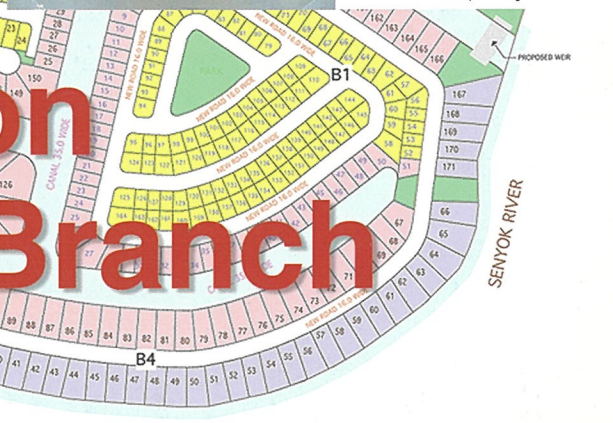
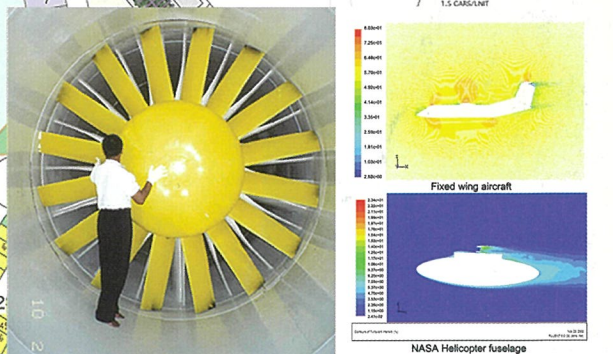




# JURUTERA

THE MONTHLY BULLETIN OF THE INSTITUTION OF ENGINEERS, MALAYSIA

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## Special Issue on IEM Southern Branch

STRAITS OF JOHOR



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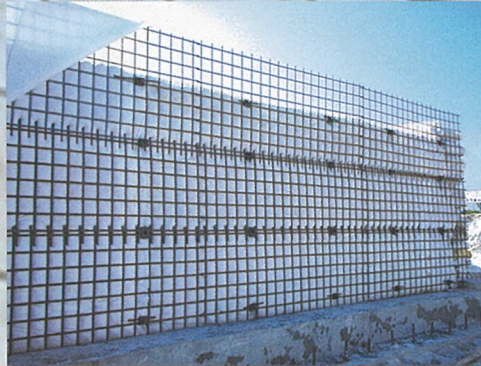




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# TNB Engineering Corporation



Established in 1993, TNB Engineering Corporation Sdn Bhd (TNEC) is a wholly-owned subsidiary of Tenaga Nasional Berhad (TNB), Malaysia's premier energy utility provider. TNB has diversified its business into areas like manufacturing of power components such as transformers, switchgears and project services. TNEC has been entrusted to provide project services as well as develop energy related projects and has extensive experience in the development, construction, operation and maintenance of District Cooling System (DCS) plants and networks, spanning a period of more than 10 years.

TNEC is supported by the wide experience and knowledge of the TNB group of companies. The strong bond that it shares with TNB has made TNEC the choice partner for energy related projects in Malaysia. This relationship has been the driving force behind the company's surge forward in winning projects and fulfilling customer demands.

TNEC's core businesses include providing DCS, Co-Generation Plants and undertaking turnkey contracts, which entail the full scope of services starting from initial concept, detailed design, procurement, construction, installation and commissioning.

In Malaysia, several DCS plants with comprehensive operations and maintenance are currently in operation. DCS is the future trend in large air-conditioning systems and the natural choice for far-sighted property owners.

## WHAT IS A DISTRICT COOLING SYSTEM?

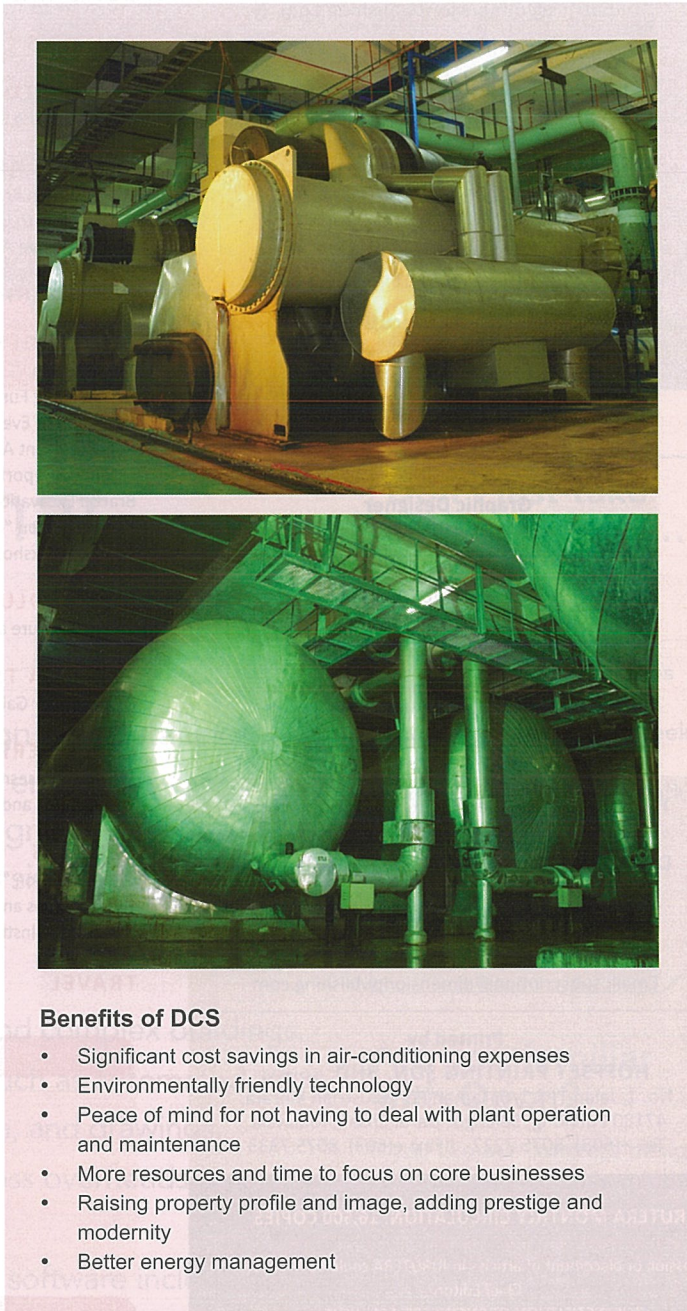
A DCS distributes thermal energy in the form of chilled water or other media from a central source to multiple buildings through a network of underground pipes for use in space and process cooling. It is usually supplied from a central cooling plant, thus eliminating the need for separate systems in individual buildings.

A DCS normally incorporates one of a few technology options available. These options can be classified as follows:

- **Thermal Energy Storage (TES)** - takes advantage of the lower electricity tariff during the night, by storing thermal energy for use during the day.
- **Co-Generation** - the simultaneous production of electricity and thermal energy from the same energy source.

Selected TNEC DCS projects:

- Institut Jantung Negara (National Heart Institute)
- Majlis Bandaraya Shah Alam
- Bangsar/Pantai District (Menara TM, Wisma Telekom, TNB Corporate HQ Complex, Cygal Plaza and Pantai Plaza developments)
- Malaysian Institute of Nuclear Technology
- Universiti Kebangsaan Malaysia



## Benefits of DCS

- Significant cost savings in air-conditioning expenses
- Environmentally friendly technology
- Peace of mind for not having to deal with plant operation and maintenance
- More resources and time to focus on core businesses
- Raising property profile and image, adding prestige and modernity
- Better energy management



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## Opportunities Down South

by *Ir. Sim Tian Liang*

Chairman, IEM Southern Branch

**THE** role of engineers as the prime movers for the development of the country as well as the improvement of the people's lifestyle is challenging but fulfilling for engineers. The trust that the public placed upon us has compelled us to deliver with utmost professionalism and vigilance.

In any engineering endeavour, engineers, besides being conversant in applying engineering principles, must also consider the safety, environmental and sustainability aspects of a project. Greener and eco-friendly technology is being utilised to achieve a balanced and sustainable development on this Earth in years to come. To save the world from global warming, the adoption of strategies to reduce carbon emission, promotion of alternative greener energy and proper waste management is postulated.

In the southern part of the Peninsular Malaysia, the Iskandar Development Region (IDR) is experiencing a tremendous transformation into a modern and world class metropolitan city adopting some of the principles stated above. An estimated RM360 billion worth of investments are expected to be raised for the physical, urban and industrial development of the region over 20 years.

The industrial development with emphasis in new industries requiring highly skilled labour and new technologies are transforming the region's economic base towards a knowledge-based economy (k-economy). Hi-technology parks are planned for industries involving biotechnology, biomedical, biochemical, and information and communication technology. An animation theme park, aviation logistics hub, EduCity and facilities to stimulate medical tourism are to be set up in this region.

Henceforth, the services of engineers of various disciplines are in great demand here. There are many job opportunities for engineering consulting firms, construction firms and other engineering related companies, and some of the firms are benefiting from the development now. It is envisaged that one-stop multi-disciplined consulting firms would have an edge in providing services from planning to implementation of projects for the multinational corporations (MNC) investing in this region.

Engineers are known to be the real wealth creators because of their innovativeness and entrepreneurship. The application of engineering principles and knowledge by engineers into physical development or products have not only created employment but also comfort to the society at large. Many of the top companies in the world are engineering firms such as General Motors, Microsoft Corporation and Nokia. The IDR offers us ample opportunities for us to attest our reputation. ■





## The Greater Challenge Ahead

by **Engr. Dr Yeoh Hak Koon**

Bulletin Editor, Standing Committee on Information and Publications

(Emails to the editor: [pub@iem.org.my](mailto:pub@iem.org.my))

A Hollywood star made an international call to complain that his chartered flight did not have the correct bottled water, and refused to get on the plane. The agent on the receiving end had just learnt that five Cambodian children he was helping - all scavengers at a dump yard - had typhoid. With this last straw, Scott Neeson left a posh job to found the Cambodian Children's Fund in 2004 (March 2010 issue of Reader's Digest).

The contrast in priorities and lifestyle is stark, and saddening. "Who said the world is fair?", you might counter. In fact, society, capitalist or otherwise, cherish such unfairness, otherwise the likes of Warren Buffet, Bill Gates, Li Yanhong, etc. would not have existed, nor worshipped by so many. It is this yearning to rise above others that drives civilisation.

The ecosystem does the same thing, but in a much more brutal manner. It is a constant battle of life and death: overpower, out-hide, out-run or out-poison one another. The strong will devour the weak. Geologic and astronomical events shake things up even more violently, tilting the balance every so often.

On such a scale, indeed, mankind is nothing. We are just a

blip in the history of the universe. If we made the right collective choice, we last longer, and perhaps develop sufficiently to dodge cataclysmic events such as eruptions of super-volcanoes, or even the burning out of the sun. Otherwise, we just disappear, to be replaced by another.

Seen from such perspectives, what should we do as engineers? We could choose to dance with the music, join the rat race, and have fun till we drop. After all, everyone has to die, it is just a question of when and how!

Alternatively, we could choose to contribute towards the longevity and quality of our civilisation. This is a messy technosocio problem. The poor cannot live like the rich without risking disastrous outcomes, yet the rich refuses to have anything less! Engineers must work with scientists, politicians and the masses; but the solution is yet unknown, hopefully not unknowable!

How many chose the easy path, how many even think of the alternative? Our destiny is shaped by our collective efforts and, at the moment, it is not pretty. This is my last piece as the Bulletin Editor, and I leave you with this to ponder and, hopefully, act on. ■

## ANNOUNCEMENT

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.

"The Engineer" can be purchased through IEM for RM125, of which RM20 will be donated by the author to IEM funds. Please add delivery and handling costs of RM20 for Peninsular Malaysia and RM30 for Sabah and Sarawak.

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# ADVANCE MATERIALS FOR CONSTRUCTION, REPAIR & MAINTENANCE OF REINFORCED CONCRETE STRUCTURES

Date & Time: **24 & 25 May 2010 (Mon-Tue)** 9a.m – 5.30p.m

Venue: Seminar Hall, Wisma Wawasan

Participants: Civil Engineers, Structural Engineers, Architects, Developers, Lecturers, Academics, Building Contractors, Consultants, Project Managers, RE

Fee: Normal Price - RM1500/person

Promotion Price - RM1200/person  
\* for 2 or more persons

Speaker: **Dr.Mohamed A.El-Reedy**

**+FREE**  
**Spreadsheets**  
a) RC Staircase Design  
b) RC Pad Footing Design  
c) RC Slab Design (BS8110)  
**Worth RM1200**

## DAY 1

### Introduction and Overview

- ✓ Conventional Concrete Materials Limitations and Problems
- ✓ High Strength Concrete and High Performance Concrete
- ✓ Special Constituent materials and Admixtures

### High Strength Concrete: General

- ✓ Durability Improvement, Structural Improvement & Importance and Economy

### High Strength Concrete: Materials

- ✓ Slag (GGBS), Fly Ash & Silica

### High Strength Concrete: Production

- ✓ Batching and Mixing High Strength Concrete
- ✓ Placing and Compacting High Strength Concrete
- ✓ Finishing and Curing High Strength Concrete

### SCC Characteristics

- ✓ Definition, Importance and Economy & Performance Improvement Concerns

### Construction Practices for Concrete in the Gulf

- ✓ Specifics of Gulf Environment, Definition of hot weather for concreting processes & Precautions for different concreting operations in the hot weather of Gulf region

## DAY 2

### Standard Test Methods for Non-Conventional Concretes and Reinforcement

- ✓ Standard test methods for fresh and hardened special concretes
- ✓ Standard specifications for epoxy coated bars
- ✓ Standard specifications for steel wires and strands for prestressed concrete
- ✓ Standard test methods for properties of FRP rods

### Technical Specifications for Concrete and Reinforcement

- ✓ Specification definition and specified qualifications
- ✓ Specification types, features and format
- ✓ Sample concrete and reinforcement specifications

### Non-Traditional Types of Reinforcement Used in Concrete Structures

- ✓ Galvanized and epoxy coated bars, Stainless steel bars & Fiber Reinforced Plastic (FRP) reinforcement for concrete

### Repair Materials for Concrete Structures

- ✓ Required properties in repair materials, Types of repair materials, Repair methods and techniques & Sample technical specifications for repair works

### Latex Modified Concrete: Introduction & Materials

- ✓ Background, Standard Specifications and Guidelines Mix Proportioning, Mixing and Placing & Finishing and Curing

### Advanced Concrete Materials:

- ✓ Problems and Solutions, Dosage and Over Dosage, Workability, Setting and Finishing, Long Term Performance & Repair by using CFRP

# WORKSHOP ON FOUNDATION UNDER MACHINES

Date & Time: **27 May 2010 (Thursday)** 9a.m – 5.30p.m

Venue: Seminar Hall, Wisma Wawasan

Participants: Civil Engineers, Structural Engineers, Architects, Developers, Lecturers, Academics, Building Contractors, Consultants, Project Managers, RE

Fee: Normal Price - RM650/person

Promotion Price - RM500/person  
\* for 2 or more persons

Speaker: **Dr.Mohamed A.El-Reedy**

**+FREE**  
**Spreadsheet**  
a) Machine Foundation Design  
**Worth RM500**

- It is usual in university courses to focus on concrete design for real estate projects and housing buildings.
- For factories and industrial projects, we face with problems in designing concrete foundation for holding heavy machines and vibrations. In this course, we will focus on the design of concrete foundation under machines with case study for reciprocating and centrifugal machine.

### SESSION 1

- Principal design for foundation under machine
- The required data from manufactures

### SESSION 2

- Solve unknown data problems & Practical design and precaution

### SESSION 3

- Dynamic analysis check for reciprocating machine
- Dynamic analysis check for centrifugal machine

### SESSION 4

- Workshop for design foundation under gas turbine generator
- Methods of isolating the machine

# WORKSHOP ON CARBON FIBER REINFORCED POLYMER (CFRP) FOR CONCRETE STRENGTHEN

Date & Time: **28 May 2010 (Friday)** 9a.m – 5.30p.m

Venue: Seminar Hall, Wisma Wawasan

Participants: Civil Engineers, Structural Engineers, Architects, Developers, Lecturers, Academics, Building Contractors, Consultants, Project Managers, RE

Fee: Normal Price - RM650/person

Promotion Price - RM500/person  
\* for 2 or more persons

Speaker: **Dr.Mohamed A.El-Reedy**

**+FREE**  
**Spreadsheets**  
a) RC Staircase Design  
b) RC Pad Footing Design  
**Worth RM1000**

- Nowadays Fiber reinforced polymer is the most famous technique to strengthen concrete structure. In this seminar speaker may present the up to date carbon fiber reinforced polymer and other material that can be used to strengthen and repair the reinforced concrete members. ACI 440 presents the way of design FRP, how it is match with BS requirements and evaluate the FRP in reinforced concrete structure.

### SESSION 1

- Types of FRP in the market

### SESSION 2

- Properties of fiber reinforced polymer
- Using FRP in repair and strengthening

### SESSION 3

- Calculate FRP for strengthen member against flexural stress
- Calculate FRP for strengthen member against shear stress

### SESSION 4

- Workshop in flexural strengthening
- Workshop in shear strengthening



Distinguished Speaker:  
**Dr.Mohamed A.El-Reedy**  
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## IEM Southern Branch... in brief

by **Ir. Mohd. Khir bin Muhammad** and **Ir. Tey Choo Yew, Calvin**

*IEM Southern Branch*

**THE** IEM Southern Branch is one of the largest IEM branches in terms of membership and is definitely among the earliest to be set up by the IEM to cater to its members who reside outside the Klang Valley.

It was officially registered with the Registrar of Societies (ROS) on 18 August 1971 with its official branch address at the Sultan Ismail Power Station, Lembaga Letrik Negara (LLN), Johor.

The Branch Committee in those early years largely consisted of member engineers from government departments such as the Public Works Department (JKR), the Drainage and Irrigation Department (DID), LLN and a few from the private sector including consulting engineers.

As it is common for IEM in the early years, the branch operated without any fulltime secretariat staff and had no permanent office for many years. The "branch office" was effectively the workplace of its committee members, normally the office of the Chairman or the Honorary Secretary.

In the mid 80s, the branch, with the support of IEM headquarters, managed to raise funds to acquire a 3-storey commercial shop lot to become its permanent office. The office, located at Jalan Abiad, Johor Bahru, has been the home of the IEM Southern Branch ever since.

We have played an important role in promoting the engineering profession among our members and the society. Our membership (in 2009) stands at about 1,900 members, of which 40% consists of corporate members. The remaining 60% comprises graduate and student members. Interestingly, about 300 of our members, mostly graduate engineers, are working in Singapore.

We have been actively organising activities that benefit our members and fellow engineers. These include technical talks, seminars, charitable works, social activities and technical visits. Some of the visits have even brought us to engineering project sites and facilities in Singapore.

We maintain cordial relationships not only with the Johor state government but also with other professional bodies such as the state's Bar Council committee, the southern branch of Malaysian Association of Architects (PAM), the Institute of Surveyor Malaysia (ISM) Johor, The Institution of Engineers Singapore (IES) and the ASEAN Concrete Construction Institute, Singapore.

IEM representatives have also been appointed by the state government as *ex-officio* members in the local councils of Majlis Bandaraya Johor Bahru (MBJB) and Majlis Perbandaran Johor Bahru Tengah (MPJBT). This is testimony to the recognition of the government towards the contribution of IEM, particularly in Johor Bahru.

Our Young Engineers Section (YES) has also been very active in recent years with the involvement of the two IEM student chapters at Universiti Teknologi Malaysia (UTM), Skudai, and Universiti Tun Hussein Onn (UTHM), Batu Pahat.

The management of both universities have been supportive of the IEM and have been promoting IEM to its academic staff and engineering students. In the case of UTM, the present Vice-Chancellor, who is also an IEM member, has been kind enough to provide a 5-year lease-free office space within a building in its campus for IEM to promote and conduct its activities beginning the second half of 2010.

The IEM southern branch has come a long way since the 1970s. The branch will be holding its 37<sup>th</sup> Annual General Meeting and Annual Dinner come June 2010. Next year, in 2011, we will be celebrating the 40<sup>th</sup> Anniversary of the IEM Southern Branch.

As the saying goes, life begins at 40. With the branch being 40 years "young", this largest branch of the learned professional organisation of IEM will continue to play a pivotal role in promoting the advancement of science and engineering, and to contribute for the betterment of the engineering profession particularly down south in the state of Johor.



*IEM (Southern) Committee Session 2009/2010  
Photo with IEM President (July 2009)*



**EXECUTIVE COMMITTEE FOR SESSION 2009/2010, IEM SOUTHERN BRANCH**

**Chairman**

Ir. Sim Tian Liang, *MIEM, P. Eng.*

**Vice-Chairman**

Ir. Mohd. Khir bin Muhammad, *FIEM, P. Eng*

Ir. Ling Ngie Soon, *MIEM, P.Eng*

**Immediate Past Chairman**

Ir. Prof. Dr Amir Hashim bin Mohd Kassim, *FIEM, P. Eng*

**Honorary Secretary**

Ir. Hoe Tian Hee, Tony, *MIEM, P. Eng*

**Honorary Treasurer**

Ir. Assoc. Prof. Hayati binti Abdullah, *MIEM, P. Eng*

**General Committee Members**

Ir. Mohd. Salehuddin bin Abd. Hamid, *MIEM, P. Eng*

Ir. Lee Hock Hai, David, *MIEM, P. Eng*

Ir. Lee Wei Shiong, *MIEM, P. Eng*

Ir. Assoc. Prof. Dr Shuhaimi bin Mansor, *MIEM, P. Eng*

**Co-opted Committee Members**

Ir. Wong Ngie Sing, Geoffrey, *MIEM, P. Eng*

Ir. Tan Chee Pheng, *MIEM, P. Eng*

Ir. Hj. Abdul Malek bin Talib, *MIEM, P. Eng*

**Past Chairman Serving in the Committee**

Y.Bhg. Dato' Ir. Chong Yoon On, Steve, *FIEM, P. Eng*

Ir. Teh Sea Chuan, *FIEM, P. Eng*

Ir. Ng Ah Kow, *FIEM, P. Eng*

Ir. Chan Choong Cheong, *FIEM, P. Eng*

**Young Engineer Section's (YES) Representative**

Engr. Ng Pui Ling, *Grad. IEM*

**Secretariat Staff**

Ms. Azlina binti Abdullah (Lina)

Ms. Iffah Nadiyah binti Azman (UiTM trainee)



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IEM (Southern) Committee Session 2000-2001



IEM (Southern) Committee Session 1990-1991

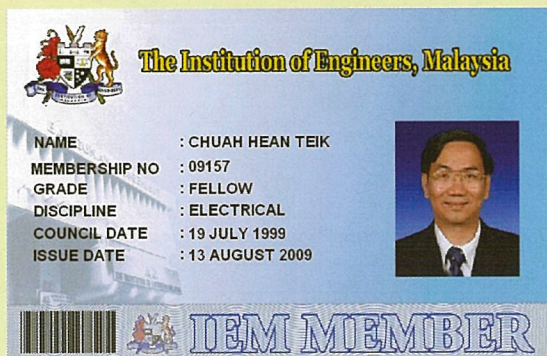


IEM (Southern) Committee Session 1979-1980

**LIST OF PAST CHAIRMEN, IEM SOUTHERN BRANCH**

Sessions	Name
2008/2009	Ir. Sim Tian Liang
2006/2007, 2007/2008	Ir. Prof. Dr Amir Hashim bin Mohd. Kassim
2004/2005	Ir. Chong Yoon On, Steve
2003/2004	Ir. Ng Ah Kow
2001/2002, 2002/2003	Ir. Puen Tak Hong
1999/2000, 2000/2001	Ir. Chong Yoon On, Steve
1997/1998, 1998/1999	Ir. Chan Choong Cheong
1995/1996, 1996/1997	Dato' Ir. Prof. Dr Mohd. Noor bin Hj. Salleh
1993/1994, 1994/1995	Ir. Teh Sea Chuan
1991/1992, 1992/1993	Ir. Lim Chow Hock
1989/1990, 1990/1991	The late Ir. Chye Chern Yee
1987/1988, 1988/1989	Ir. Ooi Kao Yang
1986/1987	Ir. Ching Goo Kia
1985/1986	Ir. Roger Ling Ung Yii
1983/1984, 1984/1985	Ir. Lee Kim Kiew
1981/1982, 1982/1983	The late Ir. Dato' Ooi Tiong Lee
1979/1980, 1980/1981	The late Ir. S. Devedran
1977/1978, 1978/1979	Ir. Chan Swee Seng
1976/1977	Ir. Dato' Cheah Thean Sun
1975/1976	Ir. Dato' Tay Lang Seng
1974/1975	Ir. Dato' Hj. Shamsuri bin Hj. Ali.

**NEW IEM MEMBERSHIP CARD**



Effective from 1 January 2008, IEM has introduced a new IEM membership card for all Members. The new card had been designed to include bar code features as provision for future expansion. It is hoped that this new card would assist IEM to provide better and more efficient service to the Members.

Members who have not collected the card can submit a "scanned" passport sized photograph (softcopy) in JPEG format and e-mail to [iemphoto@gmail.com](mailto:iemphoto@gmail.com). Kindly indicate your name, membership number and grade upon submission.

You may also contact the IEM Secretariat at 603-79684017 for an appointment for your photo to be taken.

Thank you for your co-operation.



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## FEATURE



Figure 10: Flow visualisation using smoke and oil

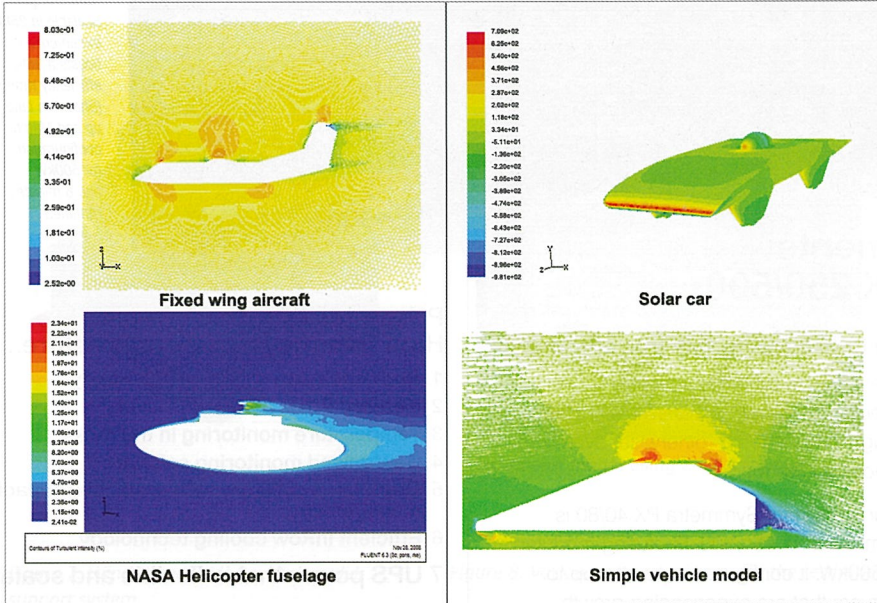


Figure 11: CFD computational results using Fluent at UTM-LST

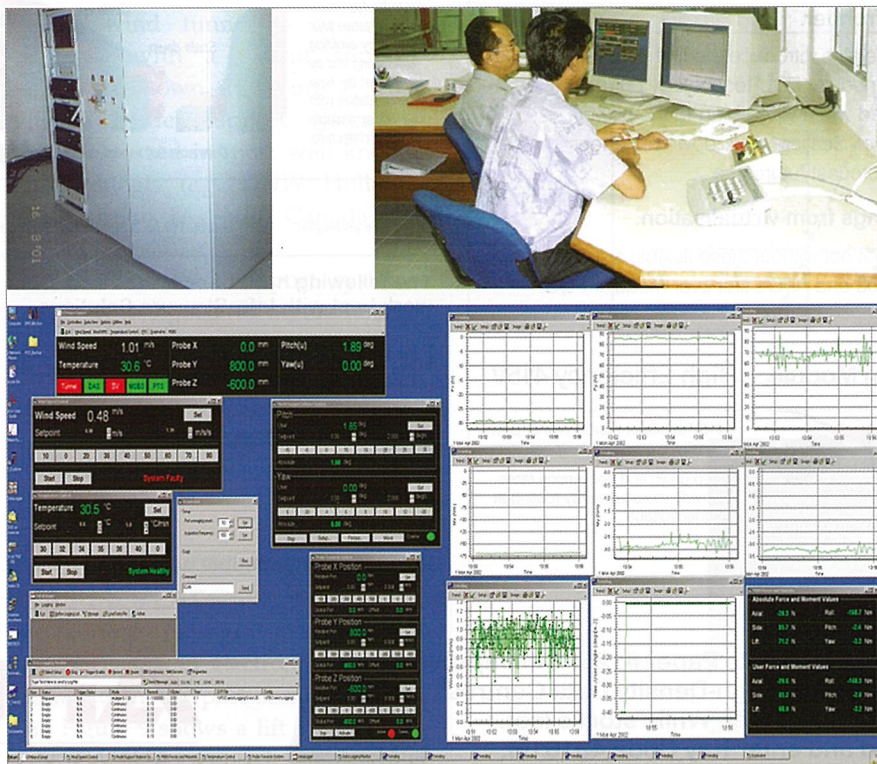


Figure 12: Facility control with fully integrated DARS

## 5.0 FLOW VISUALIZATION AND CFD CORRELATION

Flow visualisation is a qualitative technique to visualise the flow pattern on the surface of the model. Smoke is commonly used for flow visualisation. An example over a car is illustrated in Figure 10.

The UTM-LST is also equipped with Fluent, a commercial Computational Fluid Dynamics (CFD) software package for fluid flow simulation. Figure 11 shows some of the results using this package at UTM-LST.

## 6.0 FACILITY CONTROL SYSTEM

The wind tunnel is equipped with a fully integrated automatic Control, Data Acquisition and Reduction System (DARS). The operation and post-processing data of the tests is done inside the control room. The measurement of air properties, 6-component balance, pressure transducer, hot-wire and other transducer are read and stored in the control room. These are illustrated by Figure 12.

## 7.0 CONCLUSION

The UTM-LST has been in service for more than eight years to facilitate the teaching, research and industrial application of the aeronautical and non-aeronautical fields in Malaysia. With this state-of-the-art test facility in terms of flow-quality, instrumentation and DARS, our vision is to become a centre of excellence for wind tunnel testing in Malaysia as well as within the region. ■

## REFERENCE

- [1] Universiti Teknologi Malaysia Low-Speed Wind Tunnel (UTM-LST) Aerodynamic Commissioning Report, Report No: 4070/R185, Aiolos Engineering Corp. 2001.



## Automated Equipment Sector Facing Stiff Competition

The local automated equipment manufacturing sector, which has been the driving force behind Penang's industrialisation for the past 30 years, is facing a shortage of quality design engineers in the country as well as strong competition from China-made products. Pentamaster Corp Bhd executive chairman C.B. Chuah said that China was starting to design higher-end automated equipment with innovative features and are priced 40%-50% lower than Malaysia-made units. He added that the majority of younger-generation engineers in Malaysia also do not have the ability to do design work.

AT Systemisation Bhd managing director Beh Lai Lien said there was a shortage of quality technicians in small and medium machinist workshops that supported the automated equipment industry. Beh also said the local automated equipment makers were not receiving a high volume of orders from the domestic market to enable them to produce cost effectively. MMS Ventures Bhd managing director T.K. Sia said the engineering curriculum at local universities is too theoretical, not giving sufficient attention to the practical needs and trends of the automated equipment industry. In addition, Sia suggested that the Government look into giving rebates to companies that buy locally-made automated equipment to encourage the purchase of locally-made equipment as practised in China.

Penang Skills Development Centre (PSDC) chief executive officer Datuk Boonler Somchit said the education system did not produce sufficient engineers to fulfil the needs of multinational corporations and small and medium enterprises, particularly in the areas of design and development. He pointed out that PSDC has been involved in developing a programme for diploma and degree holders to acquire the hard and soft skills in engineering in the shortest time possible via a finishing school concept, which provides both the theoretical and practical aspects of training for specific employment. Datuk Boonler stated that PSDC has applied for a substantial grant to start operating the finishing school for engineers as soon as possible under the 10th Malaysian Plan.

*(Sourced from The Star)*

## Stadium Roof Collapse Caused by Multiple Flaws

A detailed 60-page confidential report finalised by an investigation committee that was tasked by the Public Works Department found that some of the main contributing factors behind the roof collapse at Stadium Sultan Mizan Zainal Abidin in Gong Badak on June 2 last year included serious engineering flaws, shoddy workmanship, inferior materials and lack of expertise in the key project management team. Menteri Besar Datuk Ahmad Said said the committee also determined that the main cause of the collapse was, among others, the faulty design with failure to take into account the support condition of the roof structure. He added that not only did the management team failed to conduct a design analysis, other factors contributing to the collapse included

the undesirable manner in which the structure was erected and that no checks were done during the erection process. He said the committee also recommended the appointment of a new team of consultants based on a quality-based selection system and accredited independent check engineers, and that repair works should be undertaken by a specialist contractor.

*(Sourced from The Star)*

## Winners of Digi Deep Green Challenge for Change

At the inaugural Digi Deep Green Challenge for Change, Team D'Regen from Universiti Sains Malaysia, Penang, and Feng from Universiti Malaysia Sarawak, Sarawak, were crowned the champions of the main and topical challenges, and won RM50,000 and RM20,000 respectively. The six-month competition, aimed at inspiring young Malaysians to discover new, meaningful and innovative renewable energy solutions, saw undergraduates working on a series of challenges that focused on energy efficiency solutions for the mobile telecommunications industry and renewable energy solutions for Malaysian communities. Challenge for Change is aligned with Digi's Deep Green programme, which addresses energy efficiency within the company's business, and broader areas of sustainability with related stakeholders. Digi.com Bhd's chairman, Sigve Brekke, stated that DiGi's Deep Green programme aims to directly reduce its CO<sub>2</sub> footprint by 50% by 2011.

*(Sourced from The Star)*

## GE Supplies Gas Turbine to Ranhill Plant

GE recently announced the commissioning of the first Frame 6FA gas turbine supplied to the Ranhill Powertron II plant in Sabah. President of GE Energy, Asia Pacific, Kenji Uenishi stated that the 190-megawatt combined-cycle facility will play a significant role in the ongoing development of the Sabah region. He added that, by implementing high efficiency, advanced F-class gas turbine technology, the new facility will offer lower fuel consumption and improve environmental performance. GE supplied two Frame 6FA gas turbine-generator packages, training and technical advisory services and performance testing. GE and Ranhill have also signed a 21-year contractual service agreement that covers repairs, upgrades and outage services for the turbines. Ranhill Power Sdn Bhd's Chief Executive Officer Norlian Abd Rahim said that the new plant will help Sabah meets its short-term energy needs while also playing a key role in the overall enhancement of the region's energy infrastructure. Both the Ranhill Powertron I and II plants are owned by Ranhill Power Sdn Bhd, a subsidiary of Ranhill Bhd.

*(Sourced from BERNAMA)*





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## CANDIDATES APPROVED TO SIT FOR PROFESSIONAL INTERVIEW FOR YEAR 2010

In accordance with Bylaws 3.9, the undermentioned names are published as having applied for membership of the Institution, subject to passing the year 2010 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 bearing the name and the membership number of the complainant should be lodged *a month* from the date of publication.

Thank you.

**Ir. Assoc. Prof. Dr Jeffrey Chiang Choong Luin**  
Honorary Secretary,  
The Institution of Engineers, Malaysia

NEW APPLICANTS	
Name	Qualifications
<b>CHEMICAL ENGINEERING</b>	
NORHELME BIN OMAR	BE HONS (UTM) (CHEMICAL, 98)
<b>CIVIL ENGINEERING</b>	
ABDUL JAMAL BIN TALIB GHAZALI BIN DAUD HABIBAH BINTI BABA MAZNAH BINTI MAKHTAR MOHD HISHAM BIN SAPUAN	BSc (SOUTHERN ILLINOIS UNI) (CIVIL, 86) BSc (CALIFORNIA STATE UNI, LONG BEACH) (CIVIL, 85) ADV DIP (UITM) (CIVIL, 87) BE HONS (USM) (CIVIL, 04) BE HONS (UTM) (CIVIL, 00)

TRANSFER APPLICANTS		
M'ship No	Name	Qualifications
<b>AGRICULTURAL ENGINEERING</b>		
24903	LIM SWEE SANG	BE HONS (UPM) (BIOLOGY & AGRICULTURAL, 99)
<b>CHEMICAL ENGINEERING</b>		
25761	LAU BEN FANG, RAYMOND	BE HONS (UTM) (CHEM, 2001)
<b>CIVIL ENGINEERING</b>		
35618	ADHAM BIN AHMAD	BE HONS (UTM) (CIVIL, 03)
25072	ANILARASU A/L AMARANAZAN	BE HONS (UTM) (CIVIL, 05)
39178	CHOO INN AIK	BE HONS (UKM) (CIVIL, 02)
25602	FARAH HAZNEE BINTI AHMAD	BE HONS (UNITEN) (CIVIL, 03)
21226	IDAHAT BIN MAHAT	BE HONS (MALAYA) (CIVIL, 02)
18395	KRISHNAKUMAR A/L PARAMANANDAN	BE HONS (MALAYA) (CIVIL, 02)
29154*	MUHD ABDAL RATHOMY BIN ROMELI	BE HONS (UTM) (CIVIL, 04)
25057	NG BENG HOOI	BE HONS (UTM) (CIVIL, 05)
33803	POH KONG CHIN	BE HONS (USM) (CIVIL, 03)
29198	ROHANI BINTI HAROON	BE HONS (EAST LONDON) (CIVIL, 97)
25268	TAN HUN KIN	BE HONS (USM) (CIVIL, 02)

NEW APPLICANTS	
Name	Qualifications
MOHD RASHID BIN YA'ACOB WONG TOH KOO	BE HONS (UITM) (CIVIL, 03) BE (NEW SOUTH WALES) (CIVIL, 91)
<b>ELECTRONIC ENGINEERING</b>	
AMIR RUDIN BIN MAT DIN	BE HONS (UTM) (ELECT, 00)
<b>MECHANICAL ENGINEERING</b>	
AHMAD AFZAINIZAM BIN MOKHTAR MOHD ROSLAN BIN DAUT	BE HONS (UNITEN) (MECH, 00) BSc (PURDUE UNI) (MECH, 91)

TRANSFER APPLICANTS		
M'ship No	Name	Qualifications
23921	TOH DING KIONG	BE (MONASH) (CIVIL, 01)
17034	YET CHEE HONG	BE HONS (USM) (CIVIL, 98)
<b>ELECTRICAL ENGINEERING</b>		
36947	AMMAR BIN ALAMSHAH	BE HONS (UTEM) (INDUSTRIAL POWER, 06)
26229	CHUAH RHUN RIANG	BE HONS (UTM) (ELECT, 06)
29643	HAFIZI BIN ZAKARIA	BE HONS (UITM) (ELECT, 98)
20925	JUNAIDI BIN JAMALUDDIN	BE HONS (STRATHCLYDE, GLASGOW) (ELECT, 96)
<b>MECHANICAL ENGINEERING</b>		
32619	LAU SUN WAH	BE HONS (USM) (MECH, 04)
20719	SU LAY CHIEW	BE HONS (STAFFORDSHIRE) (MECH, 94)
16544	WONG MUN CHONG	BE (THE NATIONAL UNI OF S'PORE) (MECH, 91)
20101	WONG WING HENG	PART 2 (EC) (MECH, 99)
20849	AHMAD MASYHUR BIN JAHAYA	BE HONS (STRATHCLYDE) (ELECT & MECH, 97)
<b>MECHATRONICS ENGINEERING</b>		
38872	MAZLAN BIN AHMAD MANSOR	BE (TOHOKU) (MECHATRONICS, 1998)

## ANNOUNCEMENT

The Institution of Engineers, Malaysia (IEM) is pleased to announce that the IEM ENGINEERING WEEK 2010 (EW2010) will commence from 19-24 April 2010.

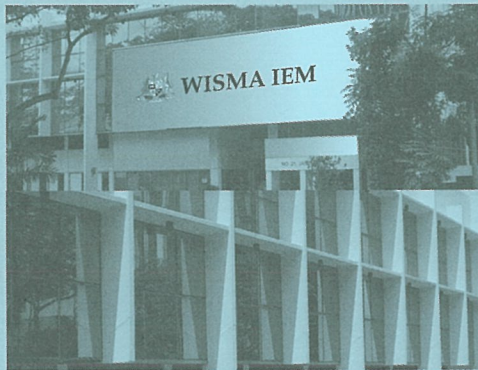
This will be the fourteenth (14th) consecutive year that IEM is organising the IEM Engineering Week. The theme for this year is '*Engineering Mobility and Globalisation for a Sustainable Future*'.

Kindly refer to the circular in the Bulletin and announcement in our website for details of the activities or contact the IEM Secretariat at 03-7968 4001 for further information.

Thank you.

The Standing Committee on Welfare and Service Matters  
Session 2009/2010





## LATEST UPDATE!

### CONTRIBUTION TO WISMA IEM BUILDING FUND

RM1,292,377.20 from IEM Members

RM340,502.00 from Private Organisations

## TOTAL

# RM1,632,879.20

(ANOTHER RM10,517,120.80 IS NEEDED)

IEM wishes to take this opportunity to thank all members who have contributed and would like to appeal for support from members who have not yet contributed

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

## DONATION LIST TO THE WISMA IEM BUILDING FUND

25<sup>th</sup>  
Announcement

The Institution would like to thank all contributors for donating towards the Wisma IEM Building Fund. Members and readers who wish to donate can do so by downloading the form from the IEM website at <http://www.iem.org.my> or contact the IEM Secretariat at +603-79684001/2 for more information. The list of the contributors as at 31 January 2010 are shown as below.

NO.	MEMBERSHIP NO.	DETAILS	NO.	MEMBERSHIP NO.	DETAILS	NO.	MEMBERSHIP NO.	DETAILS
1	M03166	AW KHA CHING	11	G34041	MOHAMED ZAIMIR BIN MOHAMED SUFFIAN	19	M 38696	REKHA PERUMALOO
2	M04071	CHONG KWET HIN	12	G13581	MOHD NASIR BIN HUSSIN	20	M 36853	ROSLI BIN ABU BAKAR
3	M23927	CHOO CHEE MING	13	M38710	MUSTAFA KAMAL BIN ARIFFIN	21	G 16397	TAN BOON CHEW
4	M03650	CHUA LEE BOON	14	M18178	NARAYANAN A/L RAMASAMY	22	M 12618	TEOH SENG GIAP
5	M00945	GOH GIN HAN	15	M 24199	NG EAK TONG	23	G 07934	THOMAS SAMUEL S/O C.T. SAMUEL
6	M01639	HUSSEIN BIN ABDUL RAZAK	16	M 11772	NITCHIANANTHAN A/L BALASUBRAMANIAM	24	M 09670	TOK CHIN THIAM
7	M05540	KWANG EAU QUAN	17	M 09429	POGBALAN S/O MAHALINGAM	25	M 09380	WAN SHUHAIMI BIN WAN DAUD
8	M17099	LEE KIEW TENG	18	M 14630	RAMLY BIN YAHAYA	26	M 09124	WONG SIONG SANG
9	G30625	LIAN BOON HAN				27	S 28121	YEO CHOON SENG
10	M19353	LIM BOON TIONG						



## IEM DIARY OF EVENTS

For further enquiries on the events below, please visit IEM Homepage at <http://www.iem.org.my> or contact IEM Secretariat for further information and forms.

### Mechanical Engineering Technical Division

8 MAY 2010  
Technical Visit to George Kent Technology Centre  
Venue: Puchong, Selangor  
Time: 9.00 a.m. to 1.00 p.m.

11 MAY 2010  
Talk on "The Realities and Myths of Total Quality Management in Construction Industry"  
Speaker: Ir. Dr Chong Chien Fatt  
Venue: C&S Lecture Room, Wisma IEM  
Time: 5.30 p.m. to 7.30 p.m.

### Electrical Engineering Technical Division

8 MAY 2010  
Talk on "Energy and Climate Change"  
Speaker: Ir. Francis Xavier Jacob  
Venue: Tan Sri Prof. Chin Fung Kee Auditorium, Wisma IEM, Petaling Jaya  
Time: 9.30 a.m. to 11.30 a.m.

8 MAY 2010  
25<sup>th</sup> EETD AGM  
Venue: Tan Sri Prof. Chin Fung Kee Auditorium, Wisma IEM, Petaling Jaya  
Time: 11.30 a.m. to 12.30 p.m.

25 MAY 2010  
One Day Course on "Electrical Energy Efficiency Regulations and Applications"  
Venue: TUS Room, Wisma IEM, Petaling Jaya  
Time: 8.30 a.m. to 5.00 p.m.

### Tunnelling and Underground Space Technical Division

15 MAY 2010  
10th Annual General Meeting  
Venue: TUS Room, Wisma IEM, Petaling Jaya  
Time: 11.00 a.m. to 1.00 p.m.

1-3 MARCH 2011  
International Conference and Exhibition on Tunnelling and Trenchless Technology - "Tunnelling in South East Asia-Future Challenges and Management of Safety and Risks in Tunelling"  
Venue: Sheraton Subang Hotel, Subang Jaya  
Time: 9.00 a.m. to 5.30 p.m.

### Building Services Technical Division

15 MAY 2010  
Technical Visit to SKB Shutters Corporation Berhad  
Venue: Kota Damansara, Selangor  
Time: 9.00 a.m. to 5.00 p.m.

### Civil and Structural Engineering Technical Division

21 MAY 2010  
One-Day Seminar on Adopting Eurocodes EC0, EC1 and EC2 in Malaysia  
Venue: Dynasty Hotel, Miri, Sarawak  
Time: 9.00 a.m. to 5.00 p.m.

### Engineering Education Technical Division

24 MAY 2010  
21st Century Engineering Education: Issues and Its Future  
Speaker: Engr. B Balmuralithara  
Venue: C&S Lecture Room, Wisma IEM  
Time: 9.00 a.m. to 5.00 p.m.

### MAJOR EVENTS

30 NOVEMBER - 2 DECEMBER 2010  
28<sup>th</sup> CONFERENCE OF ASEAN FEDERATION OF ENGINEERING ORGANISATIONS  
Venue: Hotel Melia, Hanoi, Vietnam  
Time: 9.00 a.m. to 5.30 p.m.



## CONFERENCES & SEMINARS

### MALAYSIA

24-25 MAY 2010  
FLOOD FORECASTING AND  
WARNING SYSTEM

Venue: COIT, UNITEN

Tel: +603 8921 2020 ext 6205

(Assoc. Prof. Ir. Dr Lariyah Mohd. Sidek)

(Invitation to register)

7-10 JUNE 2010

THE 3<sup>RD</sup> REGIONAL CONFERENCE ON ENGI-  
NEERING EDUCATION AND RESEARCH IN  
HIGHER EDUCATION (RCEERHED2010)

Venue: Riverside Majestic Hotel, Kuching,  
Sarawak

Tel: +607 521 8170/8159

Website: [http://seminar.spaceutm.edu.my/  
rceerhed2010](http://seminar.spaceutm.edu.my/rceerhed2010)

(Invitation to register)

30 JUNE-1 JULY 2010

SHORT COURSE ON INTRODUCTION TO  
WATER SENSITIVE URBAN DESIGN (WSUD)  
AND CONCEPTUAL DESIGN

Venue: Residence Hotel, UNITEN

Tel: +603 8921 2020 ext 6205

(Assoc. Prof. Ir. Dr Lariyah Mohd. Sidek)

(Invitation to register)

6-7 JULY 2010

INTERNATIONAL CONFERENCE ON  
ADVANCE IN RENEWABLE ENERGY  
TECHNOLOGIES (ICARET 2010)

Venue: Putrajaya, Malaysia

Tel: +603 8921 2020

Fax: +603 8921 2116

Website: [http://www.uniten.edu.my/go/  
icaret2010](http://www.uniten.edu.my/go/icaret2010)

(Invitation to register)

26-29 JULY 2010

2<sup>nd</sup> W2W AND 6th i-CIPEC

Venue: PWTC, KL

Tel: +603 6140 6666

Fax: +603 6140 8833

(Invitation to register)

5-6 OCTOBER 2010

INTERNATIONAL UNIVERSITY SOCIAL  
RESPONSIBILITY CONFERENCE AND  
EXHIBITION (IUSRCE2010)

Venue: Putra World Trade Centre

(PWTC, Kuala Lumpur)

Tel: +607 521 8170/8159

Email: [rceerhed@utm.edu.my](mailto:rceerhed@utm.edu.my) (Ms. Raihana) /

[iusrce2010@utm.edu.my](mailto:iusrce2010@utm.edu.my) (Ms. Shafinaz)

Website: <http://seminar.spaceutm.edu.my/iusrce2010>

(Invitation to register)

## IEM Job Vacancy Advertisement

Greetings from The Institution of Engineers, Malaysia.

It gives us great pleasure to notify you of a new value added service that IEM will be providing to our members as well as companies involved with the supply of products and services related to the engineering profession. As you may be aware, the new IEM building, Wisma IEM, is now the venue for all IEM activities such as talks, seminars, courses, workshops, etc.

With a nominal fee, we are offering you the opportunity to introduce your products and services to fellow engineers by putting up advertisements at our advertisement boards/panels or electronic board. Check out our offer in the IEM website, [www.iem.org.my](http://www.iem.org.my).

Feel free to contact our IEM Secretariat staff at 03-79684021 (Tarmizi) for further information.

Looking for Engineers?

Advertise your vacancies on one of the most prestigious engineering website in Malaysia. Hire qualified candidates!

**Cheaper than using traditional search  
firms or newspaper!**

**Over 20,000 Engineers exposed to your job posting**

**Approximately 300 website hits per day**

**Job postings appear for 30 days  
in website compared to 1 day for  
newspaper**

**Only minimum of RM50 per job advertised for  
IEM members and RM100 for non-members**

Please be informed that IEM provides job vacancy advertisement through the IEM Website and Notice Board to its members and non-members who are looking for engineers on a full time/contract or on part-time basis to fill job vacancies in their respective companies. The 'Job Vacancy Advertisement Form' and 'Its Terms and Conditions' are available at the IEM website, [www.iem.org.my](http://www.iem.org.my) or you may contact En. Mizi, the IEM Secretariat at 03-7968 4001/2 for more details.

Job seekers can search for their desired employment in the IEM Website under the 'Job Gallery' section for the latest job vacancy advertisements.

Thank you and best regards,

Chairman  
Standing Committee on Welfare and Service Matters  
The Institution of Engineers, Malaysia



# Recent Activities of the IEM Southern Branch Young Engineers Section

by **Engr. Ng Pui Ling**

*Chairperson, Young Engineers Section, IEM Southern Branch*

THE IEM Southern Branch Young Engineers Section (YES) started off as a student chapter at Universiti Teknologi Malaysia (UTM). The YES of IEM Southern Branch was formally established in 2006. Since then, it has achieved several milestones.

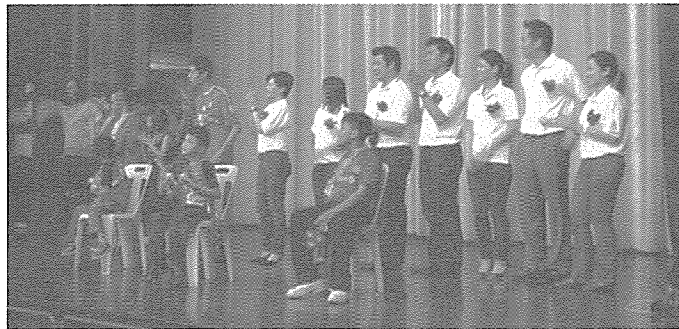
Currently, the committee of YES IEM Southern Branch consists of many active graduate engineers and engineering students from the two student chapters based in Universiti Teknologi Malaysia (UTM), Skudai, and Universiti Tun Hussein Onn (UTHM), Batu Pahat.

Despite the hustle and bustle of life as young engineers and students, the committee members of YES managed to support the activities of the branch as well as those conducted by other organisations.

The monthly meetings amongst the committee members not only transform planned activities into reality, but they also provide a platform to enhance the rapport among fellow engineers and for the exchange of ideas in both the professional and personal realm. YES members, who have started off as strangers, have moved on to form a cohesive team and became friends.



*Photo 2: Bowling session amongst YES members*



*Joining children from Pertubuhan Kebajikan Insan Istimewa Johor Bahru for a stage performance during the "For You" Charity Night 2009*



*At Johor Bahru's Cheshire Home to help the needy, March 2010*



*At the barbeque with the Indonesian delegates during YEAFEO 2009 in Singapore*

In 2008, a social gathering with the Johor Young Lawyer Council (JYLC) was held, marking the beginning of the relationship of YES with other professional bodies in the southern region of Malaysia.

In 2009, a charity night themed "For You" was jointly organised by these two groups of young budding professionals. The charity night successfully raised RM 15,000 in aid of the Pertubuhan Kebajikan Insan Istimewa Johor Bahru (PKIJB).

In December 2009, three representatives from the YES Southern Branch participated in the Conference of Young ASEAN Federation of Engineering Organizations (YEAFEO).

On the eve of the conference, the committee members of the YES Southern Branch hosted a barbeque session in Singapore for delegates of other YES branches as well as the delegates from Singapore, Thailand, Indonesia, Myanmar, Hong Kong and Japan.

Early this year, the YES Southern Branch visited the Petronas petrochemical plants in Kerteh, Terengganu. The visit was conducted in collaboration with the YES Kerteh Branch. A total of 30 graduates and students participated in the technical visit.

The most recent activity of YES was the charity work to help the needy and disabled persons at the Johor Cheshire Home. The young engineers and students, together with the committee and other members, conducted a 'gotong-royong' exercise to clean and spruce up the compound area of the home.

Teamwork is the essence of success. More upcoming YES activities can be expected for the improvement of young engineers in the near future. ■



# Talk on “A Case Study: Design and Construction of Foundation and Braced Excavation at a Reclaimed Site at Waterfront”

by **Ir. Liew Shaw Shong**

*Deputy Chairman, Geotechnical Engineering Technical Division*

**DR** Eric Li S.F., from the Hong Kong Institution of Engineers, presented an evening talk on “A Case Study: Design and Construction of Foundation and Braced Excavation at a Reclaimed Site at Waterfront” at Wisma IEM on 17 April 2009. The talk, chaired by the author, was attended by 45 participants.

Dr Li first presented the project background of the case study in which a solution was proposed to mitigate the flooding problem at the low lying Sheung Wan area located at the western side of Hong Kong Island. The major causes of the flooding were primarily due to storm surge and the inability of timely discharge of the excessive runoff from the adjacent hill site to the seafront during high tide. Such a hydraulic condition causes a backflow of sea water and the overflow of drain water from manholes and gully gratings at the downstream drainage.

The solution involves constructing a large capacity surface intercepting drainage system to collect the runoff and channel it to a temporary storage for direct discharge to the seafront by pumping. The main element of the talk focused on the design and construction of the underground storage tank and pumping station (43m by 56m with depth ranging from 10m to 11m), which is located right behind the seafront. The project is known as Sheung Wan Stormwater Pumping Station (SWSPS).

## GROUND CONDITIONS

Two series of ground investigations consisting of 32 boreholes were conducted in 2002 and 2006. In the desk study of the construction as-built details of the seawall, it was known that the dredging of the original soft marine clay was carried out and replaced with sand fill overlaid by rubble stone rock fill as the foundation for the masonry seawall. From the ground investigations, the general subsoil stratification underlying the site platform of +4.0m PD is approximately 18m thick fill overlying 5m to 13m soft to firm marine clays and a thin layer of alluvium before interfacing with the moderately to slightly decomposed medium to coarse grained granite.

## DESIGN CONSTRAINTS

During the design stage of the deep excavation, the following design considerations were noted:

- Sensitive existing structures surrounding the proposed site: Sheung Wan Saltwater Pumping Station on raft and has a deep open culvert (found at -3.8m PD) on the side abutting the proposed SWSPS (west), seawall (north) and Chung Kong Road (south)
- High water table (mostly active sea water level ranging from +0.5m PD to +2.5m PD)

- Presence of a thick layer of heterogeneous fill and soft marine deposits

## EXCAVATION AND LATERAL SUPPORT SYSTEM

Design objectives were established to:

- facilitate a stable excavation with minimum obstruction
- provide an efficient groundwater inflow cut-off
- contain ground movement to acceptable limits

The final shoring design consists of 24m (north and west sides) and 18m (south and east sides) long FSP IV sheet pile wall around the excavation with three levels of internal strutting system (at +2.5mPD, -1.0mPD and -4.0mPD). Sheet piles were installed by push-in method using Giken Super Crusher System, which was equipped with auger for overcoming obstruction as anticipated on the north side. There, the sand fill beneath the sheet pile was made less permeable by toe penetration grout curtain (using Tube-A-Manchette method) to a depth of minimum 1m into the completely decomposed granite (CDG).

On the west side, ground improvement in the form of penetration grouting of a 6m zone behind the sheet pile wall and jet grouting of a 4m wide zone below the toe of the sheet piles were implemented. On the other two sides, despite the walls being stable, it was estimated that ground movement behind the walls would be excessive when groundwater level was lowered below the excavation level. Hence, grouting of a 2m wide zone down to the CDG stratum was implemented to serve as cut-off to groundwater flow.

The jet grout parameters adopted: target grout diameter of 1500mm to 2000mm, jetting pressure of 300-400bars, withdraw rate of 13-15min/m, rotation rate of 6-7 rev/min, target strength of 600kPa (UCS) and stiffness of 150MPa (elastic modulus). The UCS strength from the core sample of jet grout has achieved typically 7-10MPa with occasional test results of more than 40MPa. Penetration grouting using bentonite-cement grout has also managed to achieve the target stiffness of 50MPa as verified by the pressuremeter test and core samples.

## FOUNDATION SYSTEM

The original foundation design consists of 60 numbers of 1.2m to 1.5m diameter bored piles. However, the contractor subsequently proposed an alternative design by replacing the large diameter bored piles with rock socketed H-piles (305×305×223kg/m Grade 55C with a carrying capacity of 6,900kN) formed by grouting the 550mm drillhole into bedrock. The H-piles were further reinforced by four numbers of T50 bars.



## ANALYSIS AND PREDICTION

A finite element package, Plaxis, was used to analyse the soil-structure response of the excavation. The analysed tilting of the seawall north of the excavation is approximately 1:650, which is still well within the tolerance threshold of the seawall structure. The predicted wall deflection and ground movement responses from the FEM analyses are summarised in Table 1.

Table 1 : Summary of prediction of wall deflection and ground settlement

Boundary Side	Wall Deflection	Ground Settlement	Ground Distortion
East	115mm	82mm	-
West	60mm	18mm	-
North	102mm	75mm	1:160
South	88mm	53mm	1:800

Monitoring results indicated that significant ground settlement occurred during initial foundation pile installation, particularly near the seawall. The settlement is considered mainly attributed to a combination of over-excavation of sandy soils by the open hole drilling with air flushing method, and the compaction effect of the fill material and the rock fill foundation of the seawall by vibration from the construction. It was also considered that this effect has been further aggravated by the presence of voids within the gravelly material within the fill layer. Dr Li also showed the sinkhole developed at the site, in which a remarkable amount of concrete was used to backfill the sinkhole.

## INSTRUMENTATION AND MONITORING

The principal instrumentation sections with ground settlement markers, inclinometers, standpipe piezometers and building tilt markers focused on the north wall (seawall), east wall and west wall (WSD's Saltwater Pumping Station). Monitoring results indicated substantial ground movement occurred during initial pile installation, especially on the side adjoining the existing seawall. The settlement is primarily attributed to the probable combined effects of over-excavation of soil material using high compressed air flushing technique in high groundwater condition and the compaction of fill material and rock fill foundation of the seawall resulting from the vibration of construction activities.

Generally, the monitoring results showed a reasonable agreement to the prediction by finite element analysis, except for the western wall in which the wall deflection 7.5mm is much lesser than the predicted 60mm. This is probably due to ignoring the strengthening effect by the ground improvement at the excavation side under raft PC3+4 with the aim to control differential settlement, which was decided subsequently to the earth lateral support (ELS) design.

## CONCLUSION AND RECOMMENDATION

Dr Li concluded the talk with the following lessons from the project:

- Understanding of site history is important for developing ground model
- Proper selection of construction method and equipment is

essential for controlling ground disturbance, particularly near sensitive structures

- Giken Super Crush Piler has successfully overcome obstruction (but this is costly)
- Settlement due to pile installation can be significant
- Collaboration of all parties involved is essential for delivering a project

## DISCUSSIONS

During the discussion session, the following matters were raised and discussed:

- Differences between Plaxis Finite Element Method (FEM) software package and FLAC Finite Difference Method: Dr Li commented that Plaxis is easy to use and efficient in terms of running time, whereas FLAC may take a longer time to complete the analysis depending on the problem analysed.
- Giken Piling method: Dr Li gave a more detailed elaboration on the installation processes by showing photos. He then commented that the wear-and-tear rate of the auger is very high. On average, one new auger can last for three sheet pile installation at the rubble stone rock fill. Therefore, the operating cost is high.
- The control measure of building settlement measurement: Dr Li advised to make due additional allowance on the predicted settlement as there is always uncertainties in the FEM model prediction.
- Grout properties adopted for the project: Dr Li highlighted that jet grouting is new in Hong Kong. In the design parameters and operating parameters adopted for jet grouting, he made references to the test data available from Nicole Highway. But the performance in the validation test showed far better results than the adopted values.
- Ground settlement induced from pile installation: Dr Li highlighted that some portion of the ground settlement monitored was due to the potential ground loss as a result of the over-excavation of sandy materials using the Dubex air flushing drilling method. With the high water table at the site, soil liquefaction under drastic hydraulic head led to excessive sandy soil materials flowing into the drillhole.
- Interlocking problem of sheet piles: Dr Li commented that the interlocking of sheet piles in Giken statically push-in installation has shown good interlocking of the sheet pile clutch. However, he then showed the uncontrolled seepage in a badly interlocked sheet pile wall for another project which eventually flooded the whole excavation.
- The Hong Kong practise of monitoring king post heaving or settlement: Dr Li agreed that monitoring the heave or settlement of king posts is a good practice for the assurance of strut stability. In this project, most of the vertical supports for strut were founded on pile foundation. Therefore, it was not a concern.
- Tidal effect on the instrumentation results: Inadequate monitoring frequency prohibited an investigation of the potential tidal effect in the monitoring results. However, Dr Li shared the view that the tidal effect is undoubtedly prominent as a result of close proximity to the seafront.
- Abnormal heave at settlement markers, SS14: It was noted that significant sudden heave was observed at settlement



markers SS9, 10, 13 and 14, which showed an overall settling trend. Dr Li commented that the sudden heave must have been attributed to the construction activities at site.

For those who want to get more details of the project, it is recommended that they refer to the technical paper by Leung *et al.* (2009) as listed in the reference. A copy of the proceedings is available in the IEM library. ■

**Acknowledgement:** The author wishes to thank Dr Eric Li S. F. for the use of his presentation slides in this report.

## REFERENCE

- [1] Leung, K.Y., Li, S.F. and Leung C.L. (2009), "A Case Study: Design and Construction of Foundation and Braced Excavation at a Reclaimed Site at Waterfront", Proceedings of the Seminar on "The State-of-the-art Technology and Experience on Geotechnical Engineering in Malaysia and Hong Kong", 25 February 2009, Hong Kong. Geotechnical Division, The Hong Kong Institution of Engineers, ISBN: 978-962-7619-37-6, pp 27-41.

# Talk on "Understanding the Importance of Copywriting"

by **Ir. Dr Faris Tarlochan**

**THE** talk, organised by the Engineering Education Technical Division, coincided with the IEM Engineering Week 2009 (20-25 April 2009) and was attended by a total of 20 participants. It focused on creating an awareness on the importance of copywriting. Copywriting is the one skill that will turn words into cash, and it is really the one thing you must learn if you are thinking of selling anything at all.

The speaker was Ir. Soon Woi Kheng. The talk started with an explanation on the meaning of copywriting. Simply, the art and science of copywriting involves strategically writing words that promote a person, product, business, opinion, or idea, with the ultimate intention of having the reader take some form of action. Ir. Soon also identified where copywriting is commonly used, such as direct mail pieces, taglines, jingle lyrics, web page content, online ads, e-mail, television or radio commercial scripts, press releases, catalogs, billboards, brochures, postcards and sales letters.

Why is copywriting so important? Copywriting is one of the most essential elements of effective online marketing. It is sometimes even called 'Salesmanship in Print'. Ir. Soon showed some good examples on swipe file:

<http://carltoncopycritiques.com>

<http://www.leadcopy.com>

A common question that is normally asked is how can one become a good copywriter? The answer is, just become a student of copywriting and study from the masters.

Ir. Soon also covered some aspects of Sales Psychology which is integral to copywriting and also gave some tips on how to get started:

- 1) Become a sales detective – do market research
- 2) The most important thing you can do is read up and research your market.
- 3) Interview people using "like kind" products you plan to sell.
- 4) Go through your competitor's marketing system.
- 5) Sales thinking – see the unique angle, find "the hook".

- 6) Record a few of your own or someone else's sales messages and then craft it into a letter.
- 7) Get as many testimonials as you possibly can. This will help you craft your copy. The more you get the better. One on one interviewing is the best thing you can do.
- 8) Be street savvy. Learn the language of your audience. Then use it.

Presentation of examples of headlines words and copy connectors. Swipe file of samples on these application were displayed at <http://www.perrymarshall.com/adwords/renaissance>.

Samples cliché that sell and sample websites that sells were introduced. Illustration of opening sentences and sample usage were shown at <http://www.successdoctor.com>.

Tips to create 'Creating Breakthrough Writing' were presented. Speed Editing Secrets were revealed. When do you stop writing? How do you know when your work is polished? Do your best and send the work out. The feedback you get will help you do more rewriting, this is the secret.

Lastly, a step-by-step process on how to change average writing into hypnotic writing is made known:

- 1) See the event
- 2) Write to one person
- 3) Get excited
- 4) Get to the point
- 5) Do not judge

More samples to enhance the concept:

A "we" statement. It does not appeal to them all.	Focus on the interests of the person reading your words. Speak to their interests.
We have been in business five years.	You can rest assured you will get your item from us on time and to your satisfaction, as we have been doing this over five years.
We love to make donuts.	You will love our mouthwatering donuts because our passion for making them energises every one we create for you.
My e-product gets results.	The more you read into this website, the more you will realise that my e-products get results.



At the end of the talk, Ir. Soon recommended some very good resource links for more information:

<http://www.thegaryhalbortletter.com/newsletter-archives.htm>

<http://www.marketingrebelrant.com>

<http://www.awaionline.com>

<http://www.perrymarshall.com>

<http://www.successdoctor.com>

<http://www.carltoncopycritiques.com> ■

## Workshop on 'Challenges of Women Engineers in the Industries'

by *Ir. Sharifah Azlina binti Raja Kamal Pasmah*

**THERE** is more happiness in sharing than in keeping, and this was certainly the spirit on 22 October 2009 when the above workshop was held at UniKL MICET (Malaysian Institute of Chemical & Bio-engineering Technology) at Alor Gajah, Melaka. The workshop was jointly organised by the Sub-committee on Lady Engineers, IEM and the Section of Chemical Engineering Technology (SCET), UniKL MICET.

The 80 chemical engineering students – all ladies – and presenters from IEM, were both enthusiastic to impart upon each other shared knowledge and experience of becoming and being an engineer in the industry. For the presenters, the experience was equally valuable, as we took for granted our roles until we sat down and reflected upon them as a reminder to ourselves the obligation and demand of the profession.

After a welcoming address by Assoc. Prof. Dr Ahmad Marzio Mohd. Yusof, Deputy Dean of UniKL MICET, Ir. Sharifah Azlina Raja Kamal, a highway and transportation engineer, took the audience through the organisational structure of the IEM and the stance of the Sub-committee on Lady Engineers. Concerned with the decline in the number of women engineers who remain in the profession, which was then less than 12% of the total number of registered engineers in the nation, this sub-committee was formed with an objective to encourage aspiring lady engineering students to practice and remain in the engineering profession throughout their career life.

Ir. Raftah Mahfar, a geotechnical engineer, deliberated on the numerous activities held by this sub-committee since its formation and, in particular, during the recent years in promoting strong enthusiasm and inspiration to be a successful lady engineer. Part of the drive involved giving talks at universities as well as secondary schools to motivate female students to pursue a career in engineering and proudly be part of the nation-building team.

The presenters also briefly explained the requirements of becoming a professional engineer after graduation. Another key interest amongst the attendees was the challenges faced in striking a balance in both career and family fronts. "We do not strike a balance", said Ir. Sharifah Azlina, "we attend to both according to their needs and priority given to each." "And we multitask, women are natural multi-taskers, and this is how we get a lot, if not all, things done," added Ir. Raftah.

Ir. Yee Sew Ping, a professional engineer with chemical

engineering background, gave an enlightening talk on her early days as a process engineer and her valuable experience after becoming a consulting engineer. She touched on the subject of contributions by a chemical engineer in areas such as, the oil and gas industries, wastewater and environment, and manufacturing; accentuating the immense demand for chemical engineers in the near future, both locally and globally.

To a concern whether chemical engineering is 'safe' especially among women, Ir. Yee emphasised that given the strict regimen of QA/QC and comprehensive procedures which are a norm in the manufacturing environment, she said, "Changing a bulb yourself at home carries more risks than carrying out a similar task in a controlled manufacturing environment."

Keen interest among the students was demonstrated during the Q&A session, such as the grave concern if they have made the right choice of career and how to juggle life in the ever-demanding profession. Assurance was given by the presenters that, although it is challenging, it is one of the more rewarding careers.

Ir. Dr Chan Tuck Leong, who is the spouse of Ir. Yee, gave an ad hoc presentation on chemical engineering and the roles of chemical engineers. Ir. Dr Chan, who practices in an oil and gas organisation, shared his knowledge on the career path upon graduation and the various opportunities to explore in related industries. He showed slides which illustrated the options available to aspiring chemical engineering students. Being the only 'thorn' among the lady speakers, Ir. Dr. Chan affirmed his support for the ladies in pursuing engineering as a profession.

After the scrumptious lunch provided by UniKL MICET, the workshop proceeded with group work. Each group, consisting of 10 students, was given a topic for deliberation. Their task was to analyse and explore the subject matter under the supervision of a lecturer in each group. Presentations were made on their findings at the end of the session, and the most creative group walked away with a hamper for their effort.

The workshop had raised awareness among the students on the requirements of the engineering profession and the challenges that come with the career. Nevertheless, it was strongly advocated that women should not be discouraged by the obstacles they encounter in this male-dominated industry. The workshop had also promoted empowerment among the female students to contribute to the development of the nation. ■



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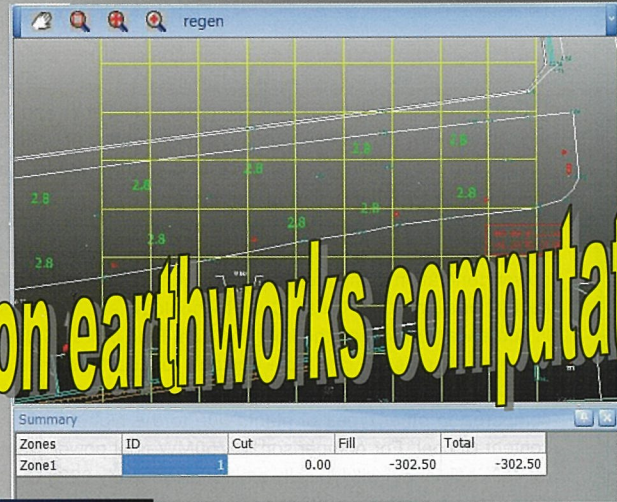
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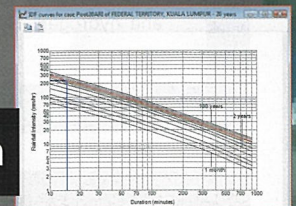
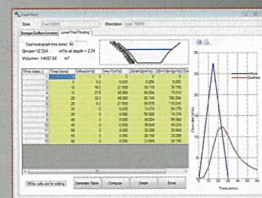
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[www.civilstructural.com.my](http://www.civilstructural.com.my)



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## Carbon Capture and Storage Schemes

by *Ir. Zaki bin Anhar*

**COAL** has always been perceived as a dirty fuel and is associated with thick black smoke. However, the abundant supply and the relatively lower price of coal have made it a major energy contributor throughout the world.

In recent years, several efforts have been introduced to reduce particulates, SO<sub>x</sub> and NO<sub>x</sub> emission from coal-fired power generation plants, for example, by introducing flue gas desulphurisation unit, Clean Coal Technology, etc. This has in some ways improved the image of coal-fired power plants. However, there is still one more obstacle for coal fired units.

Coal fired plants generate a higher amount of CO<sub>2</sub> as compared to other types of plants due to the higher carbon content of coal. For comparison, a 750MW coal power plant (at 40% efficiency) will typically emit approximately 822g CO<sub>2</sub>/kWh. This is almost double the CO<sub>2</sub> emission of a gas-fired Combined Cycle Gas Turbine of similar size.

The present challenge is to aggressively reduce CO<sub>2</sub> emissions while continuing to utilise coal for power generation (because of its abundant supply). To achieve this objective, current studies are mainly focused on improving plant efficiency (*i.e.* to reduce coal consumption) and in improving the viability of Carbon Capture and Storage Schemes (CCS). In essence, CCS is to capture CO<sub>2</sub> emitted from the plant and store it somewhere.

There are two main options for carbon capture which is pre-combustion and post combustion. Pre-combustion capture removes carbon from the fuel before combustion. For coal, this can be achieved through the upcoming Integrated Coal Gasification Combined Cycle plants. Coal is gasified to produce syngas, which consists of carbon monoxide and hydrogen. Syngas is treated to remove CO<sub>2</sub>, while the

hydrogen is fired in a Combined Cycle Gas Turbine plant. This option is still very much in the preliminary stage, partly due to limitations of firing hydrogen in gas turbines.

Post-combustion carbon capture is generally tricky, since the percentage of CO<sub>2</sub> in flue gas is small. The flue gas has to be cooled and passed through chemical compounds which absorb CO<sub>2</sub>, and this requires a significant percentage to be effective. Several methods had since been studied to increase the CO<sub>2</sub> percentage which, among others, include flue gas recirculation (flue gas is routed back to the furnace) and oxy-firing (supplying pure oxygen for combustion reduces the amount of air fed to the furnace, thus increasing the concentration of CO<sub>2</sub> in flue gas).

After capture, the pure CO<sub>2</sub> has to be dehydrated and compressed to a dense phase, usually at pressures above 80 bar. This fluid-like dense CO<sub>2</sub> can then be pumped to an underground storage which is suitable to contain the CO<sub>2</sub> with a leakage of less than 1% in 100 years. Among potentially suitable sites are:

- Depleted oil reservoirs
- Underground aquifers
- Used for enhanced oil recovery in active oil reservoirs
- Unminable coal seams

It is obvious that the handling of CO<sub>2</sub> from coal combustion is difficult and costly. However, as the cost of natural gas increases, and more regulations are introduced to penalise the producers of CO<sub>2</sub>, this cost may be justified in the near future. It is important that the industry, at the very least, start to consider the available options and plan for staged implementation. ■

### Circulating in cyberspace ...

#### Words to ponder

"Don't worry about avoiding temptation. As you grow older, it will avoid you."

- *Winston Churchill*

"By the time a man is wise enough to watch his step, he's too old to go anywhere."

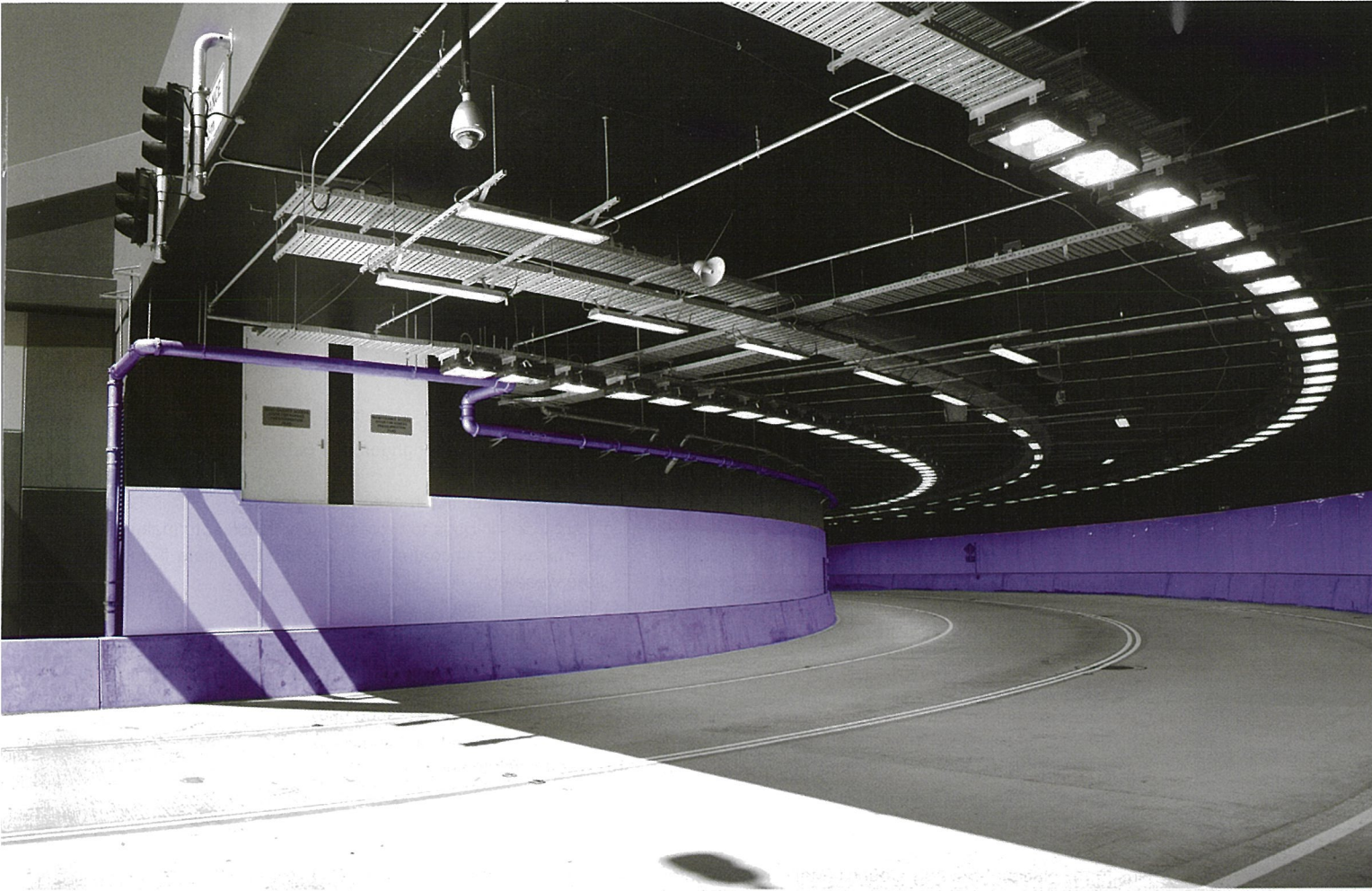
- *Billy Crystal*

"I have never hated a man enough to give his diamonds back."

- *Zsa Zsa Gabor*



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# SAFE TIME

## Preparing for Gaia's fury

by Ir. Shum Keng Yan

**OF** late, we have been seeing a pattern of increasingly severe natural disasters. Perhaps Gaia has lost her patience.

We are lucky in the sense that our country is relatively spared from major disasters such as earthquakes and typhoons. Still, year after year, we read about severe flooding in many parts of our country.

What can we do to be safe under these conditions?

Firstly, keep a rational and calm mind during the event. We can mitigate it somewhat with a little bit of preparation to survive the first few days. This is a basic guide, so please feel free to modify it to suit your family. Keep in mind that even though disaster management is a field by itself, we can still prepare for it.

### FLOOD

If possible, secure your home as best you can and move your family to a safe place. If you need to stay back, check out this link [http://www.civildefence.gov.my/dokumen/panduan\\_kecemasan.pdf](http://www.civildefence.gov.my/dokumen/panduan_kecemasan.pdf). In fact, this handbook covers various emergencies.

Link to the National Security Council (Majlis Keselamatan Negara):  
[http://www.mkn.gov.my/v1/index.php/bm/fokus-mkn/fokus\\_pengurusan-bencana](http://www.mkn.gov.my/v1/index.php/bm/fokus-mkn/fokus_pengurusan-bencana)

### TYPHOON AND EARTHQUAKE

If you are living in a country where there are severe natural disasters (since some of us work outside of Malaysia), be prepared. Most likely you are staying in a hotel or rented apartment. Make sure you know the local emergency contacts such as the police, fire brigade, Malaysian Embassy and, of course, your host. Get a copy of the country's emergency plan (if any) and know what you should do.

Some companies prepare emergency kits for their employees. It is not rocket science to prepare your own

survival kit. Many experts differ on the contents that should go inside the kit (due to different location requirements and experts' experience). This is a starting point (please remember to replace perishables).

### Contents:

- 1) Drinking water (enough for your family for the first few days)
- 2) Dry food (biscuits, crackers, energy bars)
- 3) Large plastic bags to protect your valuables, to make a makeshift raincoat or to keep your food safe from the weather
- 4) Swiss Army knife
- 5) Torchlight with spare batteries
- 6) Ropes
- 7) Small first aid kit
- 8) Some cash (for post rescue use)
- 9) Baby needs (food, clothing, etc.)
- 10) A knapsack to keep all of the above

### Optional items:

- 1) One set of clothing
- 2) Warm clothing (if in cold climate)
- 3) Toilet paper/towel
- 4) Dusk mask (earthquake rubble dust)

Further support will depend on the national emergency response plan.

I have personally been caught in two typhoons. So it pays to be ready. Remember to keep a rational and calm mind.

To share your survival experience, do email me at [pub@iem.org.my](mailto:pub@iem.org.my). ■

*Perhaps someday we will not just think of ourselves as coming from a certain country, instead, we should realise we are from the same planet. After all, Mother Nature does not have borders!*

## Circulating in cyberspace ...

### Oops!

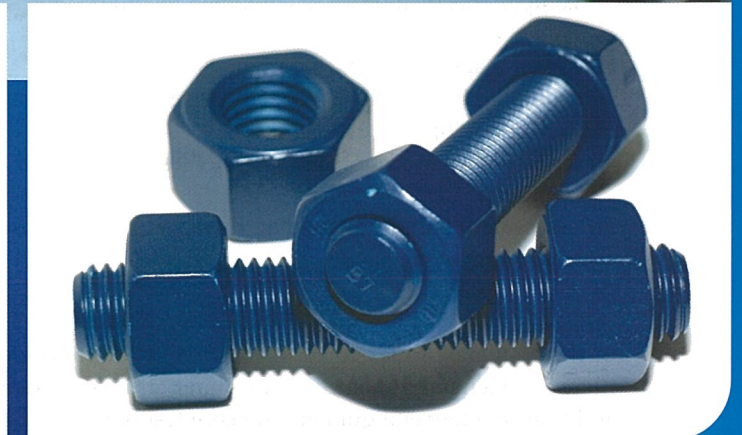
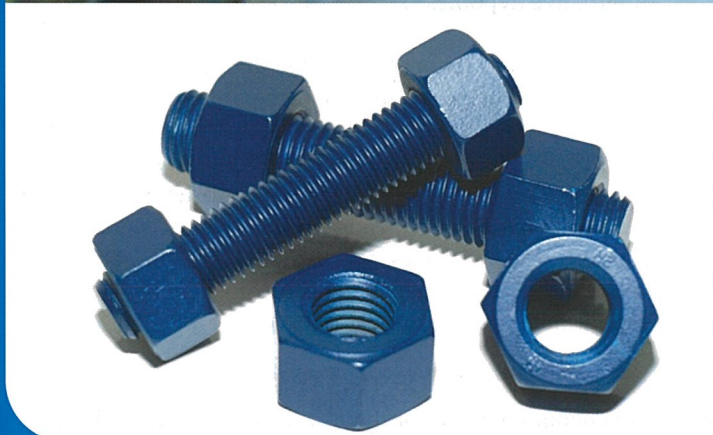
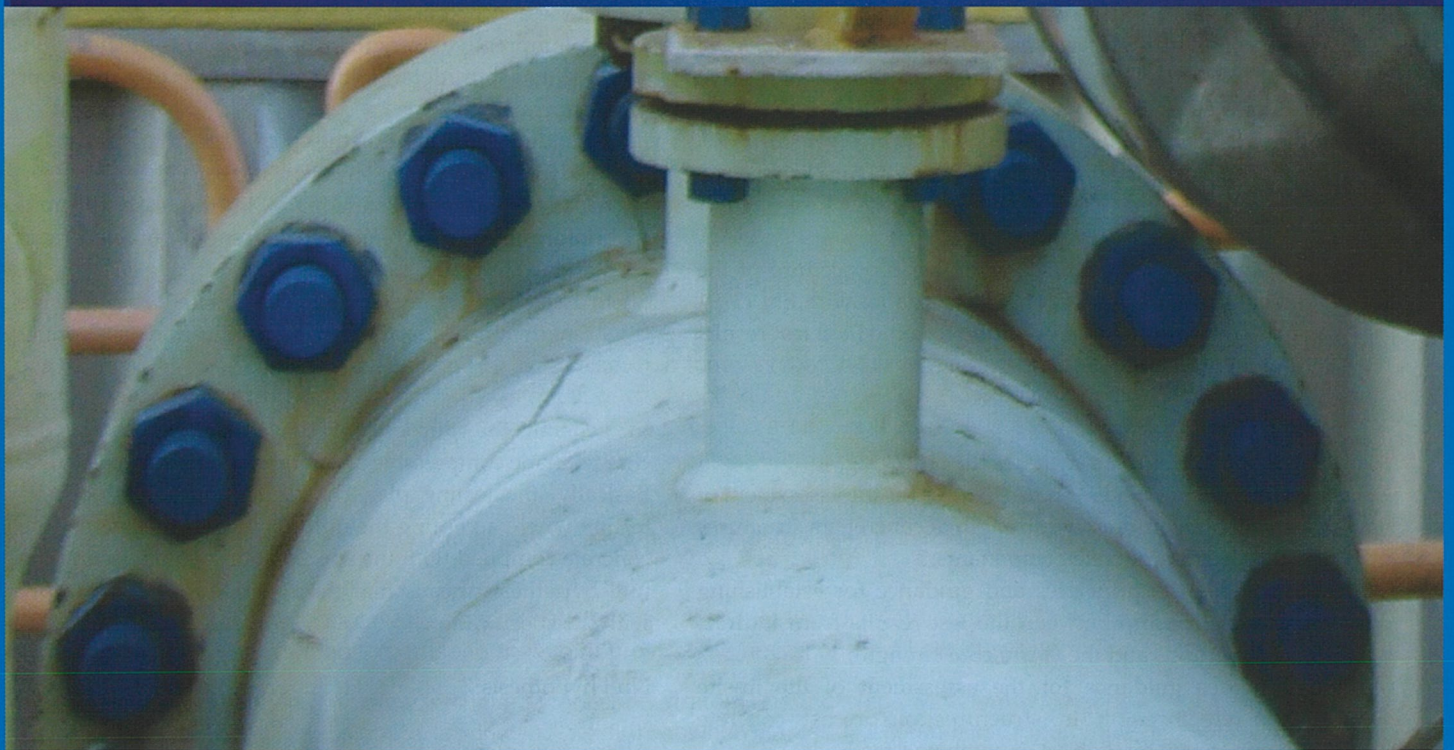
Two men were playing golf at their local golf course. One of them was about to chip onto the green when a long funeral procession came on the road next to the course. He stopped in mid-swing, took off his golf cap, closed his eyes, and bowed down in prayer. His friend said: "Wow, that is the most thoughtful and touching thing I have ever seen. You truly are a kind man." The man replied: "Yeah, well we were married for 35 years."



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- ii) Execution of the test;
- iii) Number of tests.
- iv) Interpretation of the results.

Various statistical methods can be used to assist in the interpretation of the test results. Furthermore, engineering judgement shall be applied carefully to determine the reasons for the non-conforming of the test results.

In order to achieve the level of reliability of the test, all tests shall be carried out according to the proper procedure. A common question is the representative of the single core. EN 13791 specifies that three cores is the minimum number for the core test. Similar recommendations are given for the requirement on the number of samples for indirect tests.

In Malaysia, it is rather common that a single-core or two-core samples are used to determine the quality of the *in situ* concrete.

### 5.0 CHARACTERISTIC CUBE COMPRESSIVE STRENGTH

Characteristic value is defined as the value for which 5% of all possible value is expected to fall below. However, there are many factors affecting the exact value of the characteristic strength of the material. These include the population distribution and sampling techniques. Normally, it is assumed that the material behaves normally and random sampling is used.

BS 5328 [3] recommends moving an average of four samples and minimum sample result for the checking of compliance. Similarly, EN206-1 [4] recommends an average of up to 15 samples (either overlapping, i.e. moving average or non-overlapping) for the checking of compliance.

BS 6089 recommends the following formula for determining the characteristic strength of *in situ* concrete:

$$f_{cu} = \mu - 1.64 \sigma \quad \text{Eq. (1)}$$

where  $\mu$  is the mean concrete strength and  $\sigma$  is the standard deviation of the samples.

EN 13791 gives two approaches to determine the characteristic strength based on cores test. Based on approach A (for at least 15 samples), the characteristic compressive strength of the *in situ* concrete shall be the lower value of  $(\mu - k_2\sigma)$  or  $(f_{min} + 4)$ , where  $f_{min}$  is the lowest result of the sample and  $k_2$  shall be given in the National Annex or use a value of 1.48. Based on approach B (for three to 14 samples) the characteristic compressive strength of the *in situ* concrete shall be the lower value of  $(\mu - k)$  or  $(f_{min} + 4)$ , where  $k$  is given by Table 2 of EN 13791. National Annex NA to BS EN 13791 suggested t distribution shall be used in place of approaches A and B.

EN 13791 suggests that the concrete tested in accordance with EN 206-1 and that of *in situ* testing are of different population. A ratio of 0.85 is suggested for the ratio of the *in situ* characteristic strength to the characteristic strength of a standard specimen. BS 6089 suggested that the partial

safety factor for concrete can be reduced up to 1.2 subject to the decision of the design engineer, and normally consent should not be unreasonably withheld.

### 6.0 CORE TEST FOR APPLICATION

It is generally agreed that core test is the most reliable method for determining the quality of concrete in terms of compressive strength. Core test shall be carried out in accordance with BS 1881: Part 120: 1983 [5] or BS EN 12504-1:2000 [6]. However, it was also recognised that core tests have to be planned and carried out properly to ensure reliable results are being obtained so that correct interpretation can be reliably given. Further guidance can be obtained from CSTR 11 [7] and the Manual for Ready Mixed Concrete [8]. There are many factors affecting the strength of the core. These include age, location, curing history, moisture content, voidage and imperfection of the concrete, diameter of the core, length to diameter ratio, flatness of the end surface, capping of the end surfaces, effect of drilling and reinforcement. A notable difference between EN 13791 and BS 6089 is the correction for the direction of drilling. BS 6089 gives two different formulae for the horizontal and vertical direction of drilling. BS EN 13791 proposed the following correction factor for the conversion of the tested core strength to the equivalent *in situ* cube, for both horizontal and vertical drilling (*i.e.* independent of the direction of drilling):

$$K_{is, cube} = \frac{2.5}{1.5 + \frac{1}{\lambda}} \quad \text{Eq. (2)}$$

where  $\lambda$  is the length/diameter ratio.

### 7.0 INDIRECT METHODS

Indirect methods stated in EN 13791 include rebound hammer tests, Ultrasonic pulse velocity measurements and pull out tests. However, EN 13791 only recognised an indirect test with correlation to the core tests. Indirect tests carried out without correlation to the core tests is actually beyond the scope of EN 13791.

In fact, as pointed out by BS 6089, rebound hammer tests, if carried out properly, may estimate the strength of the concrete near the surface to an accuracy of  $\pm 20\%$ . This is a rather high percentage of inaccuracy and hence it shall be used with care.

### 8.0 COMPARISON OF THE INTERPRETATION OF CORE TESTS RESULT BASED ON BS 6089 AND EN 13791.

In this section, we will compare the interpretation of two actual test programs based on BS 6089, EN 13791 as well as the general procedure of hypothesis testing.

#### Case I (Core test for apartment):

This was a core test carried out in 2005 with a total of 22 samples. The concrete was C30. The results are shown in Table 1.





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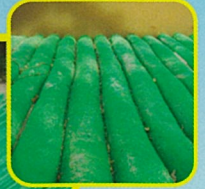
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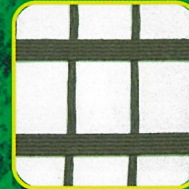
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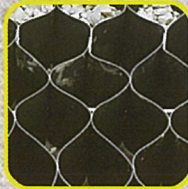
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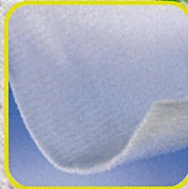
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# PAPER SERIES ON STRUCTURAL EUROCODES

Table 1 (part 1): Core test results (Core 1 to 12)

Sample identification	1	2	3	4	5	6	7	8	9	10	11	12
Location	BA - wall	BA - wall	BA - wall	BA - wall	BA - slab	BA - slab	BA - slab	BA - slab	BB - alab	BB - alab	BB - wall	BB - wall
Direction of drilling	Hor	Hor	Hor	Hor	Ver	Ver	Ver	Ver	Ver	Ver	Hor	Hor
Diameter of core	69	69	69	69	69	69	69	69	69	69	69	69
L/D	1.11	1.10	1.10	1.12	1.11	1.11	1.12	1.12	1.10	1.10	1.10	1.10
Correction of reinforcement	1.05	1.00	1.00	1.06	1.00	1.00	1.00	1.06	1.00	1.00	1.13	1.16
Measured strength	32.0	31.0	34.0	33.0	35.5	33.5	31.0	34.0	31.5	35.0	34.0	26.5
Correction of L/D ratio (BS 6089)	1.041	1.038	1.038	1.045	0.958	0.958	0.961	0.961	0.955	0.955	1.038	1.038
Estimated <i>in situ</i> strength (BS 6089)	35.0	32.2	35.3	36.5	34.0	32.1	29.8	34.6	30.1	33.4	39.9	31.9
Mean and Standard deviation	34.1, 2.8											
Estimated <i>in situ</i> characteristic strength	34.1, 2.8											
Correction of L/D ratio (BS EN 13791)	1.041	1.038	1.038	1.045	1.041	1.041	1.045	1.045	1.038	1.038	1.038	1.038
Estimated <i>in situ</i> strength (EN 13791)	35.0	32.2	35.3	36.5	37.0	34.9	32.4	37.7	32.7	36.3	39.9	31.9
Mean and Standard deviation	35.5, 2.6											
Estimated <i>in situ</i> characteristic strength	31.7											

Table 1 (part 2): Core test result (Core 13 to 22)

Sample identification	13	14	15	16	17	18	19	20	21	22
Location	BC - slab	BC - slab	BC - wall	BC - wall	BD - wall	BD - wall	BD - wall	BD - slab	BD - slab	BD - slab
Direction of drilling	Ver	Ver	Hor	Hor	Hor	Hor	Hor	Ver	Ver	Ver
Diameter of core	69	69	69	69	69	69	69	69	69	69
L/D	1.12	1.12	1.10	1.10	1.10	1.13	1.10	1.10	1.10	1.11
Correction of reinforcement	1.00	1.05	1.00	1.05	1.00	1.00	1.03	1.14	1.05	1.11
Measured strength	35.0	30.0	35.5	30.0	35.5	35.0	33.0	31.0	30.0	36.0
Correction of L/D ratio (BS 6089)	0.961	0.961	1.038	1.038	1.038	1.048	1.038	0.955	0.955	0.958
Estimated <i>in situ</i> strength (BS 6089)	33.6	30.3	36.8	32.7	36.8	36.7	35.3	33.7	30.1	38.3
Mean and Standard deviation	34.1, 2.8									
Estimated <i>in situ</i> characteristic strength	33.2									
Correction of L/D ratio (BS EN 13791)	1.045	1.045	1.038	1.038	1.038	1.048	1.038	1.038	1.038	1.041
Estimated <i>in situ</i> strength (EN 13791)	36.6	32.9	35.3	32.7	36.8	36.7	35.3	36.7	32.7	41.6
Mean and Standard deviation	35.5, 2.6									
Estimated <i>in situ</i> characteristic strength	31.7									



i) **BS 6089**

Mean value was 34.1 N/mm<sup>2</sup> with a standard deviation of 2.79 N/mm<sup>2</sup>. Based on BS 6089, the characteristic strength of the concrete is estimated to be 33.2 N/mm<sup>2</sup>. Hence, the concrete is deemed to comply with the concrete specification.

ii) **EN 13791**

Mean value was 35.5 N/mm<sup>2</sup> with a standard deviation of 2.56 N/mm<sup>2</sup>. Based on EN 13791, the characteristic strength of the concrete is estimated to be 31.7 N/mm<sup>2</sup>. Hence, the concrete is deemed to comply with the concrete specification.

**Case II (core test for reinforced concrete piles)**

This was a core test carried out in 2005 with a total of eight samples. The concrete was C40. The results are shown in Table 2, 2a and 2b. In order to have a better understanding of the quality of the *in situ* concrete, outlier detection and zoning were carried out to detect the presence of any extreme value. There was no outlier detected since all values lie within  $\pm 1.5$  standard deviation. However, there was a clear zoning. Hence, it was concluded that these eight samples may be taken from two different populations (*i.e.* different test regions). Hence, it may be interpreted differently for these two test regions.

i) **BS 6089**

Overall mean was 37.5 N/mm<sup>2</sup> with a standard deviation of 4.80 N/mm<sup>2</sup>. Based on BS 6089, the characteristic strength of the concrete is estimated to be 36.9. If the design engineer permitted to lower down the safety

factor to 1.2, then the concrete is deemed to comply with the concrete specification.

Mean value for zone 1 was 40.8 N/mm<sup>2</sup> with a standard deviation of 1.94 N/mm<sup>2</sup>. The characteristic strength of the *in situ* concrete was 38.6 N/mm<sup>2</sup>. For zone 2, the mean was 32 with a standard deviation of 0.97 N/mm<sup>2</sup> and the characteristic strength of the *in situ* concrete was 29.8 N/mm<sup>2</sup>.

ii) **EN 13791**

Based on EN 13791, the characteristic strength of the concrete is estimated to be 33.2 N/mm<sup>2</sup>. Even by applying the ratio of 0.85 for the *in situ* characteristic strength to the characteristic strength of a standard specimen of *in situ* concrete, the concrete is still deemed to be not complying with the concrete specification.

The characteristic strength of the *in situ* concrete for zone 1 was 35.9 N/mm<sup>2</sup> and with the ratio of 0.85, it is equivalent to the characteristic strength of the standard specimen of 42.2 N/mm<sup>2</sup> and, hence, complied with the specification. The characteristic strength of the *in situ* concrete for zone 2 was 26.0 N/mm<sup>2</sup>.

iii) **Statistical testing**

Based on the statistics, since mean and standard deviation has to be estimated, this is a t-distribution. The results are shown in Table 3a (for data based on BS 6089) and Table 3b (data based on EN 13791). Based on the hypothesis testing, the overall result of the core test did not comply with the specification at the significance level of 0.01.

Table 2: Overall core test results (Case 2)

Sample identification	1	2	3	4	5	6	7	8
Direction of drilling	Hor	Hor	Hor	Hor	Ver	Ver	Ver	Ver
Density	2320	2320	2360	2380	2330	2350	2370	2390
Diameter of core	100	100	100	100	100	100	100	100
L/D	1.08	1.07	1.07	1.08	1.08	1.08	1.08	1.07
Correction of reinforcement	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Measured strength	30.0	39.5	40.5	43.5	34.5	31.5	42.5	42.5
Correction of L/D ratio (BS 6089)	1.031	1.027	0.945	0.948	0.948	1.031	0.948	1.027
Estimated <i>in situ</i> strength (BS 6089)	30.9	40.6	38.3	41.2	32.7	32.5	40.3	43.6
Mean	37.5							
Standard deviation	4.80							
Estimated <i>in situ</i> characteristic strength	35.9							
Correction of L/D ratio (BS EN 13791)	1.031	1.027	1.027	1.031	1.031	1.031	1.031	1.027
Estimated <i>in situ</i> strength (EN 13791)	30.9	40.6	41.6	44.8	35.6	32.5	43.8	43.6
Minimum <i>in situ</i> strength	30.9							
	39.2							
Mean and Standard deviation	5.44							
Estimated <i>in situ</i> characteristic strength	33.2							



Table 2a: Zone 1 core test results

Sample identification	2	3	4	6	7
Direction of drilling	Hor	Hor	Hor	Ver	Ver
Density	2320	2360	2380	2370	2390
Diameter of core	100	100	100	100	100
L/D	1.07	1.07	1.08	1.08	1.07
Correction of reinforcement	1.00	1.00	1.00	1.00	1.00
Measured strength	39.5	40.5	43.5	42.5	42.5
Correction of L/D ratio (BS 6089)	1.027	0.945	0.948	0.948	1.027
Estimated <i>in situ</i> strength (BS 6089)	40.6	38.3	41.2	40.3	43.6
Mean	40.8				
Standard deviation	1.94				
Estimated <i>in situ</i> characteristic strength	38.6				
Correction of L/D ratio (BS EN 13791)	1.027	1.027	1.031	1.031	1.027
Estimated <i>in situ</i> strength (EN 13791)	40.6	41.6	44.8	43.8	43.6
Minimum <i>in situ</i> strength	40.6				
Mean	42.9				
Standard deviation	1.75				
Estimated <i>in situ</i> characteristic strength	35.9				

Table 2b: Core test results for zone 2

Sample identification	1	5	6
Direction of drilling	Hor	Ver	Hor
Density	2320	2330	2350
Diameter of core	100	100	100
L/D	1.08	1.08	1.08
Correction of reinforcement	1.00	1.00	1.00
Measured strength	30.0	34.5	31.5
Correction of L/D ratio (BS 6089)	1.031	0.948	1.031
Estimated <i>in situ</i> strength (BS 6089)	30.9	32.7	32.5
Mean	32.0		
Standard deviation	0.97		
Estimated <i>in situ</i> characteristic strength	29.8		
Correction of L/D ratio (BS EN 13791)	1.031	1.031	1.031
Estimated <i>in situ</i> strength (EN 13791)	30.9	35.6	32.5
Minimum <i>in situ</i> strength	30.9		
Mean	33.0		
Standard deviation	2.36		
Estimated <i>in situ</i> characteristic strength	26.0		

Table 3a: Hypothesis testing based on BS 6089

Item	Description	Value
1	Characteristic strength	40
2	Standard deviation	3
3	Targeted mean strength	44.9
4	Degree of freedom	7
5	t – score	-4.37
6	Critical value for level of significant of 0.01	-2.988

Table 3b: Hypothesis testing based on EN 13791

Item	Description	Value
1	Characteristic strength	40
2	Standard deviation	3
3	Targeted mean strength	44.9
4	Degree of freedom	7
5	t – score	-2.988
6	Critical value for level of significant of 0.01	-2.988

### 9.0 CONCLUSION

Assessment of the compressive strength of the *in situ* concrete shall be carried out in accordance with the standard specification and great care shall be taken in the interpretation. Various techniques shall be applied to enhance the interpretation of the test results. It was noted that BS EN 13791 gives higher result for vertical drilling

compare to BS 6089 due to the fact that same factor be used for both horizontal and vertical drilling in BS EN 13791. Further guides shall be written for Malaysia scenario in the form of the national annex to EN 13791. ■

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# Senibong Cove - A New Integrated Waterfront Development In Johor Bahru

by *Ir. Ling Ngie Soon, Ir. Pui Syn Kong and Ir. Abdul Halim bin Ali Hassan*

## 1. INTRODUCTION

Senibong Cove is a new integrated high-end waterfront residential-cum-commercial development coming up on the Eastern Corridor of Iskandar Malaysia with 208 acres of land and an estimated gross development value (GDV) of RM1.7 billion. The project is located at the special economic zone in South Johor – fronting the Lunchoo River and the Straits of Johor (see Figure 1). Australian property developer, Walker Group, is spearheading this unique project through a joint venture with Iskandar Waterfront Development Sdn Bhd (landowner).

## 2. ENGINEERING WORKS

### 2.1 Original Conditions

At the time of project commencement, the site was covered almost entirely by fish ponds and low land.

### 2.2 Filling Works

The total fill volume required to raise the ground to about 1.5m above high tide is around 3.3 million cubic metres, mainly imported from adjacent land presently under development. The average fill thickness is around 4m.

A perimeter bund is formed prior to the general filling of land. This will minimise siltation to the surrounding areas, and enable revetment construction to proceed without waiting for the completion of filling works. At areas where revetment will be built later, the bund is covered by geotextile and anchored with rock pieces.

### 2.3 Soil Treatment to Facilitate Early Building Works

Soft layers are common in riverine and estuary conditions, and will settle gradually under the weight of fill. To select a suitable soil treatment method to minimise further settlement, a trial was done, see Figure 2. Due to the presence of sand and silt in the soft layer, it was found that a 1.5m fill surcharge can complete the settlement process in three months. The addition of prefabricated vertical drain did not alter the result. The 1.5m surcharge is being applied over the entire filled land,

except the areas for greens and open space. Settlement plates were installed and monitored.

### 2.4 Waterfront elements

Senibong Cove offers four different natural sets of waterfront environment – the Lunchoo River, the Lunchoo Estuary, the Johor Straits as well as a preserved mangrove swamp along the river, each with its own unique characteristics. Artificially, three additional sets of waterfront are added - a marina, a canal system to facilitate waterfront living to more lots, and sandy beach along the Straits of Johor.

Along the water’s edge in the Phase 1 area, a boardwalk is being built to allow the residents to get close to the water. The boardwalk is built about 1m above high tide.

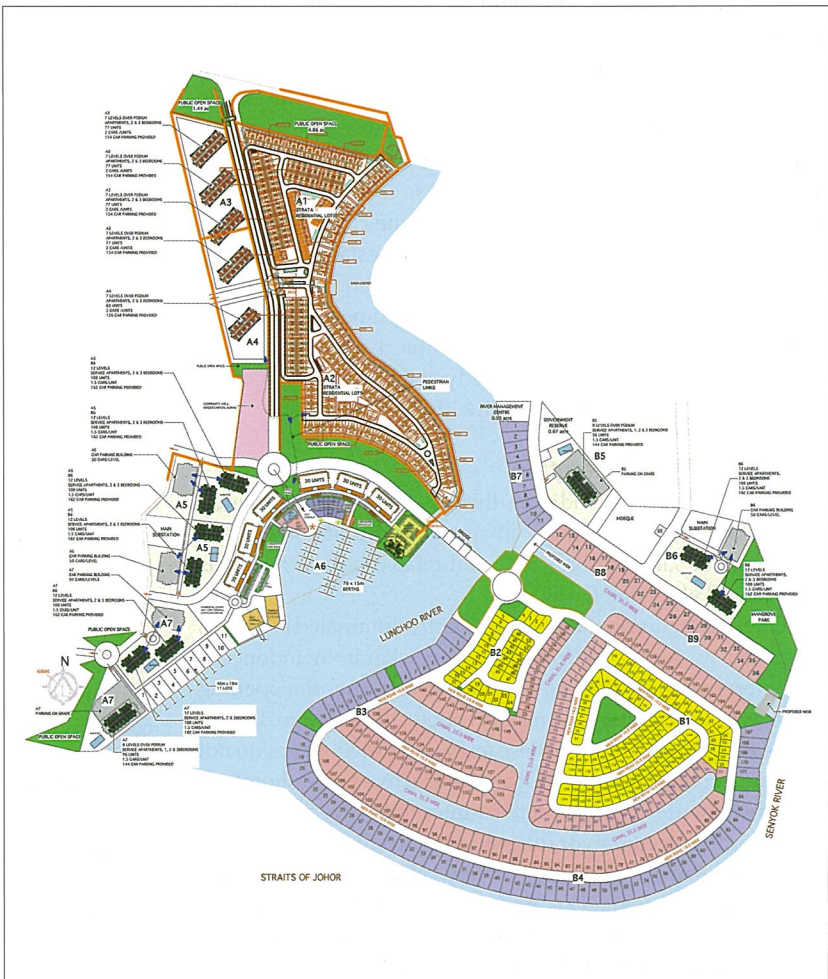


Figure 1: Master Plan of Senibong Cove





Figure 2: Trial soil improvement before the commencement of filling works

### 2.5 Riverine and Drainage Consideration

The original riverbed is very shallow, practically dry with a small gully upstream during low tide. To improve the water quality and to permit boating in the rivers, dredging is being carried out to have 4m of water at the marina during low tide, and generally 2m elsewhere. Normal tidal range at the site is around 3m.

With a catchment area of 7.5km<sup>2</sup>, the drainage requirement for Lunchoo River is about 40m wide including slope according to the Drainage Master Plan for the area. The width of the river at the project site is about 90m, much more than the drainage requirements. According to the National Flood Study, there is no record of flood within the catchment area.

The river reserve at the project site is established along the land lot boundary. The narrowest section is 95m wide. The resulting drainage capacity is five times larger than that actually required as the depth of the river is dredged as explained previously. The water body at the lower reach of the river at the site is further enlarged with a marina basin.

### 2.6 Coastal Consideration

Due to the sheltered condition, there is no continuous sandy beach along the water edges in the Johor Straits, indicating an absence of sandy littoral zone and related beach erosion as experienced along the East Coast.

The wave action in the area is presently dominated by waves generated by ferries to/from the Riau islands in Indonesia. These ferry services to Riau became popular after the opening of the ferry terminal at Stulang Laut about 10 years ago. Unlike waves generated naturally, these ferry-generated waves do not generate a continuous drift but are destructive to the shoreline. Rock revetment is being built to counter this wave action.

According to the hydraulic study, current velocity in the area is in the order of 0.2m/s - a very calm environment with respect to the current. This project will thus have no impact to the environs with respect to the tidal current, especially considering that the project is located within a slightly indented bay between two headlands.

### 2.7 Canal System

A water canal system will be developed under Phase 2 of the development. To retain water in the canals while permitting flushing to maintain the water quality, a system of weirs is introduced as follows, as recommended by a hydraulic simulation:-

- a) Two eastern openings with 15m wide weirs at +0.6m RL for the intake of rising sea water from the east;
- b) Three western openings with 15m wide weirs at +0.6m RL and with 1.2m diameter concrete pipes for the discharge of ebb water to the west during low tide;
- c) Canal water complete turnover is 14 days;
- d) Minimum canal water level is +0.6m RL. Average high water level is +1.2m RL, with highest astronomical tide at +2m RL. Canal average water level variation is thus 0.6m.

### 3. PLANNING CONSIDERATIONS

The river flows continuously and the greenery grows healthily with nature and human living in harmony – the consideration of preserving and enhancing the quality of the environment is the core element in the proposed Senibong Cove, starting from concept development, master planning and implementation.

In total, approximately 25 acres of Senibong Cove have been allocated for greens, parks and canals.

The systematic traffic and smooth circulation, with a dedicated underpass which provides direct access to Senibong Cove via the soon-to-be-completed coastal highway, is also an essential part of sustainable living within Senibong Cove.

Social element components such as a multipurpose hall, public hall, kindergarten, river management centre and marina facilities will strengthen the relationship between man and man, as well as between man and nature within Senibong Cove.

Incorporation of green technologies such as the harvesting of rainwater, minimisation of waste, management of surface run off, utilisation of energy saving methods and deployment of solar energy in public areas, are part of the challenges that have been taken into consideration in the development concept.

A permanent river management centre will be established within Senibong Cove, to be operated by the developer with input from local universities and the authorities. This centre is the first of its kind in Iskandar Malaysia, perhaps even in the country, with respect to private development along waterfront. The centre will be equipped with state-of-the-art technology to facilitate river cleaning and improvement, enforcement, educating the public, as well as the testing of new methods or concepts on river management.

### 4. CONCLUSION

The effort by the developer to promote a sustainable and conducive living environment in Senibong Cove is being achieved by implementing the concept of strengthening key elements such as water, green, parks, together with the incorporation of green technologies, sound traffic management, good environmental management practice, social participation as well as promotion of a healthy living environment. ■



## Evening Talk on “Geotechnical Engineering in the Middle East – A Malaysian Perspective”

by *Ir. Dr Chan Sin Fatt*

**THE** talk was organised by the Geotechnical Engineering Technical Division (GETD) of the IEM on 28 May 2009. The invited speaker, Ir. Tan Ek Khai, recently completed a two and a half year posting in the Middle East. The talk, which was attended by 65 people, was held at the Tan Sri Prof. Chin Fung Kee Auditorium at the new Wisma IEM building. The session was chaired by Ir. Dr Chan Sin Fatt.

The talk was previously delivered as a paper at the 6th Asian Young Geotechnical Engineers’ Conference in Bangalore, India, in December 2008 and has won an Appreciation Certificate. The author started the talk by thanking the IEM GETD Committee for inviting him. The effort and work of the co-authors of the paper (and colleagues of the speaker), Ir. Lee Seng Hoor and Ir. Dr Ooi Lean Hock, were also acknowledged.

The Middle East has experienced a major boom in its construction industry in recent years. The geotechnical engineering practice in this region is similar to the Malaysian practice where a laissez faire approach applies. An open competitive market has resulted in the construction industry with international participation in design and construction.

Ir. Tan described some of the engineering challenges in the Middle East in design and construction and how these were overcome. These were discussed as case studies relating to (1) airfield pavement subgrade preparation and performance on reclaimed fill, (2) lateral testing of offshore piles, (3) contamination of pavement aggregates, and (4) managing of geotechnical risks in dewatering an excavation by the sea.

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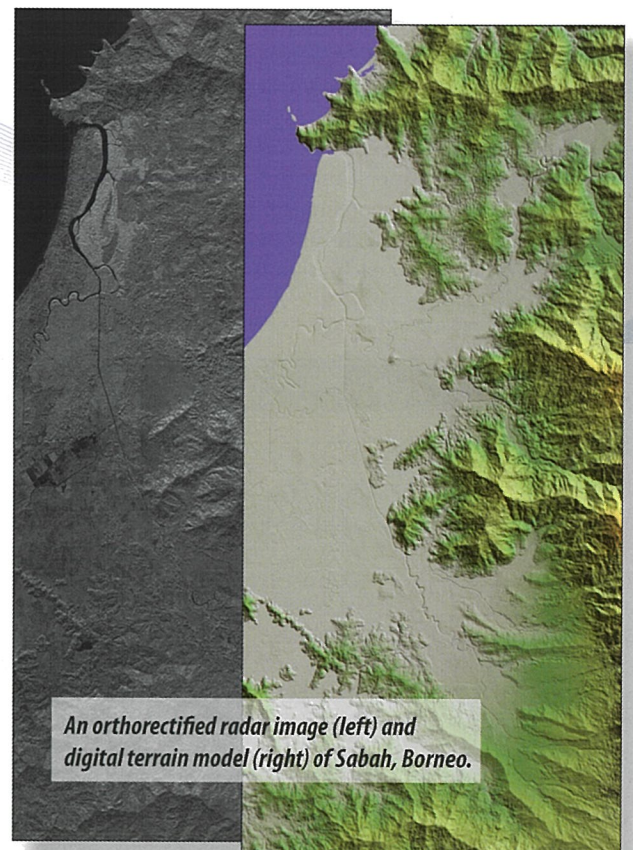
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*An orthorectified radar image (left) and digital terrain model (right) of Sabah, Borneo.*





(Left) Ir. Dr Chan introducing the speaker. (Right) Engr. Tan delivering his talk

Findings and comparisons to other practices, in particular that of Malaysia, were made where relevant. To practise in a competitive environment such as the Middle East requires an engineer to have good understanding of not only the fundamentals of engineering design and construction, but also geotechnical investigations and testing.

These were highlighted in the case studies presented in the talk. It was also commented by the speaker that structural engineering problems are typically more difficult in the Middle East when compared to Malaysia due to the extreme climatic and aggressive environmental conditions. More attention is required to address these structural durability and construction problems, when compared to geotechnical engineering.

Recent techniques applied in Malaysia concerning geotechnical risk assessment were found to be useful in assessing geotechnical problems in the context of engineering, cost and time, especially to project stakeholders. The successful completion of some of the projects by Malaysian practitioners in the Middle East is a demonstration of effective geotechnical risk management.

Selected discussions at the end of the talk are included below for each case study presented.

### AIRFIELD PAVEMENT SUBGRADE

A query was raised by the Chairman on the 'ground treatment' carried out for the reclaimed fill. The speaker clarified that the scope of the reclamation was by others. The contractor preparing the reclamation utilised a 'high energy compactor' for the preparation of the reclamation platform above water. Beneath critical structures such as the airfield, the fill beneath water was carried out using rockfill. The 'high energy compactor' was found to be suitable for earthworks with calcareous sand used in the reclamation. Selection of target density for the earthwork is, however, important when working with the calcareous sand which is susceptible to crushing of particles.

### OFFSHORE LATERAL PILE LOAD TEST

A query was raised on how the lateral pile load test was carried out for the two pile types presented (0.7m and 1.4m diameters) with different free-head cantilever above the seabed when it was carried out onshore instead of offshore.

It was clarified that a free-head cantilever condition was provided with the ground surrounding the piles being excavated to the rock-head and sleeved with a steel casing to allow for a fixed free-head cantilever of the piles. An equivalent test load of the pile using the conservation of moment principle was used in the pile verification. Some photos of how the piles were sleeved were presented.

### GEOTECHNICAL RISK MITIGATION IN DEWATERING BY THE SEA

In view of the very low rainfall in the Middle East region, a member of the audience queried the necessity of the large detention ponds, which has resulted in the need of a large excavation – up to 80m x 80m.

Ir. Tan clarified that the design concept of the drainage system (*i.e.* hydraulically driven by gravity) was one of the mandatory requirement of the contract. Considering this requirement, drain configuration and platform level, the discharge point of the drainage system would be below the mean sea level. Thus, a detention pond is required to contain the drain. ■

## Engineering Jokes from the Internet

### New Lyrics to Beatles song - "YESTERDAY"

Yesterday,  
All those backups seemed a waste of pay.  
Now my database has gone away.  
Oh I believe in yesterday.

Suddenly,  
There's not half the files there used to be.  
And there's a milestone hanging over me.  
The system crashed, so suddenly.

I pushed something wrong,  
What it was, I could not say.

Now all my data's gone,  
And I long for yesterday-ay-ay-ay.

Yesterday,  
The need for back-ups seemed so far away.  
I knew my data was all here to stay,  
Now I believe in yesterday.

from <http://www.inflection-point.com/jokes.php>



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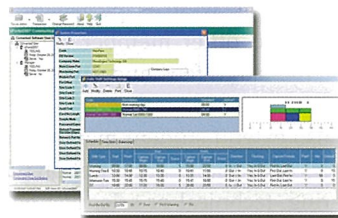
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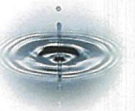
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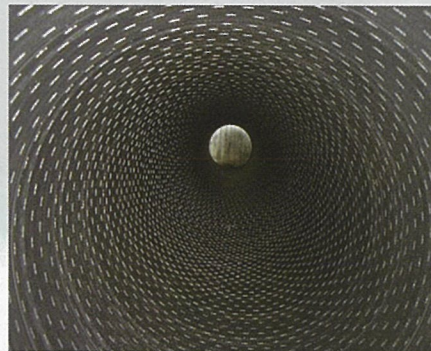
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HDPE Pile Jacket for Jetty Pile Protection Work



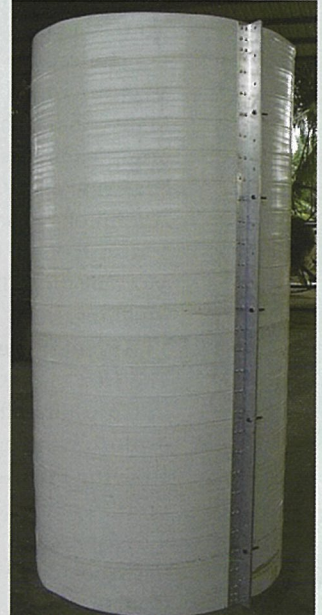
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## The Maldives and Its Underwater World

by *Ir. Chin Mee Poon*

**PEOPLE** all over the world are attracted to the Maldives for its beaches and underwater world.

The Republic of Maldives is made up of 1190 islands in 26 atolls spread over 820km north to south and 120km east to west, north of the equator. It is about 700km southwest of Sri Lanka. The number of islands in the republic actually depends on the tide and the definition of an island.

The capital of the Maldives, Male, occupies an entire island at the southern edge of the North Male Atoll. The international airport of Male occupies another island which is about a 5-minute boat ride away. Only 200 islands are inhabited. A total of 44 islands are resort islands, each with a resort on it but with no human settlement. Most of the 270,000 people of the Maldives are Muslims.

I went to the Maldives for scuba diving twice. The first visit was in June 2002 when we stayed in Club Rinnalhi Resort. While the divers were exploring the underwater world, the wives were enjoying themselves on the beaches and soaking up the ambience of the resort.

My second visit, in December 2009, was a live-aboard diving trip strictly for divers only. Over six days, we dived at various dive sites with the hope of catching sight of two of all divers' Big Four – the manta ray and the whale shark. The other members of the Big Four are the hammerhead shark and the mola-mola (sun fish). We had timed our visit to coincide with the feeding season of manta rays and whale sharks in this area.

As fate would always have it, some of us were luckier than the others and saw both. I was one of the not-so-lucky ones. I did not manage to see any whale shark. I only had a fleeting glimpse of a manta ray during one of the dives. However, I had a memorable encounter with three juvenile manta rays busy feeding on the sea surface when I was going ashore in a dinghy from our dive boat.

On our last evening onboard our dive boat, all of us had a whale of a time enjoying a spectacular acrobatic show put up by three manta rays. Our boat was anchored, the two spotlights at the stern were shining directly on the sea and a high concentration of planktons was attracted by the light.



The planktons in turn attracted the three manta rays which happened to be in that area.

For more than two hours, the three manta rays took turns to feed on the planktons, circling and somersaulting again and again with their cephalic fins arched like a scoop. I could even see their gills clearly through their wide-opened mouths. We thoroughly enjoyed the show from the deck. We did not even have to jump into the water. Wow!

I left the Maldives with one regret though – after more than 20 years of scuba diving, I still have not met my first whale shark! ■



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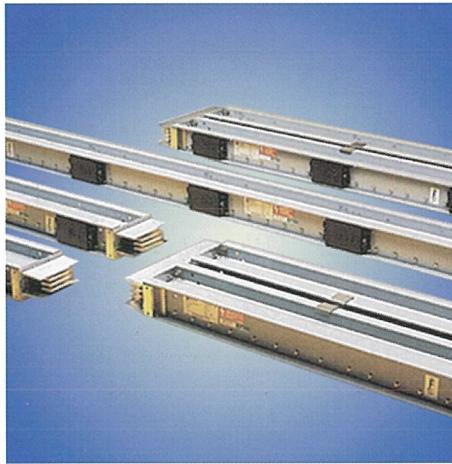
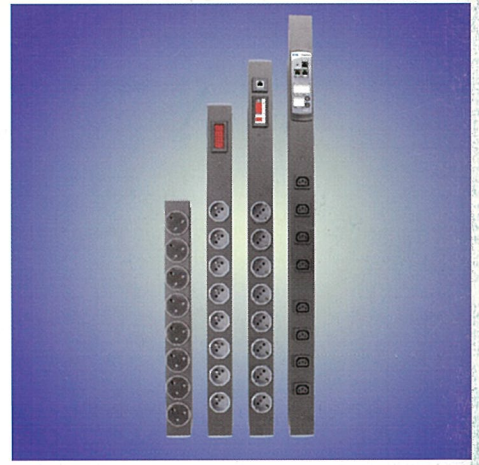
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