

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









ALCOM Future Roofing For Today







NATURAL CORROSION RESISTANCE







DURABLE & LIGHTWEIGHT

T | +603 3346 6262 **F** | +604 3341 2793 **W** | www.alcom.com

Aluminium Company of Malaysia Berhad (Co. No. 3859-U)

No.3 Persiaran Waja, Bukit Raja Industrial Estate 41050 Klang, Selangor Darul Ehsan, Malaysia



The Solution to Sustainability In **Concrete Structures**



estimated cost of nearly \$97 mill.

The new bridge design had to account for seismic activity as well as being constructed in an aggressive marine environment. As a result of Xypex Admix superior performance in marine environments and its increased shear performance compared to untreated concrete, 670m3 of Xypex Admix modified concrete was used cast in situ in the pier walls and approach spans of the bridge.

For more information on how our solutions can provide sustainable benefits for your concrete assets, please visit our website at www.xypex.com.au or LinkedIn Page.



BUILDING

RNC Integral Concrete Technology (M) Sdn Bhd (436178-D) 37 Jalan Putra Mahkota Exclusive applicator and distributor for Xypex in Malaysia, for Xypex: Sustainability In Concrete Structures solutions that includes conrete repair, protection and durability enhancement.

7/7B Putra Heights 47650 Subang Jaya, Selangor Darul Ehsan

Tel: +603-51928186 Fax: +603-51926826 Email: support@waterproofing.com.my www.waterproofing.com.my



AQUATIC CENTRE, PETRA JAYA SARAWAK

READY FOR SUKMA AND SEA GAMES

The RM32 million aquatic centre was built according to international standards and will host 2016 Malaysian Games (SUKMA) and 2017 SEA Games. The centre consists of competition, diving, training and leisure pools. Sika provided a comprehensive range of products and solutions such as Sika®-1 for watertight concrete, Sika® Waterbars for joint treatment, Antisol®-A as concrete curing compound, Sikalastic®-110 for pool deck waterproofing, Sikalatex®-118 as additive for cement sand mortar on pool decks waterproofing, Igolflex® R for retaining

walls. Sikalastic®-1 KMY for all the pools' waterproofing, and SikaTop® Seal-107 for internal wet area waterproofing.

SIKA KIMIA SDN BHD · WATERPROOFING No. 9, Jalan Timur, 46000 Petaling Jaya, Selangor D.E., Malaysia

Phone: +603 7957 0111 + Fax: +603 7956 7291 www.sika.com.my







Number 07, July 2016

IEM Registered on 1 May 1959

MAJLIS BAGI SESI 2016/2017 (IEM COUNCIL SESSION 2016/2017) YANG DIPERTUA / PRESIDENT

Ir. Tan Yean Chin

TIMBALAN YANG DIPERTUA / DEPUTY PRESIDENT Ir. David Lai Kong Phooi

NAIB YANG DIPERTUA / VICE PRESIDENTS Ir. Prof. Dr Ruslan bin Hassan, Ir. Lai Sze Ching, Ir. Lee Boon Chong, Ir. Prof. Dr Jeffrey Chiang Choong Luin, Ir. Assoc. Prof. Dr Norlida bt Buniyamin,

Ir. Ellias Bin Saidin, Ir. Ong Ching Loon SETIAUSAHA KEHORMAT / HONORARY SECRETARY

Ir. Yam Teong Sian

BENDAHARI KEHORMAT / HONORARY TREASURER Dr Wang Hong Kok F.LE.M.

BEKAS YANG DIPERTUA TERAKHIR / IMMEDIATE PAST PRESIDENT Y.Bhg. Dato' Ir. Lim Chow Hock

BEKAS YANG DIPERTUA / PAST PRESIDENTS

Y.Bhg. Academician Tan Srⁱ Dato' Ir. (Dr) Hj. Ahmad Zaidee bin Laidin, Y.Bhg. Dato' Ir. Dr Gue See Sew, Y.Bhg. Dato' Paduka Ir. Keizrul bin Abdullah, Y.Bhg. Academician Dato' Ir. Prof. Dr Chuah Hean Teik, Ir. Choo Kok Beng

WAKIL AWAM / CIVIL REPRESENTATIVE Ir. Prof. Dr Mohd. Zamin bin Jumaat

WAKIL MEKANIKAL / MECHANICAL REPRESENTATIVE Ir. Dr Kannan M. Munisamy

WAKIL ELEKTRIK / ELECTRICAL REPRESENTATIVE Y.Bhg. Dato' Ir. Dr Ali Askar bin Sher Mohamad

WAKIL STRUKTUR / STRUCTURAL REPRESENTATIVE Ir. Hooi Wing Chuen

WAKIL KIMIA / CHEMICAL REPRESENTATIVE Ir. Prof. Dr Thomas Choong Shean Yaw

WAKIL LAIN-LAIN DISPLIN / REPRESENTATIVE TO OTHER DISCIPLINES Ir. Roznan bin Abdul Rashid

WAKIL MULTIMEDIA DAN ICT / ICT AND MULTIMEDIA REPRESENTATIVE Mr. Abdul Fattah bin Mohd. Yatim, M.I.E.M.

AHLI MAJLIS / COUNCIL MEMBERS

Ir. Gary Lim Eng Hwa, Y.Bhg Dato' Ir. Hj. Noor Azmi bin Jaafar, Ir. Dr Aminuddin bin Mohd Baki, Ir. Mohd Radzi bin Salleh, Ir. Ong Sang Woh, Ir. Mohd Khir bin Muhammad, Y.Bhg Dato' Ir. Hj. Hanapi Bin Mohammad Noor, Ir. Dr Ahmad Anuar bin Othman, Ir. Ishak bin Abdul Rahman, Ir. Chong Pick Eng (PE Chong), Ir. Ng Yong Kong, Ir. Tejinder Singh, Ir. Sreedaran a/I Raman, Ir. Roger Wong Chin Weng, Ir. Assoc. Prof Dr. Ahmad Kamil bin Arshad, Ir. Dr Tan Kuang Leong, Ir. Hoo Choon Sean, Y.Bhg. Lt. Jen. Dato' Wira Ir. Ismail bin Samion (Ret. RMAF), Ir. Hj. Anuar bin Yahya, Ir. Mah Way Sheng, Ir. Gunasagaran a/I Kristnan, Ir. Chen Harn Shean, Ir. Mohd Aman bin Hj. Idris, Ir. Gopal Narian Kutty, Ir. Yap Soon Hoe, Ir. Santhakumaran a/I Erusan **PENGERUSI CAWANGAN / BRANCH CHAIRMAN**

- Pulau Pinang: Ir. Dr Mui Kai Yin
 Selatan: Ir. Assoc. Prof. Hayati binti Abdullah
- 3. Perak: Ir. Lau Win Sang
- 4. Kedah-Perlis: Ir. Hj. Abdullah bin Othman
- 5. Negeri Sembilan: Ir. Shahrin Amri bin Jahari
- Kelantan: Ir. Hj. Mohd Zaim bin Abd. Hamid
 Terengganu: Ir. Atemin bin Sulong
- Ierengganu: Ir. Atemin bin Sulon
 Melaka: Ir. Dr Tan Chee Fai
- Melaka: Ir. Dr Tan Chee
 Sarawak: Ir. Haidel Heli
- 9. Sarawak: ir. Haidel Heil 10. Sabah: Ir. Hj. Yahiya bin Awang Kahar
- 11. Miri: Ir. Paul Chiew Lik Ing

12. Pahang: Y. Bhg. Dato' Ir. Tn. Hj. Abdul Jalil bin Hj. Mohamed

AHLI JAWATANKUASA INFORMASI DAN PENERBITAN / STANDING COMMITTEE ON INFORMATION AND PUBLICATIONS 2016/2017

Pengerusi/Chairman: Ir. Prof. Dr Ruslan Hassan Naib Pengerusi/Vice Chairman: Ir. Mohd. Khir Muhammad Setiausaha/Secretary: Ir. Lau Tai Onn Ketua Pengarang/Chief Editor: Ir. Prof. Dr Ruslan Hassan Pengarang Buletin/Bulletin Editor: Ir. Mohd. Khir Muhammad Pengarang Prinsipal Jurnal/Principal Journal Editor: Ir. Prof. Dr Ruslan Hassan Pengerusi Perpustakaan/Library Chairman: Ir. C.M.M. Aboobucker Ahli-Ahli/Committee Members: Y.Bhg. Datuk Ir. Prof. Dr Ow Chee Sheng, Ir. Prof. Dr Dominic Foo Chwan Yee, Dr Wang Hong Kok FLE.M., Ir. Santha Kumaran a/I Erusan, Mr. Abdul Fattah bin Mohamed Yatim M.I.E.M., Ir. Chin Mee Poon, Ir. Yee Thien Seng, Ir. Ong Guan Hock, Ir. Dr Oh Seong Por, Ir. Tejinder Singh, Ms. Michelle Lau Chui Chui Grad. IEM

LEMBAGA PENGARANG/EDITORIAL BOARD 2016/2017

Ketua Pengarang/Chief Editor: Ir. Prof. Dr Ruslan Hassan Pengarang Buletin/Bulletin Editor: Ir. Mohd. Khir Muhammad Pengarang Jurnal/Journal Editor: Ir. Prof. Dr Ruslan Hassan Ahli-ahli/Committee Members: Ir. Ong Guan Hock, Ir. Lau Tai Onn, Ir. Yee Thien Seng, Dr Wang Hong Kok FLIE.M., Ms. Michelle Lau Chui Chui Grad. IEM Secretariats: Janet Lim, May Lee

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

CONTENTS

JURUTERA Füture *Sreen

COVER NOTE

Consulting Engineers and Green Environment

COVER STORY

6 - 14

15 - 28

30 - 38

5

Fostering Green Growth for Malaysia, Energy-Wise

FEATURE ARTICLES

Cross Border Trade in Services (CBTS) and International Engineering Alliance (IEA) Accords/ Agreements: Opinion of a Retired Practitioner20

Making the Auditor-General's Report More Accessible, Integrated and Usable24

FORUMS

NEWS FROM BRANCH

41

IEM Sarawak Branch Annual Dinner 2016 Report

GLOBE TREKKING

The Terracotta Warriors of Xian

BLUE PAGE Membership List

PINK PAGE

Professional Interview

46 - 47





For more product information or enquiries, call toll free 1800 88 0865



Email us at: roofing-malaysia@monier.com

or visit





e BrandLaurease Awards fo Consecutive Years 2008, 2009 2010, 2011, 2012 and 2015



ed for our CSR

efforts, Monier was honoured with an Asia Responsible Entrepreneur Award 2011

www.monier.com.my



Building Con



CERTIFIED TO MS ISO 9001(200 Redistration No (AB, 1050

MONIER MALAYSIA SDN. BHD. (19163-M)

Suite 12W, 12th Floor, Wisma Sime Darby, Jalan Raja Laut, 50350 Kuala Lumpur. Malaysia.

T: (+60) (3) 2176 0600

F: (+60) (3) 2604 0335









by Ir. Yim Hon Wa Chairman, Consulting Engineers Special Interest Group (CESIG)

Ir. Yim is the founder of Perunding IBS Sdn. Bhd., an M&E engineering consultancy services. He has more than 25 years of experience in the building industry. He is active in IEM and has served as Vice-President. He is also the Past President of ASHRAE (Malaysian Chapter).

Consulting Engineers and Green Environment

onsulting engineers plays a significant role in Green Environment development.
 We design better buildings when working on projects with limited resources, thus
 contributing toward developing a better environment for our communities.

The main elements critical for environmental sustainability are Green House Gases (GHG), atmospheric gaseous compounds capable of absorbing infrared radiation, thereby trapping heat in the atmosphere and leading to global warming, and Green Warming Potential (GWP), a measurement to compare the impacts of emissions and reductions of different gases.

The overall aim is to reduce emission of GHG and to improve safety performance to protect and enhance environmental sustainability. The design aspects in Green Environment include improvement in energy efficiency, conservation of water resources and environment protection. Designs must also ensure sustainable operations and maintenance for the future. Also to be considered are indoor air quality enhancement for human comfort and innovative green features.

We save energy and resources by using recycled materials and minimising toxic substances. In doing so, we can sustain and improve the quality of human life while maintaining the capacity of the ecosystem at both local and global levels. Further consideration is needed to make efficient use of resources to improve operational savings significantly and to increase workplace safety.

The strategic approaches to be considered are reduction of CO_2 emission, ban on ozone depletion substances, reduction of GWP, minimising of waste generation, 3R (Recycle, Reduce, Reuse) aproach, reduction of methane gas and conservation of water.

DIMENSION PUBLISHING SDN. BHD. (449732-7)

Level 18-01-03, PJX-HM Shah Tower, No. 16A, Persiaran Barat,

46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia. Tel: +(603) 7493 1049 Fax: +(603) 7493 1047 E-mail: info@dimensionpublishing.com Website: www.dimensionpublishing.com

For advertisement placements and subscriptions, please contact: **DIMENSION PUBLISHING SDN. BHD.** (449732-T)

at +(603) 7493 1049, or E-mail: info@dimensionpublishing.com

Subscription Department

E-mail: info@dimensionpublishing.com

Printed by

HOFFSET PRINTING SDN. BHD. (667106-V) No. 1, Jalan TPK 1/6, Taman Perindustrian Kinrara, 47180 Puchong, Selangor Darul Ehsan, Malaysia. Tel: +(603) 8075 7222 Fax: +(603) 8075 7333

Mailer

PERFECT MAIL SERVICES. (648839-P) 14 Jalan TSB 2, Taman Perindustrian Sungai Buloh, Sungai Buloh, Selangor Darul Ehsan, Malaysia. Tel: +(603) 6156 5288

JURUTERA MONTHLY CIRCULATION: 40,000 COPIES

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

Chief Editor

THE INSTITUTION OF ENGINEERS, MALAYSIA (IEM) Bangunan Ingenieur,

Lots 60 & 62, Jalan 52/4, P.O. Box 223 (Jalan Sultan), 46720 Petaling Jaya, Selangor. Tel: +(603) 7968 4001/4002 Fax: +(603) 7957 7678 E-mail: pub@iem.org.my or sec@iem.org.my

IEM Website: http://www.myiem.org.my © 2016, The Institution of Engineers, Malaysia (IEM) and Dimension Publishing Sdn. Bhd. Chairman ROBERT MEBRUER

CEO/Publisher PATRICK LEUNG

General Manager SHIRLEY THAM *shirley@dimensionpublishing.com*

Head of Marketing & Business Development JOSEPH HOW ioseph@dimensionpublishing.com

Editor TAN BEE HONG bee@dimensionpublishing.com

Contributing Writers PUTRI ZANINA & ZOE PHOON putri@dimensionpublishing.com zoe@dimensionpublishing.com

Senior Graphic Designer SUMATHI MANOKARAN sumathi@dimensionpublishing.com

Graphic Designer NABEELA AHMAD beela@dimensionpublishing.com

Advertising Consultants AZIM SHAARI & THAM CHOON KIT azim@dimensionpublishing.com

ckit @dimension publishing.com

Accounts cum Admin Executive YEN YIN yenyin@dimensionpublishing.com

PUBLICATION DISCLAIMER

The publication has been compiled by both IEM and Dimension with great care and they disclaim any duty to investigate any products, process, services, designs and the like which may be described in this publication. The appearance of any information in this publication does not necessarily constitute endorsement by IEM and Dimension. There is no guarantee that the information in this publication is free from errors. IEM and Dimension do not necessarily agree with the statement or the opinion expressed in this publication.

COPYRIGHT

JURUTERA Bulletin of IEM is the official magazine of The Institution of Engineers, Malaysia (IEM) and is published by Dimension Publishing Sdn. Bhd. The Institution and the Publisher retain the copyright over all materials published in the magazine. No part of this magazine may be reproduced and transmitted in any form or stored in any retrieval system of any nature without the prior written permission of IEM and the Publisher.





Ir. Prof. G. Lalchand, 77, was an electrical engineer with Tenaga Nasional Berhad (TNB) and its predecessors (LLN and CEB) for 37 years including on contract assignments after mandatory retirement as the Chief Corporate Auditor. He is a Fellow of Academy Science of Malaysia and ASEAN Academy of Engineering & Technology (AAET) and actively serving the Consulting Engineers Special Interest Group of IEM. He is also a director at G&P Professionals Sdn. Bhd., an advisor to the Federation of Manufacturer Malaysia (FMM-MIMG) and an adjunct professor at University College Sedaya International (UCSI). After retirement from TNB, he has involved in policy issues covering energy efficiency, renewable energy, green growth and sustainable development.

Ir. Prof. G. Lalchand of the Institution of Engineers, Malaysia's Consulting Engineers Special Interest Group, shares his thoughts on the country's green environment

for developed and developing economies as critical strategies to mitigate the adverse effects of climate change around the world.

The vast majority of global weather scientists have produced irrefutable evidence to convince humanity that climate change is caused by human activities. Virtually unrestrained use of fossil fuels such as oil, coal and natural gas over the last couple of centuries, has resulted in global warming emissions such as carbon dioxide, methane and other gases that contribute to global warming.

Current scientific projections have set an upper limit of 450 ppm (parts per million) of carbon dioxide equivalent (CO_{2eq}) content in the atmosphere to limit the global temperature rise to not more than 2°C. These issues have assumed greater urgency during this century as the carbon dioxide (CO_2) and its "equivalent green-house gases (GHGs or CO_{2eq})" content in the atmosphere has exceeded 400 ppm.

Fortunately, in December 2015, the global community managed to achieve consensus at the Conference of Parties 21 (COP21) in Paris, to initiate concerted action to reduce GHG emissions in efforts to limit global temperature rise to 2°C.

Malaysia was a leading negotiator for the group of developing nations in the COP21 session and made finite commitments as its contribution. Before that, at the COP15 in Copenhagen in 2009, Malaysia had committed to reduce its "carbon intensity" (CO_{2eq} emissions to GDP) by 40% from its 2005 value by 2020. Its commitment was enhanced to 45%

carbon intensity reduction by 2030 at the COP21, subject to conditions regarding financing assistance and transfer of technology.

Meanwhile, the Institution of Engineers, Malaysia (IEM) is also doing its part to foster green growth through the upcoming International Green Energy Workshop and Exhibition (IGWE) that it is organising in October, 2016, to showcase green energy generation technologies as well as appliances, products and technologies that use energy efficiently.

While it's better late than never, it's even better sooner rather than later when it comes to reducing global warming.

On what elements of GHG emitting sources should the government address to accomplish the desired carbon intensity reductions, Ir. Prof. G. Lalchand (or Ir. Lal as he prefers to be called) began by explaining that the burning of any material containing carbon, such as fossil fuels (including coal, oil and natural gas) will produce GHG.

On the other hand, electricity-powered transport such as express rail link, mass and light rail transit and electric buses don't produce "tail-pipe" emissions. Emissions from electric transport occur at the power stations which generate the electricity used by these modes of transport. Even the burning of food waste produces carbon dioxide, while its decomposition produces methane.

So what has Malaysia done so far, is doing now and can do in the future, to ensure that it "honours" its commitment at COP21?

Figure 1: <u>The need for Energy Efficiency (EE) is embedded in Malaysia's National</u> Energy Policy

Petroleum Development Act 1974	National Petroleum Policy 1975	National Energy Policy 1979	National Depletion Policy 1980	Four-Fuel Diversification Strategy 1981	Five-Fuel Diversification Strategy 2001	
Vested on PETRONAS the exclusive rights to explore, develop and	• To regulate downstream oil & gas industry via the Petroleum Regulations 1974	To ensure adequacy, security and <u>cost-</u> <u>effectiveness</u> <u>of energy</u> <u>supply</u> To promote	• To prolong lifespan of Malaysia's oil reserves for future security & stability of oil supply	 To pursue balanced utilization of oil, gas, hydro and coal 	 Renewable Energy included as the "fifth fuel" in energy supply mix 	
produce petroleum resources of Malaysia	a	efficient utilization of energy • To minimize negative environmental impacts in the energy supply chain				

NATIONAL POLICIES AND LEGISLATION

According to Ir. Lal, Malaysian government policies for energy, especially electricity supply, have traditionally been based on "supply-side" considerations.

Malaysia plans for adequate energy supply to meet the projected energy demand, with enough reserve capacity to cater for plant breakdowns and other utility emergencies. Most of the electricity supply (over 90% nationally) still comes from fossil fuels and a little bit from renewable energy (RE) resources like hydro, biomass from oil palm plantations and biogas from palm oil mills. However, as feedstock for power generation waste, especially from plantations, biomass has now become a valuable commodity and is too costly to burn for power generation due to its several alternative uses.

The government has formulated policies, legislation and promotional activities to promote green growth to meet the ambitious targets set. Figure 1 Suruhanjaya Tenaga (ST or the Energy Commission) lists some of the key energy policies that reflect the national planning perspectives. for the transport sector. This was followed by the formulation of the National Green Technology Policy in 2009 and the Renewable Energy Policy and Action Plan (REPAP) which led to the enactment of the RE Act in 2011 to develop RE powered electricity generation for supply to the national electricity supply network. Ir. Lal decried the absence of any dedicated EE policy or enactment in Malaysia, indicating that "the need for Energy Efficiency (EE) is embedded in Malaysia's National Energy Policy". Why is this a concern for Malaysia? Ir. Lal pointed out that both the International Energy Agency's (IEA) projections as shown in Figure 1 and Figure

Policies promoting "green energy" really started from 2006 when the National Bio-fuel policy was formulated to

encourage the use of bio-diesel (mixed with mineral diesel)

Agency's (IEA) projections as shown in Figure 1 and Figure 2 that efficient use of energy is the single most significant component of GHG emission reductions in the projections to achieve a 450 ppm CO_2 limit in the atmosphere, as shown in the slides below.



Energy efficiency is an essential climate



Source: IEA Blue Map Scenario

Sav to the Pipe Revolution $\bigcirc (C) (50$



The Pipe Revolution

Meet HYPRO, the latest piping technology in the market today and tomorrow.

Our highly-advanced patented molecular orientation process transforms conventional PVC material into high performance PVC-O - making it 5 times stronger and weights only fraction of metal pipes, you can now say goodbye to corrosion and scaling.

Today, more than 8,000km of MOLECOR'S PVC-O pipes are in service globally, including in Europe, the Americas and Australia, and is fast gaining popularity here in South East Asia.

HYPRO is suitable for all your demanding needs in water, sewerage and irrigation.

100% leak tightness

light-weight yet exceptionally heavy-duty

saving

of installation

design life

sustainable

and PN25, from sizes DN90 to DN630

Contact us NOW for a FREE technical seminar



members of the FITTERS Group www.molecorsea.com inquiry@molecorsea.com 03-62767155 03-62751378



So, the lack of an EE policy makes the possibility of achieving the desired GHG emission reductions somewhat unlikely for various reasons as mentioned below.

RE IN MALAYSIA

Ir. Lal said that globally, the renewable sources to meet energy demand include biomass (for heating, electricity, transportation), hydro-power (electricity), geothermal (heating, electricity), wind (electricity), solar (light, heating, electricity) and others, such as marine resources like wave, tidal, OTEC or Ocean Thermal Energy Conversion (for electricity and other by-products).

However, some of these RE resources have little or no potential in Malaysia. These include wind, wave and tidal power generation due to their very limited capacity in the region. In Malaysia, the economically viable renewable sources are solid waste, plantation waste biomass (empty fruit bunches), palm oil mill effluent (POME), small hydro and solar (PV), as shown in Figure 3, using their respective power generation technologies.

For example, Singapore is producing energy from municipal waste, so very little of it goes to landfills. In Malaysia, it's the other way round, partly because no waste-to-energy project has been implemented here successfully.

Renewable Sources in Malaysia

KeTTHA



National RE development plans have changed over the last few Malaysia Plans from year 2000, as per the Sustainable Energy Development Authority's (SEDA) as shown in Figure 4.



Ir. Lal said that SEDA's RE capacity development, including the EPP-10 target of about 1.25 GW from PV by 2020, is difficult to achieve with the present size of the RE Fund based on the RE levy of 1.6% on electricity bills of the affected consumers. He quoted a previous SEDA statement which implied that the Feed-in Tariff (FiT) for PV was more to develop human capacity in PV, not so much as alternative to fossil fuel power source for Malaysia.

Ir. Lal noted that although SEDA has attempted to promote overall development of electricity generating capacity from all the designated RE sources, its efforts have not seen much success, except for the PV sector. This has been caused partly by some external influences such as the high cost of biomass feedstock (empty fruit bunches from palm oil plantations) as a commodity with alternative uses, highly "convoluted approval" processes for small hydro projects, lack of successful examples of municipal waste to energy conversion projects, and remoteness from the power supply grid of projects to use biogas from POME.

He said PV generated electricity can only contribute about 25% of the energy that can be generated by the other RE technologies and as required by the consumers. Thus, additional fossil-fuelled power plants will be needed to satisfy the total power and energy demand of consumers. He said solar PV provides what can only be termed as "tigasuku kosong" capacity, and he doesn't think it can satisfy the country's energy demand.

As a result, the bulk of the RE levy has been dedicated to pay the tariff "top-up" for FiT for PV, which has actually produced a disproportionally lower energy generation, in spite of its much higher share of installed capacity in MWs.

RE Policy & Action Plan: Goals



He continued to say that "many people don't realise that energy generated from PV is much less than that generated from other RE resources for the same power generating capacity installed. But PV is useful in certain aspects as it can reduce peak demand and can be a good option for the country to a limited extent".

He quoted as examples the sample load profiles for the national power grid in Peninsular Malaysia (Figure 6).

These show that adequate PV capacity installation can help to "smoothen" the electricity supply demand profile, which will reduce the need for the use of fossil fuel power plants to meet the daily peak load.

COVER STORY

Potential PV capacity Can be Used BUT Without FiT



It can also help to reduce the need to reinforce the electricity supply distribution network to meet increasing consumer demand.

As an extreme example, in Peninsular Malaysia, even with, say, 15,000 MW of PV system capacity against the 15,000 MW of power demand, the fossil-fuelled (or other) power plants will be needed to meet the energy and net demand shortfall (of the order of 70%) which can amount to about 10,500 MW.

Can PV Satisfy Energy Demand?

Example:- even with, say, 15,000 MW of PV system capacity against the 15,000 MW of

power demand, the fossil-fuelled (or other) power plants will be needed to meet the



So, should Malaysia plan to develop PV Farms when they cannot satisfy user nergy needs. SEDA itself has admitted these shortcomings of PV power plants as shown in the next slide. *Fiaure* 7

ENERGY EFFICIENCY (EE)

Ir. Lal noted that EE is the most prominent option for reducing global GHG emissions for the future to achieve the 2°C temperature rise limit. Greater emphasis on EE is therefore an essential element for the national climate change policy.

But policies are sometimes not consistent and cost effectiveness not always adequately addressed. This includes more efficient use of natural gas in co-generation mode but this option is hampered by some "administrative constraints" which the relevant industry regulators don't appear to be able to resolve.

EE doesn't mean not using energy when necessary, but rather using it more efficiently, thus reducing waste. After all, the "cheapest kWh is the one that you don't use", and adoption of EE helps to reduce the energy used without compromising on the desired benefits of using it.

In this respect, Ir. Lal said the relevant government agencies had made attempts to encourage the efficient use

of electricity over several Malaysia Plan periods. The table 8 shows the initiatives as presented by the ST recently.

Table 8

EE Promotion Initiatives In Malaysia Over The Years

- EE rating and labelling of equipment (2009)
- Green Technology Financing Scheme (2010)
- Subsidy rationalisation plan (2010)
- <u>Competitive bidding</u> for new generation capacity plant-ups (2011)
- EE equipment rebate scheme (2011)
- + UNDP-GEF Building Sector Energy Efficiency Project (BSEEP) (2011)
- MS 1525 provisions in <u>Uniform Building By-Laws</u> (2012).
- Minimum energy performance standards (MEPS) reculations (2013)
- UNIDO-GEF industnal energy efficiency project (2013)
- Energy Performance Contracting (EPC) for government buildings (2013)
- Incentive-based tariff regulation (2014)
- 5% energy reduction target for government buildings (2014)

It did not include the EMEER (Efficient Management of Energy Efficiency Regulations) that ST enacted for implementation from December 2008.

Ir. Lal had been involved in promoting EE under various local and internationally supported programmes from 1999, and confirmed that the list shown was only for the more recent initiatives. He added that there had actually been other initiatives from earlier years such as:

- EE awards for different categories of the larger consumers (early 1990s)
- Japanese (JICA) and French (ADEME) government projects to conduct and inculcate energy audit practices and programmes (mid-1990s)
- Feasibility study for an EE policy (by Danish consultants in 1999/2000)
- Malaysian Industrial Energy Efficiency Improvement Project (MIEEIP, a UNDP/GEF project from 1999 to 2007)
- Capacity Building in EE/DSM at the ST (Danish consultants from 2002 to 2005), which started the appliance EE labelling scheme for refrigerators and electric motors

All these initiatives had varying degrees of success during the periods that the foreign consultants executed the programmes, usually as joint-ventures with local consultants (as partners and "under-studys"). Unfortunately, there was little or no follow-up to continue with those initiatives after the projects ended.

In addition, the "EE equipment rebate scheme" mentioned in the list above was the Sustainability Achieved Via Energy Efficiency (SAVE) programme, which was a part of EPP-9 (Oil, Gas and Energy Lab) of the Economic Transformation Programme (ETP) to catalyse EE adoption via purchase of EE appliances such as five-star refrigerators and EE air-conditioners. This programme was an unmitigated success as its end result achievements went well beyond its planned targets. Sadly, it was not continued after its "oneoff" implementation.

Ir. Lal was rather sad that one of the most promising government initiatives on EE by the Ministry of Energy, Green Technology and Water (KeTTHA), the NEEMP (National EE





ADVANCING ARCHITECTURE IN ASIA

ARCHIEX®15

THE 7TH INTERNATIONAL ARCHITECTURE, INTERIOR DESIGN & BUILDING EXHIBITION, MALAYSIA







SCAN AND DOWNLOAD THE **ARCHIDEX APP** TO PRE-REGISTER YOUR VISIT.

FEATURING



CONCURRENT EVENTS

PAM CONFERENCE

DATUM

PAM DESIGN FORUM

PAM GREEN FORUM

PAM ARCHITECTURE EXHIBITION PAM MASTERCLASS PAM PUBLIC LECTURE PAM GRAPHIC DESIGN EXHIBITION PAM ARCHITECTURE TOURS PAM ROUND TABLE



EXHIBITION DATE	ТІМЕ
20 & 21 JULY 2016, WEDNESDAY & THURSDAY	10AM - 7PM - TRADE DAYS
22 & 23 JULY 2016, FRIDAY & SATURDAY	10AM - 7PM - TRADE, PUBLIC & STUDENT DAYS

THIS TRADE EXHIBITION IS OPEN TO PERSONS ABOVE 16 YEARS OLD AND UPON REGISTRATION ONLY. Visitors must be in proper business attire and the Organisers reserve the rights to refuse entry to any person/s at their discretion. CPD Point(s) are applicable for Architects and Engineers attending the exhibition.

www.ARCHIDEX.com.my

Master Plan), formulated from mid-2008 to 2010, had not been "allowed to see the light of day". The Plan was peerreviewed by an Asia Pacific Economic Cooperation (APEC) team of industry experts at the end of 2010, and endorsed as a good policy, but the Malaysian government never implemented it.

Ir. Lal said "KeTTHA had also been formulating an Energy Efficiency & Conservation (EE&C) Act, which was scheduled to be implemented by 2014 (as a part of the NEEMP), to enable adoption of EE in Malaysia". However, KeTTHA later came out with a "watered down" version (as an NEEAP, i.e. an Action Plan) in January 2014, which removed any reference to the need for legislation for EE. The "watered down" NEEAP failed to get the stakeholders' support that KeTTHA sought for at the end of the year.

He noted: "It's now 2016 and there is no legislation yet to mandate the adoption of EE&C initiatives nor is there any dedicated agency to implement the initiatives." He believes that electricity consumers would be only too happy to help the national EE objectives if, by doing so, they can also save on their electricity costs.

He said the Public Works Department (JKR) had done a lot more in EE, adding that it had improved its building designs to become more energy efficient. JKR had also retro-fitted some large government buildings in Putrajaya and achieved energy savings of up to 14% (about RM2 million to RM2.5 million) a year.

In the private sector, Ir. Lal said the Malaysia Association of Energy Service Companies (MAESCO) is doing retrofits to help companies save energy. Some of these activities have been conducted under an Energy Performance Contracting (EPC) concept, where the energy service companies (ESCOs) invest in the energy saving installations for their clients. MAESCO members have been active but their success is limited because energy is cheap, so companies are not so keen on investing to be more energy efficient. Companies are also not getting as many incentives and EE support from the government as are given in some other countries.

The EMEER which came into force in December 2008, required consumers who used more than an average of 500,000 kWh a month, to practise formal energy management. MAESCO has been approaching them to start saving energy with its EPC system. It's a form of financing energy equipment upgrades from cost reductions, as is being practised at Serdang Hospital.

However, the good news is that the Economic Planning Unit (EPU), under the Prime Minister's Department, has taken on the task of formulating a new "EE/DSM" study which is expected to override the NEEAP.

"It now remains for us to see whether the adoption of EE&C initiatives will be implemented effectively and according to realistic timelines. We will have to see if the targets and timelines set are realistic and to make sure adequate resources are made available for effective implementation," he said. Ir. Lal strongly supported the need to encourage widespread adoption of co-generation, as it can be easily and quickly adopted with minimal public investment. Co-generation can achieve energy conversion efficiency of up to 85% compared with "only power generation" efficiency of 60% at best. This issue had been raised by potential consumers (who would also be investors) for many years, but the administrative hurdles, which have been partly "lowered", still remain.

He insisted that for Malaysia to truly succeed in reducing its carbon-intensity through "green growth", especially for the energy supply and use segment, appropriate legislation is needed to make it work. He added that Malaysia needs an "EE Champion" to achieve the benefits that EE can bring. He supported the impact of national adoption of EE by quoting the following excellent example relating to the US as shown in the box below.

The USA is considered a nation of "Energy Guzzlerrs". No doubt they consume far more energy per capita than most developing countries. But look at the following recent post in "Green tech efficiency" web page - http://www.greentechmedia.com/ articles/read/energy-efficiency-americas-mostimportant-resource?utm_source=Efficiency&utm_ medium=Headline&utm_campaign=GTMDaily where NRDC's Peter Lehner explains how efficiency has been a vital hidden resource for America.

Extract from article by Peter Lehner, dated October 2013:-

America May Be an Energy Hog-But It's Not as Bad as You Think

Which energy source has had the biggest impact on meeting America's energy needs over the past 40 years?

It's not coal. It's not oil. Not wind or nuclear. Believe it or not, it's even bigger than all of those combined.

Our greatest energy resource is energy efficiency - wasting less energy and making the most out of the energy we already have.

According to the Natural Resource Defense Council's *groundbreaking, comprehensive analysis* of key indicators, America's energy position, in terms of security and reliability, has never been stronger. That's reassuring, and perhaps surprising, in a time when bad energy news (turmoil in the Middle East, fracking, oil spills) seems to dominate the headlines. For nearly 40 years, our economic growth has been rapidly outpacing our energy consumption. Our businesses and industries are producing and selling more stuff, and using less energy to do so. We used less energy last year than we did in 1999 -- despite running an economy that's 25 percent bigger.



Always Secure. Always Available.

Introducing the UPS that delivers peace of mind

Discover the MGE Galaxy 300 10-80kVA

- Secure: Maximum protection and availability with double-conversion online topology
- Compact: Wide or narrow tower in space-saving footprint
- Simple: Easy to install and operate
- Efficient: up to 93.5%, reduces cost of ownership
- Flexible: 1+1 parallel capability meets redundancy needs
- Serviceable: Push-open, front access to maintenance bypass and slide-out boards make servicing easy
- Fast-charging: Shorter battery recharge time prevents deep discharge damage

Call us now. We can help you to optimize energy and sustain performance.





adrian.koh@schneider-electric.com

KC LAU • +6019 419 3036 kokchoy.lau@schneider-electric.com

CUSTOMER CARE CENTRE • 1-800-880-977 (Toll Free) customercare.my@schneider-electric.com

Discover higher efficiency and availability with the Galaxy 300

Download our FREE brochure and enter to WIN an exclusive gift from us!

Visit: www.SEreply.com Keycode: 57341M







©2016 Schneider Electric. All Rights Reserved. All trademarks are the property of Schneider Electric SE, its subsidiaries and affiliated companies. 998-1239004_GMA-US_B

Ir. Lal is amazed that, after its commitment on carbon intensity reductions at COP15 in Copenhagen (2009), the Malaysian government has failed to support an EE culture for the country for over half a decade.

GREEN TRANSPORT

Ir. Lal stated that the promotion of hybrid vehicles mentioned under the EPP-9 of the ETP was, in fact, a move towards promoting green transport, even though it was not termed as such. In addition to that for hybrid vehicles, Malaysia has now provided incentives for energy efficient vehicles (EEVs) in a bid to make the nation a regional hub for EEVs.

Both hybrid vehicles and EEVs help to reduce GHG emissions as they consume less fuel. The excise duty exemption for hybrid cars under the EPP-9 achieved great success, as the sale of such vehicles "exploded" from a few hundred vehicles a year to some 15,000 vehicles a year. Sadly again, this incentive was withdrawn after a couple of years and the sale of such hybrid vehicles dropped significantly again.

What Ir. Lal found disconcerting about this is that subsequently, the same incentives have been given to "locally assembled" hybrid vehicles, which include costly high-end models (such as Audi, BMW, Mercedes Benz and Volvo) which are beyond what most people can afford. Thus, the numbers sold would be much lower than that of models which benefited from the EPP-9 in the first place which applied to vehicles in the more affordable price range such as Honda, Lexus and Toyota models which had petrol engines of less than 2,000cc capacity per km travelled than the conventional internal combustion engine (ICE) vehicles.

Ir. Lal also expressed surprise that the government is promoting battery electric vehicles (EVs) as low-emission (or even wrongly "as zero-emission") vehicles and granting these fiscal incentives, through the Malaysia Green Technology Corporation.

He said EVs in Peninsular Malaysia are NOT zeroemission vehicles as the electricity used to charge the batteries comes from the national power supply grid. About 95% of the electricity in Peninsular Malaysia is generated from fossil fuels which emit substantial emissions. So, EVs DO contribute to emissions, though not at their "tail-pipes".

He said electric traction for public transport systems, whether as rail (MRT, LRT, monorail and so forth) or buses (BRT, intra-city buses, etc) can be considered as low emission and hence, "green" transport due to the much lower emissions per passenger-kilometre travelled. The same does not apply to individual passenger EVs as these are still costly (not affordable for the majority of people) and are not likely to achieve mass market sales due to affordability and "range-anxiety" concerns.

He is not in favour of incentives for such high cost vehicles as these are likely to end up as "toys" for the

wealthy rather than commuting vehicles for the middleand lower-income working people.

As a consultant in green environment, Ir. Lal relates to the "low hanging fruit first" approach as mentioned by Dr Rajendra Pachauri of the International Panel on Climate Change when he visited Malaysia in April 2011 to give his views on nuclear power and climate change, post-Fukushima Daiichi nuclear disaster. Dr Rajendra had advocated "adopting EE first, developing RE generation next, and then only going for more fossil fuelled or nuclear powered generation plants".

SO WHERE DO WE GO FROM HERE?

Last but not least, Ir. Lal offered some ideas on what the government should/could do to contribute more significantly to the GHG emission reduction aspirations.

One of the most significant initiatives with almost immediate returns is to remove the administrative barriers to allow greater adoption of co-generation in industries.

It is also essential to expedite the EPU's efforts on the EE/ DSM study, the enactment of any necessary legislation, the provision of adequate resources (financial and expert human capital) and to set challenging but pragmatic targets.

In addition, ST could extend the minimum energy performance standards (MEPS) to more products as well as raise the efficiency levels of the products coming into the country.

The government can also extend perks to owners of old buildings and industries to become more energy efficient. EE fiscal incentives have been around since 2001, in the form of sales tax and import duty exemptions for designated products. For industry players and ESCOs, there is investment tax allowance or pioneer status for those embarking on energy conservation or EE projects.

The government can also provide incentives for hybrid cars, not only for the buyers of luxury marques, but also for those within the affordability range of the majority of the people. It can also ensure better public transport and improved traffic management so we don't have "car parks" with fossil fuel engines caught in city jams and thus wasting energy and increasing emissions, he added.

He also said Malaysia should not try to "chase impossible dreams" by promoting activities that have little realistic benefits for the national GHG emission reduction aspirations, such as trying to harness wind energy, wave or tidal power, or other non-viable marine energy generation, or EVs which may be just "ego-trips" for their promoters.

According to him, there's a need to facilitate productive use of POME to increase the use of RE, by extending the electricity supply network to oil mills which are willing to generate electricity from POME and sell it to the grid.

Supercapacitor, the Advanced Energy Storage Device



Ir. Dr Ng Kok Chiang

Ir. Dr Ng Kok Chiang B.Eng (Electrical & Electronics) (Western Australia) and Ph.D. (Nottingham University, UK), is currently the Chief Technology Officer at MyBig Sdn. Bhd. He has been involved in research and prototyping projects in collaboration with various government agencies and research bodies, including Malaysia Rubber Board and MOSTI. iven the climate changes that the world is currently facing, it is imperative that we find a sustainable supply of energy from renewable sources very soon. The depletion of fossil fuels due to extensive extractions to meet the increased demand by growing economies such as China and India, has also caused concerns about the preservation of such resources for future generations.

Amidst all these, social responsibility prevails with the change in the direction of the energy industry towards the harvesting of renewable energy from sustainable and abundant sources such as the sun, ocean tides and wind.

Due to increased awareness brought about by extensive environmental campaigns, the motoring industry has also shifted its focus to the development of environmentally friendly cars. These cars, which are driven by hybrid engines or entirely powered by electricity, are designed to reduce CO₂ emissions substantially.



Figure 1: Ragone plot of specific power vs specific energy, indicating the relative capabilities of conventional capacitors, supercapacitors, batteries and fuel cells

However, energy from renewable sources has its disadvantages as the consistency of the amount generated is beyond our control. This is because such energy sources depend heavily on wind cycles (wind energy), the revolution of the earth and the moon (tidal energy), and the intensity or amount of sunlight received (solar power). For this reason, energy storage systems have become one of the most important initial parts in the chain of power distribution. Ensuring maximum and efficient utilisation of energy in electric vehicles requires strategic and specialised energy storage systems to deal with sudden power bursts during acceleration and braking. Batteries and supercapacitors occupy a large

part in the spectrum of specific power and energy among the various kinds of energy storage systems available to date.

However, with the ever-increasing demand from different applications, from portable electronics and electric vehicles to large-scale storage systems for industrial purposes and power distribution, the performance of batteries and supercapacitors has to improve significantly.

This improvement is also necessary due to the increasingly complicated requirements of these future applications. There is a need to develop and characterise new or improved materials to support the growing demand created by innovations in consumer products and technology. A good understanding of these new materials is crucial, particularly with the recent advancement in nanoscale materials having brought with it a whole new chapter of novel discoveries in the area of interfacial chemistry and electrochemistry which has significantly impacted the performances of electrochemical devices.

BACKGROUND

Ground-breaking work by Whittingham, Scrosati, and Armand with lithium-ion batteries brought about the introduction of lithium-ion batteries in 1990 by Sony. Huge energy densities can be obtained from the lithium type batteries, reportedly reaching as high as 180 Wh/kg. However, lithium-ion batteries are costly and known to be environmentally unfriendly. Thus they need to be disposed of appropriately.

While significant effort has been expended in the production of advanced lithium-ion batteries and other superior secondary batteries with new nanostructured materials, supercapacitors were not popularly researched until a few years ago. Supercapacitors are advantageous because they occupy a different niche in the specific energy and power position (faster and higher power energy storage) as compared to



INDUSTRIAL TECHNICAL Training provider

OUR TRAINING PROGRAMMES

- All our training programmes are unique; they are based on industrial research, needs and technology.
- Each of our programmes is hands on, practical and problem solving oriented, to maximise the employee's talent at work place.
- We provide real equipment for participants to practice physically and gain better understanding in their learning.

OUR EXPERTISE

INDUSTRIAL AUTOMATION ENGINEERING (with software)

- Siemens PLC : S7 300/400, S1200, S1500, S5
- Mitsubishi PLC : Q Series and FX Series
- Omron PLC
- Allen Bradley PLC
- Distributed Control System with Siemens
 Distributed Control System with Emerson
- Distributed control system with Emerson
- INSTRUMENTATION AND PROCESS CONTROL

 Intermediate and Advanced Instrumentation and Process
 Control

MECHANICAL ENGINEERING

 Pneumatic, Hydraulic, Bearing, Pumps, Piping, Valves, Compressors, Electric Motor, Steam Boiler, etc

- ROTATING EQUIPMENTS
- Valves, Machinery Alignment, Vibration, Balancing, etc ELECTRICAL ENGINEERING
- Troubleshooting, Maintenance, Fault Calculation, Safety, etc
 POWER ELECTRICAL ENGINEERING

LV, MV, HV, Switchgear, Transformer, Power Plant Safety, etc MACHINERIES AND MAINTENANCE ENGINEERING

- Equipment Maintenance, Spare Part Management, Maintenance Planning, TPM, Machinery Safety, Root Cause Failure Analysis, etc
- GREEN TECH & RENEWABLE TECHNOLOGY • HVAC System, Energy Management, Energy Audit, etc

WHY CHOOSE US?

- Industrial Experience Expert Consultants
- Quality and High Standard Industry Based Contents of Courses

PPROV

HRDF

- Practical Based Training with Real Equipment
- Industry Based Problem Solving Solutions
- Worth for Money and Investment
- Satisfaction Guaranteed



WIDESPREAD MALAYSIA SDN. BHD. Corporate Office No. 93-2, Jalan BK 5A/2, Kinrara Niaga, Bandar Kinrara, 47180 Puchong, Selangor. Training Centre Level 2, No. 30, Jalan Perindustrian Suntrack, Suntrack Industrial Hub, Off Jalan P/1A, Section 13, Bandar Baru Bangi, 43650 Bangi, Selangor. Tel: +603 8080 1135 Fax: +603 8080 1137 Hotline: +6011 3264 8379 Website: www.widespread.my Email: training@widespread.my Email: training@widespread.my lithium-ion batteries, thereby compensating what is lacking in the current energy industry.

APPLICATIONS OF SUPERCAPACITOR AND HOW IT WORKS

The supercapacitor is a budding technology that plays a significant role in the advancement of electronic devices and systems in both the present and future of energy storage. Unlike batteries, supercapacitors can be charged and discharged within seconds, giving straight-line potential-time plots and providing a high power density due to the rate of the charge-discharge.

This characteristic ability allows the immediate delivery of power when required. However, supercapacitors have lower specific energy than batteries. The interplay of these two factors is most aptly demonstrated in a Ragone plot (Figure 1). With such properties, supercapacitors have the potential to replace certain batteries while compensating for the inconsistency of electrical energy generated from renewable sources. Examples of such applications are photovoltaic devices or other renewable energy generators which are employed to meet the sudden surges of power demand or as backup supplies to prevent sudden black-outs in power distributions.

Supercapacitors have found its place in many new technologies, from miniature devices such as iPod chargers to the emergency doors of a modern Airbus A380. These examples demonstrate the recognition accorded to this new energy device with regards safety, functionality and dependability, despite its short history. The US Department of Energy has also stated that supercapacitors are a priority and as important as batteries for future power sources.

Supercapacitors differ from conventional capacitors in the way in which it stores charges. Depending on the storage mechanism, supercapacitors can be divided into two main categories. The most basic type is that which is called the electrochemical double-layer capacitor (EDLC). As its name suggests, it stores the charge in the double-layered high surface area carbon electrode/ electrolyte interface.



The second type of supercapacitor utilises the rapid and reversible redox properties of electrode materials, such as transition metal oxides and conducting polymers, to effect charge storage. Such Faradic reactions occur in the bulk of the active material close to the surface and involve adsorbed

Figure 2: Lab Constructed Supercapasitors

species at the electrode/electrolyte interface of the active materials. These reactions are known as "pseudo-capacitance" and capacitance in the range of 10-100 times the double-layer capacitance per unit area is obtainable through pseudo-capacitance.

The limited use of supercapacitors in the past lies in the low specific energy it commands as compared to batteries, which confines it to a narrow range of applications. Unfortunately, most appliances and equipments require prolonged discharge times of more than a few seconds.

When the supercapacitor was first built and patented in the 1950s, there was no real sense of direction for the technology and a consequent lack of strategic research aimed at increasing its specific energy. When coupled with a lack of application in the real world, the little technological progress in supercapacitors, from the 1960s to the 1990s, was understandable. In fact, it was only recently,

when the demand for high power energy sources emerged, that supercapacitors were given a second lifeline. Unfortunately, due to the lack of technological development as compared to batteries, supercapacitors now have some way to go before it can overcome its disadvantages and be competitive for a wider range of applications.

ELECTRIC/HYBRID CAR: A SUPERCAPACITOR CASE STUDY

The supercapacitor device can be used to successfully improve the performance of an electric/hybrid vehicle or devices requiring bursts of power much larger than the steady-state requirement. If we assume the application requires a steady-state power of 7.2 kW for 10 hours, with occasional peak power of 80 kW for a few seconds to tens of minutes at a time, we can use the data presented in Figure 1 to determine how this supercapacitor technology can benefit.

In a first scenario, we assume that the vehicle is powered solely by Li-ion batteries, with energy density of 100 Wh/kg and power density of 0.1 kW/kg. Here, the total energy requirement of 72 kWh requires 720 kg of Li-ion batteries. These batteries can provide 72 kW of power at maximum, thus not meeting the burst requirement of 80 kW of the occasional peak power. It may also cause the over-discharging of the Li-ion batteries if stretched.

To achieve the required peak power, the Li-ion batteries would need to be sized-up by an extra 80 kg. However, combining Li-ion batteries of 720 kg and 0.8 kg of the supercapacitor will meet this peak power requirement, which means a savings of 79.2 kg of the total weight of the energy storage.



Figure 3: Commercial supercapacitors of different sizes and built that are available in the market for different applications

In a second scenario, we assume that the electric vehicle is powered by Ni-Cd batteries, with energy density of 70 Wh/kg and power density of 0.06 kW/kg. Here, the total energy requirement of 72 kWh can be supplied by 1,029 kg of batteries. These batteries are capable of providing 61.7 kW at maximum power, which is less than the maximum power requirement. To achieve maximum power of 80 kW, the vehicle would actually need to carry 1,334 kg of Ni-Cd batteries or an extra load of 305 kg. This extra power of 10.3 kW can alternately, be supplied by a 2 kg supercapacitor for burst times of a few seconds to tens of minutes.

Similar performance benefits will be obtained if fuel cells replace batteries as the primary power source, as the energy density is higher and power density is lower for fuel cells. In this case, the supercapacitor can provide power burst with less mass than Li-ion batteries.

CONCLUSION

It is evident that in many application areas, supercapacitors are emerging strongly as either a new, complementary or alternative technology to existing energy



SEGi University & Colleges

We are an established private university actively seeking Professional Engineers to join our growing institution.

Professional Engineers in the field of:

- CIVIL ENGINEERING
- CHEMICAL
 ENGINEERING
- MECHANICAL MECHATRONICS ENGINEERING
- ELECTRICAL/ ELECTRONICS ENGINEERING

Any related engineering disciplines may be considered.

Advantageous to have an undergraduate degree with a minimum of (CGPA > 3.5) and either a Master's degree or PhD qualification.

.....

Interested applicants may email their updated resume to **Ms.Azniwati Binti Azmi**.

Are you ready to embark on this journey to make a difference?

Write in to:

SEGi University Sdn. Bhd (10058940) Human Capital Management No. 9, Jalan Teknologi, Taman Sains Selangor, Kota Damansara, PJU 5, 47810 Petaling Jaya, Selangor. azniwatiazmi@segi.edu.my 3 03 6145 2699



seqi.edu.my



storage devices, such as rechargeable batteries. The superior effectiveness of supercapacitors, in terms of energy efficiency compared to rechargeable batteries, will help lower the total energy consumption in many energy-driven processes and devices, offering a green solution to the current energy crisis.

Further research and development will undoubtedly extend the coverage of applications and bring supercapacitors to a more advanced level so as to continuously satisfy the increasing civil and industrial demands for clean energy.

REFERENCES

- Schainker, R.B. and P.A. Epri. Executive overview: Energy storage options for a sustainable energy future. 2004.
- [2] Abbey, C. and G. Joos, Supercapacitor energy storage for wind energy applications. IEEE Transactions on Industry Applications, 2007. 43(3): p. 769-776.
- [3] Faggioli, E., et al., Supercapacitors for the energy management of electric vehicles. Journal of Power Sources, 1999. 84(2): p. 261-269.
- [4] Conway, B.E., Electrochemical Supercapacitors: Scientific fundamentals and technological applications. 1999, New York: Kluwer Academic/ Plenum Publishers.
- [5] Kötz, R. and M. Carlen, Principles and applications of electrochemical capacitors. Electrochimica Acta, 2000. 45(15-16): p. 2483-2498.
- [6] Tarascon, J.M. and M. Armand, Issues and challenges facing rechargeable lithium batteries. Nature, 2001. 414(6861): p. 359-367.
- [7] Miller, J.R. and P. Simon, Materials science: Electrochemical capacitors for energy management. Science, 2008. 321(5889): p. 651.
- [8] Miller, J.R. and A.F. Burke, Electrochemical capacitors: Challenges and opportunities for real-world applications. Electrochemical Society Interface, 2008: p. 53.
- [9] Simon, P. and Y. Gogotsi, Materials for electrochemical capacitors. Nature Materials, 2008. 7(11): p. 845-854.
- [10] McHardy, J., et al., U.S. Patent 4 766 522. 1988.
- [11] Conway, B.E., Transition from supercapacitor to battery behavior in electrochemical energy storage. Power Sources Symposium, 1990., Proceedings of the 34th International, 1990: p. 319-327.
- [12] Arico, A.S., et al., Nanostructured materials for advanced energy conversion and storage devices. Nature Materials, 2005. 4(5): p. 366-377.
- [13] Roy, R., Ceramics by the solution-sol-gel route. Science, 1987. 238(4834): p. 1664-1669.
- [14] Schmidt, H., Considerations about the sol-gel process: From the classical sol-gel route to advanced chemical nanotechnologies. Journal of Sol-Gel Science and Technology, 2006. 40(2): p. 115-130.
- [15] Peigney, A., et al., Aligned carbon nanotubes in ceramic-matrix nanocomposites prepared by high-temperature extrusion. Chemical Physics Letters, 2002. 352(1-2): p. 20-25.
- [16] Kear, B.H. and P.R. Strutt, Chemical processing and applications for nanostructured materials. Nanostructured Materials, 1995. 6(1-4): p. 227-236.
- [17] Lee, W.E. and R.E. Moore, Evolution of in situ refractories in the 20th century. Journal of the American Ceramic Society, 1998. 81(6): p. 1385-1410.
- [18] Chang, S., L. Liu, and S.A. Asher, Preparation and properties of tailored morphology, monodisperse colloidal silica-cadmium sulfide nanocomposites. Journal of the American Chemical Society, 1994. 116(15): p. 6739-6744.
- [19] Gangopadhyay, R. and A. De, Conducting polymer nanocomposites: a brief overview. Chemistry of Materials(USA), 2000. 12(7): p. 2064.
- [20] Liu, L., Z. Qi, and X. Zhu, Studies on nylon 6/clay nanocomposites by melt-intercalation process. Journal of Applied Polymer Science, 1999. 71: p. 1133-1138.
- [21] Gilman, J.W., Flammability and thermal stability studies of polymer layered-silicate (clay) nanocomposites. Applied Clay Science, 1999. 15(1-2): p. 31-49.

[22] Becker, H.E., U.S. Patent 2 800 616. 1957.

- [23] Oberlin, A., M. Endo, and T. Koyama, Filamentous growth of carbon through benzene decomposition. Journal of Crystal Growth, 1976. 32(3): p. 335– 349.
- [24] Peng, C., et al., Carbon nanotube and conducting polymer composites for supercapacitors. Progress in Natural Science, 2008. 18(7): p. 777-788.
- [25] Rao, C.N.R., A. Müller, and A.K. Cheetham, Nanomaterials chemistry: Recent developments and new directions. 2007: John Wiley and Sons Ltd.
- [26] Jin, X., et al., Nanoscale microelectrochemical cells on carbon nanotubes. Small, 2007. 3(9): p. 1513-1517.
- [27] Encyclopædia Britannica. 1926: New York. p. 216.
- [28] Rightmire, R.A., U.S. Patent 3 288 641. 1966.
- [29] Boos, D.L., U.S. Patent 3 536 963. 1970
- [30] Pandolfo, A.G. and A.F. Hollenkamp, Carbon properties and their role in supercapacitors. Journal of Power Sources, 2006. 157(1): p. 11-27.
- [31] Yoshida, A., et al., An electric double-layer capacitor with high capacitance and low resistance. Components, Hybrids, and Manufacturing Technology, IEEE Transactions on, 1992. 15(1): p. 133-138.
- [32] Namisnyk, A.M., A survey of electrochemical supercapacitor technology. 2003, University of Technology, Sydney.
- [33] Bullard, G.L., et al., Operating principles of the ultracapacitor. Magnetics, IEEE Transactions on, 1989. 25(1): p. 102-106.
- [34] Dowgiallo, E.J. and J.E. Hardin, Perspective on ultracapacitors for electric vehicles. Aerospace and Electronic Systems Magazine, IEEE, 1995. 10(8): p. 26-31
- [35] Key, T.S., *et al.*, Comparison of standards and power supply design options forlimiting harmonic distortion in power systems. IEEE Transactions on Industry Applications, 1993. 29(4): p. 688-695.
- [36] Gregorian, R., U.S. Patent 4 210 872. 1980.
- [37] Nishino, A., Capacitors: operating principles, current market and technical trends. Journal of Power Sources, 1996. 60(2): p. 137-147.
- [38] Trasatti, S. and P. Kurzweil, Electrochemical supercapacitors as versatile energy stores. Platinum Metals Review, 1994. 38(2): p. 46-56.
- [39] Sparnaay, M.J., The electrical double layer. 1st ed. Vol. 4. 1972: Pergamon Press.
- [40] Torrie, G.M. and J.P. Valleau, Electrical double layers. 4. Limitations of the Gouy-Chapman theory. The Journal of Physical Chemistry, 1982. 86(16): p. 3251-3257.
- [41] Matsumoto, M., Electrocapillarity and double layer structure. Electrical phenomena at interfaces: fundamentals, measurements, and applications, 1998. 76: p. 87-99.
- [42] Wieckowski, A., Interfacial electrochemistry: theory, experiment and applications. 1999: Dekker.
- [43] Oldham, K.B., A Gouy–Chapman–Stern model of the double layer at a (metal)/(ionic liquid) interface. Journal of Electroanalytical Chemistry, 2008. 613(2): p. 131-138.
- [44] Grahame, D.C., The electrical double layer and the theory of electrocapillarity. Chemical Reviews, 1947. 41(3): p. 441-501.
- [45] Bockris, J., M. Devanathan, and K. Muller, On the structure of charged interfaces. Proceedings of the Royal Society of London. Series A, Mathematical and Physical Sciences (1934-1990), 1963. 274(1356): p. 55-79.
- [46] Raymundo-Piñero, E. and F. Béguin, Application of nanotextured carbons for supercapacitors and hydrogen storage. Activated Carbon Surfaces in Environmental Remediation, 2006. 1000(10): p. 100.
- [47] Ng, K.C., et al., Nano-sized Mn2O3 prepared by a novel solvolysis route as an electrochemical capacitor electrode material. Journal of Institution of Engineers, Malaysia, 2008. 69(3): p. 31-36.
- [48] Conway, B.E., V. Birss, and J. Wojtowicz, The role and utilization of pseudocapacitance for energy storage by supercapacitors. Journal of Power Sources, 1997. 66: p. 1 - 14.



2- Day Course on: Sustainable Concrete Construction and Protection

Course Presenter: Professor Steve Garrity BSc(Hons),MSc,CEng,MICE,FIStructE,MCIHT,FIMS



- Chartered Civil,Structural and Highways Engineer
 More than 35 years' experience in planning, design,
- supervision of construction and repair or strengthening.
- Professor of Architectural Engineering, School of
- Civil Engineering, University of Leeds,UK Recipent of various awards including the Institution of Highways and Transportation Babtie Premium Awards (1992), Institution of Structural Engineers Cass Hayward Prize (1993), Sir Arnold Waters Medal (1995) and Lewis Kennt Award (2004) and etc.
- Currently chair of UK Joint Board Moderators (JBM) and Past President of the International Masonry Society.

Benefits of Course

This two-day course focuses on gaining an understanding of the potential problems facing concrete construction and how these can be reduced or avoided at an early stage in the design process as well as during construction. Due considerationis also given to the various additional protective measures that are now available to contractors and designers.

Course Outline

- Session 1: Setting the Scene
- Session 2: Brief Review of Concrete
- Session 3: Construction Process
- Session 4: Cracking
- Session 5: Deterioration Overview
- Session 6: Lessons from the past
- Session 7: Additional Protective Measures I
- Session 8: Additional Protective Measures II

Date Venue						
17-18 August 2016 ARMADA HOTEL, PJ		RM2120 (Individual)				
Closing Date: 10 AUGUST 2016		RM1908 (Group)				
* Discould a state of a first of a first of a first of a COTT Day 2000 (toth the b)						

* Prices shown above inclusive of 6% GST. Price before GST is Rm 2000 (Individual) Rm1800 (Group).

BEM Approved CPD Hours (Application in progress) 20 CIDB approved CCD Points (Ref No.: CIDBSL/C/2016/0268)

EARLY BIRD DISCOUNT RM100

Pay Before: 17th July 2016

Other Upcoming Course

Course Title: Engineering Infrastructure Asset Management Speaker: Professor Stephen Garrity Venue: Armada Hotel, Petaling Jaya Date: 16th August 2016

Course Title: Cooling Towers – Principles, Operation, Selection, Piping, Pumps, Fans & Maintenance Speaker: Dr. Ling Foon Fatt Venue: Armada Hotel, Petaling Jaya Date: 25th August 2016

2- Day Course on: Essential Project Management

Course Presenter: Ir. Lee Boon Chong B.Sc. (Hons), M.Sc., DIC, CCPM, PMP, FIEM, MIET, MMIM, Hon Member AFEO P Eng., C Eng., Int. PE, ACPE, APEC Eng., ASEAN Eng



- Vice President and Council Member of IEM
- Deputy Chair and Panel Member of the Engineering Accreditation Council (EAC), Malaysia.
- More than 30 years of experience in the industry as a Professional / Chartered Engineer as well as a project management practitioner
- Certified Project Management Professional PMP[®] of PMI, USA.
- Member of Industry Advisory Panel (IAP) for Institutions of Higher Learnings.
- Past Chairman and Advisor of the Project Management Technical Division of the Institution of Engineers, Malaysia (IEM)

Benefits of Course

This two-day intensive course is designed to provide participants with a fundamental but solid grounding on project management. The course contents are closely aligned with "A Guide to the Project Management Body of Knowledge (PMBOK® Guide), fifth edition published by the Project Management Institute, Inc. (PMI) of USA, covering the globally recognized standard and guide for the project management profession. Participants will learn the concepts, principles, norms, methods, processes, tools and techniques as well as the structured and integrated approaches to managing single projects. The course is both practical and interactive and provides useful forms, worksheets and templates, supplemented with practical exercises, real-life case studies, working examples and hands-on applications.

Course Outline

- Session 1: Introduction & Fundamental Concept/ Framework
- Session 2: Project Business Link, Project Initiation and Mandate
- Session 3: Project Planning and Preparation, Project Scope Planning, Project Time Planning
- Session 4: Project Cost Planning & Other Essential Project Planning
- Session 5: Project Risk Planning, Other Essential Project Planning & Integrated Project Management Plan
- Session 6: Project Execution and Action
- Session 7: Project Monitoring and Control
- Session 8: Project Closing and Termination

Date					
22-23 August 2016	RM2120 (Individual)				
Closing Date: 15 August 2016		RM1908 (Group)			
* Prices shown above inclusive of 6% GST Price before GST is 8m 2000 (Individual)					

* Prices shown above inclusive of 6% GST. Price before GST is Rm 2000 (Individual) Rm1800 (Group).

EARLY BIRD DISCOUNT RM100

15 BEM Approved CPD Hours (Ref No.: IEM16/PP/046/C) KM 100 20 CIDB Approved CCD Points (Ref No.: CIDBSL/C/2016/0269) Pay Before: 22nd July 2016

Please Contact Applied Technology Group Sdn. Bhd.: Phone: 012-3174863/03-5634 7905 Email: admin@apptechgroups.net Fax: 03-5637 9945

REGISTER NOW, limited seats available!

Please visit our website at **www.apptechgroups.net** for detailed course brochure.

Cross Border Trade in Services (CBTS) and International Engineering Alliance (IEA) Accords/Agreements: Opinion of a Retired Practitioner



Ir. Rocky H.T. Wong

Ir. Rocky H.T. Wong, araduated from the University of Malaya in 1965 as an Electrical Engineer. He is retired but continues to be an active volunteer. serving the engineering fraternity and mentoring younger engineerina services professionals. Amona his contributions to the globalised and liberalised Science, Engineering & Technology (SET) community, he serves as the Chair (on Malaysia's behalf) for the ACPECC-SGM with a view to expedite the mobility of ACPEs, and to up-grade the 1-G ASEAN MRA (currently) catering to Engineering Services, to also include Integrated Engineering Services that will involve the mobility of all arades of FSPs

n sum, Cross Border Trade in Services (CBTS) relating to engineering and construction services and IEA Accords/Agreements (International Engineering Services Standards or ESS) is the key for GATS to develop a universal WTO (sample) MRA on ESPs' mobility.

IEA (Qualification) Accords & (Mobility) Agreements are stakeholder-developed international ESS suitable for WTO (via GATS) to facilitate CBT in engineering and construction services delivered by Engineering Services Professionals (ESPs).

SYNOPSIS

Washington Accord (WA) came into being in 1989 for a reason - to facilitate cross border trade in services (CBTS), in particular cross border trade in engineering (including technology) and construction services. "Trade in Services" was introduced for the first time in 1986, under the ambit of GATT (the forerunner to WTO) which hitherto, since 1947, dealt only with trade of goods. In time, WA was complemented by the development of two other accords; viz. the Sydney Accord (SA) and the Dublin Accord (DA) effectively completing the entry qualifications for the Engineering Team of Engineering Services Professionals (ESPs) and four professional competences/ professionalism based agreements for the purpose of cross-border mobility relating to the respective ESPs of the Engineering Team.

However, cross border mobility of ESPs in a (binding) rules and standards based MRA (after an FTA has earlier been inked), is only effective if it was a G-to-G Arrangement. IEA's three (Qualification) Accords and four (Mobility) Agreements in aggregation forms a family of international "Engineering Services Standards" (ESS) that WTO has good reason to adopt to improve its GATS. Perhaps to develop a (universal) model MRA on the crossborder mobility of ESPs forming the Engineering Team that delivers CPC 8672 (Engineering Services), CPC 8673 (Integrated Engineering Services), and CPC cluster 511 to 518 (Construction & Engineering Services).

It is worth noting that Regional FTAs' down line and subsequent MRAs on Trade in Services, for example ASEAN Framework Agreement on Services (AFAS), are templated after WTO+/ GATS-plus rules. However, GATS lacks a set of international (stakeholders developed/ accepted) ESS, unlike WTO's TBT Agreement which has adopted the IEC Standards for the Cross Border Trade in E&E equipment/ goods. It is time IEA engages WTO and other Regional FTA's such as TPPA and others to adopt IEA ESS.

For seamless CBTS, there shall be inclusiveness between nations (or economies).

Trade is better than aid. Therefore all nations shall have the opportunity to export goods, services, professionals and skilled workers. Enhanced trade is generally the result of increased FDIs. Both CBTS and FDI depend upon domestic available resources and human resources capital is the key. If a jurisdiction can have its ESPs benchmarked to IEA ESS, what a difference it will make. There is a case for IEA to encourage the "Inclusiveness" and "Prosper Thy Neighbour" approaches, by initiating outreach capacity building efforts among least-developed and developing countries. A nation's prosperity and economic affluence (sustained by trade) ensures the community's well-being and peace for all.

IEA ESS facilitates global CBTS relating to Engineering & Construction Services:

- 1. In 1986, the United States launched the initiative to introduce "Trade-in-Services" as a new agenda for the GATT's Uruguay Round (which followed the Tokyo Round of the 1970s, the Kennedy Round of the 1960s, and the earlier formative rounds).
- 2. The past rounds since GATT's 1947 formation, dealt only with Trade in Goods. After all, GATT, the forerunner to WTO, which was eventually formed 1 January 1995, stands for "General Agreement in Trade and Tariff".
- "Trade in Services", as primed by President Reagan and lobbied by American Bankers and Financial Institutions (read accountants), were then considered by many nations, including Malaysia, as "invisible trade" gauged by annual Balance of Payments (BOPs); a nation had either a positive or negative BOP.
- 4. "Trade in Services" to accountants, are in the areas of banking, insurance, project financing (loans), credit card transactions etc. very often referred to as financial products or financial instruments or asset-management that's the innovative accountants for you. They also introduced profitable `financial engineering'.
- 5. Hang on. Is that fish or fowl?
- 6. Engineers soon realised that accountants (bankers and financial institutions) can have their financial-products only when there are real projects to leverage on, to creating numerous instruments that facilitate "trade in financial services".
- 7. It all begins with "engineering and construction services" on which ride the financial services priming cross border trade. It is not only in engineering and construction services. Indeed trade in so many other science, engineering and technology (SET) services as in energy distribution (for example, the ASEAN Grid?), IPP power plants, communication & ICT, environmental services, etc.
- 8. It is no surprise that the first attempt, three years after the 1986 launch of GATT's Uruguay Round, was to establish an Outcomes Based Education (OBE) Quality Framework for benchmarking the (lead) engineering services provider/professional (ESP) the 'Engineer' crossing border into different jurisdictions was the WA. This inaugural accord (the WA) entered among Engineering Professional Bodies, forms the basis for a structured assessment of OBE delivered engineering programmes for substantial equivalence "entry qualification" of recognised (graduate) engineers into the engineering profession.
- 9. For professional engineers (following formation and development from graduate status) to be gauged for their competence, skills and ethics/ professionalism for cross border mobility, initial Quality Framework (i.e. the WA) was later supplemented with some form of MRAs which made their appearances as the International Engineer Mobility Forum (now IPEA), and the APEC Engineer Agreement (following the economies-based establishment of the Asia Pacific Economic Cooperation). To date, the IEA has developed two other mobility agreements, viz. the International Engineering Technologist Agreement (IETA), and the Agreement for International Engineering Technologist Agreement (AIET).
- 10. By the way, APEC Engineer's skills, experience and professionalism template forms the basis for mutual recognisition arrangement criteria of the ASEAN Chartered Profession Engineer (ACPE) under First Generation (1-G) ASEAN MRA on engineering services (specifically CPC 8672) that came into effect 2005 and now operationalised.
- 11. An Engineering Team delivers engineering and construction services.
- Engineering Team consists of various grades of engineering services professionals (ESPs) made-up of the following: (1) Professional Engineers, (2) Engineering Technologists, (3) Technicians, and (4) related engineering trade professionals.



Formerly Neusynthetics Sdn. Bhd.

We are a supplier of high quality geosynthetic products used for soft soil stabilization, slope reinforcement, coastal erosion protection, river bank protection, landfills, drainage, road and railway construction.

Our Products:

- NEXTILE NON-WOVENS
- NEXFORCE HIGH-STRENGTH WOVENS
- NEXGRID GEOGRIDS

We also provide design, specification, bill of quantities, cost estimate and drawings free-of-charge.













Get in touch with us:

Tel: 03-6142 6638 (Ext. 215) Fax: 03-6142 6693

sales@neusynthetics.com

Sales Team: Izwan (012-568 5611) Gordon (012-355 0872)

> NEHEMIAH GEOSYNTHETICS SDN. BHD. No. 45-3 Jalan PJIL 5/20

No. 45-3, Jalah PJO 5/20, The Strand, Kota Damansara, 47810 Petaling Jaya, Selangor Darul Ehsan. Malaysia.



Protection Technologies

Injection Systems

Whether for restoring structural integrity or for sealing cracks and surfaces against the ingress of water, MC-Bauchemie - the leading supplier and expert in this area offers proven Injection Systems to suit your project requirements.

- Waterproofing of Structures
- Strengthening of Structures
- Sealing against Water Ingress
- Foundation Stabilisation

GERMANY MC-Bauchemie Müller GmbH & Co. KG www.mc-bauchemie.de

MALAYSIA

MC Bauchemie (Malaysia) Sdn Bhd Lol S113, 2nd Floor, Centrepoint, No. 3 Lebuh Bandar Utama, Bandar Utama, 47800 Petaling Jaya, Selangor, Malaysia. Phone: +603 7728 1633 Fax: +603 7728 6833 Fax: +603 7728 6833 Email: enquiry@mc-bauchemie.com.my www.mc-bauchemie.com.my



They are organised into appropriate coherent teams to provide either:

- a) Engineering Services under WTO CPC 8672, or
- b) Integrated Engineering Services under CPC 8673, either (i) as the PMC on the Demand Side, or (ii) as the EPCC on the Supply Side of the Project Delivery Equation and
- c) Construction & Engineering Services under the CPC cluster of: 511 to 518.
- 13. The IEA now has a complete set of "Standards" Engineering Services Standards (ESS), which when arranged in a mix-and-match mode forms a holistic quality framework for QA/QC based delivery of Engineering and Construction Services provided by ESP's who have their qualification/competence/skill/professionalism benchmarks established by international best practices. IEA ESS is subjected to CQI/OFI being carried out on a regular and incremental basis for the higher bar and for relevance.
- 14. The three IEA (Qualification) Accords and four (Mobility) Agreements are therefore meant to facilitate cross border trade in engineering and construction services; a set of "Engineering Services Standards" (ESS) WTO will find interesting and useful for GATS to develop a global MRA on ESPs' mobility to deliver CBT in Engineering & Construction Services as for CPC 8672, 8673 and the CPC cluster: 511 to 518.
- 15. WTO had recognised (on its onset) the IEC Standards to support their TBT Agreement and to overcome NTB/NTM in the trade of E&E equipment/goods.
- 16. Perhaps it is time IEA engages the WTO & "Free Trade Areas" such AEC, the TPPA Region and other economic blocks to have the IEA "Engineering Services Standards" adopted to underpin their (respective) MRA's in the cross border trade in engineering & construction services.
- 17. In short, the time has come for IEA to outreach to WTO and other Regional Economic Groupings that the IEA "Engineering Services Standards" are on par with ISO/IEC and ITU standards, worthy of global (WTO) recognition.
- 18. With a universal (WTO) recognition and acceptance, then trading nations when framing their G-to-G MRA on CBT in engineering and construction services will then be able to underpin such arrangements with international "Engineering Services Standards" (ESS).
- 19. Cross-border trade in engineering and construction services (and other SET services) will flourish, thanks to IEA "Engineering Services Standards".
- 20. Domestic FDI will be enhanced when foreign investors realise that the professional qualifications of the domestic registered/licensed ESPs in the host country are benchmarked to (WTO recognised) IEA "Engineering Services Standards".
- 21. It's an exciting time! However there are questions: Who is going to belt the cat? Who shall bankroll the expenses involved?

ACRONYMS ACPECC - ASEAN Chartered Professional Engineer Coordinating Committee SGM - Study Group on Mobility **CBT** - Cross Border Trade GATT - General Agreement in Trade & Tariff **MRA - Mutual Recognition** Arrangement WTO - World Trade Organization AEC - ASEAN Economic Community, a common market & borderless production base CPC - Central Product Classification, managed by UN/WTO FDI - Foreign Direct Investment G-to-G - Government to Government

G-to-G - Government to Government GATS - General Agreement on Trade dozen multilateral Agreements that constitute/underpin the creation of the WTO) **NTB** - Non-Technical Barriers (to trade) **NTM** - Non-Technical Measures (against trade) **TBT** -Technical Barriers to Trade (Trade based on International Standards (such as ISO/ IEC Standards)-centric arrangements: to remove barriers to trade)

in Services (one of more than a

Examples: The ASEAN MRA on E&E Equipment, and the APEC MRA on E&E Equipment; both arrangements are based on WTO's TBT Agreement's principles and are IEC Standards centric.

THE CORE OF STABILTY

The SUBGRADE STABILIZATION Solution that meets ALL critical performance functions in ONE geotextile

Build firm foundations on soft subgrades with Mirafi® HPa

Stabilized container yard platform with Mirafi® HPa

Heavy rutting without TenCate Mirafi® HPa

Interasia Lines

Installation of TenCate Mirafi® HPa

B

EXAMPLE TENCATE Mirafi[®] HPa Reinforcement + Confinement + Permeability + Separation Integrated Performance

Ideal for Pavement systems - Load support platforms - Soft Subgrades

TenCate Geosynthetics Asia Sdn. Bhd. (264232-0) 14, Jalan Sementa 27/91, Seksyen 27, 40400 Shah Alam, Selangor Darul Ehsan, Malaysia. Tel: +60 3 5192 8568 Fax: +60 3 5192 8575 Email: info.asia@tencate.com www.tencategeosynthetics.com

TENCATE materials that make a difference

Making the Auditor-General's Report More Accessible, Integrated and Usable



Mr. Aw Kong Koy

Mr. Aw Kong Koy, graduated with 1st Class Honours in mechanical engineering from Universiti Malaya in 1973. He was a former council member

of IEM and the Founder Chairman of the IT Special Interest Group. He has been a full time programmer since 1988, with an interest in applying ICT to address societal problems. his article describes the motivation, challenges and implementations in the development of the project "AG's Report Information Graph" (Information Graph) to make the Malaysian Auditor-General's report more accessible, integrated and usable. This project can be framed as a problem in managing strategic information, an important component of knowledge management systems.

The objective of the Auditor-General's office is to strengthen the accountability, transparency and integrity of government and public sector entities. It also has to demonstrate ongoing relevance to citizens, Parliament and other stakeholders. Even though the audit reports contain valuable information that is not available elsewhere, the difficulty faced in using the information often results in the information being used on a piecemeal basic, under-utilised or even ignored. This is a shame as so much effort and resources went into auditing the public sector entities and producing the reports. At the same time, many issues and leakages are reported repeatedly.

The government machinery is huge and intricate and, as such, the audit reports have to cover a wide range of activities, performances and issues. It is a challenge just to understand the structure and functions of the government machinery and to develop a strategy to organise the disparate information.

It is difficult to expect people to read the annual AG's reports from start to end as it is just too boring. People need to be able to explore the reports to look at specific issues or subjects. They want the information to be arranged to suit their purposes. The static arrangement provided by documents as in the case of the AG's reports will need to be supplemented by something more dynamic, a system that will allow the information to be rearranged in many ways, even interactively. This is to allow the users to discover trends and relationships. Our solution is to use the concept of the information graph to provide the required flexibility and adaptability.

Graph computing is a relatively new computing concept. Internet giants like Facebook, Google, LinkedIn and Amazon are all big users of graph databases. We are fortunate to have in-house graph computing engine which we started developing in 1995.

THE AG'S REPORT INFORMATION GRAPH IN CONTEXT

The Information Graph is not intended to duplicate the work of the National Audit

The Information Graph in Context



(All figures are approximate).

Department (NAD) but to complement it. Development of the Information Graph requires abstract thinking and appropriate technology as precedents are hard to find. The development will be interactive and opportunistic, focusing on the value added rather than the predefined system requirements.

DIAGRAMMATIC REPRESENTATION OF OBJECTIVE

A simplified diagrammatic representation of the objective of the Information Graph is shown in the figure below.



Diagrammatic representation of the objective of the Information Graph

CONTENT MODEL



Content Model of the Information Graph

The content model for the Information Graph provides an overview of the information to be included in the Information Graph. This information will need to be acquired from various sources.

The annual Auditor-General's reports will need to be updated when new reports are released. They have to be decomposed and preprocessed before incorporation. The audit objects or entities are the public entities that the Auditor-General has the mandate to audit under the Federal Constitution and the Audit Act. They form the critical background information of the government machinery. Government contractors, suppliers and concessionaires do not come under this mandate, but they are included for completeness.

The reference information such as the Acts of Parliament, the 5-year plans, government programmes and annual budgets are important as the government machinery are required to comply with these acts and policies and to implement or enforce them as appropriate.

To provide another level of integration, a common thread that runs across all the audit information is required. We have identified two such threads: Audit areas and audit issues.

AUDIT AREAS AND AUDIT ISSUES

The audit area is a list of related business sectors or activities. Each audit may be related to one or more audit areas. By associating the audits to the audit areas, we can group these audits for comparison and analysis.

A wide range of issues is raised by the auditors in their reports. This provides another opportunity to bind the audit information together. You can see how these two lists are used to good effect in the usage scenarios that are described later.



Audit Areas and Audit Issues

Ideally, these two lists should be provided by the NAD, but as there are no published lists available, we have to construct them from information in the annual reports. The lists should be considered work-in-progress, and they will be revised and fine-tuned as more reports are processed. Ambiguity in the terminology used must also be removed, while conforming to the industry usage.

Manually matching the text of audit information against these two lists is very laborious and error prone. Researchers may have the motivation to do this, but we cannot expect this from content management staff. It is difficult



for humans to remember the two long lists and the definitions of the items to perform the match consistently. This is where a computer-aided facility can be helpful.

Technically, the items in the two lists are "named entities." For our purposes, we wrote a simplified named entity recognition utility using "match phrases with wildcards." It is a semi-automated process where the final decision has to be made by a person after viewing the match phrases in context. This utility needs to be trained for it to perform effectively.

STATUS OF THE INFORMATION GRAPH

A beta version of the Information Graph has been online since 1 November 2015 at *http://myagr.mcthosting.net*. Work started on the project in October 2013, and it took us some time to understand the requirements and how to organise the information meaningfully. At the time of writing this article, the Information Graph includes the annual reports of 2011, 2012, 2013 and 2014, and we are now processing the first series of the report of 2015.

USAGE SCENARIOS

To demonstrate the flexibility and usefulness of the Information Graph, we have written several articles in our blog at https://myagrblog.wordpress. com. The articles that addressed the following usage scenarios should be of particular interest:

- a) Who is audited?
- b) Government procurement
- c) Cross tabulation of audit information
- d) Government linked companies.

WHO IS AUDITED?

This is a simple legitimate question that is difficult to answer without the Information Graph. If you are looking for a single entity, you can try searching the AG's office website. However, for management and analytic purposes, we need to look at the audited entities more broadly and from different perspectives such as:

- a) National level
- b) Federal level
- c) State level
- d) Departmental level and
- e) Organisational level.

We may also want to know how many audits have been undertaken with any of the public sector entities and to be able to access directly the audit reports and summaries. The full article shows how this task becomes almost trivial with the Information Graph.

GOVERNMENT PROCUREMENT

This scenario uses procurement as one of the many cross-cutting issues in the government machinery to demonstrate how users can investigate it in the Information Graph.

We have identified 14 sub-issues in procurement, namely:

This article focused on one of the more prevalent procurement issue,

- a) Approvals
- b) Bonds, Guarantees and Insurance.
- c) Consultant selection
- d) Contractor selection
- e) Cost overrun
- f) Late delivery
- g) Miscellaneous (other issues)

- h) Documentation
- i) Purchasing
- i) Scheduling
- k) Short or non-supply
- I) Specifications
- m) Value for money
- n) Wastage in procurement

i.e. specifications, and demonstrated how the user can drill down the Information Graph and use the interactive list processing facility to reorganise the information as part of the investigation. The same technique can be used on the other sub-issues or any other issue in the list of Audit issues.

CROSS TABULATION

For management purposes, we need to be able to have an overview of this intricate network of information. One way to do this is to cross tabulate the audit issues with the other facets available. This novel approach may help us unravel the issues encountered by the government machinery.

The article demonstrates how the various main audit issues can be cross tabulated against the audit areas and other audit entities' lists.

GOVERNMENT-LINKED COMPANIES

Government linked companies (GLCs) are grouped under "Federal Government-Linked Companies" and "State Government Subsidiaries." In this usage scenario, we are demonstrating how we can explore and compare the attributes of the lists of GLCs as an example of any other list of public sector entities.

In the Information Graph, the users can view the two lists of GLCs – the list grouped to the Federal Ministries or States and the Related Audits. The related audits can be cross tabulated against the audit issues headings and the GLCs for the users to have an overview of the state of the GLCs.

DISCUSSIONS

We have demonstrated through this project that the annual AG's report, which is often used on a piece meal basis or ignored and underutilized, can be turned into a dynamic and valuable resource that can serve many purposes. This includes the needs of the audited public entities, the auditors, citizens, parliament, various stakeholders, management and others involved in public administration. Making the audit information more accessible, integrated and usable, will open up many other possibilities that are left to the imagination of the users.

The literature on the civil service is often based on conventional wisdom and conjecture rather than on evidence. This is not surprising as it is difficult to obtain data about the civil service. With the Information Graph, we are now able to pre-process the audit information into data. The information from the audit reports is not infallible but it is important information collected by many different people. We need the auditors to record their observations and findings judiciously. With more people scrutinising the audit reports, hopefully there will be motivation to improve the quality of the reports.

The civil service and other public sectors' entities are working within an environment that is getting more complex and challenging. With the current economic crisis,

The Institution of Structural Engineers

YOUNG STRUCTURAL ENGINEERING PROFESSIONAL AWARD

The IStructE Malaysia Regional Group Young Structural Engineering Professional Award 2016 is now open for entries to Engineers residing in Malaysia.

We want to promote the accomplishments of YOU, the young structural engineers – showcasing the diverse and skilled individuals who are driving the profession forward. Winning the award is a unique opportunity to be marked out as "one to watch" among the Institution's global membership, and an internationally recognised mark of achievement in structural engineering.

Structural engineering is an exciting career and that is why winners of this award have the opportunity to act as an ambassador for the Institution and the profession – showcasing the crucial role engineers play in shaping the built environment and providing identifiable role models for young people interested in engineering.

The scheme is open to Engineers Registered with the Board of Engineers aged 30 years or under. To enter the competition, complete your submission and send to: The Honorary Secretary, IStructE Malaysia Regional Group at "istructe.md@gmail.com" by midnight Monday 31 October 2016.

THE SUBMISSION MUST INCLUDE:

- 250 word opinion piece on what structural engineering means to you.
- Poster presentation. You may submit up to four posters in pdf format (A1 size) about three projects that you have been involved in. The posters should show the technical aspects of the design, and also shout about your own input into the project. It is up to you to decide how you split up the posters – focus more heavily on one project or equally across the three.
- Video recorded presentation (max. 5 minutes). At the end of your presentation, please answer the question "what does structural engineering mean to you?" (This is based on your opinion piece and should last no more than 20 seconds).
- CV

Endorsement from your employer (max. 300 words).

Entries will be reviewed by the judging panel against the following criteria: I. Creativity and originality

- II. Personal involvement on one specific project
- III. Knowledge of structural engineering and the profession
- IV. Quality of written and verbal communication
- V. Clarity of presentation



Precast Concrete System for Building









EASTERN PRETECH (MALAYSIA) SDN. BHD. 28, Jalan 7/108C, Taman Sungai Besi, 57100 Kuala Lumpur. Tel: +603-7980 2728 Fax: +603-7980 5662 www.epmsb.com.my the civil service will have to do more with less. There are issues in education, health, urban and rural infrastructure, human-resource management, foreign labour, poverty eradication, transportation, communications, water, energy, food and so on, that need to be addressed. All these issues are, in some way, interconnected and we need an integrated approach, starting with the way we manage information.

The usage scenario provided is representative of what is possible with the audit information available to identify areas of concern but they are unlikely to be sufficient to address the problems. For example, the specifications issue in procurement can have many dimensions. The specifications issues in different types of projects across the diverse spectrum, have very different characteristics. This can take several forms and it will require professionals in the various fields to analyse the sub-issues in detail and to formulate corrective actions. Some of the problems may be systemic and may only be effectively tackled at departmental or even national level. The list of audits related to the specifications issue shown in one of the usage scenarios will serve as a good starting point for further action.

The Information Graph is still in beta stage. We need to backtrack a few years and to incorporate the latest annual AG's reports as these are released, to make it more comprehensive and relevant. There is also a need to provide more processing and viewing facilities to support the diverse needs of the users. ■

Quick facts

- 1. Government department and agencies: 1,400
- 2. Government-linked companies: 1,700
- 3. Each year, less than 300 of these entities are audited
- 4. Annual reports published in three series since 2013 with more than 100 audit report documents per year
- 5. Civil service: 1.4 million staffs
- 6. National Audit Department: 2,000 staff

IEM DIARY OF EVENTS

Title: Talk on "Renewable Energy in the Context of Sustainable Development"

19 July 2016

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.

ERRATA

Error on FORUM – Reprise of 55th Rankine Lecture on "Hazard, Risk & Reliability in Geotechnical Practice" published in JURUTERA June 2016 issue on Page 38. We wish to attach the corrected author's information:

Ir. Dr Gue Chang Shin is currently a Committee Member of IEM Geotechnical Engineering Technical Division (GETD). He was formally with the Norwegian Geotechnical Institute (NGI) in Norway and is currently attached with NGI-G&P in Malaysia.

The error is much regretted.



DESIGN · PRECAST · BUILD Providing Precast Solutions to Bridge & Wall Engineering

Concrete Arch

Rivo Builders (M) Sdn Bhd (1018070-A)

Concrete Arch

Lot 5127, Batu 6, Jalan Kenangan Off Jalan Meru, 41050, Klang, Selangor Darul Ehsan. Tel: 603-3392 8113 Fax: 603-3392 9113 Email: rivobuilders@gmail.com Website: www.rivo.com.my

Concrete Retaining Wall

Concrete Sheetpile

FORUM

The Overview of IEC 62305 Standards

ELECTRICAL ENGINEERING TECHNICAL DIVISION



reported by Dr Siow Chun Lim

Dr Siow Chun Lim B. Eng (Electrical & Electronic) and Ph.D. (Univ. Putra Malaysia), is a lecturer at the School of Engineering, Taylor's University, and Associate Editor of Journal Of Engineering Science & Technology. EM's Electrical Engineering Technical Division organised a half-day seminar on the overview of IEC 62305 standards on lightning protection on 29 January 2016 at Wisma IEM, Selangor. The IEC 62305 is a global standard on lightning protection that's recognised and adopted by many countries, including Malaysia.

The talk was delivered by Mr. Ray Khan from Lightning Protection International Pty Ltd Australia, who has had 15 years of experience in the electrical industry and was a trainer on lightning protection for several years. Malaysia is prone to lightning, so understanding the fundamentals of lightning protection, as governed by the international lightning protection standard IEC 62305, is of utmost importance for the protection of lives, properties and equipment.

Lightning is an atmospheric electric discharge which may occur within the same cloud, between a cloud and another object or between a cloud and the ground. The of interest here cloud is typically cumulonimbus and among the three types of lightning, cloud-to-ground lightning is of greatest concern. Although the highest peak cloud-to-ground lightning current of magnitude of 200kA was mentioned in the IEC 62305 standard, it is more common to experience an average peak current in the range of 5kA.

There are four main parts of the IEC 62305 standard, namely:

- Part 1 : General principles
- Part 2 : Risk management
- Part 3 : Physical damage to structures and life hazard
- Part 4 : Electrical and electronic systems within structures

Understanding the basic principles underlying the physics of lightning formation is paramount as it will allow designers of lightning protection systems to better grasp the gist of the remaining parts of the standard. It is commonly accepted and understood that the formation of lightning materialises in 4 main stages:



Presentation by Mr. Ray Khan

- Stage 1: Formation of stepped leader or a flow of negative charge from the cloud towards the ground
- Stage 2: Emission of upward streamers by structures on the ground
- Stage 3: Successful meeting of the stepped leader and the upward streamers
- Stage 4: Formation of a complete path for lightning current to flow

By understanding the aforementioned stages, we can then understand why tall structures are highly susceptible to lightning strikes along with the associated hazards, hence warranting a higher level of lightning protection. It is also typical for multiple strokes to take place within a single lightning flash although this is not detectible by the naked eye.

Part 2 of the IEC 62305 is all about understanding the sources, damages and losses attributed to lightning strikes. Such information is needed for risk assessment to be performed prior to the design of lightning protection systems. Loss of human life takes precedence over other types of losses associated with damage by lightning and this principle should be embodied by all designers of lightning protection systems.

Guidance on the design of lightning protection systems is encapsulated in part 3 of the IEC 52305 standard. The 3 main components of a complete lightning protection system include the air termination system, down conductors and earth termination system. Positioning of the

FORUM

air termination system, as per recommendation in IEC 62305, can be done via one of the following methods:

- 1. Rolling sphere method
- 2. Protective angle method
- 3. Mesh method

However, it must be acknowledged that no method offers 100% accurate prediction of where the lightning will strike on the plane of the vicinity to be protected. In line with this, as well as possible practical installation challenges, there are bound to be areas which may not be sufficiently protected. Therefore, the installation of Lightning Warning System can be seriously considered to alert the public of approaching thunderstorms. As for the installation of down conductors, the bonding practices have to be given great care to ensure, as far as possible, that the lightning current is successfully grounded by the intended path from the air termination system right down to the earth termination system.

Finally, for an effective earth termination system, it is also strictly recommended by the standard that all earthing systems be bonded for equipotentialisation purposes. Proper coordination of Surge Protective Device (SPD) as well as the possible utilisation of spark gaps must be considered.

In Part 4 of the standard, the understanding of Lightning Electromagnetic Impulse (LEMP) for the protection of electrical and electronic systems is inculcated. Classification of Lightning Protection Zones done coordination is and of SPDs then ensues. Lifespan of the SPDs must be monitored to ensure integrity of the protection system.

In conclusion, the IEC 62305 is an international lightning protection standard adopted and adapted by many countries. However, it is advisable that practitioners and responsible local authorities constantly enhance the rigour of the standards to safeguard human lives, property and equipment.

IEM DIARY OF EVENTS

Title: Seminar on Protection, Switching and Metering

21 July 2016

Organised by Time CPD/PDP : Building Services Technical Division : 9.00 a.m. - 5.30 p.m. : 6.5

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.

CONGRATULATIONS

IEM would like to congratulate **Ir. Prof. Dr Ruslan Bin Hassan**, IEM Vice President on the conferment of **"Darjah Kebesaran JOHAN SETIA MAHKOTA (J.S.M.)"** from the Yang DiPertuan Agong on 4 June 2016. EMASKIARA EMASKIARA The Preferred Integrated Geotechnical Engineering Solutions Partner

New Low Cost Carrier Terminal (LCCT), Sepang, Selangor. Refinery and Petrochemicals Integrated Development (RAPID), Pengerang, Johor Data Logger in the cabin of PVD installation rig.

Partners to the Best with Emas Kiara

Having established its reputation as an integrated provider of a complete range of geosynthetic products and geotechnical solutions, Emas Kiara had been entrusted to undertake the supply and installation of Prefabricated Vertical Drains (PVD) for fast paced, challenging and mega quantity projects. Together with our valued clients we have won accolades for best in safety, productivity and most importantly, completion time.

We also possess a comprehensive fleet of equipment, which include Hydraulic Rigs capable of penetrating depths up to 50m, mounted on Excavators and Crawler Cranes and Static Rigs which are all customized to suit various ground conditions.

Coupled with state of the art data loggers, capable of providing real-time data for recording and monitoring installations, we remain at the forefront of PVD technology.



www.emaskiara.com



...WITH MAXIMUM DESIGN FLEXIBILITY STEN 5 Z

INNING EDGE

OUR \

steel components and lesign results in cost **Cost Effective**

183

Pre-engineered for high-quality

Quality

consistency using reliable professional services.

Speed Pre-engineered components result in faster built-up and erection time.

CLEAR-SPAN

TONA 2 ш 2 Ĩŧ 1L

of HITEC METAL PEB Special Features Framing System







- Up to 85 m clear span Extra-high ceiling heights
 - Extreme load
- requirements
- Roof slope of 2° to 45°
 - Capable for crane degrees
 - system
- Capable for piperack & hoistrack

MULTI-SPAN

		BUILDING	SIDEWALL HEIGHT
	Multi-Span		
(TCIMI)	Tapered Column Modular One Interior Column	18m - 100m	3.5m - 12m and over
(TCM2)	Tapered Column Modular Two Interior Column	28m - 120m	3.5m - 12m and over
(TCMSS)	Tapered Column Multi - Span Single Slope	20m - 160m	3.5m - 12m and over
	Clear-Span		
(SS)	Straight Column Single Slope	4.5m - 22m	3m - 9m
(1)	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
(rcs)	Tapered Column Clear Span - Two Piece Ratter	12m - 85m	3.5m - 12m and over
(TCS)	Tapered Column Clear Span - Three Piece Rafter	12m - 85m	3.5m - 12m and over

HITEC METAL SDN. BHD. (320497-14)

(TCS)

(\$C\$)

1050

6

No. 17-2, Jalan Tasik Utama 8, Medan Niaga Tasik Damai, 57000 Sungai Besi Kuala Lumpur Office:

- 01	03-9055 3010
Хе	(HUNTING LINE) 03-9055 3101 03-9055 3121
sbsite	www.hitecmetal.com.my

LL.

enquiry@hitecmetal.com.my E-mail

3



SPECIALISE IN

Design & Built Pre-Engineered Building Framing System

- Industrial building
 - Hypermarket
- Storage warehouse
 - Canopy structure
- Factory building Sports hall
- Aircraft hangars Steel platform
- raw material. Optimized d savings in s

Inspire Me Talk by Ir. Prof. Dato' Dr Chuah Hean Teik

ELECTRONIC ENGINEERING TECHNICAL DIVISION



reported by Ir. Dr Lee Choo Yong

Ir. Dr Lee Choo Yong is committee member of Electronic Engineering Technical Division (eETD) 2015/2016. t was a sunny day on 21 April 2016 in Penang. The Electronic Engineering Technical Division (eETD) organised an Inspire Me talk by Prof. Chuah Hean Teik, president of Universiti Tunku Abdul Rahman (UTAR) in Penang Science Cluster @ Heritage (PSC), Wisma Yeap Chor Ee, Georgetown, Penang.

Before the talk, eETD committee members had a fellowship lunch at Hai Nan Town Restaurant, Weld Quay, to get better acquainted since eETD is the only technical division established outside IEM headquarter.

The talk, titled "My career as an Engineer and Educator - A Malaysian Experience" was attended by some 50 participants comprising IEM members from Penang branch, members of PSC and college/secondary school students.

The talk started at 2.10p.m. with eETD chairman Dr Leow Cheah Wei giving his welcome speech. He also introduced eETD, drove home the objective of the Inspire Me talk, motivated students to consider taking up engineering and then to join IEM upon graduation. Subsequently, the CEO of PSC, Mr. Ooi Peng Ee introduced PSC and invited engineers to become mentors for its various activities.

Inspire Me Talk is a series of talks in which prominent technical leaders in the electronics and electrical industry are invited to share their experiences and to inspire students to pursue engineering study and young engineers to develop a career in engineering. Previous Inspire Me speakers were:

- Dato' Simon Wong, former vice president of Dell Asia Pacific Sdn. Bhd.
- Dr Hari Narayanan, managing director of Motorola Solutions Sdn. Bhd.
- Mr. Chu Jenn Weng, CEO of ViTrox Group
- Mr. Kit Yong, R&D director of National Instrument

Prof. Chuah reminisced his humble journey in engineering education, starting attending Hu Yew Seah with Primary School and Chung Ling High School (钟灵中学) in Penang. He then continued his undergraduate and postgraduate studies in Universiti Malaya, Kuala Lumpur. Inspired by his physics teacher in secondary school, he developed a deep interest in physics as well as teaching. With these two interests, he said, becoming a lecturer in engineering was the best combination.



eETD chairman Dr Leow Cheah Wei presenting a souvenir and certificate of appreciation to Prof. Chuah Hean Teik. On the left is PSC CEO Mr. Ooi Peng Ee

As a 100% Malaysian-trained engineer, Prof. Chuah is on par with his overseas-trained peers, for example, the publishing of research findings in international journals and conferences.

To be successful in engineering, he said one has to know the 3 ICs: Integrity & Competence, Integration & Communications and Internationalisation & Cooperation.

But beside work, engineers also face a multitude of other challenges such as inequality of wealth distribution, unavailability of clean water, inequality of food distribution, increasing energy consumption, global warming and climate change. Therefore, engineering education must be the source of human capital, a means to overcome poverty, a catalyst to change and innovation as well as a driver of economic growth.

Engineers, scientists and technologists play an important role in supporting industry and contributing towards economic growth. Prof. Chuah added: "The declining numbers of students in science has reached worrying proportions."

He urged eETD committee members to organise talks in primary and secondary schools to motivate students to opt for the science stream. Otherwise, he said, our nation will be short of science and technology human capital to sustain its development in the future.

Prof. Chuah concluded his talk with the story of a cocoon and a butterfly. The moral of the story was that struggle was part of the growth experience. Together with PSC CEO Mr. Ooi, Dr Leow presented a souvenir and a certificate of appreciation to Prof. Chuah.

Visits to Iron Ore Producer and Royal Malaysian Navy

PROJECT MANAGEMENT TECHNICAL DIVISION



reported by Ms. Prema Sivanathan

Ms. Prema Sivanathan has a B.S. degree in Metallurgical Engineering from Universiti Malaysia Perlis (2012) and Materials Research Aalen University, Germany (2011). She is currently a committee member for PMTD and has about 3 years of working experiences in industries. The Project Management Technical Division (PMTD), IEM organised visits to Vale Malaysia Mineral Sdn. Bhd. and the Royal Malaysian Navy (RMN) on 26 and 27 February, 2016, respectively to understand and learn about project implementation in these two organisations. More than 30 IEM members took part in the events.

We left the Institution of Engineers, Malaysia in Petaling Jaya by bus on 26 February, morning led by PMTD chairman (session 2015/2016) Ir. Dr Ahmad Anuar B. Othman and six other committee members. We arrived at Teluk Rubiah Maritime Terminal at about 3p.m. after Friday prayers. Waiting for us at the entrance of the main gate was Mr. Faidzal Mohamed Ariff, Pre-operation and Quality Specialist at Vale. Before the visit proper, we were given a safety briefing by a Vale safety officer.

SITE VISIT TO VALE

Vale is the world's biggest producer of iron ore and pellets, essential in the manufacturing of steel. Iron ore is found in nature in the form of rocks mixed with other elements.

After going through various industrial processes that incorporate cutting-edge technology, iron ore is processed and sold to steel companies. Iron ore, as a component of final products, can be found in houses, cars and household appliances.

Vale is investing in technological innovations and developing initiatives to prevent and minimise environmental impacts that mining causes. Vale also aims to set the benchmark in the sustainable management and the use of natural resources.

SITE VISIT TO RMN LUMUT

On the second day, we visited a Royal Malaysian Navy warship where we were briefed on engineering as well as project management practices conducted by Royal Malaysian Navy (RMN).

A RMN warship is usually maintained by engineering personnel and involved various



Safety briefing at Vale Malaysia



RMN deep diving demonstration at Diving Centre.



Lt Kdr Ir. Lee J.J (left) is involved in the development of project management syllabus, incorporating PMP knowledge into the training module

disciplines such as weapons, electrical, mechanical and marine engineering. Duties include preventive maintenance and corrective maintenance, involving equipment usage upkeep and operational routines.



B.Zero Tondo tubular steel arch

Engineering a Better Solution

Maccaferri offers innovative and specialist solutions for all stages of the tunnelling process. We provide technical specialist support including design, supply of products, customisation and installation, for roads, railway, dams, metros and mining. We do not merely supply products, but work in partnership with our clients. Maccaferri solutions are proven, versatile and cost effective for all tunnelling applications; tunnel support, soil consolidation and waterproofing.



www.maccaferri.com/asia

Fibreglass bars, soil nails and anchors		Chemical grout	
Steel rock bolts and anchors		Drainage tubes and pipes	

Steel arch tunnel support

Waterproofing solutions



A warship consists of many systems and equipment such CIS'

- propulsion system (main engines, gearboxes, shafting arrangement, propeller)
- power generations (prime movers, alternators switchboard, distributors)
- hotel services system (air conditioning, ventilations, heaters, fresh water system, sewage treatment plant, sanitary system, galley equipment)
- damage control system (firefighting equipment, fire alarms)
- communication system (radios. military communications)
- sensors (navigation radars, surveillance radars, sonar),
- combat systems (guns, missiles, torpedoes, fire control system)

Project (non-operational routine) management:

- defect rectification & maintenance
- emergency repairs
- ship refit (major maintenance in dockyard)

Today, RMN is giving emphasis to good project management practices where young engineers are introduced to project management during the early stages of their career training.

We also visited the diving and mine warfare headquarters where we watched demonstrations of deep diving and salvage and underwater welding, conducted in the centre's deep pool.

IEM DIARY OF EVENTS

Title: PRE AGM TALK i) BEM Guideline on the Role and Responsibility of Professional Engineers for **Temporary Works during Construction ii) MS1462** Metal scaffolding - Mandatory under CIDB Act 520 (Amendment 2011)

23 July 2016

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

Title: 30th Annual General Meeting of the Civil and Structural Engineering Technical Division, IEM

23 July 2016

Organised by	: Civil and Structural Engineerir
	Technical Division
Time	: 11.00 a.m. – 1.00 p.m.
CPD/PDP	: 2

Title: One Day Course on An Introduction to Earthquake Engineering Based on AS/NZS 1170 Part 5: Earthquake Actions - New Zealand

25 July 2016

Organised by	: Graduates & Student - The Young
	Engineers Section
Time	: 9.00 a.m. – 5.30 p.m.
CPD/PDP	: 6.5

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.

The Geotechnical Specialist Since 1986

Solutions To Your Geotechnical Needs / Problems Using:



Electricfied Double Track Project More Than 70 Locations, 9m High, 2m From Railway Track

JACKED ANCHORS (Patent System)

ADVANTAGES:-

- Assured Capacities • Improvement To Soil Properties
- No Collapsed Drilled Holes & Sink-Holes
- Much Shorter Construction Time
- Lower Construction Cost
- No Muddy Working Conditions • Fully Mechanised Process



SGE's Fleet of Stone Column Machinery

STONED COLUMNS (Patent System)

Excellent For Soft Ground Engineering

ADVANTAGES:-

- 100% Dry Operation No Environmental Contamination
- Every Stone Cloumn is Tested During
- Construction to 2 Times Working Capacity Volumetric Proof of Design Diameter
- 100% Displacement Method
- No Problem on Human Error Process is Fully Mechanised Strong Technical Backing By Reputable
- Instituitions For A Local Innovative System

SGE Geotechnic Sdn Bhd



ng

Double Track Project at Gemencheh, Negeri Sembilan

SLOPE STABILISATION

Over the years, SGE has gained wide recognition and has established itself to be the leading, the most active and reputable Specialist Contractor in this particular field of Geotechnical Engineering. SGE builds its strength and reputation, all upon its clients' confidence.

Technical Visit to Pipe Roofing System at Maluri Station

TUNNELLING AND UNDERGROUND SPACE TECHNICAL DIVISION



reported by Ir. Frankie Cheah

Ir. Frankie Cheah, is Committee Member of the Tunnelling and Underground Space Technical Division (TUSTD). He is a geotechnical engineer with AECOM Perunding Sdn Bhd The Tunnelling and Underground Space Technical Division (TUSTD) of IEM organised a visit to the Maluri Station of The Klang Valley MRT (KVMRT) project, in Jalan Cheras, Kuala Lumpur, on 16 January 2016.

The 28 participants, comprising student members, academicians and practitioners, arrived at Maluri at 9.20a.m. and were welcomed by MMC Gamuda staff.

The visit started with a safety briefing and an overview presentation of the project by the section head of the station. Later, Ir. Lim Yean Shong, the section head of underground station for MMC Gamuda briefed members on the construction sequence of pipe jacking works. other trenchless machine to install a series of interlocking steel pipes which form a temporary support system, below which the final section of the structure is then constructed".

In the case under study, the pipe roofing system is located between the retrieval shaft and Entrance A of the Maluri Station. The system was chosen in order to facilitate the excavation works and to maintain the traffic flow along Jalan Cheras.

The support system is 780mm diameter steel hollow pipe supported with temporary strut and waler with the size of 400 x 400 x 140 kg/m and 914 x 419 x 253.4 kg/m respectively. The microtunnelling method was adopted during the installation stage.



Figure 1: Overview of The Proposed Pipe Roofing System at Maluri Station

PIPE ROOFING SYSTEM

According to an article by Ir. Cheng Kim Hua, who gave a talk in 2010, a pipe roofing system "involves the use of microtunnelling/jacking/





Figure 2: Pipe Roofing System Site View and Graphical Illustration

MICROTUNNELLING CORING SEQUENCES

In this project, microtunnelling was executed in the following steps:

Step 1: Holes No. 1 to 4 were cored prior launching of the micro-TBM



Repeat steps 2 and 3 until all 17 holes are completed

MICROTUNNELLING SEQUENCE OF WORKS

After a brief explanation of the microtunnelling coring system, the sequence of works was explained.

- a) Coring of part of the Secant Bored Pile retaining system
- b) Setting of Jacking Frame for the Micro TBM Launching
- c) Micro TBM Launching
- d) Welding of the Steel Pipe in order to join the steel pipe
- e) Micro TBM Retrieval after the complete installing the steel pipe
- Annulus Grouting along the steel pipe f)
- g) Pipe Backfilling

CONSTRUCTION SEQUENCE FOR PIPE ROOFING SYSTEM

The general construction sequence for pipe roofing system was designed using Finite Element (FEM) program, PLAXIS. The proposed construction was modelled in the FEM program.

- a) Pipe drilling and installing horizontally from Entrance A toward Station Box.
- b) Hack portion of the Secant Pipe wall for mined-through excavation.
- c) Carry out first mining excavation work at not more than 2m away.
- d) Install temporary support.
- e) Repeat steps (c) to (d) until the excavation reaches station wall
- Hack off the knock off panel at the station wall for f) entrance construction.
- g) Complete the construction works of permanent structure with the temporary support to be removed when the permanent structure achieves required strength.

MONITORING OF PIPE ROOFING SYSTEM DURING THE CONSTRUCTION

Service ability Limit State (SLS) forces from the FEM analysis will be used to design as Ultimate Limit State (ULS). Meanwhile the predicted deformation, such as settlement and lateral deformation, will be used to monitor the pipe roofing system throughout the construction period.

We were informed that the performances of the system were good and that there were no incidents to slow down the construction progress. A short Q&A session followed before members were ushered to the Maluri Station Adit A to witness the pipe roofing installation works.

Your Geosynthetic Partner[™] G≡OVIRO



We are Rainforest Safesm Company (actively involved in reduction of carbon foot print in our projects)

Our Core Products:

- ✓ PET & PP Geogrids, Fiberglass Geogrids and Biaxial Geogrids
- High Strength Woven Polyester Geotextiles
- Non Woven Geotextiles
- High Capacity Soil and Rock Slope Protection Netting System
- Soldier Umbrella Protection against Landslides and Stabilization System
- Rockfall and Debris Flow Barrier System
- Prefabricated Vertical Drain for Ground Improvement
- Structural Repair for Concrete and Basement/Concrete Water Proofing - Epoxy and Polyurethane
- Flexible Concrete & Asphalt for Pavement Repair Works for Road and Airports





High Strength Woven Geotextile





Prefabricated Horizontal Drainage



Soil & Rock Slope Netting System



Bi-axial Geogrid Composite

Rockfall Barriers

*We also provide : Design and Built Services

Uni-axial PET Geoarids

GEOVIRO (M) SDN. BHD. (No. 1033537-D) 1-01-05, 5th Floor, Block I, Setiawalk, Persiaran Wawasan, Pusat Bandar Puchong, 47160 Puchong, Selangor, Malaysia.

+603 7493 6003

+6013-399 0114

+603 7493 5959

sales@geovirosb.com

Non Woven Geotextile



www.swissma.com

Swissma Sanko Seam Lock® Unique Features:

Purlin spacing up to 6m c/c

Longest length 345,000mm at 2° pitch

ROOF: Swissma Sanko Grip Deck® 3-Pan WALL: Swissma Sanko Speed Deck® MATERIAL: Clean COLORBOND® XRW Steel

ROOF: Swissma Sanko Astana® AS760 WALL: Swissma Sanko Speed Deck® MATERIAL:Clean COLORBOND® ULTRA steel

ROOF: Swissma Sanko Grip Deck® 3-Pan WALL: Swissma Sanko Speed Deck® MATERIAL: Clean COLORBOND® XRW Steel

We customize roofing solutions to meet your acoustic, thermal & other requirements.

27.5

- Swissma Sanko has over 41 years of reputable track records in Malaysia.
 Over 18 profiles available.
- All materials are supplied by BlueScope Steel Malaysia & backed by BlueScope Steel Malaysia warranty.
- Up to 30 years warranty using Zincolume[®] and descent Colorbond[®]

Contact us for obligation free roof and wall cladding solutions & quotations

SWISSMA BUILDING TECHNOLOGIES SDN. BHD. (444319-T) Tel: 603-55191360 Fax: 603-55101362 E-mail: enquiry@swissma.com









Dear members,

"AMAZING ENGINEERING"

Mark your calendar as busy between 14th - 20th August 2016, as it is the official date for Engineering Week 2016! Once again, IEM will be celebrating IEM Engineering Week with various exciting activities lined up for members and public. Apart from creating exciting programs to IEM members, IEM Engineering Week 2016 main objective will be to promote IEM to public and to young generation about engineering profession. All members are encouraged to participate in this event and below are the upcoming activities in conjunction with IEM Engineering Week 2016:

Organiser / Technical Division	Event Title	Date	Time	Venue	Registration Contact/ webpage	IEM Ö	
Sub - Committee on Engineer's Run 2016	IEM Engineer's Run 2016	14 Aug 2016	7.30 am – 10.30 am	University of Malaya	For public https://mro.myraceonline, com/iem16/registrations For members http://www.mylem.org.my /news/newsdetails.aspx?i d=360	Organizing Committee of IEM	
Oil, Gas and Mining Technical Division	One-Day Course on "Introduction to Oil and Gas Industry – An Engineering Design Perspective"	17 Aug 2016	8.30 am – 5.00 pm	TUS and C&S Lecture Rooms, Wisma IEM	norshafiqah®iem.org.my or http://www.mylem.org.my	Committee of IEM Engineering Week 2016 Chairman: Ir. Sreedaran Raman Vice Chairman:	
Electronic Engineering Technical Division (eETD)	Membership Drive (Siltera Sdn Bhd)	17 Aug 2016	9.00 am - 10.00 am	Siltera, Kulim Kedah	iempenangbranch#gmail .com	Secretary: Ms. Wong Kah Yin	
Electronic Engineering Technical Division (eETD)	Technical Visit to Siltera Sdn Bhd	17 Aug 2016	10.00 am - 12.00 pm	Siltera, Kulim Kedah	iempenangbranch@gmail .com	Treasurer: Ms. Jasmine Goh	
Oil, Gas and Mining Technical Division	Two-Day Course on "Critical Thinking for Engineers"	17 – 18 Aug 2016	8.30 am – 5.00 pm	Auditorium , Wisma IEM	norshafiqah@lem.org.my or http://www.mylem.org.my	Ir. Tan Ban Loong Ir. Yong Hong Lee Ir. Yau Chau Fong Mr. Tan Zhi Howe	
Oll, Gas and Mining Technical Division	Technical Visit to Selinsing Gold Mine Manager SdnBhd	20 Aug 2016	7.00 am – 2.00 pm	Kuala Lipis, Pahang	norshafiqah@iem.org.my or http://www.myiem.org.my	Mr. Kok Jing Shun Ms. Lee Hooi Chie Ms. ShazlenaShariff Mr. Kenny Chia Sdr. ThibanRaaj Sdr. CheahKhai Chun Sdr. Sylvia Wong Sdr. Ahmad Ridhwan Sdr. Low Kar King Sdr. Naveen Kumar	
Young Engineers Section and Engineering Education Technical Division	STEM Quiz 2016 (for secondary school students only)	20 Aug 2016	8.30 am	Taylor's University Lakeside Campus	Sdr. Cheah Khai Chun kha1chun95@gmail.com Participation by invitation to Klang Valley Schools		
Young Engineers Section	Engineering & Creative Model Building Challenge (for secondary school students only)	20 Aug 2016	10.30 am	Taylor's University Lakeside Campus	Sdr. Cheah Khai Chun kha1chun95@gmail.com Participation by invitation to Klang Valley Schools		

Please log on to IEM webpage: www.myiem.org.my for details of all the above events. EW Secretariat Contact :

Mr. Aklanie Mahzan (aklanie@iem.org.my)
 Ir. Sreedaran Raman (sreedaran@hotmail.com)
 Secretariat
 Chairman, Organizing Committee of Engineering Week 2016

IEM Sarawak Branch Annual Dinner 2016 Report

By Ms. Lee Mei Ping, Young Engineer Section, Sarawak Branch



IEM Sarawak Branch Committee Members

he IEM Sarawak Branch organised its Annual Dinner on 30 January 2016 at Imperial Hotel, Kuching. The theme, $E=mC^2$, was the abbreviation of "Engineering Night = Mystical Classical Celebration".

The dinner was held in conjunction with raising funds for the design and construction of the Innovation and Technology Engineering Centre (InTEC) and engineering companies in Sarawak showed their strong support by buying dinner tables. More than 800 members and guests from various industries (material supply, consultancy and construction) attended the dinner.

After the guests were seated, the VIPs, Dato' Ir. Lim Chow Hock, Ir. Haji Zuraimi B. Sabki (Note-post/organisation) and Dato Richard Alexander John Curties (Note: post/ organisation) entered the Grand Ballroom, accompanied by dancers from Studio 23. The dancers gave a great performance to symbolise a mystical gladiator and his conquest victory. This was followed by speeches from the IEM Sarawak Branch Chairman, Ir. Haidel Heli, and then IEM President, Dato' Ir. Lim Chow Hock.

MORE ON INTEC

In November 2015, IEM Sarawak Branch had organised a competition for the planning and conceptualising of the proposed development of an Engineering Centre in Kota Samarahan. Held under the InTEC sub-committee chaired by branch vice chairman Ir. Dominic Ong, it was opened to all professionals in the construction industry based in Sarawak as well as for undergraduate and postgraduate students in universities in Sarawak.

The panel of judges was headed by branch chairman Ir. Haidel and consisted of representatives from Pertubuhan Akitek Malaysia (PAM) Sarawak Branch, Association of Consulting Engineers Malaysia (ACEM) Sarawak Branch, Sarawak Housing and Real Estate Developers Association (SHEDA) and the Land Surveyors Board Of Sarawak.

Five teams took part in the competition and three finalists were selected as follows:

- 1. Team Synergy, Swinburne University of Technology (Sarawak Campus)
- 2. Team Q-Tech, Department of Public Works
- 3. Team EcoTech, Swinburne University of Technology (Sarawak Campus)

All three teams made 1-minute videos each and these were shown to the dinner guests, who made the final choice. The Best INTEC Design award, with a total prize money of RM10,000, was won by Team Synergy led by Mr. Collin Chieng while Team Q-Tech and Team EcoTech won RM5,000 each.

IEM Sarawak Branch wishes to thank the many sponsors for their generosity.



CONTRACTOR'S SPECIALIST PARTNER

HCR BRIDGE MACHINERY (M) SDN. BHD.

China, Malaysia, Singapore, Korea, India, Sri Lanka, Indonesia, Poland, Slovakia, Greece, USA, Saudi Arabia, Mexico, Venezuela, Iraq, Iran, Israel, Morocco, Ethiopia, Nigeria, Angola, Mali, Niger, Sudan, Algeria.











Used equipment also available! Call us for your inquiry.

PRODUCT RANGE

- Launching Gantry (LG)
- Segment Erector, Segment Lifter (SE)
- Moveable Scaffolding System (MSS)
- Form-Traveler (FT)
- Multiple Axle Trolley (MAT)
- Straddle Carrier (SC)
- Beam Erector (DJ, HJSB)
- Portal Crane, Gantry Crane
- Portal Crane, Gantry Crane
- Derrick (DC)
- Formwork (FS)
- Operation Team
- Erection Team



OFFICE: 18-2 Jalan Cempaka SD12/2, Bandar Sri Damansara, 52200, Kuala Lumpur, Malaysia. Tel: +603 6276 6020, 6731 6020 @ info@hcrailway.com

FACTORY:

No 2. Zhanbei Road, Fuxing District, Handan City, Hebei Province, 056003, China. Tel: +86 310 4022 310 Fax: +86 310 4022 310 @ hdztjx@hdztjx.com



The Terracotta Warriors of Xian



Ir. Tham Kum Weng

Ir. Tham Kum Weng worked in JKR for 18 years. He has been a C&S consulting engineer for the past 24 years. His current focus is on engineering inspection, assessment and evaluation of structures and bridge engineering. Bing-Ma-Yong, the Terracotta Warriors Museum, is located in Xi Yang Village, Lintong Country, 35 kms east of Xian in the Shaanxi Province of China. It is, literally, a collection of "funerary life-sized statues of soldiers and horses", representing the army of Qin Shi Huang Ti, the first Emperor of China.

My wife and I visited this 1987 UNESCO World Class Cultural heritage site in April 2016, some 40 years after it was first discovered by local farmers (the Yang families) in 1974 while digging wells in search of water. The discovery of pottery fragments and ancient bronze weapons led to intensive excavation efforts and textural research.

By 1979, three excavation pits (Pits 1,2 and 3), with a total area of over 2,000 sq metres of about 8,000 terracotta sculptures of armed warriors and horses and 100 chariots buried there, were opened to the public as an onsite museum. Continued excavation and archaeological research are still in progress at this site, 1.5 kms east of the emperor's mausoleum. The Emperor's tomb remains largely sealed up and unexplored and is marked by a solid triangular shaped mound. The biggest, Pit 1, is 230m long and 62m wide. It depicted the terracotta warriors and horses (about 6,000) and 40 woody chariots, in battle formation. The curved steel roof trusses span the width, with a hinged joint at the apex. I imagine it would have been a significant engineering feat to design and install the roof trusses over such precious relics with limited available space for any temporary support.

GLOBE TREKKING

The discovery in 1974 revealed the resplendence and the intrigues of an old dynasty in the Warring States Period which marked the start of a united imperial China some 2,200 years ago. In my primary school history lessons then, I had learnt of Emperor Qin's many achievements and exploits. He united China and established the Qin Dynasty. He standardised Chinese writing, the currency system and weights and measurements as well as fixed carriage axles at six feet. I learnt that he built the Great Wall but I did not learn about his obsession with the construction of the terracotta warriors mausoleum that was of such world-shaking proportions.



Emperor Qin was born in 259 BC as Ying Zheng and inherited his father's throne at the age of 13. Despite his courage and insight, he ruled with an iron fist, prosecuting large numbers of scholars and destroying much of ancient Chinese culture, especially Confucian writings. He died at the age of 49 and the Qin Dynasty (221-207BC) ended two years later through a peasant rebellion (210BC).

According to historians, Emperor Qin began the construction of the mausoleum when he came to the throne. Work continued for 38 years, a massive undertaking that involved 720,000 conscripts at the peak of its construction.

I wonder what changes there would have been, in terms of human and cultural dimensions, if Emperor Qin had lived longer.

13

When You Think Of Water Reservoir Think MALSTORE

0

A Product That Is Designed To Be Durable, Reliable, Competitive And Innovated Towards Maintenance Free Using Proven Materials And Technology

MALSTORE SDN BHD (576477-H)

No. 3D, Jalan PJS 1/48, Taman Petaling Utama, 46150 Petaling Jaya, Selangor Tel : 03-7770 6428 Fax : 03-7770 6419 Email : enquiry@malstore.com.my



TEMUDUGA PROFESIONAL

Tarikh: 13 Jun 2016

Kepada Semua Ahli,

SENARAI CALON-CALON YANG LAYAK MENDUDUKI TEMUDUGA PROFESIONAL **TAHUN 2016**

Berikut adalah senarai calon yang layak untuk menduduki Temuduga Profesional bagi tahun 2016.

Mengikut Undang-Undang Kecil IEM, Seksyen 3.8, nama-nama seperti tersenarai berikut diterbitkan sebagai calon-calon yang layak untuk menjadi Ahli Institusi, dengan syarat bahawa mereka lulus Temuduga Profesional tahun 2016.

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

Ir. Yam Teong Sian

Setiausaha Kehormat, IEM,

	PI	ERMOHONAN BARU				
Nama		Kelayakan				
KEJU	RUTERAAN AWAM					
HAFIZA	H BINTI ZAKARIA	BE HONS (UTM) (CIVIL, 1998)				
GOH KI	ET RHEE	BE HONS (UMS) (CIVIL, 2002)				
MD. RIE	ZWAN BIN C.CHIK	BE HONS (CNAA-MIDDLESEX POLYTECHNIC) (CIVIL, 1987)				
NORIK	IWAN BIN ABU SEMAN	BE HONS (UiTM) (CIVIL, 2002)				
KEJU	RUTERAAN KIMIA					
KWEK E	BOON TENG	BE HONS (UKM) (CHEMICAL, 2006)				
KEJU	RUTERAAN ELEKTRIKA	F.				
CHONG	HALFUNG	BE (CANTERBURY) (ELECTRICAL & ELECTRONIC, 2002)				
CHONG YEN FONG, CHRISTINA		BE HONS (MULTIMEDIA) (ELECTRONICS-COMPUTER, 2004) CONVERSION (UNITEN) (2013)				
FATHIYAKAN BIN ABD RAHIM		BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS, 2003) CONVERSION (UNITEN) (2012)				
HALMI BIN RUSMAN KUMUTHA A'P ARUMUGAM MOHD FATIMI BIN IZANI MOHD HAIRUL NIZAN BIN		BE HONS (UTM) (ELECTRICAL, 2008) BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS, 2010) BE HONS (UTM) (ELECTRICAL, 2007) BE HONS (UTM) (ELECTRICAL, 2012)				
MUHAMMAD						
TAN SING FALT YUSOF BIN ALWI		BE HONS (UTM) (ELECTRICAL, 2004) BE HONS (UNITEN) (ELECTRICAL POWER, 2008)				
KEJUF	UTERAAN KAWALAN 8					
MOHAM	AD HAFIZULLAH BIN CHARIL	BE HONS (UTM) (ELECTRICAL -ELECTRONIC, 2004)				
KEJUF	UTERAAN MEKANIKAL					
CHRIST	OPHER LEO PERALTA	3E HONS (UNITEN) (MECHANICAL, 2003) ME (UNITEN) (MECHANICAL, 2005)				
MOHD AZNI BIN MD KASIM		BE HON (UTM) (MECHANICAL-MARINE TECHNOLOGY, 2007)				
PERPINDAHAN AHLI						
No. Ahli	Nama	Kelayakan				
KEJU	RUTERAAN AWAM					
47098	LUKE KONG TECK TIANG	BE HONS (RMIT) (CIVIL & INFRASTRUCTURE, 2010) ME (MELBOURNE) (STRUCTURES, 2011)				
50209	MOHAMAD RUSDI BIN MUS	SA BE HONS (MALAYA) (CIVIL, 2007) ME (UPM) (WATER RESOURCES, 2013)				
52526	Mohd Faiz Bin Mohamma Zaki	AD BE HONS (UTM) (CIVIL, 2010) ME (UTM) (CIVIL-GEOTECHNICS, 2012)				
42463	SHARIL AMRAN BIN AMIR MOHAMED	BE HONS (UTM) (CIVIL, 2010)				
KE.IU	RUTERAAN KIMIA					
64541	OOI MONG LEE	BE HONS (MALAYA) (CHEMICAL, 2015)				
KE.IU	RITERAAN EI EKTRIKA					

48472	MUHAMMAD SHAZWAN BIN MUSTAFA	BE HONS (UNITEN) (ELECTRICAL POWER, 2009)				
50131	MOHAMAD ARIFF BIN KARUDDIN	BE HONS (UITM) (ELECTRICAL, 2008)				
52562	HAZLEE AZIL BIN ILLIAS	BE HONS (MALAYA) (ELECTRICAL, 2006)				
43666	SIVARAMAN A/L JAGANATHAN	BE HONS (UTM) (ELECTRICAL, 2007) ME (MALAYA) (POWER SYSTEM, 2014)				
KEJURUTERAAN MEKANIKAL						
66705	LAU CHIN SHENG	BE HONS (SINGAPORE) (MECHANICAL, 2008)				
27336	YOGESWARAN A/L NILAMIHAM	BE HONS (UTHM) (MECHANICAL, 2009)				
KEJURUTERAAN KAWALAN & INSTRUMENTASI 54001 RAYMOND RICHIE REYES BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS,						
		2011)				
PERMOHONAN BARU/PEMINDAHAN MENJADI AHLI KORPORAT						

KEJURUTERAAN KIMIA TAN PEL SZE, LINDA

BE HONS (UKM)(CHEMICAL & PROCESS, 2000)



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 May 2016 adalah seperti jadual di sebelah:

NU.	NU. AHLI	NAWA		04	10015	MOHD. TAJUDIN BIN
1	11026	ABDULLAH BIN		21	18015	REJAB
		OTHMAN		22	23167	MOK SIEW HENG
2	03314	ACHUTHAN KUTTY G. KRISHNAN		23	16217	MUHAMMAD ASHRI BIN MUSTAPHA
3	10136	AHMAD FITRI BIN OTHMAN		24	79284	MUSTAFFA BIN MOHAMMED
4	45787	AHMAD RASYIDI BIN AHMAD SUKARDI		25	17306	NOOR RAZMAN BIN ABDUL RAZAK
5	20633	ANDRE MILLER MATALI		26	13941	PETER MESSENGER ROBERTS
6	10820	AZIZAN BIN AB. RAHMAN		27	52461	PUAN CHUN YEE
7	09646	CHAI SIEW KEY		28	36923	SAMUEL BIN EDWARD ATIT
8	22916	CHAN CHEE KIT		29	13400	SEET JEN PING
9	24198	CHUAH CHIN SENG		30	15949	SHA'RI BIN MOHD. YUSOF
10	18121	S/O A. RAMACHANDRAN		31	11359	SIOW YOON CHIN
11	13663	IZHAR BIN OSMAN		32	49790	SKHOO PECK HOONG
12	42031	JEFFREY ANAK DICKSON SANDOM		33	15088	SLEE TUCK WAH
13	15387	LAU TUNG NGIU		34	13420	TEONG CHOO CHEING
14	02069	LEE MOOK SWEE, LARRY		35	17519	THAM CHEE MENG
15	09010	LEONG SANG KHIM		36	24521	WONG GOON WENG
16	22936	LIAW WEI LOONG		37	18436	WONG KIM HUNG
17	16258	LIEW AUN LEONG, DAVID		38	19258	WONG YANN JEH, STANLEY
18	11462	LIU PNG HOCK		39	19094	YAP CHO FAH
19	14866	LOKE CHEE KEEN		40	13096	YEOW POW KWEI
20	02875	MOHD. ISA BIN HAJI SARMAN				

MOK WAI LIANG 61954

BE HONS (MULTIMEDIA) (ELECTRICAL, 2009)

KFAHI IAN

KEJURUTERAAN ELEKTRONIK LEE KOK WEL 1ST YEAR (UNITEN) JOSHUA LEE SHENG KAI

78971

78970

78929

78927

78931

78949

78964

78936

78951

LEE SHOW LIP. RAVEN LEONG HAO WUANG LIEW WEI JI LIONG CHUN WAI LOH KUAN MING LOK DE YONG LOOI JUN JIE MAS ELINA BINTI ROMELI MASYITAH BINTI MUHAMAD RAZI MIRRAH SYAHIDA BT SAMAD ΜΟΗΑΜΑΟ ΑΚΜΑΙ ALIFF BIN AZHARI MOHAMAD ALIF BIN IBRAHIM MOHAMAD HAZIM SYAHMI BIN ZAILANI MOHAMAD HISYAM BIN MOHD ASRI MOHAMAD NAZRIN BIN ALIAS монамар NORSYAFIQ B. MOHD SOFIAN MOHAMAD RADZI BIN SANI MOHAMAD SHAFFFO BIN SALLEHUDDIN MOHAMAD SHAHRUL BIN AHMAD MOHAMAD SHAKIRUL MUEZ BIN RAMLI MOHAMAD SYAFIQ BIN MOHD ZIN MOHAMMAD FARID BIN ABD KARIM MOHAMMAD HAZIM **BIN ZULKIFLI** MOHAMMAD ZULHAFIZ BIN MD ISA MOHD AMIR ARIFF BIN ANUAR MOHD ARIFF AZHAN BIN MOHAMAD MOHD HAKIMIN BIN MOHD HUSSIN MOHD HARITH FIKRI BIN MOHAMED ZAMBRI MOHD ZHARFAN ZAKIRIN BIN ABD RAZAK MUHAMAD AIZAT BIN KAMAL SHARIFF MUHAMAD FAHMI BIN AZIS MUHAMAD NABIL ASYRAF BIN GHAZALI MUHAMAD NAZRIN BIN AB SOTA MUHAMAD SHAHRUL

(ELECTRICAL & ELECTRONIC) 1ST YEAR (UTAR) (ELECTRICAL & ELECTRONIC) 1ST YEAR (UTHM) (ELECTRONIC) 1ST YEAR (UTHM) (ELECTRONIC) 3RD YEAR (UTAR) (ELECTRICAL & ELECTRONIC) 1ST YEAR (APU) (ELECTRICAL & ELECTRONIC) 1ST YEAR (UTAR) (ELECTRICAL & ELECTRONIC) 1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC) 1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC) 1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC) 2ND YEAR (USIM) (ELECTRONIC) 1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC) 1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC) 2ND YEAR (USIM) (ELECTRONIC) 2ND YEAR (USIM) (ELECTRONIC) 3RD YEAR (UMP) (ELECTRICAL & ELECTRONIC) 1ST YEAR (USIM) (ELECTRONIC) 1ST YEAR (UTHM) (ELECTRONIC) 1ST YEAR (UNITEN) (ELECTRICAL & FLECTRONIC) 4TH YEAR (UMP) (FI ECTRICAL & ELECTRONIC) 1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC) 2ND YEAR (USIM) (ELECTRONIC) 1ST YEAR (UTHM) (ELECTRONIC) 3RD YEAR (UMP) (ELECTRICAL & ELECTRONIC) 4TH YEAR (UMP) (ELECTRICAL & ELECTRONIC) 1ST YEAR (MMU) (ELECTRONIC) 1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC) 1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC) 1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC) 1ST YEAR (UTHM) (ELECTRONIC) 1ST YEAR (USIM) (ELECTRONIC) 1ST YEAR (USIM) (ELECTRONIC) 2ND YEAR (USIM) (ELECTRONIC) 1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC) 1ST YEAR (USIM) (ELECTRONIC

MUHAMMAD AIMAN BIN AHMAD KAMAL	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
MUHAMMAD AIZAT	2ND YEAR (USIM)
MUHAMMAD	1ST YEAR (USIM)
AKID HAFRIZ BIN MUHAMAD	(ELECTRONIC)
MUHAMMAD AMIRUL ASHRAF BIN ZAHARUDIN	1ST YEAR (USIM) (ELECTRONIC)
MUHAMMAD FAHMI BIN SUDIN	1ST YEAR (USIM) (ELECTRONIC)
MUHAMMAD	1ST YEAR (UNITEN)
ABD MUTALIB	(ELECTRICAL & ELECTRONIC)
MUHAMMAD HAFIZ BIN AHMAD	1ST YEAR (UTHM) (ELECTRONIC)
MUHAMMAD HAQEEM BIN MOHD NASIR	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
MUHAMMAD HAZIM BIN HASSAN	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
MUHAMMAD IRFAN BIN NOR AZLI	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
MUHAMMAD KHAIRI	1ST YEAR (UNITEN)
B. MOHD JAIS	(ELECTRICAL & ELECTRONIC)
MUHAMMAD KHAIRUL MUIZ BIN NASARUDIN	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
MUHAMMAD NAQIB	1ST YEAR (UTHM) (ELECTRONIC)
MUHAMMAD NAZRIN	1ST YEAR (USIM)
MUHAMMAD	2ND YEAR (USIM)
NORHAKIM BIN HALIM	(ELECTRONIC)
NURFIRDAUS B. ABD GHANI	(ELECTRONIC)
	2ND YEAR (USIM)
MUHAMMAD RIDWAN	3RD YEAR (UMP)
BIN ZULAMRAN	(ELECTRICAL & ELECTRONIC)
MUHAMMAD RUSLAN BIN RAMLI	3RD YEAR (UMP) (ELECTRICAL & ELECTRONIC)
MUHAMMAD SALEEM BIN AMANULLAH	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)
MUHAMMAD SYAFIQ	2ND YEAR (USIM)
MUHAMMAD	1ST YEAR (UTHM)
SYAHREEN AIMAN BIN HUSSIN	(ELECTRONIC)
MUHAMMAD SYAZANI BIN MUHAMMAD	1ST YEAR (UNITEN) (ELECTRICAL &
SYAFIQ SURESH	ELECTRONIC)
MAHANIF	(ELECTRICAL &
NADIA SHAZWANY BINTI SOLEHAN	4TH YEAR (UMP) (ELECTRICAL &
NAJWA BT AHMAD ZAKI	4TH YEAR (UMP)
BINTI HASHIM	(ELECTRICAL & ELECTRONIC)
NG WEI KIT	2ND YEAR (UTAR) (ELECTRICAL &
NG YONG QUAN	1ST YEAR (UTAR) (ELECTRICAL &
NGEI CHEE KIT	3RD YEAR (UTAR) (ELECTRICAL &
NIKY ELYSHA BINTI NIK MOHD SUHAIMI	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRICAL &
NOOR CELINA BINTI	2ND YEAR (USIM)
NOOR HANANI BINTI	1ST YEAR (UNITEN)
JA'AFAR	(ELECTRICAL & ELECTRONIC)
NOOR NABILA BINTI AHMAD NAZRI	4TH YEAR (UMP) (ELECTRICAL &
	ELECTRONIC)
BINTI SHAMSUDIN	(ELECTRICAL & ELECTRONIC)
NOR ALIAH BINTI ABU	
SAMAH	1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)

78945

78941

78966

78937

78938

78969

78935

78952

78968

78953

NOR AZLINA BINTI 1ST YEAR (UNITEN) ABU NAYAN (ELECTRICAL & FLECTRONIC) NOR SHAFIQAH BINTI 1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC) YUSOFF NORALISSA BINTI 1ST YEAR (UNITEN) SAMSUDIN (ELECTRICAL & ELECTRONIC) NORASHIKIN BINTI 1ST YEAR (UNITEN) ABDUL RAHMAN (ELECTRICAL & ELECTRONIC) NORFARHANA BINTI 1ST YEAR (UNITEN) MOHD FAZAL (ELECTRICAL & ELECTRONIC) NUR AFIQAH BINTI 1ST YEAR (USIM) RAZMAN (ELECTRONIC) NUR AIN INSYIRAH BINTI MUHAMAD 1ST YEAR (USIM) (ELECTRONIC) KAMIL 1ST YEAR (UNITEN) NUR AINUN NATRAH BINTI IZDHAR (ELECTRICAL & ELECTRONIC) 2ND YEAR (USIM) (ELECTRONIC) NUR AISHAH BT MOHAMAD NUR AMIERAH BINTI 2ND YEAR (USIM) ABDULLAH (ELECTRONIC) NUR ERMI SUHADAH 1ST YEAR (USIM) BT TERMIZI (FLECTRONIC) NUR FARHANA 4TH YEAR (LIMP) ATIQAH BT AMIR HAFIDZ (ELECTRICAL & ELECTRONIC) NUR FARHANA BINTI 2ND YEAR (USIM) ROSLI (ELECTRONIC) NUR IZATI BINTI MAT 2ND YEAR (USIM) SALEH (ELECTRONIC) NUR IZAZAYA BT 1ST YEAR (USIM) AHMAD HANAFI (ELECTRONIC) NUR IZZATI BINTI JAMALUDIN 1ST YEAR (USIM) (ELECTRONIC) NUR KARIMAH BT 1ST YEAR (UNITEN) AZHAR (ELECTRICAL & ELECTRONIC) NUR SALIHA BINTI MD SALLEH 1ST YEAR (UTHM) (ELECTRONIC) NUR SYAFINA BINTI BARIMAN 1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC) NUR SYAHIRA BT 1ST YEAR (UNITEN) MOHD NADZRAN (ELECTRICAL & ELECTRONIC) NUR SYAMIRA BINTI MOHD ASERI 1ST YEAR (UNITEN) (ELECTRICAL & FLECTRONIC) 4TH YEAR (UMP) NUR SYAZANA BINTI ΔΗΜΔΠ (ELECTRICAL & ELECTRONIC) NURAZURA BINTI ABDUL RAZAK 4TH YEAR (UMP) (ELECTRICAL & ELECTRONIC) 4TH YEAR (UMP) NURFARAH ATHIRAH (ELECTRICAL & ELECTRONIC) BINTI AZMI MUKHTAR NURHAFIZA BINTI AHMAD 2ND YEAR (USIM) (ELECTRONIC) NURHAIDA DAYANA 2ND YEAR (USIM) BINTI MD JASMAN (ELECTRONIC) 1ST YEAR (UNITEN) NURLIYANA AFIQAH (FI ECTRICAL & BT KASMAT AIDI ELECTRONIC) NURSYAZAWIYAH HAZIRAH BT ABD 4TH YEAR (UMP) (ELECTRICAL & TALIB ELECTRONIC) 1ST YEAR (UNITEN) NURUL AFIQAH BINTI SHAMSUDIN (ELECTRICAL & ELECTRONIC) NURUL ATHIRAH BINTI MUHAMMAD 1ST YEAR (USIM) (ELECTRONIC) ZANI 1ST YEAR (UNITEN) NURUL AZWA BINTI JAMI (ELECTRICAL & ELECTRONIC) NURUL FAZIRA BINTI ROMAZUKI 4TH YEAR (UMP) (ELECTRICAL & ELECTRONIC) NURUL HAZIRAH BT 2ND YEAR (USIM) ABD AZIZ (ELECTRONIC) NURUL HIDAYAH BINTI SAPAR 4TH YEAR (UMP) (ELECTRICAL & ELECTRONIC) 4TH YEAR (UMP) NURUL HIDAYAH NOOR AZMI (ELECTRICAL & ELECTRONIC) NURUI SYAHIRAH 1ST YEAR (UNITEN) BINTI RUSLI (ELECTRICAL & ELECTRONIC) NURUL SYUHADA 4TH YEAR (UMP) BINTI ABDUL (ELECTRICAL & RAHMAN ELECTRONIC) ONG CHONG SING 1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC)

AMRI BIN MUSTAPA

MUHAMAD UWAIS B

MUHAMMAD AFNAN

MUHAMMAD BIN

NIZALUDIN

BIN SAZALI

SABRI

KEAHLIAN

1ST YEAR (APU)

OSEJI SOLOMON 1ST YEAR (APU) IFECHUKWUDE (ELECTRICAL & ELECTRONIC) ΡΙΙΛΕΝΤΙΒΑΝ A/L CHETTIAR KAVANDAN (ELECTRICAL & ELECTRONIC) QUAH CHIA YI 1ST YEAR (UTAR) (ELECTRICAL & ELECTRONIC) RAGAVENDRAN A/L SEGAKUMARAN (ELECTRICAL & ELECTRONIC) RAMANESVARAR A/L 1ST YEAR (APU) AGUSTHEER (ELECTRICAL & ELECTRONIC) REVATHY A/P ALAGARAISAMY (ELECTRICAL & ELECTRONIC) RUBAN RAJ S/O SANKARAN (ELECTRICAL & ELECTRONIC) SAIFUL AMRI B. ROSLI (ELECTRICAL & ELECTRONIC) SAIYIDAH BINTI SAMSUDDIN 1ST YEAR (UTHM) (ELECTRONIC) SATHISWARAN A/L JAYARAMAN (ELECTRICAL & ELECTRONIC) 1ST YEAR (UTHM) (ELECTRICAL & SEE BOON THAI ELECTRONIC) SHAHRAN A/L ASOK 3RD YEAR (UMP) KIIMAR ELECTRICAL & ELECTRONIC) SHAHRUL NIZAM B. AHMAD RAFAI 2ND YEAR (USIM) (ELECTRONIC) SHAMINI DEVI A/P KANESON (ELECTRICAL & ELECTRONIC) SHARMAN A/L RAMESH (ELECTRICAL & ELECTRONIC) SHARON LING HUI (ELECTRICAL & ELECTRONIC) SHASHA ANEEZA (ELECTRICAL & ELECTRONIC) BINTI AML SHIVA GHANDI ISMA 2ND YEAR (MMU) A/L ILAMARAN (ELECTRONIC) 3RD YEAR (UTAR) SIA CHEE YANG (ELECTRONIC 8 4TH YEAR (UMP) (ELECTRICAL & ELECTRONIC) SITI AISYAH BINTI YAMAT SITI NADHIRAH BT. 1ST YEAR (USIM) ZAINURIN (ELECTRONIC) SITI NURRANISAH (ELECTRICAL & ELECTRONIC) BINTI ABDUL RAHIM SITI ROZIANAH BINTI 4TH YEAR (UMP) MOHD AMIR (ELECTRICAL & ELECTRONIC) SITI SULIHAH BINTI 2ND YEAR (USIM) JAMIAN (ELECTRONIC) 1ST YEAR (UTHM) (ELECTRONIC) SOFINI BIN SUSENG SOLEHAH BINTI 4TH YEAR (UMP) AHMAD (ELECTRICAL & ELECTRONIC) SOWIN KUMAR NAMEL A/L NAGARAJAN (ELECTRICAL & ELECTRONIC) SURAJH JONATHAN JAMES (ELECTRICAL & ELECTRONIC)

78928

78956

78947

1ST YEAR (UNITEN) 1ST YEAR (SWINBURNE) 1ST YEAR (UNITEN) COMMUNICATION) 1ST YEAR (UNITEN) 1ST YEAR (UNITEN) 1ST YEAR (UNITEN)

78961

78943

78950

SYED AMIR HAZMAN BIN SYED BASRI TAN FOO YEN. ARTHUR TAN JIA YEE, ALFRED TAN KANG YUAN TAN PEI JOO TAN VEE HAN TAN WERN -JYAN, GEOFFREY THANESH GESAN A/L SANDRA GESAN THANESH KOOMAR A/L SELVARAJA THENEISH A/L RAVEENDRAM THENMOLI A/P S.PRABOO THIAH SU LIN. TUNG FOON HENG, RYAN UMI SUHAILA BINTI SAULAIMAN UMMU SOLEHAH BT A. RAHMAN @ A. RAHIM WAFA AIMAN BINTI MOHD TARMIZI WAN MOHAMMAD SYAHMIN B. WAN RUSHDAN WAN MUHAMAD AFIQ AIMAN BIN W ABD RAHMAN WAN NUR AAINA AYUNI BT WAN ABDULLAH WAN NUR AISYA AMIRA WAN HUSNI WAN NURUL NAZIFA BT WAN AHMAD HAZMI @ MEGAT PUTEH WANG TZE KOON WONG CHEN FUNG WONG CHU XUAN WONG JIA YI WONG POH HONG, MICHAEI WONG POH PEK DAVID COMMUNICATION)

1ST YEAR (UNITEN) (ELECTRICAL & FLECTRONIC 1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC) 1ST YEAR (SWINBURNE) (ELECTRICAL & FLECTRONIC) 1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC) 1ST YEAR (SWINBURNE) (ELECTRICAL & ELECTRONIC) 2ND YEAR (UTAR) (ELECTRICAL & ELECTRONIC) 1ST YEAR (APU) (ELECTRICAL 8 ELECTRONIC) 1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC) 1ST YEAR (UTHM) (ELECTRONIC) 1ST YEAR (UNITEN) (ELECTRICAL 8 ELECTRONIC) 1ST YEAR (UNITEN) (ELECTRICAL 8 ELECTRONIC) 2ND YEAR (UTAR) (ELECTRICA ELECTRONIC) 1ST YEAR (APU) (ELECTRICAL & ELECTRONIC) 1ST YEAR (USIM) (FLECTRONIC) 2ND YEAR (USIM) (ELECTRONIC) 1ST YEAR (UTHM) (ELECTRONIC) 1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC) 1ST YEAR (USIM) (ELECTRONIC) 3RD YEAR (UMP) (ELECTRICAL & ELECTRONIC) 1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC) 1ST YEAR (UNITEN) (ELECTRICAL & ELECTRONIC) 2ND YEAR (UTAR) (ELECTRICAL 8 ELECTRONIC) 1ST YEAR (APU) (ELECTRICAL ELECTRONIC) 1ST YEAR (UNITEN) (ELECTRICAL 8 ELECTRONIC) 3RD YEAR (UTAR) (ELECTRONIC) 3RD YEAR (UTAR) (ELECTRONIC & COMMUNICATION) 3RD YEAR (UTAR) (ELECTRONIC &

(ELECTRICAL 8 ELECTRONIC) WOO WEI KAI 1ST YEAR (UTHM) (ELECTRONIC) YAP XIEN YIN 1ST YEAR (UTHM) (ELECTRONIC) YEI WEI SHEN 2ND YEAR (UTAR) (ELECTRICAL & ELECTRONIC) YOU ZE WEI 1ST YEAR (UTAR) (ELECTRICAL & ELECTRONIC) 1ST YEAR (USIM) 78962 7ATIL HANANI BINTI MUSTAFA (ELECTRONIC) **KEJURUTERAAN KIMIA** 78590 AFIQ HAFIZI BIN AZIZI 4TH YEAR (UMP) (CHEMICAL AHMAD RIDHWAN 3RD YEAR (UMP) 78546 BIN IDRIS (CHEMICAL) 78600 AIDA SALIHAH BINTI 4TH YEAR (LIMP) ABU BAKAR (CHEMICAL AIN SOFIANOR IZZATI BT RABUAN 3RD YEAR (UMP) (CHEMICAL) 78640 4TH YEAR (UMP) (CHEMICAL) AIN SYAWALINOR 78631 SHAFINA BINTI RABUAN AINIL HAWA BINTI AMIRRUDIN 3RD YEAR (UMP) (CHEMICAL) 78607 AIZATUL FATIMAH BT AZLAN 4TH YEAR (UITM) (CHEMICAL) ALIFF HAMZAH BIN 4TH YEAR (UITM) KAMARUDDIN (CHEMICAL) AMALIA HASYYATI BT 4TH YEAR (UMP) 78501 HAYATUDDIN (CHEMICAL) AMALINA BINTI AZIMIN 4TH YEAR (UITM) (CHEMICAL) 78540 AMANIE SHAZWANIE BT AHMAD SABRI 4TH YEAR (UMP) (CHEMICAL) AMIRUL NUBLI BIN 4TH YEAR (UMP) 78650 MUSTAMIN (CHEMICAL) ANIMAH BT SAIDON 4TH YEAR (UITM) (CHEMICAL) ANIS NABILA BINTI MOHD AULI 2ND YEAR (UMP) (CHEMICAL) 78609 AREEN EMILIA BIN FAIZLUKMAN JERRY 3RD YEAR (UMP) (CHEMICAL) 78644 ARUNAWATHI A/P 1ST YEAR (UMP) 78645 ARUL MOZHI VARMAN (CHEMICAL) ASHWINI A/P VASSEKARAN 78635 1ST YEAR (UMP) (CHEMICAL) 4TH YEAR (UITM) (CHEMICAL) ASRIFA BINTI SAARI ASWINI A/P BASKARAN 1ST YEAR (UMP) (CHEMICAL) 78592 ATHIRAH ZURIANI 4TH YEAR (UMP) 78516 **BT RAIMI** (CHEMICAL) AZIATUL HANIM BT 4TH YEAR (UITM) (CHEMICAL ABD. AZI AZYYATI BINTI ABD HAMID 4TH YEAR (UMP) (CHEMICAL) 78611 AZZIAN BINTI ARIFFIN 4TH YEAR (UITM) (CHEMICAL) 3RD YEAR (UMP) 78608 BETTY LAU SZE YII (CHEMICAL) CHAI KIAN HOONG 3RD YEAR (UTAR) (CHEMICAL)

WONG SIE KEAT.

Note: Remaining list would be published in the August 2016 issue. For the list of approved "ADMISSION TO THE GRADE OF STUDENT", please refer to IEM web portal at http://www.mviem.org.mv.

CONTRIBUTIONS TO WISMA IEM BUILDING FUND



RM 2,861,733.62 contributed by IEM Members and Committees RM 744,332.19 contributed by Private Organisations TOTAL RM 3,606,065.81

(ANOTHER RM 3,122,778.87 IS NEEDED)

The Institution would like to thank all contributors for donating generously towards the IEM Building Fund HELP US TO PROVIDE BETTER SERVICES TO YOU AND TO THE FUTURE GENERATION (The donation list to the Wisma IEM Building Fund is published on page 45)

STAYING AHEAD FOR YOU.

100 **Companies Have Worked** With Us in Malaysia

200 **Buildings Have Been Designed &** Erected By Us In Malaysia

1,000,000 Square Metres Of Space Has Been Constructed By Us In

Malaysia

That's what we have been doing for multinational companies who stay ahead of the game with fast erection and superior building technologies for their worldwide facilities.



BlueScope Buildings Malaysia Phone: +603-7839-3000 Email: KokSheng.lee@bluescopesteel.com www.bluescopebuildings.com.my



SALES OFFICES & MANUFACTURING LOCATIONS BRUNEI | CANADA | CHINA | ENGLAND | INDIA | INDONESIA | JAPAN | MALAYSIA | MEXICO AUSTRALIA PHILIPPINES | SAUDI ARABIA | SINGAPORE | SOUTH AFRICA | SOUTH KOREA | THAILAND | U.S. | VIETNAM NEW ZEALAND



ANCHOR-REINFORCED EARTH

Our Strength is Your Confidence

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

CT CRIB[™] The Most Reliable & Cost Effective

CTSB

Retaining Wall System

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



For enquiry please contact: **CRIB TECHNOLOGIES SDN BHD** (564096-A), **ARE WALL (M) SDN BHD** (542608-W) 46-A, SS 22/25, Damansara Jaya, 47400 Petaling Jaya, Malaysia Tel: +603-7731 7391 Fax: +603-7725 7868 Email: groadesb@yahoo.com Website: http://www.ctsbare.com



PETALING JAYA (HQ) No. 45-3, Jalan PJU 5/20, The Strand, Kota Damansara, 47810 Petaling Jaya, Selangor Darul Ehsan, Malaysia. Tel: (603) 6142 6638 Fax: (603) 6142 6693 E-mail: enquiry@nehemiahwalls.com

Reinforced Soil System



www.nehemiahwalls.com

