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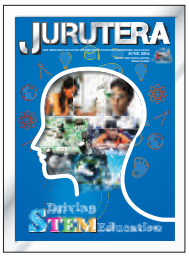

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JURUTERA is circulated to more than **40,000 registered members** of The Institution of Engineers, Malaysia (IEM), with an **estimated readership of 160,000** professionals.

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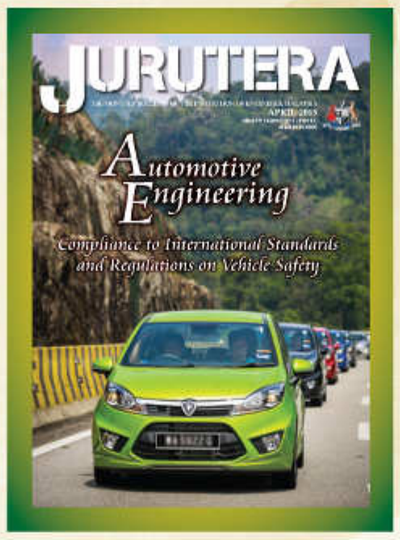

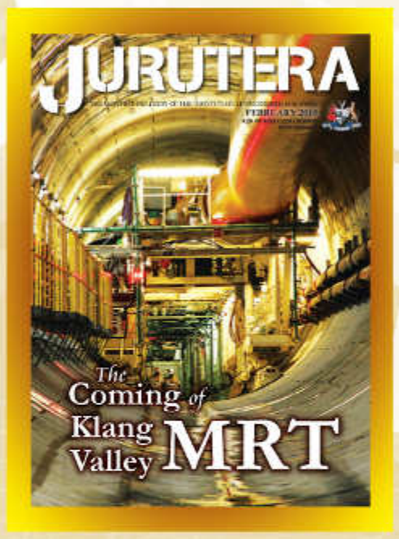

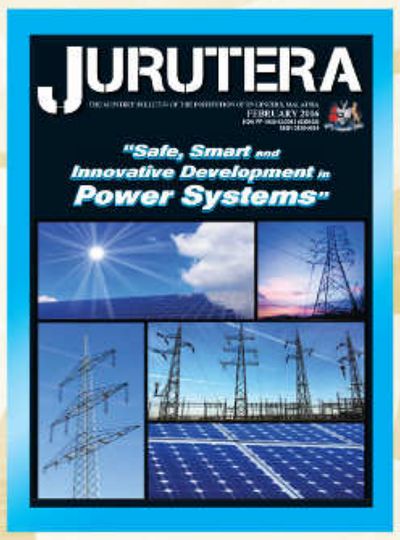

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by Ir. Prof. Dr Vinesh Thiruchelvam
Chairman,
Engineering Education
Technical Division

***Prof. Vinesh** is currently the Dean of the Faculty of Computing, Engineering & Technology at Asia Pacific University of Technology & Innovation. He has over 20 years of academic and industrial experience in which he served over 8 years overseas as a consultant. Prof. Vinesh is an advocate for STEM education, and knowledge and technology transfer and also a Chartered Engineer (MIET & FIMechE) and a Competent Energy Manager.*

Enhancing STEM Education

Youths moving away from Science, Technology, Engineering & Mathematics (STEM) education is truly worrisome. Our nation's prospects hinge on how well it responds to demographic and technological changes.

Measures are being taken at ministry level as well as by educational institutions and various industries to bring Malaysian youths back to STEM-based education but there is plenty still that needs to be done.

The challenge is scale: All strategies and initiatives must reach the majority of students.

We need engineers to embrace nationwide development and technology and, as engineers, it is our duty to promote this profession to the future generation. To maintain technology leadership, it is imperative that we secure an adequate pipeline of future STEM talent.

Engineering Education Technical Division (E2TD) has been actively promoting STEM over the last few years by organising national-level talks and engineering activities at schools. The Ministry of Higher Education has also recognised our efforts and given us its full support to promote STEM.

Over the last two years, E2TD has approached and conducted awareness programmes in 47 schools and since 2012, we have been organising an annual national engineering essay competition in which 62 schools from all over the country have taken part.

E2TD thanks its members for contributing ideas, time and effort to promote awareness and activities in STEM. We hope others will join us in our efforts to reach out to young Malaysians. ■

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Enhancing STEM Education, Encouraging Interest in TVET

Dato' Seri Ir. Dr Zaini Ujang

BEng. (Chemical), MSc (Env. Eng.), PhD (Env. Eng.), MIEM, FASc (M), FIChemE (UK), CEng (UK), CSci (UK), P.E. (M), MCIWEM (UK), MIWA (UK), MIEM, EPRM, MMIM

***Dato' Seri Ir. Dr Zaini Ujang**, age 51, is Secretary General, Ministry of Higher Education. He graduated with B.Eng. (Chemical Engineering) from Universiti Teknologi Malaysia (UTM), and MSc and PhD in environmental engineering from the University of Newcastle, UK. Prior to being Secretary General, Ministry of Higher Education, he was the Vice-Chancellor of UTM, one of the oldest technical university in Malaysia. He is also a Chartered Engineer (UK) and a Fellow of Academy Science of Malaysia. He is the first recipient of the Malaysia Merdeka Award 2009 for the category of Outstanding Scholastic Achievement in environmental and sustainability water.*

While interest in Science, Technology, Engineering and Maths (STEM) is declining among Malaysian students, the Ministry of Higher Education is not perturbed as it is also a worldwide trend that can be addressed by developing developing technical-vocational education and training, and experiential learning instead. JURUTERA interviewed Dato' Seri Ir. Dr Zaini Ujang, the first professional engineer appointed as Secretary General of the Ministry of Higher Education.

Engineering makes things better. Without engineering, we would not be living in the kind of world we know today — with modern roads, bridges and clean water, for example. Engineering disciplines, including civil, mechanical, industrial, electrical and materials, cut across many industries, such as transportation, petroleum and construction. These are deeply intertwined in the real world and yet interest among the young in Science, Technology, Engineering and Maths (STEM) education, which is crucial in developing systems, structures, products or materials, seems to diminish not only in Malaysia but also worldwide.

What will happen as the young generations of today and tomorrow start moving away from STEM? *JURUTERA* poses this question to Dato' Seri Ir. Dr Zaini Ujang.

According to Ir. Dr Zaini, the number of young Malaysians pursuing higher education equivalent to the A-Levels for entry into university, stands at less than 30%. Knowing the importance of a semi-skilled and skilled workforce, the Government is promoting and encouraging students to pursue Technical and Vocational Education and Training (TVET). Worldwide, interest in TVET is also increasing as it concerns the acquisition of knowledge and skills for the "real world" of work. It comprises formal and informal learning of skills and acquiring knowledge, from basic to advanced levels, across a wide range of institutional and work settings in many socio-economic sectors.

Elaborating on TVET, Ir. Dr Zaini says this is divided into two categories:

- Knowledge-based or research-based TVET, where students can go up to the Masters level.
- Hands-on TVET, where working citizens, including trained technicians in engineering fields, may pursue courses and pass examinations to acquire professional qualifications on the job (or better known as "experiential learning"), despite them not having formal university or college education.

Ir. Dr Zaini adds that the Ministry of Higher Education, through Malaysia Qualifications Agency (MQA), has approved Accreditation of Prior Experiential Learning (APEL) in 2015, which provides the opportunity for individuals with working experience but who lack formal academic qualifications, to pursue their studies in Institutions of Higher Learning (IHLs). Under APEL, they will be assessed on both formal education and working experiences.

"For example, Universiti Pertahanan Malaysia (UPNM) is now working on 'appealing' military senior officers and those who want to achieve the rank of colonel can undergo proper military training and get the necessary exposure on the job, from technical to managerial positions. In many countries, when you reach certain positions, such as colonel in the military, you can apply for APEL certification to enrol in a Master's degree programme," he says.

HANDS-ON LEARNING

Ir. Dr Zaini stresses that the route to STEM-related professions should not be limited to education in STEM per se.

"I am optimistic that if you take students good in maths, for example, and expose them to the job market in STEM-related professions and then allow them to get APEL certification and other accreditations, they will be able to reach higher levels of education. What should be emphasised is not the level of education, but rather the outcome of higher education and how this can be made available and practical in the working world," he says.

"There are many routes that people can choose from. Conventionally, you go to school and then to college/university to get a degree and then get a job. But some school-leavers opt to not go to university; they may take the TVET route or enter the job market first and later come back for APEL certification."

Ir. Dr Zaini cites the data on tertiary education of populations in the last 50 years (1962-2012) in selected countries compiled by the Organization for Economic Cooperation and Development (OECD). In Germany, for example, the percentage of its population enrolled in higher education has not changed in the last 50 years but remains at 30%. Austria also maintained 28% in the same period but South Korea saw a massive jump from 15% to 80%, as did Japan, from 20% to 60%.

However, maintaining 30% tertiary education level has not affected the industrialisation of Germany or Austria.

"They know that industrialisation only requires a certain number of technicians and engineers, for example. But one engineer may require 10 highly-skilled technicians and 10 highly-skilled technicians will require 100 semi-skilled staff doing various types of jobs. So they work around the 100+10+1 approach. This is what they have in their TVET and APEL system," says Ir. Dr Zaini.

"In Malaysia, we are also looking into this. Yes, in schools, the number of students interested in STEM is declining. We should be concerned. However, we should understand that this is the conventional route to getting higher education. We also should promote other routes that will help students make it in the job market.

"Some STEM-related sectors can also benefit from non-STEM students. In Germany for example, industries are benefitting from TVET students. These students fall into two categories:

1. Students good in Maths who can hold positions at superior levels
2. Students who are highly trained in and good with hands-on skills. These are highly sought after, for example, in the car-making industry, for which Germany is well known."

DEVELOPING HUMAN CAPITAL

Under the 11th Malaysia Plan (2016-2020) which spells out six strategic thrusts, the third singles out Human Capital Development as a way to advance the nation. It is a critical enabler to drive and sustain Malaysia's economic

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growth. It also supports the transition of all economic sectors towards knowledge-intensive activities. Ir. Dr Zaini points out that a big portion of our Human Capital Development hinges on building TVET.

He says: "We want the TVET route to be enhanced. In the Malaysia Education Blueprint 2015-2025 (Higher Education), the Government has set the target for TVET to grow 6.8% annually. The growth of conventional academic studies is only 2.6%. Those who do not go to or are not qualified to enter university, can choose polytechnics or community colleges with TVET options. In addition, the fees are cheaper as they are highly subsidised by the government."

Malaysia, he adds, looks at experiences and studies done in many parts of the world.

"The future industry does not depend solely on applied sciences or basic sciences and the like. In future, more integration will take place. In fact, this is already happening. For example, in information technology, people use IT for creative work. Many workers in virtual reality IT are art students who also do animation and creative gammification. They don't need to be science students to be able to do this kind of job. As long as they study general science and mathematics at SPM level, they should be able to do the job. Students who are good in art are often the ones who can handle creative technology better," he says.

He recalls that in the past, architects used diagrams which they drew for their presentations. "Not anymore. Today, they use animations done by art-based people who complement the skills of the architect. In the old context, we needed computer skills to do computer work, coding and programming, and that we required only computer specialists to do these jobs. But not anymore," he says.

He agrees that the decline in the interest in STEM is worrisome but we should forecast and understand the dynamics of future technology and industry in which TVET suits the K-economy ecosystem.

"For example, Malaysia is no longer competitive in manufacturing (such as textiles and polymer-based industry) because our labour cost is much higher than that of, for instance, Bangladesh, Indonesia and Vietnam. In addition, such low-value-chain industries are no longer encouraged in this country. We are now encouraging knowledge-based industry, which requires fewer people with STEM education at the top but more highly-skilled, local TVET workers to do various skills-based jobs down the line," he says, adding that this is based on the premise that STEM should be supported by TVET graduates.

"Personally, I think we need a workforce that's 30% STEM:70% TVET. Only then can we possibly replace the foreign labour in our country. Countries such as Saudi Arabia, which don't have local TVET workers, have to import large numbers of low-skilled foreign workers for various sectors such as manufacturing and construction. Germany and Japan, on the other hand, do not employ foreign workers in factories. Instead, they employ locals with high-skilled TVET qualifications," says Ir. Dr Zaini.

RAISING QUALITY TVET GRADUATES

For Malaysia to have more skilled workers, Ir. Dr Zaini is propagating efforts to raise TVET graduates, not only in terms of numbers but also in quality. In terms of numbers, it is already set at 6.8% growth annually, which means the country will not be building more universities.

"We will build more polytechnics instead. We are also encouraging both public and private universities as well as colleges to focus on skills development. The students must be given avenues to get closer to the industry. We want to convert conventional internship to work-based learning. This is the 'U-to-I' concept, to the University, to the Industry."

A good example, he says, is Management and Science University (MSU), where students work as part of their training on campus. They get industry-related exposure while studying, such as managing the university's food and retail outlets or being entrusted with jobs in accounting, marketing and other fields.

More polytechnics will be built under the 11th Malaysian Plan. The Ministry has already started to build polytechnics in Bagan Datoh in Perak, Besut in Terengganu, Sri Menanti in Negri Sembilan and Tawau in Sabah. All will be built in collaboration with industry. The industry players will have part of their operations, such as laboratories, located within the campus to enable the engagement of students in their operations.

DIVERSIFYING ROLES OF ENGINEERS

In the future, Ir. Dr Zaini says, the job functions of engineers will also need to be redefined. As engineers move up in a company, their functions must be diversified and they must be exposed to opportunities to meet and deal with people from different backgrounds, including decision makers in the different segments of the company's business.

For example, they may be part of the branding team, so they must be able to present the importance of products to the marketing team. In that position, they would want to be involved in branding strategy and perhaps, to drive the innovation of products.

When it comes to innovation, Ir. Dr Zaini cites South Korea as the country for us to emulate.

"South Koreans innovate continuously. It seems like a new machine is being created in South Korea every day. For them, to innovate a machine is like changing the temperature in their factory. They won't buy new equipment but they will innovate instead," he says.

"When engineers can communicate right up to board level, they can do a lot in terms of driving innovation and getting board approval to invest in innovation. To convince decision makers, engineers must improve their communication skills."

PRACTICAL, SKILLS-BASED LEARNING

Ir. Dr Zaini notes that today's young generation is not keen on learning in the classroom. Whatever new input or new ideas they get, usually come from their observations of the environment around them or from friends.

"We must ensure that highlights about STEM and engineering are being carried out continuously. For example, when the world experienced an eclipse of the sun recently, I did not see any school teaching students how to calculate the angles of the eclipse. We had missed a good opportunity to entice students to engage with and love Maths. We only showed them the equipment for watching the eclipse. There are programmes readily available on the Internet on how to calculate eclipses. Teachers can introduce this programme to their students and make them realise the importance of learning maths and how it can be applied in real life situations. Students learn better by observing things around them," he says.

Chairman of IEM's Engineering Education Technical Division, Ir. Prof. Dr Vinesh Thiruchelvam, agrees that IEM should embrace the experiential learning concept and take it forward by collaborating with the Ministry of Higher Education.

"We should also go for increasing project-based awareness and get students to see the roles that engineers play in projects and how resources are spread in different types of projects," he says.

Ir. Dr Zaini further emphasises on the importance of presenting case studies to students. "The building of KLIA and KLIA2, for instance, are good case studies. Why do we need KLIA2 when we already have KLIA? Students must be guided to study from the engineering perspective and other areas such as projection of passenger capacity. This involves mathematical calculation and the ability to project into the future. That's the way we want to teach, hands-on. There are lessons to learn from actual cases and our surroundings as well," he says.

"We must know what kind of technology we will need in the future. Technology will determine our preparations for the future. In knowledge-based technology, employers want to know what we can do instead of asking for our credentials. The emphasis will be more on the practical aspects than the academic."

Ir. Dr Zaini mentions Udacity as an excellent and current example of practical skills-based teaching and learning concepts. Udacity (www.udacity.com) offers massive open online courses to students worldwide without even having a physical university setup.

Though it started with university-style courses originally, it now focuses more on vocational courses for professionals. Students can choose to specialise in a subject, such as coffee-making, and a professional will be engaged via Udacity to teach, impart the skill and then grade the student.

Such a "virtual university" allows students from all over the world to be taught by specialists in their chosen fields. Ir. Dr Zaini says the professional grading is far more valuable than qualifications obtained from conventional universities, adding that the focus is on the outcome. This is what we want for Malaysia, he stresses. ■

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Ir. Prof. Dr Vinesh Thiruchelvam

Prof. Vinesh *is currently the Dean of the Faculty of Computing, Engineering & Technology at Asia Pacific University of Technology & Innovation. He has over 20 years of academic and industrial experience in which he served over 8 years overseas as a consultant. Prof Vinesh is an advocate for STEM education, and knowledge and technology transfer and also a Chartered Engineer (MIET & FIMechE) and a Competent Energy Manager.*

There has been a lot of hue and cry over the declining interest in Science, Technology, Engineering and Mathematics (STEM) in Malaysia. In reality, this is not only a domestic problem but a global battle too, one that is caused by education trends, shifts in youth mindset and incomes generated based on different professions.

Reversing the trend will take time but immediate plans and actions are necessary. Building young people's engagement in STEM goes beyond the confines of the classroom or school. Education systems alone cannot overcome the pervading cultural norm that it is acceptable to be "bad at Maths" or "not a numbers person".

Mathematics is a fundamental core requirement for engineering. Many people ask why there is an E in STEM when S (Sciences) and M (Mathematics) already cover the basic requirements for engineering. Practical skills are where E (Engineering) works best. Global research shows that building STEM capacity across the population is critical to support innovation and productivity, regardless of occupation or industry (1).

Engineering is and will always be one of the fastest-growing and most rewarding careers in the world. Opportunities for young engineers are plentiful and, as we move towards greater technology advancements, their services will definitely be needed to integrate technology and applications. To earn the rewards of being an engineer, however, one must put in place some essential early building blocks, starting with school.

There should be a focus on action that will lift foundation skills in STEM learning areas, development of mathematical, scientific and technological literacy as well as the promotion of the development of 21st Century skills in problem solving, critical analysis and creative thinking. The importance of focusing on STEM in the early years should be given due recognition and this focus must be maintained throughout the school years.

Taking engineering as a core element, a good start would be to introduce a subject titled "Engineering Science" for example. This is where engineering can be taught via Problem Based Learning (PBL), starting with critical analysis of root causes, leading to research on solutions and finally, coming up with the best methods for solution implementation. The present secondary school system may not be ready for such an introduction, which is why we need to derive the content and way the subject can be rolled out.

At school level, the most fundamental questions are what "engineering" means, how it differs from technology and how it relates to Science and Mathematics curricula. Researchers have come to several important conclusions, one of which is that the dominant

STEM subjects, such as Science and Mathematics, are usually taught in "silos", that is, as separate, independent subjects. Engineering may provide a catalyst for integrating STEM education and making it more relevant to everyday experiences for students (2). This experience can only come from practical work.

Table 1: STEM's Engineering Integration

Subject Matter Title	Science Integration Topic	Engineering Integration Field	Technology Applied
Catching the Wind: Designing Windmills	Wind and Weather	Mechanical	Wind Turbines
Water, Water Everywhere: Designing Water Filters	Water	Chemical/ Environmental	Pumping & Filtration Systems
Sounds like Fun: Listening & Analysing Animal Sounds	Sound	Acoustical	Analogue/Digital Analysers
Roll & Roll: Designing the most challenging rollercoaster	Structure	Civil & Structural	Building block/ Models/Steel Pipes/Bending Machines
The Best of Bugs: Designing Hand Pollinators	Insects & Plants	Agricultural	Gauges/Soil testing Kits/CBRs
An Alarming Idea: Designing Alarm Circuits	Electricity	Electrical	Circuit Boards, Wires, Electronic Components, Arduino
Marvellous Machines: Making Work Easier	Simple Machines	Industrial	AC or DC Motors – Stepper/ Induction

There is a difference between Technical and Vocational Education and Training (TVET) and STEM. Vocational learning is tuned towards producing future hands-on technical experts while STEM is inclined towards creators and innovators. The engineering science model will work if it is embedded with content covering the basic elements of engineering. A sample is shown in Table 1.

STEM is all about integration and, if well-coordinated, it can be fun. Now with engineering as a core element that ensures practice as shown in Table 1, the fun will come in touching, creating, forming, assembling, testing and innovating while taking up challenges.

These activities are what learning should be about. Learning will be further enhanced if the activities are done as a team, with the exchange of ideas and debates on how best to do tackle problems. This learning method leads to the true development of engineers from a very young age.

One possible method is to enlist the aid of university engineering students (as part of their community service or internship) to participate in these teaching deliveries at secondary school level. This will be a win-win situation, one that allows ex-students of a particular school to spread the awareness of STEM and Engineering in their own communities. ■

Photos are courtesy of Asia Pacific University of Technology & Innovation (APU)

REFERENCES

[1] PricewaterhouseCoopers (PWC), *A Smart Move: future-proofing Australia's workforce by growing skills in STEM* (2015).

[2] Charles M. Vest, *Putting the 'E' in STEM Education*, National Academy of Engineering, The Bridge – Linking Engineering and the Society (2015)

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Palm Oil Waste Management: Value-Added Products from Effluent Pond Solids

Ir. Wan Wai Thong

Ir. Wan Wai Thong *graduated with a Bachelor in Engineering Hons. Agriculture in 1993 and he managed to complete the 3 years of Reserve Officer Training Unit in 1992 before graduated as an engineer. At present, he works as a technical advicer in palm oil mills in Malaysia and Indonesia.*

Conventionally, palm oil mill effluent is treated via a series of ponds such as Acidification, Anaerobic, Aerobic and Algae ponds. Due to natural bacteria process in the effluent, solids normally form in an aerobic ponds as the effluent passes through it and eventually settles at the bottom of the pond.

In current mill practice, the effluent solids are pumped out or excavated every six months or yearly; these are then dried naturally in the drying bed. Alternatively, with matured engineering and technology innovations, the effluent solids are extracted out daily and further processed and turned into value-added products which can be sold. This product is normally called bio-fertiliser or organic fertiliser.

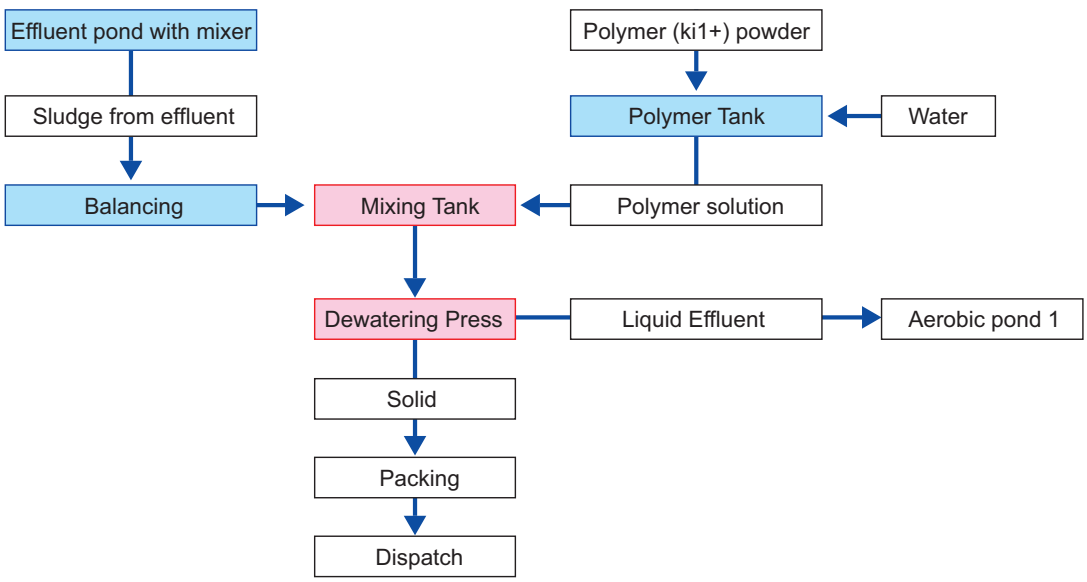
Here, we will briefly elaborate, with a clearer scope, about the product and the process which has improved the management of solids in the ponds and resulted in a by-product that is marketable.

INTRODUCTION

Dewatering is the removal of water from solid material or soil by wet classification, centrifugation, filtration or similar solid-liquid separation process, such as removal of residual liquid from a filter cake by a filter press as part of various industrial processes.

The bio-fertiliser plant is used to produce organic fertilisers which have a lot of nutrients. Natural and organic fertilisers are quite different from chemical fertilisers. Soil with organic material will remain loose and airy to hold more moisture and nutrients that will promote faster growth of soil organisms. This results in healthy plant root development.

Flow chart - The solid dewatering process flow is shown below:



THE PROCESS FLOW:

The Palm Oil Mill Effluent (POME) is initially stirred at the Effluent to homogenise the mixture. After this, it is pumped to the balancing tank at 25m^3 /hour as shown in Photo 1.

Photo 1: Balancing tank – Inlet and overflow

The powdered polymer (Ki1 cation) is diluted by mixing it with water. This process is done in the mixing tank as shown in Photo 2. Next, the polymer solution and the sludge from effluent are mixed together using a stirrer. This is done so that the solid particles will coagulate together during the chemical reaction. The whole system is automated, making it very efficient and reliable. The control panel is attached to the machine itself (Photo 2).

Photo 2: Mixing Tank

Following this, the mixture (sludge + polymer) is fed into a dewatering press with three motors attached as shown in Photo 3. The machine removes moisture and thickens the solid clusters. The filtered water from this machine is sent back to the Aerobic Pond No.1.

At the end of dewatering press, there is an adjustable press plate to determine the dryness of solid. This is done to ensure the efficiency is up to 90-95%. The press is controlled by an inverter which regulates the speed of the screw, depending on the dryness of the solid. If there is too much moisture, it will automatically decrease the speed of the screw, ensuring the moisture has enough time to be separated. The solid is then conveyed via a stainless steel shaftless conveyor for solid disposal into a solid storage bunker as shown in Photo 4.

Photo 3: Multi disc screw dewatering press

The solid cake can be packed for sale as shown in Photo 5.

Photo 4: Solid storage bunker

Photo 5: Solid cake packed into bags for sale

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A sample of the solid cake was tested to check the components contained and the following results were obtained:

Table 1: Sample contents

N	3.59%
P	1.43%
K	1.03%
Mg	1.22%
Organic Matter	42.88%
CN Ratio	15.5%
Moisture	77.18%

SUMMARY

This waste product, produced daily by palm oil mills, has immense potential. Right education, promotion and marketing strategies will improve demand for the product.

As seen from Table 1, the product sample has a high content of organic matter which will help enhance the soil nutrients for agriculture. The production process requires very low power consumption and will not add much to the cost of running the mill, only about <10KW in total for an entire plant.

It is not only a good organic fertiliser but it also helps to maintain effluent ponds retention time as the daily effluent desludging process takes away most of the solid continuously.

This solid can also be used as base material for a chemical fertiliser known as hybrid fertiliser, which can be tailor-made to suit customer requirements by adding other fertiliser components to it. ■

IEM DIARY OF EVENTS

Title: 2-Day Course On 'Adjudication – Procedure and Problems'

13 - 14 June 2016

Organised by : Project Management Technical Division
Time : 8.45 a.m. – 5.30 p.m.
CPD/PDP : 14

Kindly note that the scheduled events below are subject to change. Please visit the IEM website at www.myiem.org.my for more information on the upcoming events.

Engagement Safety Trainings: Part 2, The True Journey

by Ir. Shum Keng Yan

***Ir. Shum Keng Yan** is a chemical engineer and a certified accident prevention and safety practitioner. He advises on EHS in the chemical, fast moving consumer goods, heavy metal manufacturing and building services industries across Asia Pacific and beyond. He regularly delivers talks at conferences, forums and universities.*

Welcome back to "Our Journey" to transport our valued items from point A to B. Previously, the group was trying to figure out how to execute the project safely. That leads us to getting the group to the Acknowledgement Stage of the 3As (Awareness, Acknowledgement, Acceptance).

ACKNOWLEDGEMENT

Let us map some of the group's usual answers to the safety elements.

Table 1: Safety Elements in the Exercise

	Element	Group's Consideration
1.	Hazard Identification / Risk Assessment / Risk Control	Route Planning, Weather Condition, Rest Areas, Driver Alertness
2.	Legal Requirements	Licences
3.	Proper Tools	Correct Type of Vehicle for the Journey
4.	Skilled Employees	Knowledge of the Route
5.	Proper Maintenance	Vehicle Inspection
6.	Additional Protection (PPE)	Securing the Artefact (Wrap, Box, Foam, etc.)
7.	Risk Transfer	Insurance

After the group members have presented their plan, review it with them by mapping the inherent safety considerations that they have listed. Do not reveal all of it. Instead, let the participants offer their thoughts on what they have considered and where it fits into the safety lesson.

Since the plan and the "mapping" are done by the participants, the group will be able to move towards Acknowledgement.

Now the last challenge is to move the group to Acceptance before the training ends.

At this stage, start to think about good role play stories that can help you drive safety in your organisation. To share your stories, contact me at: pub@iem.org.my.

Stories have been shown to be a better way to convey a memorable message. Being part of a good story is even better. ■

The safest risk is the one that you did not take. Often it is the gap in the risk perception that leads to a gap in risk control.

COLLAPSE OF TEMPORARY STRUCTURE – OBSERVE SAFETY PROCEDURE

The Institution of Engineers, Malaysia (IEM) is concerned over the collapse of a building under construction in Jalan Barat, Petaling Jaya, Selangor, on 15 May 2016, in which six construction workers were injured. We would like to express our heartfelt sympathies to the family members of the victims.

IEM recognises the importance of observing good design and safety procedures on construction sites. We acknowledge the need for more stringent and stricter safety requirements through the inclusion of and strict adherence to such provisions in design standards and industry code of practice.

IEM emphasises that the method of construction of all temporary works, particularly in falseworks and scaffoldings, should be properly designed, endorsed and supervised by Professional Engineers to maintain an accredited standard and quality in construction practices.

IEM has published a Position Paper on the Prevention of Collapse of "Scaffolding & Falsework" which highlights some of the main causes for the collapse of temporary works. These include the lack of safety considerations at the design stage, improper or bad construction practice, use of inferior materials, lack of enforcement and lack of maintenance. The Position Paper is available for download at the following link: http://www.myiem.org.my/content/position_papers-301.aspx

The Position Paper also offers recommendations to prevent or mitigate the collapse of scaffolding and falsework, including the provision of sufficient funds for safety, health and environmental programme for all construction projects. These items are recommended be included in the Preliminaries of all contracts.

There is a need to update and amend the relevant local acts and regulations, guideline and code of practice. Beside more stringent enforcement, it is also important to have mandatory requirement for sufficient training for supervisory personnel and construction teams.

IEM strongly believes that safety is the major concern in any construction work. We are willing to provide technical expertise to the relevant authorities on recommendations to prevent and mitigate the collapse of temporary works.

Members of the Press who wish to have an Interview with the IEM President to receive further insight into this matter, may contact the secretariat office at ed@iem.org.my or sec@iem.org.my for an appointment. ■

Ir. Tan Yean Chin
President
16 May 2016

COMMENTS BY THE INSTITUTION OF ENGINEERS, MALAYSIA, ON FLASH FLOODS IN THE KLANG VALLEY

The Institution of Engineers, Malaysia (IEM) is concerned over a flash flood that hit several key roads in Kuala Lumpur after a downpour on 12 May, 2016. This was not the first flash flood to hit the Klang Valley that week as flooding was also reported in Shah Alam two days earlier, on 10 May.

On 12 May, several key roads, including Jalan Tuanku Abdul Halim, Jalan Lingkungan Budi (near University Malaya entrance), Jalan Bangsar and Jalan Ampang were affected by the flash flood, which caused several vehicles to be submerged in water, brought traffic to a standstill and inconvenienced both motorists and the public.

The main cause of the flood might not be attributed to heavy rainfall alone. During the storm, silt and debris could have been washed and deposited at the outlets of drainage systems and culverts, clogging them. The accumulation of earth deposits, silt and debris on the bottom of drains and culverts will reduce the cross-sectional area of the drain and/or culvert and so impede its capacity to carry away water in the speed intended.

Rapid development in urban areas, without due consideration for a proper drainage system, can also contribute to the frequent flash floods. New developments must take into account best management practices such as the provision of an adequate drainage system designed at appropriate protection level and control of water at source principles.

IEM would like to recommend that, for new projects in the Klang Valley, the zero-additional discharge principle should be imposed on developers as a condition for project approval. This means that any new development approved must not contribute to additional surface water runoff upon completion. This can be done through the provision of adequate detention ponds for storage and detention of rainwater at source in the development areas.

The flood may also be due to ongoing construction works near and around the affected areas. Contractors must adopt a professional approach and use authorised hydrological data from DID Malaysia to design a temporary drainage system during construction works. Best management practices on silt traps, culverts and

drains must also be incorporated and strict enforcement by the authorities is of paramount importance.

IEM would like to stress that, in carrying out flood mitigation measures, there is a need to consider both structural and non-structural measures, which must be implemented under the short and long term development programmes.

The non-structural measure lies in the control of land development and all relevant authorities must be serious in tackling the root causes that result in major siltation of the drainage system, rivers and waterways. It is also important to educate the public to stop dumping garbage in local drainage systems and to uplift the maintenance culture of local governments for a better drainage system.

IEM is keen to assist the authorities in resolving a recurrence of such flood incidents and to provide the necessary technical advice on flood mitigation and prevention, including creating public awareness on flood related issues. ■

Ir. Tan Yean Chin
President
16 May 2016

The Press Statement was published in the following media:
(16 May 2016)
1) The Sun, The Malay Mail, The Sun Daily, The Malay Mail Online, Sin Chew Jit Poh – COLLAPSE OF TEMPORARY STRUCTURE-OBSERVE SAFETY PROCEDURE
2) The Star (Nation), The Star Online, The Malay Mail Online – FLASH FLOOD IN THE KLANG VALLEY

LIST OF AWARDS 2016 PRESENTED DURING THE AGM 2016

NAME	AWARD	PRIZES
Associate Professor Ir. Dr Norlida Binti Buniyamin	IEM Woman Engineer Award 2016	Plaque Certificate RM800/- 2 complimentary ticket to event
Ir. How Yoke Teng Title of paper: "Impact of Building Information Modelling (BIM) on the Engineering Profession"	Best Technical Paper 2016 Tan Sri Ir. Hj. Yusoff Prize for Corporate Member – Civil Engineering Category	Medal Certificate
Associate Professor Ir. Dr Leong Wai Yie Title of paper: "Recognise Women in Health Technology: Globalize Our Values and Contributions"	Best Technical Paper 2016 Tan Sri Ir. Hj. Yusoff Prize -Corporate Member – General Category	Medal Certificate

IEM DIARY OF EVENTS

Title: TALK ON "CREDENTIAL SECURITY & PHYSICAL ACCESS CONTROL SYSTEMS"

9 July 2016

Organised by : Electrical Engineering Technical Division
Time : 9.00 a.m. – 11.00 a.m.
CPD/PDP : 2

Title: TALK ON "GBI & GREEN BUILDINGS: THE GOAL & CHALLENGES AHEAD"

9 July 2016

Organised by : Electrical Engineering Technical Division
Time : 11.00 a.m. – 1.00 p.m.
CPD/PDP : 2

Title: Talk on "Building Information Modeling"

21 July 2016

Organised by : Information and Communications Technology Special Interest Group
Time : 5.30 p.m. – 7.30 p.m.
CPD/PDP : Applying

Title: 56th Rankine Lecture on Geotechnics and Energy

26 July 2016

Organised by : Geotechnical Engineering Technical Division
Time : 5.30 p.m. – 7.30 p.m.
CPD/PDP : 2

Kindly note that the scheduled events below are subject to change. Please visit the IEM website at www.myiem.org.my for more information on the upcoming events.

Crystal @ SME Programme: Developing Innovative Minds in Schools & Universities

ENGINEERING EDUCATION TECHNICAL DIVISION

reported by
Ir. Dr Mandeep Jit Singh

Ir. Dr Mandeep Jit Singh *received his B.Eng. (with honours) and Ph.D. degrees in electrical and electronic engineering from the University of Northumbria, UK, and Universiti Sains Malaysia, in 1998 and 2006, respectively. He is currently the Deputy Chairman of E2TD committee and an Associate Professor at Universiti Kebangsaan Malaysia.*

reported by
Hafizah Husain

Hafizah Husain *received her Bachelor of Science (Electrical Engineering) from University of Hartford, USA in 1986, Masters of Science (Mechatronics) from De Montfort University, UK in 1995 and Ph.D. in Electrical Engineering from Universiti Teknologi Malaysia in 2007. She is currently an Associate Professor in the Department of Electrical, Electronics and System Engineering, Faculty Of Engineering & Built Environment in Universiti Kebangsaan Malaysia.*

ET2D chairman giving a talk on STEM

Teenagers have an innate curiosity and natural creativity. These characteristics need to be nurtured and channelled into structured, organised and continuous activities, so that they will continue to flourish.

The Crystal@UKM programme was conceived to realise the country's innovation agenda, nurture creativity and develop a sense of competitiveness globally. It utilises facilities and staff expertise at the Faculty Of Engineering & Built Environment as well as the School of Information Science & Technology, based on a module that integrates electronics and programming skills to educate the school students who will also be mentored by university students.

In 2009, the programme was proposed to the office of the Deputy Vice-Chancellor (Industry and Community Affairs) by the Faculty Of Engineering & Built Environment, in collaboration with UEM Group. The plan was to foster a culture of innovation in young people through exposure to technology by using a microcontroller-based Arduino Board.

This affordable and easy-to-use board can be programmed using a computer. By interfacing the board to specific devices, it can be programmed to perform various tasks automatically, either for the purpose of games (fun-and-play) or for actual industrial application. There are no limitations to what the students can develop as it all depends on their creativity.

The main features of the programme, other than inculcating interest and awareness in automation and intelligence, are to encourage students to move on to a higher level of education and to prepare them for the working world.

Presentation of certificate by Prof. Datuk Ir. Dr Mohd Marzuki Mustafa pro vice-chancellor (strategy and corporate development)

Group photo between the students, mentors and JKEES staff

The programme offers students the opportunity to explore technologies not available in the classroom. University students mentor school students by guiding them in designing and programming the microcontroller chip to develop microcontroller-based systems that can be used to solve real life problems. Ultimately, the experience produces graduates who are concerned for the well-being of society and equip them with skills that will be useful in the working world.

The programme comprises three phases. In the first phase, school students are given "hands-on" training, using specially designed modules and kits. They are taught to develop simple automatic circuits using the microcontroller. In the second phase, they are divided into groups of four students. Each group is required to prepare a proposal according to the theme and present it to a panel. The students are expected to conduct a study based on the problem that needs to be solved. In the third phase, the students will design and develop the alpha prototype of their projects. The entire programme takes 6-8 months to complete.

The pilot project started with two schools in Gelang Patah, Johor, namely SMK Taman Nusa Jaya and SMK Kompleks Sultan Abu Bakar. So far, 200 students from 15 schools and 150 UKM students have taken part in the programme.

The latest programme, involving eight technical schools, was successfully completed in February 2015. Two of nine products developed by a group of students from Sekolah Menengah Teknik Kuala Lumpur, the Page Turner and the Handicapped Parking Detector, won several gold and silver awards at the national (IComp Ex2015, IIDEX 2015 and National Innovation Award 2015) and international level (WIC2015, South Korea).

The 2 gold medals won in South Korea were an acknowledgment of innovation and original ideas. By winning the international awards, the students have gained a high degree of self-confidence and demonstrated national pride. All nine prototypes developed can be commercialised and produced on a large scale. ■

Students assembling the prototype

"Hands-on" training using specially designed modules and kits

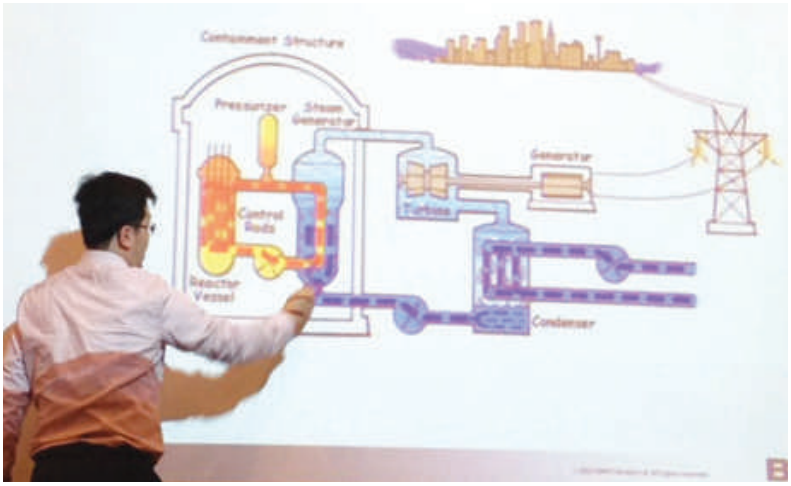
Talk on "Nuclear Power Generation - Myths and Facts"

ENGINEERING EDUCATION TECHNICAL DIVISION

reported by
Ir. Chew Weng Yuen

***Ir. Chew Weng Yuen** is a co-opted member of the Engineering Education Technical Division of IEM. He is currently Deputy General Manager of Forefront Tiara Sdn. Bhd., a property development company.*

The Engineering Education Technical Division co-organised a talk entitled "Nuclear Power Generation – Myths and Facts" with the Consulting Special Interest Group of IEM, Engineers Australia Malaysia Chapter, and the Institution of Mechanical Engineers Malaysia Branch, on 23 March 2016, at Wisma IEM in Petaling Jaya, Selangor.



Mr. Wayne Soong explaining how the Pressurised Water Reactor works

The talk, attended by 42 participants, was delivered by Mr. Wayne Soong, a licensed professional engineer from the nuclear engineering department of BWXT Canada Ltd. in Ontario, Canada.

Mr. Soong started by reviewing the nuclear fission process and the mechanism of how a large nucleus splits into smaller nuclei with the release of energy. The most common nuclear fuel is uranium and Mr. Soong highlighted two uranium isotopes namely U^{238} which is non fissile (99.7% natural abundance), and U^{235} which is fissile (0.3%). It is the fissile isotope that can sustain a chain reaction since it can be broken apart by thermal neutrons and so, is important for both nuclear reactors and nuclear weapons.

He explained the uranium enrichment process whereby the percentage composition of U^{235} is enriched through isotope separation for both reactor grade uranium (3-4% U^{235}), or the highly enriched weapon grade uranium (90% U^{235}).

He then elaborated on the process of turning uranium ore into nuclei fuel in what is called the Nuclear Fuel Cycle. He started with the mining of uranium ore and extracting uranium from the ore to subsequently getting uranium oxide concentrate which is sealed in drums. Then he moved on to the enrichment process where the uranium oxide (U_3O_6) is transformed into gaseous uranium hexafluoride (UF_6). The enriched UF6 is then converted into uranium dioxide powder at the fuel fabrication plant. The uranium dioxide powder is subsequently pressed to form small fuel pellets, which are then heated to make a hard ceramic material. The pellets are then inserted into thin tubes of zirconium alloy to form fuel rods which are then grouped together to form fuel assemblies measuring several metres in length. These fuel assemblies are then used to build up the nuclear fuel core of a nuclear power reactor.

The functions of the nuclear reactor are mainly to shield radiation, extract heat energy and control fission rate. The two most common nuclear reactor designs are Pressurised Water Reactor (PWR) and Boiling Water Reactor (BWR).

Mr. Soong discussed the advantages and disadvantages of both types of designs and said that currently, 70% of all the nuclear reactors in the world are PWRs.

He said that currently USA and France were the top 2 leading nuclear generating countries, followed by Russia, South Korea,

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China, Canada and other countries in Europe. Japan was also a leading nuclear power generating country prior to the unfortunate incident involving the Fukushima Daiichi Nuclear Power Plant. It is now in the process of shutting down most of its nuclear power plants.

The future of the nuclear power market, especially in developing countries, was also discussed. Mr. Soong said Vietnam could be the first ASEAN country to embrace nuclear power generation as the ground work, in terms of nuclear policy, implementation and the design and construction safety was in a very advanced stage.

He also discussed the roles played by the various engineering disciplines in the construction of a nuclear power plant and elaborated on the roles played by nuclear, mechanical, civil/structural, electrical, material and chemical engineers. He said it can take 6-7 years to build a nuclear power plant (i.e. from conceptual design to operational stage).

Despite the unfortunate incidents involving Fukushima Daiichi and Chernobyl Nuclear Power Plant in former Soviet Union, and the high construction costs, Mr. Soong believes that nuclear power generation is still a viable source of energy. ■

Ir. Mathew Thomas of the Engineering Education Technical Division presenting a memento to Mr. Wayne Soong

IEM DIARY OF EVENTS

Title: 1-Day Course on Enterprise Risk Management and Business Continuity Management

15 June 2016

Organised by : Building Services Technical Division
Time : 9.00 a.m. – 5.00 p.m.
CPD/PDP : 7

Title: 1-Day Workshop On 'Mind Mapping for Creative Problem Solving and Decision Making'

16 June 2016

Organised by : IEM Women Engineer Section
Time : 9.00 a.m. – 5.30 p.m.
CPD/PDP : 7

Kindly note that the scheduled events below are subject to change. Please visit the IEM website at www.myiem.org.my for more information on the upcoming events.

PERFORMANCE MONITORING

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Annual IEM E2TD Essay Writing Competition

BY ENGINEERING EDUCATION TECHNICAL DIVISION

The Engineering Education Technical Division (E2TD) has been holding an annual E2TD Essay Writing Competition since 2012. This is supported by the Ministry of Education and sponsored by IEM and other engineering societies such as Institution of Engineering and Technology (IET) Malaysia Branch, Institution of Mechanical Engineers (IMechE) Malaysia Branch and Engineers Australia Malaysia Chapter (EAMC).

The aim of the competition is to create and promote STEM education by:

- Creating awareness among school students about the importance of engineering
- Inculcating in the young, an interest in the vast, dynamic field of engineering
- Fostering a deeper understanding and appreciation among students on the many disciplines of engineering
- Triggering the imagination of students on how the world will be without engineers.

From the start, participation has been encouraging. The competition is open to all Form 4 and Form 5 students nationwide and gives students who have a flair and passion for writing, the opportunity to pen their thoughts.

The competition topics are changed every year. In the past, these included "Why I Aspire to be an Engineer?", "Engineers are Nation Builders" and "Contributions of an Engineer in ensuring Malaysia achieves a Carbon Free Nation by year 2025".

Ir. Dr Matthew Teo, Chairman of IET presenting IET Silver Award of RM500 to the winner Ms. Ayna Latisya binti Azfar Rizal of Sekolah Seri Puteri, Cyberjaya

For 2016, the topic is "Nation Building: Why we need Engineers?". The essay is divided into two categories, Bahasa Malaysia and English, and limited to between 500 and 1,000 words.

Prize winners of the 2015 Essay Writing Competition with Tan Sri Ir. Radzi and principal office bearers of E2TD after the Dato' Chuah Prestige Lecture held on 1 August 2016

All those who take part will receive a certificate of participation from IEM, provided the essays meet the requirements and rules stipulated. The panel of judges will comprise professional engineers, university lecturers and representatives from the four earlier mentioned societies. The award winning essays in each language category will be rewarded with cash prizes and certificates of merit. There will be 3 main prizes of RM750, RM500 and RM250 as well as 5 consolation prizes of RM100 each. Participating schools will also receive a certificate of appreciation from IEM. ■

Tan Sri Ir. Radzi presenting the EAMC Gold Award of RM750 in the Bahasa Malaysia Category to Mr. Vythilingam a/l Siva Shanmugam of SMK Sultan Abdul Samad, PJ

Tan Sri Ir. Radzi presenting the EAMC Gold Award of RM750 for the English Category to Mr. Chan Jun Kang of SMK Raja Mahadi, Klang

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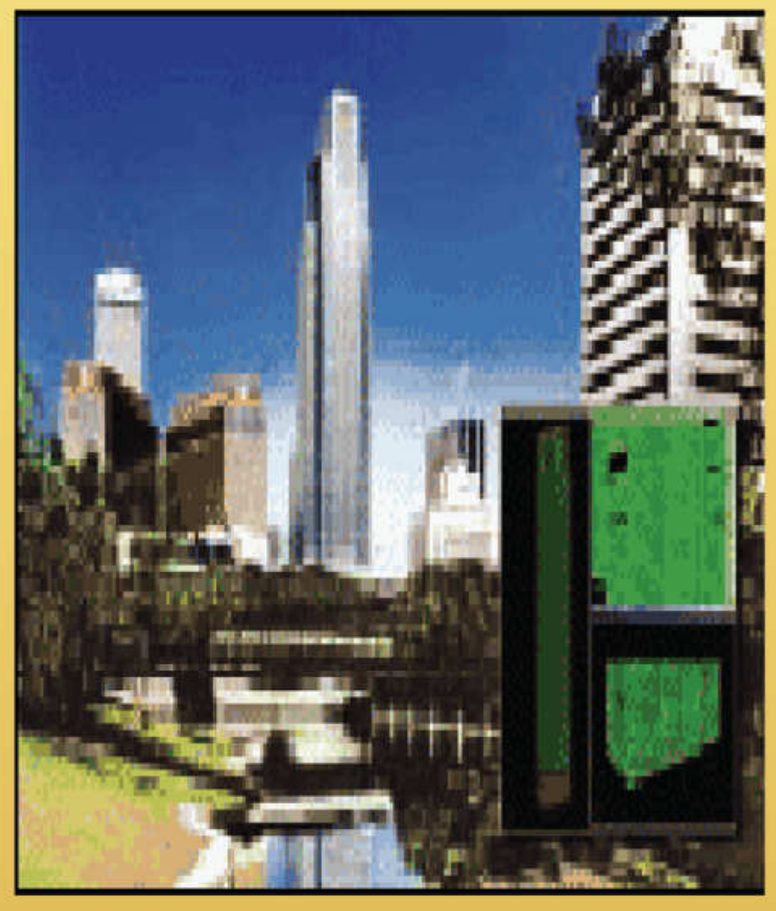

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Technical Visit to LRT Depot Kelana Jaya Line, Petaling Jaya

ENGINEERING EDUCATION TECHNICAL DIVISION

reported by
Mohd Yusof Rahmad Tulahan, *Grad. IEM Committee Member, Engineering Education Technical Division (E2TD).*

Mohd Yusof Rahmad Tulahan, *is a graduate of Universiti Teknologi Malaysia (UTM) and currently a Construction Engineer with Opus International Berhad.*

On 5 March, 2015, the Engineering Education Technical Division (E2TD) organised a technical visit to the Depot LRT Kelana Jaya Line, Petaling Jaya, for 36 members and engineers. The depot includes a maintenance workshop and the control centre.

The first stop was the rolling stock department where we were briefed on the functions of bogie drive. Each car has two bogies and an integrated mechanical, electrical and electronic system. The braking system is a crucial train system function. When the door closes, the train will increase speed up to 100 km/hr and decrease gradually as it approaches the next station.

Communication is one of the most important aspects of the railway system. It is pre-programmed to communicate between the control centre and the train crew and station as well as inter-train communication.

Signalling is the primary electronic sensor where data is transmitted to the Operational Control Centre (OCC) in Real Time for processing and feedback to the Automatic Train Control (ATC) system. Movements of trains are automatically controlled and, in the event of any incident or accident, the OCC will trigger the emergency response procedure in the system.

Ir. Arnizan (Rapid Rail, Prasarana - the presenter) explaining the emergency brake and power turned - off for trains.

The primary functions of a signalling system are:

- To control and manage trains in a safe manner
- To meet line capacity
- To reach the destination in the shortest time
- To provide a comfort and efficient ride.

ATC comprises Automatic Train Protection, Automatic Train Operation and Automatic

Participants with Prasarana in front of Main Building Depot.

The circuit, trackway and trains movement within the depot.

Train Supervision. These are all pre-programmed and integrated to major components including the safety devices interlock, timing, speed and emergency response action. The OCC monitors all the systems components including the Central Management System, Depot Control System, Station Management System, etc. It also controls the Closed Circuit Television (CCTV) of the entire system, including stations. The OCC is also able to control the operation of individual trains via emergency stop buttons. ■

IEM DIARY OF EVENTS

Title: Technical Visit to MMK Engineering Sdn. Bhd.

16 June 2016

Organised by : Mechanical Engineering Technical Division
Time : 9.00 a.m. – 1.00 p.m.
CPD/PDP : 2

Title: Technical Visit to MMK Engineering Sdn. Bhd.

16 June 2016

Organised by : Mechanical Engineering Technical Division
Time : 9.00 a.m. – 1.00 p.m.
CPD/PDP : 2

Title: Pre-GETD AGM: Talk on "Reinforced Soil Structures: Performance under Extreme Loading Conditions"

18 June 2016

Organised by : Geotechnical Engineering Technical Division
Time : 9.00 a.m. – 10.30 a.m.
CPD/PDP : 2

Kindly note that the scheduled events below are subject to change. Please visit the IEM website at www.myiem.org.my for more information on the upcoming events.

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IEM-WE Community Engagement with Children of Kampung Orang Asli Kuang, Selangor

WOMEN ENGINEERS SECTION

reported by
Dr Habibah @ Norehan Haron
Grad. IEM

Dr Habibah @ Norehan Haron, *a senior lecturer at UTM Razak School, is currently a committee member of Women Engineers Section. She is actively involved in Engineering Education and Manufacturing Systems Engineering research.*

The children playing in the waterfall.

On Sunday, 6 December 2015, a group of volunteers from IEM Women Engineers Section (WE), students and youth spent some quality time with the children of Kampung Orang Asli Kuang, Selangor, about 50 km from Kuala Lumpur. This was our third activity with the children from the village.

Led by Dr Habibah @ Norehan Haron, we had 2 objectives: To check on 2014 SPM and UPSR academic achievements and to evaluate the current motivation status of 20 children who had participated in previous IEM-WE activities.

There were 14 girls and 6 boys, of which 5 girls and 4 boys had participated in WE activity previously. The children, aged between 7 and 17, comprised 5 students in Standard 3, 3 students in Standard 4, 2 students in standard 5, 2 students in Form 4 and 8 students from various other levels.

One of the girls who had joined the programme previously, completed SPM the year before, but was unable to participate this time. We were also unable to get details of her SPM results.

On the other hand, a UPSR student who joined us last year, was with us for this event. She is now in Secondary 1. She had obtained Cs in Science and Mathematics.

FIRST ACTIVITY: SURVEY FORM

We started our visit by distributing survey forms to the children to get their response. As some of the boys were unable to read and spell some words, WE volunteers helped to guide them in filling in the forms.

The children and the WE committee.

From the data collected, all the children who attended our programme (with the exception of one) said it had inculcated their interest in Science related subjects. But only 1 indicated an interest to try for a career related to Science, in particular to be a Mathematics teacher. On the whole, however, nearly 80% said that Mathematics and/or Science were their top 3 favourite subjects in school.

SECOND ACTIVITY: TREASURE HUNT

After getting to know each other, WE student volunteers divided the children into four groups with one volunteer acting as facilitator in each group.

The groups took part in a treasure hunt. The children were very excited and a strong teamwork spirit was obvious. Winners received tokens and hampers which were prepared from the cash and in-kind contributions sponsored by WE committee members.

THIRD ACTIVITY: WATERFALL OUTING

Breakfast, sponsored by WE, was served before the group trekked to a waterfall located about 1 km away. The children chattered excitedly as they guided us to the waterfall. The atmosphere was warm and welcoming as the children played host. They took the responsibility of ensuring that we reached the destination and returned to the village safely.

Shortly after we arrived at the waterfall and relaxed in the natural surroundings, it started to rain heavily. One of the boys advised us to quickly leave the place. He shared with us an experience in which, during the rain, he and some friends were almost swept away by a sudden torrent of water gushing down from upstream.

We arrived back at the village hall soaking wet but we didn't mind as we had spent some wonderful moments with the children.

In conclusion, we felt that the series of activities had influenced the children to develop a fondness for Science and Mathematics. It was observed that the children also showed greater confidence in outdoor activities. ■

IEM DIARY OF EVENTS

Title: Talk on Nominated Sub-Contracts (Especially under Pertubuhan Akitek Malaysia Contract 2006)

18 June 2016

Organised by : Sub Committee on Engineering Contracts of Standing Committee on Professional Practice
Time : 9.30 a.m. – 12.00 p.m.
CPD/PDP : 2

Title: Pre AGM Talk & 29th WRTD AGM

25 June 2016

Organised by : Water Resources Technical Division
Time : 9.00 a.m. – 1.00 p.m.
CPD/PDP : 4

Title: 2nd Annual General Meeting of the Seniors Special Interest Group

2 July 2016

Organised by : Senior Special Interest Group
Time : 11.00 a.m. – 1.00 p.m.
CPD/PDP : 2

Kindly note that the scheduled events below are subject to change. Please visit the IEM website at www.myiem.org.my for more information on the upcoming events.

Reprise of 55th Rankine Lecture on "Hazard, Risk & Reliability in Geotechnical Practice"

GEOTECHNICAL ENGINEERING TECHNICAL DIVISION

reported by Dr Gue Chang Shin

***Dr Gue Chang Shin** is a Committee Member of IEM Geotechnical Engineering Technical Division (GETD). Formerly with the Norwegian Geotechnical Institute (NGI) in Norwa, he is now with NGI-G&P in Malaysia.*

On 14 December, 2015, Dr Suzanne Lacasse of Norwegian Geotechnical Institute (NGI), reprised the 55th Rankine Lecture on "Hazard, Risk & Reliability in Geotechnical Practice" at the Tan Sri Ir. Prof. Chin Fung Kee Auditorium, Wisma IEM. The lecture was chaired by IEM's Geotechnical Engineering Technical Division (GETD) committee member Dr Gue Chang Shin.

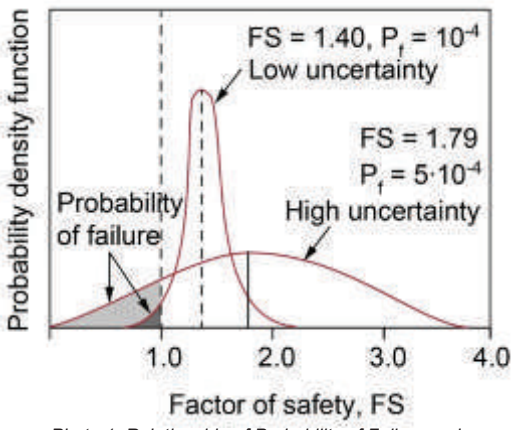

Photo 1: Relationship of Probability of Failure and Factor of Safety

The Rankine Lecture is considered the most prestigious geotechnical lecture in the world, and commemorates Prof. W.J.M. Rankine, best known for his theory on earth pressure on retaining walls. Dr Lacasse is the first female Rankine lecturer.

Dr Lacasse started the lecture with two key questions: "How can reliability and risk concepts help ensure adequate safety while achieving cost effective design?" and "What are the advantages and challenges of the hazard, risk and reliability approach?".

The lecture was aimed at answering these questions by introducing methods for reliability analyses and probabilistic analyses, through various real life examples.

Risk is a function of hazard and consequences and is defined by the International Organisation for Standardisation (ISO) as the effect of uncertainties on objectives. Dr Lacasse brought our attention to the concept of probabilistic analysis for risk assessment and said that the conventional way of applying a same value of Factor Of Safety (FOS) for conditions that involve varying degrees of uncertainty, is incorrect. She emphasised that FOS should be related to probability of failure and highlighted that the probability of failure is never zero. This means that FOS alone is not a sufficient measure of the actual safety. Photo 1 shows the relationship of FOS and the probability of failure.

Dr Lacasse then moved on to Probabilistic Analysis (Photo 2). She said the essence of reliability approach allows one to design with a margin of safety and to "calibrate" safety factors in codes. Various case studies were then discussed, to show how probabilistic analyses could be used in design. Through the case studies, she pointed out the paradox of geotechnical profession such as time and budget constraints for site investigations and design to a minimum when there are important uncertainties.

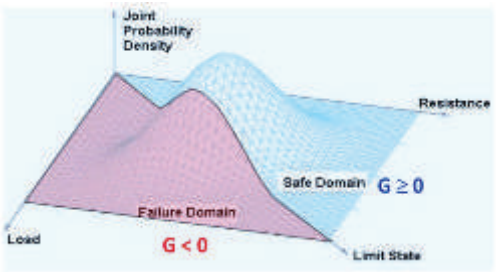

Photo 2: Probabilistic Analysis

However, when a major failure occurs, there seems to be unlimited budget for site investigations, analyses and expert advice. The challenge lies in how one can convince clients to carry out sufficient site investigations and have proper designs. Dr Lacasse said the reliability approach will provide more insight in tackling such issues.

On the safety factor and characteristic value for design, she stressed that codes with

a constant safety factor without considering the uncertainties in analysis and their effects on safety, do not give uniform safety against failure. Ideally mean value is the easiest value to obtain but this requires recalibration of the safety requirements in the codes and such recalibration will take a lot of time and effort.

The First Order Reliability Method (FORM) and the Second Order Reliability Method (SORM) provide the most reliable results in terms of probability of failure. Characteristic values can be determined based on statistical values, which are more "reliable" than the average value "by eye".

The final part of the lecture was on the observational method which involves exploration of the most probable conditions and most unfavourable conceivable deviations. Design is based on selection in advance of action/ modification for every foreseeable significant deviation of the observational findings. Dr Lacasse pointed out that the Bayesian updating provides a framework to allow updating of prior estimates with new information. Design based on profiles and soil properties on both measurements and earlier experience, is actually Bayesian. She told the audience that Bayesian thinking was also used by Alan Turing in solving the German Enigma Code during World War II.

She then gave examples of Bayesian updating such as, updating settlement predictions with measurements, updating soil resistance to pile driving with measurements during pile driving, as well as Bayesian approach to estimate annual probability of slope failure.

Dr Lacasse concluded the lecture by saying that geotechnical engineers are in a vulnerable spot where decisions need to be made with insufficient information. She stressed that reliability approaches do not remove uncertainty nor alleviate the need for judgement. However, it does provide a way to quantify the uncertainties and to handle them consistently. This encourages foresight rather than hindsight!

The course ended with GETD Chairman Ir. Yee Thien Seng presenting a memento of appreciation to Dr Lacasse.■

GETD Chairman Ir. Yee Thien Seng presenting a memento of appreciation to Dr Lacasse

Safety Integrity Level (SIL) Training

CHEMICAL ENGINEERING TECHNICAL DIVISION

reported by
Dr Chong Chien Hwa
Grad. IEM

***Dr Chong Chien Hwa,** is the Associate Dean (Learning & Quality), School of Engineering, Taylor's University.*

reported by
Lee Teck Lii,
Grad. IEM

***Lee Teck Lii**, Chemical Engineering Technical Division) is the Process Specialist, Technology Services - Gas Processing and HydrogenUOP, A Honeywell Company*

SIL workshop group photo

The Chemical Engineering Technical Division (CETD) held a one-day training programme on the various aspects of safety requirements in the Oil &Gas Industry in September 2015. It was conducted by Ir. Razmahwata Mohamad Razalli, who had 20 years of working experience in the industry.

Ir. Razmahwata introduced the qualitative and quantitative assessment methods to measure risk, based on frequency and target mitigated event likelihood (TMEL) concepts respectively. He discussed the differences

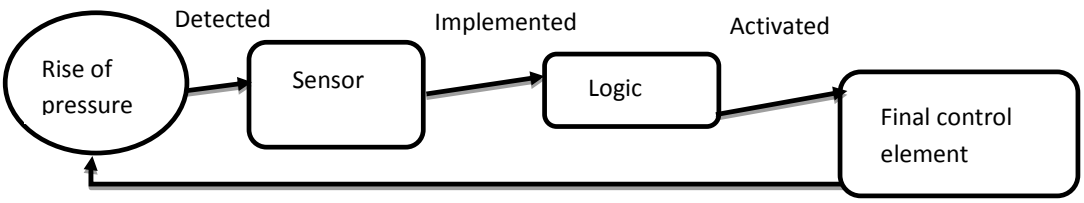

Figure 1: The pressure build-up in a vessel with top event of over-pressure of vessel, resulting in rupture, loss of containment, fire, explosion, environmental contamination.

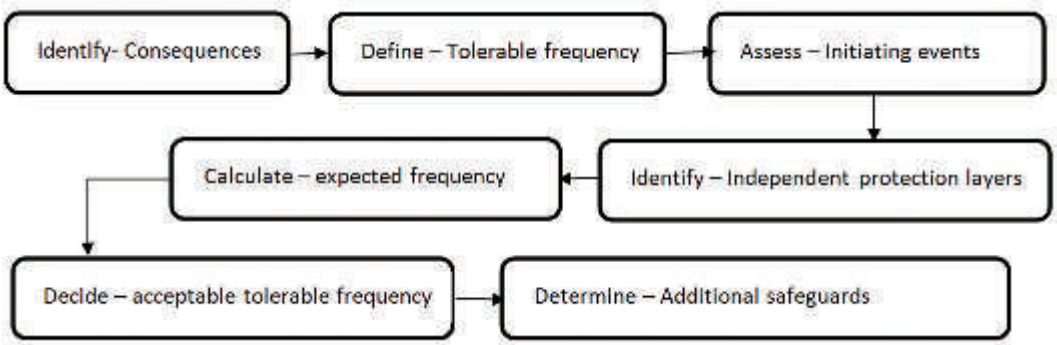

Figure 2: A typical LOPA process

between Safety Instrumented System (SIS) and Safety Instrumented Functions (SIF) requirement. The SIF is called Instrumented Protective Function (IPF) and is implemented by SIS in order to achieve or maintain a safe state. The SIS is made up of safety functions with sensors, logic solvers and final control elements. The pressure build-up in a vessel is used as an example to show how SIF functions work (Figure 1).

Ir. Razmahwata also presented a tolerable failure table of a given SIF and said: "It is important to take note of the user demands and vendor confirmations for SIL classification/determination and SIL verification respectively."

He used a case study to discuss the two SIL classification methods. Each participant was given a copy of the Term of Reference (TOR) to conduct the SIL classification using risk graph and risk matrix analysis (Table 1).

He later discussed the seven steps in "Layer of Protection Analysis" (LOPA) as shown in Figure 2.

He used a case study of a reboiler condensate pot in an over-pressure condition which led to vessel rupture and which resulted in a single fatality. "The major challenge prior to conducting LOPA is to obtain the frequency number," added Ir. Razmahwata.

In the last part of the programme, Ir. Razmahwata discussed the components required in the TOR, including objectives, scopes, participants, technical and procedural boundaries of the SIL study, extent of review and Process Hazard Analysis (PHA) method used (whether the team is doing risk ranking, persons required, time and date). ■

Table 1: SIL level classification

SIL	*PFD AVG	*RRF
4	$<10^{-4}$ to 10^{-5}	10,000 to 100,000
3	$<10^{-3}$ to 10^{-4}	1,000 to 10,000
2	$<10^{-2}$ to 10^{-3}	100 to 1000
1	$<10^{-1}$ to 10^{-2}	10 to 100

**PFD (probability of failure on demand) and RRF (risk reduction factor)*

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Iguazu, World's Largest Waterfalls

Ir. Chin Mee Poon
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***Ir. Chin Mee Poon** is a retired civil engineer who derives a great deal of joy and satisfaction from travelling to different parts of the globe, capturing fascinating insights of the places and people he encounters and sharing his experiences with others through his photographs and writing.*

The Aerolineas Argentinas' Boeing 737 landed at Puerto Iguazu Airport at 1:30p.m., 85 minutes after leaving Buenos Aires. Back in the Argentinean capital after our cruise to the Antarctica, my wife and I decided to visit Iguazu Falls, the largest waterfalls in the world. It was the height of summer, 11 years ago.

Our guide came in a car and whisked us off to our hotel for a one-hour rest. Then we were put in a van with other tourists for our visit to the world-famous waterfalls.

Situated on the border between Argentina and Brazil, Iguazu Falls comprises a basalt escarpment across the 1.5km-wide Iguazu River, 23km upstream from its confluence with the mighty Parana River. Islets along the edge of the 2.7km-long, reversed J-shaped escarpment, have split the water curtain into a series of falls, numbering 150 to 300, depending on the height of water in the river; 80% of the falls are in Argentina and 20% in Brazil.

The Iguazu National Park in Argentina was created in 1934 and 50 years later, it was admitted to UNESCO's list of World Heritage Sites. The adjoining Parque Nacional do Iguaçu in Brazil, formed in 1938, was admitted to the same list 3 years later, in 1987. Together, the two national parks cover a total 67,620 hectares for the protection of Iguazu Falls, voted as one of the Seven Natural Wonders Of The World, in a global poll in November 2011. In the language of the Guaranis, the original inhabitants of the region, who are skilled hunters, gatherers and boatmen, Iguazu means "big water". When she visited the Iguazu Falls, former US First Lady Eleanor Roosevelt was reported to have exclaimed "Poor Niagara!".

After going through the Argentinean border control, followed by the Brazilian immigration across the Iguazu River, we bought our entrance tickets and boarded a double-decker electric bus to a resort. This was where we started to walk along a cliff to view the falls from Brazil side. We had only 1½ hours to soak in the magnificent views.

The following day, however, we had all the time we wanted to enjoy the falls on Argentinean side. We arrived at the main entrance of the Argentine Iguazu National Park at 9:45a.m. From the Visitors Centre, we followed a green trail to the Cataratas Station and boarded a green-coloured train to the starting point of a trail 2.3km away which led to Devil's Throat, a long and narrow chasm into which almost half the river water fell in a dramatic, thunderous roar. The 1.2km walkway, constructed of galvanised steel over the Iguazu River, went close to the Devil's Throat. The viewing platform at the end of the walkway also offered a superb view of the falls on both Argentinean and Brazilian sides.

Back at the Cataratas Station, we walked to the Upper Circuit, a galvanised steel walkway with 5 viewing platforms for spectacular views of the Salto dos Hermanas, Salto Bossetti, Salto Bernabe Mendez falls as well as some unamed ones.

After lunch, my wife and I left the group to explore the falls on our own. We descended to the Lower Circuit. This was more than just viewing the falls from different angles. We came to a platform barely 6m away from the thundering Salto Bossetti and were drenched by the mist from the water curtain. The mist refracted the sunlight into a beautiful rainbow. It was a most exhilarating experience!

At the landing below, we could see a line of tourists waiting for a boat that would take them really close to the falls. We joined another queue of people to cross the channel to the little San Martin Island. From there, a flight of steep steps brought us back to the Upper Circuit and we finally returned to our hotel by bus at about 6:00p.m.

With this trip, I have visited the 3 most spectacular waterfalls in the world: Iguazu Falls in South America, Victoria Falls in Africa and Niagara Falls in North America. ■

Editor's Note: *We welcome contributions from all members on travel stories.*

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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. Yam Teong Sian
Setiausaha Kehormat, IEM,

PERMOHONAN BARU

Nama	Kelayakan
KEJURUTERAAN AWAM	
AHMAD ARIFIN BIN KASAH	BE HONS (UiTM) (CIVIL, 1997)
DZULKIFLI BIN A.BAKAR	BSc (SOUTH DAKOTA) (CIVIL, 1985)
FAIZUL BIN ABDUL WAHAB	BE HONS (UTM)(CIVIL, 1999)
ONG WEE HONG	BE HONS (UPM) (CIVIL, 2008) MBA (UPM) (2013)
KEJURUTERAAN BIOPERUBATAN	
LIM EINLY	BE HONS (MALAYA) (BIOMEDICAL, 2003) MESc (MALAYA) (2006) PhD (NEW SOUTH WALES) (2010)
KEJURUTERAAN ELEKTRIKAL	
ABU HURAIRAH BIN AZMAN	BE HONS (UTeM) (ELECTRICAL-INDUSTRIAL POWER, 2006)
FOONG GAIK TENG, PATRICIA	BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS, 2003) CONVERSION (UNITEN) (ELECTRICAL) (2010)
JESVINA KAUR A/P SWARAN SINGH	BE HONS (UNITEN) (ELECTRICAL POWER, 2008)
NABIHAH BINTI AHMAD PAUZI	BE HONS (UNITEN) (ELECTRICAL POWER, 2012)
SHAMSUL AZIZI BIN SHAHUDIN	BE HONS (UTM) (ELECTRICAL, 2005)
WONG YEW YIIN	BE HONS (CURTIN) (ELECTRICAL POWER, 2008)
WONG YEW YIIN	BE HONS (CURTIN) (ELECTRICAL POWER, 2008)
KEJURUTERAAN ELEKTRONIK	
AYIB ROSDI BIN ZAINUN	BE HONS (UTM) (ELECTRICAL, 2000) ME (NAGOYA INST. OF TECH) (COMPUTER SCIENCE & ENGINEERING, 2005) PhD (UiTM) (ELECTRICAL, 2013)
FADZRIL IDZHAM BIN ABDUL JALIL	BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS, 2003)
KEJURUTERAAN MEKANIKAL	
MD FUAD SHAH BIN KOSLAN	BE HONS (UTM) (MECHANICAL-AERONAUTICS, 2001) ME (UTM) (MECHANICAL, 2006)
SHAHARUDDIN BIN TAJALUDIN	BE HONS(UTM) (MECHANICAL, 2006)
KEJURUTERAAN PEMBUATAN	
SHASTHRI A/L SIVAGURU	BE HONS (MALAYA) (CAD/CAM, 2000) ME (MALAYA) (2002) PhD (IIUM) (2015)

PERPINDAHAN AHLI

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
31195	GAN YIN CHIEN	BE HONS (MALAYA) (CIVIL, 2009)
71611	MOHAMAD NIZAMHADI BIN BUJANG	BE HONS (USM) (CIVIL, 2006)
27251	NICHOLAS LIM	BE HONS (USM) (CIVIL, 2006)
32577	SV KALAISELVAM A/L VELAYUDAN	BE HONS (UTM) (CIVIL, 2005)
28298	YAP WEE GHIAN	BE HONS (USM) (CIVIL, 2009) MSc (USM) (STRUCTURAL, 2010)
KEJURUTERAAN GEOTEKNIKAL		
50754	MOHAMMED FADHIL BIN JAMAIN	BE HONS (USM) (CIVIL, 2006) MSc (UiTM) (CIVIL-GEOTECHNIQUE, 2014)
KEJURUTERAAN ELEKTRIKAL		
86276	AIZAT BIN NOOR AZMI	BE HONS (UiTM) (ELECTRICAL, 2010)
38050	HARUN AL-FAYED BIN HASSAN	BE HONS (UNITEN) (ELECTRICAL & ELECTRONIC, 2008)
KEJURUTERAAN MEKANIKAL		
77634	ANUAR BIN AHMAD SALAR	BE HONS (UTM) (MECHANICAL-AERONAUTICS, 2008)
52531	CHONG TJUN YIE	BE HONS (UTAR) (MECHANICAL, 2011)
81301	NG KOK ENG	BE HONS (MULTIMEDIA) (MECHANICAL, 2012)

PERMOHONAN BARU/PEMINDAHAN MENJADI AHLI KORPORAT

KEJURUTERAAN MEKANIKAL		
-	AZMAN BIN YUSOFF	BE HONS (UTM) (MECHANICAL, 1999)
KEJURUTERAAN PRODUKSI		
-	LIM YONG CHUNG	PART II (THE INSTITUTION OF PRODUCTION ENGINEERS, UK) (1970) FELLOWSHIP (THE INSTITUTION OF PRODUCTION ENGINEERS, UK) (1971)

Pengumuman yang ke-92

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 April 2016 adalah seperti jadual di sebelah:

NO.	NO. AHLI	NAMA
1	10908	CHANG CHOOI FOONG
2	16364	CHERYL CECILIA SAROL UDARBE
3	24341	CHIN SHYI HER
4	04719	CHOW SZE CHENG
5	04855	CHU TET LIN, JOSEPH
6	04825	CHUA SONG YANG
7	34338	FARIDA ARYANI BINTI KAMARUDIN
8	25252	FOO YEW CHIN
9	04332	GHAZALI BIN HASHIM
10	36364	HARTINI BINTI ALI
11	15055	HING WAI KEONG
12	09696	HO SAY HAI
13	13113	JAMAL BIN ABDUL GHANI
14	08701	JOHN SELVIN S/O HENRY SAMUEL
15	14629	KAMARULZAMAN BIN MUSA
16	04907	KHALID BIN HAMZAH
17	01472	LAU MUN CHEONG
18	02277	LAU PIK SENG
19	01998	LEE LAM
20	25874	LEE WEI CHIEK
21	29180	LIEW KUOK JEW
22	08601	LIM HOCK GUAN
23	09666	LIM TOCK KING
24	14337	LIM YUEK LUH
25	19710	LOK NGAI HEY
26	07078	LOO YEOW CHUEN
27	07451	MANAF BIN DAUD
28	44112	MAT ISA BIN JAAFAR
29	21440	MOHD BAHARUDDIN BIN TAJUDIN
30	15842	MOHD NAZRE BIN HAJI MARDZUKI
31	09016	MUSA BIN OMAR
32	15327	NG KIN WENG
33	05709	NIK AB RAHIM BIN NIK ISMAIL
34	19549	NOOR RAMLI BIN OTHMAN
35	45369	NURMIN BINTI BOLONG
36	57548	NURUL AZWANI BINTI MAHBOB
37	10347	ONG HOCK GUAN
38	03462	RAMU S/O ANDY
39	45817	ROHAN BIN AHMAT
40	14580	SIA TUNG KIONG
41	36992	SONG YOKE CHIN
42	03845	TAN HUI KUAN
43	07657	TAN KOK HENG
44	13434	TAN SRI DATO' TEO CHIANG KOK
45	00874	TARA SINGH GILL
46	04077	TEH GEK HUAT
47	13453	TEOH KENG ENG
48	06722	TIONG HUO CHIONG
49	20736	VINCENT ANAK ANTHONY
50	06544	WONG HAN PIU
51	08989	WONG KAI CHEONG
52	38335	WONG YIING
53	26827	YAU CHEE SIONG
54	29572	YOU KONG HEAN
55	13750	ZAMZURI BIN OTHMAN

CALL FOR NOMINATIONS

IEM ENGINEERING HALL OF FAME AWARD 2017

The Sub-Committee of Engineering Hall of Fame under the auspices of the Standing Committee on Professional Practice is proud to invite nominations for the IEM Engineering Hall of Fame Award 2017.

It is timely and expedient to induct and to record the accomplishments of engineers in the country who have or had demonstrated particularly outstanding professional achievements and provided excellent services to the Institution, the engineering industry and the Nation.

The IEM Engineering Hall of Fame is established with the aim to confer recognition and to celebrate the accomplishments of members of the IEM:

- Who have demonstrated outstanding professional achievements.
- Who have made significant contributions to the engineering profession, the Institution of Engineers, Malaysia (IEM) and the Nation.
- Who have rendered valuable service to the Community.

The Engineering Hall of Fame will serve as the focal point or showcase of outstanding Malaysian engineers, past and present, who had or have made great contributions to the engineering profession and to the quality of life in Malaysia. Engineers honoured in the Engineering Hall of Fame will also serve as a beacon and as role models for young engineers as well as create greater interest in engineering in general and awareness of the contributions made by outstanding engineers in the country.

Nominations for the Award are open to Malaysian citizens who are or have been Corporate Members of the IEM.

The closing date for receipt of nominations for IEM Engineering Hall of Fame Award is **30 September 2016.**

Please submit nominations to:

Hon. Secretary
The Institution of Engineers, Malaysia
Bangunan Ingenieur, Lots 60&62
Jalan 52/4, Petaling Jaya, Selangor.

The nomination form can be downloaded from the IEM website at ***www.myiem.org.my***

IEM AWARD FOR CONTRIBUTIONS TO THE ENGINEERING PROFESSION IN MALAYSIA 2017

To encourage an interest in engineering and to recognise important services or contributions to engineering in Malaysia, the IEM Award for Contribution to the Engineering Profession in Malaysia is to be presented to the person(s), who has:

- Contributed to the advancement of engineering in Malaysia, and/or
- Designed and constructed an original engineering device or system of merit and applicability to industry.

This Award is open to all Malaysian citizens and permanent residents.

NOMINATIONS

- Nominations will be invited annually. The closing date for receipt of nominations for each year is 30 September.
- Nominations shall be made through a member of the Institution. Each member is restricted to one nomination per year.
- Each nomination shall be accompanied by a brief write up of the services rendered or contributions made or system designed and/or constructed together with relevant photographs and other documents.

AWARD

- The Award is to be made by the Council upon recommendation by the Awards Committee.
- The Award shall comprose a metal plaque, a scroll and a sum of RM1,000.

The closing date for nominations is **30 September 2016**.

Please submit nominations to:

Hon. Secretary
The Institution of Engineers, Malaysia
Bangunan Ingenieur, Lots 60&62
Jalan 52/4, Petaling Jaya, Selangor.

The nomination form can be downloaded from the IEM website at ***www.myiem.org.my***

IEM OUTSTANDING ENGINEERING ACHIEVEMENT AWARD 2017

The IEM Outstanding Engineering Achievement Award is created to confer recognition to an organisation or body for outstanding engineering achievements within Malaysia. The award will be given to an organisation or body responsible for an outstanding engineering project in the country.

The basis for the award shall be an engineering achievement that demonstrates outstanding engineering skills which has made a significant contribution to the profession and to the quality of life in Malaysia. In making the selection, the following criteria will be given special consideration:

1. Contribution to the well-being of people and communities,
2. Resourcefulness in planning,
3. Creativity in the solution of design problems,
4. Pioneering use of materials and methods,
5. Innovations in planning, design and construction,
6. Unusual aspects and aesthetic values.

Engineering achievements which include, interalia, the following can be submitted for consideration:

- Bridges, Tunnels, Waterways Structures, Roads
- Telecommunications of national/ international character, Power Transmission and Transportation
- Dams and Power Stations
- Ports and Harbours
- Building and Structures
- Airports
- Water Supply, Waste Disposal Projects
- Military projects such as bases, launching units, harbour facilities
- Drainage, Irrigation and Flood Control Projects
- Local design and manufacture of high technology products
- Energy, Heat, Mass Transfer
- Outstanding work in engineering research and development
- Chemical processing of indigenous raw resources such as rubber, palm oil and various other local plants
- Innovative use of local engineering materials
- Outstanding contribution in engineering education
- Original discovery of useful engineering theory

Nominations are invited from all members of the Institution. Each nomination submitted should contain a brief summary/write-up of the project in approximately 1,000 to 2,000 words together with full relevant reports on the project and three copies of supporting documentation including photographs. A project or component part thereof which has received an earlier award, from IEM does not qualify for nomination.

- The award in the form of a metal plaque, naming the achievement shall be given to the organisation or body responsible for the project for permanent display.
- The award shall be presented with due ceremony at an appropriate function of the IEM.

The closing date for nominations is **30 September 2016.**

Please submit nominations to:

Hon. Secretary
The Institution of Engineers, Malaysia
Bangunan Ingenieur, Lots 60&62
Jalan 52/4, Petaling Jaya, Selangor.

The nomination form can be downloaded from the IEM website at ***www.myiem.org.my***

IEM YOUNG ENGINEER AWARD 2017

The objective of the Award is to encourage interest in engineering and to recognise potential among young engineers in Malaysia. The Award will be presented to the person who has shown outstanding ability and leadership qualities, **either**

i. in the design and/or construction of an engineering device or system of merit; **or**

ii. in the research and development or teaching of engineering.

In any one year, the Award may be made in either one or both of the categories mentioned above. If the Award is to be made in only one of the two category may be made in the year. The Award is open to candidate who are:

i. Registered member with the Board of Engineers, Malaysia and under 35 years of age

ii. Malaysian citizens or permanent residents of Malaysia

iii. Graduate or Corporate Members of IEM.

The Proposer may or may not be a member of IEM. However, each nomination shall be supported by a brief recommendation from two Referees who are Corporate members of IEM. If the Proposer himself is a Corporate member of IEM (or higher), then he may also act as one of the two required Referees.

The Award will comprise a cash prize of RM500.00, a scroll and plaque, to be presented with due ceremony to each recipient of the Award.

The closing date for nominations is **30 September 2016.**

Please submit nominations to:

Hon. Secretary
The Institution of Engineers, Malaysia
Bangunan Ingenieur, Lots 60&62
Jalan 52/4, Petaling Jaya, Selangor.

The nomination form can be downloaded from the IEM website at ***www.myiem.org.my***

IEM WOMAN ENGINEER AWARD 2017

The primary objective of the Award is to recognise the contributions by women engineers. This Award may also incidentally encourage interest in engineering among women and encourage them to strive towards greater excellence. The Award will be presented to the woman engineer who has shown outstanding ability and leadership qualities, or has been a pioneer in any more of the following areas:

- In the design and/or construction of an engineering device or system, structural system, planned development, environmental improvements or,
- In the research and development of engineering device, systems, processes and/or materials, publication of paper or,
- In the teaching of engineering or,
- In the management of engineering projects,
- Entrepreneurship in the commercial sector.

In making the selection, the following criteria will be given special consideration:

- Contribution to the well-being of people and communities
- Resourcefulness in planning and in the solution of design problems
- Pioneering in use of materials and methods
- Innovations in planning, design and construction
- Unusual aspects and aesthetic values

The Award is opened to candidates who are:

- Registered members of the Board of Engineers, Malaysia,
- Malaysian citizens or permanent residents of Malaysia,
- Graduate or Corporate Members of The Institution of Engineers, Malaysia.

The Proposer may or not be a member of IEM or BEM, or an engineer. However, each nomination shall be supported by a brief recommendation from two Referees who are Graduate or Corporate member of IEM. If the Proposer is herself either a Corporate or Graduate member of IEM (or higher), then she may also act as one of the two required Referees.

The Award shall comprise a cash prize of RM800.00, a scroll and and plaque, to be presented with due ceremony to each recipient of the Award.

The closing date for nominations is **30 September 2016.**

Please submit nomination to:

Hon. Secretary
The Institution of Engineers, Malaysia
Bangunan Ingenieur, Lots 60&62
Jalan 52/4, Petaling Jaya, Selangor.

The nomination form can be downloaded from the IEM website at ***www.myiem.org.my***

CONTRIBUTIONS TO WISMA IEM BUILDING FUND

RM 2,844,957.65 contributed by IEM Members and Committees

RM 744,332.19 contributed by Private Organisations

TOTAL RM 3,589,289.84

(ANOTHER RM 3,200,384.43 IS NEEDED)

The Institution would like to thank all contributors for donating generously towards the IEM Building Fund

HELP US TO PROVIDE BETTER SERVICES TO YOU AND TO THE FUTURE GENERATION

(The donation list to the Wisma IEM Building Fund is published on page 45)

KEAHLIAN

	NUR SYAHIRA SYUHADA BINTI MOHD ZAID	1ST YEAR (UNITEN) (ELECTRICAL)
	NUR SYAHIRAH BINTI MOHD RAZALI	1ST YEAR (UNITEN) (ELECTRICAL)
	NUR SYAZANA BINTI HISHAMUDDIN	1ST YEAR (UTHM) (ELECTRICAL)
	NUR ZAFRI BIN ABDUL RAHIM	1ST YEAR (UTHM) (ELECTRICAL)
	NURIN AKMAL BINTI NAWAWI	1ST YEAR (UTHM) (ELECTRICAL)
	NURIZZATI BINTI KHAIRUL ANUAR	1ST YEAR (UNITEN) (ELECTRICAL)
	NURNELISSA BT NOORDIN	1ST YEAR (UNITEN) (ELECTRICAL)
	NURUL FARAH HANIS BT IBRAHIM	1ST YEAR (UNITEN) (ELECTRICAL)
	NURUL HAZIQAH BINTI MD DATAR	1ST YEAR (UTHM) (ELECTRICAL)
	NURUL IZZATY BINTI SABUDIN	1ST YEAR (UNITEN) (ELECTRICAL)
	NURUL NABILAH BINTI MADSIAM	1ST YEAR (UTHM) (ELECTRICAL)
	NURUL SHAFINA BT RAZALI	4TH YEAR (UMP) (ELECTRICAL)
	NURUL SYAFIQAH BINTI RAZALI	1ST YEAR (UNITEN) (ELECTRICAL)
	OEH ZHE HAN	1ST YEAR (UNITEN) (ELECTRICAL)
	PRAVINJIT SINGH A/L MOHAN SINGH	1ST YEAR (UNITEN) (ELECTRICAL)
	PREVEENA THANGARAJ	1ST YEAR (UNITEN) (ELECTRICAL)
	RAJAN MUHAMMAD SAFARIN BIN RAJA KECHEK	1ST YEAR (UNITEN) (ELECTRICAL)
	SAHMENE KAUR A/P SEGAR SINGH	1ST YEAR (UNITEN) (ELECTRICAL)
	SARA RADZIAH BT SULAIMAN	1ST YEAR (UNITEN) (ELECTRICAL)
	SHAHIRAH BINTI SHAFII	1ST YEAR (UNITEN) (ELECTRICAL)
	SHEIKH AHMAD LUTFI B. SHIKH BADRUDDEN	1ST YEAR (UTHM) (ELECTRICAL)
	SITI ADILA BINTI MD DON	1ST YEAR (UTHM) (ELECTRICAL)
	SITI HAWA BINTI HAMDIN	1ST YEAR (UNITEN) (ELECTRICAL)
	SITI NURULJANNAH BINTI ABDUL RHAMAN	1ST YEAR (UNITEN) (ELECTRICAL)
	SITI ZULIQA BT RAMLI	1ST YEAR (UTHM) (ELECTRICAL)
	SUHAILA BT ALIAS	1ST YEAR (UTHM) (ELECTRICAL)
	SYAFIQ HAAZIQ BIN AZMI	1ST YEAR (UNITEN) (ELECTRICAL)
	SYARIFAH NURIZZATY BT SYED IDRUS	1ST YEAR (UNITEN) (ELECTRICAL)
	SYAZLIYANA BINTI KHAIRUL SHAMSI	1ST YEAR (UNITEN) (ELECTRICAL)
	TAN SHUN YAO	1ST YEAR (UNITEN) (ELECTRICAL)
	TAN ZHONG YIH	1ST YEAR (UNITEN) (ELECTRICAL)
	TAREK MOUSTAFA YOUS	1ST YEAR (APU) (ELECTRICAL)
	TASHVIND MOHAN A/L S.KANAGASUNDRAM	1ST YEAR (UNITEN) (ELECTRICAL)
	THEVINDRA NATH A/L JEGANATHAN	1ST YEAR (UNITEN) (ELECTRICAL)
	WALIKOR BIN ABUDAH	1ST YEAR (UTHM) (ELECTRICAL)
	WAN HAFIIZHAH BINTI WAN MOHAMAD NORAFI	1ST YEAR (UNITEN) (ELECTRICAL)
	WAN MOHAMAD SHAKIR BIN WAN SHAMSUDDIN	1ST YEAR (UNITEN) (ELECTRICAL)
	WAN MUHAMMAD AMIR B. ZULKIFLI	1ST YEAR (UNITEN) (ELECTRICAL)
	WAN SUHAILA BINTI ANUAR	1ST YEAR (UNITEN) (ELECTRICAL)
	YEW SOOK KWAN	1ST YEAR (UNITEN) (ELECTRICAL)
	YONG KONG WOON	1ST YEAR (UNITEN) (ELECTRICAL)
	ZIKRY HAKIM BIN ZAKARIA	1ST YEAR (UTHM) (ELECTRICAL)
	ZULHAIMIE BIN BOLOH	4TH YEAR (UTEM) (ELECTRICAL)

KEJURUTERAAN ELEKTRONIK

78967	ABDUL REDZA B ABD HALIM	1ST YEAR (USIM) (ELECTRONIC)
	ADAM BIN ADNAN	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	AFIFI HAKIMI BIN AHMAD NAZIR	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	AHMAD IRFAN BIN OTHMAN	3RD YEAR (UMP) (ELECTRICAL & ELECTRONIC)
78930	AHMAD NAJMUDDIN SYAFIQ BIN AHMAD SUKARNO	2ND YEAR (USIM) (ELECTRONIC)
78932	AHMAD NAZIRUL AZRI B ZAHARI	2ND YEAR (USIM) (ELECTRONIC)
78972	AHMAD SHAUQI BIN KAMARUDIN	1ST YEAR (USIM) (ELECTRONIC)
	AHMAD SIRAJ BIN MOHD YUSOF	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	AHMAD SYUKRI BIN MOHD ZAID	1ST YEAR (MMU) (ELECTRONIC)
78974	AHMAD ZUBAIR BIN MOHD HASHIM	1ST YEAR (USIM) (ELECTRONIC)
	AIDID AZAHAR BIN BASIR	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
78960	AIMI NABILAH BINTI ISMAIL	1ST YEAR (USIM) (ELECTRONIC)
78942	AIN NADIAH BINTI ABDUL AZIZ	2ND YEAR (USIM) (ELECTRONIC)
	AINA SABIHAH BT MOHD SUKOR	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	AINAA MAHIRAH BINTI KHAIROL AFANDI	1ST YEAR (UTHM) (ELECTRONIC)
	AJWAD BIN AZLIN	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	ALEJANDRA EVANDER A/L JUSTIN	3RD YEAR (UMP) (ELECTRICAL & ELECTRONIC)
	ALI AMRAN BIN NASRUN	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	ALICESHA APRIL ANNE HILARY	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
78965	AMAR BIN LOKMAN	1ST YEAR (USIM) (ELECTRONIC)
	AMIRA SYAFIKA BT KAMARUZAMAN	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	AMIRUL IZWAN BIN MAHROII	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	AMNANI BT MOHD AMIR HAMZAH	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	ANA MARDHIAH BTE AHMAD TAHA	1ST YEAR (UTHM) (ELECTRONIC)
	ANANTHAN A/L RAMESH	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	ARIS DANIAL BIN AFANDI	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	ARWEN RAAJ S/O MANUKARAN	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	AZIZOL ASSRI BIN DAUD	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	BONG TECK PAW, CALEB	3RD YEAR (SWINBURNE) (ELECTRICAL & ELECTRONIC)
	CALEB DEVANESAR DEVADASS	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	CHAI WEI JIN	1ST YEAR (UTAR) (ELECTRICAL & ELECTRONIC)
78434	CHAN CHI YEN	4TH YEAR (UPM) (ELECTRICAL & ELECTRONICS)
	CHAN WEI HWA	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	CHANG POE YONG	1ST YEAR (UTHM) (ELECTRONIC)
	CHEE ZHEN YAO	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	CHENG YI XIANG	2ND YEAR (UTAR) (ELECTRICAL & ELECTRONIC)
	CHIN KOK CHING	2ND YEAR (UTAR) (ELECTRICAL & ELECTRONIC)
	CHOW WENG KEET, DARYL	3RD YEAR (UTAR) (ELECTRONIC & COMMUNICATION)
	CHUA ZHENG YUN, TIFFANY	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	CYPRIAN ANAK AWOS	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	DEVANTHERAN A/L ALAKENDRAM	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	DEVENDRAN A/L RAJAN	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	DINESH A/L BALASUBRAMANIAM	3RD YEAR (UMP) (ELECTRICAL & ELECTRONIC)
	DINISHDARAN A/L SUBRAMANIAM	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	FARAH ADIBA BINTI AZMAN	3RD YEAR (UMP) (ELECTRICAL & ELECTRONIC)
	FARIS SYAHMI BIN SAMIDI	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	FATHEN AINES FARAHIN BINTI NORAZMAN	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	FATIN AREENA BT A AZIZ	1ST YEAR (UTHM) (ELECTRONIC)
	FATIN HAZIRAH BINTI ROSLAN	4TH YEAR (UMP) (ELECTRICAL & ELECTRONIC)
	FATIN LIDIYA BT MOHD SALLEH	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	FATINI DIYANA MOHAMAD FADZIL	1ST YEAR (UTHM) (ELECTRONIC)
	GAOTHAM A/L KALAISELVAM	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	GOH WIN SERN	1ST YEAR (UTHM) (ELECTRONIC)
	HANA NAJWA BINTI OMAR RASHID	4TH YEAR (UMP) (ELECTRICAL & ELECTRONIC)
	HARIZ ASYRAFF B. ABDUL LATIFF	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	HAZWANI BT MOHAMMAD HELMI	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	HENG CHIN YANG	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	HENG KIAT JING	1ST YEAR (SWINBURNE) (ELECTRICAL & ELECTRONIC)
	HOO KAI WEI	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	HOO YU HENG	2ND YEAR (UTAR) (ELECTRICAL & ELECTRONIC)
	KATHY ANAK KOPER	1ST YEAR (UTHM) (ELECTRONIC)
	KEHSEEGAN A/L VENUGOPALAN	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
78973	KHAIRIL ANWAR BIN ABDUL KHALIK	1ST YEAR (USIM) (ELECTRONIC)
	KHAIRINA NAJWA BINTI RAMELI	4TH YEAR (UMP) (ELECTRICAL & ELECTRONIC)
	KHAIRUNISA BT ZAINUDDIN	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	KHEMARAJ A/L KABILAN	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
	KHISHN KUMAR A/L KANDIAH	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
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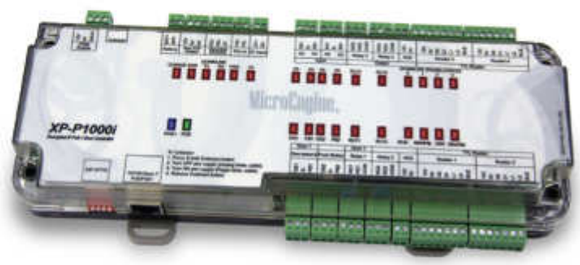

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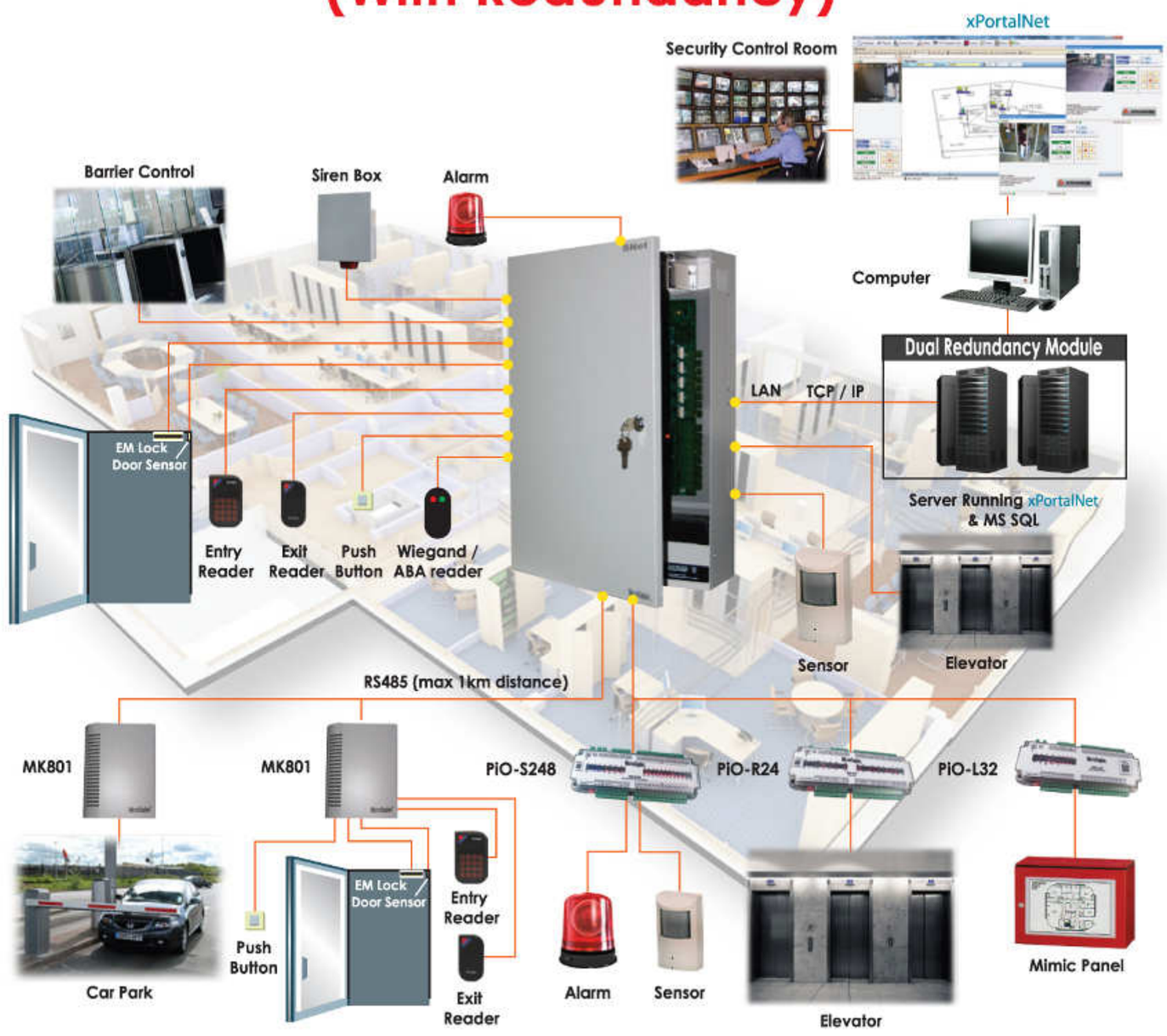

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