERVICES, 2014)
KEJURUTERAAN AWAM		
114685	ENTONI ZAINI	DIPL. (MAJU INST. OF TECH.) (CIVIL, 1988)
KEJURUTERAAN MEKANIKAL		
114687	MOHD SABRIE BIN AZAMAN	DIPL. Tech.(POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH)(MECHANICAL, 2013)

Note: *Continuation would be published in May 2022. For the list of approved "ADMISSION TO THE GRADE OF STUDENT", please refer to IEM web portal at http://www.myiem.org.my.*

dimensionpublishing

The Choice of Professionals

Authorised Publisher: The Institution of Engineers, Malaysia (IEM) - JURUTERA

Explore our full set of
Professional and Integrated
PUBLISHING MANAGEMENT SERVICES:

- » **Project Management**
- » **Creative Management**
- » **Ad Space Management**
- » **Mailing Management**
- » **Print Management**

- **Annual Reports**
- **Booklets** • **Brochures**
- **Buntings** • **Business Cards**
- **CD / DVD Replications**
- **Calendars** • **Cards & Invitations**
- **Certificates** • **Custom Printings**
- **Envelopes** • **Folders**
- **NCR Bill Books** • **Notepads**
- **Leaflets** • **Letterheads**
- **Paper Bags** • **Posters**
- **Stickers** • **Others**

For enquiries, please contact:

dimensionpublishing
The Choice of Professionals

Dimension Publishing Sdn Bhd (449732-T)
Level 18-01-02, PJX-HM Shah Tower, No. 16A, Persiaran Barat,
46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia.
Tel: +603 7493 1049 Fax: +603 7493 1047 E-mail: info@dimensionpublishing.com
Shirley Tham : +6016 283 3013 Joseph How : +6011 1234 8181

ANCHOR-REINFORCED EARTH

Our Strength is Your Confidence

APPLICATION • Bridge Abutment • Land Reclaimation • Housing Development & Temporary Embankment • Other Civil Engineering Application



CTSB

CT CRIB™

The Most Reliable & Cost Effective Retaining Wall System

APPLICATION • Slope Protection • Embankment Stabilization • Housing & Road Project • Other Civil Engineering Application



For enquiry please contact:

CRIB TECHNOLOGIES SDN BHD (564096-A), **ARE WALL (M) SDN BHD** (542608-W)

No. 28-2, Jalan Setia Utama AS U13/AS, Setia Alam, Sek U13, 40170 Shah Alam, Selangor

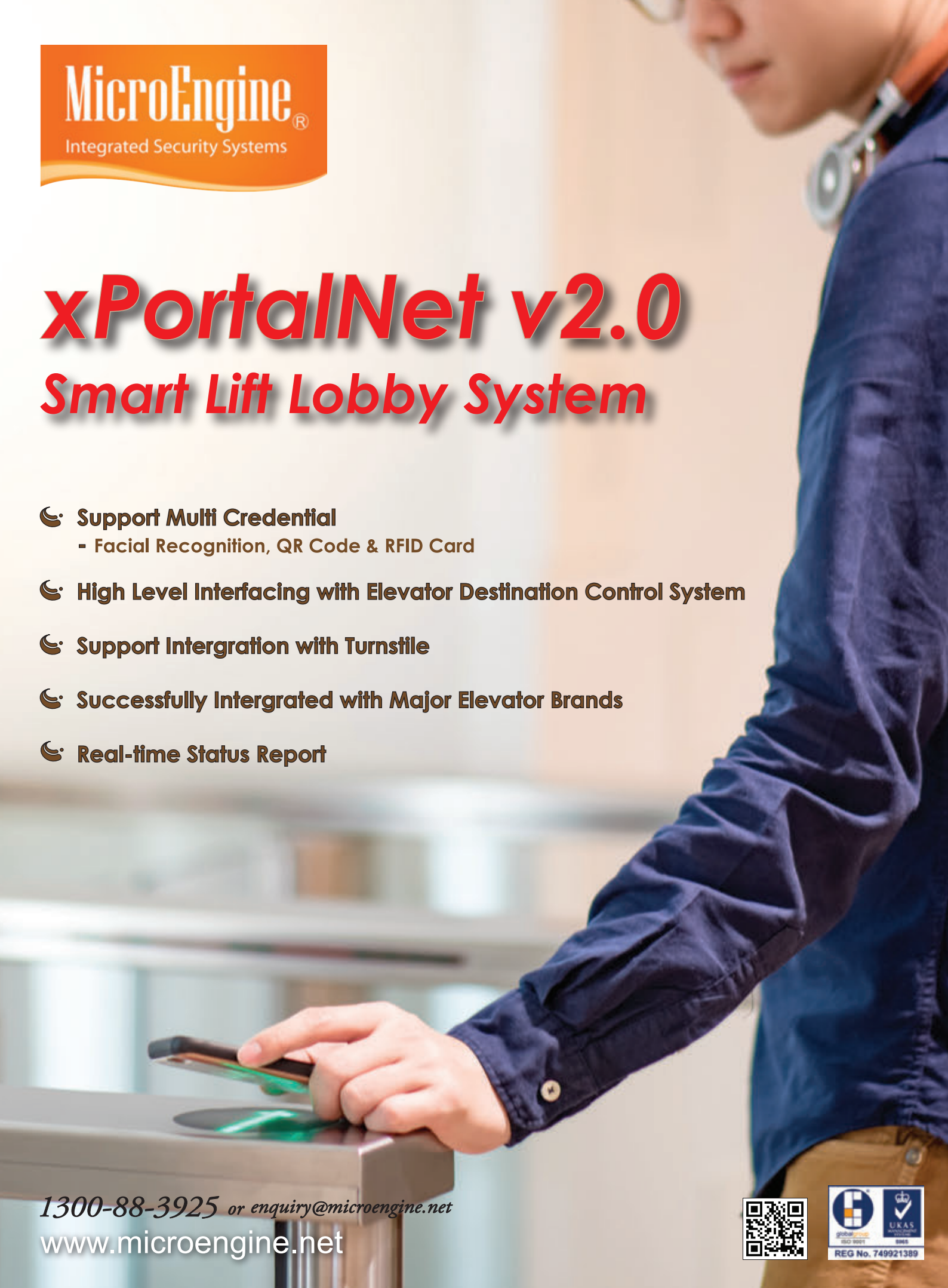
Tel: +603-3359 1227 (Hunting Line) Fax: +603-3358 7392 Email: groadesb@yahoo.com Website: http://www.ctsbare.com

MicroEngine®
Integrated Security Systems

xPortalNet v2.0

Smart Lift Lobby System

- **Support Multi Credential**
  - Facial Recognition, QR Code & RFID Card
- **High Level Interfacing with Elevator Destination Control System**
- **Support Intergration with Turnstile**
- **Successfully Intergrated with Major Elevator Brands**
- **Real-time Status Report**



1300-88-3925 or enquiry@microengine.net
www.microengine.net

REG No. 749921389