BIL.2011 NO. 12 DECEMBER 2011

JURUTERA

THE MONTHLY BULLETIN OF THE INSTITUTION OF ENGINEERS, MALAYSIA
KDN PP 1050/12/2012 (030192)
ISSN 0126-9909

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Bandar Puchong Jaya, 47170 Puchong, Selangor Darul Ehsan, Malaysia.
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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

JURUTERA MONTHLY CIRCULATION: 25,000 COPIES

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THE INSTITUTION OF ENGINEERS, MALAYSIA,
Bangunan Ingenieur,
Lots 60 & 62, Jalan 52/4, P.O. Box 223 (Jalan Sultan),
46720 Petaling Jaya, Selangor.
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New Strategies for Enhancing the Agro-Food Industry

*by **Ir. Kumar Subramaniam,***
Chairman,
Agricultural and Food Engineering Technical Division

EFFORTS are being made by the Malaysian government to develop the agriculture and agro-food industry into the third engine of growth for the Malaysian economy. The agro-food industry is reaching out globally and the government is supporting this effort under the National Agro-Food Policy 2011-2020 which consists of four main strategies, namely,

- to ensure adequate food supply,
- to increase the value-add of the agro-food sector,
- to complement and strengthen the supply chain
- to provide trained labour for the agriculture sector.

Untapped potential in the agro-food industry includes the use of food as medicine. The use of chemical fertilizers in agriculture has caused soil depletion and this has led to crops containing fewer nutrients. The solution is to revert back to organic and sustainable agriculture. Studies have shown that organically grown foods are healthier. Currently, the agro-food products that are being produced locally include:

- Palm oil based vegetable oils and products
- Halal certified agro and dairy commodities, food ingredients and additives.
- Halal and non-halal snack foods
- Roselle juice and cordial foods
- Processed bird's nests
- Fish feeds and animal feeds

Agricultural and Food Engineering has contributed to the industrialization of the Malaysian agriculture and agro based industry. Our natural resources are limited and it has become necessary to produce more food with less resources. Our engineers must invent improved technologies to process and produce food products with environmentally sustainable solutions to treat and manage the byproducts and wastes. Changing global conditions are demanding for increased agriculture and food production within a limited land bank, as well as to increase the efficiency and quality of services in the food preservation and supply chain. ■

SUBSCRIPTION REMINDER

RENEWAL OF MEMBERSHIP FEE

Effective from **1 January 2012**, defaulting members in arrears of subscription will be considered as suspended members with all benefits removed. Consequently, these members will not be allowed to evening talks and will be charged the non-members' fee at the entrance. They will also not be entitled to register for visits/courses/seminars/conferences and any paid event of the IEM at members' registration fee.

To avoid this, all IEM members are advised to settle their annual subscription on time and the deadline for payment each year is on 31 January.

Thank you.

Executive Committee of the IEM Council

Green Technology and Sustainable Agricultural and Food Production

by Ms. Suvarna Ooi

Dato' Zohadie's visit to Japan during the Cherry blossom season

Emeritus Dato' Ir. Prof. Muhamad Zohadie Bardaie, Ph.D., P.Eng. Dato' Zohadie holds a Ph.D. degree in Agricultural/Environmental Systems Engineering from Cornell University, USA. He retired as a professor in engineering from Universiti Putra Malaysia (UPM) in December 2006. In 2009 he was conferred the 'Emeritus Professor' in Bio-systems Engineering by the Faculty of Engineering, Universiti Putra Malaysia of Selangor.

FOOD prices have been increasing in recent years. Between March 2007 and March 2008, global food prices increased by an average of 43% as reported by the International Monetary Fund. According to the National Inflation Association in the United States, the average American family currently spends only 13% of their total annual expenditure on food.

However, it is projected that Americans will spend as much as 40% of their annual expenditures on food by 2015. The World Watch Institute concluded that the growth of biofuel, the impact of climate change and the rising prosperity of developing nations are all driving retail food prices to their biggest annual increase in 30 years.

Closer to home, international aid agencies are increasing worried by the recent dramatic rise in food costs in Asia, particularly the price of rice. World stocks of grain are at their lowest for more than 20 years and international rice supplies are at their lowest since 1976. To make matters worst, many of the world's leading rice exporting countries are limiting the sale of rice or banning them altogether.

With the world population ever increasing, estimated by the United Nations to reach 10 billion by 2050, food production will become even more critical as time goes by. As such, JURUTERA sought out Emeritus Prof. Dato' Ir. Muhamad Zohadie Bardaie, Chairman and Director of Perunding Bakti Sdn Bhd and former Vice Chancellor of Universiti Putra Malaysia (UPM), for his thoughts on how we should address some of these issues.

According to him, one possible solution could come from green technologies in agricultural and food production. This would involve the use of innovative technologies that have the potential to steer agriculture along a sustainable path, while at the same time contribute to the advancement of the economic and efficient production of safe and high quality food. This also includes sustainable agriculture, the practice of farming using principles of ecology, which can be defined as an integrated system of plant and animal production practices having a site specific application that will last over the long term.

Dato' Muhamad Zohadie pointed out that several research institutions and universities in Malaysia have carried out studies on some of the green technologies that are available in the country. One of the more interesting R&D initiatives in agricultural and food production that he has encountered is the concept of "vertical farming". This refers to the cultivation of plant or animal life within skyscrapers, or on vertically inclined surfaces.

(Continued on page 8)

WORKSHOP ON CASE HISTORIES OF DESIGN & CONSTRUCTION OF BORED PILES E053

Date & Time: 10 December 2011 (Saturday) 9.00a.m – 5.30p.m
Venue: Hotel Armada, Petaling Jaya, Arista Room, Level 3
Participants: Civil Engineers, Geotechnical Engineers, Structural Engineers, Building & Piling Contractors, Consultants, Project Managers, RE, Lecturers, Academics
Fee: A) Normal Price - RM 550/person B) Promotion Price - RM 450/person * for 2 or more people
Speaker: Ir. Neoh Cheng Aik KMN

SESSION 1
- Overview of pile foundation design.
- Practical bored pile foundation design with particular reference to boring, reinforcement cage and concreting. Scope of design verifications/analysis/calculations to meet EC 7 requirements.
- Scope of SI & ground characterization will be elaborated.
- Scope of inspection & recording for bored pile installation. Significance of these as part of QC?

SESSION 2
- Scope & methods of design validation to verify bored piles capacity & structural integrity.
- Works specification for bored pile installation. Standard Spec & typical addendum specifications.

SESSION 3
- Typical case histories to meet EC 7 requirements.
- Case Study 1
  Project briefs related to site conditions/site terrains, loadings and Client's requirements for a mixed commercial housing project consisting of three blocks of high-rise RC buildings including deep basement car park near a high slope.

SESSION 4
- Case Study 2
  As Case Study 1 but in limestone formation.
- Case Study 3
  Three maintained load test/PDA results for bored piles to evaluate.

WORKSHOP ON CASE HISTORIES OF BUILDING FOUNDATION FAILURES E054

Date & Time: 17 December 2011 (Saturday) 9.00a.m – 5.30p.m
Venue: Hotel Armada, Petaling Jaya, Arista Room, Level 3
Participants: Civil Engineers, Geotechnical Engineers, Structural Engineers, Building & Piling Contractors, Consultants, Project Managers, RE, Lecturers, Academics
Fee: A) Normal Price - RM 550/person B) Promotion Price - RM 450/person * for 2 or more people
Speaker: Ir. Neoh Cheng Aik KMN

SESSION 1
- Classification of types of building foundation failures.
- Building foundation failure investigation: scope, techniques & checklist.

SESSION 2
- Common design shortfalls & construction defects for building foundations.
- Common methods of remediation & technical basis/calculations.
- How ground vibration and ground movement can be generated to cause building foundation distress and failures? Mechanism? Assessments? Mitigations? Case histories?

SESSION 3
- Case Study 1
  Building foundation failure in filled ground.

SESSION 4
- Case Study 2
  Building foundation failure is about how some settling columns of buildings are remedied.
- Case History 3
  Presentation, illustration and discussion of 5 case histories of building foundation failures on soft ground.

DATE	CPD HOURS/POINTS	LIST OF COMING SEMINARS	SPEAKERS	PRICE
10 December 2011 (Saturday)	7	Workshop on Case Histories of Design & Construction of Bored Piles (E053)	Ir. Neoh Cheng Aik KMN BE (Hons), FIEM, FIHT, MICE MASCE, ASEAN Eng, P. Eng, C. Eng	Normal Price RM550/pax 2 or more RM450/pax
17 December 2011 (Saturday)	7	Workshop on Case Histories of Building Foundation Failures (E054)	Ir. Neoh Cheng Aik KMN BE (Hons), FIEM, FIHT, MICE MASCE, ASEAN Eng, P. Eng, C. Eng	Normal Price RM550/pax 2 or more RM450/pax

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He said, "The strongest proponent of vertical farming is Dr Dickson Despommier, a professor of environmental health sciences and microbiology at Columbia University in the United States. He argued that vertical farming is legitimate due to environmental reasons and claimed that the cultivation of plant and animal life within skyscrapers will produce less embedded energy and toxicity than plant and animal life produced on natural landscapes."

Vertical farming promotes the mass cultivation of plant and animal life for commercial purposes in skyscrapers. In theory, the latter could also produce fish, poultry, fruit and vegetables using advanced greenhouse technology such as hydroponics and aeroponics. And unlike traditional farming, indoor farming can produce crops year-round. All-season farming multiplies the productivity of the farmed surface by a factor of four to six depending on the crop.

Furthermore, the crop would not need to be transported between production and sale as it would be sold in the same infrastructure in which it is grown. This will result in less spoilage, infestation and energy required compared to conventional farming. Vertical farming would also reduce the need for new farmland due to overpopulation, thus saving many natural resources currently threatened by deforestation or pollution.

Dato' Muhamad Zohadie said, "Dr Despommier argued that the technology to construct vertical farms currently exists and also stated that the system can be profitable and effective. Developers and local government from various cities in the world, including South Korea, United Arab Emirates, United States, Canada, France, India, and China, have expressed serious interest in establishing vertical farms. In fact, the Illinois Institute of Technology is now crafting a detailed plan for Chicago."

He added, "However, it has been suggested that prototype versions of vertical farms should be created first, possibly at large universities interested in the research of vertical farms, in order to prevent failures. Perhaps one of our local research universities would consider the suggestion with a grant from the federal government."

SUSTAINABLE AGRICULTURE

The most important factors for a farm site are sun, air, soil and water. Of the four, water and soil quality and quantity are most amenable to human intervention through time and labour. As such, when farmers grow and harvest crops, some of the nutrients from the soil are removed. Without replenishment, however, the land suffers from nutrient depletion and becomes either unusable or suffers from reduced yield.

Dato' Muhamad Zohadie explained that, "Sustainable agriculture depends on replenishing the soil while minimising the use of non-renewable resources, such as natural gas or mineral ores. Some of the practices which can replenish the soil with nutrients includes recycling crop and livestock waste, growing legume crops and forages that form symbioses with nitrogen-fixing bacteria, genetically engineering (non-legume) crops to form nitrogen-fixing symbioses or fix nitrogen without microbial symbiont, long-term crop rotations, and returning to natural cycles that annually flood cultivated lands and return lost nutrients."

He pointed out that, while some areas have sufficient rainfall for crop growth, many other areas require irrigation. Thus, for irrigation systems to be sustainable, it needs proper management and this includes, among others, improving water conservation and storage measures, providing incentives for selection of drought-tolerant crop species, using reduced volume irrigation systems, and managing crops to reduce water loss.

As soil erosion is fast becoming one of the world's greatest problems, he also recommended several soil management techniques such as no-till farming, growing wind breaks to hold soil, incorporating organic matter back into the field, avoiding the use of chemical fertilisers which contain salt, protecting soil from water runoff, and incorporating Keyline design which is a technique for maximising the use of water resources on a piece of land.

OPPORTUNITIES IN GREEN TECHNOLOGY

According to Dato' Muhamad Zohadie, the Ministry of Energy, Green Technology and Water is in the process of intensifying the development of renewable energy, particularly biomass, as the "fifth fuel" resource under the country's Fuel Diversification Policy.

The policy has been reinforced by fiscal incentives, such as investment tax allowances and the Small Renewable Energy Program (SREP). This latter encourages the connection of small renewable power generation plants to the national grid. Such initiatives will further encourage the utilisation of green technology in the country.

However, with global warming becoming a global concern, how can Malaysians in general take advantage of opportunities in green technology? Dato' Muhamad Zohadie responded by explaining that the current priority is to mitigate climate

change which the Intergovernmental Panel on Climate Change (IPCC) defines as activities that reduce greenhouse gas (GHG) emissions, or enhance the capacity of carbon sinks to absorb GHGs from the atmosphere.

He said, "Many countries, both developing and developed, are now aiming to use cleaner, less polluting technologies. Use of these technologies aids mitigation and could result in substantial reduction of CO_2 emissions. Policies include setting targets for emissions reduction, increasing the use of renewable energy, and increasing energy efficiency."

He added that there are opportunities available for both the private and government sectors in the country to work on technologies for emission reduction on current processes which utilise fossil fuels, such as power plants, automobile and other industrial equipment.

Other areas of opportunity include introducing and developing technologies for increasing energy efficiency, and the development of renewable energy, such as bio-fuel and hydro-electric generation.

Dato' Muhamad Zohadie pointed out that opportunities may also exist in geo-engineering which encompasses a range of techniques to remove CO_2 from the atmosphere or to reflect incoming sunlight. He said, "As most geo-engineering techniques would affect the entire globe, deployment would likely require global public acceptance and an adequate global legal and regulatory framework, as well as significant further scientific research. On this matter, there might be opportunity for research institutions and universities to propose research projects and sought funding internationally."

Opportunities in green technology could also exist for green factories in the food industries which must have features that conserve the natural environment and resources. Dato' Muhamad Zohadie said, "The energy used in a green factory has to be non-polluting, and preferably renewable. Part of the energy supply could be generated internally by utilising the organic waste from the factory. Methane digesters could be built on site to transform the organic waste into biogas, which could then be burned to generate electricity for the factory."

He added that a water conservation process, which includes a water recycling and cleaning system, should be implemented in a green factory to minimise usage, ensure proper reuse of water, and discharge only clean water into the waterways. An air scrubbing and filtration system should also be installed to ensure that all particulates and harmful gases are trapped and prevent any accidental atmospheric discharge. In addition, waste from the factory needs to be properly processed to ensure there is no detrimental effect on the environment. Any solid waste from the process can be utilised by the farm for soil improvement.

Dato' Muhamad Zohadie said, "Besides all that, the management of the factory should be responsive to any malfunction of the installed systems, be on the lookout for any new technology which can improve the system, as well as organise regular briefings for employees to create awareness on the importance of going 'green'."

HOW CAN AGRICULTURAL ENGINEERS HELP?

Apart from the basic principles of engineering, Dato' Muhamad Zohadie pointed out that agricultural engineers in Malaysia should also be exposed to some of the basic principles of agriculture. The engineers should not only be aware of the availability of green technologies, they also need to be able to provide engineering solutions to most of the agricultural issues related to these technologies.

In fact, he said, "I would like to see one of the agricultural institutions in the country, be it the Agriculture Department or MARDI, create a centre for technological research. The main function of the latter will be to discover and study all the new technologies that are developed around the world with regards to agriculture and its related field. The centre should also have information on these new developments for use by our engineers in solving the agricultural problems in Malaysia."

He stated that agricultural engineers, in particular, needed to understand that they are dealing with living things, namely, plants and animals; thus, their experiences will be different from other engineers. For example, he said, "Once, an orchard owner who faced a serious drought problem wanted to set up an irrigation system for his mango orchard. He called me for advice on the type of irrigation system he should use. The first question I asked him was, 'What is your water source?' Suddenly, there was silence on the phone. A minute later came his reply, 'What water source?' Can you imagine, he was expecting the irrigation system to provide water for his orchard without a water source!"

When it comes to solving agricultural engineering problems, Dato' Muhamad Zohadie strongly believes in adopting a systematic approach. Relating an incident that illustrated this concept, he said, "Some time ago, there was a tomato harvesting issue in California. During the initial production, tomato harvesting was done manually, mainly by foreign labourers from neighbouring Mexico, who would go to the fields and pick ripe tomatoes from the plants. The Tomato Growers Association then decided to approach the University of California for a way to mechanise the operation."

He added that, after several initial studies and trials, the researchers at the university embarked on a systematic approach by bringing together the plant breeder, the agronomist and the agricultural engineer. The plant breeder was tasked with the breeding of a variety of tomato plant which grows upright and have uniform fruit maturity. The agronomist, on the other hand, had to create an appropriate practice in order to allow a machine to go through the field, while the agricultural engineer was tasked with designing the harvester.

After several years, the researchers produced a harvester which goes over the row of upright tomato plants. The machine uproots the plant, strips the fruits, then discharges the stripped plant at the rear. The final design of the machine was sent to a private company for fabrication, resulting in a machine which was named the UC-Blackwelder Tomato Harvester. The resulting harvester revolutionised the tomato industry in California, and was also adopted by other states in the US. ■

Knapsack Granular Fertiliser Dispenser

by Engr. Mohd. Fazly Mail

INTRODUCTION

Anyone who has grown a garden, maintained a lawn, or kept house plants knows that it is necessary to apply fertiliser to the soil to keep cultivated plants healthy. As they grow, plants extract nutrients they need from the soil. Unless these nutrients are replenished, the plants will eventually cease to grow. In nature, nutrients are returned to the soil when plants die and decay. However, this does not occur with cultivated plants.

Humans cultivate plants mainly for food, either for themselves or for livestock. When cultivated plants are harvested, the nutrients that the plants extracted from the soil are taken away. To keep the soil productive, it is necessary to replace these nutrients artificially. The type and amount of nutrients that plants need can be supplied by applying to the soil substances that contain these nutrients.

Proper application of fertiliser depends on the type of fertiliser you buy and the type of equipment you use. Traditional application of fertiliser utilises a lot of human labour, in which the fertiliser is placed in a bucket to facilitate the process. Fertilisers can be scattered by hand and raked in if gloves are worn, but this method is not very efficient or accurate. This method is not only tedious but also the amount of fertiliser is not evenly distributed often resulting in over or under-fertilisation of plants.

The practice of sowing fertiliser this way causes farmers to bear the weight of the bucket in one hand whilst bending at the waist to dispense the fertiliser. This causes a substantial burden on the body. To overcome this problem, farmers need to find a suitable position to distribute the fertiliser while carrying the bucket. In addition, this method requires the farmers to come into direct contact with chemical fertilisers. Only a small number of farmers wear gloves as a safety measure. Studies show that farmers feel uncomfortable wearing gloves, thus this situation can be detrimental to the health of the farmers, if it persists for long periods.

As a result, demand for a knapsack style fertiliser dispenser is in high demand from nursery operators, contractors and suppliers of oil palm plantations and indoor ornamental plants. However, most fertiliser dispensers in the market are designed for liquid fertilisers.

MACHINE DESIGN

Recognising this problem, a knapsack style instrument to dispense fertiliser has been designed by MARDI. This instrument is designed to overcome the uneven distribution of fertilisers to each tree. It is ideal for use on crops planted in polybags. It has a nozzle that allows the fertiliser to be placed directly into the polybag. This nozzle greatly improves the traditional fertilisation technique used by most farmers that require them to bend at the waist to distribute fertilisers into polybags.

This invention is generally designed to sow fertilisers accurately and quickly to crops (Figure 1). The amount of fertiliser applied is controlled by a metering hole on the device which can be changed according to the plant's needs (Figure 2). The prototype device is made of plastic to avoid being eroded by fertilisers. In addition, the design is simple and of relatively low cost to manufacture.

The equipment consists of a tapered container at the bottom, a precise metering mechanism, a hose, a long pipe and handle. When the handle is pushed down, it forces the fertiliser down through the outward holes, goes directly to the hose and pipe before it finally reaches the plant. It can distribute fertiliser accurately in amounts of 6g, 9g, 12g, 15g or 20g.

Figure 1: Knapsack Granular Fertiliser Dispenser

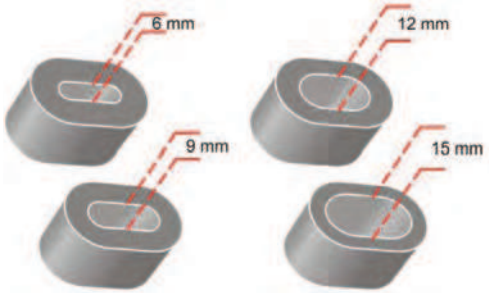

Figure 2: Rings to control the amount of fertiliser dispensed

FINDINGS OF TRIALS

It was revealed that workers exerted less physical effort when the fertilisation of potted plants at the nursery was done using the knapsack fertiliser dispenser compared to the conventional method. Moreover, workers were not exposed to chemicals and could work safely (Figure 3). On top of that, the exact amount of fertiliser could be discharged for each tree (Figure 4). The time taken is similar to the manual method, but the uniqueness of this invention lies in its accuracy, as well as safety and user-friendly features.

Figure 3: Field test being conducted at nursery plots

Figure 4: Fertilisers being dispensed from the nozzle

The economic impact, potential uses or commercial potential of the dispenser are as follows:

i) Affordable for smallholders to own.
ii) The development of this instrument is indispensable for the food and agriculture industries to increase their efficiency and productivity.
iii) Suitable for use by smallholders, contractors for small-scale plantations and operators of ornamental plant nurseries.
iv) Applicable to rubber, oil palm and fruit tree nurseries.

CONCLUSION

The knapsack fertiliser dispenser performance satisfies all the design requirements and objectives of the study. This instrument is simple in design and construction, easy to use without causing back pain to the operator and is able to consistently dispense fertilisers to crops. ■

Acknowledgement:

The author wishes to express his gratitude to En. Aris Abdullah, Pn. Norahshekin Abd. Rahman, En. Kasron Ahmad and En. Saleh Bardos for their contributions to the research. Special thanks to MARDI's Planting Material, Seed and Livestock Breed Production Unit for allowing trial tests to be conducted at their nursery plots.

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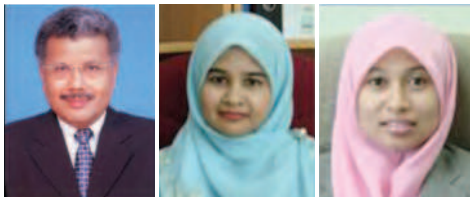

by Assoc. Prof. Dr Mohd. Nordin Ibrahim, Engr. Assoc. Prof. Dr Yus Aniza Yusof and Dr Rosnita A. Talib

INTRODUCTION

In 1996, the Department of Process and Food Engineering was established in Universiti Putra Malaysia to offer a four-year undergraduate programme, namely, Bachelor of Engineering (Process and Food) with an optional area of specialisation in Food Engineering or Biomaterial Process Engineering. The department also offers postgraduate programmes, Master of Science and Doctor of Philosophy with an optional area of specialisation in Food Engineering, Packaging Engineering, Bioprocess Engineering and Agricultural Process Engineering.

The Bachelor of Engineering (Process and Food) programme has been developed in response to the need to enhance agricultural production revenue through value adding processes and meet the requirements of the fast evolving food industry and agricultural related processes. It concentrates on the processing and manufacturing industries, which convert biological or agricultural raw materials into processed foods as well as utilise bio-products or agro-based materials as inputs for the production of consumer goods (food, pharmaceutical and industrial), thus providing the necessary knowledge and skills for future engineers in related areas and applications.

The curriculum incorporates the Outcome Based Education (OBE) approach to teaching and learning which satisfies one of the accreditation requirements of the Engineering Accreditation Council (EAC). The objectives and outcome of this programme will help ensure that the degree remains relevant for years to come. The programme is fully accredited by the EAC and certified by the Board of Engineers, Malaysia. The programme goes through a periodic review every five years by the EAC to ensure continual suitability and relevance to the needs of the nation and industry. An integral part of the accreditation is the report by an independent external reviewer or assessor appointed from professors who come from established and prestigious world class universities. The programme assessment and examination processes are carried out annually.

As a pioneer and the only institution offering this programme in Malaysia, it accepts the responsibility of expanding and developing the process and food engineering field. To meet research and teaching requirements, nine laboratories (Instrumentation and Process Control, Bioreactor Engineering, Agricultural Process Engineering, Food Engineering Unit Operations, Food Processing Quality, Food Processing Machinery Design, Food Engineering Transport Process, Bio-Material Engineering Properties, Preservation and Packaging) have been established.

The department has four niche research areas, namely, Agricultural Process Engineering, Bioprocess Engineering, Food Engineering and Packaging Engineering. Agricultural Process Engineering focuses on the application of engineering solutions for the post harvest handling, preservation and processing of agricultural and biomaterials; Bioprocess Engineering applies biochemical engineering principles in food processing; Food Engineering applies process engineering technology and concepts for food processing operations; while Packaging Engineering covers the technical design, fabrication and testing of packaging.

PROCESS AND FOOD ENGINEERING DISCIPLINE

Since food is important and the world's agricultural and food supply is highly dependent on and affected by variation in climatic conditions, the need to process and preserve food in large quantities to meet the ever increasing demand necessitates the application of engineering ingenuity, so that healthy and safe foods may be presented for human consumption through effective and efficient processes.

Thus, Process and Food Engineering, an emerging professional engineering area that is highly inter-disciplinary in nature, comprises the applications of engineering and biological sciences, as well as incorporates the concepts and techniques of the following processes or operations:

- Utilisation of efficient processes for preparing and preserving raw agricultural or biological materials,
- Transforming and processing agricultural or biological materials by using appropriate techniques, taking into consideration the properties of the materials initially, during processing, and of the final products, to ensure the maximum production rate and highest quality for consumption or further manufacturing, and
- Extracting and purifying agricultural or biological materials into high quality food, pharmaceutical, and industrial materials.

The aforementioned processes can be achieved through the theories, principles, analyses and applications of the following engineering and food quality or safety practices:

- Physical unit operations and process design
- Heat and mass transfer operation and design

(Continued on page 15)

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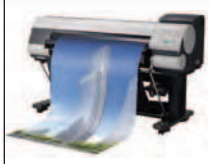

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As such, Process and Food Engineering education in UPM, as encompassed in the Bachelor of Engineering (Process and Food) curriculum, has the ultimate objective of producing professionals who are competent in the process engineering of agricultural/biological materials into final products for human consumption and further industrial manufacturing.

CURRICULUM

The Process and Food Engineering programme is founded on a balanced blend of basic science or engineering science courses, followed by applied/professional courses with emphasis on the application of engineering principles required for the processing or manufacturing industries which utilises biological or agricultural raw materials as inputs for the production of consumer goods (food, pharmaceuticals and industrial products). These courses cover process operation and design, equipment and machinery design, processing systems, process instrumentation and control, process modelling and simulation, process plant design, packaging engineering and other areas. The students' practical and soft skills are developed through opportunities to participate in seminars, laboratories and computer-aided-design exercises, design projects, industrial training, and other activities.

The students are also required to undergo a minimum of 10 weeks of industrial training in processing establishments (private companies or government agencies) during the semester break in their third year of study. This provides the students with the opportunity to learn firsthand the reality of work in the industry and enables them to see the relevance of the academic programme.

In the final year, students choose an area of specialisation from two options, namely Food Engineering or Biomaterial Process Engineering, to suit their interest and preferences. Biomaterial Process Engineering emphasizes on the application of process engineering principles and concepts for the processing of major agricultural commodity crops and developing new bio-based products for use as food materials and raw materials for the manufacturing industries. On the other hand, Food Engineering emphasizes on the application of process engineering principles and concepts for the food processing industries. The students are required to complete four advanced level courses including the choice of one course from technical elective subjects such as Advanced Processing Systems, Pharmaceutical Technology, Food Extrusion Technology, Microbial Process Engineering, Powder Technology, Rice Processing and Palm Oil Processing.

CAREER OPPORTUNITIES

Graduates from this programme can find career development opportunities in various relevant industries such as manufacturing or processing plant operation and management, engineering design (process, equipment and system design), product development and research. Previous records have shown that the employability of graduates from this programme is very high. The photographs below depict the various activities of the students. ■

Figure 1: Texture analysis of bread in the laboratory of food processing quality

Figure 2: Final year students explaining their plant design project to examiners

Figure 3: Students who participated in research exhibitions and competitions

Figure 4: Student visits and educational tours

Acknowledgement:
The authors wish to thank all staff members of the Department of Process and Food Engineering, UPM, for contributing towards the preparation of this article.

Fouling Deposits in Food Industries: The Challenges in Pursuing the GBI-IEB

by Engr. Dr Norashikin Ab. Aziz

INTRODUCTION

In the 21st Century, as fuel and gas prices keeps increasing, issues of green technologies, renewable energy and resources have attracted many premiers. In Malaysia, the National Green Technology Policy was launched on 24 July 2009, in order to control the impact of fuel and gas prices on the national economy. One of the objectives of this policy is to reduce energy usage, while at the same time increase economic growth.

In line with this, the Green Building Index (GBI) for Industrial New Construction (INC) and Industrial Existing Building (IEB) was launched on 7 June 2011, as a rating tool to promote sustainability in energy and water utilisation, indoor environmental quality, site planning, management, material and resource utilisation and innovation. GBI recognition provides company stature in conserving rapidly depleting fossil fuels and the environment. In addition, Malaysia also provides attractive incentives under the Budget 2010 and under the Ministry of Energy, Green Technology and Water for those who have obtained GBI certification.

In the food industry, the issue of sustainability is not only limited to energy utilisation, but also includes water and cleaning chemical utilisation. However, many food production owners are not aware about fouling deposit, which is a major hurdle to overcome before "Green Factory" recognition becomes a reality. Here, the background of fouling deposit is described.

WHAT IS FOULING DEPOSIT?

The deposition of dissolved or suspended material or the growth of biological organisms is commonly found in fluids involved in heat exchange. This may generate the accumulation of unwanted deposits on the surface of the heat exchanger, known as the fouling deposit. Figure 1 shows the fouling deposit of fresh milk after pasteurisation.

Figure 1: Fouling deposit of fresh milk after pasteurisation

The presence of fouling deposit means more fuel is needed to maintain the processing, and this can impact production because its formation can impede the heat transfer, and increase the resistance to fluid flow and maintenance work (Somerscales & Knudsen, 1981).

Both inorganic and organic materials can generate fouling. Each processing material will lead to different fouling mechanisms. Table 1 identifies fouling mechanisms and its level of problem for fluids from different industries (Garrett-Price *et al.*, 1985). Among those industries, fouling in the food industry is most critical. For the importance of food safety, it is compulsory to ensure that a processing plant maintains hygienic conditions.

Table 1: Several types of fouling mechanisms and their level of problems in some industries. Adapted from Garrett-Price et al. (1985)

Type of Industry	Fouling Mechanisms						
	Chemical reaction	Crystal-lisation	Biologi-cal	Particulate		Corro-sion	Freez-ing
Food and kindred products	Major	Major	Medium	Minor	Major	Minor	
Wood and paper products	Minor	Major	Minor	Minor		Medium	
Chemical and allied industries	Minor / Major	Medium	Medium	Minor	Medium	Medium	
Petroleum refineries	Major	Medium	Medium	Minor	Medium	Medium	
Glass, concrete				Minor	Major		
Electricity generation		Medium	Major	Major		Minor	Major

Table descriptions (Bott, 1995):

- ***Chemical reaction fouling,*** *is when the deposit forms because of chemical reactions at the heat transfer surface. Heat exchanger surface is not a reactant but can catalyse the reaction.*
- ***Crystallisation fouling*** *is the formation of solid due to deposition from solution onto the heat transfer surface. Insoluble salts, fats and waxes may crystallise on cooled surfaces, whereas reverse soluble salts, e.g. calcium carbonate, crystallise onto heated surfaces.*
- ***Biological fouling*** *is the formation of organic films consisting of microorganisms and their products (microbio fouling) and the attachment and growth of macrooganisms (macrobio fouling) such as barnacles or mussels.*
- ***Particulate fouling*** *happens when small suspended particles accumulate onto the heat transfer surface. Products of chemical reactions, upstream corrosion products and ambient pollutants are examples of suspended particles.*
- ***Corrosion fouling*** *occurs when processing fluid reacts with the heat exchanger material and produces corrosion products on the heat transfer surface.*

(Continued on page 18)

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IMPACT OF FOULING DEPOSIT

The application of thermal processing is vitally important in maintaining the hygienic condition and reducing the concentration of harmful species (bacteria, etc.) in processing. As a result, fouling builds up rapidly and daily cleaning is often needed in food plants for maintaining the quality of food products in terms of being safe to eat, providing good nutrition and for it to look good. For instance, daily cleaning is routine in the dairy industry (Visser & Jeurnink, 1997). Fouling in the food industry is more severe than in other industries. This is due to the heat sensitivity of the food substance that promotes fouling.

Dairy products (Burton, 1968; Miettinen *et al.*, 1999), cheese sauce (Li *et al.*, 2004), mayonnaise, tomato paste (Cheow & Jackson, 1982b), and fruit juices (Jiraratananon & Chanachai, 1996) are among some of the food products which create fouling problems during processing. Table 2 lists the behaviour of major food substances. Fouling which consists of protein is classified as tenacious. Generally, food contains several components; for example, ice cream consists of fat, protein, sugar and salt. Due to its heterogeneous structure, food fouling is complex to understand.

Table 2: The nature of food deposits deposit during production, the effect of heating and the solubility of the deposit (Grassoff, 1997)

Component deposited	Solubility	Ease of removal	Change upon heating
Sugar	Water soluble	Easy	Caramelisation: more difficult to clean
Fat	Water and alkali soluble	Difficult	Polymecrisation: more difficult to clean
Protein	Water insoluble, alkali soluble, slightly acid soluble	Very difficult	Denaturation: very difficult to clean
Mineral salts	Water solubility is variable but most are acid soluble	Easy to difficult	Interactions with other constituents: generally easier to clean

As the food industry demands frequent cleaning, more precautions are needed. If fouling build-up is not monitored appropriately, increased maintenance, fuel costs and capital expenditure are likely (Fryer *et al.*, 1995; Pritchard, 1988). Production cost will increase as well. In addition, a huge penalty could be incurred if food product safety is compromised. Hasting (1995) reported that the cost of food contamination could reach as high as £400 million. This value is high as food contamination can be fatal to consumers and result in a huge loss of consumer confidence in the brand.

COST FOR FOULING PROBLEMS

Fouling problems add to production costs. Total fouling cost in a year could be represented as a percentage of GNP (Gross National Product). These percentages were computed for top industrialised countries (e.g. the United States, the United Kingdom, Germany and Japan) by Garrett-Price *et al*. (1985) and Pritchard (1988). Müller-Steinhagen (2000) multiplied these percentages with the 1992 GNP of these countries to obtain the fouling costs of that year. Table 3 shows that the total fouling cost for these countries are higher compared to the figures for less industrialised countries.

Table 3: Total fouling costs per annum in 1992, calculations are base on percentage of Gross National Product (GNP) taken from Dynamic Descaler's

Country	Fouling Costs as % of GNP	1992 GNP ($billion)	Fouling Costs ($million)
UK	0.25	1000	2500
US	0.25	5670	14,175
New Zealand	0.15	43	64.5
Australia	0.15	309	463
Germany	0.25	1950	4875
Japan	0.25	4000	10,000
Total Industrialised World	0.20	22,510	45,020

Source: (http://www.process-controls.com/techsales/Dynamic_Descaler/energy_cost.htm)

In the food industry, one of the major costs is attributed to cleaning. Several factors that influence the cleaning cost have been listed by Gillham (1997):

- Cleaning chemical usage.
- Energy consumption to heat up and pump the cleaning solution.
- Production loss because of cleaning,
- Waste water treatment from the cleaning process,
- Cost for labour to dismantle the equipment before proceeding with the cleaning work, and
- Plant downtime cost during cleaning.

Generally, environmental cost is the greatest cleaning expenditure. Cleaning chemicals are also a relatively high expenditure in cleaning. It was revealed that the global sales of cleaning chemicals is over $1 billion per year (Kane & Middlemiss, 1985). The cleaning costs in the food industry are more expensive than other process industries.

Thus it is vital to reduce the usage of cleaning chemicals, cut down on water processing and cleaning time, and use equipment that is hygienically designed. Optimum cleaning will cut down fouling cost and protect the environment.

CURRENT EFFORTS TO SOLVE FOULING DEPOSIT PROBLEMS

Much work has been done to reduce fouling formation. However, the need to change product ingredients and process conditions for reducing fouling are not appropriate for most food production. Many methods have been invented to mitigate fouling problems such as the use of mechanical removal, modified surfaces and cleaning in place. Mechanical methods, such as ice pigging (Quarini, 2002), are generally limited to the shape of the equipment (e.g. tube heat exchanger). The application of

modified surface technology in the food industry is still under investigation as the invention of a new surface which has better functions (e.g. chemical resistant, corrosion resistant, abrasive wear resistant, electrical properties and non-stick) is difficult (Bornhorst *et al.*, 1999; Muller-Steinhagen *et al.*, 2000).

Cleaning-in-Place (CIP) is the most commonly applied technique to mitigate food fouling. However, regular CIP can be uneconomic in terms of downtime and materials (Changani *et al.*, 1997). Nowadays, the food market is being dominated by gigantic retailers such as Tesco, Asda and Sainsbury. Because of the high competition, food industries must offer cheaper prices. One way to achieve this is by reducing production cost. This can be done by adopting the optimum cleaning method. To optimise cleaning, it is essential to understand the removal mechanisms and have some knowledge of material behaviour during cleaning. This can reduce maintenance cost and production losses.

CLEANING-IN-PLACE (CIP)

CIP was invented to simplify the old cleaning method in which the equipment was dismantled before cleaning. In this process, hot cleaning chemical is circulated through the plant (Alfa-Laval, 1987). Müller-Steinhagen (2000) and Liu & Macchietto (1993) agree that CIP is better than mechanical methods. CIP usually involves several steps as given in Table 4.

Table 4: Cleaning cycles in CIP (Christian, 2003)

Cycles	Function
Pre-rinse	The stage where loose deposit is removed from the processing surface. Water is often used in this stage.
Detergent cycle	Deformation of deposit and most removal occur here. Generally assisted by using acid or alkali base cleaning agent. Some of the CIP methods need more than one detergent cycle, in this case intermediate rinse is needed.
Post-rinse	Water is use to rinse out the processing area from remaining deposit and detergent residues.
Sanitization	Disinfection and surface conditioning process.
Final rinse	Water is circulated until the required degree of clealiness is reached. Then proceed with production activity.

All industries have their own degree of cleanliness to attain. This degree of cleanliness can be down to the nano-scale, also known as atomically clean. Physically clean aims to clean the surface until it looks clean but chemical residues may remain. Chemically clean ensures the surface is fully clean from any substance that may affect product processing. Biologically clean means that the surface has a level of microorganisms that is not harmful.

Normally, the objective of CIP in food production is to have a chemically clean surface. There are two types of CIP treatment that are recognised in milk processing (Timperley & Smeulders, 1987):

i) Two-stage: the first stage uses alkali while the second stage uses an acid base.

ii) Single-stage: a formulated detergent is used, which contain compounds, such as sodium hydroxide, surface active and chelating agents, to enhance cleaning.

Sodium hydroxide (NaOH) is a common cleaning chemical and has been used in several studies of food fouling (Cheow & Jackson, 1982a; Romney, 1990; Bird & Fryer, 1991; Gillham, 1997; Liu *et al.*, 2007). Owing to its highly alkali condition (usually pH 12 to pH 13), NaOH promotes the break of peptide bonds in protein. However, acid is required to remove the mineral layer. The addition of sequestrents and detergents in single-stage cleaning chemicals enable both deposits to be removed simultaneously.

Several researchers have studied the optimisation of the CIP processes. Hiddink & Brinkman (1984) and Timperley & Smeulders (1987) compared the two types of CIP treatment and found that the single-stage treatment is more economical due to reductions in rinsed water, energy consumption and downtime. Smaili *et al.* (1999) scheduled and minimised the length of the cleaning periods to reduce the cost of cleaning in sugar processing plants, which are described in a series of papers (Smaili *et al.*, 2002b; Smaili *et al.*, 2002a). However, several studies have also been done to investigate the optimal cleaning for tropical food producers.

CONCLUSION

Malaysia's awareness of fouling deposit problems and the importance of cleaning in the food industry is very low. This is due to a lack of educational and promotional effort from the related authorities.

For an industrialist, without the proper cleaning technique, the production cost will significantly increase due to chemical usage, water wastage, maintenance work, heating of fuel, downtime and production loss. As for its effect on the public, the competitive price of convenient foods can be difficult to obtain and the over discharge of cleaning effluent can pollute our water resources.

Consequently, the related authorities must make sufficient efforts to comprehend the importance of cleaning, enforce a specific standard of CIP on the food industries, and educate Malaysian consumers on this issue. Industrialists must also take serious action to ensure that hygienic processing is maintained. As consumers, we should be aware of the current practice in modern countries that have a better control system for monitoring their food producers. ■

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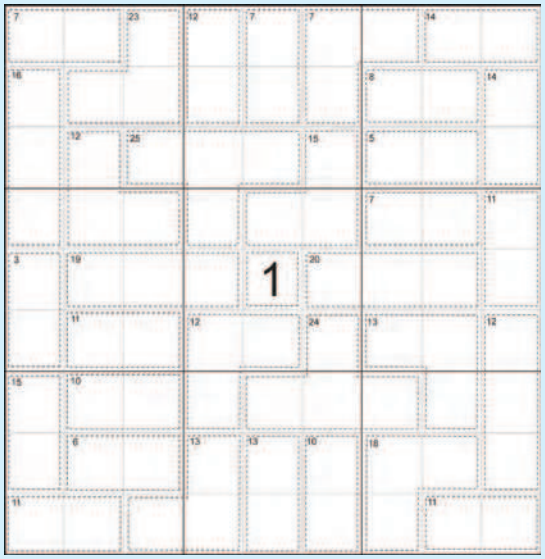

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by Mr. Lim Teck Guan

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(*Solution is on page 43 of this issue.*)

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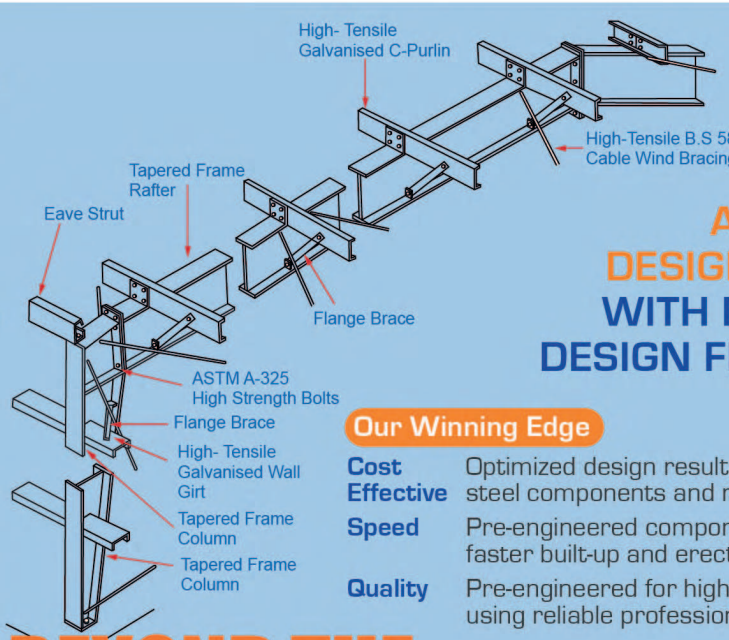

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Prospecting for Green Technology in POME Treatment

by Ir. Kumar Subramaniam

One of the greatest issues encountered in the palm oil industry has been the quality of treated palm oil mill effluent (POME) when discharged into the watercourses and local ecosystem, and the emission of methane gas from the POME treatment plant. Palm oil millers are desperately searching for a green technology that can bring the BOD (Biological Oxygen Demand) level of treated POME at final discharge to less than 20ppm to meet the requirements set by the Department of Environment.

A technical visit to Bangalore has been most fruitful. A suitable green technology in POME treatment was uncovered which can be applied directly to the palm oil industry in Malaysia and Indonesia. This new system of treating POME does not use any treatment ponds and there is practically no emission of methane gas from the system. The treated water can be used for land irrigation and cleaning purposes.

INTRODUCTION

The palm oil industry is the single largest agro-based industry in Malaysia, and it has been contributing effectively to the growth of our country. However, the industry has been closely associated with claims of pollution and environmental destruction by the foreign media for a long time now. One of the biggest issues highlighted has been the discharge of POME into the watercourses and local ecosystem.

The conventional POME treatment system in Malaysia, Indonesia and other oil palm growing countries is based on the retention pond system with a hydraulic retention time (HRT) of more than 120 days. POME is discharged daily from the mills depending on the operating capacity of the palm oil mill. About 0.8 m^3 of POME is produced for every 1.0MT of FFB (fresh fruit bunch) processed by the palm oil mill. The estimated amount of POME discharged by the mills (operating at 22 hours per day) is presented in Table 1.

Table 1: Mill capacity and amount of POME produced

Capacity (MT/Hour)	Volume/per hour (m^3)	Volume/per day (m^3)
20	16	352
30	24	328
45	36	792
60	48	1056
90	72	1584
120	96	2112

The treated POME is discharged to the watercourses at BOD levels ranging from 20ppm–100ppm on a daily basis. The land irrigation method is also being practiced to reduce the final discharge volume to the watercourses and ecosystem. The issues surrounding the final discharge of POME are:

i) The final volume of POME being discharged.
ii) The BOD level of POME at final discharge.
iii) The natural colour of POME at final discharge (due to the tannin).
iv) Pollution of river water and ecosystem.
v) Release of methane gas from the POME plants.

The Department of Environment is encouraging the industry to install the POME polishing plant into their POME treatment system to reduce the BOD level of POME at final discharge to less than 20ppm and to utilise all treated water for land irrigation. The ultimate objective in POME treatment is to minimise the amount of treated POME being discharged into the watercourses and ecosystem. A technical visit to the southern part of India was carried out by the author from 8-12 August 2011 with the aim of prospecting for an appropriate green technology in POME treatment for application in the Malaysian palm oil industry.

GREEN TECHNOLOGY IN POME TREATMENT

The visit provided an opportunity to see the rapid growth and development of palm oil related technologies in the palm oil industry in India. The author visited two palm oil mills in the South Indian state of Andra Pradesh to see the zero ponds and higher biogas generation projects that were undertaken there. In contrast to the open lagoon (pond) systems that pollute the underground water and emit methane gas into the atmosphere, this technology overcomes both of these environmental problems, thus making it a totally green technology. The following are brief descriptions of the POME treatment processes which consist of four main components, namely, (a) Pre-treatment, (b) Anaerobic treatment, (c) Aerobic Treatment and Tertiary Treatment.

(a) Pre-Treatment of POME

Depending on the topography of the site, the raw effluent is conveyed to the treatment site using a suitably designed channel or a closed pipe. POME enters a screen chamber which removes floating materials, and then enters an oil-grease trap to remove the free oil. After that, it enters the equalization tank (EQT) for the purpose of equalisation and surge control. The POME from the EQT is then pumped into the plate heat exchanger (PHE) to reduce the temperature.

(b) Anaerobic Treatment of POME

The Stirred Anaerobic Reactor (SAR) is a non-media, continuously stirred tank reactor. It operates best within the mesophillic temperature range of 36°C to 39°C. The foundation of the tank is designed according to the soil type at the location. On soft ground, a floating type foundation that can ensure equal settlement is preferred. The tank reactor is fabricated at site using mild steel plates and structural members, conforming to internationally accepted engineering design codes. The inside of the reactor is sand blasted and painted using chlorinated rubber paint. The external surface of the tank reactor is wire brushed, cleaned and painted using synthetic enamel or aluminum paint.

Raw POME is introduced into the tank reactor from the top. Recycled sludge is also added from the top of the reactor. The mixed liquor travels downward through the central shaft in which an agitator provides an adequate mixing of raw waste and recycled sludge. The mixed liquor flows out of the central shaft into the reactor near the bottom of the tank. A set of agitators is located equidistant along the circumference of the reactor to mix the liquor thoroughly. The constant agitation helps to maintain the active bacteria in suspension while the bacteria utilise the organic matter present in the wastewater to produce biogas.

At the outlet of the reactor, the solids are separated from the liquids using the Lamella Clarifier and are pumped back into the system. The recirculation of settled solids helps to maintain an adequate population of active bacteria inside the reactor. The reactor is designed with the following accessories to ensure the efficient performance and safety of the reactor:

- Overflow point that serves as pressure breakers in case of emergencies.
- Pressure breaker and vacuum breaker, if pressure exceeds the operating range.
- Flare stack to flare the biogas generated if it is not used.
- Gas flow meter to record the quantity of gas generated.

The treated effluent of the reactor is discharged from the top of the reactor and the head available can be utilised. Biogas is produced by the anaerobic digestion inside the reactor and is collected from the reactor roof. This biogas is then transferred to a floating type gas holder which is fitted with all the essential safety equipment such as breather valve, flame arrestor, etc.

(c) Aerobic Treatment of POME

The overflow from the Lamella Clarifier enters into a Conventional Aeration Tank (CAT). In the CAT, the microorganisms degrade the soluble organics aerobically. To provide the required population of bacteria in the CAT, a specific concentration of the mixed liquor suspended solids (MLSS) is maintained. This is done to maintain the requisite MLSS and food to micro-organisms ratio (F/M). Some of the settled sludge from the clarifier is re-circulated back to the aeration tank. A fixed surface aerator is used to provide oxygen to the bacteria.

The mixed liquor from the CAT enters the central well of the Lamella Clarifier, and separates the sludge and the liquid. The clarifier is a hopper bottom circular tank with a centrally driven clarifier mechanism, and the solids settle at the hopper bottom after passing through tube settlers. The supernatant from the clarifier overflows the peripheral launder uniformly. Part of the sludge from the clarifier is re-circulated back to the aeration tank while the balance of the sludge is dried for disposal.

The overflow of the clarifier enters the Extended Aeration Tank (EAT) in which the microorganisms degrade the soluble organics aerobically. As in the CAT, the requisite MLSS and F/M is maintained, and part of the settled sludge from the clarifier is re-circulated back to the aeration tank. A surface aeration system is used to provide oxygen to the bacteria.

The mixed liquor from the EAT enters the central well of a second clarifier to separate the sludge and the liquid. As previously mentioned, the solids settle at the hopper bottom and the supernatant overflows the peripheral launder. Part of the sludge is re-circulated back to the aeration tank while the balance is dried and disposed of.

(d) Tertiary Treatment of POME

A chlorine solution is added to the treated affluent for disinfection and is adjusted to maintain a residual chlorine concentration of 0.5ppm-1.0ppm. A baffled wall channel constructed in RCC M-20 is provided. The chlorinated effluent is then pumped to a multi-grade filter to remove the suspended solids. The multi-grade filter consists of a

cylindrical mild steel vessel with dished ends while the filter media is in the form of sand and gravel.

The effluent is then pumped from the multi-grade filter to an activated carbon filter to remove the suspended solids, colour, odour, etc. The activated carbon filter consists of a cylindrical mild steel vessel with dished ends and the filter media is in the form of activated carbon.

The treated effluent is temporarily stored in a storage tank and can be used for crop irrigation, as well as gardening, floor washing, and other cleaning purposes. The sludge is sufficiently mineralised in the aerobic digestion and does not need any further treatment before dewatering and disposal. Sand filtration drying beds is used to dewater the sludge which is then sun-dried. Sludge drying beds are constructed in brick masonry with a sand media supported by a gravel bed and suitable under-drainage arrangement.

CONCLUDING REMARKS

The technical visit to Bangalore has been most fruitful. A suitable Green Technology in POME treatment was uncovered and it can be applied directly in the palm oil industry in Malaysia and Indonesia. This Green Technology is widely being used in India in the sugar refineries, distilleries and breweries industries for more than 15 years and has recently been adapted for use in the palm oil industries over the last 5 years. This new system of treating POME does not use any treatment ponds and there is practically no emission of methane gas from the system. The treated water can be used for land irrigation to reduce final volume of discharge to natural water resources.

The future of Waste Water Technology should emphasize on the followings:

i) Reduced volume of treated waste water discharge. This could be done at upstream level by reducing water usage in the recovery process too.
ii) Reduced BOD / COD / Suspended Solids as per to allowed level without great fluctuation to maintain stable discharge quality.
iii) Capture of methane gas and firing into existing boilers or gas engines to produce green power and reduce dependency on fossil fuel.
iv) Avoid conventional earthwork pond system to protect ground water quality and avoid contamination. Glass coated or steel tanks to be used to reduce land usage.
v) To build high technology waste treatment plants and operated by educated Environmental Engineers and not by ordinary operators.

All industry waste must be reduced, recycled and treated to required quality in line with green technology guidelines to preserve our environment. ■

RM2.5 Billion Property Venture for IIB and China Firm

Iskandar Investment Bhd (IIB) and China-based Qingdao Zhuoyuan Investment Holdings (Zhuoyuan), a subsidiary of real estate developer Zhuoda Real Estate Group, have entered into two framework agreements to develop mixed residential and commercial projects in Medini Iskandar Malaysia in Johor. Medini is IIB's flagship development in Medini North, its leisure and tourism area. The gross development value and gross development cost of the project is estimated at RM2.5 billion and RM1.85 billion respectively. The first two of the three-phase project will be jointly developed by IIB and Zhuoyuan, while the latter will develop the third phase on its own.

IIB president and chief executive officer Datuk Syed Mohamed Syed Ibrahim said that the project was expected to be completed over the next 10 to 15 years and that work on the first phase would start next year. The first framework agreement is for the formation of a joint venture between IIB and Zhuoyuan to develop a residential project on an 18.14-acre plot in Medini North. The project would have a total sales value (TSV) of RM157.6 million, with the estimated investment reaching RM1.2 billion. The second framework agreement is for the sale of lease for a 9.74-acre plot for mixed-use development, also in Medini, which would have a TSV of RM70.8 million, with an estimated total investment of RM520 million.

(Sourced from The Star)

TNB Unit Secures KLIA 2 Jobs

Tenaga Nasional Bhd (TNB) has struck a deal with Malaysia Airports Holdings Bhd (MAHB) to build a 132kV sub-station and a district cooling plant for the supply of chilled water and electricity at the new low-cost carrier terminal, also known as KLIA2, in Sepang, Selangor. The generation plant would supply energy cooling to the airport's core facilities, comprising the terminal building, with 250,000sqm of covered area, and for private facilities at the integrated complex. The deal is for a build-operate-transfer model for a concession period of up to 20 years. TNB unit Airport Cooling Energy Supply Sdn Bhd is the concessionaire for the project. TNB stated that 80% of the KLIA2 generation plant project's cost of RM388 million would be funded through external borrowings while the balance would be via shareholders' equity. Meanwhile, MAHB will take a 23% stake in Airport Cooling Energy Supply with the balance owned by TNB's wholly-owned subsidiary, TNB Engineering Corporation Sdn Bhd.

(Sourced from BERNAMA)

Petronas Praised for Bringing RM45 Billion Worth of Projects to Sabah

According to the Sabah Oil and Gas Contractors Association (SOGCA), the state's oil and gas industry has been energised by downstream oil and gas projects following the discovery of oil and gas resources offshore Sabah. Its president Datuk Iskandar Malik thanked Petronas for bringing in the mega projects into Sabah, describing them as "a windfall for the people of Malaysia and Sabah in particular". He added that SOGCA was well-positioned to continue its drive as the premier organisation representing Sabah's own petroleum industry contractors and stakeholders.

(Sourced from BERNAMA)

RM638 Million Contract in Sri Lanka Secured by KNM Subsidiary

A subsidiary of Octagon Consolidated Bhd has awarded KNM Process Systems Sdn Bhd, a subsidiary of KNM Group Bhd, a conditional US$200 million (RM638 million) contract to build a waste-to-energy plant in Sri Lanka. The contract is for the engineering, procurement, construction and commissioning (EPCC) of a plant with capacity to process up to 1,000 tonnes per day of municipal solid waste for generation of a minimum of 40MW of gross electrical energy in Karadiyana on turnkey EPCC basis. The contract, to be implemented under a public-private-partnership between Octagon's subsidiary and the Waste Management Authority of Western Province, an agency under the government of Sri Lanka, was conditional to the signing of a definitive agreement, based on terms and conditions acceptable to the parties by December 2011.

(Sourced from The Star)

Hock Seng Lee Awarded RM90.3 Million Score Contract

Regional Corridor Development Authority (Recoda) has awarded Hock Seng Lee Bhd (HSL) a RM90.3 million contract for a new rural water treatment plant project in Samalaju, Bintulu, in the Sarawak Corridor of Renewable Energy (Score). This will be the second water treatment plant to be built in Samalaju to serve the energy-intensive industries there. HSL managing director Datuk Paul Yu Chee Hoe said that the scope of works for the water supply project includes substantial mechanical and electrical works, earthworks, drainage and retaining structures, piling, piping and actual construction of the treatment plant and associated works. The treatment plant would comprise a pump house, chemical house, aerators, flocculation tanks, sedimentation tanks and other filtration process facilities.

(Sourced fromThe Star)

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SAFE TEA TIME

Staying Within the Line

by Ir. Shum Keng Yan

AN understanding on how the law impacts our business is crucial. I am sure not many company directors have a good understanding of the Occupational Safety and Health Act. So where shall we start?

The main idea is to establish a process whereby we can be updated on the changes in regulations and take appropriate actions to meet the requirements. We then need to communicate these to the relevant stakeholders in the organisation.

In larger organisations, you might be able to tap the legal department for advice. Some even subscribe to sites that provide regulatory updates. However, the regulator's website remains one of the best sources.

Fortunately in Malaysia, we can obtain the safety legislations online (http://www.dosh.gov.my/doshv2/). In many countries, you can only obtain part of the legislations for free. There will be other legislations which are specific to your industry.

Many companies use Legal Registers to monitor compliance to the legislations. The Legal Register lists out the laws and legislations applicable to the respective business. The current state of compliance is then determined. Actions are then assigned to the Person in Charge with the agreed due dates. The Table of Contents lists out all the legislations applicable to the business and the current status of where it is applicable or not applicable (refer to Table 1 below).

In the most basic way, an Excel sheet can be used. In more complex organisations, online applications are utilised. Let me share a format which I found to be useful. Please do note that Legal Registers are by no means an end to itself.

Each key requirement in the legislation is checked for applicability. If it is currently not applicable but can be applicable in the future (e.g. in cases where headcount is stated as a threshold before a certain action needs to be taken), then a note is included.

Any licences or approval that is stated in the legislation should be obtained. The requirements are then communicated to the relevant stakeholders or affected parties. A Person in Charge is assigned to action as required. This register is reviewed whenever there is a change in the regulations, when the organisation crosses the threshold or at a defined interval (refer to Table 2 below).

I would like to caution that the Legal Register is just a tool, but one that is widely used in the industry. I am also interested in gathering a list of safety-related legislations (especially from different industry sectors). If you are keen to share, just drop your list off at *pub@iem.org.my*. ■

Merry Christmas and a Happy New Year 2012!
May you have a safe and healthy year ahead!

Table 1: Environmental, Health and Safety Legal Register

No	Legislation	Title	Status	Current Update	Comments	Next Review Date	Status
1							
2							
3							
4							

Table 2: Each of the legislations is then analysed in more detail

Legislation	Key Requirements	Reference document	Applicability (Y/N) (if N-provide reason)	Key thresholds to note in the future	Licences / Permits / Approvals Required	Affected Parties	Compliance status (Compliant / Need improvement) - put in comments	Action(s) required (if "Need improvement")	Person in charge	Date Due

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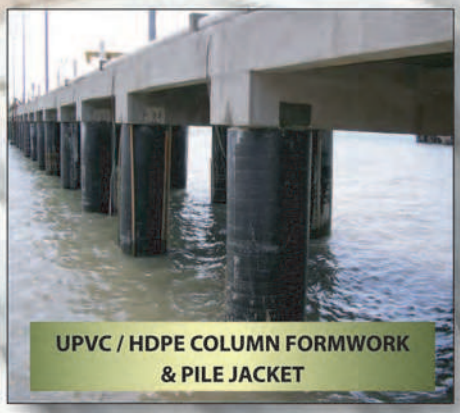

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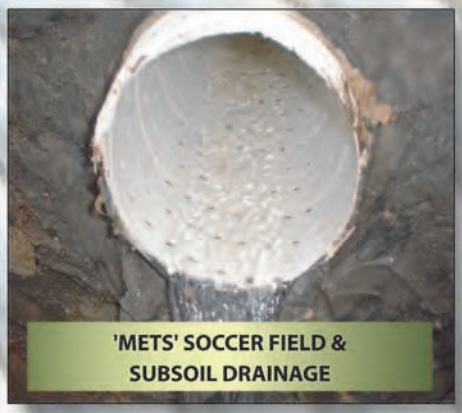

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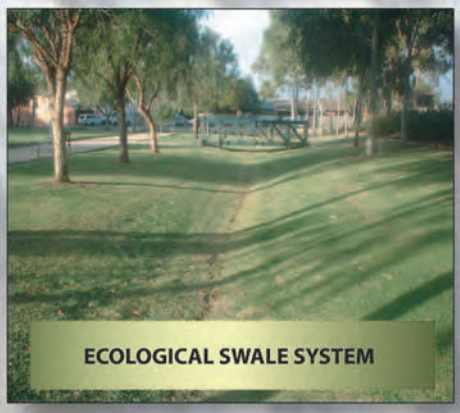

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Technical Visit to Modipalm Engineering Sdn Bhd

by Ir. Yong Hong Liang

AGRICULTURAL AND FOOD ENGINEERING TECHNICAL DIVISION

THE Agricultural and Food Engineering Technical Division organised a technical visit to Modipalm Engineering Sdn Bhd (Modipalm), a wholly owned subsidiary of CB Industrial Product Holding Bhd (CBIP) on 24 September 2011. Modipalm is located at Telok Panglima Garang, Kuala Langat, Selangor.

Since 1979, Modipalm has been supplying palm oil mills in Malaysia and around the world with processing equipment and replacement parts. A total of 16 participants took part in the visit. During this visit, Modipalm's Senior Marketing Manager, Mr. Tai Tack Kow, introduced us to the background of CBIP and Modipalm, a public listed company that has a US$100 million turnover annually. To date, the company has sold more than 100 systems to its customers which include Felda, Tradewinds, Wilmar, Tabung Haji and Agro Indomas.

He also stated that 70% of the screw presses in the industry were fabricated by Modipalm. Their patented system, Continuous Sterilisation, which eliminates the use of a traditional steriliser, improves the oil extraction rate (OER) by 1% when compared with the conventional system. The benefits of this system are the smaller factory size required (5 ha) and the reduction in manpower by half.

Briefing and Q&A at the factory

IEM's token presentation to Modipalm Engineering Sdn Bhd

Mr. Tai also highlighted that Modipalm has improved the link chain used in the continuous steriliser with a higher strength link chain size, i.e. 16mm and 19mm, and reduced the length of the chain link by providing double deck sterilisers. The participants were then invited to visit the fabrication yard. Along the way, Mr. Tai gave a briefing of the products such as cage tipper, thresher, screw press, king cracker, digester and centrifuge.

The technical visit concluded with a "nasi briyani" lunch and the presentation of IEM's token of appreciation to Mr. Tai. ■

Engineering a Career in Agriculture and Food

by Dr Samsuzana Abd. Aziz and Ir. Assoc. Prof. Dr Azmi Yahya

AGRICULTURAL AND FOOD ENGINEERING TECHNICAL DIVISION

A programme to promote agricultural and food engineering was successfully conducted by the Department of Agricultural and Biological Engineering (DABE) together with the Department of Process and Food Engineering (DPFE) of Universiti Putra Malaysia (UPM) on 8 October 2011 at UPM's Faculty of Engineering. The programme, which was jointly organised by IEM, was themed "Engineering a Career in Agriculture and Food" and involved 390 students from local high schools, matriculation courses as well as current DABE and DPFE undergraduates.

The programme was officiated by Emeritus Prof. Dato' Ir. Dr Muhamad Zohadie Bardaie, Chairman of Perunding Bakti Sdn Bhd, who was the former Vice Chancellor of UPM. The opening remarks of the programme was given by the Head of DABE, Dr Khalina Abdan, who emphasized that the objectives of the programme were to increase the awareness of the importance of the agriculture and food sector to the country, to enrich the public's understanding of agricultural and food engineering, as well as to promote higher education, especially bachelor programmes in agricultural and food engineering offered by UPM's Faculty of Engineering. Other VVIPs who were present included the Dean of the Engineering Faculty of UPM, Prof. Dr Fakhru'l-Razi Ahmadun, and the Head of DPFE, Engr. Assoc. Prof. Dr Yus Aniza Yusof.

The highlight of the programme was the public lectures delivered by two distinguished personnel from the agriculture and food industry, En. Aziz@Awang Mat Ali, who is the Assistant Director of Agricultural Engineering Unit, Department of Agriculture Malaysia, and En. Abdul Aziz Isa, Sales Executive, Bank Pertanian Malaysia Berhad (Agrobank). En. Nazri talk's emphasized on the direction of the agricultural sector in the country, while En. Abdul Aziz shared the business opportunities that are available for fresh graduates in the agricultural sector.

Figure 1: Mr. Chan, Director of Maxtwo Engineering & Services Sdn Bhd, sharing his success stories after more than 10 years of involvement in the industry

A seminar on "Career Success Inspiration" from four successful DABE and DFPE alumni was the other highlight of the day. The distinguished alumni were Ir. Kumar Subramaniam, Project Manager and Consulting Engineer from SGT Konsult Sdn Bhd; Mr. Chan Kah Whye, Director of Maxtwo Engineering & Services Sdn Bhd; Mr. Tay Cheow Hwang, Production Engineer, Nestle' Manufacturing (Malaysia) Sdn Bhd; and Ir. Hj. Izhar Mahmood, Director of Plantation Operations, EPA Management Sdn Bhd. They shared valuable advice and their success stories after having been involved in the agricultural and food engineering industries for more than 10 years.

Figure 2: The "Engineering a Career in Agriculture and Food" programme was jointly organised by IEM and UPM

Figure 3: Fatin Abdul Rahman and Fathin Ayuni Azizan sharing their experiences on the mechanisation of apple picking operation using robotics and image processing, as interns at the Center for Precision and Automated Agricultural Systems, Prosser, Washington

Figure 4: Posters and booths showcasing outstanding and successful researches

Figure 5: Student projects in agricultural and food engineering

The final event of the day was the presentations of the Students Mobility Programme by several groups of DABE and DPFE undergraduate students who shared their learning experiences at the international universities they visited during the last semester break. Two of them went to the University of Florida, the United States, for an internship programme at Citrus Research and Education Centre for 10 weeks. Ngu Wei Pin and Lee Jia Ni, who are final year students of the Bachelor of Agricultural and Biosystems Engineering, shared their hands-on experience on research activities at the centre on the mechanisation of the citrus industries in Florida. They also talked on some interesting educational and cultural visits they made during the internship.

Another two students from the same course, Fatin Abdul Rahman and Fathin Ayuni Azizan, went to Washington State University, US, and worked as interns at the Center for Precision and Automated Agricultural Systems in Prosser, Washington. Apart from the educational and cultural learning experiences, they shared their study on the mechanisation of an apple picking operation using robotics and image processing. On the other hand, three Bachelor of Process and Food Engineering undergraduate students went to Universitat Zu Berlin, Germany, for a summer course on "Urban Agriculture". Tan Mei Mey, Wong Chiew Chan and Gan Kok Yong, jointly presented a very interesting talk on the current practice of urban agriculture in big cities such as Humboldt in Germany.

The final presentation was from Nor Amira Farhana Harun, Nuratika Ali, Nur Salihah Buang, Nurul Buhirah Abd Rahman and Liyana Annisa Zaini, who were undergraduate students of Process and Food Engineering. These students spent their semester break at Fatih University, Turkey, for a period of two weeks. They presented an interesting learning experience on the educational and cultural heritage of Turkey since the early Ottoman Empire.

Showcases of outstanding and successful research and findings in agricultural and food engineering from the faculty members of both departments were exhibited in parallel during the full day event. There were booths featuring research on robotics and mechanisation such as Conceptual Agricultural Robot, Pineapple Multi-peeler and Automated Blender-Cooker for Paste Making, and also posters showcasing other fields of research such as GIS and remote sensing, bio-information systems, soil, water and environmental engineering as well as food process and production engineering. The exhibitions aimed not only to be a platform for researchers and faculty members to highlight their work and latest findings to the public, but also to attract students and introduce innovation and engineering design in their daily lives.

The director of the programme, Dr Samsuzana Abd Aziz, said the event had successfully enhanced the understanding of agricultural and food engineering not only to college students, but also to high school students, teachers, parents and the general public. ■

Half-Day Talk on "Managing Beyond Stormwater Treatment – A New Approach using CDS Technology"

by Ir. Dr John Eow

IEM SOUTHERN BRANCH

IEM Southern Branch recently invited Mr. Yale Wong, Managing Director of Ecoclean Technology Sdn Bhd, to present a half-day talk on stormwater management using the Continuous Deflective Separation (CDS) technology on 21 May 2011 at The Zon Regency Hotel, Johor Bahru. The talk was chaired by Ir. Dr John Eow, and was attended by more than 50 participants.

For the first part of his talk, Mr. Wong explained the concept of CDS technology, which is an innovative non-blocking screening technology for the separation of solids from liquid streams. Unlike direct screening, CDS utilises the principle of indirect screening where the particles are carried by the flow across the face of the screen. This, in conjunction with hydraulic balancing across the screen, delivers a process capable of removing solids from high flows of water and wastewater. Figure 1(a&b) illustrates the comparison between a normal direct filter screen and the CDS indirect screening technology. With normal direct filter screening, particles impact directly on the screen and eventually cause blinding [see Figure 1(a)]. With CDS indirect screening, particles sweep past the screen which remains clear [see Figure 1(b)].

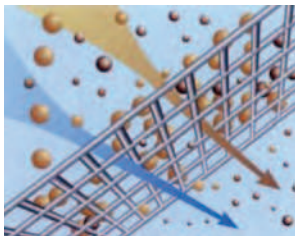

Figure 1(a): Normal Direct Screening

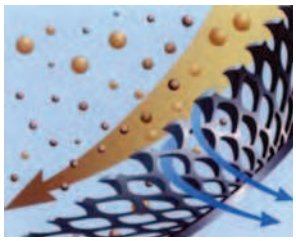

Figure 1(b): Indirect CDS Screening Technology

The indirect CDS Screening Technology utilises a cylindrical screen with tangential inlet for the fluid above the screen and a sump below the screen. The tangentially introduced flow rotates inside the screen, keeping the screen surface free of solids while the fluid passes through each of the apertures in the screen. Solids will be retained inside the screen on the rotating column of fluid if of neutral density, sink into the sump if settleable, or float to the surface of the fluid in the unit. Characteristics of the CDS technology include non-blinding operation, high loading rates (up to 32m³/s), capture performance that is independent of flow rate, and low operation and maintenance requirements and no electrical power cost.

Figure 2 illustrates a CDS unit in operation, and its performance is summarised in Table 1. It is claimed that CDS is the only non-blocking screening technology independently validated by world-class research organisations such as CSIRO (Commonwealth Scientific & Industrial Research Organization), CRCCH (Co-operative Research Centre for Catchment Hydrology) and UCLA (University of California Los Angeles). In Malaysia, successful CDS stormwater management projects include several rivers within the Iskandar Development Region, Puteri Harbour, Nusajaya, Medini Development, Legoland, Putrajaya precincts, Bandar Botanic (Parcel A) in Klang and the University of Nottingham in Selangor.

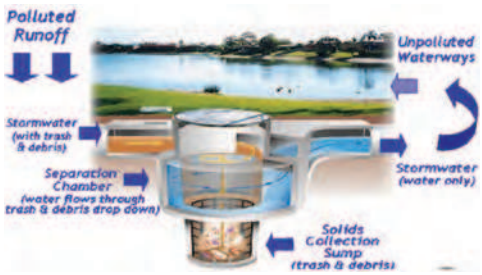

Figure 2: CDS unit in stormwater treatment operation

The CDS technology has also been adapted to operate in raw sewage. There are also CDS units in use for screening of coolants, food processing, potable water intakes, coal fines separation and wash-down yards. Today, the range of products include surface and rainwater treatment devices, sewer mining process appliances for water re-use and smart water plants to class A water re-use. These units remove solids that include man-made litter, organic material (leaves, twigs, etc), and sediments from the influent.

Table 1: Typical performance of the CDS screening technology

Description	Capture Rate
Gross Pollutants (> 5mm)	98%
Coarse Sediment (> 0.2mm)	90%
Suspended Solids (TSS)	70%
Total Phosphorus (TP)	30%
Free Oil	95%

Recently, Shell has used CDS technology for stormwater management, and the Shell 3 building in Cyberjaya has recently won the country's first LEED certified Gold category Green Building.

Last but not least, IEM Southern Branch is very grateful to Mr. Wong for his invaluable contribution to the knowledge of local practising engineers in the field of stormwater management. The speaker was presented with IEM souvenirs by Ir. Mohd Khir Muhammad, the Chairman of IEM Southern Branch. For more information on CDS Screening Technology, Mr. Wong can be contacted at *yalewong@ecoclean.com.my* ■

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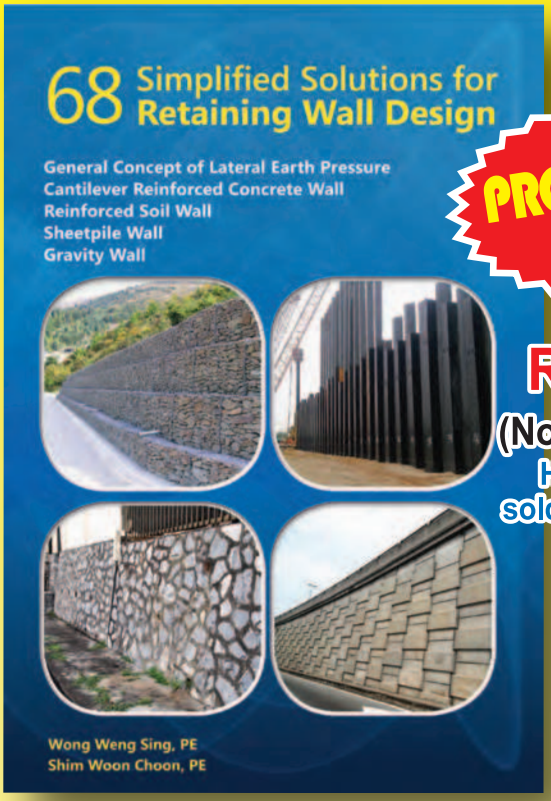

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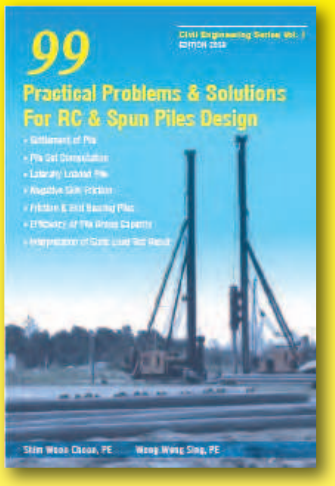

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Visit to The Meteorological Station at Cameron Highlands

by Ir. Assoc. Prof. Dr Jeffrey Chiang

TECHNICAL COMMITTEE ON WIND LOADING

THE visit was organised by the IEM Technical Committee (TC) on Wind Loads which is chaired by Ir. Assoc. Prof. Dr Jeffrey Chiang. The other Technical Committee members involved in the visit are Ir. MC Hee, Ir. Tu Yong Eng and Mr. Tan Huvi Vein. Incidentally, Mr. Tan is also a senior officer of the Malaysian Meteorological Department (MMD) and was instrumental in organising the visit on behalf of the Technical Committee.

On 23 April 2011, the delegation departed by bus from Bangunan Ingenieur at about 8.30am, and reached the Meteorological Station at Cameron Highlands at about 12.00pm, via the Tapah exit point along the North-South Expressway. The uphill drive was quite long and winding, but the traffic was sparse due to the off-peak tourist season.

On hand to welcome the delegation was the Officer-in-Charge, Mr. Ong Lian Poh, who graciously took the visitors for a sumptuous lunch at a nearby restaurant in Brinchang town.

Figure 1: Mr. Chan, Director of Maxtwo Engineering & Services Sdn Bhd, sharing his success stories after more than 10 years in the industry

After lunch, Mr. Ong proceeded to give a first-hand hour-long tour of the station's facilities, in particular, the measuring instruments at the rear compound of the station. In addition, the visitors were also shown the newly constructed tower block which houses some of the more impressive and latest computerised recording machines, which took up one of the upper floors. Wind speed recordings are all automatically captured and sent electronically to the main MMD Headquarters in Petaling Jaya. As in most parts of the Peninsula, wind speeds there are dominated by thunderstorm downbursts.

The objective of the visit was for the TC members to have a first-hand look at the typical layout of wind speed measuring instruments in MMD stations located in Peninsular Malaysia. Since the TC has been tasked to review the current Malaysian Wind Code MS1553:2002, there is a possibility that the wind speed data presented therein may have to be updated. The committee is also considering the possibility of adopting Eurocode 1-4 Wind Actions, like what Singapore has done. It has to be mentioned here that the current MS1553 prescribed 3-second gust wind speeds, which is suitable for Malaysia due to its frequent thunderstorm winds, whereas Eurocode 1-4 recommends 10-min hourly wind speeds which is more suited for prevalent winds found in northern Europe. More in-depth study has to be carried out by the IEM TC, provided the requested financial support is forthcoming from the Department of Standards Malaysia (DSM).

A previous visit by the TC was made to the MMD station located at the old Subang Airport, which is on flat terrain with hillslopes about 2-3km away. For the Cameron Highland visit, the committee had a chance to observe how the various wind speed measuring instruments were sited atop a steep hill which is located a short distance away from the main street of Brinchang town. Besides the wind speed detection instruments, other equipment are also available, including devices for measuring air quality (as part of the global atmosphere watch station), rainfall collection and other readings. The location is good as there are minimum obstacles all round, although the surrounding hillslope areas are being cut and used for resort development. Very soon, the terrain in the vicinity may change with more high-rise resort buildings being built for holidaymakers.

The delegation was surprised to learn that a nuclear radiation detection facility was also housed in the MMD station compound – it sits right next to the existing building. It is exclusively off-limits to visitors, hence Mr. Ong could only give a verbal explanation of its function, which is essentially to constantly monitor the amount of radiation in the surrounding environment emitted from local as well as regional sources. The recent triple disaster on 11 March 2011 in Eastern Japan came to mind, with the nuclear plant crisis which followed the magnitude 9.0 earthquake and the ensuing 10m high tsunami hitting the eastern shores of Japan.

As a matter of interest, the area in the vicinity of Ipoh city generally has a higher wind speed than other parts of Peninsular Malaysia. For example, for a return period of 50 years, the wind speeds for selected urbanised areas are as follows:

Table 1: Typical wind speeds in major locations [Source: MS1553:2002]

Town	Wind speed (m/s)
Ipoh	33.5
Cameron Highland	26.8
Subang	32.1
Melaka	29.4
Bayan Lepas	27.5
Senai	29.1
Mersing	32.0
Kuantan	29.8
Kota Bahru	32.4
Kuching	32.6
Kota Kinabalu	30.5

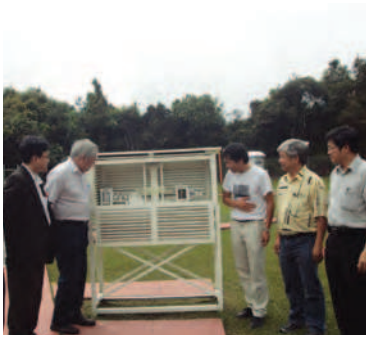

Figure 2: Mr. Ong explaining the use of the hydrograph and thermograph instruments

Figure 3: Further demonstration was given on a sub-grounded rain catchment measuring device.

Towards the end of the on-site briefing and tour, Mr. Ong treated the visitors to some of the highlands' renowned fresh fruits and pastries from nearby farms. At the end of the visit, the head of the delegation, Ir. Assoc. Prof. Dr Chiang thanked the gracious host for the kind hospitality extended to the IEM delegation, and presented a souvenir to Mr. Ong.

The delegation departed from the station at 4.30pm, and the bus arrived safely back at the IEM Headquarters at 7.30pm. The visit had been very enlightening and refreshing in more ways than one, and the IEM TC would like to thank MMD for kindly consenting to and hosting the visit.

The TC will continue the collaborative effort between its Working Group 2 with the MMD technical staff, by jointly carrying out rigorous wind speed data analysis, based on the numerous wind speed records of all the MMD stations. Once the data is harmonised, a set of reasonable and accepted wind speeds for all parts of Peninsular Malaysia can be established. ■

Announcement

Current and past issues of JURUTERA, the monthly Bulletin of IEM, may now be viewed or downloaded from the IEM portal, at *www.myiem.org.my*.

SHAIKY'S VIEW CARTOON BOOK

The cartoons appearing in Shaiky's View are now available in a professionally designed, 28 x 22 cm hard cover coffee table copy titled "*The Engineer*". This limited edition contains more than 180 cartoons dealing with engineering and construction.

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Technical Visit to Sungai Prai Swing Bridge Project

by Ir. Dr Jumat Ahmad

HIGHWAY AND TRANSPORTATION ENGINEERING TECHNICAL DIVISION

ON 2 July 2011, the Highway and Transportation Engineering Technical Division (HTETD) organised a technical visit to the Swing Bridge project at Sungai Prai, Penang. The technical visit was hosted by MMC-Gamuda Joint Venture Sdn Bhd, the main contractor for the northern Electrified Double Track Project (EDTP) between Ipoh and Padang Besar.

The visit was attended by 15 members of IEM led by AFETD committee member Ir. Dr Jumat Ahmad. The group arrived at the site office at around 11am and was welcomed by the project director for the design and construction team, Dr Khoo Ping Sen who provided the technical briefing.

The technical briefing covered the development status, project general arrangement, swing bridge moving mechanism, and challenges encountered at the construction site. Estimated at more than RM100 million, the swing bridge was designed by Waagner-Biro Stahlbau AG from Vienna, Austria. The electrification, signalling and communications systems are from Balfour Beatty Ansaldo Systems JV Sdn Bhd, United Kingdom. Basic details of the Swing Bridge are indicated in Table 1.0.

Table 1.0: Swing Bridge Details

Item	Wind speed (m/s)
Length	4 x 38.42m + 2 x 45.0m (Swing Bridge) + 1 x 36.5m = 280.18m
Horizontal Alignment	Tangent Track (Except for about 90m at the entry of the Sungai Prai Bridge on a 525m radius curve)
Vertical Gradient	0%
Speed	Design Speed: 60km/h Operating Speed: 50km/h

The 329km long northern EDTP package comprises the design and construction of the infrastructure and systems. The contract involves the laying of two new parallel tracks to replace the existing single track. It also includes the construction of new stations, bridges, as well as the installation of modern electrification, communications and signalling systems. According to Dr Khoo, the new swing bridge, which is part of the EDTP package, is already more than 45% complete. The bridge is scheduled to be ready by 2012.

Photo 1: Completed piling work for pier

Photo 2: IEM showing its appreciation to the host

Photo 3: A group photo of the HTETD delegates

Photo 4: An artist's impression of the new swing bridge

Once completed, the bridge will be an iconic structure on the Butterworth Outer Ring Road (BORR). The bridge that crosses Sungai Prai will have a 90m mid-span section. Through a unique design, the bridge is able to rotate and swing. This was designed to allow unrestricted movement of ships and marine vessels navigating along Sungai Prai. Table 2.0 shows the design characteristics of the bridge.

The new Sungai Prai Swing Bridge will replace the existing 40-year-old single-track railway bridge which was built by Keretapi Tanah Melayu Bhd (KTMB) in the 1960s. Six piers will be constructed to support the overall bridge length of 282m across Sungai Prai. The new swing bridge will be located between Pier No. 4 and Pier No. 6 and will be electro-hydraulic driven. The swing bridge will be monitored continuously from the KTMB control station. It will swing and operate at a 72.3-degree angle rotation with Pier No.5 functioning as the pivot for the moving mechanisms. Table 3.0 indicates the design criteria for the bridge.

Table 2.0: Sungai Prai Design Characteristics

Swing Bridge	• Ballastless Track System • Steel Sleepers Supported On Steel Deck • Sail Structure Formed By Steel Plates • Vessel Protections System Provided
Approach Structure	• Ballasted Track System • Conventional Beam & Slab System

Table 3.0: Sungai Prai Bridge Design Criteria

Total Swing Bridge Length	90m
Total Deck Weight	approx. 1100 tonnes
Operation Angle	approx. 72.3 degree
Drive	Electro-hydraulic operated
Total Operation Time	approx. 5 minutes to fully open and vice versa

The project director admitted that there might be some challenges in completing the project. The main issue relates to the design and installation of the electrical and hydraulic interfacing system with the rail locking mechanisms to ensure reliability of locking during the open or close operation.

The lift and turn mechanism at the centre pivot has to be engaged or repositioned correctly after the rotation or swing. This is to ensure that the track is properly locked. Nevertheless, he was confident that the challenges would be overcome, and not cause any delay in the delivery schedule.

After lunch, the delegates were brought to visit the site. We managed to see the progress of piling works and the completed approach on the Butterworth side. We noticed how well the working area was organised by the experienced contractor. Some piling points for the bridge piers were driven by the stationed piling barge at Sungai Prai. We also witnessed the formwork preparation for the bridge slab deck and substructure platforms at the fabrication yard.

The technical visit ended after a site photography session. Through this visit, the participants were able to gain a better understanding of design techniques, applications and construction of the swing bridge. ■

ERRATA

In the article entitled "Issues Raised by the Application of Eurocode 7 to the Design of Reinforced Soil Structures" published in the October 2011 issue of Jurutera, the author's name should be spelt as Mr. Michael Dobie. On page 14, "b" should be read as "ß" in Figure 3, while the formula in the first column should be read as $P_v = 0.5\gamma N\gamma X\gamma L_{eff}^2$. On page 19, the first equation in the left column should be read as

$$F = \frac{1}{\Lambda_{GEO}} = \frac{R\frac{1}{\gamma_{Re}}\sum\left[\frac{c'}{\gamma_{c'}}b_n + (\gamma_{G,fav}W_n + \gamma_{Q,fav}Q_n - ub_n)\frac{tan\phi'}{\gamma_{\phi'}}\right]\frac{sec\alpha_n}{\left[1+\frac{tan\phi' tan\alpha_n}{\gamma_{\phi'}}\right]}}{R\sum(\gamma_G W_n + \gamma_Q Q_n)sin\alpha_n}$$

while the first equation in the right column should be read as

$$F = \frac{1}{\Lambda_{GEO}} = \frac{R\sum\left[c'b_n + (\gamma_G W_n + \gamma_Q Q_n - ub_n)tan\phi'\right]\frac{sec\alpha_n}{[1+tan\phi' tan\alpha_n]}}{\gamma_{Re}R\sum(\gamma_G W_n + \gamma_Q Q_n)sin\alpha_n}$$

instead of as published. We apologise for the errors.

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(The donation list to the Wisma IEM Building Fund is published on page 41)

One-Day Seminar on Road Safety Audit

by Engr. Dr Khoo Hooi Ling

HIGHWAY AND TRANSPORTATION ENGINEERING TECHNICAL DIVISION

THE Highway and Transportation Engineering Technical Division (HTETD) held a one-day seminar on "Road Safety Audit" at the C&S Lecture Room, Wisma IEM on 28 March 2011. The talk was conducted by three speakers, namely, Ir. Mohd. Shahrom Ahmad Saman, Ir. Richard Wong Chuen Fun and Ir. Aik Siaw Kong.

Ir. Mohd. Shahrom is an accredited road safety auditor. He is one of the leading experts on road safety auditing and accident investigation in the Public Works Department (PWD). According to him, road safety audit is a formal examination of the planning, design and construction of a road project to identify any potentially unsafe feature or operational arrangement that may adversely affect the safety of any road user.

The audit is conducted by independent and qualified examiners. In fact, the road safety audit is an effective accident prevention strategy, while the blackspot technique is useful as an accident reduction countermeasure. He went on to introduce the "Nota Teknik (Jalan) 25/07 - Guidelines on the contents of a road safety audit".

Published by the PWD, the guidelines are used when evaluating new or existing road design in the country to ensure that road safety issues are properly addressed. Ir. Mohd Shahrom shared various case studies with the audience and discussed the deficiency of road design and operational problems. He also highlighted different types of countermeasure strategies to overcome these deficiencies.

The second speaker was Ir. Wong, who is the principal of RW Consultancy and an accredited road safety auditor who has more than 25 years of experience. He highlighted the five important stages in conducting the road safety audit, namely, the planning and feasibility, preliminary design, detailed design, construction and pre-opening, and operation stages.

He indicated the important features to be considered in each of these stages and highlighted the relevant guidelines used. Some of the important elements which have to be considered are vertical and horizontal alignments, cross sections, sight distances, auxiliary lanes, traffic islands and kerbs, traffic signs and signals, road markings and delineation, street lights and clear zones, and road safety barriers.

The third speaker was Ir. Aik, Director of Pakatan Jurutera Pintar Sdn Bhd and a registered road safety auditor who has more than 25 years of experience. In his presentation, he explained some common issues which are important to be considered during a road safety audit. He presented various case studies with drawings to highlight these issues.

Ir. Richard Wong Chuen Fun | *Ir. Mohd Shahrom Ahmad Saman* | *Ir. Aik Siaw Kong*

Next, Ir. Aik discussed how the needs of vulnerable users are taken care of under a road safety audit. In addition, he also explained the types of information required in managing a road safety audit. This includes project scope, statement of project, guidelines, drawings, etc. He stressed that in order to achieve the optimal benefits from a road safety audit, the auditing process should start at the early stage and the auditor should be appointed as a team member to facilitate the design process.

Throughout the course, all three speakers had provided valuable information and cited case studies to enlighten the participants about road safety audit issues. It is hoped that the seminar has helped enhance the knowledge of the participants on this subject. The seminar concluded with an actively participated Q&A session and the presentation of IEM's certificate and token as an appreciation to the speakers. ■

DONATION LIST TO THE WISMA IEM BUILDING FUND

42th Announcement

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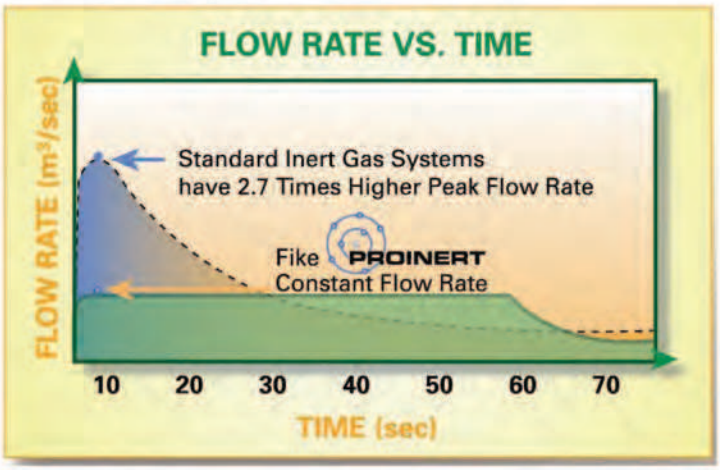

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One-Day Energy Series Course: Registered Electrical Energy Manager (REEM) – Challenges and Barriers

by Ir. Mah Soo

ELECTRICAL ENGINEERING TECHNICAL DIVISION

THE first part of the Energy Series Course was organised by the IEM EETD on 12 January 2011 at Wisma IEM, Petaling Jaya. Attended by 50 participants, this part of the course focused on "Registered Electrical Energy Manager (REEM) – Challenges and Barriers". The facilitator for the course was Ir. Lam Sing Yew, an experienced REEM who has completed numerous REEM energy assessments. He shared his experience on how to be effective in carrying out the duties and role of a REEM. Also discussed were the challenges and barriers faced at the customer plants, which he elaborated with a case study.

He commenced the course by highlighting the provisions of Section 23 of the Electricity Supply Act 1990 that has led to the 'Efficient Management of Electrical Energy Regulations 2008' being gazetted on 15 December 2008. He explained the various parts and sections of the 'Efficient Management of Electrical Energy Regulations 2008' relating in particular to the requirements for compliance by parties related to the supply and consumption of electrical energy equal to or exceeding 3,000,000kWh over a period of six consecutive months.

He then described the functions and duties of a REEM and explained how the engagement of the REEM as an energy facilitator could help create value for business operations in the areas of management, production output, customers and suppliers. In order to be effective, it would be important for the REEM to possess the required capabilities and apply appropriate methodologies in executing his tasks.

Ir. Lam described the methodology that he has used by summarising it in six steps:

1) Planning and Organisation
2) Assessment
3) Identification of Options
4) Feasibility Analysis of Options
5) Implementation and Monitoring of Options
6) Continuous Improvement

The effectiveness of the REEM would help a company in the following areas:

1) Minimise energy wastage
2) Reduce production cost
3) Protect the environment
4) Green - Corporate Social Responsibility (G-CSR) Efforts

He then shared the challenges and barriers that he had encountered at customer plants in four different aspects:

1) Customers perception
2) REEM challenges
3) REEM barriers
4) Tough market conditions

He concluded the training session with a case study on the thought-provoking topic "Is the Registered Electrical Energy Manager (REEM) competent in the market to win customer engagement?"

Participants then engaged actively in the 'Question and Answer' session. Some participants highlighted the concern of how much consultancy fee should be charged and whether the market is willing to pay the auditing fee. The trainer responded that there is no standard guideline that governs the fees charged for consultancy work in the market. It is subject to the level of knowledge and the time involvement required for different energy audit tasks. Finally, he reminded the participants to look out for the second part of REEM – "Overview of Electrical Energy Equipment Management and Application" of the three-part Energy Series to complete the whole series of the training course. ■

Answer for 1Sudoku published on page 20 of this issue

5	2	9	7	3	1	4	8	6
3	8	6	5	4	2	1	7	9
4	1	7	6	9	8	3	2	5
9	7	4	3	2	5	6	1	8
2	6	5	8	1	7	9	4	3
1	3	8	4	6	9	2	5	7
8	9	1	2	7	3	5	6	4
7	4	2	9	5	6	8	3	1
6	5	3	1	8	4	7	9	2

My Fascination with Radio Controlled Helicopters

WATER RESOURCES TECHNICAL DIVISION

by Ir. Zainal Abidin Othman

I have been interested in flying machines, especially helicopters, because of its manoeuvrability, so much so that, for a very long time, I even harboured the thought of training to be a helicopter pilot. After all these years, it has remained as a distant dream of mine. So I decided to transform that dream into becoming a radio controlled (RC) heli pilot.

This began when I saw a salesman at a shopping mall flying a mosquito (mini) heli, manoeuvring it with ease and landing it gently on his palm. In the spur of the moment, I took up the challenge to have a go at this creature. It was not a pleasant experience when the heli did not perform as demonstrated. More often than not, it fell to the ground and began hopping around like it was having a seizure. Although it was disheartening at first, I was motivated to keep trying in the belief that I could do as per the salesman's demonstration.

I keep trying until the heli broke down. Somehow, the desire to control this bird is too strong. After a lapse of two months, I bought a four-channel Hunter helicopter and started practising. I also referred to online videos and sought the advice of several interest groups on the Internet. It took me more than a week to master the technique to make the heli hover and fly smoothly. After a month, I was eager to take it outside to test my skills. It was a captivating experience until the heli was caught in a gust of wind. It flew far above a 40-feet tree near the main road. Before I could regain control of the transmitter, I lost sight of the heli and never found it again.

The lost of the Hunter was a mystery as I could not locate it anywhere within the vicinity. However, it made me more determined to challenge myself to get a much bigger coaxial heli. For beginners, it is recommended to start with a dual-rotor (coaxial rotor) helicopter. Coaxial rotors provide smother flight stability. This type of RC helicopters usually does not have a tail rotor. As each coaxial rotor spins in the opposite direction, the pilot can make it turn by applying more force to either rotor, thus making it easier to learn. The next step is to consider flying a slightly bigger coaxial which can handle the wind better for outdoor flying.

The Big Lama, a large enough coaxial heli for outdoor flights, was my next choice. This heli flew gallantly in fairly moderate wind outdoors and it was a great experience to be able to control and manoeuvre it through the air on weekends. Once you have mastered this coaxial heli, the urge to try the six-channel heli is too great. It was like an addiction. I was aware of the risks involved in moving from a four-channel to a six-channel heli as it was noted in most write ups that it is much more difficult and challenging.

Well as the saying goes, no pain no gain. Furthermore, I was willing to be like a postage stamp, i.e. stick to something until I get there. Mind you, what was actually driving me on this journey was the various online videos that showed the 3D manoeuvres of these helis. There was even one video of a six-year-old child effortlessly controlling the bird doing the funnel, pirouette, tic-toc and auto tumbling. At my age, RC heli is probably the next best alternative to experiencing the excitement of such an achievement without having to stress my ageing muscles.

When you first start to fly RC helicopters, the fact is you are going to crash a lot! What you need to do is find a helicopter that can give you the necessary basic skills and withstand the numerous crashes that it will have to endure at your fingertips. I managed to find a mentor who sells and repairs this creature and followed his advice to buy a clone six-channel collective pitch heli which promised cheap spare parts and was easy to handle.

It was a difficult adjustment to control a bigger and more powerful machine. However, once you have mastered hovering, the next move is to fly it higher, after which moving it in any direction becomes much easier. Follow a strict regime of training and a serious case of practise, practise, practise; and you will eventually master the art of controlling the bird.

Flying a RC helicopter can be very exciting and challenging at the same time. A RC helicopter toy can be intimidating to beginners because of its versatility. Compared with other vehicles, a helicopter can move in any direction and perform 360-degree turns. Performing manoeuvres that other vehicles cannot accomplish and the freedom to move through the sky without any obstacles is one of the reasons why RC helicopters are becoming so popular.

In order to track your progress, it is advisable to record the flights as much as possible. This way, you will be able to analyse the moves and improve as you go along. I have worked with my wife in recording most of these flights, including the crashes, and this has been both interesting and enjoyable.

Learning to fly can be demanding at first, but also very gratifying, so why not get started on this great pastime today! ■

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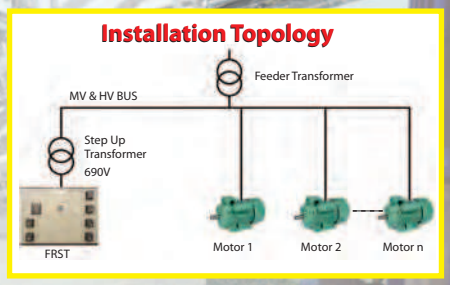

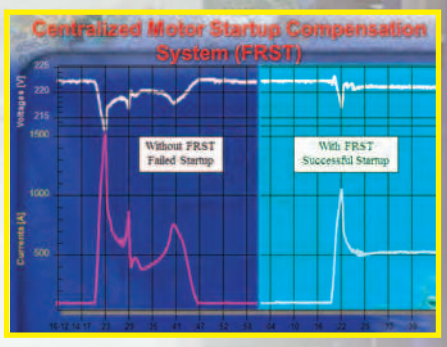

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IEM'S STAND ON LIBERALISATION IN BUDGET 2012

THE UGLY SIDE OF UNFETTERED LIBERALISATION:

Its implications on engineering consultancy practices and the public

BY THE STANDING COMMITTEE ON CORPORATE AFFAIRS

WHAT IS IEM'S STAND ON THE LIBERALISATION OF SERVICES?

IEM fully understands the benefits and fully supports liberalisation and the related opening up of 100% equity in Engineering Consultancy Practices (ECPs), but firmly believes that the move must be confined to Professional Engineers only. Allowing non-professional engineers to own ECPs would curtail the professional independence of professional engineers and, with it, the ethical and professional standards expected of the profession and this is expected to lead to reduced standards and quality as well as increased cost to the consumers and end-users. It will also certainly stifle the development of engineers who will be working in an environment devoid of the necessary opportunities needed for nurturing the creativity, innovation and expertise that are the foundations of good engineering practice. This will curtail the country's ability to achieve engineering excellence and of reaching developed status by 2020.

WHAT IS LIBERALISATION DOING TO THE ENGINEERING CONSULTANCY PRACTICES (ECPs)?

Aligning with common practices in free trade, the laws relating to engineering practice are also being amended to allow anyone, including the possibility for non professional engineers, to invest in and to own 100% of ECPs. All that is needed is to "employ" or appoint two or three professional engineers as directors to take full responsibility for the decisions taken. If this is to happen, business interests will be expected to take precedence over professional concerns and profits will supersede the need to ensure health, safety and quality.

An unintended but disastrous outcome will be a complete change in the landscape of engineering consultancy for the existing engineer owners of ECPs as it will be possible now for the big developers to set up and own 100% equity of ECPs. If we assume that 100 to 150 developers decide to do so and in the process "employ" or appoint up to 500 existing engineer owners of ECPs as directors, the livelihood of up to 3000 remaining engineer owners of other ECPs may be severely affected as there will be only very limited projects left to be shared. It is highly likely that most of them will have to terminate their practices.

WILL THE PUBLIC BE ADVERSELY AFFECTED?

When ECPs can be owned by anyone, local or foreign, and who can have undue influence in what engineers should or should not do; including the possibility of compromising on health and safety standards, there is the likelihood that engineering decisions will be dictated by business concerns for higher profits. The consumer and end user will end up the loser. This may not even be evident immediately as the effects of engineering works are quite often neither noticeable nor visible until sometime later. Hopefully, it will not take a disaster, causing injuries and loss of lives, before we are made to realise the consequences of having non-professional engineers take ownership in ECPs. ■

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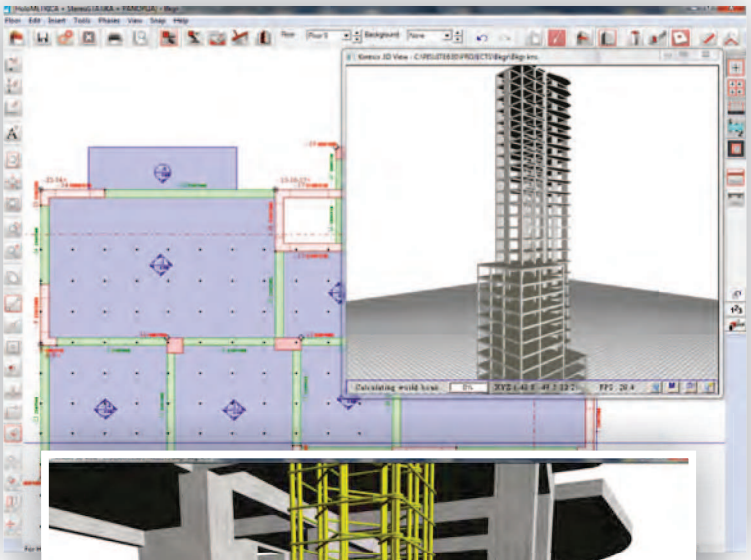

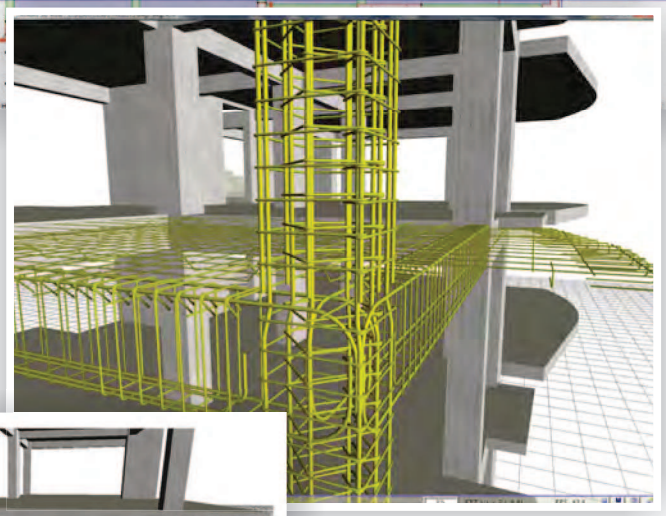

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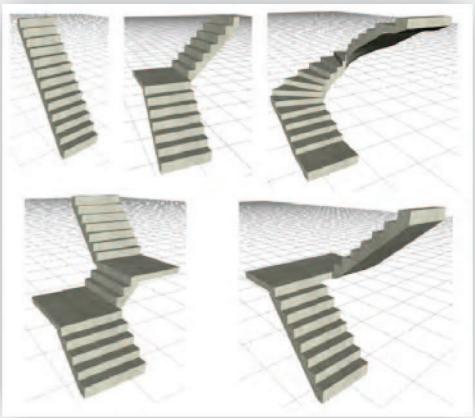

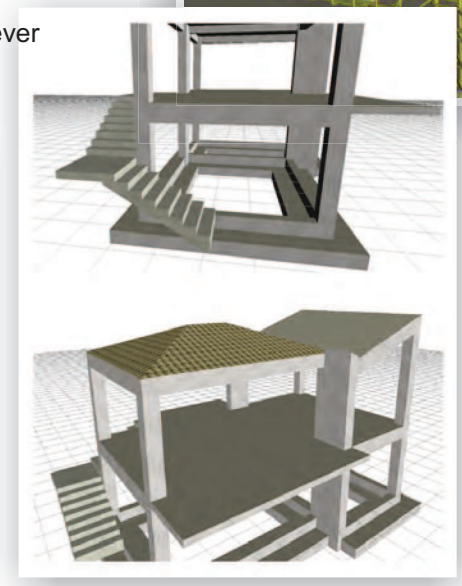

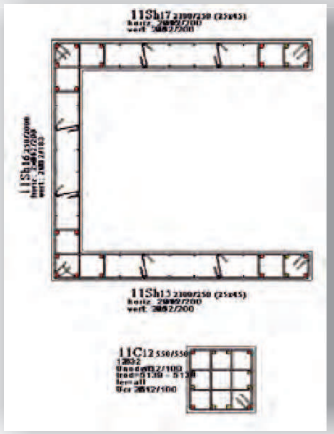

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Where Millions of Butterflies Flutter

by Ir. Chin Mee Poon

ZITACUARO is a small town 165km west of Mexico City. My wife and I put up a night there because it was the nearest place to the Monarch Butterfly Sanctuary that had some decent accommodation for visitors.

My guidebook says that the best time to visit the Sanctuary is between mid-November and mid-March. It was 14 March when we checked out of our hotel, left our luggage at the reception and boarded a bus just before 8.00am for the village of Ocampo 23km away.

The journey took about 45 minutes. Following the direction of a local, we walked to a road junction from where the bus dropped us to board a "colectivo" (a van operated like a mini-bus) to get to a smaller village known as El Rosario. The road was bad and it took the van 35 minutes to travel 11km.

The van driver dropped us at a car park and told us to walk uphill between the rows of empty stalls. About 20 minutes later, we reached the entrance of the Monarch Butterfly Sanctuary. Admission was 40 New Mexican pesos (about RM10) each and included the service of a guide. Another uphill walk of 35 minutes along a pretty well-maintained footpath took us to a plateau fringing an Oyamel fir forest.

Orange coloured butterflies with black patterns on their wings were sighted on the shrubs beside the footpath and their numbers kept increasing as we approached the plateau. These are the monarch butterflies. Puddles on the ground were covered with carpets of butterflies. Our guide, a middle-aged woman who did not speak a word of English, led us to a spot in the Oyamel fir forest which had us spellbound in awe – whole trees were covered with butterflies!

We had never seen anything like this before. It was unbelievable! And when we walked about, waves of butterflies swarmed past us and they were everywhere: in the air, on tree trunks, branches and leaves, on the ground and even on our body! A signboard said 80 million monarch butterflies were found there.

According to scientists, monarch butterflies in the millions migrate from the eastern parts of Canada and United States over distances of up to 4000km to Central Mexico to escape from the cold winter. They hibernate in Oyamel fir forests 3000m above sea level in Michoacan State and then fly back north in March when the days become warmer again.

The sheer numbers involved in such a massive migration is by itself amazing enough, yet even more amazing is the fact that the time needed to migrate over such a long distance may actually exceed the normal lifespan of the butterfly which is 2 to 6 weeks. So how can the migration be possible?

Incredibly, when cold air begins to blow in September or October in Canada and the US, a special generation of monarch butterflies is born with an exceptionally long lifespan between 6 to 8 months. This generation of butterflies is able to undertake the long journey to Central Mexico. How they navigate their way to Central Mexico remains a mystery. After hibernating through the winter in Central Mexico, they begin to find their way back to Canada and the US in March.

They will breed and go through the lifecycle of egg – larva (caterpillar) – pupa (chrysalis) – adult (butterfly) on their way north. About two or three generations of butterflies, each with a lifespan of 2 to 6 weeks, may be required to get the monarch back to its place of origin. By September or October, the monarch is ready to start its cycle of four generations of breeding all over again.

What triggers the autumn generation of butterflies to be different from the other generations is yet another unsolved mystery. While waiting for entomologists to solve these mysteries, we just have to accept that the annual migration of the monarch butterflies is truly one of the most extraordinary phenomena of nature. ■

To All Members,

Date: 21 November 2011

CANDIDATES APPROVED TO SIT FOR YEAR 2011 PROFESSIONAL INTERVIEW

The following candidates have been approved to sit for the Professional Interview for 2011.

In accordance with Bylaws 3.9, the undermentioned names are published as having applied for membership of the Institution, subject to passing the year 2011 Professional Interview.

If any Corporate Member of the Institution has any reason as to why any of the candidates is not a fit and proper person for election, he should communicate in writing to the Honorary Secretary. Such communication should be lodged ***within a month*** from the date of this publication.

Thank you.

Ir. Prof. Dr Lee Teang Shui
Honorary Secretary,
The Institution of Engineers, Malaysia

NEW APPLICANTS

Name	Qualifications
CHEMICAL ENGINEERING	
AZZUDDIN RIZAL RAMLI	BE HONS (UTM) (CHEMICAL, 2001)
CIVIL ENGINEERING	
ABDULLAH BIN AHMAD	BE HONS (UTM) (CIVIL, 2006)
HUAN YEW JIN	BE HONS (ADELAIDE) (CIVIL, 2003)
MOHAMAD ZAKI BIN MAJID	BE HONS (UTHM) (CIVIL, 2003)
NGUI WEI CHIUN	BE HONS (UTHM) (CIVIL, 2005)
OOI SHEIN DIN	BE HONS (NUS) (CIVIL, 2003)
REUBEN SELVARAJAH	BE HONS (UTM) (CIVIL, 2001)
COMPUTER ENGINEERING	
HONG KAI SZE	BE HONS (UTM) (COMPUTER, 2001)
ELECTRICAL ENGINEERING	
SHYFUL BAHRIN BIN ISMAIL	BE HONS (UTM) (ELECTRICAL, 1989)
BALAMURUGAN A/L NARAYASAMY	BE HONS (UTM) (ELECTRICAL, 2006)
CHANG WAN SIONG	BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS, 2002)
MD SALLEHUDDIN BIN DAHLAN	BE HONS (UTM) (ELECTRICAL, 1985)
MOHD ZURIX BIN MOHAMED	BE HONS (UTP) (ELECTRICAL & ELECTRONICS, 2004)
YUSRI BIN HASSAN	BE HONS (UTM) (ELECTRICAL, 2007)
ELECTRONIC ENGINEERING	
AHMAD AFFENDY BIN SAAD	BE (AKITA, JAPAN) (ELECTRICAL & ELECTRONIC, 1997)

TRANSFER APPLICANTS

Mem No.	Name	Qualifications
INSTRUMENTATION AND CONTROL ENGINEERING		
	WAN HASSAN BIN WAN MAMAT, DATO'	BSc (PORTSMOUTH, CNAA) (ELECTRICAL & ELECTRONIC, 1983)
MECHANICAL ENGINEERING		
	NOOR AZUAN BIN ABU OSMAN	BE HONS (BRADFORD) (MECHANICAL, 1997)
	DOMINIC BECHAT ANAK NANANG	BE HONS (UNIMAS) (MECHANICAL & MANUFACTURING, 2005)
	MD ISA BIN DAUD	BE HONS (UM) (MECHANICAL, 1995)
	MOHD ASWADI BIN TON ALIAS	BSc (PURDUE) (MECHANICAL, 1999)
	MOHD HAMDI BIN ABD SHUKOR	BE HONS (IMP COLLEGE OF SC, TECH & MED) (MECHANICA, 1994)
CHEMICAL ENGINEERING		
38002	LEE TIN SEN	BE HONS (UTM) (CHEMICAL, 2002)
CIVIL ENGINEERING		
29652	AHMAD KHUZAINI ABDULLAH SANI	BE HONS (QUEENSLAND) (CIVIL, 2003)
41140	AMIN BIN RAMLI	BSc (RENSSELAER POLYTECH) (CIVIL, 2004)
37208	ANG PENG CHUNG	BE HONS (UPM) (CIVIL, 2002)
22664	CHAN YEUN JEAN	BE HONS (USM) (CIVIL, 2000)
26392	CHONG KON WAH	BE HONS (NEWCASTLE UPON TYNE) (CIVIL, 1998)
39964	HO JIN KIAT	ME HONS (BIRMINGHAM) (CIVIL, 2006)
27863	JUNIOR FOO SEE ENG	BE HONS (USM) (CIVIL, 2007)

TRANSFER APPLICANTS

Mem No.	Name	Qualifications
28803	KHAW POI PIN	BE HONS (UPM) (CIVIL, 2006)
25086	NG CHEE CHOONG	BE HONS (ADELAIDE) (CIVIL, 2003)
20970	NG WENG SUM	BE HONS (UTM) (CIVIL, 2001)
43183	RUSNIDA BINTI TALIB	BE HONS (UiTM) (CIVIL, 2004)
19294	YEE CHEZE HUI	BE HONS (BIRMINGHAM) (CIVIL, 1998)
22218	YU KONG BOON	BE HONS (PLYMOUTH) (CIVIL, 1998)
ELECTRICAL ENGINEERING		
23193	JONG SAI LING	BE HONS (HERTFORDSHIRE) (ELECTRICAL & ELECTRONIC, 2000)
14108	MD SHAH BIN MAJID	BSc (STRATHCLYDE) (ELECTRICAL & ELECTRONIC, 1980)
43630	MOHD RIDUAN BIN MOHD SHARIFF	BE HONS (UKM) (ELECTRICAL, 2006)
27517	MUHAMMAD WAFI BIN LOKMAN	BE HONS (UKM) (ELECTRICAL, ELECTRONIC & SYSTEM, 2004)
25611	NG THIEN LEE	BE HONS (UTM) (ELECTRICAL & ELECTRONIC, 2002)
29659	SAIFUDDIN BIN AHMAD	BE HONS (UTM) (ELECTRICAL, 2006)
30609	ZUL IZWAN BIN MOHD TAHER	BE HONS (UNITEN) (ELECTRICAL, 2005)
ELECTRONIC ENGINEERING		
27973	FIRDAUS HAKIM BIN JALALUDIN	BE HONS (UTM) (ELECTRICAL-TELECOMMUNICATION, 2002)
MECHANICAL ENGINEERING		
33891	IZMIR ZIKRY BIN IBRAHIM	BE HONS (UiTM) (MECHANICAL, 2005)
27505	LAI YEW HONG	BE HONS (NOTTINGHAM) (MECHANICAL, 2004)
48066	MOHD ADZRIE BIN HJ RADZALI	BE HONS (MMU) (MECHANICAL, 2005)

IEM DIARY OF EVENTS

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

Project Management Technical Division, IEM

12 January 2012 (Thursday)

1-Day Course On 'INTELLECTUAL PROPERTY LAW IN MALAYSIA

Time: 8.30 a.m. to 5.30 p.m.

Venue : Auditorium's Tan Sri Prof. Chin Fung Kee 3rd Floor, Wisma IEM, Petaling Jaya, Selangor

Speaker: Ir. Lai Sze Ching

Registration Fees		Normal	On-line
IEM Graduate Members	:	RM320.00	RM300.00
IEM Corporate Members	:	RM370.00	RM350.00
Non IEM Members	:	RM480.00	RM450.00

COUNCIL ELECTION FOR SESSION 2012/2013

5th Announcement

Nomination papers for the Election of Council Members for Session 2012/2013 will be posted on the IEM website (http//www.myiem.org.my) and made available at the IEM Secretariat office by 23 November 2011. The closing date for nominations is on 21 December 2011.

Thank you.

Dato' Pang Leong Hoon
Election Officer, IEM

IEM READERSHIP SURVEY 2010/2011

The Readership Survey 2010/2011 form is now available. Please refer to the IEM Web portal as well as in pages 51-52 of the August 2011 issue to take part in the survey.

MEMBERSHIP

ADMISSION / ELECTION / TRANSFER APPLICANTS

The IEM Council, at its **379th** meeting on **17 October 2011** approved the admission / election / transfer of a total of **847** members, consisting the following:

DISCIPLINES	MEMBERSHIP GRADES							
	FELLOW	MEMBER	GRADUATE	INCORPORATED	AFFILIATE	ASSOCIATE	STUDENT	TOTAL
Aeronautical		1						**1**
Aerospace			1					**1**
Agricultural			2					2
Automotive			1					**1**
Biochemical								**0**
Biomedical			1					**1**
Biotechnology								**0**
Building Services		1						**1**
CAD/CAM								**0**
Chemical		4	15				63	**82**
Civil		55	100	1	1	1	53	**211**
Communication								**0**
Computer			1					1
Computer Systems								**0**
Computer and Communication								**0**
Control System								**0**
Electrical and Electronic								**0**
Electrical		12	63	1			18	**94**
Electronic		8	31	1			12	**52**
Electronic and								**0**
Instrumentation System								**0**
Electromechanical								**0**
Energy			1					**1**
Environmental			2					**2**
Food and Process			1				49	**50**
Geotechnical		2						**2**
Highway								**0**
Industrial			1					**1**
Information System								**0**
Information Technology								**0**
Instrumentation								**0**
Instrumentation and Control		2		1			1	**4**
Manufacturing		1	5					**6**
Manufacturing System								**0**
Marine							3	**3**
Materials		1	4				6	**11**
Metallurgy								**0**
Mechanical	3	18	78				204	**303**
Mechatronic			1				2	**3**
Microelectronic								**0**
Mineral			1					**1**
Mineral Resources			2					**2**
Mining								**0**
Naval Architecture		1						**1**
Petroleum								**0**
Polymer								**0**
Production			1					1
Structural		1	1					2
Telecommunication			1				6	7
Water Resources								**0**
TOTAL	**3**	**107**	**314**	**4**	**1**	**1**	**417**	**847**

The Members' names and qualifications are detailed on Page 51 to 52. The Institution congratulates the members on their admission / election / transfer.

Ir. Prof. Dr Lee Teang Shui
Honorary Secretary,
The Institution of Engineers, Malaysia

TRANSFER TO THE GRADE OF FELLOW MEMBER

Mem No.	Name	Qualifications
MECHANICAL ENGINEERING		
16513	HAYATI BINTI ABDULLAH	BSC (CLEMSON, USA) (MECH, 1984) MSC (UTM) (MECH, 1990)
12375	MAHMOOD AZMY BIN MUHAMMAD SHUKRI	BSC HONS (BOSTON) (MECHANICAL, 1986) MSC (BOSTON) (MECHANICAL, 1987)
06555	MAHMOOD AZMY BIN MD YUSOF BIN ISMAIL	BSC HONS (STRATHCLYDE) (MECHANICAL, 1975)

TRANSFER TO THE GRADE OF MEMBER

Mem No.	Name	Qualifications
AEROSPACE ENGINEERING		
46791	MOHD SALLEH BIN MOHD TAHIR	BE HONS (USM) (AEROSPACE, 2007)
CHEMICAL ENGINEERING		
22285	CHEONG WEN YUAN	BE HONS (UM) (CHEM 00)
30557	CHONG MEI FONG	BE HONS (UTM) (CHEMICAL, 2004) PHD (USM) (ENVIRONMENTAL & BIOPROCESS, 2007)
27975	NG SEOW CHING	BE HONS (UM) (CHEMICAL, 2000)
CIVIL ENGINEERING		
17694	ABDUL HAMID BIN MOHD ISA	BE HONS (UTM) (CIVIL, 1999)
38851	ANDY SURIN A/L KHOO AH CHAI	BE HONS (UMS) (CIVIL, 2004)
23953	AWANG MOHAMMAD FADILLAH BIN AWANG REDZUAN	BE HONS (USM) (CIVIL, 2001)
23966	CHIN TZE VOON, JASON	BE HONS (NOTTINGHAM) (CIVIL, 1999)
12319	CHOO KANG HONG	BE HONS (UTM) (CIVIL, 1992)
25644	FONG CHONG YIT	BE HONS (UTP) (CIIVL, 2004)
20985	GAN SHWU JIUAN	BE HONS (UTM) (CIVIL, 2001)
14696	KHAIRUL FAUZY BIN SAIDIN	BSC (TEXAS AT AL PASO) (CIVIL, 1990)
23194	KHO JOO SIONG	BE HONS (USM) (CIVIL, 2001)
28865	KOO KUAN SENG	BE HONS (UKM) (CIVIL & STRUCTURAL, 2005)
25812	LATIPAH ANAK AJIS	BE HONS (UTHM) (CIVIL, 2003)
16500	LAU UNG CHENG, LUCAS	BSc (SOUTH DAKOTA STATE UNI) (CIVIL & STRUCTURAL, 1990) MSc (SOUTH DAKOTA STATE UNI) (CIVIL & STRUCTURAL, 1992)
21921	LEE GHIM PENG	BE HONS (UTM) (CIVIL, 2004)
20799	LEE LI KEAT	BE (UPM) (CIVIL, 2004)
24164	LIM HAN SIANG	BE HONS (BIRMINGHAM) (CIVIL, 2001)
43543	LIM KOK PING	BE HONS (UNIMAS) (CIVIL, 2006)
25443	LUE LEONG SHEN, HENRY	BE HONS (UTHM) (CIVIL, 2003)
26965	MOHD FAUZI BIN SANI	BE HONS (USM) (CIVIL, 2001)
24118	MOHD HEFNI BIN ABDUL AZIZ	BE HONS (UiTM) (CIVIL, 2003)
24893	SHAMALA A/P PERAMAYAH	BE HONS (UKM) (CIVIL, 1998) ME (UPM) (WATER, 2009)
25514	SHIN CHIAN CHEOW	BE HONS (LEEDS) (CIVIL, 2004)
32606	SHU SIEW SIEW	BE HONS (PORTSMOUTH) (CIVIL, 1997)
16845	SIOW KWONG WOON	BE HONS (LEEDS) (CIVIL, 2001)
24144	TAY CHIN MIEN	BSC (SOUTH DAKOTA STATE) (CIVIL, 1999) MSC (SOUTH DAKOTA STATE) IND MGMT & ENGR, 2002)
20187	TE CHEI YEAN	BE HONS (UTM) (CIVIL, 2001) ME (UTM) (CIVIL - STRUCTURE, 2007)
11042	TONG KAR CHYE	BSc HONS (SOUTH DAKOTA STATE) (CIVIL, 1987)
25789	WONG CHUAN MEIN	BE HONS (SOUTHERN QUEENSLAND) (CIVIL, 2005)
24879	YAIW KOON LOON	BE HONS (UTM) (CIVIL, 2003)
24883	ZANARIA BINTI ABU BAKAR	BE (EAST LONDON POLY, CNAA) (CIVIL, 1991)
28813	CHAN ZE HONG	BE HONS (UTM) (CIVIL, 2006)
24267	CHONG WEE LIN	BE (HONS) (UTM) (CIVIL- CONSTRUCTION MANAGEMENT, 2003)
23655	GOH THIAM HO	BE (HONS) (UPM) (CIVIL,2000)
29681	LIM FANG LIANG	BE (HONS) (UTM) (CIVIL, 2006)
43540	NGU LOCK TEE	BE HONS (USM) (CIVIL, 2000) MSc (USM) (STRUCTURAL, 2001)
39198	SIAW MING CHIAN	BE (HONS) (UTHM) (CIVIL,2003)
22588	WONG KENG LIANG	BE HONS (MALAYA) (CIVIL,1999)
ELECTRICAL ENGINEERING		
20318	LEE LEH SING	BE HONS (BIRMINGHAM) (ELECTRONIC & ELECTRICAL, 1999) MSc (NEW SOUTH WALES) (ELECTRICAL POWER, 2007)
17914	LEE WAI KUAN	BE HONS (UTM) (ELECTRICAL, 2007)
39993	LIM LEE CHENG	B.E HONS (UNITEN) (ELECTRICAL POWER, 2007)
29094	MOHD HASANUDIN HAMADION	BE HONS (UTM) (ELECTRICAL, 2005)
26875	MOHD SHARIZAL BIN ABDUL ALIBU	BE HONS (LIVERPOOL) (ELECTRICAL & ELECTRONIC, 2004) MSc (STRATHCLYDE) (ELECTRICAL POWER, 2005)
33709	PUNITHA RAMAN A/L DORAISAMY	BE HONS (UNITEN) (ELECTRICAL POWER, 2005)
24036	TWE HWEE EE	BE HONS (UMS) (ELECTRICAL & ELEC TRONIC, 2006)

TRANSFER TO THE GRADE OF MEMBER

Mem No.	Name	Qualifications
ELECTRONIC ENGINEERING		
27628	MITHIRENDRA MANIAM	BE HONS (USM) (ELECTRICAL & ELEC TRONIC, 1999)
28066	TIANG JUN JIAT	BE HONS (MMU) (ELECTRONICS, 2004) MSc (USM) (ELECTRONIC SYSTEM DESIGN, 2006)
20380	WONG HIN YONG	BE HONS (SUSSEX) (ELECTRONIC, 1997) MSc (LEEDS) (RADIO COMM & HIGH FREQUENCY, 1998)
45791	WONG SEW KIN	BE HONS (USM) (ELECTRICAL & ELEC TRONIC, 1995)
26842	ZULFAISAL BIN OTHMAN	BE HONS (UTM) (ELECT & E'TRONIC, 2003)
GEOTECHNICAL ENGINEERING		
29146	MOHD HANIF BIN MOHD HATTA	BE HONS (UTM) (CIVIL, 2006)
25803	LIKNASWARAN A/L KOBARAJAH	BE HONS (UTM) (CIVIL-CONSTRUCTION MGMT, 2002) ME (UTM) (CIVIL - GEOTECHNICS, 2008)
INSTRUMENTATION AND CONTROL ENGINEERING		
22836	MEGAT MOHD ADZRUL NAAIM BIN MEGAT KHAMARUDDIN	BE HONS (UiTM) (ELECTRICAL, 2004)
MANUFACTURING ENGINEERING		
37872	AMIRUL ABD RASHID	BE HONS (PORTSMOUTH) (MANUFACTURING, 1997)
MECHANICAL ENGINEERING		
24654	ABDUL HAMID BIN SULEIMAN	BE HONS (UiTM) (MECHANICAL, 2007)
38362	CHIN YEN CHIH, CALVIN	BE HONS (UTHM) (MECHANICAL, 2006)
38039	GOH KHENG WEE	BE HONS (GLASGOW) (MECHANICAL, 2001)
19986	HASRUL BIN KAMAL	BE HONS (UM) (MECHANICAL, 2003)
39994	LENNY MARLINA BINTI MOHD KAIRI	BE HONS (UTHM) (MECHANICAL, 2005)
30625	LIAN BOON HAN	BE HONS (MONASH) (MECHANICAL, 2005)
22377	LIM HOU	BE HONS (UPM) (MECHANICAL, 2000)
39991	LOO CHENG TIONG	BE HONS (UTHM) (MECHANICAL, 2005)
26821	MOHD YUNUS BIN HARUN	BE HONS (USM) (MECHANICAL, 2001)
26824	NG KENG LIP	BE HONS (UTM) (MECHANICAL, 2005)
26781	WONG KIEN LONG	BE HONS (UTM) (MECHANICAL, 2001)
STRUCTURAL ENGINEERING		
29036	CHONG SUN NGEN	BE HONS (UTM) (CIVIL-CONSTRUCTION MGMT, 2006)

PASS PROFESSIONAL ASSESSMENT (PAE)

Mem No.	Name	Qualifications
CIVIL ENGINEERING		
03158	HANAPI BIN MOHAMAD NOOR	BE HONS (UTM) (CIVIL, 1980) MSC (BOURNEMOUTH) (WATER ENVI RONMENT, 1996)
25483	TIONG HIN HOW, ALEXIS	BE HONS (WALES SWANSEA) (CIVIL, 2003)
ELECTRICAL ENGINEERING		
30598	NASRUL HISHAM BIN ABDUL HALIM	BE HONS (UTM) (ELECTRICAL, 2003)

ELECTION TO THE GRADE OF MEMBER

Name	Qualifications
BUILDING SERVICES ENGINEERING	
NORSUZANAWATI BT HJ. NOR @ HJ NOA	BE (UMIST) (BUILDING SERVICES, 1996) MSC (UM) (CHEMICAL, 1998) PHD (UM) (SEPARATION TECHNOLOGY, 2007)
CHEMICAL ENGINEERING	
RIZAL AZIZI BIN GHAZALI	BE HONS (UTM) (CHEMICAL, 1997)
CIVIL ENGINEERING	
ABDUL HANIF BIN KAMALUDDIN	BE HONS (USM) (CIVIL, 2002) MSC (UITM) (BUILDING, 2010)
ADRIANA ANAK PETER CHEE	BE HONS (USM) (CIVIL, 2002)
AMALUDDIN BIN ZOLKIFLI	BE HONS (UTM) (CIVIL, 2004)
AZMAN BIN YAHYA	BE HONS (UKM) (CIVIL & STRUCTURAL, 1994)
CHAI KIAN HOH	BE HONS (UTHM) (CIVIL, 2005)
CHING CHIT KEAT	BE HONS (LEEDS) (CIVIL AND STRUCTURAL, 2003)
CHUA YAN HENG	BE HONS (NUS) (CIVIL, 1989)
FAIRUZ BIN HJ MOKHTAR	BE HONS (SUNDERLAND) (CIVIL, 1988)
LAU BENG KIM	BE HONS (UKM) (CIVIL & ENVIRONMENTAL, 2002)
MOHD NADZRI BIN MOHD SOM	BE HONS (UKM) (CIVIL & ENVIRONMENTAL, 2002)
SALIHA BINTI CHE DAUD	BSC (MONTANA STATE) (CIVIL, 1985)
SHAHRIZAM BIN MAT SALLEH	BE HONS (UTM) (CIVIL, 2004)
SYED RAJAH HUSSAIN SHAIB BIN A. H. MOHD HANIF	BE HONS (BOLTON INST. OF HIGHER EDUCATION, CNAA) (CIVIL, 1991)
TING NIK KIAT	BE HONS (UTM) (CIVIL, 2002)

ELECTION TO THE GRADE OF MEMBER

Name	Qualifications
YASIMITUAH YAACOB	BSC (WIDENER UNI, PENNSYLVANIA) (CIVIL, 1991)
GAPAR BIN ASAN	ADV. DIP (UITM) (CIVIL, 1987)
NIK MOHAMMAD YUSOFF BIN NIK OMAR	BE HONS (UTM) (CIVIL, 2003)
ELECTRICAL ENGINEERING	
MOHD SUHAIMI BIN TON ALIAS	BE (NIIGATA UNI, JAPAN) (ELECTRICAL & ELEC TRONIC, 1998)
ROSMADI BIN ABDULLAH	BE HONS (UTM) (ELECTRICAL, 2002)
SYAFRAH BINTI ABD JALIL	BE HONS (UNITEN) (ELECTRICAL POWER, 2007)
YUZRIAN EFREN YUNUS	BE HONS (UM) (ELECTRICAL, 1999)
MUHAMAD HASSAN BIN OTHMAN	BE (NAGAOKA, JAPAN) (ELECTRICAL & ELECTRONIC, 1998)
CHAN KAH YOONG	BE HONS (ROBERT GORDON) (ELECTRONIC & ELECTRICAL, 2000)
INSTRUMENTATION & CONTROL ENGINEERING	
SAIRUL AZALI BIN ZAKARIA	BE HONS (UTM) (ELECTRICAL - TELECOMMUNICA TIONS, 2005)
MATERIAL ENGINEERING	
DUAN KELVIN SELING	BSC (SAN JOSE STATE UNI) (MATERIALS, 2004)
MECHANICAL ENGINEERING	
CHANG KWONG YUE	BSC (OKLAHOMA STATE) (MECHANICAL, 1996)
JAMIL BIN HASHIM	BSC (SUNDERLAND POLY, CNAA) (MECHANICAL, 1985)
SYED ABDULLAH BIN SYED AHMAD	BSC (SUNDERLAND POLY, CNAA) (MECHANICAL, 1985)
WONG PENG KIT	BSC (OKLAHOMA STATE) (MECHANICAL, 1997)
AKMAL HISHAM BIN HAMZAH	BE HONS (MANCHESTER) (MECHANICAL, 1998)
TAN THEONG JOO	BSC (IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY) (MECHANICAL, 1982)

PASS PROFESSIONAL ASSESSMENT (PAE)

Name	Qualifications
ELECTRONIC ENGINEERING	
CHANG KENG CHAI	BE (CANTERBURY) (ELECTRICAL& ELECTRONIC, 1994)
MECHANICAL ENGINEERING	
MOHD ZAWAWI BIN HJ. HASSAN	BE (GADJAH MADA, JOGJAKARTA) (MECHANICAL, 1978)
NAVAL ARCHITECTURE ENGINEERING	
MOHD FAUZI BIN YAAKOB	BSC (MICHIGAN) (NAVAL ARCHITECTURE AND MARINE, 1994)

TRANSFER TO THE GRADE OF GRADUATE

Mem No.	Name	Qualifications
CHEMICAL ENGINEERING		
19846	CHOW PUI HEE	B.E.HONS.(UPM)(CHEMICAL,01)
44727	MUHAMMAD NASIR BIN FAIVDULLAH	B.E.HONS.(UKM)(CHEMICAL,11)
25946	RAIS HANIZAM BIN MADON	B.E.HONS.(UMP)(CHEMICAL - BIOTECHNOLOGY,09)
21121	SIM JIA HUEY	B.E.HONS.(UPM)(CHEMICAL,04) MSc(USM)(CHEMICAL,07) PhD(USM)(CHEMICAL,11)
CIVIL ENGINEERING		
38978	ABDUL HAZEEM BIN HAMZAH	B.E.HONS.(UTP)CIVIL,10)
28431	ADHILLA BINTI AINUN MUSIR	B.E.HONS.(UTHM)(CIVIL,09)
37182	ARIF AIZUDDIN BIN AHMAD FUAD	B.E.HONS.(UTHM)(CIVIL,10)
20069	CHIA YUN LEE	B.E.HONS.(UTM)(CIVIL, 01) M.E.(UTM)(CIVIL-HYRAUL & HYDROLOGY,03)
43446	DARSHANA A/P JAYA KUMAR	B.E.HONS.(CURTIN)(CIVIL & CONSTRUCTION,10)
33598	FARAH BINTI ABDUL RAHMAN	B.E.HONS.(UiTM)(CIVIL,09)
27867	FOONG CHOON WOH	B.E.HONS.(USM)(CIVIL,07)
30107	GANESH RAO A/L NAGIAH	B.E.HONS.(UNITEN)(CIVIL,11)
38402	HEW YEE CHUEN	B.E.HONS.(UMP)(CIVIL,10)
33612	ISALFI BIN JAHRO	B.E.HONS.(UiTM)(CIVIL,09)
17402	LIM WAI YIP	B.E.HONS.(UKM)(CIVIL & STRUCTURAL,97)
37754	LOH WEI YAO	B.E.HONS.(UNITEN)(CIVIL,10)
36553	MOHD AZRI BIN AZMI	B.E.HONS.(UMP)(CIVIL,10)
28924	MOHD FIRDZA BIN AB WAHAB	B.E.HONS.(UPM)(CIVIL,07)
44435	MOHD. ARSYAD BIN WAN YUSOFF	B.E.HONS.(UiTM)(CIVIL,11)
36554	MUHAMMAD HAFIZ BIN ISHAK	B.E.HONS.(UMP)(CIVIL,10)
31572	NOORFARHANA BINTI MOHD NASRI	B.E.HONS.(UTM)(CIVIL,09)
33657	NORMAIZAN BINT MARWAN	B.E.HONS.(UiTM)(CIVIL,08)
33246	NUR FIRDAUS BIN FADZIL	B.E.HONS.(UiTM)(CIVIL,09)
37184	NURUL HIDAYANI BINTI ABDULLAH	B.E.HONS.(UTHM)(CIVIL,10)

MEMBERSHIP

TRANSFER TO THE GRADE OF GRADUATE

Mem No.	Name	Qualifications
44409	NURZAFIRAH BINTI MISKON	B.E.HONS.(UiTM)(CIVIL,11)
28205	ONG HOCK CHYE	B.E.HONS.(UTM)(CIVIL, 08) M.E(UTM)(CIVIL-TRANSPORTATION & HIGHWAY,10)
28282	THOON KHIN KHUAN	B.E.HONS.(USM)(CIVIL,07)
33139	ZURAISAH BINTI DOLLAH	B.E.HONS.(UiTM)(CIVIL,08)
ELECTRICAL ENGINEERING		
24093	MOHD AZHAN BIN SIDIK	B.E.HONS.(MALAYA)(E'TRICAL,05)
33060	NABIL FIKRI BIN AHMAD	B.E.HONS.(UTHM)(ELECTRICAL,10)
34563	TAN SHI CHIAN	B.E.HONS.(UTeM)(CONTROL, INSTRUMENTATION & AUTOMATION,09)
ELECTRONIC ENGINEERING		
28480	AHMAD FIRDAUS BIN BAHAUDDIN	B.E.HONS.(UTHM)(ELECTRICAL,07)
24024	ZOOL HILMI BIN ISMAIL	B.E.HONS.(UTM)(E'TRICAL-MECHATRONIC,04) M.E(UTM)(E'TRICAL & M'TRONIC AUTOMATIC
MANUFACTURING ENGINEERING		
26263	MOHD NASIRUDDIN BIN YAAKOB	B.E.HONS.(UIAM)(MANUFUCTURING,10)
MECHANICAL ENGINEERING		
28174	ABD RAHMAN BIN ZULKEFLI	B.E.HONS.(UTM)(MECHANICAL-AUTOMOTIF,09)
42321	ANG KIAN HO	B.E.HONS.(UMS)(MECHANICAL,10)
32385	MOHAMMAD ADIB BIN ABD KADIR	B.E.HONS.(UiTM)(MECHANICAL,09)
35727	MUHAMMAD HAFIZI BIN KAMALUDIN	B.E.HONS.(UTM)(MECHANICAL-INDUSTRI,10)
37581	NG CHUN TA	B.E.HONS.(UKM)(MECHANICAL,10)
35790	SIEW HAW SHIUN	B.E.HONS.(UTM)(MECHANICAL-MANUFACTURING,10)
37607	TEO KOK THYE	B.E.HONS.(UKM)(MECHANICAL,10)
42339	THAM CHOONG SOON	B.E.HONS.(UMS)(MECHANICAL,10)
27336	YOGESWARAN A/L NILAMIHAM	B.E.HONS.(UTHM)(MECHANICAL,09)
MINERAL RESOURCES ENGINEERING		
25044	TAN LAI TEE	B.E.HONS.(USM)(MINERAL,05)

ADMISSION TO THE GRADE OF GRADUATE

Mem No.	Name	Qualifications
AEROSPACE ENGINEERING		
49584	STANLY AMPAH ANAK BARAK	B.E.HONS.(USM)(AEROSPACE,04)
AGRICULTURAL ENGINEERING		
49431	LAI SAI HIN	B.E.HONS.(UPM)(BIOLOGY & AGRICULTURAL,99) MSc(UPM)(SOIL & WATER E'RING,01)
49250	MOHD HAFIZ BIN HASSAN	B.E.HONS.(UPM)(CIVIL,02)
AUTOMOTIVE ENGINEERING		
49540	AIZAD AYASYI BIN AB GHAFAR	B.E.HONS.(UMP)(MECHANICAL-AUTOMATIVE,08)
BIO-MEDICAL ENGINEERING		
49240	HAMZAH BIN SAKERAN	B.E.HONS.(MALAYA)(BIOMEDICAL,06)
CHEMICAL ENGINEERING		
49378	GOH CHOW SEONG	B.E.(LYON)(CHEMICAL,07)
49559	LEE SIU HOONG	B.E.HONS.(MONASH)(CHEMICAL,11)
49233	FOO CHING CHEE	B.E.HONS.(SHEFFIELD)(CHEMICAL,07)
49377	MAZRIAH AYU BINTI ABU BAKAR	B.E.HONS.(SURREY)(CHEMICAL,00)
49551	LEE CHEE WAH	B.E.HONS.(UMS)(CHEMICAL,04)
49608	SER CHOON FUI	B.E.HONS.(UPM)(CHEMICAL,04)
49236	NOR FAEQAH BINTI IDRUS	B.E.HONS.(USM)(CHEMICAL,05)
49554	YUSNENTI FAZIRAN BINTI MOHD YUNOS	B.E.HONS.(UTM)(CHEMICAL,00) M.E.(UKM)(MANUFACTURING SYSTEM,10)
49216	ZATUL IFFAH BINTI MOHD ARSHAD	B.E.HONS.(UTM)(CHEMICAL,08) MSc(UTM)(CHEMICAL,09)
49393	NORAINI BINTI JAMALUDDIN	B.E.HONS.(UTP)(CHEMICAL,01)
49530	MUHAMMAD SYARHABIL BIN AHMAD	B.SC.(PURDUE)(CHEMICAL,00)
CIVIL ENGINEERING		
49619	CHOO TEIK PIN	B.E.(QUEENSLAND)(CIVIL,07)
49229	TAN YING YING	B.E.(QUEENSLAND)(CIVIL,10)
49528	YAP KHAI CHUANG	B.E.(TASMANIA)(CIVIL,11)
49269	GAN CHOEN SHENG	B.E.(WESTERN AUSTRALIA)(CIVIL,08)
49232	MOHD FARIZSHAN BIN AYOB	B.E.HONS.(BRADFORD)(CIVIL & STRUCTURAL,09) MSc(BRANDFORD)(CIVIL & STRUCTURAL,10)
49243	THAYALAN A/L BALAKRISHNAN	B.E.HONS.(KLIUC)(CIVIL,07)
49571	ASHRAF BIN AHMAD NAZARI	B.E.HONS.(KLIUC)(CIVIL,09)

ADMISSION TO THE GRADE OF GRADUATE

Mem No.	Name	Qualifications
49532	LEE TECK HWA	B.E.HONS.(KLIUC)(CIVIL,09)
49402	SAYANG BINTI ABDOL RAHIM	B.E.HONS.(KUiTTHO)(CIVIL,05)
49220	MOHD IZWAN BIN MOHD NOOR	B.E.HONS.(MALAYA)(CIVIL,04)
49291	KHAIRUL ZAMAN BIN ABDUL MALEK	B.E.HONS.(MALAYA)(CIVIL,06)
49222	NG WEI CHONG	B.E.HONS.(MALAYA)(CIVIL,08)
49224	SI GIAN SHEN	B.E.HONS.(MALAYA)(CIVIL,08)
49270	NG CHEE SIN	B.E.HONS.(NEW SOUTH WALES)(CIVIL,09)
49380	HASLINDA BINTI NAHAZANAN	B.E.HONS.(SHEFFEILD)(CIVIL,05)
49262	NOR BAIZURA BINTI MOHAMMAD SOM	B.E.HONS.(UiTM)(CIVIL,07)
49630	HALAWIYAH BINTI HUSIN	B.E.HONS.(UiTM)(CIVIL,07)
49424	SYED ROSMAN HASHIMY BIN SYED ALWI	B.E.HONS.(UiTM)(CIVIL,08)
49423	ABDUL HADI BIN FIRUZ AHMAD	B.E.HONS.(UiTM)(CIVIL,10)
49588	AVI NICA ANAK MASON	B.E.HONS.(UiTM)(CIVIL,11)
49589	FARRA NADIAH BINTI ZAKARIA	B.E.HONS.(UiTM)(CIVIL,11)
49587	MOHD SYAZRAN BIN MOHD IDRIS	B.E.HONS.(UiTM)(CIVIL,11)
49595	CHEK SOON WEI	B.E.HONS.(UKM)(CIVIL & STRUCTURAL,07)
49567	MUNIRAH BINTI ARSHAD	B.E.HONS.(UKM)(CIVIL-STRUCTURAL,08)
49288	LEE HUI SIAN	B.E.HONS.(UMP)(CIVIL,09)
49246	VISHANTHI NAIR A/P RAJINDRAN	B.E.HONS.(UMP)(CIVIL,10)
49523	SHARIFAH BINTI AWANG	B.E.HONS.(UMP)(CIVIL,10)
49613	TAN KIA PUAI, DORIS	B.E.HONS.(UMS)(CIVIL,06)
49241	DAVID JR AWANG	B.E.HONS.(UMS)(CIVIL,08)
49263	MOHD AZWAN BIN MOHD AZHAR	B.E.HONS.(UNISEL)(CIVIL,09)
49434	NURUL IZZA BINTI MOHD ZAKI	B.E.HONS.(UNITEN)(CIVIL,06)
49295	WESENTERA BIN MOHD JAYOTHISA	B.E.HONS.(UNITEN)(CIVIL,08)
49604	MOHD. RUZAIMEI BIN YALIT	B.E.HONS.(UNITEN)(CIVIL,09)
49535	DZULFAKAR BIN ISMAIL	B.E.HONS.(UPM)(CIVIL,01)
49249	MOHD AZMAN BIN IBRAHIM	B.E.HONS.(UPM)(CIVIL,02)
49432	NOR AZIANA BINTI MOHD NOR	B.E.HONS.(UPM)(CIVIL,04)
49433	SHUHAIMAN BIN NORHISHAM @ MASAM	B.E.HONS.(UPM)(CIVIL,08)
49591	OI ENG TEONG	B.E.HONS.(UPM)(CIVIL,08)
49570	FOO TUN WAI	B.E.HONS.(UPM)(CIVIL,09)
49547	ROBIA ANAK LIMAN	B.E.HONS.(USM)(CIVIL,01)
49257	RAIMOND MIKI	B.E.HONS.(USM)(CIVIL,04)
49605	SITI SALBIAH BINTI HARUN	B.E.HONS.(USM)(CIVIL,04)
49251	YEONG NGAI HUNG	B.E.HONS.(USM)(CIVIL,10)
49606	LIEW KAR SENG	B.E.HONS.(UTAR)(CIVIL,11)
49413	CHEN TIAN HEE	B.E.HONS.(UTHM)(CIVIL,07)
49401	MUHAMAD AMIN BIN HAJI AB GHANI	B.E.HONS.(UTHM)(CIVIL,09)
49543	VUN SU CHIEN	B.E.HONS.(UTHM)(CIVIL,09)
49225	MUHAMAD ZAIHAFIZ BIN ZAINAL ABIDIN	B.E.HONS.(UTHM)(CIVIL,09)(CIVIL,09)
49247	K MAGESWARY A/P KUNALAN	B.E.HONS.(UTHM)(CIVIL,10)
49593	TAN JHEN SHEN	B.E.HONS.(UTHM)(CIVIL,10)
49545	WAN MOHD SABKI BIN WAN OMAR	B.E.HONS.(UTM)(CIVIL,00) M.E.(ASIAN INSTITUTE)(CONSTRUCTION,02)
49573	SATHIYANANDHAN A/L GOPALAN @ GOPAL	B.E.HONS.(UTM)(CIVIL,01)
49407	CHAN YIN HAR	B.E.HONS.(UTM)(CIVIL,02)
49409	HASROLNIZAM BIN SHAARI	B.E.HONS.(UTM)(CIVIL,02)
49572	CHAN HOOI SAN	B.E.HONS.(UTM)(CIVIL,02)
49417	GAN SHIO WHEY	B.E.HONS.(UTM)(CIVIL,05)
49578	LIEW MING HUI	B.E.HONS.(UTM)(CIVIL,06) M.E.(UTM)(CIVIL-STRUCTURE,09)
49248	AHMAD ZAKI BIN KASSIM	B.E.HONS.(UTM)(CIVIL,07)
49415	POR TEONG HOOI	B.E.HONS.(UTM)(CIVIL,07)
49408	SEE KEAN THYE	B.E.HONS.(UTM)(CIVIL,07)
49568	MUHAMAD HANIFF BIN ISMAIL	B.E.HONS.(UTM)(CIVIL,07)
49565	NOOR AZIZAH BINTI TAHIR	B.E.HONS.(UTM)(CIVIL,07)
49278	NOR ELIZA BINTI ALIAS	B.E.HONS.(UTM)(CIVIL,07) M.E.(UTM)(CIVIL-COASTRAL & MARITIME,11)
49279	MOHD AISHAHRUDDIN BIN LONGGO	B.E.HONS.(UTM)(CIVIL,08)
49577	IZAT BIN YAHAYA	B.E.HONS.(UTM)(CIVIL,08)
49617	KATIRAVAN A/L MOORTHI	B.E.HONS.(UTM)(CIVIL,08)
49281	HANIZA BINTI HASBULLAH	B.E.HONS.(UTM)(CIVIL,10)
49412	LEE JIAN HUEI	B.E.HONS.(UTM)(CIVIL,10)
49582	MOHD SALLEHUDDIN BIN TAIB	B.E.HONS.(UTM)(CIVIL,11)
49411	LEE SENG KANG	B.E.HONS.(UTM)(CIVIL-ENVIRONMENTAL,06)
49566	IZZAH BINTI PAKU ROZI	B.E.HONS.(UTP)(CIVIL,10)
49275	RAJAKUMAR B SUBRAMANIAM	B.E.HONS.(WALES)(CIVIL,89) MSc(WALES)(STRUCTURAL,92)
49629	YAP KOON FAH	B.SC.(BALLARAT)(CIVIL,05) M.SC.(PORTSMOUTH)(CIVIL,06)
49384	AWANG MUHAMMAD ZAID AWANG ABDILLAH	B.SC.(MICHIGAN-ANN ARBOR)(CIVIL,06)
49228	LEE CHEONG HENG	M.E.(SURREY)(CIVIL,10)
49620	LIM DIXON AMANDO	M.E.HONS.(SWANSEA)(CIVIL,10)
COMPUTER ENGINEERING		
49581	MOHD FADHLI BIN NAZRUDDIN	B.E.HONS.(UTM)(COMPUTER,08)

ADMISSION TO THE GRADE OF GRADUATE

Mem No.	Name	Qualifications
ELECTRICAL ENGINEERING		
49268	WAN HOONG MING	B.E.(TASMANIA)(ELECTRICAL-POWER,08)
49245	CHEONG ZHI XIONG	B.E.HONS.(CURTIN)(ELECTRICAL-POWER,08)
49400	WARDATUL FADHILAH BINTI AMIR NAZRI	B.E.HONS.(KUiTTHO)(E'TRICAL,06)
49428	NIK ABDULLAH SHARRIS BIN NIK SHIHABUDDIN	B.E.HONS.(MALAYA)(ELECTRICAL,04)
49221	TAN CHOON CHET	B.E.HONS.(MALAYA)(ELECTRICAL,08)
49223	LEE SHYH MING	B.E.HONS.(MALAYA)(ELECTRICAL,09)
49429	YEO JENG FATT	B.E.HONS.(MALAYA)(ELECTRICAL,10)
49596	CHONG THYE SOON	B.E.HONS.(MALAYA)(E'TRICAL,08)
49537	ENG TERNG GOANG	B.E.HONS.(MMU)(E'TRICAL,10)
49555	PHOON HEE JOE	B.E.HONS.(MMU)(E'TRICAL,10)
49627	CHOW WAI KEONG, RAYMOND	B.E.HONS.(NORTHUMBRIA)(E'TRICAL & E'TRONIC,06) M.E.(MALAYA)(06)
49226	ENG HO SHIN, ALFRED	B.E.HONS.(NOTTINGHAM)(E'TRICAL & E' TRONIC, 06)
49272	PANG KEE CHEN, WILSON	B.E.HONS.(NOTTINGHAM)(E'TRICAL & E' TRONIC, 06) MSc.(NOTTINGHAM)(ELECTRICAL,07)
49628	SANURI BIN ISHAK	B.E.HONS.(PORTSMOUTH)(E'TRICAL & E'TRONIC,94)
49590	MOHD FAIRUZ BIN ABDUL KADIR	B.E.HONS.(UiTM)(E'TRICAL,07)
49422	RIZAL IZZUAN BIN JAMALUDIN	B.E.HONS.(UiTM)(E'TRICAL,08)
49391	CHONG WEI PENG	B.E.HONS.(UKM)(E'TRICAL & E'TRONIC,08)
49387	LIOW CHEE SHING	B.E.HONS.(UMS)(E'TRICAL & E'TRONIC,06)
49538	CHIN WENG KOK	B.E.HONS.(UMS)(E'TRICAL & E'TRONIC,09)
49600	LAI PUI MUN	B.E.HONS.(UMS)(E'TRICAL & E'TRONIC,09)
49403	LIAU CHEW KIT	B.E.HONS.(UMS)(E'TRICAL & E'TRONIC,10)
49404	MOHD RHEDWANSYAH BIN SALINRI	B.E.HONS.(UMS)(E'TRICAL & E'TRONIC,10)
49622	AFFIEZAL BIN ADNAN	B.E.HONS.(UNI OF LONDON)(E'TRICAL & E'TRONIC,01)
49242	NURUL HUDA BINTI ABDUL RAZAK	B.E.HONS.(UNiMAP)(ELECTRICAL-SYSTEM)
49599	LAM FOO CHEE	B.E.HONS.(UNiMAP)(E'TRICAL-SYSTEM,10)
49442	WEE JOON KEAT	B.E.HONS.(UNITEN)(ELECTRICAL -POWER,07)
49441	ZULZAMRI BIN KOSNAN	B.E.HONS.(UNITEN)(ELECTRICAL-POWER,01)
49440	LOH SIANG YEW, EDWIN	B.E.HONS.(UNITEN)(ELECTRICAL-POWER,09)
49438	PEH KOK JOO	B.E.HONS.(UNITEN)(E'TRICAL -POWER,06)
49436	WAN AZIHAN BIN WAN AHMAD	B.E.HONS.(UNITEN)(E'TRICAL -POWER,07)
49439	HO CHEE MING	B.E.HONS.(UNITEN)(E'TRICAL & E'RONIC,07)
49261	ADZRIL BIN ADNAN	B.E.HONS.(UNITEN)(E'TRICAL & E'TRICAL,05)
49444	NG CHUN HUAT	B.E.HONS.(UNITEN)(E'TRICAL & E'TRONIC,08)
49563	GANESON A/L SIVAPPRAGASAM	B.E.HONS.(UNITEN)(E'TRICAL & E'TRONIC,08)
49435	FIZAL AZUAN BIN MHD SIDIN	B.E.HONS.(UNITEN)(E'TRICAL & E'TRONIC,09)
49562	AMALINA BINTI YUSOP	B.E.HONS.(UNITEN)(E'TRICAL & E'TRONIC,09)
49553	ABDUL HAKIM BIN HJ ABU BAKAR	B.E.HONS.(USM)(E'TRICAL - POWER,02)
49586	TAN KHENG KWANG	B.E.HONS.(USM)(E'TRICAL,09)
49252	KOO KUAN YONG	B.E.HONS.(USM)(ETRICAL,10)
49253	TSANG KIAN HOE	B.E.HONS.(USM)(ETRICAL,10)
49546	LIEW TECK POH	B.E.HONS.(UTAR)(E'TRICAL & E'TRONIC,11)
49390	YONG CHIN CHOONG	B.E.HONS.(UTeM)(E'TRICAL - INDUSTRIAL POWER,05)
49302	CHEN YAU THONG	B.E.HONS.(UTM)(ELECTRICAL,02)
49583	ZULHAZMI BIN ELIAS	B.E.HONS.(UTM)(ELECTRICAL,08)
49282	MUHAMMAD IKRAM BIN MOHD RASHID	B.E.HONS.(UTM)(ELECTRICAL,08) M.E.(UTM)(ELECTRICAL-KUASA,10)
49218	CHONG CHAI THIAM	B.E.HONS.(UTM)(ELECTRICAL,10)
49217	NUR AYUZIE AKMAL BINTI MUHAMMAD	B.E.HONS.(UTM)(ELECTRICAL,10)
49414	MUHAMMAD FITRI BIN AYOB	B.E.HONS.(UTM)(ELECTRICAL,10)
49215	FAIRUZ BIN ZULKERNAIN	B.E.HONS.(UTM)(ELECTRICAL-INSTRUMENTATION & CONTROL,01)

Remaining list of the "ADMISSION TO THE GRADE OF GRADUATE" would be published in the Jan/12 issue.

Note: *For the list of approved admissions to the grade of Student member, please refer to the IEM web portal at http://www.myiem.org.my.*

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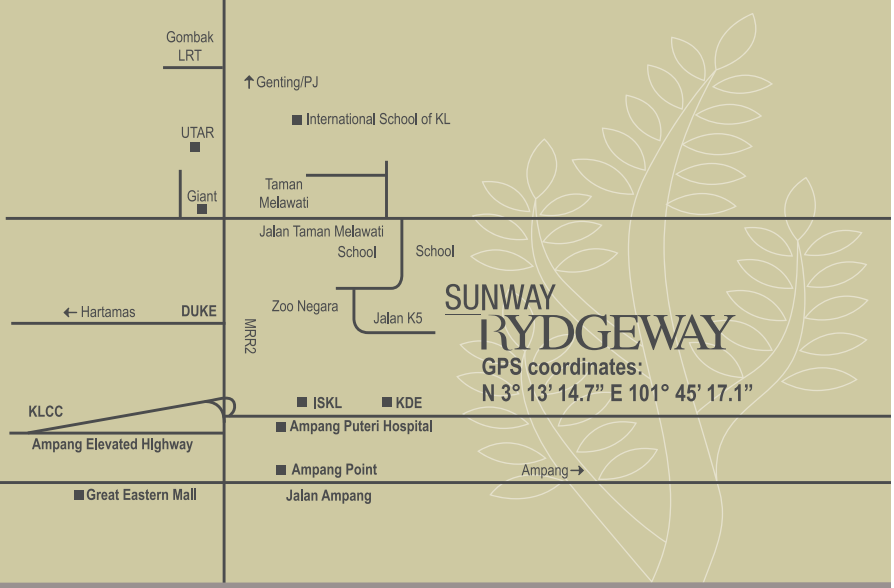
- Fortified security featuring perimeter fencing, CCTV and home alarm system that are linked to the guardhouse.
- Garden pavilion featuring a community area and swimming pool, garden maze and other themed landscape gardens.



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Sunway Rydgeway 2 1/2 Storey Zero Lot Bungalow • Developer's License No.: 10906-1/02-2014/165 • Validity Date: 23/02/2009 - 22/02/2014 • Advertisement & Sales Permit No.: 10906-1/350/2012(02) • Validity Date: 24/02/2011 - 23/02/2012 • Approving Authority: Majlis Perbandaran Ampang Jaya • Plan Reference No.: (12) dlm MPAJ. 04/1/2-19/2008 • Sekatan kepentingan: Tanah yang diberi milik ini tidak boleh dipindah milik, dipajak atau digadai melainkan dengan kebenaran pihak berkuasa negeri • Land Tenure: 99 Years (Feb 2108) • Expected Date of Completion: 36 Months (Feb 2012) • Land Encumbrance: HSBC • Selling Price: Min. RM3,372,000 - Max. RM4,660,500 • Total Units: 40 units • 7% Bumiputra Discount

*Terms & Conditions Apply

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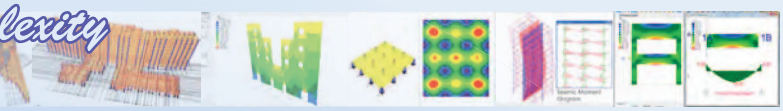

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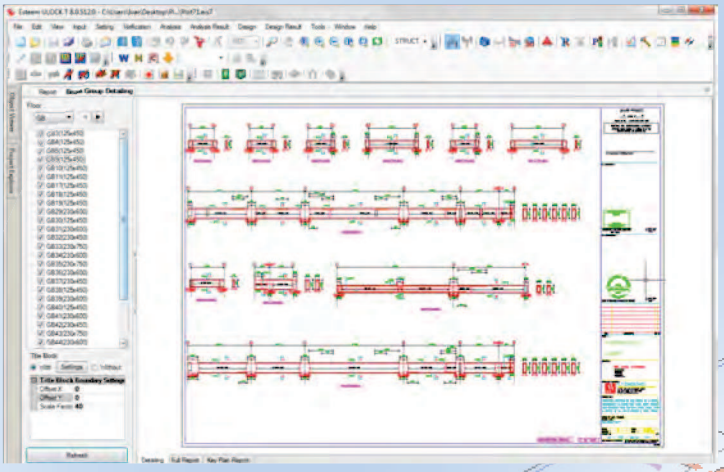
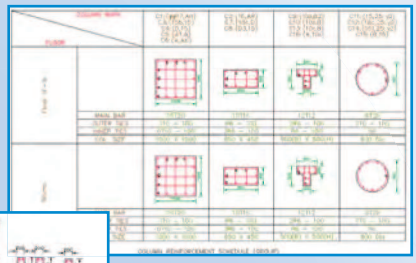
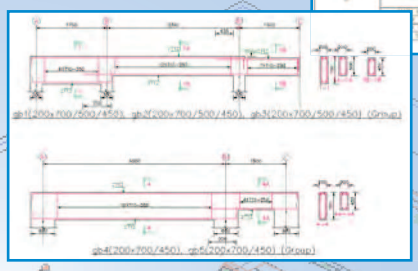


AUTO DETAILING GROUPING

COLUMN GROUPING





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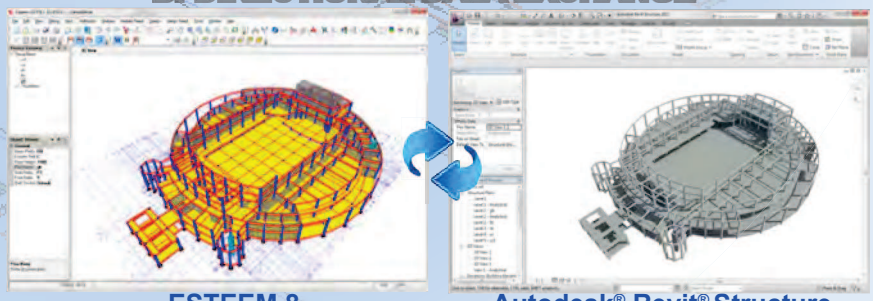

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