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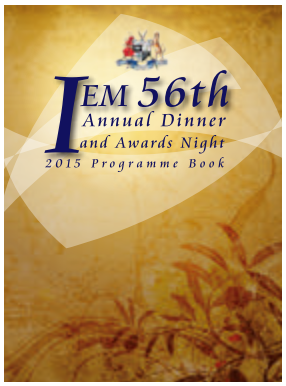
THE MONTHLY BULLETIN OF THE INSTITUTION OF ENGINEERS, MALAYSIA

JURUTERA

Standards Drive Globalisation

The Institution of Engineers, Malaysia

IEM 58th Annual Dinner and Awards Night 2017 Programme Book



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CONTENTS

5 COVER NOTE
Standards Drive Globalisation

6 - 12 COVER STORY
Ensuring Technical Safety in Electrotechnology

14 - 15 PRESIDENT'S CORNER

16 - 23 FEATURE ARTICLES
ASEAN Engineering Inspectorate (AEI) – Guide to LV Electrical Installations 16

IEC Young Professional Frankfurt 2016: A Personal Experience 21

26 SAFE TEA TIME
The Competency

28 - 38 FORUMS
IEM-ST Awareness Half-Day Seminar on MEPS for Motors 28

Report of Talk on Liquidated Damages Under Construction Contracts 31

Pre-AGM Talk on Temporary Works under BEM Guideline and MS1462 Metal Scaffolding-Mandatory under CIDB Act 520 (Amendment 2011).....32

IEEE-IEM eETD Mini Colloquium 35

Advancing Women Engineers' Role in the ASEAN Community: A sharper Focus 36

40 NEWS FROM BRANCH
IEM Engineers' Run 2016

43 GLOBE TREKKING
Conical Houses of Alberobello

44 PINK PAGE
Professional Interview

45 - 47 BLUE PAGE
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Standards Drive Globalisation

by Ir. Yau Chau Fong
Chairman, Electrical Engineering Technical Division (EETD)

Have you ever wondered whether an engineering design done in Malaysia can be used in other parts of the world? Is it possible for our designs to be adopted and accepted by engineers in other countries?

Standardising engineering designs is definitely one way forward to drive the electrical industry towards common goals such as safe electrical installation and common consumer products realisation. Hence, for the past one year, the EETD has embarked on a mission to promote standardisation in the electrical industry.

To mark our efforts in this, IEM EETD, with the support of the Department of Standards Malaysia (DSM), initiated the first national-level 2-Day Symposium & Exhibition on Electrotechnical Standards in December 2016.

With the theme, "Standards Drive Globalisation", our aim was to create awareness on the importance of Standards, in particular among the electrical engineering fraternity as this, in return, would drive our industry towards globalisation.

We were indeed honoured to have International President of the International Electrotechnical Committee (IEC), Dr Junji Nomura, deliver the main keynote address at the symposium. In this issue of *JURUTERA*, our cover story is a recent interview with Dr Nomura. Also featured is the summary of AEI's Guide To Low Voltage Electrical Installations, launched last year in compliance with the requirements of IEC 60364-6 and BS 7671-6.

We plan to include the symposium and related events in IEM's annual calendar of activities. In future, it may also trigger similar events, not just for the electrical industry but also for other engineering industries.

We thank all IEM members for their continuous support of EETD activities. ■

FEEDBACK

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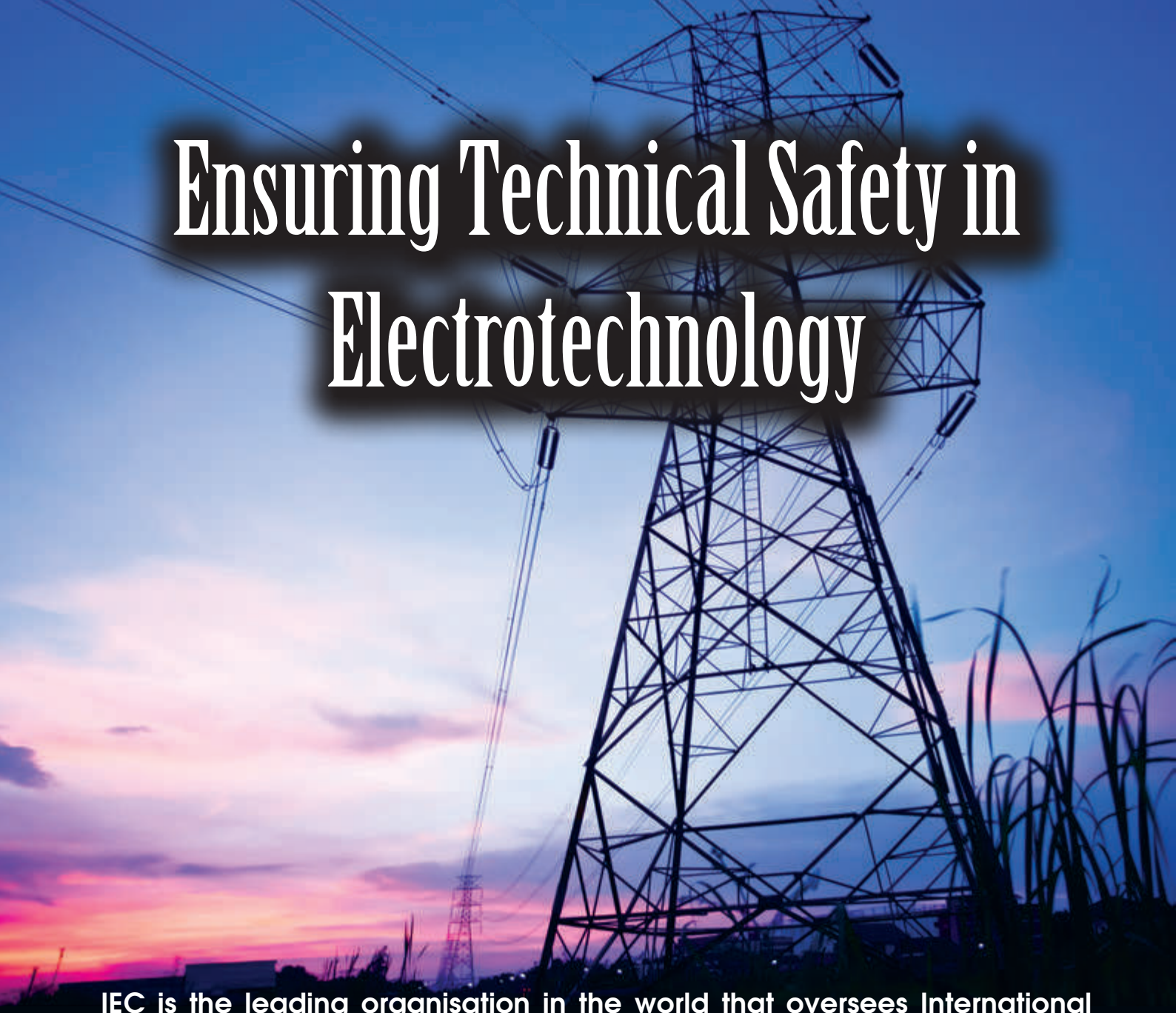

Ensuring Technical Safety in Electrotechnology

IEC is the leading organisation in the world that oversees International Standards for electrotechnology with a focus on technical safety of products, devices and components. IEC President Dr Junji Nomura, talks about the vital work of this organisation.

Founded more than a century ago, in 1906, the International Electrotechnical Commission (IEC) is the world's leading organisation that prepares, develops and publishes International Standards for all electrical, electronic and related technologies, collectively known as electrotechnology. IEC also operates conformity assessment systems in this field.

IEC takes pride in bringing together 170 countries worldwide and close to 20,000 experts from industries, commercial enterprises, governments, test and research laboratories, academia and consumer groups to take part in IEC standardisation work. They co-operate on the common IEC global platform to ensure that products are safe for use and can perform, fit and work safely together.

Efforts to bring together governments of the various countries as well as a huge number of industries and companies to discuss, develop and use the IEC International Standards are massive, yet the IEC continues to remain committed to its course, thanks to its visionary leadership. IEC's highest decision-making body is the Council Board, helmed by its Chairman who is also the IEC President, Dr Junji Nomura.

Dr Nomura became IEC President on 1 January, 2014, for a three-year term, having served as President-Elect since 1 January 2013. He is currently the Corporate Advisor, Energy Solution Business Promotion, at Panasonic Corporation, Japan.

JURUTERA speaks to Dr Nomura to learn more about the progress of IEC and its important work in preparing and promoting International Standards in the field of electrotechnology. Also adding input to the interview with Dr Nomura are Dennis Chew, Regional Director of the

International Electrotechnical Commission Asia-Pacific Regional Centre (IEC-APRC), and Ir. Yau Chau Fong, Chairman of IEM's Electrical Engineering Technical Division.

Dr Junji Nomura is IEC President (2014 to present) and Corporate Advisor, Energy Solution Business Promotion, Panasonic Corporation (2011 to present)

Q What is the biggest milestone of IEC since its inception 111 years ago?

Dr Nomura: This is subjective but I think our biggest milestone is the recent rapid growth of the IEC family. From 62 countries at the end of 1999, the membership has increased to 170 countries. The advent of the IEC Conformity Assessment (CA) Systems, together with the IEC International Standards, provides a globally unique quality and risk management tool to companies and regulators alike.

Q What is the ultimate goal and nearest vision of IEC?

Dr Nomura: Our vision statement is "IEC Standards and Conformity Assessment Programmes – the key to international trade". Based on this, the IEC promotes world trade and economic growth as well as encourages the development of products, systems and services that are safe, efficient and environmentally friendly.

I believe our nearest vision would be the adoption and/or use of IEC Standards without deviations and the acceptance of conformity assessment systems certificates and reports by every country in the world. This will not only facilitate global trade but will also ensure quality, safety and protection to the environment, among others.

As for deviations from the IEC Standards specifications, member countries should not deviate too much. We want quick work and quick activities of IEC and its members, so there must be quick response to IEC Technical Committees (TCs).

We are educating members to give a quick response to TCs as otherwise, there will be a backlog of new products and devices in many countries or factories. We must think together for new products and devices to have technical safety and these must be functional but we must always check the duration for achieving these so that there will be no delays in the work of the TCs. Members, especially those which are not market leaders, have to change. We know it is difficult to get new products and devices to satisfy all the technical safety requirements within one year. Normally, it takes three years and we allow this.

Chew: On record, IEC guidance is three years. On average, it is 34 months (2.8 years). If it takes more than five years, IEC will ask the affected TCs to stop work, and start something else. But sometimes the TCs have good reasons, so we will consider extensions and appeals on a case-to-case basis.

Q What is IEC Standards' adoption rate globally?

Dr Nomura: While we currently do not mandate National Committees to report on it, we are now initiating, for Council approval, the requirement for National Committees to fully declare this information.

However, the rate of adoption of the International Standards is high; otherwise companies globally cannot manufacture products and the required devices, which must also be produced according to the International Standards.

Take for example, Murata, a famous device maker in Japan. Although it is small in size, it is a high-profit company and its target is to make its devices quickly and according to IEC International Standards. As the lifetime of these devices is short, a quick response to safety compliance is needed and important to them.

Q What role can Malaysia play in IEC? For example, is there any technical committee that Malaysia can be more active in?

Dr Nomura: Malaysia currently has Participating Membership in 28 TCs and Sub-Committees (SCs) and Observer Membership in 66 TCs/SCs. Malaysia can choose to be more active by nominating more experts to participate or even lead Working Groups, Project Teams and Maintenance Teams in the TCs/SCs of which it is a Participating Member.

On the conformity assessment side, we are pleased to share that, last year, Malaysia was elected a member of the IEC Conformity Assessment Board. Malaysia is also very active in the International Electrotechnical Commission for Electrical Equipment (IECEE), where it regularly issues and recognises test certificates, and in International Electrotechnical Commission Explosive (IECEx) particularly in the programme to evaluate the competence of personnel installing, maintaining and repairing explosive equipment and systems. IECEx is the body that develops the IEC System for Certification to Standards Relating to Equipment for use in Explosive Atmospheres (IECEx System).

Chew: Involvement in IEC must always be dynamic but, more importantly, Malaysia must check new committee setups and take note of new work coming up in industries. There are also players who work with companies and these must be aware of the importance of participation in TCs and support them. The participation should not be seen as a form of national service but rather, it is also for the benefit of their companies. It is important for their companies to

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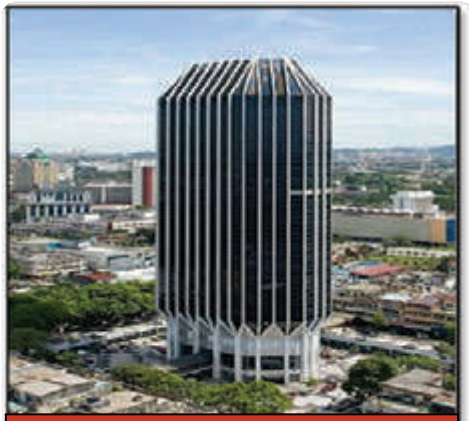

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Malaysian National Electrotechnical Committees (MyENC) meeting at the Symposium

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be involved as well. They represent their companies and, at the same time, become relevant in TCs and support the work of national bodies such as SIRIM and others.

Ir. Yau: Many of us represent organisations such as IEM and others. In fact, because of high occurrences of lightning in our tropical region, we are active in IEC TC 81 (Lightning Protection) and in IEC TC 31 (Equipment for Explosive Atmospheres), particularly for the oil and gas sector. These cover not only equipment but also every aspect that has to do with product certification, including human competency.

IEM is also involved in the committees for relevant Standards development in Standards Malaysia. Participating in symposiums involving Standards Malaysia, where most of our engineer members are also present, is important because we want our members in the electrical and electronic sector, to be more involved in Standards committees. It is also a good move to create awareness, particularly on IEC and International Standardisation, and to encourage our members to participate, especially young engineers and professionals. We have been sending them to join talks and symposiums so as to get them more involved in Standards committees.

Q How can we better adapt IEC International Standards, taking into account factors at local levels, such as environment?

Dr Nomura: IEC Standards are developed largely based on input from the experts participating in the respective TCs and SCs. At present, there are around 20,000 experts participating at the global level and thousands more contribute via mirror committees of member countries. More active participation of experts from Malaysia will allow them to share the country's additional needs and concerns so that local level factors can be fully addressed. Overall, this allows Standards to become better and more relevant for more countries. It will also simplify the adoption of IEC International Standards in Malaysia without further national modifications.

Some IEC Standards also take into account not only the environmental factor but also the materials used in production. Some may consider this as a restriction that may affect design and machines but the IEC Technical Safety Division considers all factors as a form of community care. Everyone's safety is important and company engineers involved in the design and development of a product, component and device must communicate with us. Some refuse to, maybe because of the design secret factor. Internal communication is a challenge but for design success, electrotechnical safety is a requirement and engineers must communicate and work with us. The result is not for IEC but for the companies and their engineers as well. Communication must be more open to achieve design success.

Q Besides IEC, there are many other global Standards bodies, such as the International Organization for Standardization (ISO), American National Standards Institute (ANSI) and the British Standards Institution (BSI). Due to the local national and industry-specific requirements, it is difficult to harmonise these Standards. What collaborative efforts has the IEC taken with other Standards bodies?

Dr Nomura: IEC, ISO and the International Telecommunication Union (ITU) collaborate through the World Standards Cooperation body. At the purely technical level, there are many joint efforts, including establishing liaisons that help avoid overlapping in various works and forming joint working groups where work can be shared.

Additionally, the IEC has put in place a Systems Approach with the aim to stimulate co-operation and,

wherever possible, eliminate duplication. We now have Systems Evaluation Groups and Systems Committees covering a wide range of topics, including Smart Cities, Smart Energy and Smart Mobility, Microgrids and Active Assisted Living.

With this mind-frame, the IEC had, for example, successfully organised the World Smart City Forum in Singapore in July 2016, in partnership with ISO and ITU and we invited all major Standards organisations in an effort to streamline and better co-ordinate the development of Standards for Smart Cities.

The reality is this: No single organisation can deliver all the Standards needed for increasingly big systems. Co-operation is absolutely essential. Our stakeholders, including industries, absolutely want to avoid duplication and waste. They look to the IEC to help streamline standardisation efforts in everything that uses electricity or contains electronics and to bring on board all the appropriate expertise.

Q What is your view on Standards development for developing nations, especially in the ASEAN region?

Dr Nomura: We strongly encourage more active participation of ASEAN countries in the IEC TCs/SCs. In particular, we introduced IT tools to facilitate participation. Recently, we introduced Public Commenting that would allow any company to view and comment on draft Standards and so contribute to the development of IEC International Standards via its National Committee.

IEC has also introduced a Mentoring Programme where a more developed and established National Committee can mentor a National Committee that is less mature on specific technical areas. Through this arrangement, the mentor will provide support which will strengthen the mentee's knowledge and encourage its active participation in the committees that are of interest to it.

Q Currently, there is an intention in the ASEAN region to harmonise the electrical Standards among its member countries to facilitate potential growth and support the plans of the ASEAN Economic Community (AEC). What are your views on this?

Dr Nomura: This will be a very positive development. The AEC's plans will be far better implemented if the various ASEAN member countries can adopt, not only the same IEC International Standards without deviations, but also the same edition of the International Standard, and to accept newer versions of it. As a result, this will not only benefit ASEAN but also its ability to export to international markets and to participate in global value chains.

IEC also operates four Conformity Assessment Systems where test results are mutually accepted by the participating certification bodies. The tests are done according to IEC international Standards and accepting the results will help support the AEC, too.

Essentially, Electrotechnical Standard is an international technical safety Standard and the IEC is the only international body that oversees this although, domestically, countries may have their own national Standards bodies. Another international body is ITU which oversees telecommunication systems; it is also a kind of international union society for global Standards for telecommunication.

IEC is, in fact, older than the ISO, which was formed in 1947, so that makes it only 70 years old. We have been doing studies on electrotechnical safety since we were established in 1906 and, over time, safety Standards have been improved. That is our focus. The electrotechnical safety programme is very important for the safety of human beings. For example, if an electrical item is not properly installed, it may cause an electric shock and that is dangerous to humans.

Electrotechnical safety involves not only products and systems but also many devices and sensors. Each product has many components and every component must be safe for use. Therefore we have so many TCs in IEC to cover products, systems and devices, including components. If electrical product makers want to make new products, we have to ensure that the new devices that they need are safe and correspond with the electrotechnical safety needed.

It is the same for ASEAN countries. For example, Japan has many manufacturers, such as Panasonic, Sanyo, Hitachi etc. These also want to make their products for the ASEAN region, so ensuring these products are safe and follow IEC international technical Standards is also very important. It is international Standard, not country Standard.

The situation in the various countries may be different; therefore uniting to adopt IEC International Standards is vital. But although it is convenient to adopt IEC International Standards, working with the different countries can get complicated and realising unity can be difficult.

Chew: Yes, there is an Asean initiative to harmonise Standards. In fact, there's a meeting among regulators for electrical and electronic equipment and products, and they refer to the list of IEC Standards as reference Standards. This is a step in the right direction.

Q In Malaysia, SIRIM is the national research and technology development body which also provides testing and certification services. Does SIRIM comply with IEC requirements?

Chew: There are two different things here. One is Standard as a publication and then there is conformity assessment to do verification so that products meet the Standards requirements. SIRIM's work mainly involves conformity assessment which is important to verify whether products meet the Standards.

SIRIM tests products according to the IECEE, which is the IEC System for Conformity Assessment Schemes

for Electrotechnical Equipment and Components. It is a multilateral certification system based on IEC International Standards. SIRIM is a member of IECEE. Its members use the principle of mutual recognition (reciprocal acceptance) of test results to obtain certification or approval at national levels around the world. Member countries recognise each other's test results as these are based on the IECEE and they all follow the same certification system.

Many of the tests are to help companies sell in more markets. International companies do not manufacture for just one country but for many markets. So they can go to organisations like SIRIM and say that they are exporting to various countries and ask for their products to be tested and certified according to IEC International Standards. Some products may require slight modifications; the testing body will also conduct tests on the modifications done.

Essentially it is only one list of International Standards for many different markets. The base is the IEC product-specific Standards. There are different Standards for different products. For example, there is a safety Standard for microwave ovens and another Standard for refrigerators. We make sure these International Standards are complied with.

Dr Nomura: Initially, we decide on technical safety. Then we focus on how to test using testing systems and facilities. If proper tests are not done, it will be difficult to get certification.

Testing will give assurance on the safety of the products and components. Safety has always been, and will always be, the focus of IEC. ■

ELECTROTECHNICAL SYMPOSIUM & EXHIBITION 2016

IEM Electrical Engineering Technical Division and Standards Malaysia organised the "Electrotechnical Symposium & Exhibition 2016" on 5-6 December, 2016 in Subang Jaya, Selangor, with the theme, Standards Drive Globalisation.

IEM President Ir. Tan Yean Chin delivered the welcome address. Officiating at the opening ceremony was Deputy Minister of Science, Technology and Innovation Datuk Dr Abu Bakar bin Mohamad Diah representing the Minister. Also present was Datuk Ir. Ahmad Fauzi Hasan, Chief Executive Officer of the Energy Commission and International Electrotechnical Commission (IEC) president Dr Junji Nomura.

The symposium, attended by more than 800 participants, focused on four main themes: Standards Drive Globalisation, Electrical Installation, Oil & Gas Industry and Consumer Products.

On the first day, there were four speakers in the morning: Dr Junji Nomura spoke on "Global In Standardisation", Encik Ridzwan Kasim, Senior

Distinguished symposium participants singing the national anthem, Negaraku

Director of Standards Malaysia on "Standardisation Activities in Malaysia", Datuk Seri Ir. Azman bin Mohd, President/Chief Executive Officer of Tenaga Nasional Berhad on "Importance and Benefits of Standards in the Electric Utility Industry" and Ir. Rocky Wong Hon Thang, Chairman of ACPECC-SGM on "Standards Drive Globalisation".

In the afternoon, the Electrical Installation session started with Ir. Chris Chew, Vice Chairman of MyENC, giving a keynote address on "Engaging Contractors in Standards Compliance". This was followed by Dato' Ir. Ibrahim Abu Bakar, Vice Chairman of ISCE who spoke on "Generation, Transmission and Distribution of Energy". Encik Lokman Dahlan, Ir. Lim Kim Ten, Prof. Ir. Dr Zainal Abidin Abdul Kadir and Ir. Abdul Rahim Ibrahim spoke on electrical installations. They are experts in cables, electrical installations, lightning protection and energy respectively.

MOSTI Deputy Minister Datuk Dr Abu Bakar bin Mohamad Diah and IEM President Ir. Tan Yean Chin, visiting an exhibitor's booth

Day Two started with the Oil & Gas Industry session. Ir. Mohammad Faudzi bin Mohd Yasir, Chairman of National Explosive Atmosphere Management Committee (ExMC), delivered the keynote address on "Standards & the Oil & Gas Industry". This was followed by Ir. V.R. Harindran, Ir. Quah Ewe Hock and Ir. Tiong Kung Sing who spoke mainly on the explosive and hazardous environment in Oil & Gas industry.

For the final session on Consumer Products, Encik Mohd Elmi bin Anas, Chairman of National IECEE CB Management Committee (CBMC) spoke on "Statistic of Electrical Incidents in Malaysia" and Mr. VT Doshi, Vice Chairman of ISCS, spoke on "Current Development of International (IEC) and Malaysian (MS) Safety Standards on Household and Similar Electrical & Electronic Appliances".

Four other speakers – Encik Zulkiflee Umar, Mr. Tee Tone Vei, Prof. Dr Nasrudin bin Abd Rahim and Assoc. Prof. Dr Samsul Bahari Mohd Noor – also spoke on consumer products.

The event was sponsored and supported by organisations such as Mun Hean Sdn. Bhd., HVTL Test Lab Sdn. Bhd., Ablecon Power System Sdn. Bhd., Bureau Veritas Sdn. Bhd. and TNB-ILSAS. ■

Delegates of MyENC meeting after the morning session of Day 1

Authors' Biodata

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***Dr Siow Chun Lim** obtained his Bachelor of Electrical & Electronic Engineering from University Putra Malaysia, Selangor, in 2011. In 2014, he obtained his Ph. D from the same university. His research interests include electrical grounding systems, high voltage experiments and engineering education. He is also Associate Editor of Journal of Engineering Science & Technology.*

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Promoting STEM and Engineering to Meet Demands of The Future

Ir. Tan Yean Chin
President

The Institution of Engineers, Malaysia (IEM) is concerned about the decline in the number of secondary school taking up Science, Technology, Engineering and Mathematics (STEM). This will result in a decline in the enrolment for engineering courses in universities. The consequences are disastrous as it will mean there will not be enough engineers to implement and maintain development projects in the country. This will cause the development of the nation to stagnate.

Countries which want to achieve developed status and maintain that status, will require significant numbers of engineers. The "Ratio of Engineers to Population" is used to benchmark whether a country has enough engineers for development. Developed nations such as the United Kingdom, France, Canada and Germany, have a ratio that varies from 1:75 to 1:150. What this means is that for every 75 or 150 people, there is at least 1 engineer.

Last year, our country's population stood at 31.7 million. According to the Board of Engineers, Malaysia (BEM), which registers and regulates all engineers in the country, there are some 110,000 registered engineers. IEM, as a society for engineers from all disciplines, has a membership of more than 40,000.

However, it is estimated that the actual number of engineers in Malaysia is around 200,000 as there are significant numbers of engineers who are not registered with the regulatory bodies. With this number, we have a ratio of close to 1:150, which is healthy for the time being. We should, however, target a ratio of 1:100 by year 2020, in order to expedite the pace of our transformation into a developed nation.

According to the World Economic Forum 2016, about 35% of skills which are considered important in today's workforce, will change within the next 5 years. In the future, 80% of jobs will require some form of STEM background or education.

World Economic Forum 2016 predicts that, by year 2020, some 2 million jobs created worldwide will be related to the fields of Computer, Mathematics and Engineering.

The Ministry of Science, Technology and Innovation (MOSTI) estimates that there will be a shortage of 236,000 scientists and engineers by 2020.

There are several factors underlying the declining interest in Science subjects and the engineering profession. These include the loss of interest in STEM, the misconception that engineers do not earn much, the misconception that engineers do jobs that are dirty, difficult and dangerous and the lack of Government incentive to promote engineers to top position in the civil services.

It is not true that engineers earn less than their peers in other professions. With their education and training, engineers are generally more analytical and careful as they are well versed with numbers. In reality, engineers earn as much as any other professional. However, they tend to keep a low profile and so have created the impression that the engineering profession is less glamorous, compared to other professions. But in reality, many CEOs of listed companies in Malaysia are engineers.

This declining interest in STEM is worrying for the development of the country. Currently, less than 30% of Form 4 students are in the Science Stream (it used to be 50%). Malaysia is targeting for 60%.

Young people today seem to prefer to take up studies related to business, finance and management instead of STEM-based subjects.

STEM-based degrees such as engineering, have a higher entry requirement. Courses are also generally more demanding and require at least 4 years of study.

It's not true that an engineer's job is dirty, difficult and dangerous. Engineers work in comfortable, safe and clean environments.

A better prospect for engineers to reach top posts in the government sector as well as better status recognition for engineers can be a motivation factor for school students to take up STEM Education and then pursue a career in engineering.

Government recognition of the contribution of engineers and providing a structural pathway to the top position in the Civil Service (e.g. KSN and KSU) will be a big motivator for students to pursue STEM education and engineering.

While it is important to produce more STEM students and engineering graduates to meet the national demand, it also of paramount importance to address the quality of these graduates.

With fewer students taking STEM subjects, there will be a drop in the standard of students who enrol in engineering courses. This, in turn, will result in a potentially lower quality of engineering graduates.

In 2015, IEM published a Position Paper on "Benchmarking the Quality of Engineers", which

highlighted the major concern over the quality and trainability of fresh graduates from local universities due to the lower standard of secondary school students. The findings from that Position Paper, which addressed the need to raise the standard of engineering graduates, was presented to the Ministry of Higher Education.

IEM lauds the Government's efforts to promote greater interest and awareness of Science and Mathematics programmes in schools. IEM is also actively doing its part by conducting career awareness talks as well as holding competitions and exhibitions on interesting engineering projects in schools.

Engineering students are also encouraged to join IEM as Student Members as this will give them access to IEM's resources such as joining IEM activities, talks and networking sessions. ■

Membership Renewal Notice and Annual Subscription for 2017

1. In line with Bylaws Section 4.2 and 4.3, we are pleased to attach herewith your membership renewal notice for 2017. Kindly be informed that the annual subscription rates excluding the 6% GST for 2017, which will become due from 1st January 2017 are as follows:

FELLOW	:	RM 265.00
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Note: Kindly be informed that as per our announcement on 1 October 2015, GST is chargeable on IEM Subscriptions at the rate of 6%.

2. Transfer of Grades

Members, whose applications for transfer of grades are pending, are advised to remit the subscription for their existing grades. You will be notified of the difference in fee payable when Council approves your application.

3. Mode of Payment

Payments may be made as follows:-

i. IEM Head Office Secretariat - By cash or cheque / money order / postal order / bank draft / credit card (Visa/Master)
ii. Online payment / Internet Banking - Maybank2u / RHBNow / Visa or Master via MyIEM portal *(real time payment with online receipt) / CIMB Clicks
iii. By post (Visa/Master) - Cheque / money order / postal order / bank draft / credit card

Cheque / money order / postal order / bank draft are to be made payable to **"The Institution of Engineers, Malaysia"** and returned together with the attached ***Form A***. Kindly write your name and membership number at the back of your cheque / money order.

3.1 IEM Affinity Programme - CIMB Cardholders

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To pay online, kindly login to your account at www.myiem.org.my.
You can also download Form A from the IEM website.

ASEAN Engineering Inspectorate (AEI) – Guide to LV Electrical Installations


Ir. Ng Win Siau


Dr Siow Chun Lim

The ASEAN Engineering Inspectorate (AEI) – A Guide to LV Electrical Installations provides a recommendation on the proposed minimum requirement for verification by inspection and testing for compliance to statutory and regulatory requirements and the IEC 60364-6 and BS 7671-6 standards for a low voltage electrical installation of buildings.

Low voltage is defined as voltage not exceeding 1000V AC or 1500V DC between conductors. The document details the inspections from planning to after erection, safety, functionality and performance testing as well as tests after energisation.

Inspection of an electrical installation checks for adherence to design and functional intent, compliance to statutory and regulatory requirements and standards, quality and condition of work done and equipment supplied at site, condition of site which may adversely affect performance or safety, with supervision by the submitting person.

Inspection before erection focuses on the design and factory documentation, quantity and quality of equipment and material as well as proposed method statements. During erection, the focus shifts to the correctness of the work done and material use in adherence to the proposed method statements, coordination of work between contractors and proper reporting and recording of any incidence. After erection, a final check is performed on all work and equipment quality, electrical system safety, integration and functionality and for any influence or impact of the actual site condition on the electrical system's safety or performance. The AEI guide also recommends the inspections be performed for installation with confined spaces, as defined by Occupational Safety and Health Administration (OSHA).

Testing will need to be carried out to ensure that all critical aspects of the electrical system that are difficult to determine with visual inspections alone, are verified and confirmed to be correct and safe. Elements of safety, functionality and performance are established through testing. Table 1 lists the recommended tests ought to be performed by competent person with calibrated and or verified test instruments.

Figure 1: A Guide to LV Electrical Installations Book

The first test to be conducted is the circuit conductor continuity test. A multimeter or an Ohm meter is used to check the continuity from the power source such as the distribution box to the load or socket outlet, for the live, neutral and protective conductors. The continuity test verifies that all later tests will correctly measure the values for the entire length of conductor and will avoid any rise in potential if the circuit protective conductor and bonding are not in place or disconnected when carrying out other tests.

Table 1: Tests recommended by the AEI Guide

Continuity of circuit conductors test	Functionality of electromechanically/ mechanically operated devices
Insulation resistance (IR) test	Lightning and surge protection system
Polarity test	Circuitry check
Earth electrode resistance (EER) test	Lighting installation
Earth fault loop impedance (EFLI) test	Measuring and indicating equipment
Residual current device (RCD) complying with IEC 61008 or 61009	Functionality of all items of equipment/ systems, which include busbar, generator, power drive, low voltage switchgear and controlgear

It is recommended that the protection conductor, live and neutral conductor as well as final ring circuit conductor be subjected to continuity tests. An ohmic reading of less than 1Ω is strongly recommended as the acceptable level of continuity.

The insulation resistance test is then performed to verify the dielectric strength of the cable insulation and to detect any inadvertent connection between live conductors or from a live conductor to earth. An insulation resistance tester of 250V (DC) or 500V (DC) is used and the measured value is checked to see if it is above the allowed minimum values. Table 2 illustrates the minimum values of insulation resistance as per recommendation by IEC 60364-6.

Table 2: Minimum values of insulation resistance

Nominal Circuit Voltage	Test Voltage (V_{dc})	Insulation Resistance (MΩ)
Safety Extra Low Voltage (SELV) and Protected Extra Low Voltage (PELV)	250	0.5
Up to and including 500V, with the exception of the above cases	500	1
Above 500V	1000	1

Next, in the polarity tests, single-pole switches, fuses and circuit breakers are verified to be connected to the live conductor, not to the neutral conductor. Any wrong polarity connection can lead to a dangerous situation of a conductor that stays live, without the knowledge of the user, even when the switch is off. Again, a low ohmic reading of less than 1Ω as indicated by the measuring equipment, shall be recommended.

An effective earthing system is critical in an electrical system protection, to allow tripping of the protection device and to prevent any dangerous rise in potential. Therefore, the earth electrode resistance test is conducted to measure the resistance of any leakage current flow to earth. The fault loop impedance test measurement measures the complete loop impedance value while the earth electrode test instrument and the current clamps method measures the individual resistance of each earth electrode. Prior to performing the earth fault loop impedance test, it is paramount to ensure that the earthing conductor and all relevant earth connections are in place. In addition, the equipotential bonding connection to the electricity supplier's earthing facilities must also be disconnected. Finally, any earth leakage protective device must be isolated during the test.

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Table 3: Partial checklist of low voltage switchgear and controlgear test

Nameplate information and labelling of equipment	Power factor correction capacitor bank
Adequacy of documentation from manufacturer	Harmonic filter/reactors
Arrangement of switchgear and components arrangement against manufacturer's operation and maintenance manual	Automatic changeover switch
Enclosure for proper alignment, foundation fixing, and grounding and vermin entry	Instrumentation and protection devices
Covers, sections and doors for paintwork and proper fit	Incoming/outgoing busbars and cables
Proper alignment of the primary and secondary contacts	Operating handles/ keys
Correct phasing connection of bus bar and cabling works	Torqueing test

Residual Current Devices (RCDs) minimises any danger associated with leakage current, but the RCD's proper operation is critical. RCD tests are carried out with an RCD tester which injects a specific leakage current through to earth, then measures and displays the time taken for the RCD to operate and open the circuit. The RCD in-built test button should also be tested for proper functioning of the RCD.

The low voltage switchgear and controlgear at the main switchboard and distribution boards as well as busbar systems, are tested for functionality, continuity and electrical insulation. Mechanical operations, alignments and bolt torques are verified. Protection relays and measurement instruments are calibrated and tested. Primary injection is performed to test the stability of the protection system. Table 3 lists some of the items that should be checked:

A complete lightning protection system consists of air terminations, down conductors and earthing terminations. Hence, the lightning protection system should be tested for continuity between air terminations, down conductors and earthing terminations, with the combined resistance to earth to be less than 10 Ohm. Visual inspections are performed to verify proper installation of the down conductors and earth electrodes.

In addition, the AEI guide describes the steps for circuitry check, lighting installation test and test of other major equipment such as the generator set and power drive system. Circuitry check is performed to verify that the installed circuit is in complete accordance with the

designated circuit. This is done via switching operation. On the other hand, the lighting installation test is performed mainly to check the luminaries, illumination level, lighting uniformity and a few other aspects.

Upon completion of the testing, and with all relevant authority approvals obtained, the electrical installation should only be energised by a competent person. After energisation, measurement of the nominal voltage and verification of the phase sequence should be performed on each circuit. The nominal voltage at no load shall comply with the requirements of IEC 60038. Equipment and appliances should be carried out in accordance with relevant product standards and manufacturer's specifications. ■

Authors' Biodata

Ir. Ng Win Siau, *graduated from the National University of Singapore with a Bachelor of Engineering and a Master of Engineering in Electrical Engineering. He is currently with Perunding MM 20-20 and is a member of IEM.*

Dr Siow Chun Lim, *obtained his Bachelor of Electrical & Electronic Engineering and Ph.D in Electrical Power Engineering from Universiti Putra Malaysia, Selangor. His research interests include electrical grounding systems, high voltage experiments and engineering education. He is currently Associate Editor of Journal of Engineering Science and Technology.*

3rd AFEO Energy Working Group Meeting and AEI's Guide to Low Voltage Electrical Installations

Delegates of ASEAN Energy Working Group

The third meeting of the AFEO Energy Working Group was held at the recently concluded CAFEO 34 (Conference of ASEAN Federation of Engineering Organisation) in Palawan Island, The Philippines, in November 2016. The meeting was attended by delegates from Malaysia, Singapore, Thailand, The Philippines, Myanmar, Cambodia and Indonesia.

The main agenda was the tabling of the proposal for AEI *Guidelines of Electrical Installations*. The terms of reference for AEI Steering Committee had also been proposed together with the feasibility study towards the *harmonisation* of electrical installations in ASEAN. Copies of the *AEI's Guide to Low Voltage Electrical Installations,* authored and edited by IEM EETD and officially launched during the recent AFEO Energy Tour at Malaysia, were shared amongst the delegates.

The primary objective of the guidelines was to spearhead the efforts and initiatives with the ultimate aim of harmonisation of Standards pertaining to the electrical engineering practices at the ASEAN level.

The guidelines recommends the minimum requirements proposed for verification by inspection and testing on the compliance of low voltage electrical installations of buildings by a competent submitting person and electrical contractor with statutory and regulatory requirements, and the requirements of IEC 60364-6 and BS 7671-6. ■

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IEC Young Professional Frankfurt 2016: A Personal Experience

Mr. Low Pek Jun

I was greatly honoured to be selected as a Malaysian participant, along with Cik Nor Iratul of SIRIM STS, to the International Electrotechnical Commission (IEC)'s Young Professional Programme in Frankfurt in October, 2016. Malaysia is a member of IEC and every year, IEC organises the Young Professional Programme to give new, young talents the opportunity to participate in the global scale of Standards preparation.

Delegates to the IEC Young Professional Programme 2016

After a 20-hour journey, we arrived in Frankfurt on 9 October. The youth delegates from 43 countries were received by the host, Germany National IEC Committee, IEC President Dr Junji Nomura and other IEC office bearers.

The Young Professional Programme began the following day in the cold breeze of autumn, when Dr Nomura gave the Presidential Address in which he stressed the importance of having the young generation join the standardisation communities to generate new and fresh ideas in tackling the unpredictable future.

IEC Secretary and CEO Frans Vreeswijk later gave his perspective presentation on IEC roles and its current development. It is IEC's intention to reinforce and expand the close relationship with the industry as the industry makes the greatest investment in the work, contributing time, money and expertise.

IEC introduced six Systems Evaluation Groups (Low Voltage Direct Current, Microgrids, Smart Manufacturing, Active Assisted Living, Smarter Cities and Communities and Smart Energy) to engage the community of experts, identify the relevant stakeholders and define the general architecture and boundaries of the problem to be addressed.

Head of Governance and Global Strategic Katharine Fraga shared the IEC Masterplan 2011 which incorporated vision, mission and long-term strategy for a 5-year duration. The new IEC Masterplan 2017, is currently in the drafting stage, and Young Professionals 2016 will have the chance to input fresh and creative ideas.

Ricardo Nava, one of the three 2015 Young Professional Leaders, talked about his involvement with and the benefits gained from the IEC. He encouraged Young Professionals to take chances and expose themselves for the positive possibilities from IEC.

Dennis Chew, IEC Regional Director for Asia-Pacific, talked on "What to expect in a Technical Meeting". He

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covered the complete process of the technical meeting. The technical meeting of IEC shares a similarity with our own MyENC's Industry Standards Committees (ISC) of E and S.

The morning session ended with a Q&A session on IEC operations. The panellists were Mark Amos (IECex Business Manager), Dennis Chew, Katharine Fraga, Adam Murdoch (Manager of Equipment Safety, Energy Safe Victoria Australia) and Mike Wood (General Manager of EME Management Education & Compliance, Telstra Operations Australia).

In the breakout session, we were separated into groups and we had to answer 4 questions from the Conformity Assessment Board (CAB) on current challenges faced within and without, potential partnership as well as possible improvement on the assessment method. These questions had no definite answers and we were asked to give fresh and creative opinions from the young professional's perspective. The results were presented to all IEC office bearers on the second day and I was among the 10 young professionals selected to present the ideas.

We then had a networking session with the Standardisation Management Board (SMB) as well as CAB. SMB manages and supervises the IEC's Standard works while CAB manages and supervises the conformity assessment work. The board members were generally receptive and willing to answer related questions. I asked about the financial stability of IEC and strategy to obtain and maintain it. The majority of funding comes from three sectors: Membership fees (based on the countries' economic capacity as well as the electricity consumption), income from the standards sales and certificate activities and sponsorship from industry and national committees.

Young Professionals were required to observe and learn from the SMB and CAB meetings. With my background and interest, I was fortunate to join SMB for further exposure. The meeting was chaired by IEC Vice President James Matthews and touched on aspects that included the collaboration with ISO, the yearly young professional outcome report and other businesses. This meeting coincided with a major and important event, where European Committee for Electrotechnical Standardisation (CENELEC) reconfirmed its long-standing cooperation with IEC which lead to the signing of the Frankfurt Agreement.

This was followed by a sharing session with Standardisation Manager Coebergh Van Den Braak, who emphasised on participating companies which brought strategic benefits. These companies have a broad and deep global outreach with representatives from 169 countries and IEC Standards and Conformity Assessment are widely accepted by regulatory and market authorities. With over 100 technical committees, the knowledge is there to be excavated as well as close co-operation with the ISO to enable different approaches by the companies. He ended by mentioning that without IEC, the world would not be a safe place.

The entire IEC communities, totalling 3,800+, which came to Frankfurt were invited to join the IEC Opening Ceremony. This showcased the unique Frankfurt culture as well as the technology of lasers and lighting for stage and performances. There, I met 7 other Malaysian delegates. I hope there will be more participants in future as, indirectly, this will show the world what Malaysia is capable of doing.

On the second day, there was a networking session with the National Committee of each country. Puan Ainal from Standards Malaysia, shared her knowledge and experience and we talked about how this programme could be duplicated back in Malaysia for the benefit of potential young professionals.

Next was Conformity Assessment by David Hanlon, Secretary of CAB, and Pierre Selva, Director for Conformity Assessment and Market Surveillance from Schneider Electric. Hanlon gave his view on conformity assessment and how it could bring healthy competition as well as level the playing field for

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Discussion with Roland Bent, President of the Germany National IEC Committee

big manufacturers and small local manufacturers. He also shared how assessment was done.

As part of the programme, we had to attend and observe a Designated Technical Meeting slot; in my case, this was the chair of SC 23A (Cable Management System). Most of the delegates were from Europe and North America. The meeting was more on technical discussions and debates (even grammatical!) as well as using the vote to resolve any unsolved or disputed matter.

We were later engaged in an exciting Mock Technical Committee exercise led by Beer Opatsuwan (Network Substation Standards Engineer, Energex Limited Australia) to discuss Electronic Baby Robots as Standard Development Simulation Session. We were divided into 5 role-playing teams namely manufacturers, consumers, safety council, government and associations. I was part of the Safety Council, so automatically our nearest opponent was the Manufacturers. It might have been just a mock exercise but the learning curve was exponential!

Jack Sheldon, IEC Standardisation Strategy Manager, presented Section ahG 67 – Minute Trials (ahG stands for Ad Hoc Group) of the SMB 157th Meeting Report to Young Professional, being the initiatives from the Young Professionals Group.

Later, nine representatives of Young Professionals presented the results of the Day 1 discussions to the IEC officials. I was impressed that they took our suggestions and ideas seriously. James Shannon, President-Elect of IEC personally thanked me for the presentation of ideas and encouraged me to continue working closely with the IEC.

The Young Professional Programme encouraged us to network with the IEC communities by extending the session from 7p.m. to 10p.m. 18 Technical Committee Chairs were there to take questions from the Young Professionals as well as the wider IEC communities. I had an interesting discussion with members of TC 86 – Fibre Optics; the experts shared the latest technologies from around the world, from how fibre was spliced in the street of Paris to how data centres handled the high density of fibre connection in a single rack! It was also announced that Park Chan-Kuen of South Korea was the Young Professional Leader for Asia. I would be working closely with Park to further discuss the potential of Asia for the IEC.

On the third day, there were interactive sessions where Young Professionals were required to attend to questions from IEC communities. I joined ISO/IEC JTC 1 (Information Technology) with the Convenor, Karen Higgingbottom, sharing the concern and future possibility faced by the Joint Technical Committee of ISO and IEC. As information technology is moving at a very high speed, ISO and IEC have some very strong challenges in terms of Standardisation as well as protection and safety assurance to users. The JTC 1 posed questions regarding Security & Privacy, 3D Manufacturing & Customised Products as well as Robotics and AI. Karen took my opinions regarding Security & Privacy to submit for a JTC Review.

The Young Professional Reinvention Lab Session was then initiated by Roland Bent. We were asked to provide inputs for the future IEC Masterplan which would be reviewed at the 2017 General Meeting in Vladivostok, Russia, before finalising into the blueprint of the Masterplan. Roland posed us challenges such as seeking new shareholders, relevant deliveries, think-tank in Market Strategy Board (MSB), Fora & Consortia Bridging and State of the Art Collaboration Process.

The Young Professional Programme ended with a visit to VDE (Association for Electrical, Electronics and Information Technologies) Testing Lab for Consumers' Product. We witnessed Acoustic and Noise Emission Measurement, Ecodesign and Energy Efficiency, Electromagnetic compatibility (EMC), EMF, radio and Usability Tests labs. Cik Nor Iratul said that back in Malaysia, SIRIM has all these technologies and functions to do testing for consumer products. We were proud that Malaysia has the same level of technology as the VDE, Germany.

All those who attended the IEC Young Professional Frankfurt 2016, had gained tremendous knowledge and experience. I am suggesting that the previous IEM IEC Young Professionals – Ir. Yau Chau Fong (Tokyo, 2014), and Ir. Lee Cheng Pay (Minsk, 2015) – can, together with me, set up a working group under the EETD to promote Young Professional Malaysia perhaps be the leading working group for ASEAN. Hopefully, in the near future, Young Professional Malaysia will be the Young Professional Leader for Asia too! ■

Author's Biodata

Mr. Low Pek Jun *has a Bachelor Degree in Telecommunication from Multimedia University, Malaysia. He is currently pursuing a Master Degree in Electrical Energy Management. He is a Data Center Engineer with NTT MSC, a subsidiary of NTT Communications, the world largest colocation/data centre provider. A member of IEM, he is the elected Committee Member of the Electrical Engineering Technical Division (EETD) for 2016/2017 term and lead for its Activities Portfolio.*

ANNOUNCEMENT

BENEFITS AND SERVICES FOR IEM MEMBERS

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No	Services	Brief Description	Provider
1	IEM-CIMB Affinity Credit Card Program*	***This special offer from CIMB for IEM where a rebate of 1% of the total monthly expenses accumulated from member cardholders expenses is credited back to IEM. Member are encouraged to sign up for the credit card or convert their existing credit card to the CIMB Affinity Card.*** ***Contribute towards IEM Funds by applying immediately*** √ Annual Fee waiver √ Minimum Income per/annum: RM 24,000	CIMB Bank Bhd
2	Hotel Corporate Rates*	Members can enjoy the corporate rates provided by the hotels. List of hotels and Further details can be obtained in IEM website.	Various Hotels
3	Medical Testing Laboratories Corporate Rates*	Members can enjoy a special rate for medical check-up.	BP Healthcare Group
4	Insurance Scheme*	Purchase or renew your insurance through IEM for the following; √ Professional Indemnity Insurance (PII) √ Smart Protection Plan √ Critical Cover	AON Brokers Zurich Insurance AIA Insurance
5	Job Gallery*	A free advertising platform for job seeker, job advertiser to search for candidate and advertise vacancy.	IEM
6	Jurutera Wargamas Scheme*	IEM Corporate Member who had met the requirements is entitled to pay only 25 % of Annual Subscription.	IEM
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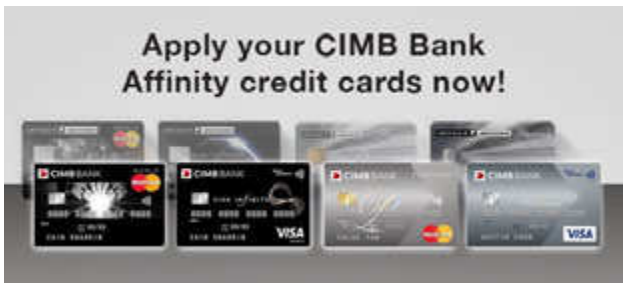
9	Mercedes Benz Corporate Program*	√ Corporate discount for brand new Mercedes √ More details will be published in the website	Mercedes Benz
10	Cycling Activities	Enjoy a healthy lifestyle by participating in the club's activities which will be announce accordingly in the website.	IEM Cycling Club
11	IEM Business Club	As a platform for business networking, explore the potential of fellow engineers helping each other through business referrals to enhance and improve business income. Business referrals via friends and business colleagues has proven to be a powerful and effective marketing tool for effective business development.	IEM Sub-Committee on Business Club

*Subject to T&C.

Regular announcements and further details can be obtained at **www.myiem.org.my**

Thank you.

Standing Committee on Welfare and Service Matters



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The Competency

by Ir. Shum Keng Yan

Ir. Shum Keng Yan is a chemical engineer and a certified accident prevention and safety practitioner.

Before we look at the experience and exposure, let us first define the Competencies of a Safety Professional. These are the knowledge, skills and aptitude required to do the job. I will not go into the dissection of competencies into the Human Resources realm of semantics but instead, let us use a simplified model. Let us divide the Competency into:

1. Functional Competency.
2. Core Competency.

1. FUNCTIONAL COMPETENCY

Functional Competency is by far the most familiar to a Safety Professional. This covers how well the Safety Professional can draw up and manage safety programmes, oversee risk management, apply risk assessment models, formulate safety intervention strategies and drive behavioural change, etc. The depth and scope depends on the job grade.

Functional Competency can be attained by attending a course followed by coaching and learning on the job. This will enable a person to gain sufficient experience. The functional courses will provide a certain level of certification. Think of Functional Competency as Technical Competency for a Safety Professional.

2. CORE COMPETENCY

Core Competency is usually defined as that which spans the organisation. This competency covers the soft skills and organisational agility of the Safety Professional. It is usually defined by the organisation as an expectation model or leadership model. This competency, though universal, is harder to develop as it requires more doing and coaching. Attending courses will only provide the concept. The real learning is in the doing.

Here is how we can add the competency portion into our Career Path.

	Coordinators	Engineers	Managers	Director	Vice President
Management Stream	Entry Level	General Practitioner	Heads a Unit	Heads a Geographical Area	Strategic Organisational
Technical Stream	Entry Level	Subject Matter Specialist	Heads a Subject Matter	Heads a Technical Unit	Strategic - Risk Control
Functional Competency	In-House cetification/ Studying for a recognised certification	Certified/ Registered Practitioner at a Local Level	Certified/ Registered Practitioner at an International Level	Continuous/ Professional Development/ Industry Involvement	Continuous/ Professional Development/ Industry Engagement
Core Competency	Communication	Personal Leadership	People Leadership	Impact Across Functions Influencing	Impact Across Businesses Engagement

Next we will look at the experience and exposure to develop the Safety Professional.

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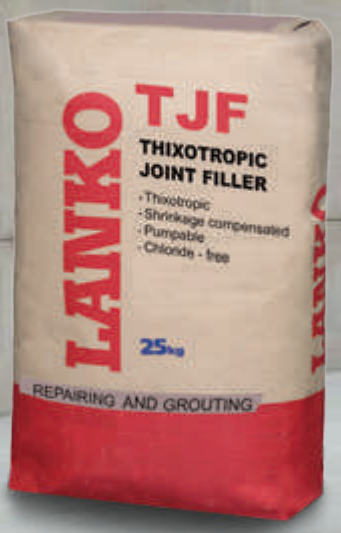

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IEM-ST Awareness Half-Day Seminar on MEPS for Motors

ELECTRICAL ENGINEERING TECHNICAL DIVISION

reported by

Dr Kwan Ban Hoe

Mr. Alex Looi Tink Huey

On 15 November 2016, IEM's Electrical Engineering Technical Division (EETD) and Suruhanjaya Tenaga (Energy Commission Malaysia) jointly organised the "IEM-ST Awareness Half-Day Seminar on MEPS for Motors" in collaboration with International Copper Association (ICA). Some 100 participants from the industry and academic institutions attended the event at Best Western Hotel in Petaling Jaya.

IEM president Ir. Tan Yean Chin delivered the welcome address and then Suruhanjaya Tenaga (ST) Chief Executive Officer (CEO) Datuk Ir. Ahmad Fauzi bin Hasan, who officiated at the opening, said the aim of the seminar was to create awareness among the industry on the Minimum Energy Performance Standard (MEPS) guidelines for electric motors. Although the initial cost of high efficiency motors is high, the operating cost is lower in the long run as these motors have less energy wastage and will last longer.

The first topic, "Market Research Study on Opportunities for High Efficiency Motors (HEMs) in Malaysia Industries", was presented by Ir. Assoc. Prof. Dr Gobbi Ramasamy from Multimedia University (MMU), Malaysia. The efficiency of electric motors can be categorised into the following IE (International Efficiency) classes: IE1 (Standard Efficiency), IE2 (High Efficiency), IE3 (Premium Efficiency), and IE4 (Super Premium Efficiency).

Some of the conclusions from Dr Gobbi's HEMs market study in Malaysia are as below:

- The majority of local industries use IE1 electric motors.
- The top 5 industries that dominate use of electric motors are paper, cement, food & beverage, petrochemical and steel.
- Most companies opt for motor rewinding (even though there will be a drop in motor efficiency) as this is cheaper than buying a new HEM.
- There are no MEPS in place and this, coupled with the lack of enforcement, has contributed to the lack of interest in the purchase of HEMs.

Ir. Abdul Rahim bin Ibrahim of ST (Energy Commission) made the presentation on "Guideline on Minimum Energy Performance Standard (MEPS) for Electric Motors". According to the guideline, the MEPS requirement shall be IE2 and motors with efficiency below the MEPS value should not be used. For motor capacity which is not covered under Table 1, 2 and 3 as defined in MS 2578-3, the MEPS value of the motor shall refer to the next higher kW capacity.

From left to right: Ir. Yau Chau Fong (EETD Chairman), Datuk Ir. Ahmad Fauzi bin Hasan (ST CEO), Ir. Tan Yean Chin (IEM President) and Mr. K.C. Wong (ICA Representative)

Speakers for the seminar. From left to right: Ir. Abdul Rahim bin Ibrahim (ST), Pn. Zuaida Abdullah (MIDA), Ir. Yau Chau Fong (EETD Chairman), Assoc. Prof. Ir. Dr Gobbi Ramasamy (MMU) and Mr. K.C. Wong (ICA Representative)

Puan Zuaida Abdullah from Malaysian Investment Development Authority (MIDA) presented the topic, "Government Facilities and Incentives in Green Technology Sector". There are 2 tax incentives for green activities

under the Green Technology Incentive, Income Tax Act, 1967: Investment Tax Allowance (ITA) and Income Tax Exemption (ITE).

Companies which undertake investments in specific projects that promote sustainability and green environment, are entitled for ITA, e.g. investment in energy efficient equipment such as HEMs. Companies that provide green services which support investments in green projects are entitled for ITE. There are also incentives given for the promotion of activities such as waste recycling and the use of promoted green products in building materials, electrical & electronics, biomass and machinery & machinery equipment. ■

IEM DIARY OF EVENTS

Title: Technical Visit to Cameron Highlands Sultan Idris (II) WOH Power Station (SSJ Cameron Highlands, TNB Generation Division, Tapah, Perak Darul Ridzuan)

13 February 2017

Organised by : Electrical Engineering Technical Division
Time : 7.00 a.m. - 2.30 p.m.
CPD/PDP : 0

Title: 2-Day Course on 'Contract Management for Construction Projects'

13-14 February 2017

Organised by : Project Management Technical Division
Time : 8.30 a.m. - 5.30 p.m.
CPD/PDP : 14

Title: 1-Day Course on Introduction to Demolition Using Explosives

15 February 2017

Organised by : Oil, Gas and Mining Engineering Technical Division
Time : 8.30 a.m. - 5.00 p.m.
CPD/PDP : 6.5

Title: Half-Day Seminar on "The Deterioration of Concrete and Its Repair & Protection According to EN1504"

16 February 2017

Organised by : Civil and Structural Engineering Technical Division
Time : 8.30 a.m. - 2.00 p.m.
CPD/PDP : 3.5

Title: 1-Day Course on "Effective Email Writing"

16 February 2017

Organised by : Oil, Gas and Mining Engineering Technical Division
Time : 9.00 a.m. - 5.00 p.m.
CPD/PDP : 6.5

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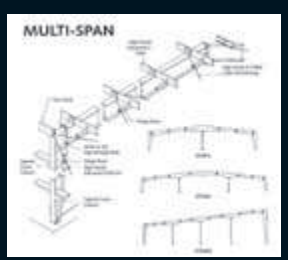

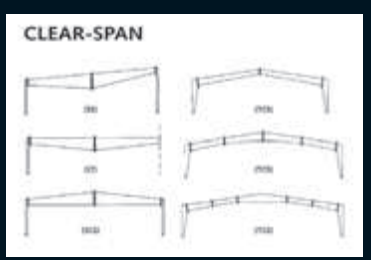

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	Clear-Span		
(SS)	Straight Column Single Slope	4.5m - 22m	3m - 9m
(LT)	Straight Column Lean To	3m - 22m	2.4m - 9m
(SCS)	Straight Column Clear Span	6m - 22m	3m - 9m
(TCS)	Tapered Column Clear Span	6m - 30m	3.5m - 12m and over
(TCS)	Tapered Column Clear Span - Two Piece Rafter	12m - 85m	3.5m - 12m and over
(TCS)	Tapered Column Clear Span - Three Piece Rafter	12m - 85m	3.5m - 12m and over

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Report of Talk on Liquidated Damages Under Construction Contracts

DISPUTE AVOIDANCE AND RESOLUTION PRACTICE

reported by

Ir. Dr Ooi Teik Aun

On 9 December, 2016, there was an evening talk on "Liquidated Damages Under Construction Contracts" at the TUS & C&S rooms, 2nd Floor, Wisma IEM.

The session, attended by 55 participants, started with Ir. Leon Weng Seng explaining what "***Practical Completion***" meant as it affected the Date of Certificate of Practical Completion (CPC) of a contract. It signified the end of Liquidated Damages (LD) if a Certificate of Non-Completion (CNC) had been issued by the S.O.

In England, the imposition of a sum of money for late completion may amount to penalty instead of Liquidated Damages which is a genuine pre-estimate of the Employer's loss where proof of loss is not required. However, this is not the case in Malaysia because all LDs are considered penalties and the court must determine reasonable compensation for the Employer. This provision is embodied in ***S75 Contracts Act 1950***.

In the famous Selva Kumar case, the Federal Court pronounced 2 kinds of contracts. For the first class, where reasonable compensation is difficult to assess, proof of actual loss is not required. For the second class, proof is essential when assessment of reasonable compensation can be carried out with settled rules.

The participants at the talk

Ir. Leon highlighted the LD clauses in PAM, CIDB, IEM Forms of Contract. He also discussed situations where the LDs are rated "$ Nil", "£ Nil", "N/A", "Zero" and the General Damages claimable in such cases. The defaulter can cite reasons such as Employer's waiver, act of prevention, interference with certifying process, absence of trigger date for imposition of LD, extension of time and condition precedent, etc. as grounds for challenging the LD imposition.

Ir. Leon highlighted recent developments (November, 2015) in England on the concept of "legitimate commercial interest" and discussed at length 2 cases (***ParkingEye Ltd v Beavis, and Cavendish Square Holding BV v Makdessi***). There was active participation from the floor in the discussions and the talk ended at 7.30 p.m. with great applause for the speaker. ■

IEM DIARY OF EVENTS

Title: IEM Forum on "Is Engineering Still Cool"

18 February 2017

Organised by : IEM Business Club & Women Engineers Section
Time : 9.00 a.m. - 1.30 p.m.
CPD/PDP : 0

Title: Talk on "The Emergent Vehicle Development Synergies In ASEAN: An Engineer's Perspective of the Last 25 Years and Its Future Potentials"

21 February 2017

Organised by : Mechanical 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.

Pre-AGM Talk on Temporary Works Under BEM Guideline and MS1462 Metal Scaffolding-Mandatory Under CIDB Act 520 (Amendment 2011)

CIVIL AND STRUCTURAL ENGINEERING TECHNICAL DIVISION

reported by

Ir. Lo Seng Ling

The Civil and Structural Engineering Technical Division (CSETD) of IEM organised a pre-AGM talk on "Temporary Works under BEM Guideline and MS1462 Metal Scaffolding – Mandatory under CIDB Act 520 (Amendment 2011)" on 23 July, 2016.

A total of 160 participants attended the talk which was presented by Ir. Tan Yean Chin, President of IEM (2016/2017) and Ir. Lee Kee Bau, committee member of the C&S Technical Division (2015/2016). Both are experienced practising engineers for temporary works in construction industry.

FIRST SESSION

The first session, "Temporary Works under BEM Guideline", was presented by Ir. Tan. In the construction industry, the process involved in erecting the permanent works at site is classified as temporary works. It is the norm that the contractor is responsible for the construction of the temporary work.

In BEM's Guidelines on the "Role and Responsibility for Temporary Works during Construction Stage", A Professional Engineer for Temporary Works (PETW) will be registered with BEM for a Practicing Certificate. The contractor can employ a PETW to carry out the design, endorsement and supervision of temporary works that require a PE's certification.

Ir. Hooi Wing Chuen presents a memento to Ir. Tan Yean Chin

Ir. Hooi Wing Chuen presents a memento to Ir. Lee Kee Bau

Also discussed were examples of temporary works in Class 1 (Minor Temporary Works), Class 2 (Major Temporary Works) and Class 3 (Temporary Works that form part of Permanent Works) according to BEM's guidelines. Ir. Tan then presented several cases of failure in temporary works design and construction in Malaysia, which had caused the death of construction workers or members of the public.

Safety in Temporary Works is very important and PETWs employed by the contractor must have adequate knowledge and experience in designing and supervising the construction of the Temporary Works.

SECOND SESSION

Ir. Lee presented the second session of the talk on "MS1462 Metal Scaffolding – Mandatory under CIDB

Act 520 (Amendment 2011)". The objectives of this talk were to promote awareness on the mandatory standard for scaffolding in our construction industry and to introduce Malaysian Standard MS1462 for metal scaffolding. The definition of scaffolding vs. falsework and several examples of scaffolding, falsework failure and collapse were presented in the talk.

In Malaysia, the design of scaffolding has to comply with Malaysian Standard MS1462: Part 1 to Part 4 and "Factories and Machinery Act 1967 (Act 139) Part X (Scaffolds)". Meanwhile, the design of falsework must comply with Standard of BS5975, BS EN 12812, BS EN 1065, BS5950 and "Factories and Machinery Act 1967 (Act 139) – Part III (Concrete Work)". All the design calculation and drawings for the scaffolding and falsework must be endorsed by a Professional Engineer with Practising Certification.

The erection and dismantling of scaffolding at site must be performed by qualified or competent scaffolders registered with DOSH or JKKP. All the erected scaffolding must be inspected, recorded in the checklist and kept by the qualified or competent scaffolders. Inspection of scaffolding must be carried out from time to time to avoid any unnecessary failure or accident.

A simple Q&A session was carried out at the end of the talk. Then, Ir. Hooi Wing Chuen from CSETD presented a memento and certificate of appreciation to Ir. Tan and Ir. Lee. ■

IEM DIARY OF EVENTS

Title: 1-Day Workshop on Competency Talent Management

23 February 2017

Organised by : Women Engineers Section
Time : 8.30 a.m. - 5.00 p.m.
CPD/PDP : 0

Title: 1-Day Workshop on Programming for Engineers (Part 2) - Visual Studio Community IDE

25 February 2017

Organised by : Information and Communications Technology Special Interest Group
Time : 9.00 a.m. - 5.30 p.m.
CPD/PDP : 7

Title: 2-Day Course on "Vertical Transportation Systems"

1-2 March 2017

Organised by : Mechanical Engineering Technical Division
Time : 9.00 a.m. - 5.30 p.m.
CPD/PDP : 13

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IEEE – IEM eETD Mini Colloquium

ELECTRONIC ENGINEERING TECHNICAL DIVISION

reported by

Ir. Dr Lee Choo Yong

IEM eETD and IEEE Penang Joint Chapter (IEEE Penang) organised the IEEE-IEM eETD Mini Colloquium on 24 September, 2016, in EGC foyer, Penang Skills Development Centre (PSDC), Bayan Lepas, Penang.

IEEE Penang is the IEEE chapter in Penang affiliated to these technical societies: Electron Devices (ED), Microwave Theory and Techniques (MTT) and Solid-States Circuits (SSC).

The mini colloquium included talks by distinguished IEEE lecturers Dr Hideto Hidaka and Dr Makoto Ikeda as well as invited speaker Dr Alastair Trigg. It attracted 30 participants comprising mainly IEEE/IEM members and engineers working in electronics companies in Penang.

FIRST SPEAKER

Dr Hideto Hidaka, chief technology officer and senior vice president of Renesas Electronics Corporation, delivered the talk on "Embedded flash memory: Technology, circuits to systems and MCU/SOC applications".

He shared the history of microcontroller (MCU) and its various applications, for instance automotive and cellular phone and explained the importance of embedded flash memory (eFlash) which enabled programmable instruction functions in MCU to support a consistent market growth.

He further elaborated on eFlash technology, architecture, circuits and sub-system design evolution and last, but not least, the application of eFlash in Internet of Thing (IOT). At the end of the talk, he answered questions from the participants who showed a keen interest in understanding the features of eFlash in IOT.

SECOND SPEAKER

After lunch, Dr Makoto Ikeda, professor of electrical engineering and information systems at Tokyo University, delivered a talk on "Smart Image Sensors and applications to 3D range-finding".

First, he introduced the smart image sensor and 3D range-finding techniques and then elaborated on high-speed 3D range-finding techniques based on light-section method lock-in pixel (1D projection), time-encoded pattern projection method (2D projection), lockin-pixel and single-photon avalanche diode (SPAD) techniques based on time of flight (ToF) theory. He talked about application specific integrated circuit (ASIC) of each technique which covered optimised device structure and circuits optimisation to maximise performance.

Top Left : Ir. Bhuvendhraa Rudrusamy presenting a certificate of appreciation to Dr Hideto Hidaka. Top Right: Ir. Bhuvendhraa Rudrusamy presenting a certificate of appreciation to Dr Makoto Ikeda while Dr Wong Peng Wen looks on. Bottom Centre: Ir. Bhuvendhraa Rudrusamy and Dr Alastair Trigg

THIRD SPEAKER

The last talk, "Packaging and Reliability for MEMS", was delivered by Dr Alastair Trigg who explained definition of MEMS (micro-eletromechanical system) and the technology of microscopic devices. MEMS devices have become ubiquitous in almost all aspects of our lives, particularly in the cars we drive and the phones we use.

Dr Trigg emphasised on packaging of MEMS integrated circuit (IC), a key part of the overall design and functionality of the device, so that it will be more robust for delicate moving parts application. He highlighted packaging and reliability challenges, together with examples of solutions which enabled MEMS devices to play such an important role in our lives.

This was the first time that IEEE Penang and eETD had co-organised the technical talk to support the professional development of engineers in the electronic industry. ■

Advancing Women Engineers' Role in the ASEAN Community: A Sharper Focus

WOMEN ENGINEERS SECTION

reported by

Engr. Estrellita C. Bordallo

Engr. Juana T. Tapel

Ir. Assoc. Prof. Dr Leong Wai Yie

The First Philippine Women Engineers Summit on September 23-24, 2016, was a historical moment for all ASEAN women engineers. The chairpersons of the various ASEAN women engineers institutions were invited to be keynote speakers at the event in Century Park Hotel, Manila. The theme was "Advancing Women Engineers' Role in the ASEAN Community: A Sharper Focus".

Here's some food for thought on the outcome of the event: It is very apparent that women today are now living the dreams of those before us. We are empowered, we are acknowledged and recognised and now we are united more than ever. There must have been some time in our HISTORY that we wanted so much more, and now we are making "HERSTORY".

We are empowered, we are acknowledged and recognised and now we are united more than ever. There must have been some time in our HISTORY that we wanted so much more and now we are making "HERSTORY".

Gone are the days of wondering and wandering; we are now in the day and age of analysis, exploration, innovation, creativity, collaboration and making it all happen for us. Creating a wider network and a reliable support system will keep us moving forward and up, locally and internationally.

Invited guest speakers with the Chairman of AFEO, Engr. Fred Monsada and PTC-Wen Adviser, Dr Engr. Lydia Tansinsin

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Panel of speakers

Prior to the event, the group composed of merely 15 Officers and Trustees but an additional 162 members registered on the second day (this was not the first though but this surely was the largest in number so far). With one or two meetings each month, multiple texts and email exchanges each day, the group was able to pull off an event that opened doors to many possibilities.

THE FIRST DAY

On the first half of Day One, focus was on the data, analysis and thoughts of Dr Leong Wai Yie, Secretary General of the WEAFEO and Chairman of the Women Engineers Section, Institution of Engineers Malaysia who presented on "Networking and Collaboration Opportunities for Women Engineers in the ASEAN Region" while Dr Aura Matias Dean of the College of Engineering, UP Diliman, discussed "Global Women Leaders in Engineering Education".

In the second part of the day, Dr Mu Mu Aye, Chairwoman of Myanmar Engineering Society, talked on "Professional Development of Women Engineers in the Academe", followed by "A Glimpse into the Future of Engineering for ASEAN Women Engineers" by Dr Mel Palencia, the Chair of Chemical Engineering Department, Adamson University. Making the event more meaningful were the last two presenters for the day, DOST Undersecretary Dr Rowena Cristina L. Guevara, who discussed "Transforming Philippines into a Science Nation - A Call for Women Engineers in S&T" and Engr. Ermie L. Garon, President of Global-OFW, who shared her views on "Empowering Women Migrant Professionals in the ASEAN Community".

THE SECOND DAY

On Day Two, Er. Emily Tan, Chair of Women Engineers Institution of Engineers Singapore, presented "Accelerating Empowerment of Women Engineers in the Private Sector" and Dr Corazon Claudio, Board of Directors, Phil. Federation of S&T and Science Centrum Leaders, discussed "Women Engineers at the Forefront of Climate Change and Disaster Mitigation". Last but not least, Engr. Praxedes Bernardo, PRC-Board of Civil Engineering, spoke on "Technology Innovation for the 21st Century Women Engineers".

As an inaugural event, there were setbacks as well as successes. But most importantly, it was a milestone for women engineers. We are now looking forward to the Second Philippine Women Engineers Summit in September 2017. ■

ANNOUNCEMENT

Raspberry Pi is a small, single-board computer that is relatively inexpensive. It is a good device for testing Internet of Things (IOT) ideas. It can act as a web-server, controller, door access system, surveillance camera and media centre. How you use it is up to your needs and imagination.

ICTSIG has donated two units of Raspberry Pi to the IEM library, together with a monitor, keyboard, mouse and the necessary SD cards. To use and test the Raspberry Pi, simply approach the librarian and request. You can also enquire about books which can give you a headstart.

Thank You.

Information and Communications Technology Special Interest Group (ICTSIG)

IEM DIARY OF EVENTS

Title: 19th Annual General Meeting of the Information and Communications Technology Special Interest Group

4 March 2017

Organised by : Information and Communications Technology Special Interest Group
Time : 11.00 a.m. - 1.00 p.m.
CPD/PDP : 2

Title: IEM Official Scarf Design Competition (Wisma IEM)

9 March 2017

Organised by : Standing Committee on Corporate Affairs & Women Engineers Section, IEM
Time : 8.30 a.m. - 5.00 p.m.
CPD/PDP : 0

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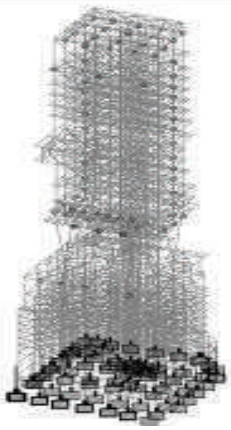
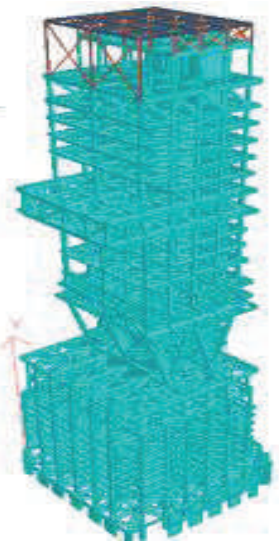

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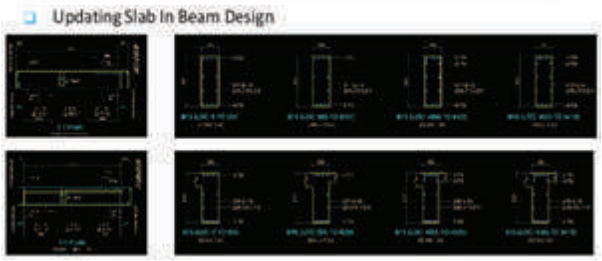
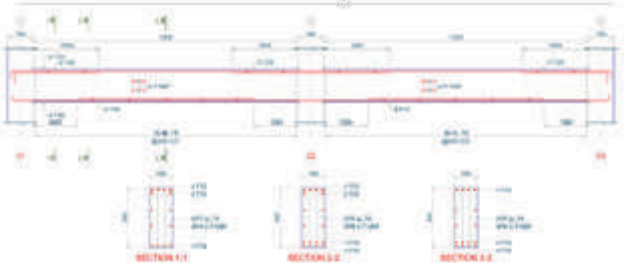
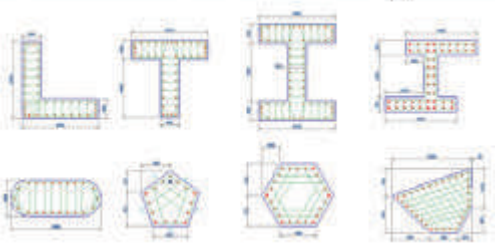


Beam Detailed Drawings



Column & Wall Detailed Drawings



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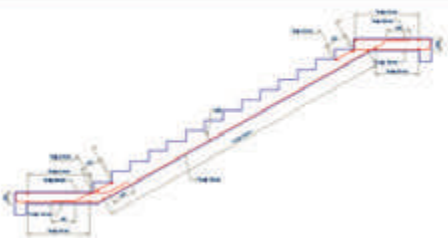

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IEM Engineers' Run 2016

reported by

James Sim Wei Hong,
YES Sarawak Branch

Lee Sian Wei,
YES Southern Branch

Chan Yaw Yee,
YES Southern Branch

Runners for 10km category waiting to be flagged off

Two branches of The Institution of Engineers Malaysia held their second annual IEM Engineers' Run last year. The Sarawak Branch Graduate and Student Section organised the run on 11 September, 2016, in Kuching City in conjunction with the Engineer's Week in Malaysia while the Young Engineers Section (YES) of the Southern Branch held it on 12 November, 2016, in Johor Bahru. The main objective was to promote the importance of exercise and health among engineers.

The Kuching run, with the theme "Bridging Our Society", was also to introduce engineering, especially civil engineering, as a profession to the public. The organising committee comprised members of the Sarawak Branch Main Committee, YES and student chapters.

A total of 1,000 runners took part in this event held at Vivacity Megamall. All proceeds were channelled to the Sarawak Cancer Children's Society (SCCS) which also held a week-long exhibition at the venue to raise awareness of the effects of cancer on children.

Officiating at the 5km fun run at 6.30 a.m. was Cr. Wilfred Yap Yau Sin, who represented the Minister of Local Government, Senator Datuk Prof. Dr Sim Kui Hian, while Vivacity Megamall Managing Director Mr. Sim Yaw Hang flagged off the 10km event which had started earlier at 6a.m. The cut-off time for both runs was 1.5 hours and 2 hours respectively.

There were four categories for the 10km competitive run, namely 10km Engineer (Men), 10km Engineer (Women), 10km Open (Men) and 10km Open (Women). In 10km Engineer (Men) category, Tang Kwang Kuok walked away with first prize, followed by Anthony Huang and Kueh Kwang Tai. Tan Lay Phin led the 10km Engineer (Women) category, followed by Vivian Lau and Nur Hawani Razak. For 10km Open (Men) category, Chong Yen Boon finished first, followed by Ang Ming Chung and Sunny Jong Shi Xian. In the 10km Open (Women) category, Tang Sii Eng finished first place, followed by Christabel Lim and Julia Yap Siew Yin.

All participants who finished the run within the cut-off times received finisher medals. The Top 10 for each category (except 5km fun run) received vouchers sponsored by Sushi Zanmai, Finisher T-Shirts and cash prizes. There was also a lucky draw session in which 13 runners walked away with various prizes including a one-month free pass from Phoenix Gym, hampers from Indocafe and smartphones from Digi.

IEM Sarawak Branch thanks the following sponsors for their contributions: VivaCity Megamall, Sarawak Energy Berhad, Sarawak Information Systems (SAINS), Alpha Survey

The organising committee

Launching of YES booklet by Ir. Associate Prof. Hayati and Ir. Haji Zainuddin

Ir. Vincent Tang (right), Chairman of IEM Sarawak Branch, presenting a plaque of appreciation to Mr. Wilfred Yap Yau Sin. On the left is Organising Chairman Ir. Johnny Tan

Consultant, Gerbang Mahawijaya Sdn. Bhd., Indocafe and Digi. It also thanks its partners, including Brooks, Revive, Phoenix Gym, The Library, Komugi, Quiznoz Café, City Jogger's Club, Rev Run Co, Moma Water and Mat Team Design.

Two months later in November 2016, the Young Engineers Section of IEM Southern Branch held the JB Engineer's Run with the theme, "Go Green Run! Go Sustainability!". Its aim was also to promote engineering as a career and to enhance the good relationship between engineers and the public in Johor.

More than 1,200 engineers, students, their family members and friends took part in the event which started and ended at Austin Heights Water & Adventure Park, Johor Bahru. One week before the race, the entry packs of a navy blue colour dry-fit T-shirt and a bib number, were distributed.

The event started with a speech by Southern Branch Vice Chairman Ir. Haji Zainuddin bin Md. Ghazali, followed by the launching of the YES Photobook by the immediate past chairman, Ir. Assoc. Prof. Hayati binti Abdullah, and YES chairperson, Ng Pang Soon. Trainers with Anytime Fitness then led the crowd in a warm-up session before the 7km run was flagged off, followed by the 3km run 5 mins later.

All those who completed the run received a finisher's medal, a certificate and refreshments. A total of 60 prizes were given to the Top 15 runners in both categories. There were also 20 lucky draw prizes given away. Prizes were presented by the sponsors' representatives. Sponsors included Hong Xin Construction S/B, MAPEI and NS BlueScope Lysaght Malaysia Sdn. Bhd.

Also set up were exhibition booths related to sustainability and green environment from UTHM IEM Student Section (Green Road Show, Tapir make from recycled material), UTM Robocon (Robotic) Team, Malaysian Nature Society and SWM Environment Sdn. Bhd. ■

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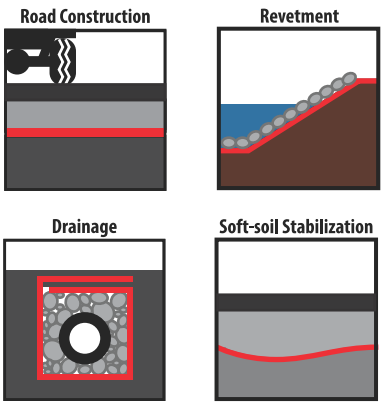

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Ir. Chin Mee Poon *is a retired civil engineer who derives a great deal of joy and satisfaction from travelling to different parts of the globe, capturing fascinating insights of the places and people he encounters and sharing his experiences with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

Alberobello is a small town at the heel of the boot-shaped peninsula that makes up the bulk of Italy. My wife and I spent a night there and had a great time.

What attracted us to Alberobello were its many stone-houses. These are unique in that part of the world. The houses are typically cylindrical in plan, one-storey high and topped with a conical roof; the whole structure is made of stones piled up neatly without any cement mortar to bind them together. The Italians call such such a building trullo (plural trulli). In 1996, UNESCO listed the trulli of Alberobello as a World Heritage Site.

Most trulli in Alberobello were built in the second half of the 19th century and the first half of the 20th century. Being constructed entirely of piled-up stones without binding cement mortar, the buildings were understandably small and were mainly dwellings for poor peasants. Some of them were used as stores.

Why was cement mortar not used to make the buildings more stable? Different historians came up with different explanations, the most laudable of which was that property tax was very high in the old days and well beyond the means of the poor peasants, so an uncemented stone building could be quickly pulled down should a tax inspector come around.

Almost all the original occupants of the trulli in Alberobello have moved to more spacious and comfortable houses. The trulli that tourists see in Alberobello today have been converted to souvenir shops, cafes, restaurants or small lodging houses to satisfy curious tourists who want to experience a taste of life in a trullo. A few trulli have been abandoned and are in a derelict condition.

My wife and I travelled from Lecce to Alberobello by train. We emerged from the railway station without having made any reservation for accommodation, so we headed straight to the tourist information office for help, but it was closed. A good Samaritan brought us to Trullidea Resort, an agency for rooms in trulli, and the friendly lady there got us a trullo with a double bed, ensuite facilities and a kitchenette. It was very nice and cosy and we liked it very much. It reminded us of our stay in a fairy chimney in Cappadocia in Turkey.

Wandering aimlessly amidst the trulli, the maze-like alleys gave us one pleasant surprise after another – a tastefully decorated little café, intricate artefacts on display in souvenir shops and even a church.

Yes, like many popular tourist destinations, Alberobello can be quite touristy during the peak travel season. It was good that we were there at the end of September, when it was possible to get away from the crowds and explore almost deserted nooks and corners of the trulli communes. This made our stay in that small town thoroughly enjoyable. ■

Tarikh: 11 Januari 2017

Kepada Semua Ahli,

SENARAI CALON-CALON YANG LAYAK MENDUDUKI TEMUDUGA PROFESIONAL TAHUN 2017

Berikut adalah senarai calon yang layak untuk menduduki Temuduga Profesional bagi tahun 2017.

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Ir. Yam Teong Sian
Setiausaha Kehormat, IEM,

PERMOHONAN BARU

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KEJURUTERAAN AWAM	
ANDING ANAK UNCHI	BE HONS (UiTM) (CIVIL, 1996) MSc (CURTIN) (PROJECT MANAGEMENT, 2013)
MOHAMMAD HIRIDDIN BIN HASHIM	BE HONS (UTM) (CIVIL, 2006
ZAMSARI BIN MOHAMAD	BE HONS (MALAYA) (CIVIL, 1998)
NORAZZLINA BINTI M.SA'DON	BE HONS (UNIMAS) (CIVIL, 2000) MSc (WALES) (STRUCTURAL, 2004) PhD (AUCKLAND) (CIVIL, 2012)
KEJURUTERAAN ELEKTRIKAL	
RIJALUL FIKRI BIN TARMIZI	BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS, 2006)
KEJURUTERAAN ELEKTRONIK	
YEOH KEAT HOE	BE HONS (UTM) (ELECTRICAL-INSTRUMENTATION & CONTROL, 2005) ME (MULTIMEDIA) (MICROELECTRONICS, 2010) PhD (MALAYA) (2014)
KEJURUTERAAN STRUKTUR	
ABDUL RAZAK ABDUL KARIM	BE HONS (UNIMAS) (CIVIL, 2000) MSc (WALES) (STRUCTURAL, 2004) PhD (AUCKLAND) (CIVIL, 2012)

PERPINDAHAN AHLI

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
41259	ABDUL RAZAK BIN ABDUL AZIZ	BE HONS (UTHM) (CIVIL, 2006)
48918	LEE VOON HEE	BE HONS (NEW SOUTH WALES) (CIVIL, 2009) MESc (NEW SOUTH WALES) (GEOTECHNICAL, 2009)
72631	MUHAMMAD NAZRIN BIN RUSLAN	BE HONS (UTM) (CIVIL, 2013)
29375	TAN KIEN YU	BE HONS (UPM) (CIVIL, 2010)
42523	CHEE CHENG HOE	BE HONS (CURTIN) (CIVIL & CONSTRUCTION, 2009)
69524	MOHD AZRAIN BIN MD. YAAKOB	BE HONS (UNISEL) (CIVIL, 2007)
89629	NORDIANA AYU BINTI ABU ZARIN	BE HONS (USM) (CIVIL, 2002)
KEJURUTERAAN ELEKTRIKAL		
42514	DAVENDRA KUMAR KALIAPPAN	BE HONS (UNITEN) (ELECTRICAL POWER, 2008)
27508	ROLAND JULIUS @ GRAY	BE HONS (UTM) (ELECTRICAL, 1991)
KEJURUTERAAN ELEKTRONIK		
70424	IRRAIVAN ELAMVAZUTHI	BE HONS (UTM) (ELECTRICAL, 1989) PhD (SHEFFIELD) (2002)
KEJURUTERAAN PEMBUATAN		
43839	MOHD FATHULLAH BIN GHAZLI@GHAZALI	BE HONS (IIUM) (MECHANICAL, 2006) MSc (COVENTRY) (2007) PhD (BRUNEL) (2016)
KEJURUTERAAN BAHAN		
61150	CHOO JERN YUE, EDWIN	BE HONS (LONDON) (MATERIAL, 2004)
KEJURUTERAAN STRUKTUR		
50729	WONG CHEE SWEE	BE HONS (LEEDS) (CIVIL & STRUCTURAL, 2008) MSc (LEEDS) (STRUCTURAL, 2009)
KEJURUTERAAN PENGANGKUTAN		
53832	GOH BOON HOE	BE HONS (UPM) (CIVIL, 2001) MSc (UPM) (HIGHWAY & TRANSPORT, 2005) POSTGRAD CERT (NOTTINGHAM) (2013)
KEJURUTERAAN SUMBER AIR		
66686	NUR ASMALIZA BINTI MOHD NOOR	BE HONS (USM) (CIVIL, 2001) MSc (USM) (RIVER MANAGEMENT & URBAN DRAINAGE, 2010) PhD (UNITEN) (2015)
80784	SITI FATIN BINTI MOHD. RAZALI	BE HONS (UTM) (CIVIL, 2006) PhD (WESTERN AUSTRALIA) (2011)
KEJURUTERAAN MEKANIKAL		
54336	BEH JOO LEONG	BE HONS (MULTIMEDIA) (MECHANICAL, 2011)
43795	SHAYFULL ZAMREE BIN ABD. RAHIM	BE HONS (UTM) (MECHANICAL, 2000) ME (UTM) (2006) PhD (UTM) (2015)
43929	SYAZMIZAL BIN SALLEH	BE HONS (UNITEN) (MECHANICAL, 2001)
24996	MEGAT MOHD AMZARI BIN MEGAT MOHD ARIS	BE HONS (UTHM) (MECHANICAL, 2007) ME (UPM) (MANUFACTURING SYSTEMS, 2011)
25463	RAMZANUL AZHIM BIN BORHAN	BE (MINNESOTA) (MECHANICAL, 2003)

PERMOHONAN BARU/PEMINDAHAN MENJADI AHLI KORPORAT

KEJURUTERAAN AWAM	
LING SING EEK	BE HONS (UTM) (CIVIL, 2006)

Pengumuman yang ke-100

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 Disember 2016 adalah seperti jadual di sebelah:

NO.	NO. AHLI	NAMA
1	51360	ABDUL RAHIM BIN OSMAN
2	22447	AHMAD KHAIRUL HAKIMIN BIN IBRAHIM
3	45812	AMIR HASDI BIN FAUZI @ MAT RAWI
4	59052	ARULHAIZAL BIN ADAM HAMZAH
5	26497	CHEW OOI TECK
6	05111	CHIA NYAN FATT
7	16048	CHIN WUI HON
8	80584	JAMALUDDIN BIN MAHMUD
9	33876	KENNETH A/L SUNDARAJ
10	55928	LAU LEE SIAN
11	20165	LIM KEIN SENG
12	15417	M. SUGUMARAN A/L V. MUTHIAH
13	24433	MOHD THARMIZI BIN MOHD YUSOF
14	10928	NOR ASIAH BT. OTHMAN
15	43183	RUSNIDA BINTI TALIB
16	71147	SHABIR BIN AHSHRUP
17	20928	SYARUZMI KHALID
18	10084	TAIB BIN ABU BAKAR
19	15194	TAN CHUAN HO
20	36838	TE CHOON CHIAM
21	40010	TERRENCE SELVIN A/L ABRAHAM PATTU
22	87693	V SARAVANA KUMAR A/L VEERIAH
23	65245	WAN FOO KEONG
24	66769	WILLIAM WERA LUKAM
25	21423	WOO CHUNG HING

*Note: This is a continuation of the list **PERMOHONAN MENJADI AHLI 'COMPANION'** which was published on page 46 of the January 2017 issue.*

79301	TAN CHEE WEI	B.E.HONS.(UTAR) (MECHATRONICS, 2015)
78471	KHAIRUL ANUAR B. KHOLIT	B.E.HONS.(IIUM) (MECHATRONICS, 2007)
79534	LENG CHIOU HAUR	B.E.HONS.(UTAR) (MECHATRONICS, 2015)
79529	LOW CHEON YING	B.E.HONS.(UTAR) (MECHATRONICS, 2015)
79528	LOW KOK CHIEN	B.E.HONS.(UTAR) (MECHATRONICS, 2015)
79508	WONG YI HONG	B.E.HONS.(UTAR) (MECHATRONICS, 2015)
78889	YA'AKOB BIN YUSOF	B.E.HONS.(IIUM) (MECHATRONICS, 2007)

KEJURUTERAAN PEMBUATAN

79248	AHMAD TARMIZI BIN OTHMAN	B.E.HONS.(UITM) (MECHANICAL-MANUFACTURING, 2015)
79250	KHADIJAH BINTI MOHAMED SABRI	B.E.HONS.(UITM) (MECHANICAL-MANUFACTURING, 2015)
79249	MOHAMAD FADZLIN BIN MOHAMAD FARIK	B.E.HONS.(UITM) (MECHANICAL-MANUFACTURING, 2015)
78895	MOHD ROHAIZAD BIN MOHD RAZALI	B.E.HONS.(UTEM) (MANUFACTURING-MANUFACTURING MANAGEMENT, 2009)
79261	MOHD SHAHRULL BIN ABDULLAH	B.E.HONS.(UNIMAP) (PRODUCT DESIGN, 2009)
78408	MOHZANI BIN MOKHTAR	B.E.HONS.(WARWICK) (MANUFACTURING, 1995)

KEJURUTERAAN PERTANIAN

79024	SANG YEW NGIN	B.E.HONS.(UPM) (AGRICULTURAL, 1997)

KEJURUTERAAN PETROLEUM

79024	SANG YEW NGIN	B.E.HONS.(UPM) (AGRICULTURAL, 1997)
79406	AMIR ISMAIL BIN BASIRON	B.E.HONS.(UITM)(OIL & GAS, 2015)
79397	AMIR SABIRIN BIN ABDULLAH	B.E.HONS.(UITM)(OIL & GAS, 2015)
79395	ARDI BIN HUSSEIN	B.E.HONS.(UITM)(OIL & GAS, 2015)
79405	DANIEL ANTHONIUS ANAK JEFFREY ALI	B.E.HONS.(UITM)(OIL & GAS, 2015)
79396	FARAH SHAHIDAH BINTI ROSLI	B.E.HONS.(UITM)(OIL & GAS, 2015)
79404	MOHD RAHIQUE YASIN BIN KAMARUDDIN	B.E.HONS.(UITM)(OIL & GAS, 2015)
79394	MUHAMMAD FALIQ BIN TUKIMIN	B.E.HONS.(UITM)(OIL & GAS, 2015)
79403	MUHAMMAD NUR TAUFIQ BIN SHAMSUDDIN	B.E.HONS.(UITM)(OIL & GAS, 2015)
79392	NOOR AZRIN BIN MOHD RASHIDI	B.E.HONS.(UITM)(OIL & GAS, 2015)
79402	NOORUL ASFALIZA BINTI JAFAR	B.E.HONS.(UITM)(OIL & GAS, 2015)
79393	NUR AISHA BINTI JALALUL SAYUTI	B.E.HONS.(UITM)(OIL & GAS, 2015)
79401	NUR HAFIZAH BINTI SAFARIN	B.E.HONS.(UITM)(OIL & GAS, 2015)
79400	SITI AIZATUL ILLY BINTI KEMAT	B.E.HONS.(UITM)(OIL & GAS, 2015)
79399	SITI MADIHAH BINTI RAZALI	B.E.HONS.(UITM)(OIL & GAS, 2015)
79326	SOW CHIA SHEN	B.SC.(ALBERTA) (PETROLEUM, 2011)
79398	UMAR HAYAT BIN FADZULLAH	B.E.HONS.(UITM)(OIL & GAS, 2015)

KEJURUTERAAN POLIMER

79327	ANG TZE KANG	B.E.HONS.(USM) (POLYMER, 2006)
79008	TAN SEAH GUAN	B.E.HONS.(USM) (POLYMER, 2009) P.HD.(USM)(POLYMER COMPOSITES, 2013)

KEJURUTERAAN TELEKOMUNIKASI

78893	MAS AMIRA BINTI ZUAL-KEPLI	B.E.HONS.(MALAYA) (TELECOMMUNICATION, 2012)

PERMOHONAN MENJADI AHLI 'INCORPORATED'

No. Ahli	Nama	Kelayakan
KEJURUTERAAN ELEKTRONIK		
80704	VINUKUMAR LUCKOSE	B.E.(MANOMANIAM SUNDARANAR) (ELECTRICAL & ELECTRONICS, 2003) M.E.(ANNA)(POWER ELECTRONICS & DRIVE, 2005)
KEJURUTERAAN MEKANIKAL		
80546	KUMAR YOGEESH DODDAIAH	B.E.(VISVESWARAIAH TECH.)(AUTOMOBILE, 2005) M.E.(BANGALORE) (MECHANICAL-MANUFACTURING SC. & ENRG., 2010)
KEJURUTERAAN METALLURGI		
80545	CHENG GUIPING	B.E.(ANHUI POLYTECH.) (METALLURGICAL, 1991) M.E.(HEFEI)(METAL MATERIAL & HEAT TREATMENT, 1994) P.HD.(NANYANG TECH.) (MATERIALS SC & ENRG., 2007)

PERMOHONAN BARU / PEMINDAHAN AHLI

Persidangan Majlis IEM yang ke-400 pada **18 Januari 2016** telah meluluskan sebanyak **1,237** ahli untuk permohonan baru dan permindahan ahli. Berikut adalah senarai ahli mengikut disiplin kejuruteraan:

DISIPLIN	GRED KEAHLIAN									
	FELO	SENIOR	AHLI	COMPANION	SISWAZAH	"INCORPORATED"	"AFFILIATE"	"ASSOCIATE"	SISWA	JUMLAH
Aeronautikal									1	**1**
Aeroangkasa					2					**2**
Pertanian			1							**1**
Automotif									1	**1**
Biokimia					1					**1**
Bioperubatan			2		1				13	**16**
Kimia			4	1	23	1	1		92	**122**
Awam	3		47	4	106	2			164	**326**
Komputer									6	**6**
Elektrikal & Elektronik									32	**32**
Elektrikal			43	1	62				117	**223**
Elektronik	1		10	1	17	3		1	92	**125**
Alam Sekitar			1		1				1	**3**
Geoteknik			1		1					**2**
Pembuatan					4				25	**29**
Sistem Pembuatan					1					**1**
Bahan			1		1					**2**
Metallurgi					2					**2**
Mekanikal			20	2	69				223	**314**
Mekatronik					3				6	**9**
Mineral			1							**1**
Petroleum					1				7	**8**
Polimer				1	1					**2**
Struktur			1							**1**
Telekomunikasi			2					1		**3**
Sumber Air			1							**1**
Pengangkutan			1							**1**
Sistem Mekanikal					1					**1**
Sistem					1					**1**
JUMLAH	**4**	**0**	**136**	**10**	**298**	**6**	**1**	**2**	**780**	**1237**

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

Ir. Yam Teong Sian
Setiausaha Kehormat, Institusi Jurutera Malaysia

KEAHLIAN

PERMINDAHAN AHLI KEPADA AHLI FELLOW

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
6751	GOH SOON BOON	BE (NOVA SCOTIA) (CIVIL, 1981)
5267	KUEH NGEE WEI	BSC (CHENG KUNG) (CIVIL, 1978) ME (ASIAN INSTITUTE THAILAND) (GEOTECHNICAL, 1980)
7252	TIONG NGO PU	BSC HONS (CNAA-HATFIELD POLYTECHNIC) (CIVIL, 1982)
KEJURUTERAAN ELEKTRONIK		
5986	JEEWA VENGADASALAM	BE HONS (UTM) (ELECTRICAL, 1979) ME (MALAYA) (2009)

PEMINDAHAN AHLI KEPADA AHLI KORPORAT

No. Ahli	Nama	Kelayakan
KEJURUTERAAN ALAM SEKITAR		
39594	MOHD ABD HAFIZ BIN ZAKARIA	BE HONS (UNIMAP) (ENVIRONMENTAL, 2010)
KEJURUTERAAN AWAM		
48863	ADLAN RAFHAN BIN BURAHAN	BE HONS (UTM) (CIVIL, 2000)
27294	ALAN LIM CHONG BENG	BE HONS (USM) (CIVIL, 2009)
43548	CHIN KIT YEE	BE HONS (CURTIN) (CIVIL & CONSTRUCTION, 2009)
29106	CHOW WAN HAN	BE HONS (UNITEN) (CIVIL, 2004)
42042	EDDY MOHD FAIRUZ BIN YUSSLEE	BE HONS (UNISEL) (CIVIL, 2008)
21977	EVELYN PIUS	BE HONS (THE CATHOLIC UNI OF AMERICA) (CIVIL, 1988)
21222	GAN CHENG TI	BE HONS (MALAYA) (CIVIL, 2002)
24189	GUNASINGAN A/L VEERASINGAM	BE HONS (UTM) (CIVIL, 1997)
25807	HIEW SI TIEN	BE HONS (UNIMAS) (CIVIL,
45322	JERRY BETIE CHIN TIMOTHY ASSON	BE HONS (UITM) (CIVIL, 2007)
38015	KHAIRUL AMRI BIN SANUSI	BE HONS (UITM) (CIVIL, 2005)
27402	LEE CHON YEE	BE HONS (USM) (CIVIL, 2008)
20977	LEE YING YU	BE HONS (UTM) (CIVIL, 2005)
49578	LIEW MING HUI	BE HONS (UTM) (CIVIL, 2006)
66737	LIM YAO SHENG	BE HONS (UKM) (CIVIL & STRUCTURAL, 2009)
56466	LUQMAN BIN ISMAIL	BE HONS (UNITEN) (CIVIL, 2007)
36875	MOHD ALI BIN ISMAIL	BE HONS (UTM) (CIVIL, 2002)
23843	MOHD FADZIR BIN AHMAD	BE HONS (UITM) (CIVIL, 2002)
27893	MOHD ZULHAM AFFANDI BIN MOHD ZAHID	BE HONS (USM) (CIVIL, 2012)
66732	NAZRI BIN ABDUL RAHMAN	BE HONS (UTM) (CIVIL, 2002)
78073	NG SHENG YEONG	BE HONS (TASMANIA) (CIVIL, 2008)
37923	NOOR WAHYU BINTI NGADIMIN	BE HONS (UPM) (CIVIL, 2003)
49415	POR TEONG HOOI	BE HONS (UTM) (CIVIL, 2007)
28263	SIA SOON YII	BE HONS (USM) (CIVIL, 2009)
43519	TAN CHEE HOONG	BE HONS (UM) (CIVIL, 2008)
53750	TAY CHEN CHUAN	BE HONS (SWINBURNE) (CIVIL, 2011)
38731	THILAPPAN A/L SUBRAMANIAM	BE HONS (UTHM) (CIVIL, 2006)
39045	TONY KISMOOR ANAK SASAK	BE HONS (UNIMAS) (CIVIL, 2006)
KEJURUTERAAN BAHAN		
51701	WONG YEW HOONG	BE HONS (USM) (MATERIAL, 2009)
KEJURUTERAAN BIOPERUBATAN		
23071	SHAMILA ARIARATNAM	BE HONS (UPM) (ELECTRICAL & ELECTRONIC, 2000)
KEJURUTERAAN ELEKTRIKAL		
61960	AMIR HAMSAH BIN ARIFIN	BE HONS (UTHM) (CIVIL, 2011)
49948	ANANTHA RAO A/L RAMARAO	BE HONS (UTP) (ELECTRICAL & ELECTRONICS, 2009)
37832	ARULNATHAN GYNASEGARAN	BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS, 2010) ME (UNITEN) (ELECTRICAL, 2015)
44149	AZRI ADI BIN ARBAI	BE HONS (UITM) (ELECTRICAL, 2007)
16715	CHENG KEE WAY	BSC (TOLEDO UNI.) (ELECTRICAL, 1994)
43203	CHIEN HUI LIANG	BE HONS (CURTIN) (ELECTRICAL POWER, 2009)
59978	ERICHRAJA A/L MUNIANDY	BE HONS (NORTHUMBRIA) (ELECTRICAL &ELECTRONIC, 2000) MSC (UCSI) (ELECTRICAL, 2012)
53756	FONG SEIK FOO	BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS, 2008)
29336	GANAESAN TEVADASIN	BE HONS (UMP) (ELECTRICAL - POWER SYSTEMS, 2010) ME (MALAYA) (POWER SYSTEM, 2013)
61906	KAMARULZAMAN BIN MOHD DAHARI	BE HONS (UTM) (ELECTRICAL, 2003)
37057	KHAIRUL AZAD BIN AZMI	BE HONS (UNITEN) (ELECTRICAL, 2005)
39054	KONG KOK KHEONG	BE HONS (UNITEN) (ELECTRICAL POWER, 2006)
44029	KUAN JEW XUN	BE HONS (UTAR) (ELECTRICAL & ELECTRONIC, 2011)
26403	LAU HENG TIEN	BE HONS (UNITEN) (ELECTRICAL POWER, 2005)
43533	LIM YI YI	BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS, 2009)
78075	LING YANG MING	BE HONS (WALES) (ELECTRONIC & ELECTRICAL, 2003) MSC (UMIST) (ELECTRICAL POWER, 2004)
70215	MAHENDRAN JAGANATHAN	BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS, 2002)
37061	MOHD SHARIL BIN SHAHARI	BE HONS (UITM) (ELECTRICAL, 2008)
59955	MOO KEN JOON	BE HONS (MONASH) (ELECTRICAL & COMPUTER SYSTEMS, 2008) ME (UNITEN) (ELECTRICAL, 2012)
64730	MUHAMMAD HAFIZ BIN AZIZAN	BE HONS (UITM) (ELECTRICAL, 2008)
49922	NORUL AMRAN BIN AHMAD	BE HONS (UNITEN) (ELECTRICAL POWER, 2003)
44592	RAM VIKRAM GANESH S/O RAM SING	BE HONS (UNITEN) (ELETCRICAL POWER, 2007) ME (MALAYA) (2009)
49627	RAYMOND CHOW WAI KEONG	BE HONS (NORTHUMBRIA) (ELECTRICAL, 2006)
64552	SHAHARUDDIN BIN MD. LIAS	BE HONS (UTM) (ELECTRICAL, 2002)
54221	SUGUNESAN A/L GUNALAN	BE HONS (UNITEN) (ELECTRICAL POWER, 2009)
37277	THEE TEONG HONG	BE HONS (UTM) (ELECTRICAL, 2007)
50192	WAN FAMY AZLI BIN WAN AHMAD	BE HONS (UITM) (ELECTRICAL, 2008)
51267	ZAFIRAH BINTI ZULKIFLI	BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS, 2009)
27979	ZAILINI BINTI MOHD ALI	BSC (HANYANG UNI, SEOUL) (ELECT, 1989)
KEJURUTERAAN ELEKTRONIK		
38343	IRHAN BIN AMRAN	BE HONS (UTM) (ELECTRICAL-ELECTRONICS, 2006)
21239	MOHAMMAD JUANI BIN SUJANA	BE HONS (UTM) (ELECTRICAL, 1994)
24495	MUHAMMAD AKMAL BIN ABDULLAH	BE HONS (ROYAL MELBOURNE) (ELECTRICAL, 1999)
38025	NURUL HAZLINA BINTI NOORDIN	BE HONS (USM) (ELECTRICAL & ELECTRONIC, 2002) MSC (USM) (ELECTRICAL & ELACTRONIC, 2005) PHD (EDINBURGH) (2013)
47049	VIJAY A/L ARUMUGAM	BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS, 2007)
24521	WONG GOON WENG	BE HONS (MULTIMEDIA UNI) (ELECTRONIC, 2002) ME (UTM) (ELECT - ELECTRONIC & TELECOMMUNICATION, 2008)
KEJURUTERAAN GEOTEKNIKAL		
20876	GUE CHANG SHIN	BE HONS (CIVIL, 2003) MSC (LONDON) (SOIL MECHANICS, 2004) PHD (CAMBRIDGE) (2012)
KEJURUTERAAN KIMIA		
66123	MOHD AZHAR BIN ABDUL RAZAK	BE HONS (UKM) (CHEMICAL, 2002)
16559	TEOH BOON LAI	BE HONS (UTM) (CHEMICAL, 1998)
58052	THINAKARAN VADIVELOO	BE HONS (UMS) (CHEMICAL, 2007)
KEJURUTERAAN MEKANIKAL		
21995	ABD. HALIM BIN ITHNIN	BE HONS (UITM) (MECHANICAL, 2002)
38745	AHMAD NAZIR BIN KAMARUDDIN	BE HONS (UTM) (MECHANICAL-AERONAUTICS, 2001)
24487	CHIA HON KIAT	BE HONS (UKM) (MECHANICAL, 2002)
75147	DAVENDREN VEREYA	BE HONS (UNITEN) (MECHANICAL, 2007)
14254	FADIL BIN IBRAHIM	ADV DIP (UITM) (MECHANICAL, 1994)
52542	GOH YUEN PHANG	BE HONS (MALAYA) (MECHANICAL, 2007)
73091	HAMIDI BIN ABD HAMID	BE HONS (UNISEL) (MECHANICAL, 2009)
26140	JAMILUDDIN BIN JAAFAR	BE HONS (UTM) (MECHANICAL, 2005) ME (UPM) (MANUFACTURING SYSTEMS, 2013)
50720	JEYACHANDRAN BARNABAS A/L G.JESUDASON	BE HONS (UTM) (MECHANICAL, 1995)
29253	LEE CHOO MOU	BE HONS (LIVERPOOL JOHN MOORES) (MECHANICAL & MANUFACTURING, 2005)
52543	LIEW LUI YUE	BE HONS (MALAYA) (MECHANICAL, 2007)
43794	MAHESVARAN A/L PAMUSAMY	BE HONS (UTM) (MECHANICAL, 2006)
41283	MOHAMAD FARIZ BIN MOHAMED NASIR	BE HONS (UTM) (MECHANICAL, 2006)
41976	MOHAMMAD MAZMASHAHRIL BIN MAZLAN	BE HONS (MINNESOTA) (MECHANICAL, 2005)
71129	MOHD FAHMEE BIN NE'MAN	BE HONS (IUTORLEANS) (MECHANICAL, 2006)
43689	RAZALI BIN HASSAN	BE HONS (UPM) (MECHANICAL/SYSTEM, 1989)
KEJURUTERAAN STRUKTURAL		
25664	LIM CHAIN CHUAN	MSC (NATIONAL UNI OF SINGAPORE) (CIVIL, 2004)
KEJURUTERAAN TELEKOMUNIKASI		
79009	RAYMOND CHANG TZIN	BE HONS (CURTIN) (ELECTRONIC & COMMUNICATION, 2009) MSC (CURTIN) (ELECTRICAL, 2010)

PERMOHONAN MENJADI AHLI KORPORAT

Nama	Kelayakan
KEJURUTERAAN AWAM	
AB. QAHAR BIN OSMAN	BSC (GLASGOW) (1986)
ELYA SHUHAIRA BINTI SHAFIE	BE HONS (UTM) (CIVIL, 2007)
ENG BOON CHENG	BE HONS (UTM) (CIVIL, 2002)
FARIHAH BINTI MOHD THALHA	BE HONS (UITM) (CIVIL, 2005)
GOH WEI HONG	BE HONS (UTM) (CIVIL, 2003)
HOR KOK SYNN, ERIC	BE HONS (PORTSMOUTH) (CIVIL, 1999)
HUANG ZEE MENG	BE HONS (MALAYA) (CIVIL, 1996)
MOHD RIDUAN BIN CHE MUSA	BE HONS (UTM) (CIVIL, 2003)
MOHD YAZID BIN ABDULLAH	BE HONS (UTM) (CIVIL, 1981)
MUHAMAD SYAKIR BIN MAHI DIN	BE HONS (UTM) (CIVIL, 2003)
NIK RULAZMAN BIN NIK MOHD ROSDY	BE HONS (UITM) (CIVIL, 1995)
NORHISHAM BIN NORDIN	BE HONS (UTM) (CIVIL, 2001)
NORISHAM BIN ABDUL TALIB	BE HONS (UPM) (CIVIL, 1999)
SEK FOOK MENG	BE HONS (RMIT) (CIVIL, 1990)
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AZEAN BINTI ABU SAMAD	BSC (SOUTHERN CALIFORNIA) (ELECTRICAL, 2001)
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MASLIZA MD. NOAH	BE HONS (UTM) (INSTRUMENTATION & CONTROL, 1997)
MOHD AIZAM TALIB	BE HONS (PORTSMOUTH) (ELECTRONIC & ELECTRICAL, 1997) ME (UNITEN) (2002)
MOHD RIZAL BIN RAMLAN	BE HONS (UTM) (ELECTRICAL, 1997)
MUHAMMAD AZMEE BIN RIFIN	BE HONS (UITM) (ELECTRICAL, 2009)
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ADUWATI BINTI SALI	BE HONS (EDINBURGH) (ELECTRONICS (NETWORK, 2002) MSC (UPM) (COMMUNICATIONS & NETWORK, 2002) PHD (SURREY) (2009)
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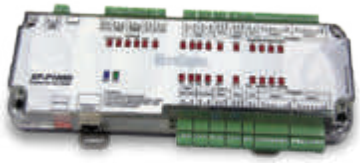

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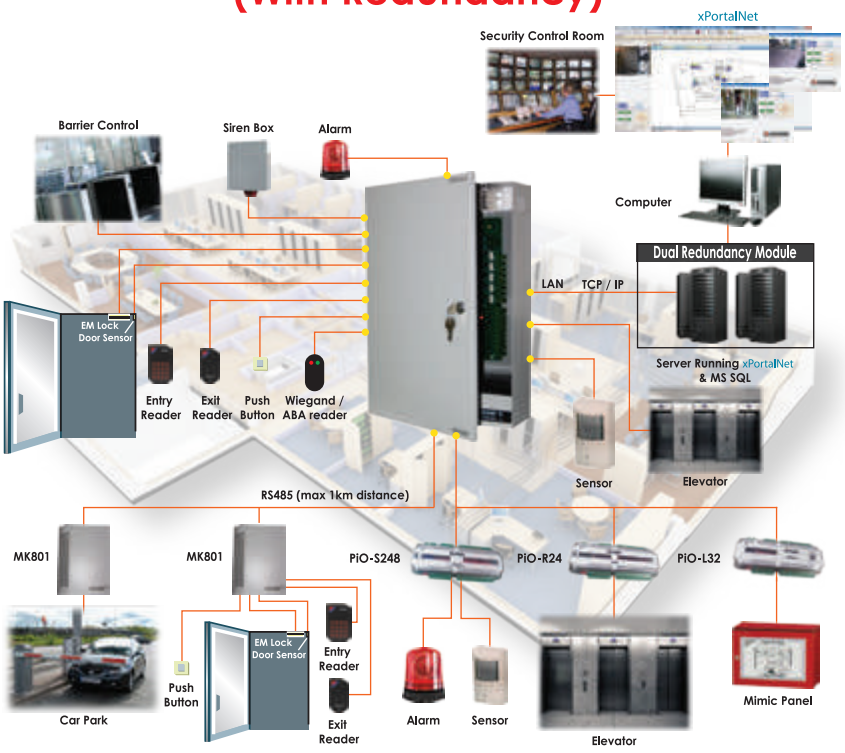

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